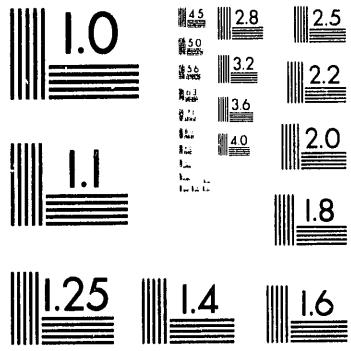
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ECOLOGICAL EVALUATION OF PROPOSED DREDGED MATERIAL FROM THE JOHN F. BALDWIN SHIP CHANNEL (PHASE III-BIOLOGICAL TESTING)

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SUMMARY

The John F. Baldwin Ship Channel is a 28-mile-long portion of the San Francisco Bay to Stockton Ship Channel, the primary shipping lane through San Francisco Bay and Delta. The San Francisco District of the U. S. Army Corps of Engineers (USACE) is responsible for construction of the John F. Baldwin Ship Channel, which is authorized to be deepened to a project depth of -45 ft relative to mean lower low water (MLLW). Approximately 8.5 million cubic yards (mcy) of sediment will be removed from the channel to reach this project depth.

The USACE requested Battelle/Marine Sciences Laboratory (MSL) to conduct testing for ocean disposal under the guidelines in Evaluation of Dredged Material Proposed for Ocean Disposal — Testing Manual (EPA/USACE 1991). This testing manual contains a tiered evaluation approach developed specifically for ocean disposal of dredged material at a selected site. In this study, John F. Baldwin Ship Channel sediments were evaluated under the Tier III (biological) testing guidance, which is considered to be highly stringent and protective of the environment. The Tier III guidance for ocean disposal testing requires tests of water column effects, (following dredged material disposal), deposited sediment toxicity, and bioaccumulation of contaminants from deposited sediment (dredged material).

The MSL collected sediment core samples to -47 ft MLLW from three reaches of the John F. Baldwin Ship Channel: West Richmond, Pinole Shoal, and Carquinez Strait. Samples were composited based on previous sediment characterization data, so that seven composites represented the entire study area (COMPs WR-1, WR-2, PS-1, PS-2, PS-3, PS-4, and CS-1). Physical and chemical characteristics were analyzed in sediments from all individual sampling sites as well as the seven composites. Water column [suspended-particulate-phase (SPP)] tests of the composites were conducted with the mysid *Holmesimysis sculpta*, juveniles of the sanddab *Citharichthys stigmaeus*, and larvae of the sand dollar *Dendraster excentricus*. Solid-phase toxicity tests of the composites were conducted with the amphipod *Rhepoxynius abronius*, the clam *Macoma nasuta*, and the polychaete worm *Nephtys caecoides*. Bioaccumulation of contaminants was measured in tissues of *M. nasuta* and *N. caecoides*.

In the absence of a designated disposal site at the time of the study, reference sediments representing two potential disposal sites, one deep ocean site and one in-bay site, were tested concurrently. While the study was in progress, the U.S. Environmental Protection Agency released a Draft Environmental Impact Statement addressing a deep water disposal site

off San Francisco. Therefore, the results and discussion in this report are directed toward comparison of John F. Baldwin Ship Channel data with the ocean (Deep Off-Shelf) reference site. Data that are compared include biological responses to sediment exposure such as survival and contaminant bioaccumulation, as well as sediment physical, geological, and chemical characteristics.

Water column tests showed there was no acute toxicity to *H. sculpta* and *C. stigmaeus*, but that the 100% SPP of four composites was acutely toxic to *D. excentricus* larvae. Despite those instances of significant toxicity, no LC50s could be calculated because mortality did not exceed 50% relative to the control. Normal development (as opposed to survival) of echinoderm larvae was significantly decreased by exposure to COMPs PS-1, PS-2, and PS-4 from Pinole Shoal.

The solid-phase tests of John F. Baldwin Ship Channel sediments showed no acute toxicity to *M. nasuta*, *N. caecoides*, or *R. abronius* relative to the Deep Off-Shelf reference site. Concentrations of contaminants in tissues did not exceed Food and Drug Administration (FDA) action limits for the nine measured compounds for which action limits are established. Statistically significant bioaccumulation of the pesticide 4,4'-DDD was measured in both *M. nasuta* and *N. caecoides* exposed to COMPs PS-2 and PS-4 relative to the Deep Off-Shelf reference site. Although 4,4'-DDD was elevated in tissues by up to seven times the reference concentration, the highest mean tissue concentration of 4,4'-DDD was very low: 15.8 µg/kg dry weight (approximately 1.7 µg/kg wet weight), lower than the 2 µg/kg wet weight target detection limit for the program. Four PAH compounds were bioaccumulated, but also at very low concentrations (highest mean tissue concentration of 24.9 µg/kg dry weight or about 2.5 µg/kg wet weight). Significant accumulation above detection limits and at a magnitude greater than five times the Deep Off-Shelf reference were observed for tributyltin in *M. nasuta* exposed to COMP PS-3. Tissue concentrations were 88.7 and 11.4 µg/kg dry weight for COMPs PS-3 and R-OS, respectively. There is no FDA action limit for tributyltin.

Based on the Tier III evaluation of the results of this study, proposed dredged material from John F. Baldwin Ship Channel meets the deposited sediment toxicity (benthic bioassay) criteria for ocean disposal, but some water column and bioaccumulation effects were observed. Computer modeling is required to determine if concentrations of suspended and dissolved material in the water column would exceed the LPC of 0.1% at the edge of the mixing zone, allowing for initial mixing. Careful examination of bioaccumulation data by USACE will complete the evaluation of any impacts of ocean disposal of dredged material from the John F. Baldwin Ship Channel.

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1.0 INTRODUCTION

The John F. Baldwin Ship Channel is the San Francisco Bay portion of the San Francisco Bay to Stockton Ship Channel (Figure 1.1). The San Francisco District of the U. S. Army Corps of Engineers (USACE) is responsible for construction of the John F. Baldwin Ship Channel, authorized by Congress in the Rivers and Harbors Act of 1965 (Public Law 89-298). The channel is approximately 28 miles long, and is authorized to be deepened to a project depth of -45 ft relative to mean lower low water (MLLW). To complete this phase of construction, an estimated total of 8 million cubic yards (mcy) of sediment will be removed from three reaches of the John F. Baldwin Ship Channel: 0.8 mcy from West Richmond, 7 mcy from Pinole Shoal Channel, and 0.1 mcy from Carquinez Strait (Figure 1.1).

Options for disposal of the material to be dredged from the John F. Baldwin Ship Channel include aquatic disposal either within San Francisco Bay or at an offshore ocean disposal site, marsh or wetland creation, confined disposal, or uplands disposal. In 1989, at the request of USACE, Battelle/Marine Sciences Laboratory (MSL)[a] conducted an extensive physical and chemical characterization of John F. Baldwin Ship Channel sediments (Word and Kohn 1990). With that information, USACE evaluated disposal alternatives and the necessity of conducting biological testing. To further aid in their evaluation, USACE requested a similar characterization of sediments from the West Richmond area, adjacent to the existing channel (Phase II, Word et al. 1991). Based on the information from these two and other previous studies, USACE requested MSL to conduct testing for ocean disposal under the guidelines in *Evaluation of Dredged Material Proposed for Ocean Disposal — Testing Manual* (USACE/EPA 1991). This testing manual, also referred to as the 1991 Implementation Manual, contains a tiered evaluation approach developed specifically for ocean disposal of dredged material at a selected site. John F. Baldwin Ship Channel sediments were evaluated under the Tier III (biological) testing guidance, which is considered to be highly stringent and protective of the environment.

The Tier III guidance for ocean disposal testing requires tests of water column effects, (following dredged material disposal), deposited sediment toxicity, and bioaccumulation of contaminants from deposited sediment (dredged material). To meet these requirements, MSL

(a) The Battelle/Marine Sciences Laboratory is part of the Pacific Northwest Laboratory, which is operated for the U.S. Department of Energy by Battelle Memorial Institute.

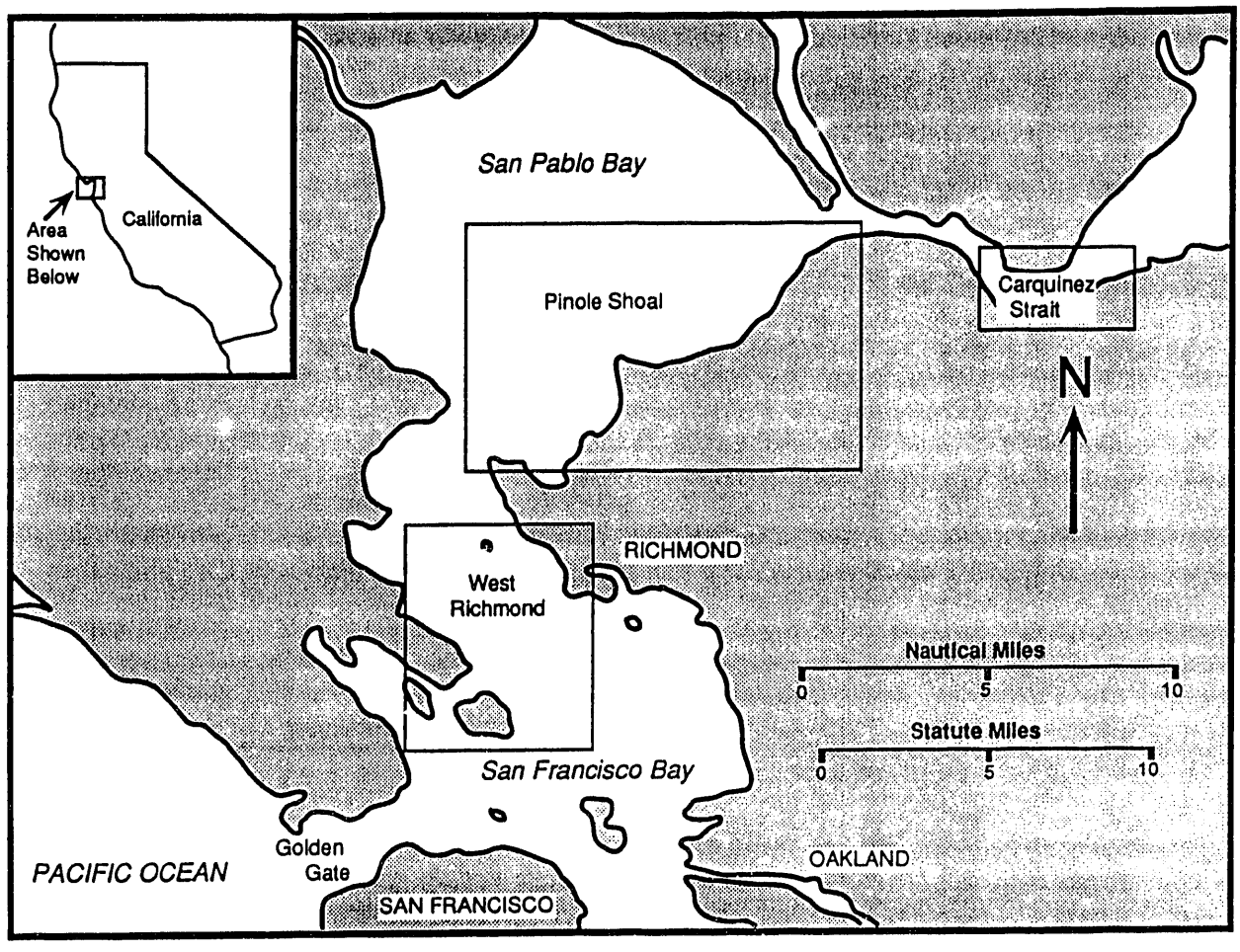


FIGURE 1.1. John F. Baldwin Ship Channel Study Area

conducted suspended-particulate-phase (SPP) toxicity tests, solid-phase toxicity tests, and bioaccumulation testing on potential dredged material from John F. Baldwin Ship Channel. Physical, geological, and chemical characterizations of sediment to support toxicity and bioaccumulation results were also conducted. In the absence of a designated disposal site at the time of the study, two reference sites representing potential disposal sites (Deep Off-Shelf reference and Bay Farm Borrow Area reference) were tested concurrently. The biological responses to the test sediments from the channel were compared to those of the reference sediments, as were the physical, geological, and chemical characteristics.

The objectives of the John F. Baldwin Ship Channel Program (Phase III: Biological Testing) were to collect and evaluate sediments that would be removed during channel con-

struction and improvements. Channel sediments were represented by core samples collected from a number of sites in the three reaches of the channel to a project depth of -47 ft MLLW (-45 ft MLLW plus 2 ft overdepth). Each reach was represented by one or more composite samples for biological testing, with each composite made up of samples from several sites. The estimated volume of sediment to be removed from each reach was considered in planning the number of sampling sites. Many previously sampled stations were included in this study, with new stations added to fill gaps and better represent the large volume of dredged material. The compositing scheme was based on the sediment characterization data from previous studies, which was used to group stations based on sediment characteristics and contaminant loads.

The MSL conducted geological analysis of core samples, chemical analysis of core and composite samples, SPP toxicity, solid-phase toxicity, and bioaccumulation tests. The geological description and chemical analyses provide a characterization of the dredged sediment. The SPP toxicity tests are designed to test for the effects of dissolved contaminants plus those associated with the suspended particulates in the water column, after allowing for initial mixing of the dredged material. Solid-phase or benthic toxicity and bioaccumulation tests examine the effects of the dredged sediment itself on sensitive benthic organisms, relative to a reference sediment that represents a possible disposal site.

Three species of marine invertebrate were exposed in solid-phase acute toxicity tests: the detrital-feeding bentnose clam *Macoma nasuta*, the deposit-feeding polychaete *Nephtys caecoides*, and the burrowing amphipod *Rhepoxynius abronius*. *M. nasuta* and *N. caecoides* were also exposed in a solid-phase bioaccumulation test. The species exposed in SPP toxicity tests were the crustacean *Holmesimysis sculpta*, planktonic larvae of the sand dollar *Dendraster excentricus*, and juvenile flatfish *Citharichthys stigmaeus* (speckled sanddab). These species meet the test-species characteristics listed in the 1991 Implementation Manual, and have been successfully used in similar testing programs conducted by MSL.

In December 1992, the U.S. Environmental Protection Agency (EPA) released a Draft Environmental Impact Statement (DEIS) for San Francisco Bay Deep Water Dredged Material Disposal Site Designation. The DEIS described several offshore study areas and named three alternative ocean disposal sites. All three of the alternative sites are located on the continental slope (west of the continental shelf), approximately 50 nautical miles from the Golden Gate. Therefore, the focus of this report is comparison of John F. Baldwin Ship Channel sediments with the Deep Off-Shelf reference, as this reference site best represents the potential disposal

with the Deep Off-Shelf reference, as this reference site best represents the potential disposal site. The Tier III evaluations of sediment characteristics, toxicity, and bioaccumulation provide the data required to address potential ecological effects of open-water disposal of dredged material.

In addition to this introduction, this report contains a Materials and Methods section (Section 2.0), Results (Section 3.0), Discussion (Section 4.0), and References (Section 5.0). Appendixes A through K provide supporting data.

2.0 MATERIALS AND METHODS

2.1 SEDIMENT SAMPLING

Sediment core samples were collected from 37 stations in the John F. Baldwin Ship Channel to -47 ft MLLW (45 ft plus 2 ft overdepth). Grab or pipe dredge samples of sediment were collected from two reference areas and three control sediment stations. Specific locations of sediment sampling stations are presented with the sampling results in Section 3.1. Core samples were taken for geological description, biological testing, and sediment chemistry analyses. Reference and control samples were taken for biological testing and sediment chemistry analyses.

2.1.1 John F. Baldwin Ship Channel Core Samples

Sediment core samples from the John F. Baldwin Ship Channel were collected to -47 ft MLLW using a 12-in. vibratory-hammer split corer and a 4-in. vibratory-hammer corer. Both samplers were designed by MSL and Manson Construction. Navigation support was provided by Towill, Inc., of Concord, California. Miniranger and laser-range systems were used to locate the planned sampling site. Towill provided corrected water depths at each station by measuring the actual depth with a recording fathometer (DE719-E), measuring the water surface elevation, and calculating the difference between the water surface elevation and 0 ft MLLW.

The 12-in. and 4-in. core samples were collected in a similar manner. Both samplers were deployed from the derrick barge *Hagar*. The core sampler was attached to an electric vibratory hammer, both of which were suspended by the crane on the derrick barge (Figure 2.1). When the coring apparatus was directly above the sampling site, the surveyors confirmed the location before the sampling gear was lowered through the water. When the end of the sampler reached the sediment surface, the vibratory hammer was switched on, unless the sediment was so soft that the corer penetrated because of its mass. Vibrating continued until the sampler penetrated beyond project depth indicated by the water surface level relative to marks on the outside of the core barrel. The coring apparatus was then pulled from the sediment, detached from the vibratory hammer, and lowered onto the barge deck.

The 12-in. corer was used to collect the large volume of sediment needed for biological testing. One core was collected per site. As each core was brought on board the barge plat-

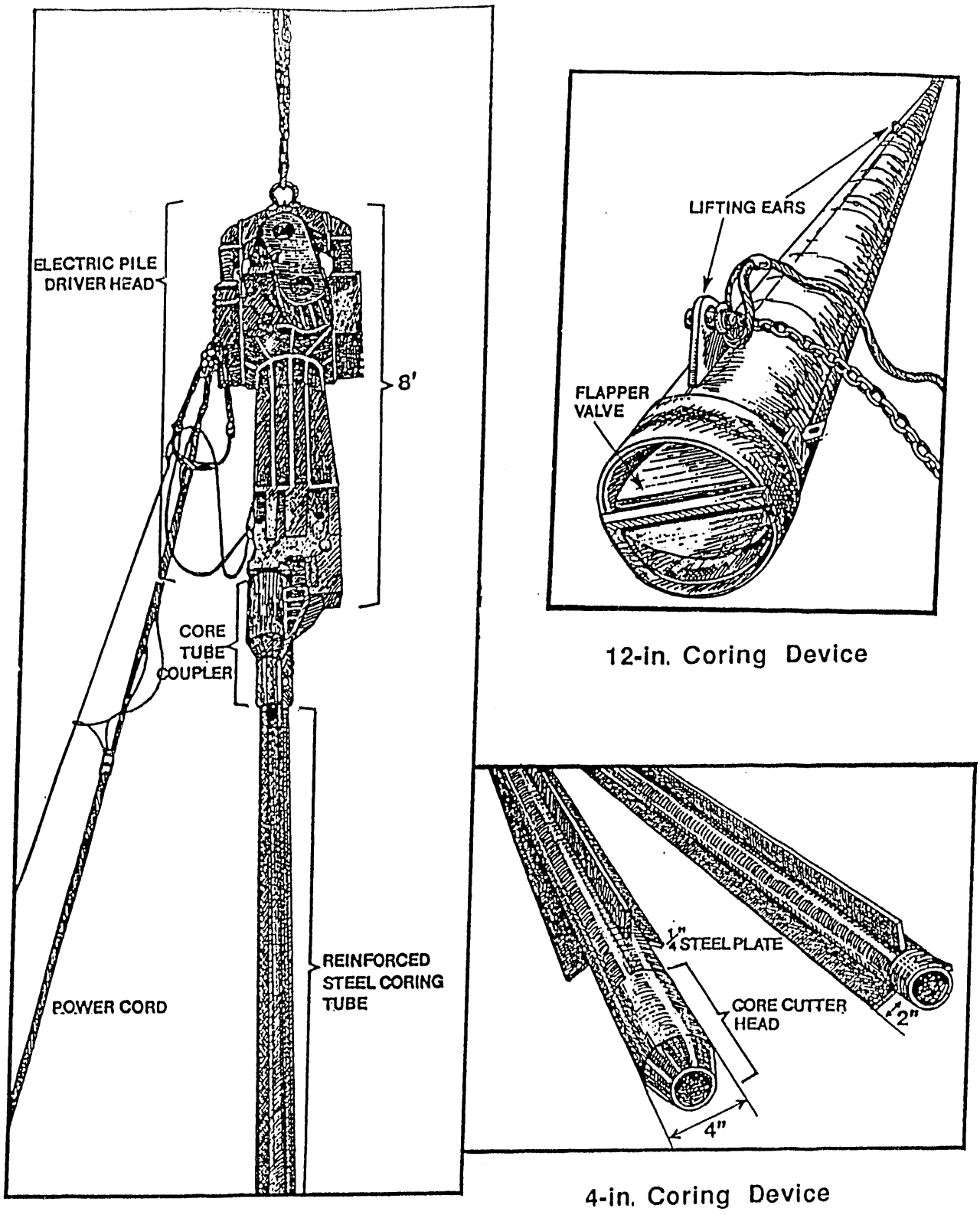


FIGURE 2.1. Components of the 4-in. and 12-in. Vibratory-Hammer Coring Devices

form, the hinged door of the core barrel was opened and the length of cored sediment was measured from the upper surface of the sample to ensure that appropriate depth was reached. If the required core length was not collected, the barrel was emptied and another core was taken. If the required core length was collected, the sediment was marked at -47 ft MLLW, and the fraction of core length relative to the volume required for the appropriate composite was determined. That portion of sediment was transferred, using a stainless-steel spade, from the 12-in. core barrel to an epoxy-coated 5-gal container. Each sample container was labeled with the project name, station, composite designation, and sampling date. The containers were sealed and kept cool (~4°C) in a freezer on board the sampling vessel until loaded into a refrigerated truck at the end of the sampling day.

Sediment was also collected to -47 ft MLLW using the 4-in.-diameter vibratory-hammer core sampler. The 4-in. cores were collected and stored in noncontaminating Lexan polycarbonate tubes to maintain the stratigraphic integrity of the sediment for geological analyses and to provide sediment for the chemical characterization from known depths at individual sites. One core was collected per site. The core barrel was lined with a 3.125-in. (inner diameter) clear Lexan core liner that had been steam cleaned. When each core was brought on board, the liner was pulled from the barrel, and the sediment core length was measured from the upper surface of the sample to determine if appropriate depth was reached. If not, the liner was replaced and another sample taken. If the core was long enough, it was capped, sealed, labeled, and cut into shorter sections, if necessary, to fit in the freezer. Each core label included an arrow pointing to the top of the core, the station designation, core section indicator (e.g., Section 1 of 2 and Section 2 of 2), length interval from the mudline (e.g., 0 to 3 ft), and sampling date. When each 4-in. core was labeled and sealed, it was kept cool (~4°C) in a freezer on board the sampling vessel until it was transferred to a refrigerated truck.

Core sampling records consisted of the station name, date, type of core (12-in. or 4-in.), replicate number, uncorrected water depth, tide height, corrected depth, required core length, sampling time, total core collected, and comments. Sediment samples were stored in a refrigerated van at the staging area until all samples were collected. An inventory of samples was maintained on chain-of-custody forms as samples were loaded onto the truck. When sampling was completed, the inventory was confirmed and the custody forms were signed by the field leader, who kept one copy and sealed the others in a water resistent container with the samples. The refrigerated truck then transported the samples to the MSL in Sequim, Washington, where they were stored at 4°C±2°C.

2.1.2 Reference and Control Sediment Samples

Sediment samples from one reference site in San Francisco Bay and one reference site offshore were collected with a pipe dredge deployed from the FV Cobra, a charter boat owned and operated by Bob Smith Sportfishing. The pipe dredge is a 12-in.-diameter cylinder, approximately 5 ft long, that is open on one end and closed on the other so that it can retrieve up to 25 gal of sediment. Sampling locations were determined by a global positioning system (GPS) aboard the vessel. LORAN C and variable fix and range radar navigation systems were available for backup. The vessel navigation systems were verified at known fixed locations, such as the Golden Gate channel pilot buoy, whenever possible. Reference sampling records were maintained in a log book, and consisted of station position, date, time, replicate, water depth, sediment type, and comments. All reference samples were kept cool in labeled coolers on board the sampling vessel until they were stored at 4°C±2°C in a refrigerated van.

The control sediment sampling sites were Sequim Bay, Washington; West Beach, Whidbey Island, Washington; and Dillon Beach/Tomales Bay, California. Experimental control sediment from Sequim Bay, Washington, was collected with a modified Van Veen grab sampler (0.1 m^2) deployed from an MSL research vessel. Control sediment from West Beach (*R. abronius* native control) and Dillon Beach (*N. caecoides* native control) was collected at the same time and location as test organisms were collected. West Beach sediment was collected with a small, MSL-designed, anchor-dredge sampler that also obtained sufficient quantities of the organisms for test purposes. The dredge was deployed from MSL's 17-ft Boston Whaler in approximately 15 ft of water. The West Beach sampling location was determined by reference to known shoreline features. Dillon Beach control sediment was collected by Brezina and Associates, using a shovel, at the same time *N. caecoides* were collected. The Dillon Beach sediment was shipped overnight to MSL, where it was stored at 4°C±2°C.

2.2 SEDIMENT SAMPLE PREPARATION

Sediment sample preparation involved all steps in the laboratory between delivery of the samples to MSL and the preparation of samples for chemical and/or biological testing. Sample preparation was completed within the 14-day holding limit between the sampling date and toxicity test initiation. The following sections describe equipment preparation, geologic descriptions of core samples, homogenizing solid-phase samples, and SPP sample preparation.

2.2.1 Laboratory Glassware and Equipment Preparation

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 (including test containers, aquaria, and sediment transfer dishes) was washed with warm, soapy water, rinsed five times with deionized water, then soaked in a 5% reagent grade nitric acid bath for a minimum of 4 h. After soaking, glassware was rinsed with deionized water five times and allowed to dry. Polyvinyl chloride (PVC), Nalgene, and Teflon tools were also washed and soaked in acid baths in the same manner as for glassware.

Stainless steel bowls, spoons, spatulas, and other utensils were washed with warm, soapy water, rinsed five times with deionized water, and allowed to air dry. They were then rinsed with methylene chloride under a fume hood, and the methylene chloride was allowed to evaporate under the hood.

Neoprene stoppers and polyethylene sheets or other porous materials were washed with warm, soapy water and rinsed five times 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 mixer used to mix sediment and epoxy-coated boards used to hold cores for geologic descriptions were washed with a mild soap solution and thoroughly rinsed with tap water followed by deionized water.

2.2.2 Geologic Description of Cores

A geologic characterization of each John F. Baldwin Ship Channel sampling site was conducted by a geologist. The physical properties of each 4-in. core collected and stored in a Lexan core tube were described. All core sections from one station were removed from storage and the Lexan tube was cut longitudinally with a circular saw. A stainless steel linoleum knife was used to split the Lexan tube open to expose the core's sediment stratigraphy. The geologist measured and described the core from top to bottom, recording data on a core data log. The geologic characterization protocol (Appendix A) was consistent with the American Society for Testing and Materials (ASTM) Method D2488-84 (ASTM 1984).

2.2.3 Preparation of Solid-Phase Samples

Solid phase, also called bulk sediment or whole sediment, refers to the sediment itself, as opposed to suspended or dissolved phases. In biological tests, the solid phase of sediments

represents 1) dredged material once it has settled at an aquatic disposal site (test sediment), 2) the existing environment of a disposal site without dredged material (reference sediment), or 3) the environment of a benthic test organism (control sediment). Solid-phase preparation also applies to samples for sediment chemistry. All solid-phase samples were thoroughly homogenized until constant color and texture were achieved before use in biological tests or chemical analysis.

Sediment samples for chemistry only, representing each individual sampling site, were prepared from the segment of the 4-in. cores consisting of the mudline depth to -47 ft MLLW. These samples were homogenized in stainless steel bowls using stainless steel spoons or spatulas. Material from the 12-in. core collected at each contributing station was combined into a composite for biological testing. Sediments making up the composite were transferred from the 5-gal pails into a mixer coated with a special epoxy paint (TNEMEC Epoxy converter 83-83B). The mixer was able to homogenize the large volume of sediment necessary for biological testing and SPP preparation. Sediment and composite samples were mixed until uniform consistency and color were visible throughout the sediment in the bowl or mixer. Minimal amounts of 0.45-µm-filtered seawater were added as needed to achieve a homogeneous consistency. After mixing, sample aliquots for chemical analyses were placed in cleaned and labeled containers appropriate for the parameters to be measured. If solid-phase samples were not used immediately for testing or SPP preparation, they were returned to the labeled, epoxy-coated metal pails for storage at 4°C±2°C. All sediments were homogenized, subsampled for chemistry, and used for testing within a 14-day holding period.

The reference and control sediments were stored in ice chests at 4°C±2°C until sieving. The sediments were placed on 1-mm stainless steel mesh and press-sieved (dry) into clean epoxy-coated tubs or pails. Any organisms collected on the sieves were discarded, and any large particles were returned to the sieved sediment. The sieved sediment was then transferred to an epoxy-coated mixer for homogenizing. Homogenized reference and control sediments were stored in clean coolers or epoxy-coated pails at 4°C±2°C until needed for testing. Between sieving of reference sediments, all equipment was thoroughly rinsed with 0.45-µm-filtered seawater to avoid potential cross-contamination between samples.

2.2.4 Preparation of Suspended-Particulate-Phase Samples

The SPP of sediment samples was used to evaluate potential water column effects of open-water dredged material disposal. The SPP is the liquid supernatant that remains after

mixing sediment with seawater and allowing heavier particles to settle out. Because the sample preparation does not involve filtration, this phase contains suspended particles as well as dissolved constituents. The SPP tests evaluate effects caused by both the physical presence of the suspended particles and the chemical toxicity of contaminants associated with the particles or dissolved fractions. The process is intended to approximate exposure conditions created as a result of materials being discharged through the water column during dredge-disposal operations.

The first step of SPP preparation was to create 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. 0.45-µm-filtered seawater was added to the 200-mL mark, then homogenized sediment was added until the water was displaced to the 400-mL mark. The jar was filled to 1 L with filtered seawater. Twelve 1-L jars of sediment and water were placed on a shaker table and agitated for 30 min at a rate of 120 to 150 cycles/min. After shaking, the slurry was poured into 500-mL Teflon containers with tightly fitting lids. These containers were placed in a centrifuge and spun for 10 to 15 min at approximately 1750 rpm. The 10-min centrifugation was necessary to ensure that test organisms would be visible at the first observation after exposure to SPP test treatments. After centrifugation, the supernatant was poured into clean, labeled, 10-gal aquaria and used in the SPP tests as soon as possible (within 24 h). If SPP was not used immediately, the aquaria were covered with clean sheet Teflon and stored at 4°C±2°C. The Teflon jars were rinsed after each use and the above process was continued until an adequate volume (approximately 115 L) of SPP was produced. Between preparation of SPP from different sediment treatments, all glass and Teflon containers were appropriately cleaned according to procedures described in Section 2.2.1.

2.3 SEDIMENT AND TISSUE CHEMISTRY

All sediment samples were analyzed for conventional sediment measurements (grain size, total organic carbon, total volatile solids, percent solids, oil and grease, and total petroleum hydrocarbons), polynuclear aromatic hydrocarbons (PAH), metals, and butyltins. Sediment composites and reference sediments for biological testing were also analyzed for chlorinated pesticides and polychlorinated biphenyls (PCB). All *N. caecoides* and *M. nasuta* tissue samples were analyzed for PAHs, metals, and butyltins. Composite samples representing *N. caecoides* and *M. nasuta* tissues exposed to each sediment treatment, including the reference treatments,

were analyzed for chlorinated pesticides and PCBs. Those compounds were detected in tissue composites; therefore, each tissue replicate was analyzed. Only the replicate pesticide and PCB data are reported here.

The following sections briefly describe the methods used for analysis of sediments and tissues for the required physical and chemical parameters. Analyses followed established EPA procedures where applicable. Quality control samples included method blanks, matrix spike (MS) and matrix spike duplicate (MSD) samples, standard reference materials (SRMs), and analytical replicates. The method blanks, MS, MSD, and SRM samples were used to evaluate analytical accuracy. Analytical replicates were compared to evaluate analytical precision, as were the MS and MSD when applicable.

2.3.1 Conventional Sediment Measurements

Conventional sediment measurements consist of grain size, total organic carbon (TOC), total volatile solids (TVS), percent solids, oil and grease, and total petroleum hydrocarbons (TPH). The procedures for each of these analyses are discussed in the following paragraphs.

Grain-size analysis was conducted by Soil Technology, Inc., of Bainbridge Island, Washington. Sixteen grain-size fractions were determined by a combination of sieve and pipet techniques from the Puget Sound Estuary Program (PSEP) Protocols for Measuring Selected Environmental Variables in Puget Sound (PSEP 1986). These methods are consistent with ASTM D421 (ASTM 1978) and D422 (ASTM 1972). Approximately 25 g of each sediment sample was analyzed for total solids while another 10- to 100-g aliquot was weighed for grain-size analysis. Sediment was washed with distilled water through a 63.5-μm (4.0 phi) sieve into a 1-L graduated cylinder to separate the coarser sand and gravel fractions from the silt/clay fraction. The coarse fraction was dried, weighed, and shaken through a nest of sieves to yield the required seven coarse subfractions. Any material still passing the final 63.5-μm sieve was added to the previous fines in the 1-L graduated cylinder. The silt/clay fraction was then subdivided by a pipet technique based on Stoke's Law of differential settling velocities for different sized particles. The silt/clay fraction was disassociated by a dispersant (sodium hexametaphosphate) in distilled water in a 1-L graduated cylinder. At specified time intervals and specified depths below the surface, 20-mL aliquots were withdrawn from the graduated cylinder, delivered to a preweighed container, and dried at 90°C±2°C to a constant weight. Triplicate analysis of three samples was performed as a quality control measure. Other quality control measures, such as spikes, SRMs, or minimum detection limits, do not apply to grain size analysis.

Total organic carbon is the amount of non-volatile, partially volatile, volatile, and particulate organic carbon compounds in a sample. Analysis of TOC was performed by Global Geochemistry in Canoga Park, California. Approximately 1 g of each sediment sample was dried and ball-milled to a fine powder. Inorganic carbon in the sample was removed by acidification before combustion. The TOC in sediment was then determined by measuring the carbon dioxide released during combustion of the sample (PSEP 1986; SW-846 Method 9060, EPA 1986), and reported as percent of dry weight. Quality control measures included method blanks and triplicate analysis of three samples. The SRM MESS-1, available from National Research Council of Canada (NRCC), was analyzed for TOC to assess accuracy. While MESS-1 is not certified for TOC concentration, it has been analyzed enough times to yield a consistent TOC value for comparison. Matrix spikes are not applicable to the combustion method of TOC analysis.

Total volatile solids are a measure of the fraction of total solids that are lost on ignition at a higher temperature than that used to determine total solids. Analysis of TVS was performed by the MSL using the method defined in PSEP (1986). The TVS are used as an estimate for the amount of organic matter in the total solids. Operationally, TVS is defined by the combustion temperature and does not always represent the organic content of a sample because some of the more volatile organic material may be lost during drying, and some inorganic material may be lost during combustion. Approximately 20 g of wet sediment was dried, weighed, and combusted at 550°C±50°C. The sample was cooled in a desiccator and then reweighed. Quality control samples included triplicate analyses to assess precision. The TVS analysis does not include a test for accuracy.

Sediment samples used for determination of percent solids were prepared in one of two ways. Each laboratory performs a percent solids analysis to determine a sample dry weight; laboratories may use either method. At MSL, preweighed wet samples are freeze-dried over a period of 4 days; at each of the other laboratories, the samples are dried in an oven at 105°C±5°C for at least 8 h and cooled in a desiccator. The ratio of dry weight to wet weight is multiplied by 100 to determine the percent solids.

Total oil and grease includes vegetable oils, animal fats, soaps, waxes, and any other carbon-hydrogen material extractable by the solvent Freon. Total petroleum hydrocarbons comprise the nonpolar mineral fraction of total oil and grease that is not removed by silica gel absorption. These analyses were performed by Analytical Resources, Inc., of Seattle, Washing-

to ton. Infrared spectrophotometry (IR) was used to determine concentrations of oil and grease (M (Method 413.2, EPA 1979) and total petroleum hydrocarbons (Method 418.1, EPA 1979). A 2(20-g aliquot of sample was dried with an excess of anhydrous sodium sulfate, then extracted w with Freon. For total oil and grease, sample extracts were scanned from 4000 to 600 cm^{-1} on an in infrared spectrophotometer and the peak height measured at 2930 cm^{-1}. This wavelength re represents the $-CH_2$ configurations of hydrocarbons and was the standard used to determine oil a and grease. For total petroleum hydrocarbons, silica gel was added to the extract to remove the m more polar animal- and vegetable-based oils. The extract was then shaken and allowed to s(settle. An aliquot was then removed and scanned the same way as for the oil and grease s(sample. The relationship of peak height to oil concentration was determined by regressing the p peak height versus a known concentration of fuel oil. Quality control samples included method b blanks, MS/MSD samples, and analytical triplicates.

2. 2.3.2 Semivolatile Organic Compounds

The semivolatile organic compounds analyzed in sediments were the 16 PAHs listed in E EPA Method 610 (EPA 1982). Analyses for PAHs in the John F. Baldwin Ship Channel Pro- g gram sediments and tissues were performed by Battelle Ocean Sciences, Duxbury, Massachu- s(setts. These compounds were extracted from approximately 30 g of wet sediment with the s(solvent methylene chloride, following the methods used by the National Oceanic and Atmo- s| spheric Administration (NOAA) for their Status and Trends monitoring program. Naphthalene- d d8, acenaphthene-d10, and benzo(a)pyrene-d12 were added to all samples prior to extraction to a assess extraction efficiency. A portion of the extract was used for PAH analysis by gas chroma- t(tography/mass spectroscopy in the Selective Ion Mode (GC/MS SIM) following EPA SW-846 M Method 8270 (EPA 1986). Tissue extracts were run through a phenogel size-exclusion high p pressure liquid chromatograph (HPLC) prior to analysis to remove any additional interferences. C Quality control samples included a method blank, SRM, MS, MSD, and analytical replicate(s) p per batch of ≤20 samples. The sediment SRM was the National Institute of Science and Tech- n nology (NIST) SRM 1941. The tissue SRM was the recently certified SRM 1974.

2 2.3.3 Chlorinated Pesticides and Polychlorinated Biphenyls

Nine each (7 test treatment, 2 reference treatment) of sediment, *N. caecoides*, and *M. n nasuta* samples were screened for the presence of pesticides and PCBs. Pesticides and PCBs w were not detected in test sediments at levels higher than in reference treatments; therefore, the ir individual sediment samples making up the composite were not analyzed for those compounds.

Pesticides and PCBs were detected in the tissue samples; therefore, every tissue replicate was analyzed. The PCB and pesticide screening analyses for John F. Baldwin Ship Channel Program sediment and tissue composites were performed by Analytical Resources, Inc., Seattle, Washington. Analysis of individual tissue replicates for pesticides and PCBs was performed by Battelle Ocean Sciences, Duxbury, Massachusetts.

Chlorinated pesticides and PCBs in sediments and tissues were quantified by gas chromatography with electron capture detection (GC/ECD) following EPA SW-846 Method 8080 (EPA 1986). Chlorinated pesticides and PCBs were extracted simultaneously with the PAH compounds following the low level methods for extraction of pesticides from soil (SW-846). The procedure involved a methylene chloride /acetone mixture extraction using sonication (for sediments) or a Tekmar tissuemizer (for tissues). A portion of the methylene chloride extract was solvent exchanged to hexane, and interferences were removed through Florisil and gel permeation chromatography (GPC) cleanup. Analytical quantification was performed using GC/ECD analysis.

For sediments, decachlorobiphenyl and tetrachlorometaxylene (TCMX) were the surrogate compounds added to each sample before extraction to assess extraction efficiency. For tissue pesticide and PCB analyses, dibromooctafluorobiphenyl (OBOFB) and Cl_5(112) were the surrogate compounds. Quality control samples included a method blank, duplicate, SRM, MS, and MSD analysis. The matrix spiking solution consisted of 6 pesticide compounds for sediments and 17 pesticides plus Aroclor 1254 for tissues. No sediment or tissue SRMs were analyzed.

2.3.4 Metals

Ten metals were measured in sediments and tissues: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), mercury (Hg), nickel (Ni), lead (Pb), selenium (Se), and zinc (Zn). Samples of sediment, *M. nasuta* tissue, and *N. caecoides* tissue were analyzed using a combination of the four different methods indicated in Table 2.1: 1) energy-diffusive x-ray fluorescence (XRF), following an internally approved procedure; 2) Zeeman graphite-furnace atomic absorption spectroscopy (GFAA), following EPA SW-846 Method 7000 (EPA 1986) and the method of Bloom and Crecelius (1984); 3) cold-vapor atomic absorption spectroscopy (CVAA), according to EPA SW-846 Method 7471 (EPA 1986) and the method of Bloom and Crecelius (1983); and 4) inductively coupled plasma mass spectrometry (ICP/MS), following EPA Method 200.8 (EPA 1990). Analyses by XRF, GFAA, and CVAA were performed by the

Pacific Northwest Laboratory (PNL) in Richland, Washington, and the MSL. The ICP/MS analyses were performed at Skidaway Institute of Oceanography in Savannah, Georgia. The analytical methods for each sample matrix and the corresponding metals for which each method was used are presented in Table 2.1.

To prepare sediment and tissues for analysis, samples were freeze-dried, then blended in a Spex mixer-mill. Approximately 5 g of mixed sample was ground in a ceramic ball mill. The XRF analysis was performed on a 0.5-g aliquot of this dried, ground material pressed into a pellet with a diameter of 2 cm. For GFAA, CVAA, and ICP/MS analyses, 0.2- to 0.5-g aliquots of dried homogeneous sample went through an acid digestion process to separate and isolate the metals from the matrix.

Quality control measures for metals analyses included analysis of blanks, matrix spikes (blanks and spikes not applicable to XRF technique), and replicate analyses for each batch of up to 20 samples, and analysis of at least one SRM sample per 20 samples. The SRM for sediment was SRM 1646 (obtained from NIST). The tissue SRM was an oyster tissue, 1566a, obtained from NRCC.

2.3.5. Butyltins

Butyltin compounds in sediment and tissues were analyzed using gas chromatography/ flame photometric detection (GC/FPD) following the methods of Unger et al. (1986). Butyltins in sediment and *M. nasuta* tissue were analyzed at MSL in Sequim, Washington, and butyltins in *N. caecoides* samples were analyzed at Battelle Ocean Sciences in Duxbury, Massachusetts. Wet samples were extracted with methylene chloride and tropolone. Tripentyltin chloride was

TABLE 2.1. Analytical Method and Corresponding Metal for Each Sample Matrix

Sediment			*N. caecoides* Tissue			*M. nasuta* Tissue		
XRF	GFAA	CVAA	XRF	CVAA	ICP/MS	XRF	CVAA	ICP/MS
As	Ag	Hg	As	Hg	Ag	As	Hg	Ag
Cu	Cd		Cu		Cd	Cu		Cd
Cr	Se		Se		Cr	Se		Cr
Ni			Zn		Ni	Zn		Ni
Pb					Pb			Pb
Zn								

added before extraction as a surrogate compound to assess extraction efficiency. The mono-, di-, and tributyltin compounds extracted from the sediment and tissues were derivatized to a less volatile, more thermally stable form (nonionic n-hexyl or n-pentyl derivatives). The extracts were passed through a Florisil liquid chromatography column for cleanup, and the butyltins were quantified by GC/FPD. Concentrations were reported in µg/kg dry weight as tin. The recently certified reference material for butyltins in sediment, NRCC SRM PACS-1, was analyzed with the sediment. Selected sediment and tissue samples were spiked with di- and tributyltins prior to extraction to assess the accuracy of the procedure. Method blanks and analytical replicates were analyzed with each batch of samples.

2.4 TOXICOLOGICAL TESTING PROCEDURES

Biological tests to assess the ecological effects of aquatic disposal of dredged material from the John F. Baldwin Ship Channel areas were conducted on the solid and suspended phases of test sediments at the MSL in Sequim, Washington. The MSL facilities provided the required conditions for flow-through solid-phase tests, static solid-phase tests, and static SPP tests. Laboratory equipment providing these testing conditions included a temperature-controlled environment, flow-through seawater supply, lighting control, and air supply.

The primary objective of the SPP tests was to simulate and evaluate potential biological effects of dredged material being discharged through the water column during disposal operations. The tests allow assessment of effects caused by the physical presence of suspended particles in the water column and the toxicity of chemical contaminants associated with the particles and dissolved fractions. Three sensitive marine species were used in these tests: mysids (*H. sculpta*), juvenile speckled sanddabs (*C. stigmaeus*), and echinoderm larvae (*D. excentricus*). Seven different sediment SPP treatments were prepared as described in Section 2.2.4 and used in testing. All SPP tests were conducted to evaluate four dilutions of each sediment SPP treatment: 0% (seawater), 10%, 50%, and 100%. Four replicates were performed for each dilution within a SPP treatment.

The solid-phase tests were used to assess the acute toxicity and bioaccumulation potential of dredged material after settling at an aquatic disposal site. Three species of marine organisms were exposed to the sediment composites from the John F. Baldwin sampling sites, reference area sediment, and control sediments (native and grain size controls). Two acute toxicity tests were conducted: 1) a 10-day solid-phase flow-through acute toxicity test using the

polychaete *N. caecoides* together with the bentnose clam *M. nasuta*, and 2) a 10-day solid-phase static test using the amphipod *R. abronius*. Bioaccumulation testing consisted of a 28-day exposure of *N. caecoides* and *M. nasuta* to assess the potential for accumulation of contaminants from the sediment into the tissues of test organisms. The test treatments and procedures were similar to those of the 10-day test but involved a longer exposure period, larger test population, and depuration processes for surviving *M. nasuta* and *N. caecoides*.

2.4.1 96-h Suspended-Particulate-Phase Static Test with *Holmesimysis sculpta*

Holmesimysis sculpta (mysids) were collected by Brezina and Associates off Monterey, California, in approximately 60 ft of water. Mysids were captured using small dip nets, and immediately transferred into oxygen-saturated seawater in double plastic bags for shipping. At the MSL, *H. sculpta* were held for at least 48 h in static, aerated aquaria maintained at test temperature (15°C ± 2°C). *H. sculpta* were fed a dense solution of brine shrimp nauplii (*Artemia salina*) twice a day, and water quality parameters in the holding tanks were monitored daily.

H. sculpta test chambers were 500-mL glass jars placed in random positions on water tables. A circulating water bath surrounding the test containers was used to maintain the test temperature. Aeration was provided through a glass pipet connected by silastic tubing to an overhead air manifold. Appropriate volumes of 100% SPP and 0.45-µm-filtered Sequim Bay seawater were measured into test containers using clean, glass graduated cylinders to reach the test concentrations (0%, 10%, 50%, and 100% SPP) at the final test volume of 300 mL per container. The test containers were labeled with position number, treatment code, concentration, and replicate number.

Once containers were in place on the water table, gentle aeration was started and water quality parameters were measured in all test chambers. *H. sculpta* were then randomly removed from the holding tanks using a wide-bore pipet. Ten individuals were added to each container so that the test population for each concentration was 40 individuals (160 individuals per treatment). The test initiation time and date were documented on data forms.

After test initiation, water quality parameters were measured daily in at least one replicate. Acceptable ranges for the water quality parameters during the experiment were as follows:

dissolved oxygen	≥4.0 mg/L
pH	ambient ± 0.5 unit
salinity	32 ± 2.0‰
temperature	15.0°C ± 2.0°C.

Observations of test organisms were made at test initiation and at 4, 24, 48, and 72 h, using a light table to enhance visibility of the *H. sculpta*. During the 96-h test exposure period, *H. sculpta* were fed small amounts of brine shrimp after 4, 24, 48, and 72 h. Excess food was removed with a small pipet before daily observations, using extra caution not to disturb test animals. Molted exoskeletons and any particulates from the SPP solution that had settled were also removed.

Before the 96-h test termination, water quality parameters were measured in all replicates. At 96 h, the numbers of live and dead animals were counted in each test container. An organism was considered dead if it did not respond to gentle probing. As a quality control check, a second analyst recounted surviving test organisms in at least 10% of the test containers.

A 96-h reference toxicant test was also conducted to establish the health and expected response of the batch of test organisms. *H. sculpta* were exposed to a seawater control along with four concentrations of copper (50, 100, 150, and 200 µg/L as Cu). There were three replicates of each treatment. The reference toxicant test was conducted in the same manner as the SPP test.

2.4.2 96-h Suspended-Particulate-Phase Static Test with *Citharichthys stigmaeus*

Juvenile *C. stigmaeus* (sanddabs) were obtained from Brezina and Associates of Dillon Beach, California. Sanddabs were collected using a small trawl net (0.25 in. mesh) in 12 to 15 ft of water. The fish were dip netted from the trawl and quickly transferred to double plastic bags containing oxygen-saturated seawater for shipping. At the MSL, *C. stigmaeus* were held in large tanks with a 3-in. layer of sediment on the bottom for at least 48 h prior to test initiation. Holding tanks were filled and supplied by flow-through seawater at test temperature (15°C). Test organisms were fed a combination of flaked fish food and freeze-dried krill twice a day during holding. Temperature, pH, dissolved oxygen (DO), and salinity of the holding tank water were monitored daily. High mortality in the first shipment of sanddabs was observed during the holding period. During the sanddab holding period, ammonia levels in the holding water were found to be elevated, especially after the sediment was disturbed. This shipment of fish was not

used for testing. Another shipment of sanddabs was ordered, received, and maintained on holding tables without sediment. No unusual mortality was noted in the second shipment of sanddabs, and these organisms were used in the SPP test.

The test chambers for the SPP test with *C. stigmaeus* were 10-gal aquaria randomly positioned on the water tables, with 20 to 24 aquaria per table. Test temperature was maintained with a circulating water bath on the water table. Aeration was provided through a glass pipet connected by silastic tubing to an overhead air manifold. Aquaria were labeled with position number, treatment code, concentration, and replicate number. The volume of test material in each aquarium was 16 L. To obtain the 100% SPP treatment, 16 L of prepared SPP was added directly to the aquarium; the 0% SPP treatment consisted of 16 L of 0.45-µm-filtered Sequim Bay seawater. To prepare 16 L of each of the 10% and 50% SPP concentrations, appropriate volumes of 100% SPP and 0.45-µm-filtered Sequim Bay dilution water were mixed directly in the test aquaria.

Once all concentrations of an SPP treatment were prepared and all replicate containers were filled, aeration was started and initial water quality parameters were measured in all replicates. *C. stigmaeus* were then randomly removed from the holding tanks using a net and added to each test container. Ten *C. stigmaeus* were placed in each 10-gal container so that the test population for each SPP concentration was 40 individuals (160 individuals per SPP treatment). Initiation time and date were documented on test containers and data record forms.

C. stigmaeus were not fed during the 96-h exposure. After initiation, DO, pH, salinity, and temperature were measured daily in at least one replicate. Acceptable ranges for the water quality parameters during the experiment were as follows:

dissolved oxygen	≥6.0 mg/L
pH	ambient ±0.5 unit
salinity	30 ±2.0‰
temperature	15.0°C±2.0°C.

Observations of *C. stigmaeus* activity and behavior in each test container were made at test initiation and at 3, 24, 48, and 72 h. A clean probe was used to determine the condition of any resting *C. stigmaeus*. An organism was considered dead if it did not respond to gentle probing.

Before termination of the test at 96 h, water quality parameters were measured in all replicates. At 96 h, the numbers of live and dead organisms were counted in each test container. As a quality control check, a second analyst confirmed the count in at least 10% of the test containers being terminated. Additionally, fish from SPP treatments exhibiting a toxicological effect (through either excessive mortality or behavioral abnormalities) were preserved for histopathological analysis.

A reference toxicant test with a seawater control and concentrations of copper was conducted concurrently with the SPP test to assess the sensitivity of *C. stigmaeus*. Three replicates each of 0, 0.5, 1.0, 1.5, and 2 mg/L copper were tested. The reference toxicant test was set up and conducted in the same manner as the SPP test.

2.4.3 72-h Suspended-Particulate-Phase Static Test with Larval *Dendraster excentricus*

Adult sand dollars (*D. excentricus*) in spawning condition were obtained from Travis Spit, Sequim, Washington. The sand dollars were held in flowing raw seawater at ambient temperature for approximately 28 days prior to testing.

The test chambers for the echinoderm larvae test were 500-mL glass jars. The dilutions of SPP for the echinoderm larvae test (0%, 10%, 50%, and 100%) were prepared directly in labeled test containers. Dilution water consisted of Strait of Juan de Fuca seawater screened at 20 µm. The final volume of test material in each container was 300 mL. Test chambers containing sediment SPP were placed in random positions on a water table and gentle aeration was started. Initial water quality parameters were measured in all replicates once the containers had reached test temperature (16°C±2°C).

Spawning was induced by injecting 0.5 mL of 0.5-M potassium chloride into the coelomic cavity through the oral opening. The sand dollars were placed oral side up over separate 100-mL beakers containing dilution water (16°C). Spawning continued until appreciable gamete flow was evident. Seawater was decanted from the 100-mL collection beakers containing sperm and gametes and were mixed with a glass rod. Sand dollar eggs were also decanted and washed with clean seawater two or three times, allowing the eggs to settle between washes. Approximately 0.5 mL of sperm solution was added to the eggs in a 500-mL volume of seawater. The solution was mixed with a perforated plunger every 5 min. After 15 min, fertilization success was checked by removing a subsample of eggs and observing under a compound microscope. Fertilized eggs were identified by a raised membrane around the developing

embryo. Fertilization was successful in at least 90% of the egg solution. To estimate fertilization success and embryo density, a 1-mL sample was removed from the container (after thorough mixing) and diluted to 100 mL in seawater. A series of 1-mL samples was removed from subsequent 100:1 dilutions, and the number of developing embryos and non-fertilized eggs was scored using a Sedgewick-Rafter counting chamber on a compound microscope at low magnification. The mean number of embryos from the replicate counts was then multiplied by 100 to correct for the dilution factor. The resulting estimate for the density of developing embryos in the egg stock was used to calculate percent fertilization.

Based on the density of embryos in the egg stock solution, the volume of stock needed to achieve an embryo density of 20 to 30 embryos/mL was pipetted into each test container. A perforated plunger was used to thoroughly mix the egg stock before removing each portion. To check the actual embryo stocking density, all test containers were subsampled immediately after initiation by removing a 10-mL aliquot (after thorough mixing) using a calibrated pipet. Each subsample was placed in a labeled scintillation vial, fixed with 5% formalin, and a percentage were scored for the number of developing embryos.

Water quality parameters were measured in all test containers at study initiation and termination (72 h) while measurements of one replicate from each SPP treatment and concentration were performed at 24 and 48 h. Acceptable ranges for water quality parameters during the experiment were as follows:

dissolved oxygen	≥6.0 mg/L
pH	ambient ±0.5 unit
salinity	30.0±2.0 ‰
temperature	16.0°C±2.0°C.

After 72 h, the control chamber larvae were checked for their state of development, and if pluteus stage larvae predominated, the test was terminated. If pluteus stage larvae did not predominate in the controls, the test was continued another 24 h, to a point when embryo development was sufficiently advanced to terminate and score the test. The sand dollar larvae test was terminated by gently mixing the contents of each test container and removing a 10-mL aliquot. Each subsample was placed in a labeled scintillation vial and fixed with 5% formalin. Termination samples were scored for the number of normal-shaped pluteus larvae, abnormally developed larvae, and total number of organisms surviving. A second observer confirmed the final counts on at least 10% of the samples.

A reference toxicant test with a seawater control and four concentrations of copper sulfate was conducted concurrently with the SPP test to assess the sensitivity of the organisms. Three replicates each of 0, 7.5, 12, 25, and 88 µg/L copper were tested. The reference toxicant test was set up and conducted in the same manner as the SPP test.

2.4.4 10-Day Solid-Phase Static Test with *Rhepoxynius abronius*

R. abronius amphipods were captured by MSL staff off West Beach, Whidbey Island, Washington, using a specially designed anchor dredge deployed from a 17-ft Boston Whaler. Sediment brought up with the dredge was sieved through a 2-mm-mesh screen to remove large debris and predatory organisms. Amphipods were kept in coolers partially filled with native sediment and seawater until they were delivered to a holding tank at the MSL after sampling. The amphipods were held in a large tank containing their native sediment and flowing 15°C seawater. Organisms were not fed during the holding period, as food was available from the holding sediment. The amphipod holding period was at least 48 h but less than 2 weeks before test initiation.

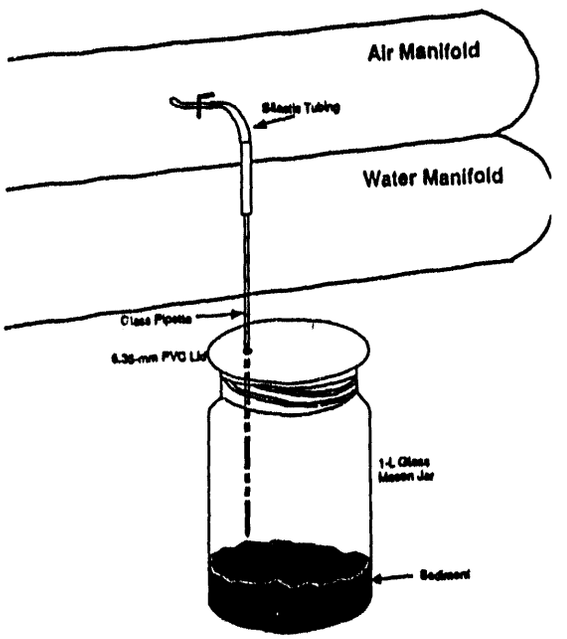


Figure 2.2. Static Amphipod Testing Jar

The 10-day test was conducted in 1-qt glass jars (Figure 2.2) placed in random positions on a water table maintained at 15°C. After the test sediment was mixed (Section 2.2.3), it was added to the jars to a depth of 2 cm. Each jar was slowly filled with 0.45-µm-filtered seawater to the test volume of 750 mL. Test containers were aerated and placed on the water table to stabilize the temperature at test conditions. After the sediment in the jars was allowed to settle overnight, initial water quality parameters were measured in each container and recorded on water quality forms.

The test was initiated by adding 20 *R. abronius* to each test container. Amphipods were gently sieved from the holding tank into clean seawater and counted into small transfer containers. The number of organisms was confirmed before they were transferred into the test container. The date and time of initiation were recorded on data forms. *R. abronius* were observed daily during the test, and the number of organisms floating on the surface, swimming in the jar, or resting on the sediment surface was recorded on observation forms. Amphipods floating on the surface were gently pushed below the water surface with a pipet tip and observed as they either burrowed or did not burrow into the sediment.

Water temperature, salinity, pH, and DO were measured daily in one replicate of each treatment and in all containers at initiation and termination of the bioassay. Acceptable ranges for water quality parameters during the experiment were as follows:

dissolved oxygen	≥5.0 mg/L
pH	7.8 ±0.5 unit
salinity	30 ±2.0‰
temperature	15.0°C±2.0°C.

At the end of the test (Day 10), the contents of each jar were sieved through a 0.5-mm Nytex screen to collect the *R. abronius*. Organisms were placed in clean seawater in a glass dish labeled with the treatment and replicate number. The numbers of live and dead organisms in each dish were counted, and the presence or absence of body parts recovered at the end of the test was noted. If a *R. abronius* did not respond to gentle probing after several minutes of observation, the organism was considered dead. At least 10% of the mortality counts were confirmed by a second analyst.

To assess the sensitivity of *R. abronius* response to a known contaminant, a reference toxicant test with cadmium was conducted. The reference toxicant test was a static 96-h exposure to four concentrations of cadmium chloride (0.5, 1.0, 2.0, 4.0 mg/L as cadmium) in the

absence of sediment. Three 750-mL replicates of each concentration, including a seawater control, were placed randomly on the water table. The test was initiated, monitored, and terminated in a manner similar to that of the 10-day sediment test.

2.4.5 10-Day Solid-Phase Flow-Through Test with *Nephtys caecoides* and *Macoma nasuta*

Polychaete worms (*N. caecoides*) were collected by Brezina and Associates of Dillon Beach, California. Worms were sieved from sediment shoveled from the mud flats of Tomales Bay, California, and placed in clean coolers with sediment and seawater from the collection site. At the MSL, *N. caecoides* were held in their native sediment in shallow pans covered with well-aerated 15°C seawater from a gravity-fed flow-through system. *M. nasuta* were collected from the intertidal zones of beaches in Discovery Bay, near Gardiner, Washington, by Gunstone and Johnson commercial suppliers. The clams were held in large tanks of clean sediment with flow-through 15°C seawater. Temperature, pH, DO, and salinity of water in each holding tank were monitored daily. The *N. caecoides* and *M. nasuta* were not fed during the holding or testing periods, because the organisms were able to obtain food from the sediment.

The flow-through test with *M. nasuta* and *N. caecoides* was conducted in 10-gal aquaria (Figure 2.3) placed in random positions on water tables. Each aquarium was filled with approxi-

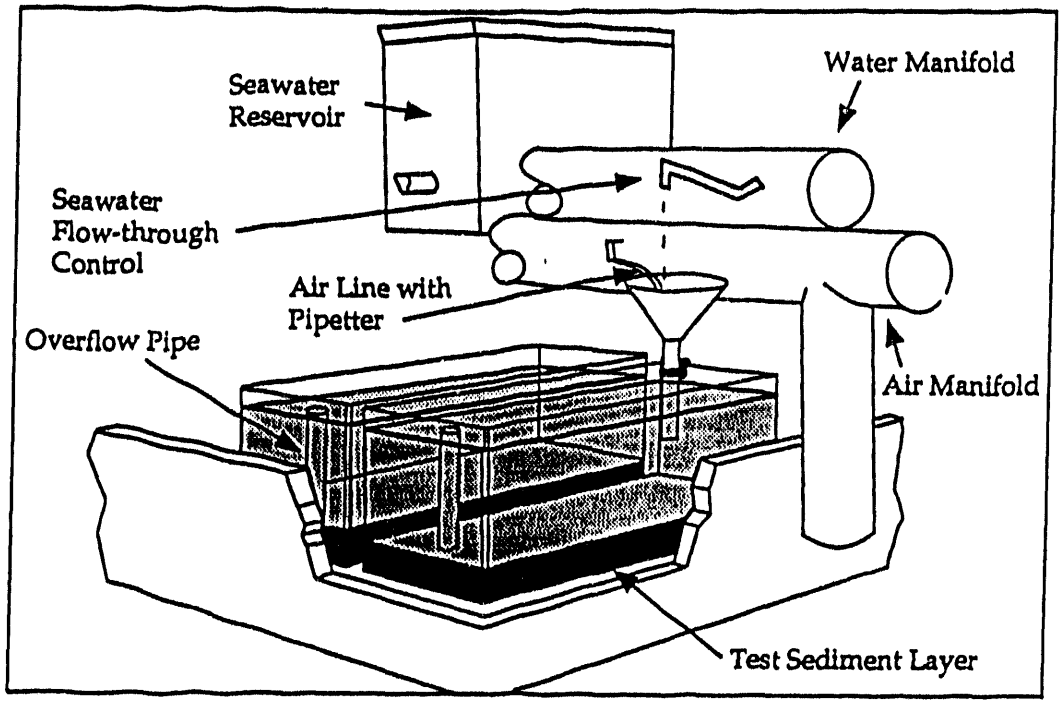


FIGURE 2.3. Flow-Through Aquarium for *M. nasuta* and *N. caecoides*

mately 8 L of sand-filtered seawater via the flow-through system. Test sediment was added to a depth of 3 cm by measuring out the required amount (3870 mL) in a clean glass container, and using seawater to wash and distribute the sediment evenly over the tank's bottom. The flow-through system was initiated, and aquaria were allowed to fill to a total volume of approximately 36 L. Suspended materials in the aquaria were allowed to settle for approximately 4 h, and the flow-through system was adjusted to deliver 125 ±10 mL/min of seawater to each aquarium. The system was allowed to run overnight before performing initial water quality measurements in all replicates and test initiation.

To initiate the test, 20 *M. nasuta* and 20 *N. caecoides* were collected from the holding tanks and placed in each aquarium. The initiation time, date, and the initials of the analyst who added the organisms to each tank were noted on each aquarium. Salinity, temperature, DO, and pH were measured daily in at least one replicate of each treatment and recorded on water quality data sheets. The acceptable ranges for water quality parameters during the experiment were as follows:

dissolved oxygen	≥5.0 mg/L
pH	ambient ±0.5 unit
salinity	30 ±2.0‰
temperature	15.0°C±2.0°C
flow rates	125±10 mL/min.

Test animal behavior was monitored daily and recorded on data forms for each test. Dead organisms were removed but not replaced. If any dead *N. caecoides* were removed, the specimen was identified as to whether it was a whole animal or a head or tail portion. The number of *M. nasuta* on the sediment surface and the number of those with their siphons exposed were recorded daily, as well as the number of *N. caecoides* on the sediment surface.

At the end of the 10-day test, water quality measurements were taken in all tanks and the contents of each aquarium were gently passed through a 1.0-mm Nytex screen to recover the *N. caecoides* and *M. nasuta*. The organisms were placed in glass baking dishes labeled with the treatment number, and the numbers of dead and live of each species were determined. Acute toxicity was determined by observing whether the *N. caecoides* reacted to gentle probing.

If there was no movement, the organism was considered dead. Acute toxicity in the *M. nasuta* was determined by observing and counting dead individuals. Those with unresponsive or gaping shells were considered dead. At least 10% of the mortality counts were confirmed by a second analyst.

2.4.6 28-Day Solid-Phase Flow-Through Test with *Nephtys caecoides* and *Macoma nasuta*

The procedure for conducting the 28-day solid-phase flow-through test with *N. caecoides* and *M. nasuta* was identical to that of the 10-day test with three exceptions: 1) the number of organisms was increased to 25 *M. nasuta* and 40 *N. caecoides* because more individuals are needed to yield enough tissue for chemical analysis, 2) the exposure period was increased from 10 days to 28 days, and 3) the surviving test organisms were depurated and sampled for chemical analysis. The ranges for water quality parameters as well as the test conditions, such as temperature and flow rate, were the same in the 28-day test as in the 10-day test. Water quality parameters were measured and mortality of the test organisms was monitored at the same frequency for both tests.

When the 28-day test was terminated, the living *M. nasuta* and *N. caecoides* were collected for chemical evaluation of bioaccumulation. To ensure that tissue chemistry results would not be biased by contaminants associated with sediment grains in the digestive tract, the test organisms were allowed to depurate, or void the digestive tract, for 48 h following the 28-day exposure. The surviving *N. caecoides* from one test aquarium were placed in a separate flow-through 10-gal aquarium with approximately 2 in. of clean, Sequim Bay sediment. Clean sediment was necessary for *N. caecoides* because these organisms require sediment to surround their tissues to survive the depuration period. All organisms were expected to depurate test sediment that was ingested during the 28-day exposure. The surviving *M. nasuta* were placed in a glass baking dish (without sediment), which was then placed in the depuration aquarium containing the *N. caecoides* from the same replicate. *M. nasuta* fecal material was siphoned from the baking dish daily during the depuration period. *M. nasuta* and *N. caecoides* were not fed during depuration. After 48 h of depuration, the *M. nasuta* shells were cleaned with a scrub brush to minimize chance contamination of tissues during the dissection process. The tissues were then removed using titanium instruments and transferred to labeled containers for chemical analysis. The *N. caecoides* were gently washed in clean seawater to remove external sediment grains and put in containers for chemical analysis. Approximately one fifth (by weight) of each replicate went to metals analysis, while three fifths went to PAH, butyltin,

and potential pesticide and PCB analyses. The remaining one fifth of each replicate for a sediment treatment went into a composite sample representing tissues exposed to that treatment. The tissue composite was analyzed for pesticides and PCBs. Pesticides and PCBs above reference levels were detected in these composites; therefore, all replicates were also analyzed.

2.5 2.5 DATA ANALYSIS

Several statistical analyses were conducted to determine the magnitude and significance of toxicity and bioaccumulation in test treatments relative to reference treatments. Each statistical test is based on a completely random design that allows unbiased comparison between treatments. The 1991 Implementation Manual recommends Dunnett's Test for comparing test treatments to a single reference treatment. However, the John F. Baldwin Ship Channel experiments were conducted with two reference treatments because a potential disposal site had not been selected at the time the experiments were designed. With EPA's release of the DEIS describing alternative offshore ocean disposal sites in December 1992, USACE requested that the John F. Baldwin toxicity and bioaccumulation data be statistically compared to the ocean reference treatment R-OS (Deep Off-Shelf reference site) using Dunnett's Test at an alpha level of 0.05. In statistical comparisons to R-OS, any data for the second reference (Bay Farm Borrow Area, R-BF) were omitted. The USACE also requested that toxicity and bioaccumulation data be compared to R-BF using Dunnett's Test, in which case R-OS data were omitted. Such testing of non-independent data sets increases the chance of statistical errors in both sets of comparisons. However, the errors are usually identification of differences as statistically significant when they are not, and this approach is environmentally more conservative because more treatments are identified as significantly different from reference. The data were analyzed as requested, but it must be noted that it is possible to avoid statistical errors by comparing the data to all reference treatments at one time, maintaining the experiment-wise error rate, in a statistical test such as Tukey's Honestly Significant Difference Test or Dunn's Test.

2.5 2.5.1 Randomization

All solid-phase and SPP toxicity tests were designed as completely random tests. Organisms were randomly allocated to treatments, and treatments were randomly positioned on water tables. A random number table for this purpose was generated for each toxicity test, using the discrete uniform random number generator in the Excel spreadsheet program. For

the SPP tests, *C. stigmaeus* and *H. sculpta* individuals, and *D. excentricus* larvae were randomly allocated to SPP replicates for all concentrations. Special care was taken with *C. stigmaeus* individuals to eliminate bias caused by variable mobility of the fish (otherwise, easily caught fish would be used earlier than more mobile fish).

2.5.2 Statistical Analysis of Solid-Phase Tests

Solid-phase toxicity of all sediment treatments was compared by analysis of variance (ANOVA) tests on the arcsine square root of the proportion of organisms surviving the test. The arcsine square-root transformation stabilizes the within-class variances to meet the assumptions of the ANOVA. Toxicity of a treatment was considered significant if it was identified as statistically different from the reference treatment by Dunnett's Test and if the survival in that treatment was ≥10% lower than the reference treatment (≥20% lower than reference for the amphipod *R. abronius*). As discussed earlier in this section, the likelihood of statistical errors is increased by comparing John F. Baldwin toxicity data to R-OS and then R-BF using Dunnett's Test.

2.5.3 Statistical Analysis of Suspended-Particulate-Phase Tests

Two statistical tests are presented in the 1991 Implementation Manual (USACE/EPA 1991) for the interpretation of SPP tests. The first test is a one-sided t-test comparing survival in control replicates and survival in the 100% SPP replicates. This test is performed only when survival in the 100% SPP is less than control (0% SPP) survival and when control survival is greater than 90% (indicating test validity). Prior to conducting the t-test, angular transformation (arcsine square root) of the proportion surviving in test replicates is performed to reduce possible heterogeneity of variance between control and 100% SPP mean survivals. The second test required by the Implementation Manual is an LC50 calculation, which estimates the concentration of SPP that is lethal to 50% of the individuals tested. The LC50 values for these tests were calculated using the Trimmed Spearman-Karber method (Hamilton et al. 1977). The Spearman-Karber estimator is appropriate only if mortality increases with increasing concentration and if 50% or greater mortality is observed in test solutions when normalized to control survival. If 50% mortality does not occur in the 100% SPP dilutions for any treatments, then LC50 values are reported as >100% SPP. The same method was used to calculate EC50 values (the concentration at which 50% of the test individuals show a certain effect) for the echinoderm SPP test and LC50 values for all reference toxicant tests.

2.5.4 Statistical Analysis of Bioaccumulation

Evaluating bioaccumulation of sediment contaminants involves comparing contaminant levels in organisms exposed to test sediment treatments to those exposed to reference treatments. The contaminant levels are qualitatively compared, statistical significance of any difference between treatment and reference is determined, and the magnitude of the difference is examined as part of evaluating bioaccumulation. Before statistical analysis of *M. nasuta* and *N. caecoides* tissue concentrations, a visual inspection of the tissue chemistry data (on dry weight basis) was performed. No further analysis was performed if visual inspection showed that a compound was 1) undetected in all replicate tissue samples for a test treatment or 2) that the mean concentration in organisms exposed to reference sediment was greater than the mean concentration in organisms exposed to test treatments. Treatments in which contaminants of concern were detected and in which the treatment mean was greater than the reference mean were compared to reference using ANOVA and Dunnett's Test ($\alpha = 0.05$). Analytical detection limit values (dry weight) were used for replicates in which the compound was not detected. Dunnett's Test identifies treatment mean concentrations that are significantly greater than reference mean concentrations. As discussed earlier in this section, the likelihood of statistical error is increased by comparing John F. Baldwin data to R-OS and then R-BF using Dunnett's Test.

2.6 QUALITY ASSURANCE

A quality assurance (QA) plan was developed for the John F. Baldwin Ship Channel Program to ensure compliance with the quality control (QC) and QA requirements of the Implementation Manual (USACE/EPA 1991). All project staff were required to be familiar with the QA plan prior to working on any part of the project. The plan includes QA/QC goals and procedures for sample handling, toxicity testing, analytical chemistry, record-keeping, and data handling, discussed in more detail below. A member of PNL's quality engineering staff was present throughout each critical phase of these studies to ensure that accepted procedures were followed.

2.6.1 Sample Tracking and Storage

All sediment samples were accompanied by a chain-of-custody form from the time of collection to receipt at MSL. After sample preparation at MSL, a new set of custody forms was

initiated for the sediment subsamples requiring chemical analyses. These forms accompanied the samples to the appropriate laboratory, where the forms were signed and returned to the MSL project manager. Custody forms were also initiated for all tissue samples upon completion of the biological testing. These forms accompanied the samples to the appropriate laboratory for chemical analyses.

All sediment collected for these studies was stored in Lexan (polycarbonate), steel containers lined with 9-C-4-A-phenolic epoxy (a noncontaminating coating), or in clean coolers. Sediment cores and grab samples were stored at 4°C±2°C prior to biological testing. Subsamples for chemical analyses were obtained prior to biological testing (Section 2.2.3) and stored in precleaned containers appropriate for the analysis. Samples for organic analyses were stored frozen up to 2 months (PSEP 1986). Samples for metals were freeze-dried upon receipt at the laboratory and held up to 6 months (PSEP 1986; USACE/EPA 1991). Samples for grain size were kept refrigerated but were not frozen.

Tissue samples were frozen immediately upon completion of the bioaccumulation tests. Samples for organic analyses were stored in precleaned glass jars with Teflon-lined lids, and samples for metals analyses were stored in precleaned, preweighed plastic jars.

2.6.2 Quality Control Procedures for Sediment and Tissue Chemistry

Chemical testing procedures require specific QA/QC protocols be followed. The QA/QC guidelines specific to this project are provided in the QA Plan for the John F. Baldwin Ship Channel Program. These guidelines include the following:

- extraction and analysis of samples in batches of no greater than 20
- analysis of a method blank with each batch of samples
- analysis of MS on at least 5% of the samples (where applicable) to assess analytical accuracy
- analysis of SRMs at a minimum frequency of 5%, if available for the analytes of interest and sample matrix
- triplicate analysis on at least 5% of the samples to assess analytical precision
- archival of all instrument printouts (e.g., raw data and chromatograms from AA and GC analyses) for future review.

The guidelines for detection limits, acceptable ranges of recovery, and relative precision are listed in Table 2.2 for sediments and Table 2.3 for tissues. In practice, some of the specific guidelines listed in the QA Plan were modified to apply to the most current methods employed by the laboratory (i.e., target detection limits).

Analytical accuracy is assessed by the analysis of MS samples, surrogate spike compounds (organic analyses only), and SRMs. Matrix spikes were analyzed for metals (except those analyzed by XRF) and for organic parameters (oil and grease, total petroleum hydrocarbons, pesticides, PCBs, PAHs, and butyltins). Known amounts of MS compounds, which are generally a subset of the analytes of interest, are added to samples prior to extraction and analysis. Percent recovery is calculated based on the difference between the amount spiked and the amount recovered in the sample, taking into account the amounts initially present in the sample. Surrogate spike compounds were added to samples analyzed for organic compounds prior to extraction. Surrogate compounds are not analytes of interest and their percent recoveries are a measurement of the extraction efficiency and procedural accuracy of the analysis. Standard reference materials have been certified for the presence of certain parameters at known concentrations. Sediment SRMs were analyzed for metals and organic compounds. Tissue SRMs were analyzed for metals. Tissue SRMs for organic compounds were not available for this study. Standard reference materials are not associated with the analysis of TOC, oil and grease and total petroleum hydrocarbons, TVS, and grain size.

Analytical precision was assessed through the triplicate analysis of selected samples. Precision is measured by the relative standard deviation (RSD) of the triplicate results. The RSD is defined as the sample standard deviation divided by the mean and multiplied by 100. Duplicate rather than triplicate samples were analyzed for pesticides and PCBs in sediments. The PCBs and pesticides in tissues were analyzed in triplicate. Duplicate precision is measured by the industrial statistic "I" and the relative percent difference (RPD). The "I" statistic is defined as the absolute value of the difference between duplicate measurements divided by the sum of the duplicates. The RPD is defined as the absolute value of the difference between the duplicate measurements divided by the mean and multiplied by 100.

2.6.3 Quality Control Procedures for Toxicological Testing

Quality control procedures for toxicological testing included development of a Toxicological Testing Plan and daily monitoring to assure that the guidelines in the plan were followed. All

TABLE 2.2. Analytical Chemistry Requirements for John F. Baldwin Ship Channel Sediment Samples

Parameters	Detection Limits (a) (mg/kg dry wt)	Number of Samples	Range of Recovery (%)	Relative Precision (%)
Sediment Conventionals				
Grain Size	NA (b)	49	NA	20
TOC	0.1%	49	NA	10
TVS	0.1%	49	NA	20
Oil and Grease	20	49	50-150	20
TPH	20	49	50-150	20
Metals				
Ag	0.02	49	75 - 125	20
As	2.5	49	NA	20
Cd	0.1	49	75 - 125	20
Cr	33	49	NA	20
Cu	5.5	49	NA	20
Hg	0.01	49	75 - 125	20
Ni	7.5	49	NA	20
Pb	6.2	49	NA	20
Se	0.2	49	75 - 125	20
Zn	7.8	49	NA	20
Organic Compounds				
PAHs (c)	0.02	49	40 - 120	30
Pesticides (d)	0.002	9	40 - 120	30
PCBs (e)	0.02	9	40 - 120	30
Butyltins	0.005	49	40 - 120	30

(a) Target detection limits; all efforts were made to reach lowest practical detection limits.
(b) Not applicable.
(c) All compounds on EPA Method 610 list, analyzed using Method 8270 in SIM mode.
(d) All compounds on EPA Method 608 list, analyzed using Method 8080 (except toxaphene target detection limit is 0.03 mg/kg dry wt).
(e) Reported as Aroclor equivalents 1242, 1248, 1254, and 1260 and total PCB, analyzed using EPA Method 8080.

TABLE 2.3. Analytical Chemistry Requirements for John F. Baldwin Ship Channel Tissue Samples

Parameters	Detection Limits (a) (mg/kg dry wt)	Number of Samples	Range of Recovery (%)	Relative Precision (%)
Metals				
Ag	0.1	49	75 - 125	20
As	2.1	49	NA	20
Cd	0.1	49	75 - 125	20
Cr	1.0	49	75 - 125	20
Cu	4.3	49	NA	20
Hg	0.01	49	75 - 125	20
Ni	1.0	49	75 - 125	20
Pb	1.0	49	75 - 125	20
Se	1.0	49	NA	20
Zn	35	49	NA	20
Organic Compounds	(mg/kg wet wt)			
PAHs (c)	0.02	49	40 - 120	30
Pesticides (d)	0.002	9	40 - 120	30
PCBs (e)	0.02	9	40 - 120	30
Butyltins	0.005	49	40 - 120	30

(a) Target detection limits; all efforts were made to reach lowest practical detection limits.
(b) Not applicable.
(c) All compounds on EPA Method 610 list, analyzed using Method 8270 in SIM mode.
(d) All compounds on EPA Method 608 list, analyzed using Method 8080 (except toxaphene target detection limit is 0.03 mg/kg wet wt).
(e) Reported as Aroclor equivalents 1242, 1248, 1254, and 1260 and total PCB, analyzed using EPA Method 8080.

prior to test initiation. Once tests were initiated, organism behavior was monitored daily to identify any unusual test conditions. Native sediment control treatments were included in all solid-phase tests. Organism survival in the native control had to be 90% or better for the test to be valid. To validate SPP tests, control survival had to be 90% or better for *H. sculpta* and *C. stigmaeus*, 70% or better for *D. excentricus*. For most test organisms, reference toxicant tests were conducted to assess organism health and sensitivity relative to other test populations. The reference toxicant was cadmium for *R. abronius* and copper for *H. sculpta*, *C. stigmaeus*, and *D. excentricus*. Reference toxicant test results were compared to literature values and to previous results for tests conducted at MSL.

In all solid-phase, SPP, and reference toxicant tests, water quality parameters were monitored daily to make sure acceptable ranges were not exceeded. All instruments were calibrated according to PNL protocols. All laboratory records were maintained in data accumulation notebooks and were reviewed regularly during testing by the test supervisors for each test. Laboratory records included acclimation, animal care and holding, daily water quality, daily observations, test initiation, test termination, and instrument calibration forms.

3.0 RESULTS

3.1 SEDIMENT COLLECTION AND SAMPLE PREPARATION

Sediment samples were collected between April 28 and May 1, 1992, from the John F. Baldwin Ship Channel, Bay Farm and Deep Off-Shelf reference areas, and Sequim Bay, West Beach, and Tomales Bay control sites. All samples were stored in noncontaminating containers at approximately 4°C until processing at MSL. Channel and reference samples were shipped via refrigerated truck to MSL as soon as all sampling was completed. Core samples were geologically described before being homogenized into samples for sediment chemistry. Composite samples, reference, and control sediments were homogenized for sediment chemistry and biological toxicity testing. The SPP of each sediment composite was also prepared for biological testing.

3.1.1 John F. Baldwin Ship Channel Core Sampling

Sediment core samples were collected to -47 ft MLLW (-45 ft MLLW plus 2 ft overdepth) from a total of 37 stations in the John F. Baldwin Ship Channel: 8 in the West Richmond reach (2 composites), 26 in the Pinole Shoal reach (4 composites), and 3 in Carquinez Strait (1 composite). One 4-in. core and one 12-in. core were collected at each station as described in Section 2.1.1. Sampling information for 4-in. core samples is listed in Table 3.1; sampling and compositing information for 12-in. core samples is listed in Table 3.2. Station locations in the West Richmond, Pinole Shoal, and Carquinez Strait reaches of the John F. Baldwin Ship Channel are shown in Figures 3.1, 3.2, and 3.3, respectively.

Two planned stations in the West Richmond reach, WR I R and WR I.5 C, were not sampled because the channel was already -45 ft MLLW or deeper within 500 ft of the planned location. In the field, these stations were replaced with two new stations located farther south to represent more of the volume of sediment to be removed from the West Richmond reach. The new West Richmond stations were WR-1-E, which was added to COMP WR-1, and WR II.5 L, which was added to COMP WR-2 (Figure 3.1). Stations P I C and P III L in the southwestern end of Pinole Shoal reach were also already -45 ft MLLW or deeper, and no cores were collected there. One new station, P III.5 R, was added in the field. P III.5 R is located on the right side of the channel (going upchannel) between P II C and P IV R (Figure 3.2).

TABLE 3.1. Sampling Information for 4-in. Core Collections, John F. Baldwin Ship Channel Phase III

TABLE 3.1. Sampling Information for 4-in. Core Collections, John F. Baldwin Ship Channel Phase III

Station	Core Size	Replicate	Date Collected	California State Plane Coordinates (Zone III) East (X)	North (Y)	Depth (-ft MLLW)	Core Required to -47 ft MLLW (ft)	Total Core Collected (ft)	Core Kept (ft)	Comments
West Richmond										
WR-1-D	4-in.	1	05-01-92	1,440,580	516,570	42.1	4.9	6.5	5.0	
WR-1-C	4-in.	1	05-01-92	1,439,880	517,960	43.8	3.2	7.6	3.5	
WR-1-B	4-in.	1	05-01-92	1,439,735	519,387	37.4	9.6	13.8	10	
WR-1-E	4-in.	1	05-01-92	1,439,691	520,197	37.6	9.4	18.0	9.5	
WR-1-A	4-in.	1	05-01-92	1,439,337	520,880	39.2	7.8	13.4	8	
WR II.5 L	4-in.	1	05-01-92	1,439,519	522,200	36.6	10.4	13.75	10.5	
WR-A	4-in.	1	05-01-92	1,439,718	523,230	38.8	8.2	13.4	8.5	
WR II L	4-in.	1	05-01-92	1,439,379	524,215	39.8	7.2	8.8	8.8	
Pinole Shoal										
P I C(a)	4-in.	NA	04-30-92	1,448,049	551,713	>45	NA(a)	0	0	No core collected; all locations inside of channel between P I C and P II C were -45 ft MLLW or deeper.
P II C	4-in.	1	04-30-92	1,450,768	554,048	44.6	2.4	7.25	3.0	
P III L(a)	4-in.	NA	04-30-92	1,454,274	557,302	45.6	1.4	0.0	0	No core collected; all locations inside of channel within 500 ft of planned site were -46 ft MLLW or deeper.
P III.5 R	4-in.	1	04-30-92	1,456,155	558,418	41.9	5.1	>5.5	5.5	
P IV R	4-in.	1	04-30-92	1,458,270	560,116	37.3	9.7	11.4	10.0	
P V L	4-in.	1	04-30-92	1,461,841	563,478	39.1	7.9	10.8	8.0	
P V R	4-in.	1	04-30-92	1,462,087	563,056	37.4	9.6	13.75	10.0	
P V.5 C	4-in.	1	04-30-92	1,464,577	564,716	38.1	8.9	12.5	9.0	
P VI L	4-in.	1	04-30-92	1,466,545	566,254	38.1	8.9	13.7	9.0	
P VI R	4-in.	1	04-30-92	1,466,790	565,885	35.8	11.2	11.75	11.2	
P VI.5 C	4-in.	1	04-30-92	1,468,694	567,264	38.4	8.6	11.5	9.0	
P VII C	4-in.	1	04-30-92	1,470,186	568,120	38.2	8.8	11.6	9.0	
P VII.5 C	4-in.	1	04-29-92	1,471,840	569,138	39.2	7.8	8.9	8.9	
P VIII L	4-in.	1	04-29-92	1,473,523	570,253	38.3	8.7	12.5	9.0	
P VIII R	4-in.	1	04-29-92	1,473,786	569,795	35.8	11.2	13.0	11.2	
P VIII.5 C	4-in.	1	04-29-92	1,476,500	570,630	37.0	10.0	14.0	10.0	
P IX C	4-in.	1	04-29-92	1,478,402	570,924	35.9	11.1	16.25	11.1	
P IX.5 L	4-in.	1	04-29-92	1,480,960	571,538	37.4	9.6	12.5	10.0	
P X R	4-in.	1	04-29-92	1,482,806	571,513	37.3	9.7	8.25	7.0	required core amount was not collected because of a math error in field log: -44.3 to -47.0 ft MLLW segment missing from sample.
P X.5 C	4-in.	1	04-29-92	1,485,395	572,215	38.2	8.8	12.5	9.0	
P XI L	4-in.	1	04-29-92	1,487,584	572,644	42.9	4.1	7.0	4.5	
P XII R	4-in.	1	04-28-92	1,489,548	571,423	40.9	6.1	5.3	5.3	
P XII RR	4-in.	1	04-28-92	1,489,570	571,167	41.2	5.8	6.5	5.6	
P XII.5 R	4-in.	1	04-28-92	1,490,814	571,342	33.3	13.7	>14	14.0	
P XII.5 C	4-in.	1	04-28-92	1,490,699	571,887	43.5	3.5	7.0	4.0	
P XIII R	4-in.	1	04-28-92	1,493,176	571,963	38.7	8.3	13.5	8.3	
P XIII L	4-in.	1	04-28-92	1,493,016	572,670	43.5	3.5	8.0		
P XIV C	4-in.	1	04-28-92	1,495,892	573,010	43.3	3.7	8.5	4.0	

TABLE 3.1. (contd)

Station	Core Size	Replicate	Date Collected	California State Plane Coordinates (Zone III) East (X)	North (Y)	Depth (-ft MLLW)	Core Required to -47 ft MLLW (ft)	Total Core Collected (ft)	Core Kept (ft)	Comments
Carquinez Strait										
CS-1-B	4-in.	1	04-28-92	1,533,244	563,795	42.0	5.0	8.0	5.0	
CS-1-A	4-in.	1	04-28-92	1,533,060	564,312	42.0	5.0	9.0	5.5	
CS-1-C	4-in.	1	04-28-92	1,532,522	564,313	40.3	6.7	7.25	7.25	

(a) Coordinates are for planned sampling location
(b) NA Not applicable.

TABLE 3.2. Sampling Information for Sediment Composites, John F. Baldwin Ship Channel Phase III

Station	Core Size	Replicate	Date Collected	California State Plane Coordinates (Zone III) East (X)	North (Y)	Depth (-ft MLLW)	Core Required to -47 ft MLLW (ft)	Total Core Collected (ft)	Mudline to -47 ft MLLW Volume Contributed (gal)	to Composite	Comments
West Richmond											
WR-1-D	12-in.	1	05-01-92	1,440,580	516,570	42.1	4.9	8.5	12	WR-1	
WR-1-C	12-in.	1	05-01-92	1,439,880	517,960	43.8	3.2	7.8	8	WR-1	
WR-1-B	12-in.	1	05-01-92	1,439,735	519,387	37.4	9.5	18	10	WR-1	
WR-1-E	12-in.	1	05-01-92	1,439,691	520,197	37.6	9.4	14.5	10	WR-1	
WR-1-A	12-in.	1	05-01-92	1,439,337	520,880	39.2	7.8	9.2	8	WR-1	
WR II.5 L	12-in.	1	05-01-92	1,439,519	522,200	35.6	10.4	14.5	10	WR-2	
WR-A	12-in.	1	05-01-92	1,439,718	523,230	38.8	8.2	10.5	10	WR-2	
WR II L	12-in.	1	05-01-92	1,439,379	524,215	39.8	7.2	8.5	10	WR-2	
Pinole Shoal											
P I C[a]	12-in.	NA	04-30-92	1,448,049	551,713	>45	NA[c]	0	0	PS-1	No core collected; all locations inside of channel between P I C and P II C were -45 ft MLLW or deeper.
P II C	12-in.	1	04-30-92	1,450,768	554,048	44.6	2.4	7.8	12	PS-1	
P III L[a]	12-in.	NA	04-30-92	1,454,274	557,302	45.6	1.4	0.0	0	PS-1	No core collected; all locations inside of channel within 500 ft of planned site were -46 ft MLLW or deeper.
P III.5 R	12-in.	1	04-30-92	1,456,155	558,418	41.9	5.1	8.5	15	PS-1	
P IV R	12-in.	1	04-30-92	1,458,270	560,116	37.3	9.7	9.7	15	PS-1	
P V L	12-in.	1	04-30-92	1,461,841	563,478	39.1	7.9	12.0	3.5	PS-2	
P V R	12-in.	1	04-30-92	1,462,087	563,056	37.4	9.6	13.75	4	PS-2	
P V.5 C	12-in.	1	04-30-92	1,464,577	564,716	38.1	8.9	13.5	3.5	PS-2	
P VI L	12-in.	1	04-30-92	1,466,545	566,254	38.1	8.9	17.6	4	PS-2	
P VI R	12-in.	1	04-30-92	1,466,790	565,885	35.8	11.2	16.0	5	PS-2	
P VI.5 C	12-in.	1	04-30-92	1,468,694	567,264	38.4	8.6	10.0	4	PS-2	
P VII C	12-in.	1	04-30-92	1,470,186	568,120	38.2	8.8	10.0	3	PS-2	
P VII.5 C	12-in.	1	04-29-92	1,471,840	569,138	39.2	7.8	11.0	3	PS-2	
P VIII L	12-in.	1	04-29-92	1,473,523	570,253	38.3	8.7	8.2	3.5	PS-2	
P VIII R	12-in.	1	04-29-92	1,473,786	569,795	35.8	11.2	11.0	4	PS-2	
P VIII.5 C	12-in.	1	04-29-92	1,476,500	570,630	37.0	10.0	NA	0	PS-3	Could not retain sediment in 12-in. core barrel
P VIII.5 C	12-in.	2	04-29-92	1,476,486	570,644	36.1	10.9	NA	0	PS-3	Could not retain sediment in 12-in. core barrel
P VIII.5 C	4-in.	2	04-29-92	1,476,486	570,644	36.1	10.9	>12	6	PS-3	Core emptied into 2 5-gallon buckets.
P IX C	12-in.	1	04-29-92	1,478,402	570,924	35.9	11.1	11.5	8	PS-3	
P IX.5 L	12-in.	1	04-29-92	1,480,960	571,538	37.4	9.6	12.5	6	PS-3	
P X R	12-in.	1	04-29-92	1,482,806	571,513	37.3	9.7	11.5	7	PS-3	
P X.5 C	12-in.	1	04-29-92	1,485,396	572,215	38.2	8.8	19.0	6	PS-3	

TABLE 3.2. (contd)

Station	Core Size	Replicate	Date Collected	California State Plane Coordinates (Zone III) East (X)	North (Y)	Depth (-ft MLLW)	Core Required to -47 ft MLLW (ft)	Total Core Collected (ft)	Mudline to -47 ft MLLW Volume Contributed (gal)	to Composite	Comments
P XI L	12-in.	1	04-29-92	1,487,584	572,644	42.9	4.1	5.0	3	PS-4	
P XII R	12-in.	1	04-28-92	1,489,548	571,423	40.9	6.1	6.1	5	PS-4	
P XII RR	12-in.	1	04-28-92	1,489,570	571,167	41.2	5.8	10.5	7	PS-4	
P XII.5 R	12-in.	1	04-28-92	1,490,814	571,342	33.3	13.7	16.5	9	PS-4	
P XII.5 C	12-in.	1	04-28-92	1,490,699	571,887	43.5	3.5	4.0	3.5	PS-4	
P XIII R	12-in.	1	04-28-92	1,493,176	571,963	38.7	8.3	11.8	6	PS-4	
P XIII L	12-in.	1	04-28-92	1,493,016	572,670	43.5	3.5	8.0	3	PS-4	
P XIV C	12-in.	1	04-28-92	1,495,892	573,010	43.3	3.7	10.0	3	PS-4	
Carquinez Strait											
CS-1-B	12-in.	1	04-28-92	1,533,244	563,795	42.0	5.0	12.0	10	CS-1	
CS-1-A	12-in.	1	04-28-92	1,533,080	564,312	42.0	5.0	4.0	10	CS-1	
CS-1-C	12-in.	1	04-28-92	1,532,522	564,313	40.3	6.7	7.7	13	CS-1	

(a) Coordinates are for planned sampling location.
(b) NA Not applicable.

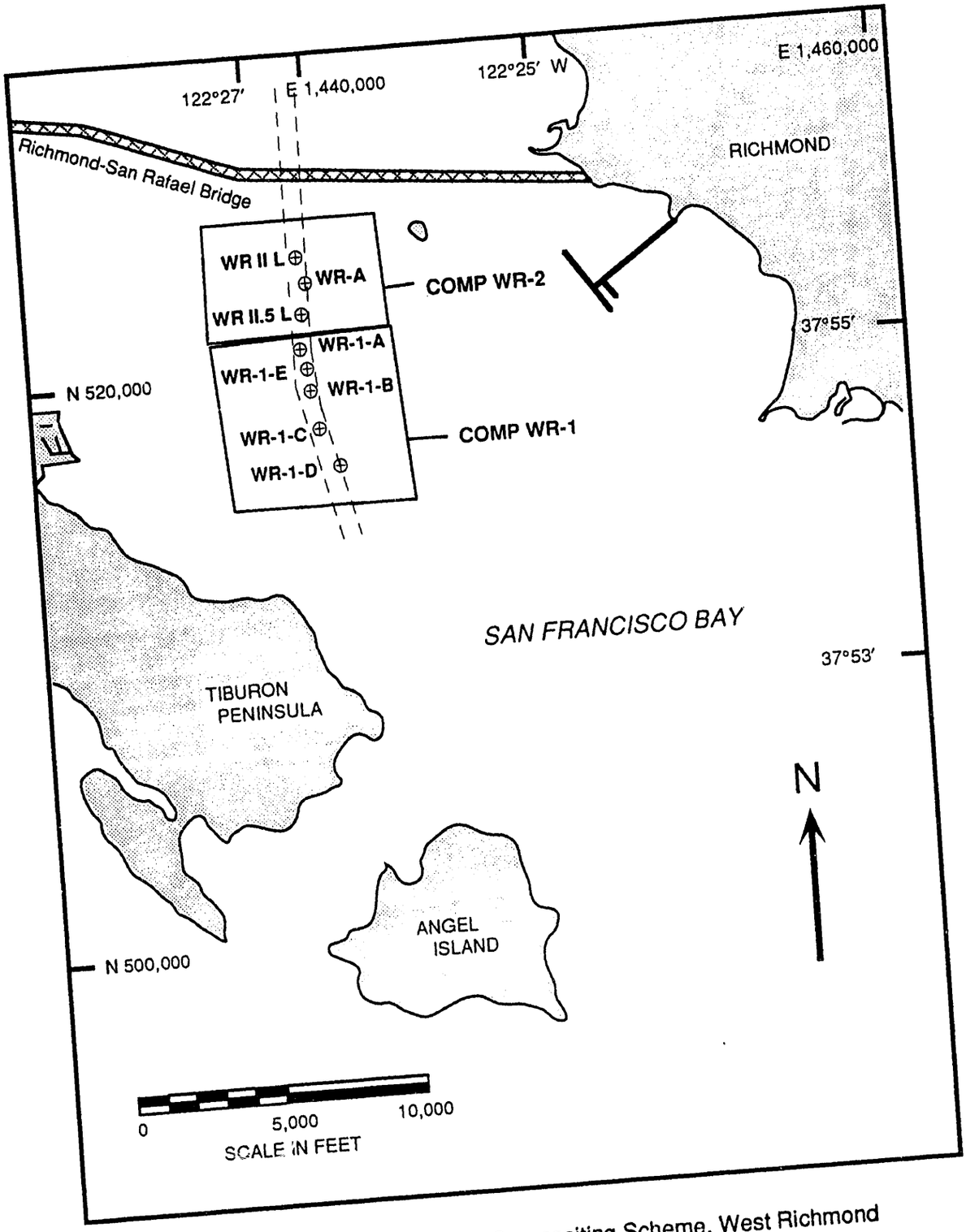


FIGURE 3.1. Sampling Stations and Compositing Scheme, West Richmond Reach of the John F. Baldwin Ship Channel

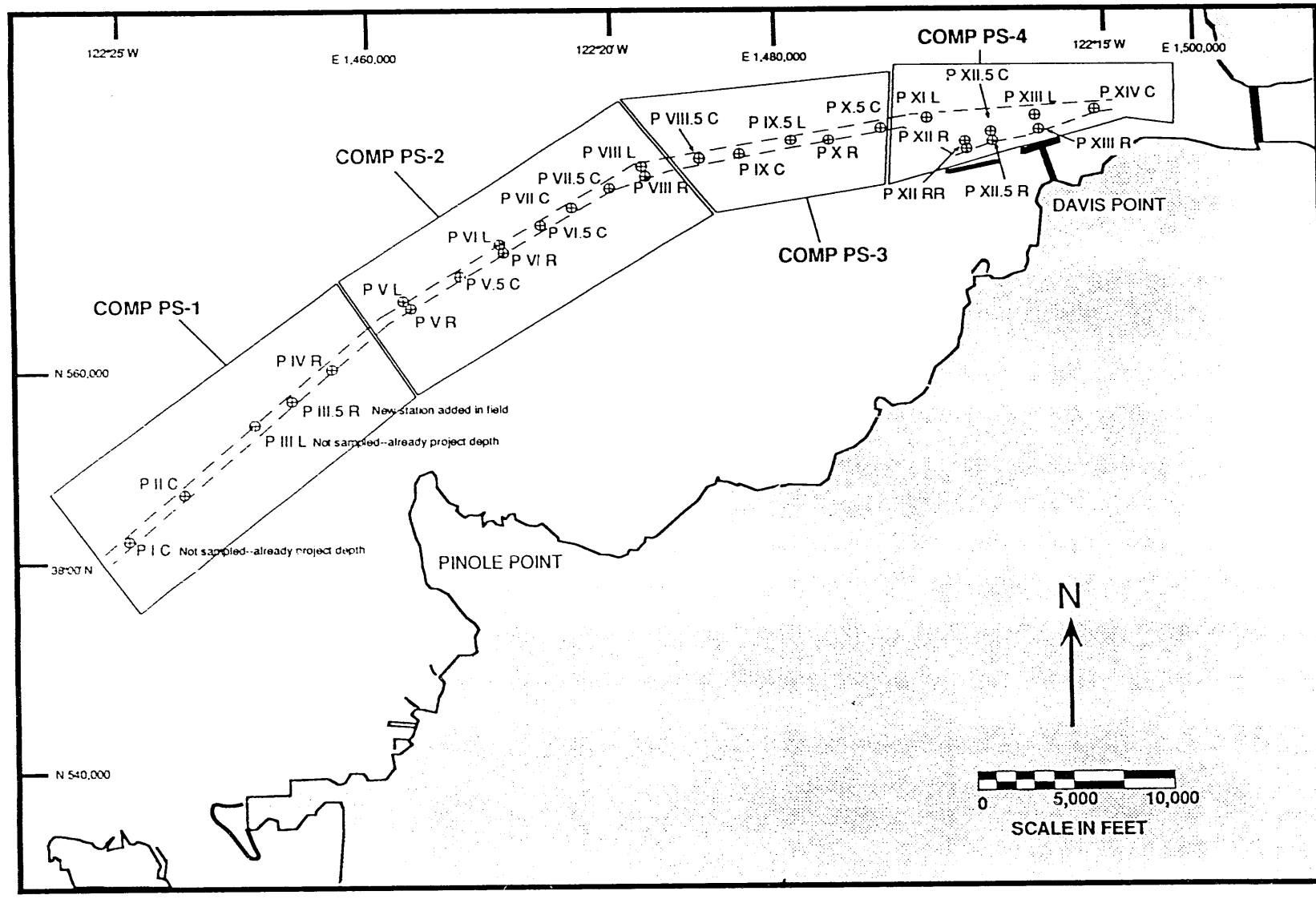


FIGURE 3.2. Sampling Stations and Compositing Scheme, Pinole Shoal of the John F. Baldwin Ship Channel

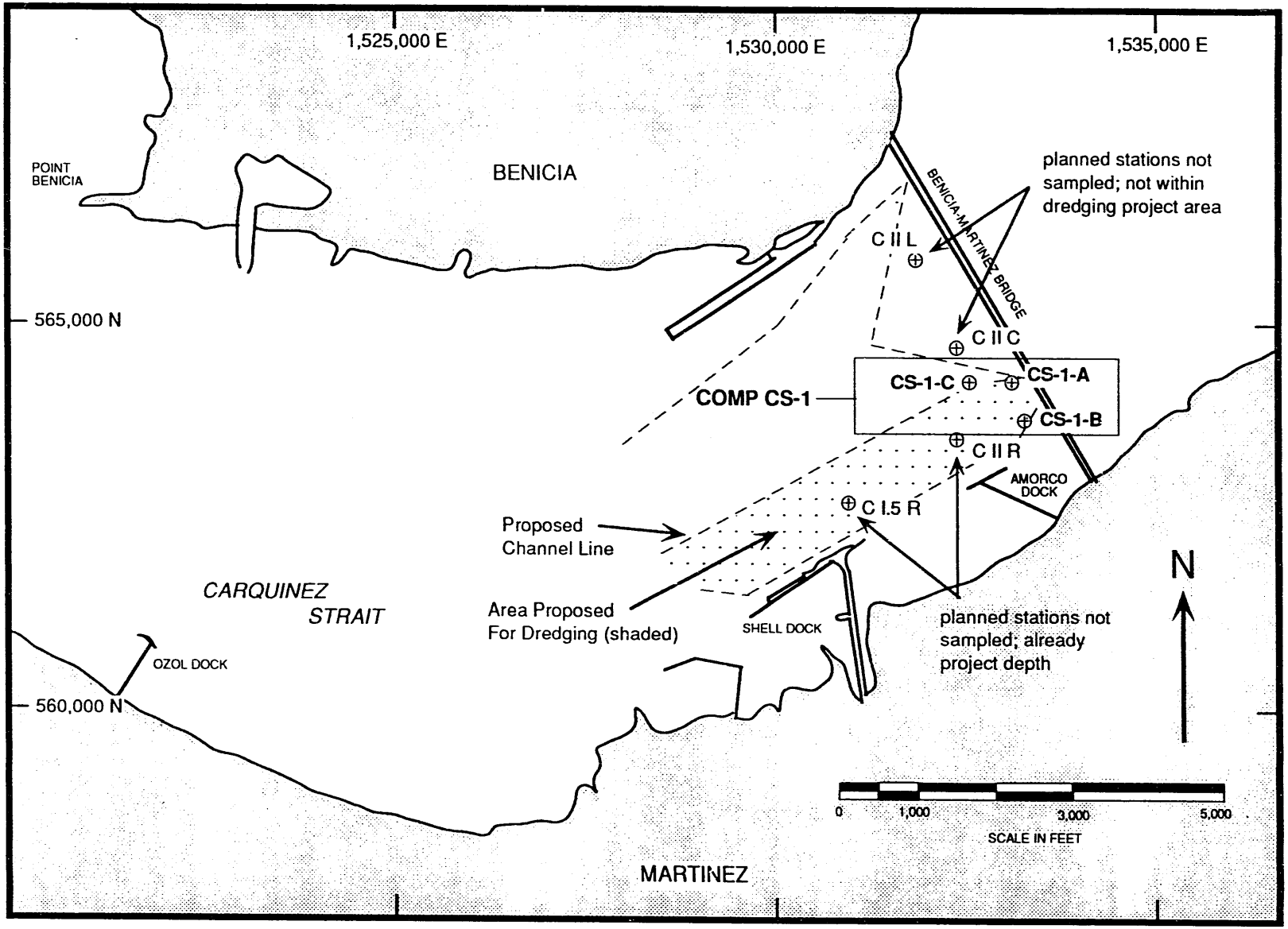


FIGURE 3.3. Sampling Stations and Compositing Scheme, Carquinez Strait of the John F. Baldwin Ship Channel

In Carquinez Strait, three planned sites ended up being located outside the channel area to be dredged, and therefore were not visited. Coordinates for three new sites were plotted in the field, all of them located immediately downstream (west) of the Benicia-Martinez Bridge (Figure 3.3), where the channel will be deepened to allow ships to pass safely under the bridge. Sampling at these locations was extremely difficult because of existing depth, currents, and proximity to the bridge.

3.1.2 Reference and Control Sediment Sampling

Sampling information for reference and control sediment collection is presented in Table 3.3. Surface sediment from the Bay Farm and Deep Off-Shelf reference areas were collected using a pipe dredge deployed from the F/V Cobra as described in Section 2.1.2. The Bay Farm reference area, located in San Francisco Bay (Figure 3.4), had four sampling sites from which sediments were composited to form a sample representative of the area. The Deep Off-Shelf reference area is located approximately 50 nautical miles southwest of the Golden Gate (Figure 3.5), off the continental shelf, in about 4200 ft of water. Control sediment for use in solid-phase toxicity tests was collected from Sequim Bay, Washington (Figure 3.6); West Beach, Washington (Figure 3.7); and Tomales Bay, California (Figure 3.8), as described in Section 2.1.2. Sequim Bay sediment (C-SB) was used in all solid-phase tests as an experimental control as well as for the native control for the clam *M. nasuta*. West Beach control sediment (C-WB) was used only as the native control for the amphipod *R. abronius*. Tomales Bay is the source of native sediment for the polychaete *N. caecoides*, and was used in both 10-day and 28-day tests with that organism.

3.1.3 Sample Preparation

John F. Baldwin Ship Channel sediment composites, 4-in. cores, reference sediments, and control sediments were processed as soon as they were received at MSL. The composites, consisting of the material between the mudline and -47 ft MLLW from each contributing station for a total of approximately 30 gal of sediment, were thoroughly homogenized before biological and chemical testing. The 4-in. cores were described by a geologist (Section 2.2.2) before the sediment between the mudline and -47 ft MLLW was removed and homogenized for sediment chemistry. Reference and control sediments were press-sieved through 0.5- or 1.0-mm mesh to remove organisms, and then were thoroughly homogenized before testing. Table 3.4 summarizes the chemical and biological testing strategy for all John F. Baldwin Ship Channel sediment samples.

TABLE 3.3. Sampling Information for Reference and Control Sediments

TABLE 3.3. Sampling Information for Reference and Control Sediments

Reference Area	Station	Replicate	Date Collected	Station Location		Depth (ft)	Comments
				Latitude (N)	Longitude (W)		
Deep Off-Shelf Site (R-OS)	R-OS	1	04-28-92	37°24.10'	123°13.84'	4200	Gravel, coarse sand, clay. Not used in R-OS because of coarse consistency
	R-OS	2	04-28-92	37°24.39'	123°14.95'	4000	Dredge empty, no sample
	R-OS	3	04-28-92	37°24.39'	123°14.18'	4100	Silt
	R-OS	4	04-28-92	37°24.46'	123°14.73'	4300	Dredge empty, no sample
	R-OS	5	04-28-92	37°24.43'	123°14.20'	4028	Silt
	R-OS	6	o4-28-92	37°24.38'	123°14.02'	4300	Silt
	R-OS	7	o4-28-92	37°24.09'	123°13.96'	4600	Silt
Bay Farm (R-BF)	R-BF 2	1	04-29-92	37°44.55'	122°16.87'	22	Silt
	R-BF 3	1	04-29-92	37°44.34'	122°16.71'	32	Silt
	R-BF 4	1	04-29-92	37°44.39'	122°16.49'	32	Silt
	R-BF 5	1	04-29-92	37°44.53'	122°16.65'	31	Silt
Sequim Bay Control (C-SB)	C-SB	1	05-05-92	48°03.70'	123°01.50'	25	
Nephtys Control (C-NE)	C-NE	1	05-01-92	38°13.83'	122°57.67'	intertidal	
West Beach Control (C-WB)	C-WB	1	05-01-92	48°23.83'	122°40.00'	15	

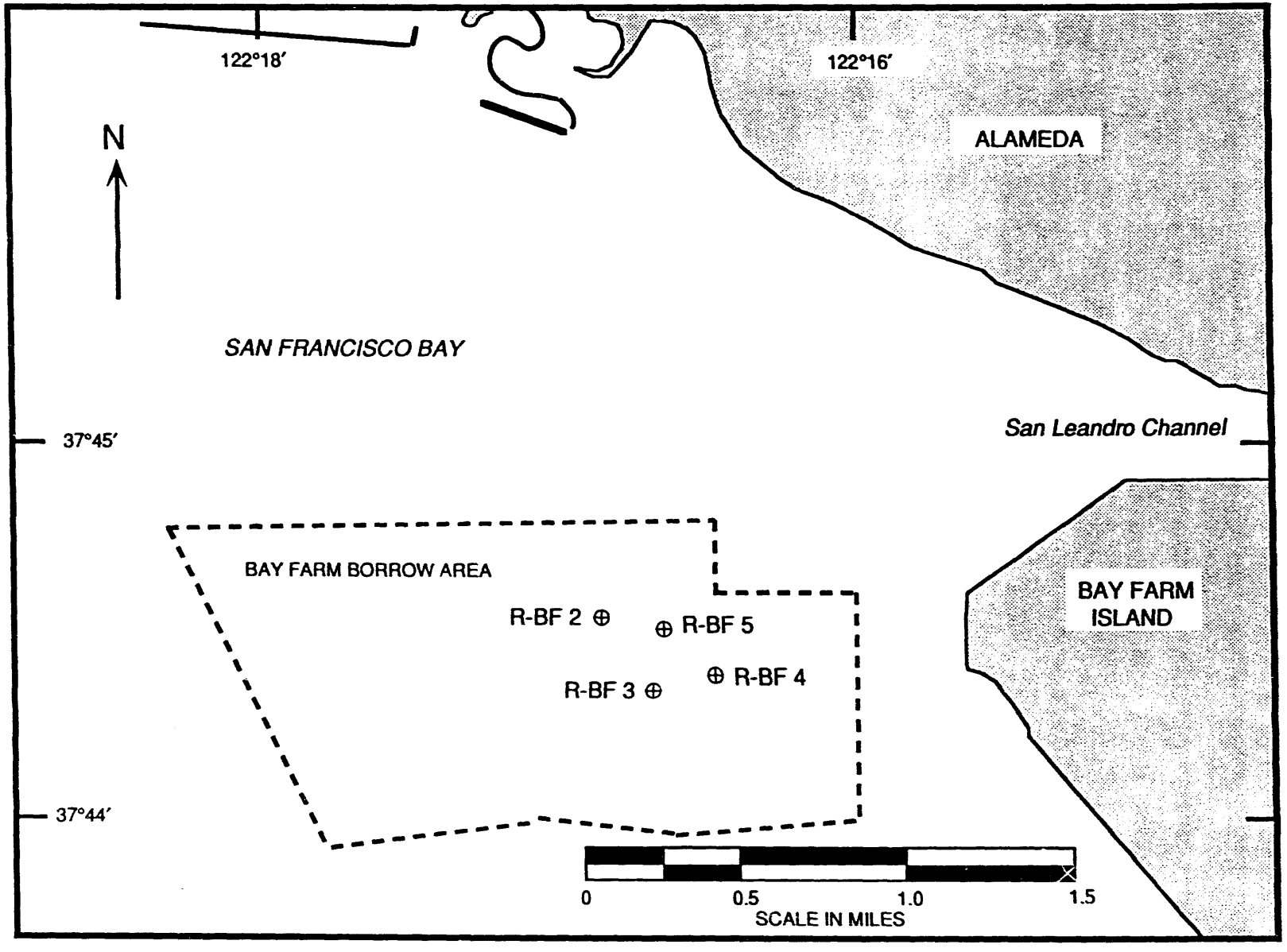


FIGURE 3.4. Sampling Stations in the Bay Farm Reference Area (R-BF)

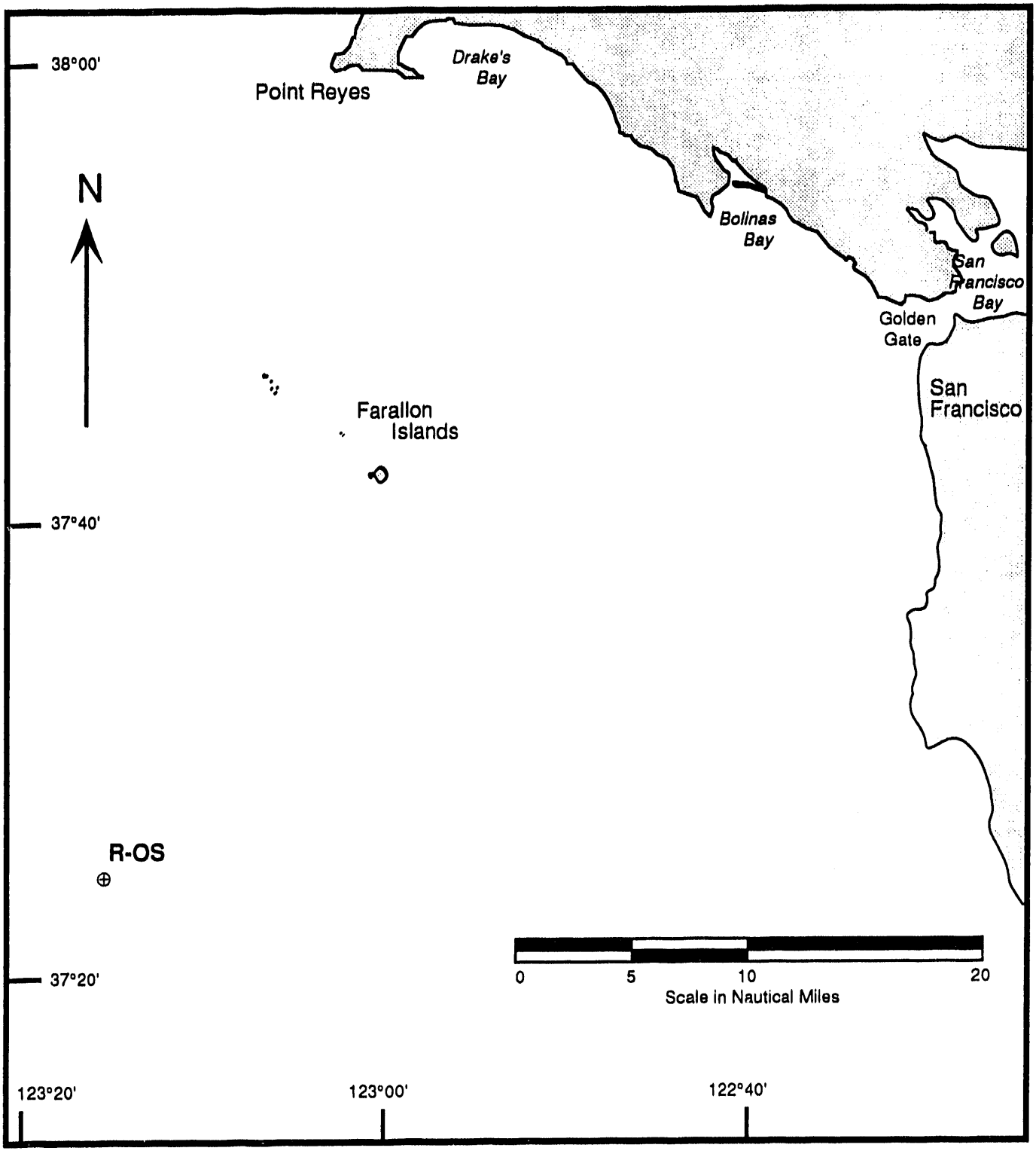


FIGURE 3.5. Location of the Deep Off-Shelf Reference Site (R-OS)

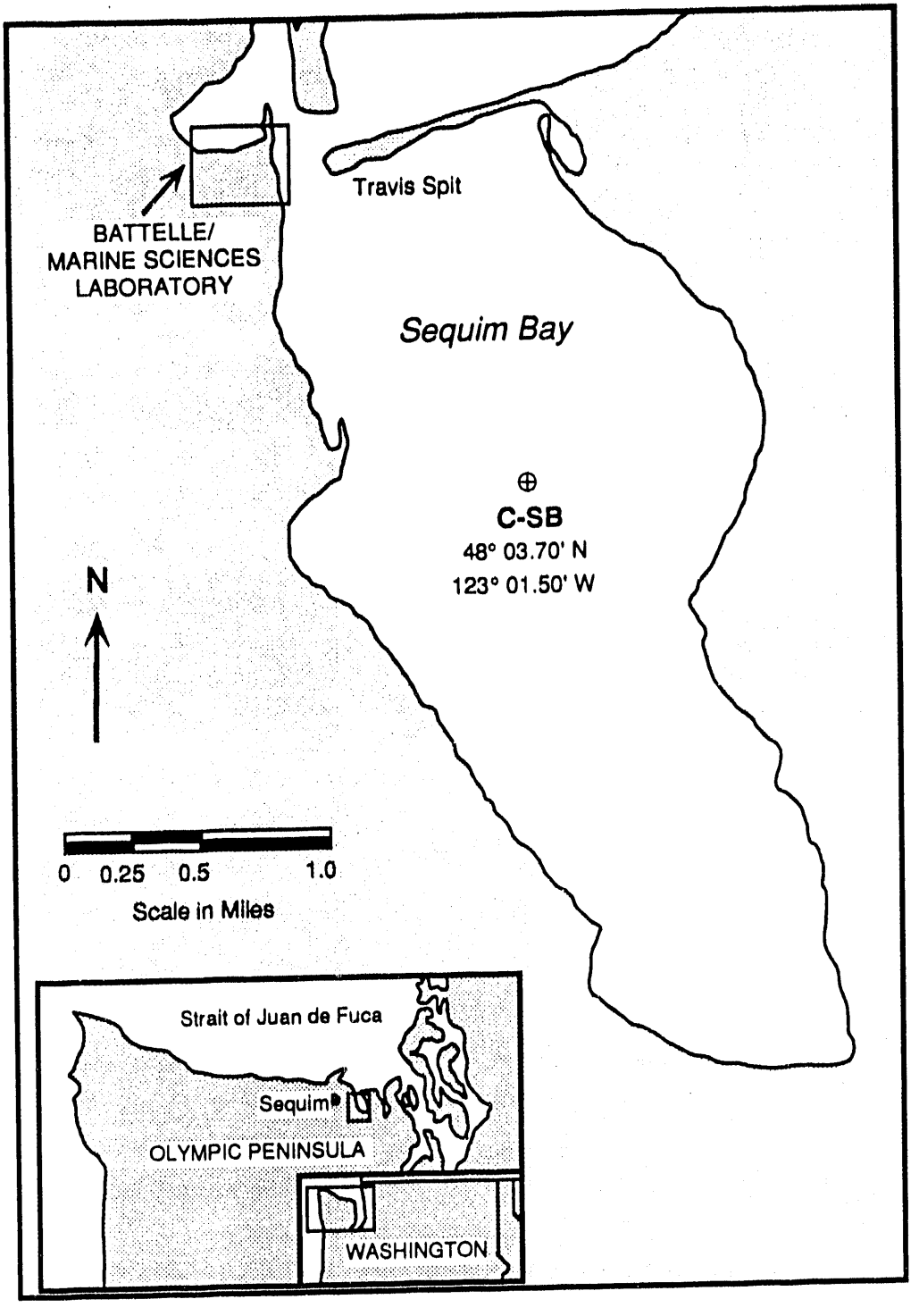


FIGURE 3.6. Location of the Sequim Bay Control Site (C-SB)

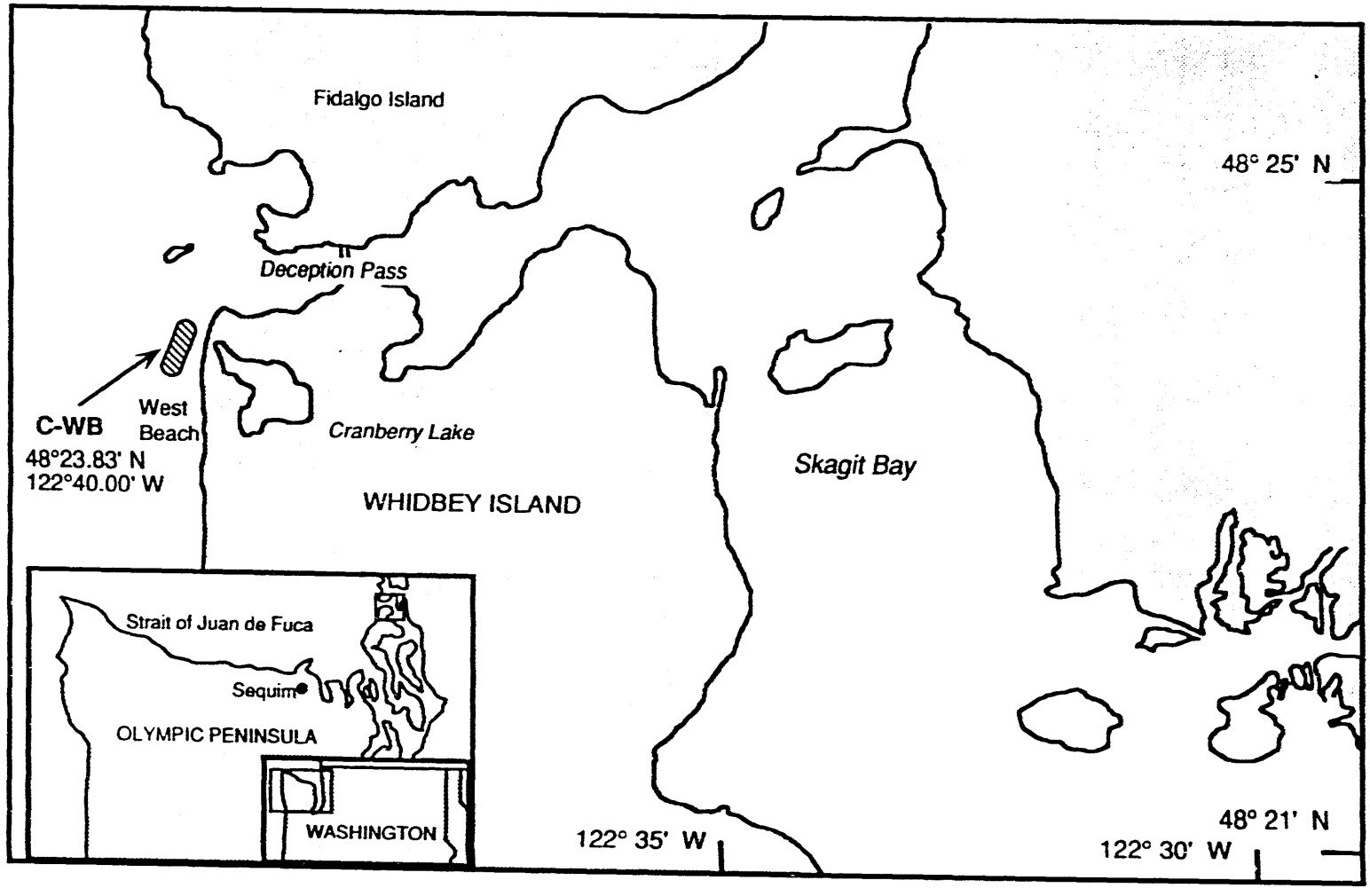


FIGURE 3.7. Location of the West Beach Control Site (C-WB)

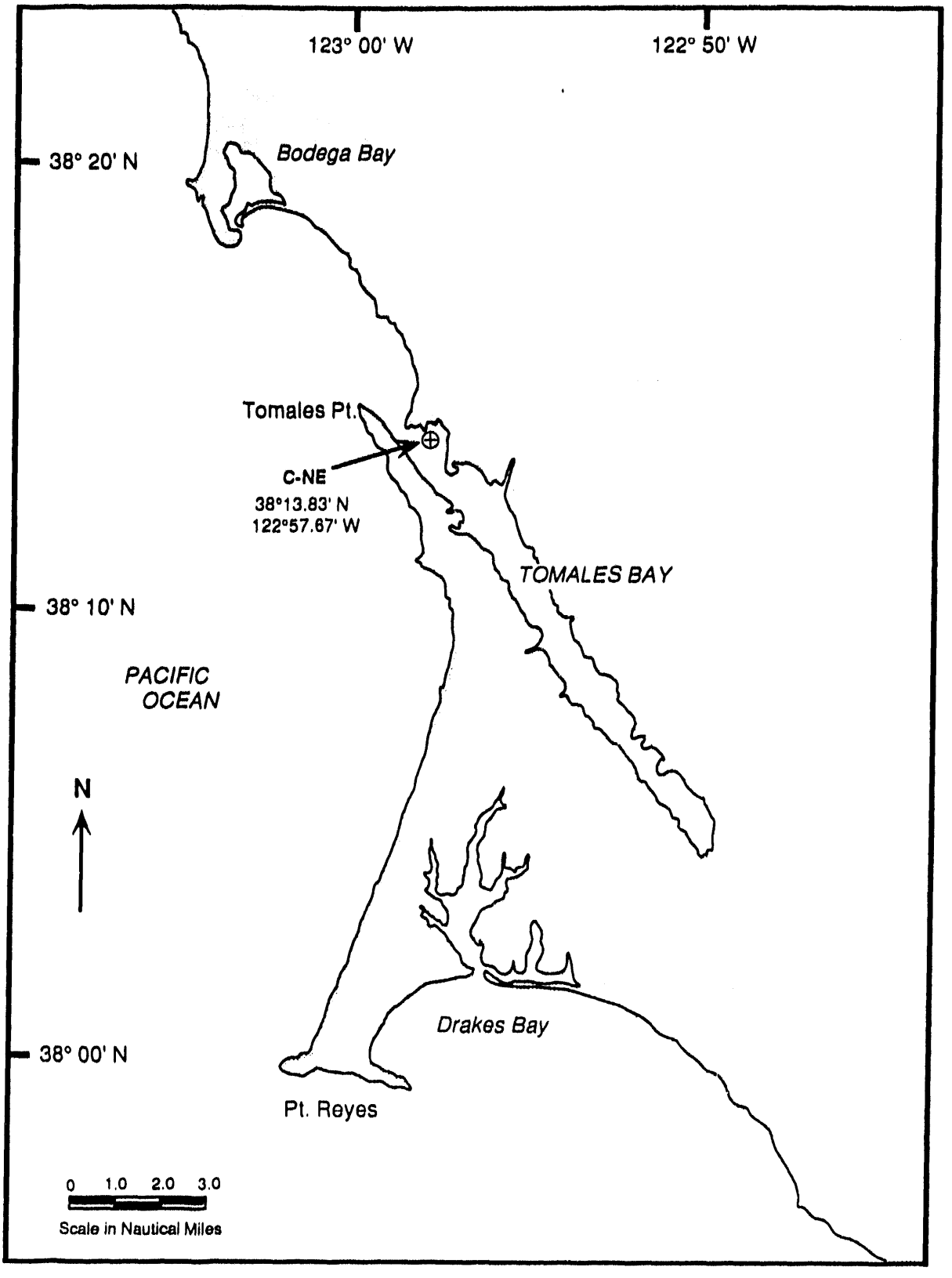


FIGURE 3.8. Location of the Tomales Bay Control Site (C-NE)

TABLE 3.4. Sediment Samples and Testing Strategy, John F. Baldwin Ship Channel

Sediment Treatment	Core Size (in.)	Vertical Segment	Mudline (-ft MLLW)	Sediment Chemistry	SPP Testing	Solid-Phase Testing	Bioaccumulation Testing
COMP WR-1	12	Mudline to -47 ft MLLW	NA[a]	YES	YES	YES	YES
WR-1-D	4	Mudline to -47 ft MLLW	42.1	YES	NO	NO	NO
WR-1-C	4	Mudline to -47 ft MLLW	43.8	YES	NO	NO	NO
WR-1-B	4	Mudline to -47 ft MLLW	37.4	YES	NO	NO	NO
WR-1-E	4	Mudline to -47 ft MLLW	37.6	YES	NO	NO	NO
WR-1-A	4	Mudline to -47 ft MLLW	39.2	YES	NO	NO	NO
COMP WR-2	12	Mudline to -47 ft MLLW	NA	YES	YES	YES	YES
WR II.5 L	4	Mudline to -47 ft MLLW	36.6	YES	NO	NO	NO
WR-A	4	Mudline to -47 ft MLLW	38.8	YES	NO	NO	NO
WR II L	4	Mudline to -47 ft MLLW	39.8	YES	NO	NO	NO
WR I.5 C	NA	Not Sampled: Already Project Depth	NA	NA	NA	NA	NA
WR I R	NA	Not Sampled: Already Project Depth	NA	NA	NA	NA	NA
COMP PS-1	12	Mudline to -47 ft MLLW	NA	YES	YES	YES	YES
P I C	NA	Not Sampled: Already Project Depth	NA	NA	NA	NA	NA
P II C	4	Mudline to -47 ft MLLW	44.6	YES	NO	NO	NO
P III L	NA	Not Sampled: Already Project Depth	NA	NA	NA	NA	NA
P III.5 R	4	Mudline to -47 ft MLLW	41.9	YES	NO	NO	NO
P IV R	4	Mudline to -47 ft MLLW	37.3	YES	NO	NO	NO
COMP PS-2	12	Mudline to -47 ft MLLW	NA	YES	YES	YES	YES
P V L	4	Mudline to -47 ft MLLW	39.1	YES	NO	NO	NO
P V R	4	Mudline to -47 ft MLLW	37.4	YES	NO	NO	NO
P V.5 C	4	Mudline to -47 ft MLLW	38.1	YES	NO	NO	NO
P VI L	4	Mudline to -47 ft MLLW	38.1	YES	NO	NO	NO
P VI R	4	Mudline to -47 ft MLLW	35.8	YES	NO	NO	NO
P VI.5 C	4	Mudline to -47 ft MLLW	38.4	YES	NO	NO	NO
P VII C	4	Mudline to -47 ft MLLW	38.2	YES	NO	NO	NO
P VII.5 C	4	Mudline to -47 ft MLLW	39.2	YES	NO	NO	NO
P VIII L	4	Mudline to -47 ft MLLW	38.3	YES	NO	NO	NO
P VIII R	4	Mudline to -47 ft MLLW	35.8	YES	NO	NO	NO
COMP PS-3	12	Mudline to -47 ft MLLW	NA	YES	YES	YES	YES
P VIII.5 C	4	Mudline to -47 ft MLLW	37	YES	NO	NO	NO
P IX C	4	Mudline to -47 ft MLLW	35.9	YES	NO	NO	NO
P IX.5 L	4	Mudline to -47 ft MLLW	37.4	YES	NO	NO	NO
P X R	4	Mudline to -44.3 ft MLLW [b]	37.3	YES	NO	NO	NO
P X.5 C	4	Mudline to -47 ft MLLW	38.2	YES	NO	NO	NO
COMP PS-4	12	Mudline to -47 ft MLLW	NA	YES	YES	YES	YES
P XI L	4	Mudline to -47 ft MLLW	42.9	YES	NO	NO	NO
P XII RR	4	Mudline to -46.8 ft MLLW	41.2	YES	NO	NO	NO
P XII R	4	Mudline to -46.2 ft MLLW	40.9	YES	NO	NO	NO
P XII.5 R	4	Mudline to -47 ft MLLW	33.3	YES	NO	NO	NO
P XII.5 C	4	Mudline to -47 ft MLLW	43.5	YES	NO	NO	NO
P XIII R	4	Mudline to -47 ft MLLW	38.7	YES	NO	NO	NO
P XIII L	4	Mudline to -47 ft MLLW	43.5	YES	NO	NO	NO
P XIV C	4	Mudline to -47 ft MLLW	43.3	YES	NO	NO	NO

TABLE 3.4. (contd)

Sediment Treatment	Core Size (in.)	Vertical Segment	Mudline (-ft MLLW)	Sediment Chemistry	SPP Testing	Solid-Phase Testing	Bioaccumulation Testing
COMP CS-1	12	Mudline to -47 ft MLLW	NA	YES	YES	YES	YES
C II L	NA	Not Sampled: Outside of Project Area	NA	NA	NA	NA	NA
C II C	NA	Not Sampled: Outside of Project Area	NA	NA	NA	NA	NA
C II R	NA	Not Sampled: Already Project Depth	>45	NA	NA	NA	NA
C I.5 L	NA	Not Sampled: Already Project Depth	>45	NA	NA	NA	NA
CS-1-A	4	Mudline to -47 ft MLLW	42	YES	NO	NO	NO
CS-1-B	4	Mudline to -47 ft MLLW	42	YES	NO	NO	NO
CS-1-C	4	Mudline to -47 ft MLLW	40.3	YES	NO	NO	NO
R-BF	grab	NA	NA	YES	NO	YES	YES
R-OS	grab	NA	NA	YES	NO	YES	YES
C-SB	grab	NA	NA	YES	NO	YES	YES(c)
C-NE	grab	NA	NA	YES	NO	YES	YES(c)
C-WB	grab	NA	NA	YES	NO	YES	NO

(a) NA Not applicable.
(b) Core sample was not collected to project depth because of a subtraction error in the field log book.
(c) Tested in 28-day exposure but test organism tissues were not chemically analyzed.

3.2 GEOLOGIC DESCRIPTION

In this section, the characteristics of the sedimentary deposits in the John F. Baldwin Ship Channel are described based on the geologic core data logs for the 37 4-in. core samples that were collected in the West Richmond, Pinole Shoal, and Carquinez Strait reaches of the channel. The length of these cores ranged from 3 to 14 ft. Core locations are shown in Figures 3.1, 3.2, and 3.3. Individual core data logs for each core location are presented in Appendix A.

Three geologic units have been identified in San Francisco Bay: the Older Bay Mud Formation, the Sand Deposits, and the Younger Bay Mud (YBM) Formation, in order of decreasing age and higher stratigraphic position (USACE 1975). Only the YBM was penetrated during core sampling in the John F. Baldwin Ship Channel. The YBM is typically composed of soft, plastic, black to gray silty clay or clayey silt with minor organic material and clayey fine-grained sand. The YBM was deposited in an estuarine environment. In the John F. Baldwin Ship Channel area, particularly in the West Richmond reach, the YBM sediments contain a significant amount of sand.

The sediments underlying the John F. Baldwin Ship Channel are generally very dark gray in color and emit a slight odor of hydrogen sulfide when treated with hydrochloric acid, indicating deposition in a chemically reducing environment. They are unconsolidated and vary in consistency from very soft (clay-rich layers) to firm (sandy layers). The consistency is firmer with increasing depth because of compaction by the weight of overlying sediments.

Most sediment is deposited in San Francisco Bay during periods of high freshwater run-off in the winter and subsequently redistributed and redeposited by the action of tidal currents, mixing of fresh and saline waters, and wind and waves (USACE 1979). In channels with a water depth of greater than 25 ft, including the John F. Baldwin Ship Channel, current action is the most important sediment transport process. Current action results in the stratification of deposits and absence of vertical mixing. The relatively strong current energy is reflected in the coarser-grained character of some of the sediments as compared to the homogeneous, finer-grained YBM sediments found in shallower portions of the Bay. The numerous vertical changes in grain size reflect deposition in an environment with a fluctuating current speed.

The sediments underlying the West Richmond, Pinole Shoal, and Carquinez Strait reaches are discussed in Sections 3.2.1, 3.2.2, and 3.2.3 respectively.

3.2.1 West Richmond

Eight cores ranging from 3.5 to 10.5 ft in length were collected from the West Richmond reach. A cross section showing sediment lithology from north to south is provided in Figure 3.9. The cross section represents a distance of approximately 1.5 miles. The West Richmond sediments are composed primarily of shell-rich clayey sand and interbedded sand and silty clay. A layer of sand approximately 2 ft thick is present at the mudline, except at Stations WR-1-E and WR-1-B, which are underlain by several feet of silty clay.

The clayey sand layers are characterized by an abundance (5% to 25%) of shell fragments and whole shells. The shell hash is composed primarily of bivalve mollusc shells and fewer gastropod shells. The shell fragments commonly show a preferred orientation and occur in stratified layers, indicating reworking by current action. The presence of whole, unbroken shells suggests that they were deposited relatively close to their source area. Twigs and other organic matter are also common. The sands have a maximum grain size of medium to coarse. The sand grains are subangular to subrounded and composed primarily of quartz, muscovite, and dark gray rock fragments.

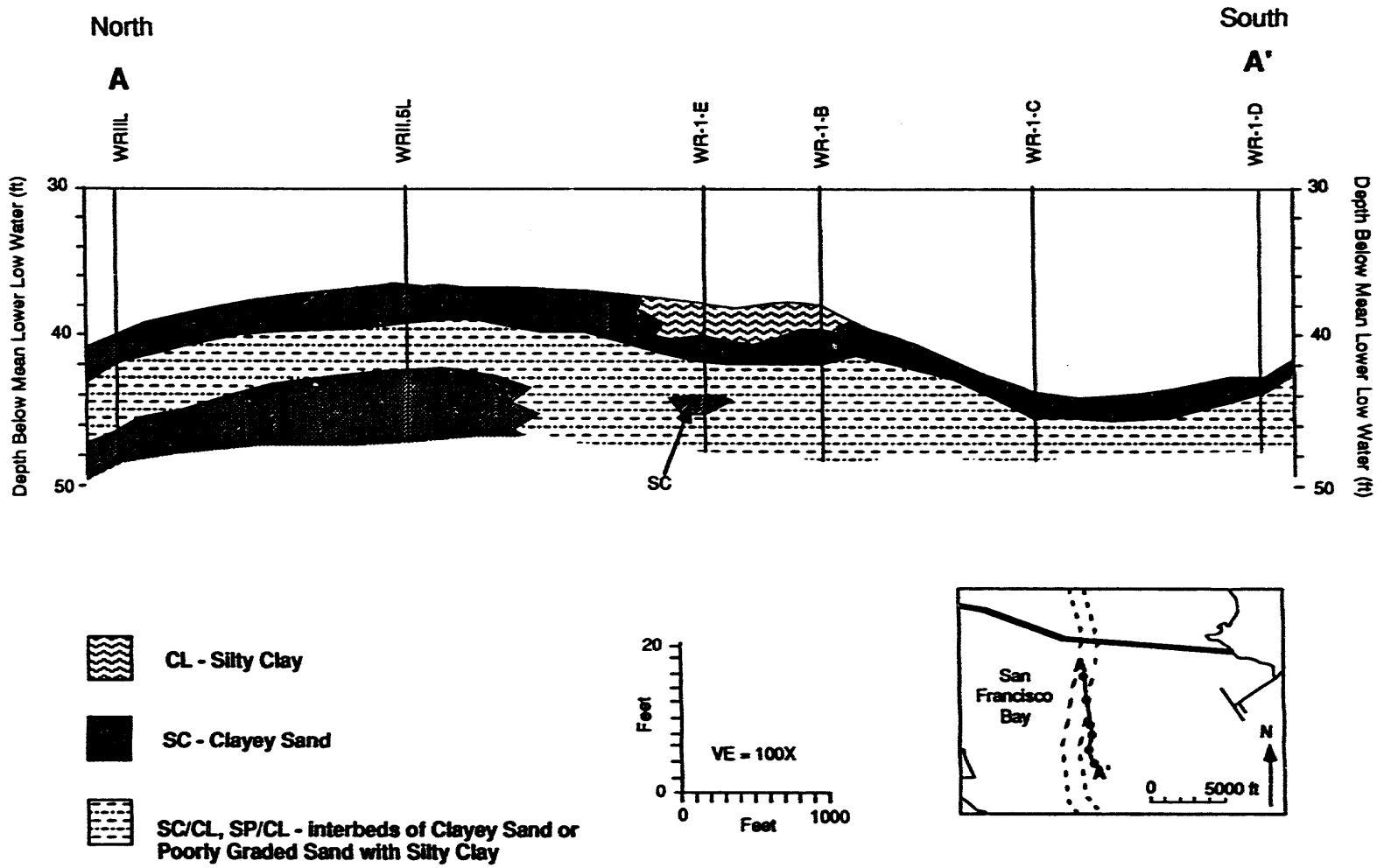


FIGURE 3.9. Sediment Lithology Along the West Richmond Reach of the John F. Baldwin Ship Channel

The interbedded sand and silty clay is composed of clayey sand to poorly graded sand with numerous lenses and laminae of silty clay. There is generally less than 5% shell material in these sediments. Twigs and other woody organic material are common.

3.2.2 Pinole Shoal

Twenty-six cores ranging from 4 to 14 ft in length were collected in the Pinole Shoal reach. Figure 3.10 shows the changes in sediment lithology along the Pinole Shoal channel from west to east, a distance of over 10 miles. Figures 3.11 and 3.12 show sediment lithology across the channel at the west end, approximately mid-way, and at the east end of the channel. Cross-channel transects represent a distance of 500 to 1000 ft.

The Pinole Shoal reach is characterized by heterogeneous sequences of sand, silty clay, and interbedded sand and clay, with more homogeneous sandy silt and silty sand at the eastern end of the channel (Stations P XIV C and P XIII R). A layer of sand several feet thick is present at the mudline, except in the deeper portions of the channel at the west end (Station P II C) and east end (Station P XIV C), which are underlain by finer-grained material.

The sand deposits are generally very dark grayish brown at the surface, indicating slight oxidation, and very dark gray at depth. The sand is poorly graded to well graded with a maximum grain size of medium sand to small pebbles. The sand grains are subangular to subrounded and composed primarily of muscovite, quartz, dark-colored grains coated with iron oxide, and shell fragments. The silty clay is dark gray to very dark gray, and generally homogeneous with few laminae of sand. The silty clay commonly contains small fragments of wood. The interbedded silty clays and poorly graded sands are very dark gray or grayish green. The sand commonly occurs in lenses or laminae and contain shell fragments. The sandy silt and silty sand at the eastern end of the channel is black to dark gray in color and rich in organic matter.

3.2.3 Carquinez Strait

Three cores were collected in Carquinez Strait. One of those cores, CS-1-C, was collected outside of the planned channel. The two cores within the channel were 5 and 5.5 ft in length. A cross section of the channel from north to south, a distance of approximately 600 ft, is shown in Figure 3.13. Carquinez Strait is underlain by silty clay with a thin layer of sand at the mudline at the north end of the channel. The silty clay is black to very dark gray in color and contains organic material and few laminae of sand.

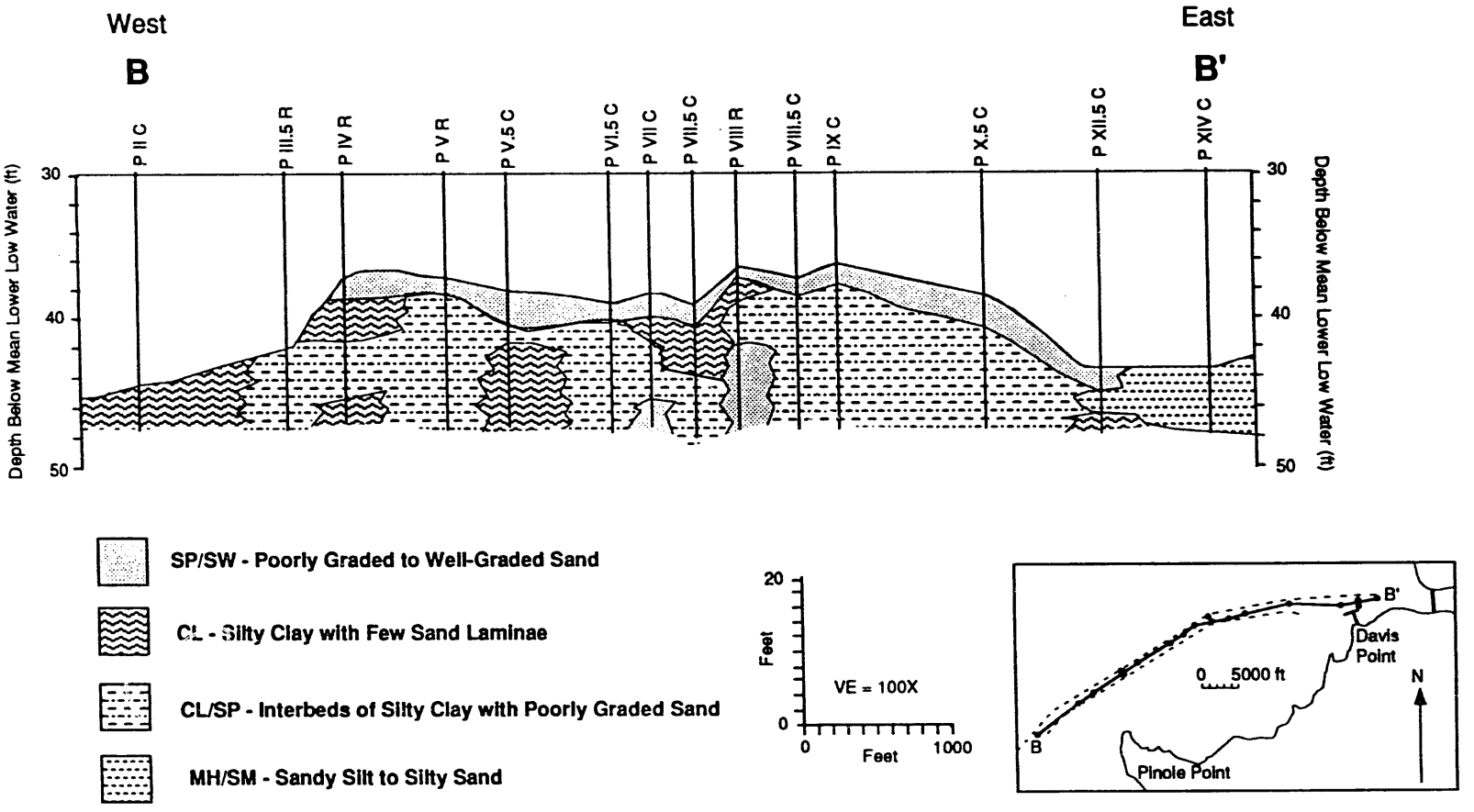


FIGURE 3.10. Sediment Lithology Along the Pinole Shoal Reach of the John F. Baldwin Ship Channel

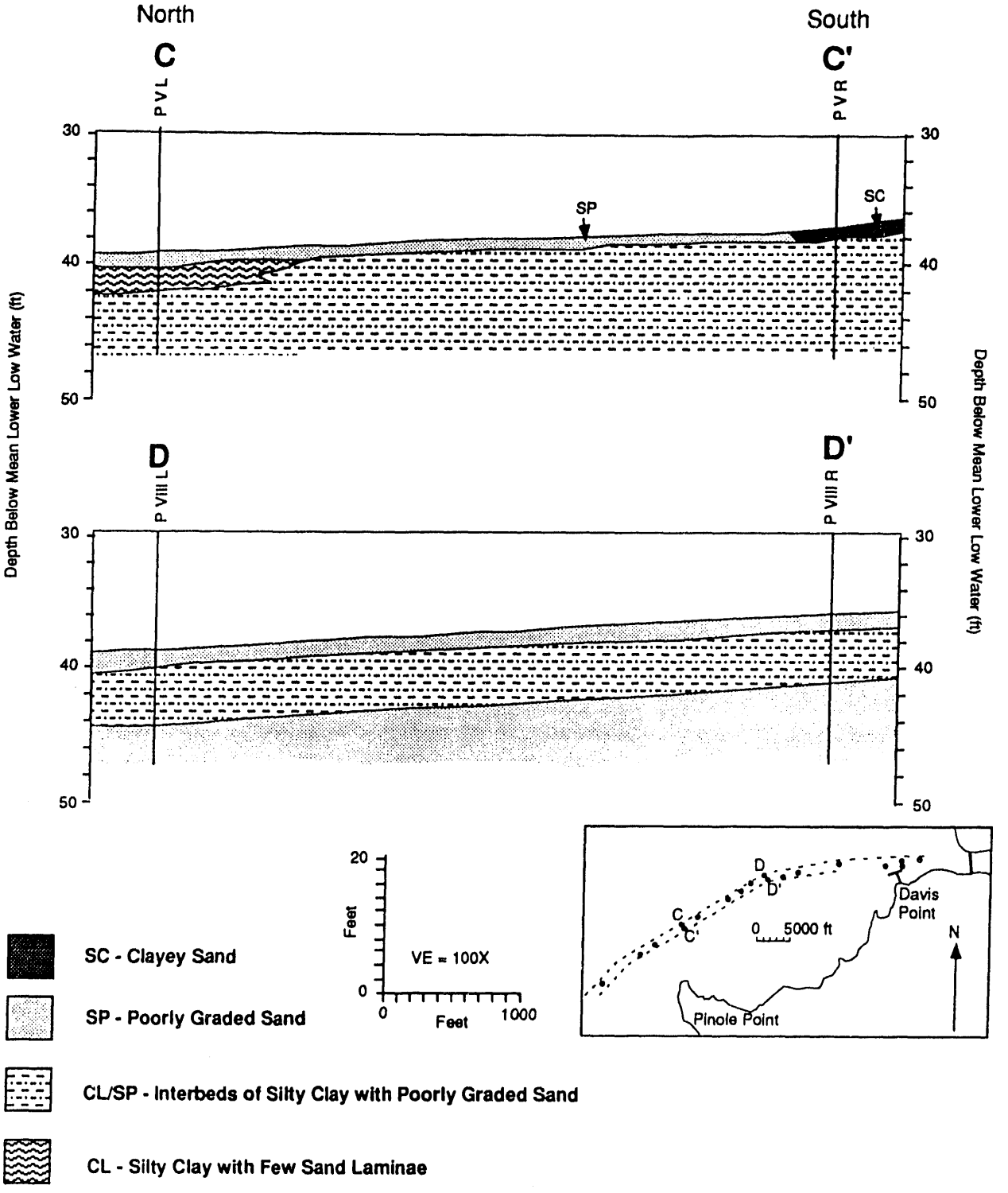


FIGURE 3.11. Sediment Lithology Along Transects P V and P VIII, Pinole Shoal Reach of the John F. Baldwin Ship Channel

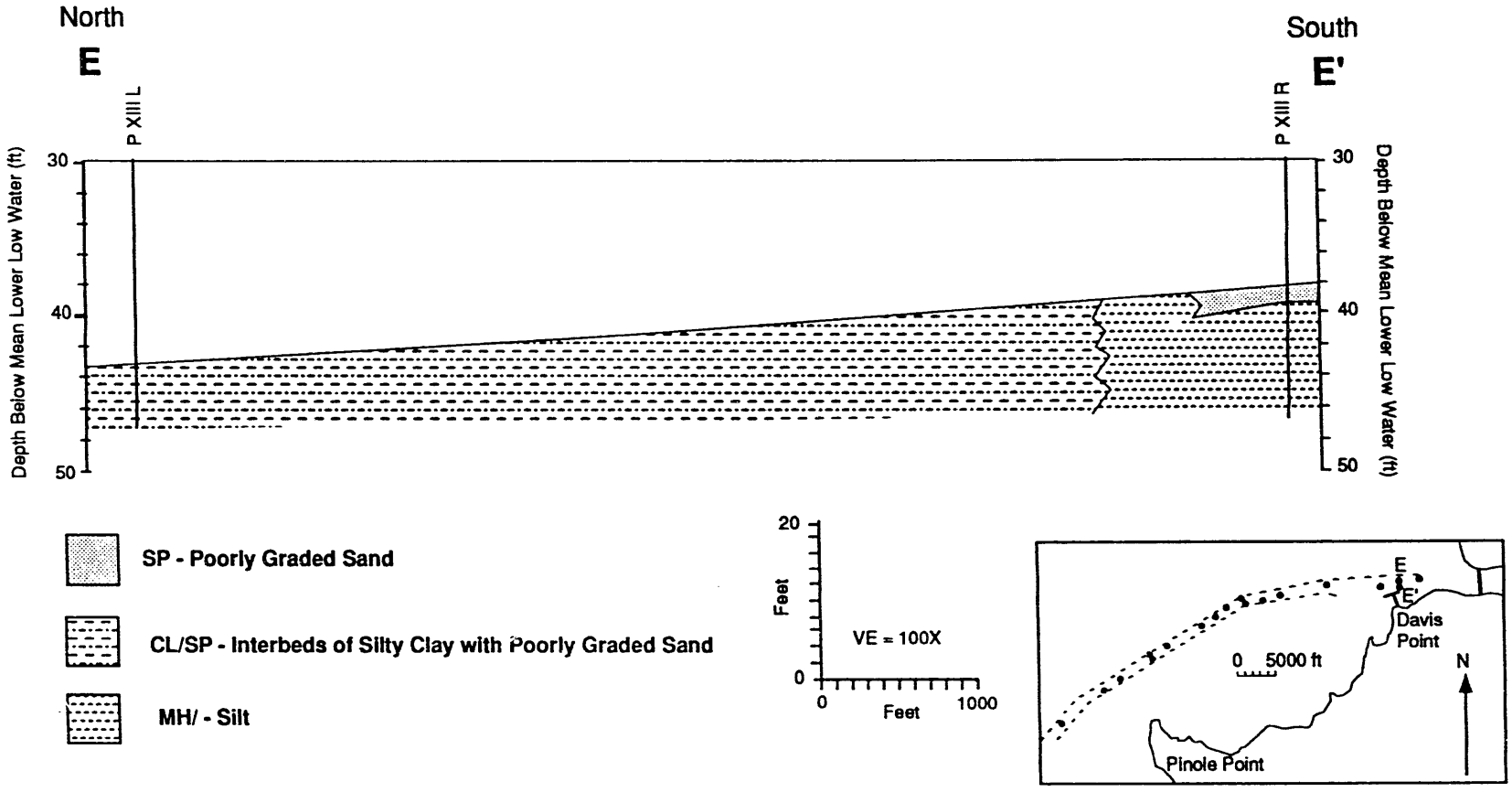


FIGURE 3.12. Sediment Lithology Along Transect P XIII, Pinole Shoal Reach of the John F. Baldwin Ship Channel

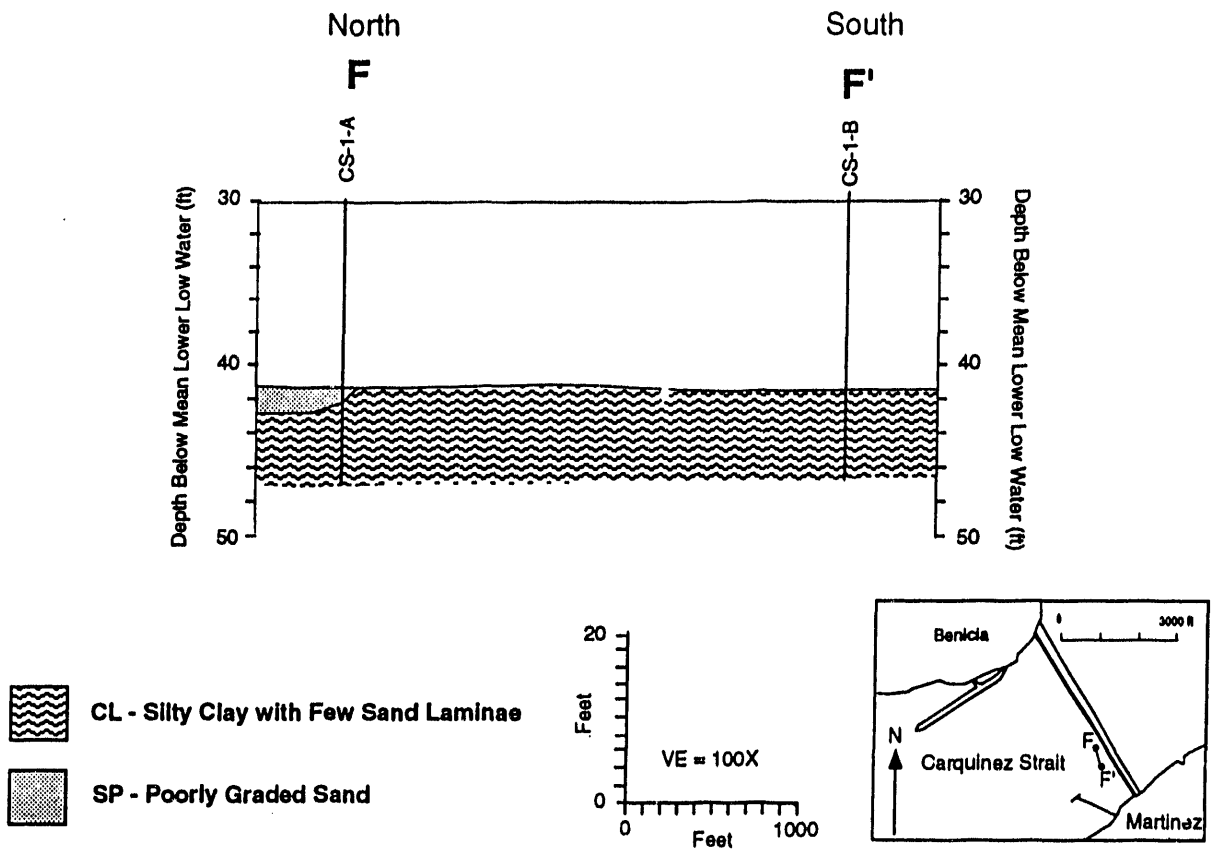


FIGURE 3.13. Sediment Lithology Along the Carquinez Strait Reach of the John F. Baldwin Ship Channel, San Pablo Bay, California

3.3 SEDIMENT CHEMISTRY RESULTS

Fifty-five sediment samples were prepared during the John F. Baldwin Ship Channel Phase III Project. Table 3.4 lists the samples and types of testing for which each sample was used. Sample preparation took place May 5 through 8, 1992, following the procedures described in Section 2.2. This section presents the results of physical and chemical analyses conducted on the sediment samples. Following sections present the results of toxicity and bioaccumulation testing.

3.3.1 Conventional Sediment Measurements

Forty-nine sediment samples were analyzed for the following conventional parameters: grain size, TOC, TVS, oil and grease, and TPH. Complete results and quality control data are contained in Appendix B, Tables B.1 through B.7. Quality control criteria for all conventional analyses were met.

Six samples were reanalyzed for TOC to verify anomalous results. Reanalysis confirmed TOC concentrations in three of these samples (P XIII L, P XIII R, and P XII.5 C). The TOC concentrations in the other three samples (COMP PS-3, C-SB, and COMP CS-1) were significantly different than the initial results. Results of the reanalyses for these samples were more consistent with historical data for these areas; therefore, they were substituted for the initial results.

A summary of conventional sediment measurements is presented in Table 3.5. Grain-size results (Table 3.5, Figure 3.14) show that the John F. Baldwin Ship Channel sediments were of widely ranging grain size, but with specific trends along the channel. The West Richmond reach was predominantly coarse-grained (>60% sand and gravel) throughout the sampling area. The Pinole Shoal reach exhibited the trend of predominantly fine-grained sediments (>70% silt and clay) at the west end of the reach beginning with station P II C, decreasing in fine sediments up the channel to stations in COMP PS-3 where the sediments were predominantly coarse-grained (>70% sand and gravel). Through COMP PS-4, the fine-grained fraction increased from 25% to 90%, with the exception of station P XIV C (40% fine). The reference sediment R-BF was mostly silt and clay (96%), while the reference sediment R-OS was equally fine- and coarse-grained. The native control sediments for *R. abronius* and *N. caecoides*, C-WB and C-NE, were mostly sand (99%). *M. nasuta* native control sediment, C-SB, was fine-grained (87% silt and clay). The grain size distribution in all seven sediment composites represented a mixture of their respective stations.

The concentrations of TOC (Table 3.5 and Figure 3.15) ranged from 0.05% in control sediment C-WB to 2.41% in C-SB. C-SB consisted of 87% silt and clay, but contained significantly more TOC than other treatments with similar grain-size distributions. The TOC concentrations in John F. Baldwin Ship Channel sediments were between 0.15% and 1.14%, and were generally well correlated with the fine-grained sediment (silt and clay) fraction (Figure 3.16). Therefore, TOC was low in the West Richmond reach (COMPs WR-1 and WR-2), high in south-

TABLE 3.5. Conventional Parameters in Sediment, John F. Baldwin Ship Channel

Sediment Treatment	Percent Dry Weight: Gravel µm ≥ 2000	Sand 62.5-2000	Silt 3.9-63	Clay ≤ 3.9	TOC	TVS	mg/kg Dry Weight: Oil and Grease	TPH	Petroleum Fraction (%)
COMP WR-1	3	68	15	14	0.33	3.58	14.1 U[a]	14.1 U	NA
WR-1-D	3	75	12	10	0.41[b]	3.11[b]	13.9 U	13.9 U	NA
WR-1-C	9	65	15	11	0.64	3.03	19.4	13.9 U	< 71
WR-1-B	7	59	18	16	0.61	4.06	18.1	15.1 U	< 83
WR-1-E	2	64	18	16	0.52	3.69	24.1	15.1 U	< 63
WR-1-A	3	71	15	11	0.56	3.39	17.2	14.3 U	< 83
COMP WR-2	5	73	11	11	0.60	3.31	13.7 U	13.7 U	NA
WR II.5 L	5	70	13	12	0.45	3.19	13.8 U	13.8 U	NA
WR-A	10	67	14	9	0.58	3.34	25.3	14.1 U	< 56
WR II L	3	74	13	10	0.45	2.71	16.6	13.8 U	< 83
COMP PS-1	1	24	42	33	0.90	5.50	24.1	20.4	85
P II C	0	7	49	44	1.14	6.12	30.4	19.0 U	< 63
P III.5 R	0[b]	14[b]	44[b]	42[b]	0.89	4.95	60.6	19.5 U	< 32
P IV R	0	31	39	30	0.86	5.04	37.8	23.4	62
COMP PS-2	0[b]	53[b]	26[b]	21[b]	0.62	4.18	37.0	29.3	79
P V L	0	15	45	40	1.04	5.94	90.3	57.1	63
P V R	0	35	35	30	0.76	4.16	62.7	23.1	37
P V.5 C	0	44	30	26	0.76	4.46	35.2[b]	22.5[b]	64
P VI L	0	21	42	37	0.86	5.43	60.1	26.7	44
P VI R	0	45	30	25	0.70	4.01	58.6	30.1	51
P VI.5 C	0	65	19	16	0.32	3.42	46.5	26.2	56
P VII C	0	38	32	30	0.78	4.66	71.8	47.3	66
P VII.5 C	0	47	31	22	0.66	3.90	32.5	25.1	77
P VIII L	0	60	20	20	0.63	4.07	88.2	44.1	50
P VIII R	0	64	19	17	0.54	3.53	56.4	50.4	89

TABLE 3.5. (contd)

Sediment Treatment	µm	Percent Dry Weight: Gravel ≥2000	Sand 62.5-2000	Silt 3.9-63	Clay <3.9	TOC	TVS	mg/kg Dry Weight: Oil and Grease	TPH	Petroleum Fraction (%)
COMP PS-3		0	85	7	8	0.20	2.26	16.7 (b)	13.5 U(b)	< 81
P VIII.5 C		0	68	17	15	0.39	2.87	48.0	20.4	42
P IX C		0	83	9	8	0.29	2.33	14.8	13.5 U	< 91
P IX.5 L		0	89	6	5	0.16	1.55	13.6(b)	12.7 U(b)	< 91
P X R		0	83	8	9	0.22	2.32	13.0 U	13.0 U	NA
P X.5 C		1	86	8	5	0.18	2.10	13.1 U	13.1 U	NA
COMP PS-4		0	42	29	29	0.48	5.58	43.2	24.0	56
P XI L		1	73	14	12	0.36	2.55	13.7 U	13.7 U	NA
P XII RR		0	62	19	19	0.37	3.65	26.9	14.2 U	< 53
P XII R		0(b)	63(b)	18(b)	19(b)	0.34	3.86	18.5	14.2 U	< 77
P XII.5 R		0	28	34	38	0.74	6.17	135.4	87.4	65
P XII.5 C		0	26	38	36	0.39	6.61	33.6	16.0 U	< 48
P XIII R		0	22	39	39	0.47	6.62	21.8	16.8 U	< 77
P XIII L		0	9	41	50	0.39	7.49	21.9	18.3 U	< 83
P XIV C		0	60	18	22	0.62(b)	4.44(b)	111.8	91.3	82
COMP CS-1		1	62	17	20	0.42	4.09	14.6 U	14.6 U	NA
CS-1-A		0	32	32	36	0.42	6.20	37.8	37.8	100
CS-1-B		0	11	34	55	0.74	7.99	50.3	21.3	42
CS-1-C		0	75	13	12	0.15	2.56	12.6 U	12.6 U	NA
R-BF		0	4	54	42	1.10	7.60	155.8	119.4	77
R-OS		0	50	29	21	0.75(b)	3.59(b)	29.2	17.2 U	< 59
C-SB		0	13	49	38	2.41	7.82	152.8	29.4 U	< 19
C-NE		0	99	1	0	0.06	0.88	12.3 U	12.3 U	NA
C-WB		0	99	0	1	0.05	0.83	12.2 U	12.2 U	NA

(a) U Undetected above given concentration.
(b) Value is mean of three replicates.

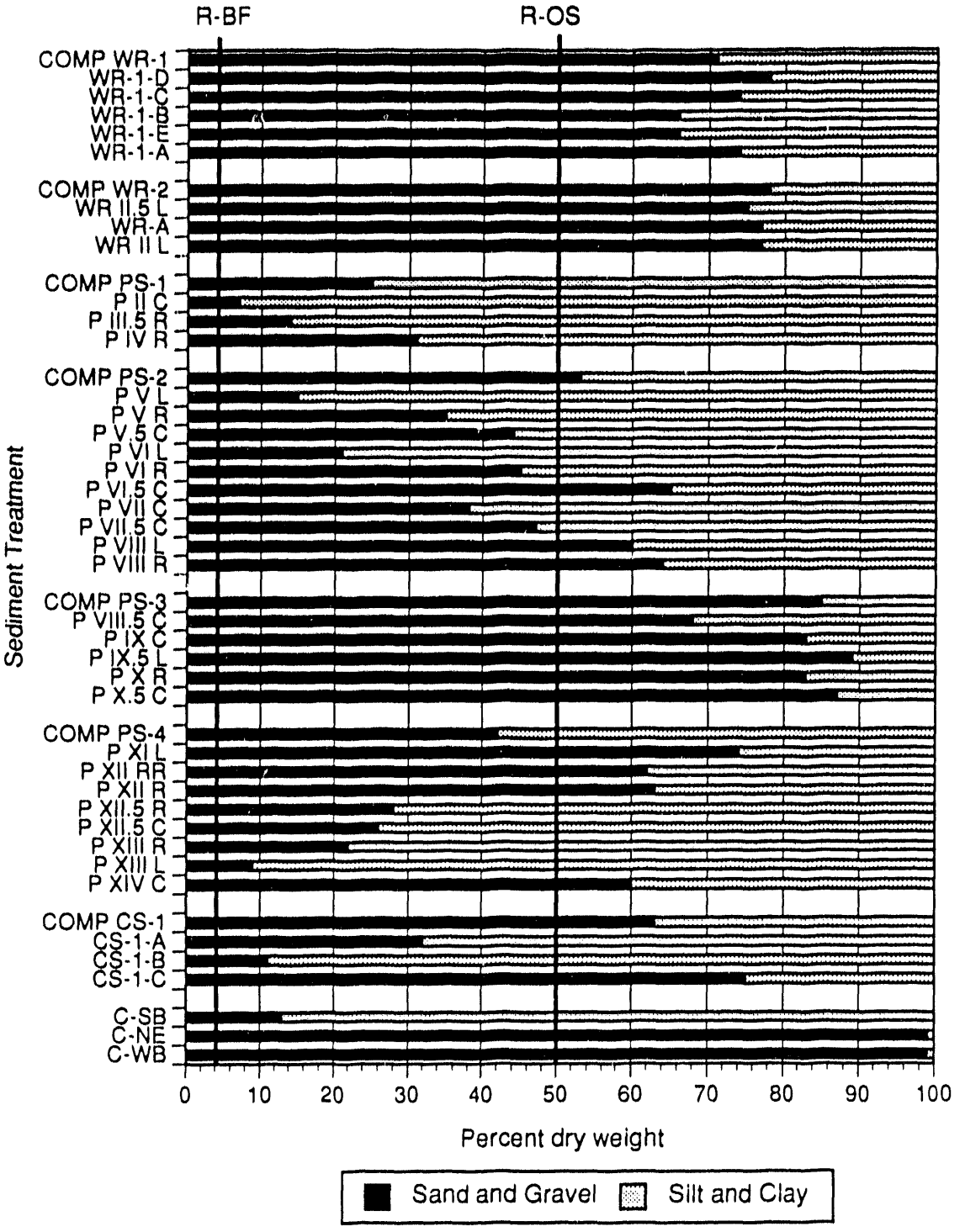


FIGURE 3.14. Grain-Size Distribution in John F. Baldwin Ship Channel Sediments (vertical lines indicate percent gravel and sand in reference sediments)

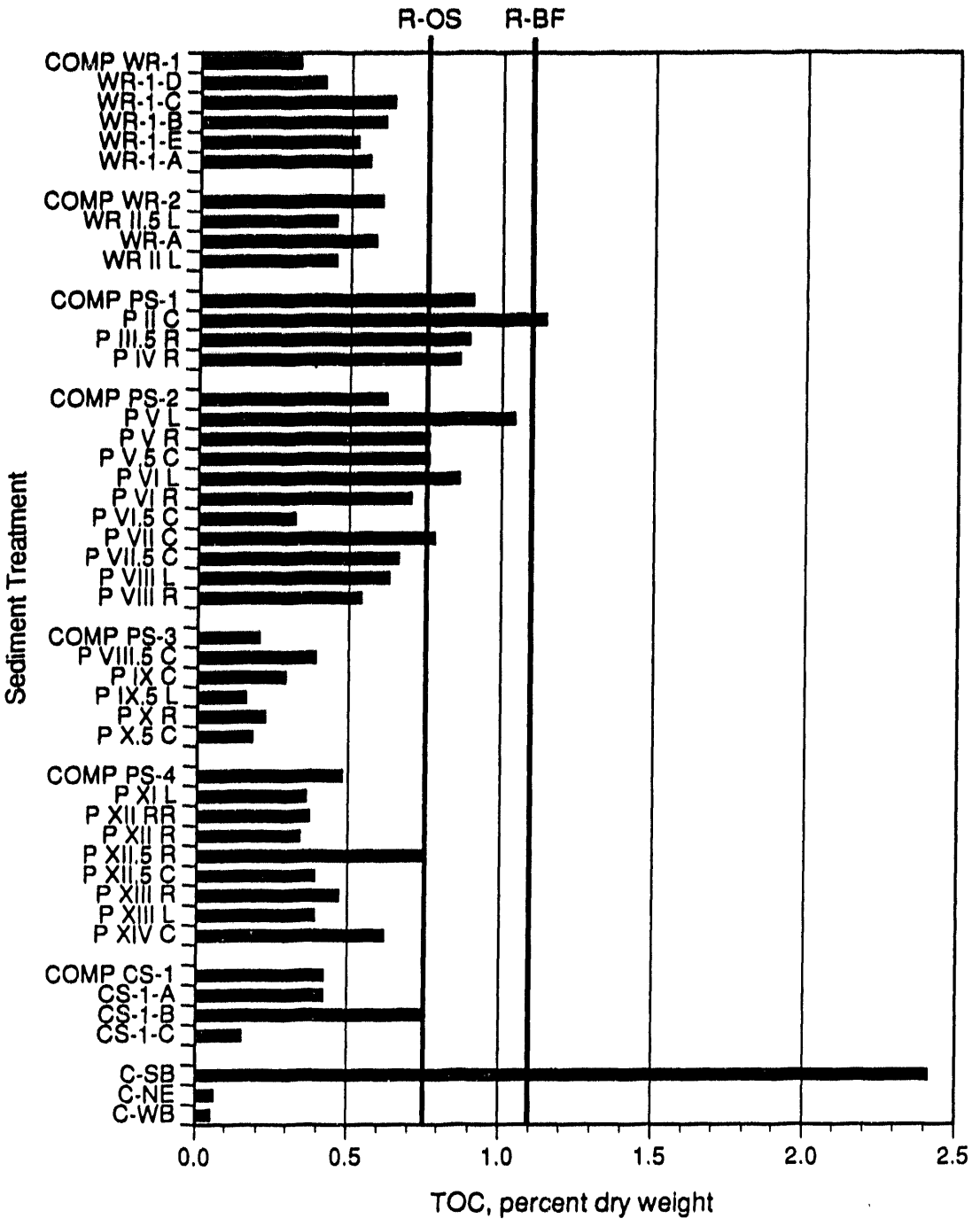


FIGURE 3.15. Total Organic Carbon in John F. Baldwin Ship Channel Sediments

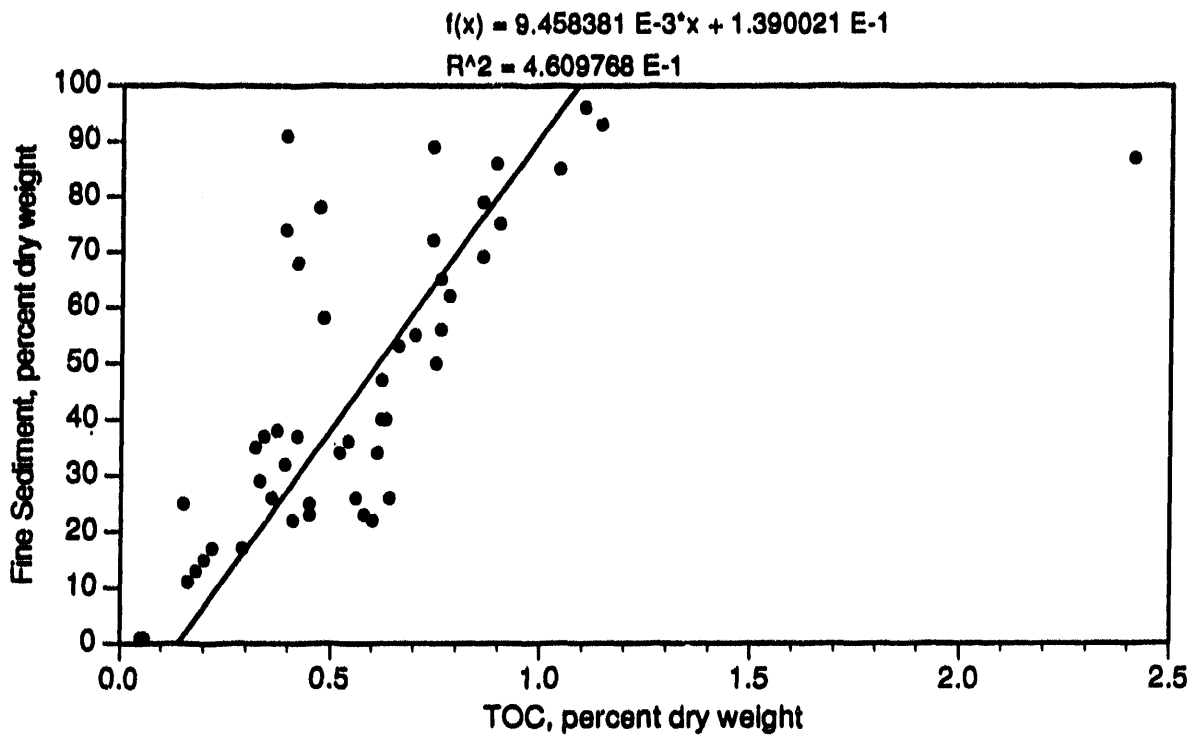


FIGURE 3.16. Relationship Between Sediment TOC and Grain Size

western Pinole Shoal (COMPs PS-1 and PS-2), decreasing in COMP PS-3, and relatively low again in COMP PS-4 near Davis Point. The TOC in Carquinez Strait stations was variable. Most John F. Baldwin Ship Channel sediments had similar or lower TOC than the two reference sediments.

The TVS concentrations ranged from 0.83% in control sediment C-WB to 7.99% at station CS-1-B (Table 3.5, Figure 3.17), with most John F. Baldwin Ship Channel stations having 3% to 6% TVS. Like TOC, TVS was well correlated with the silt/clay fraction (Figure 3.18), and therefore followed a similar distribution along the channel. All stations with more than 50% fine-grained sediment also had ≥4% volatile solids. Approximately half the channel stations had TVS exceeding the Deep Off-Shelf (R-OS) reference concentration; only station CS-1-B had TVS exceeding the Bay Farm (R-BF) reference concentration.

Oil and grease and TPH concentrations are presented in Table 3.5 and Figures 3.19 and 3.20. Detected oil and grease concentrations in test sediments ranged from 15 mg/kg (dry weight) in P IX C to 156 mg/kg in R-BF. Detected TPH concentrations ranged from 20 mg/kg in

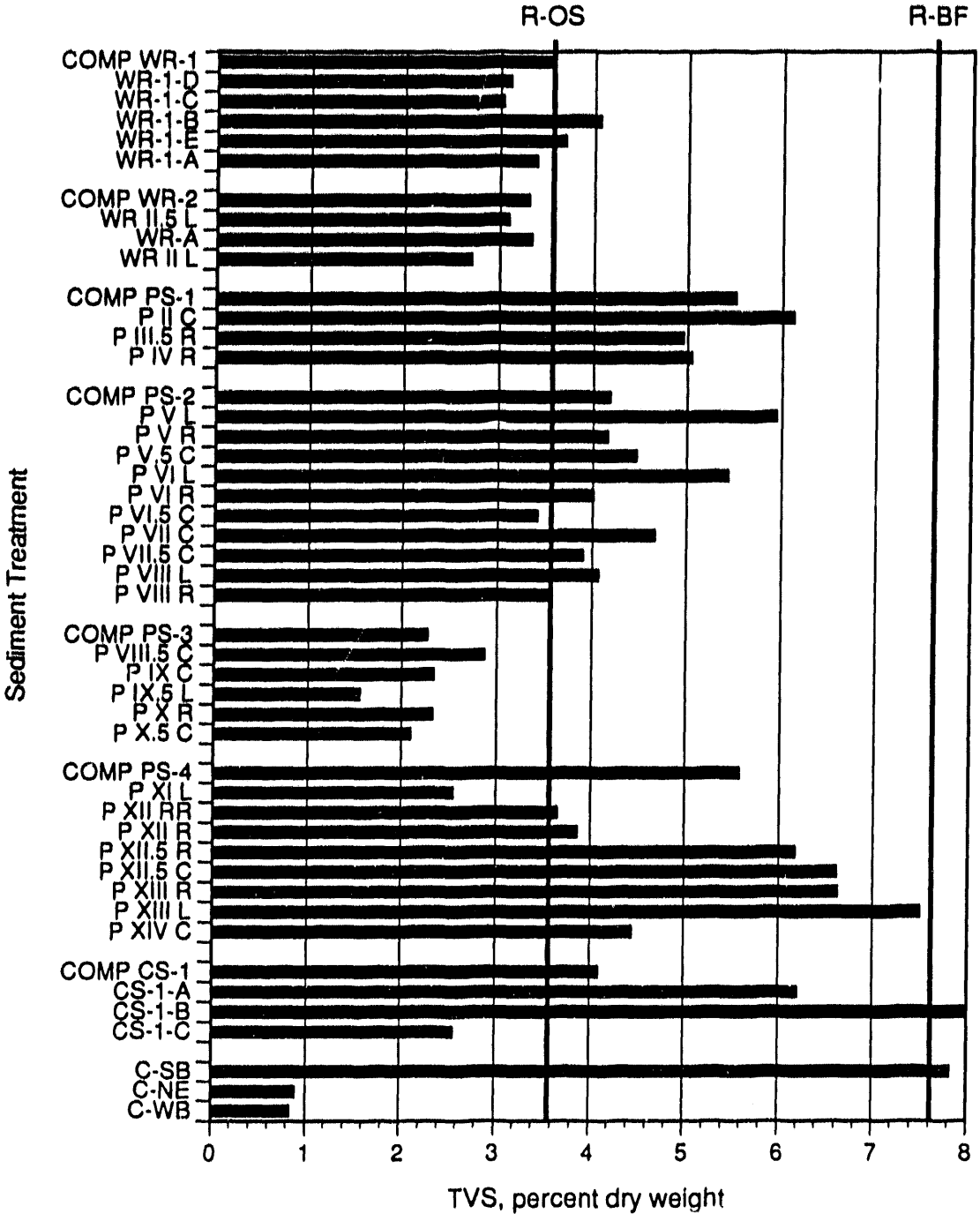


FIGURE 3.17. TVS in John F. Baldwin Ship Channel Sediments

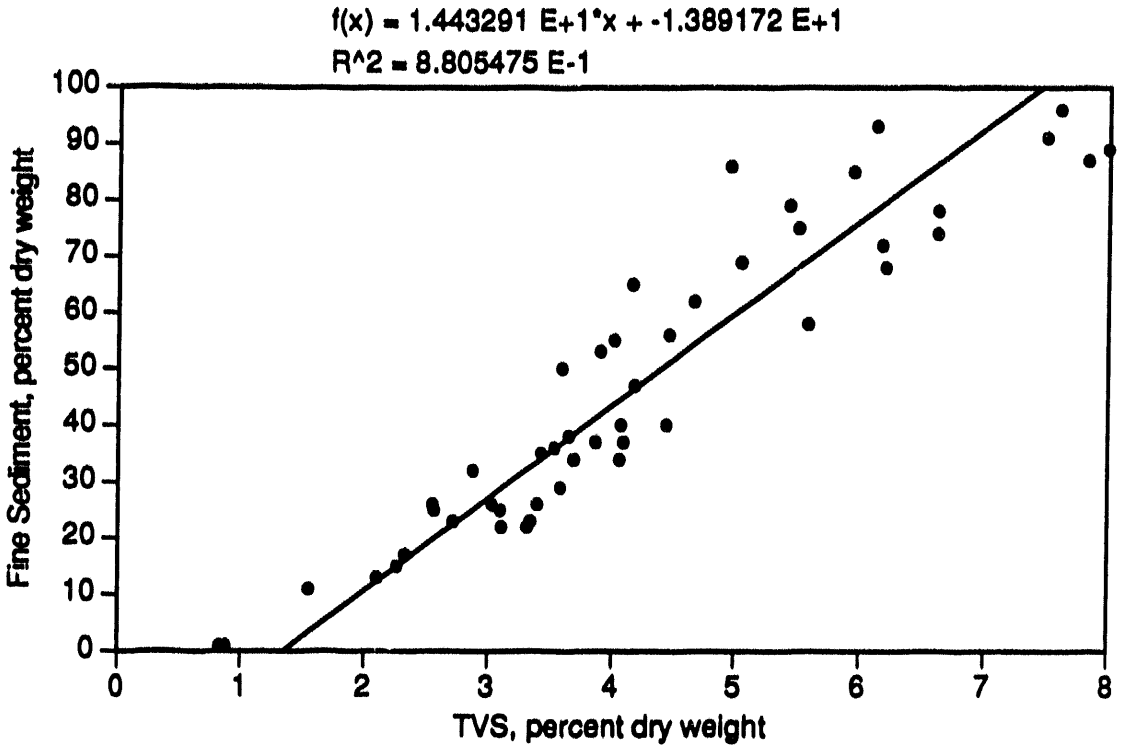


FIGURE 3.18. Relationship Between Sediment TVS and Grain Size

P VIII.5 C and COMP PS-1 to 119 mg/kg in R-BF. Oil and grease and TPH were generally low in John F. Baldwin Ship Channel: only two stations near Davis Point, P XII.5 R and P XIV C, had more than 100 mg/kg oil and grease. None of the ship channel stations exceeded R-BF in oil and grease and TPH; approximately half the channel stations exceeded R-OS. C-SB showed high TOC, high oil and grease, and low TPH values, suggesting that the organic carbon does not have a high petroleum content. R-BF however, had high TOC, oil and grease, and TPH values, suggesting a relatively large percentage of petroleum-based carbon in the sediment there.

3.3.2 Polynuclear Aromatic Hydrocarbons

All John F. Baldwin Ship Channel samples were analyzed for the 16 priority pollutant PAHs. Complete results of PAH analysis, including quality control data, are contained in Appendix B, Tables B.8 through B.13. In general, the PAH data are acceptable. Recoveries of the three surrogate compounds were within quality control limits, with mean recoveries of 57% to 68%. Recoveries of the high molecular weight surrogate compound benzo[a]pyrene-d12,

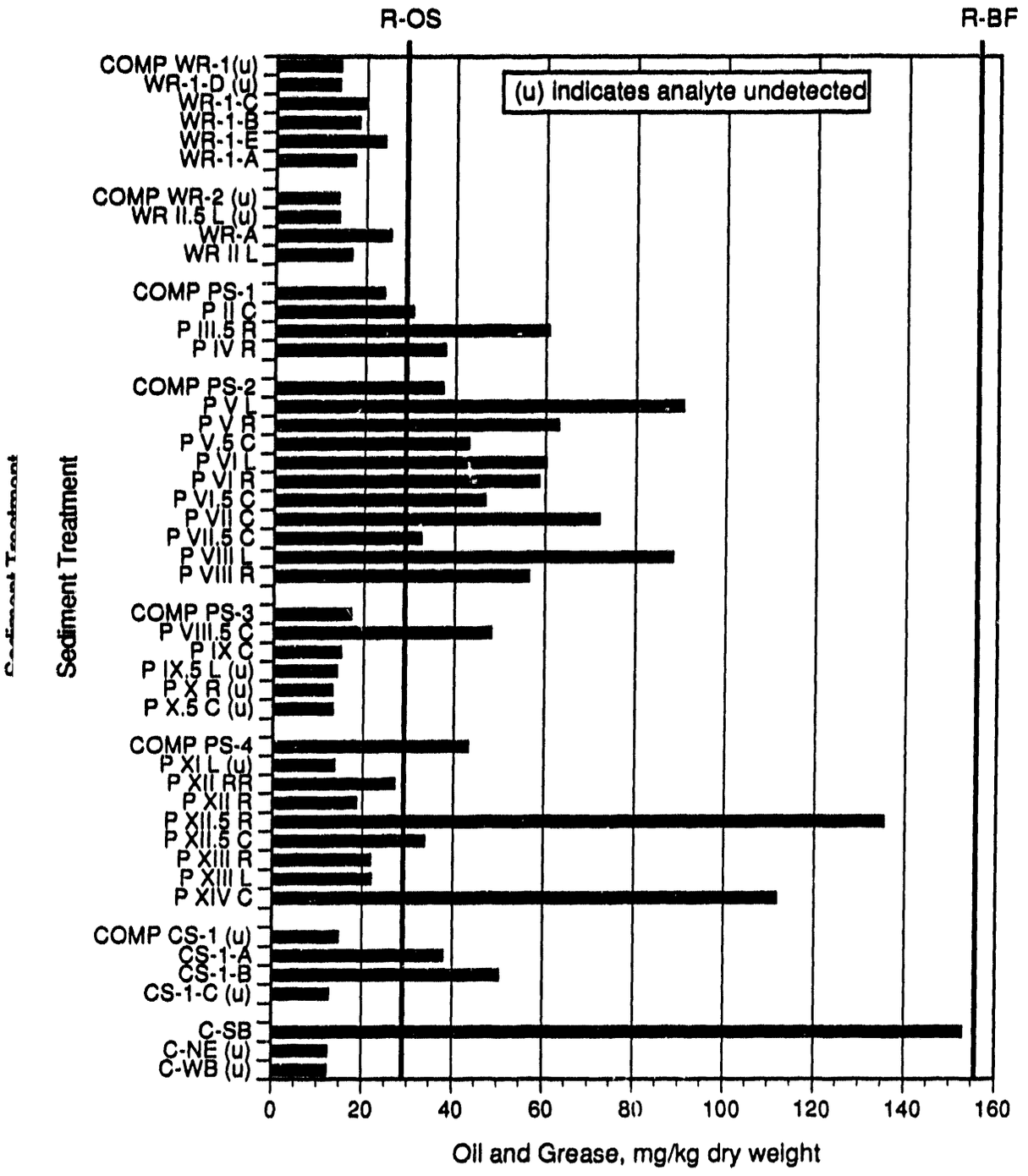


FIGURE 3.19. Oil and Grease in John F. Baldwin Ship Channel Sediments

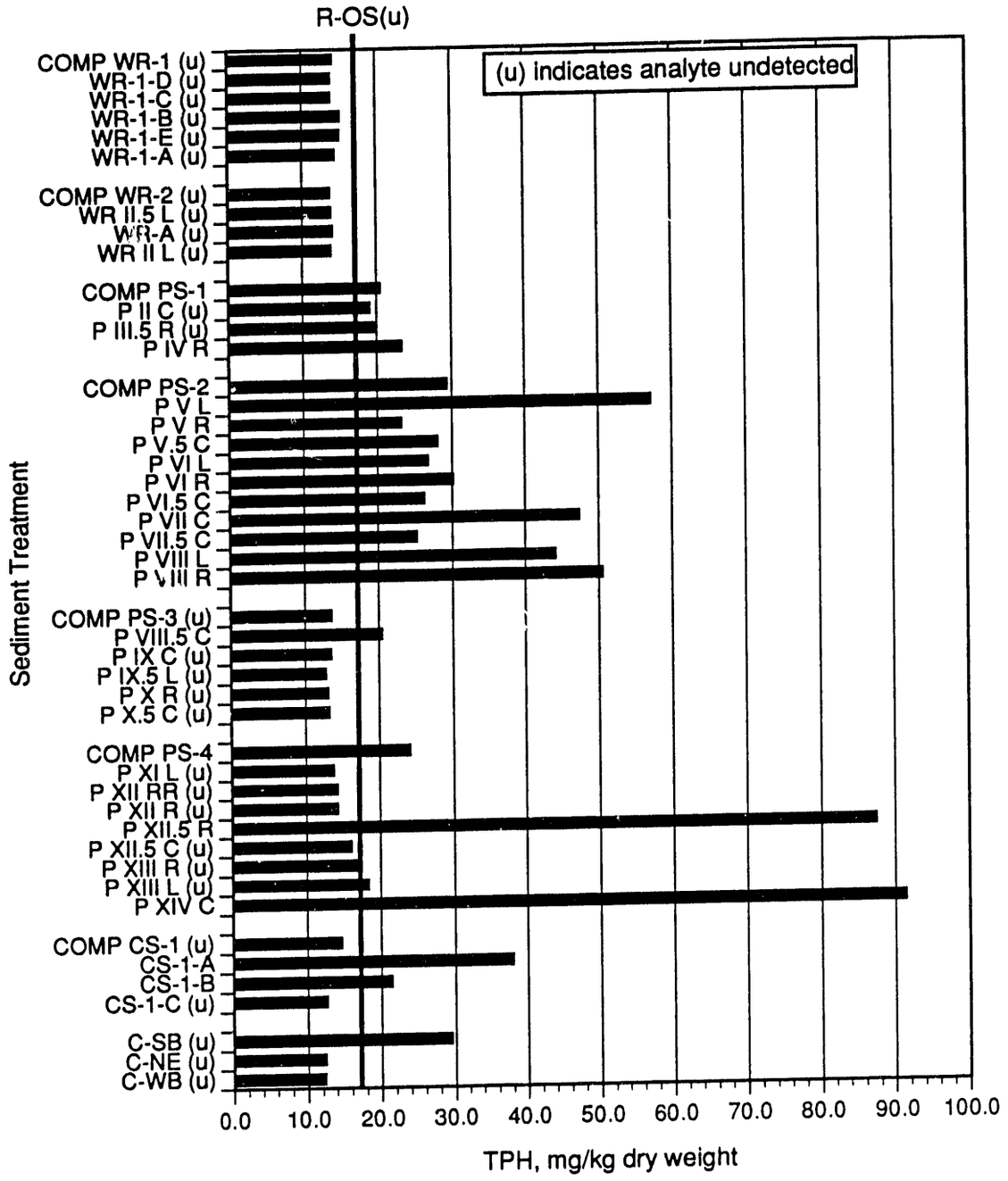


FIGURE 3.20. TPH in John F. Baldwin Ship Channel Sediments
(TPH in R-BF was 119 mg/kg dry weight)

however, were low in two of the three analytical batches, with mean recoveries of 22% and 27% for those batches. Recoveries of this surrogate compound from the method blanks for those batches were within quality control limits, and a review of laboratory records revealed no performance or calibration problems. The reason for the low recoveries of benzo[a]pyrene-d12 is not clear. Concentrations of benzo[a]pyrene in the associated samples are consistent with concentrations of other high molecular weight PAH (HPAH) compounds except for those in COMP CS-1, CS-1-A, CS-1-B, and R-BF, which showed concentrations below the detection limit. Therefore, the data for all samples except the four listed above do not appear to be affected by the low recovery of the surrogate benzo[a]pyrene-d12. One sample (P IV R) was re-extracted and reanalyzed because of low surrogate recoveries; the data for the reanalyzed sample was acceptable.

Both low molecular weight PAH (LPAH) and HPAH contributed to the total PAH concentrations in the ship channel sediments (Table 3.6), though generally HPAH was more than 80% of the total PAH. Detected concentrations of LPAH ranged from 1.79 µg/kg dry weight (C-WB) to 256 µg/kg (R-BF) (Figure 3.21). The lowest detected concentration for HPAH was observed at 3.11 µg/kg in control sediment C-WB, and the highest value was 2346 µg/kg in reference sediment R-BF (Figure 3.22). Low total PAHs in R-OS (60 µg/kg total) were exceeded by approximately half the John F. Baldwin Ship Channel stations. The PAHs in R-BF were far higher than PAHs in any of the John F. Baldwin Ship Channel sediments. The highest PAHs in John F. Baldwin Ship Channel were found in Carquinez Strait COMP CS-1 (1398 µg/kg total PAH) and contributing station CS-1-A (792 µg/kg total PAH). Total PAHs in West Richmond were in the 250 to 350 µg/kg range for COMP WR-1 and two of its stations (WR-1-B and WR-1-E), but PAHs were very low for the other three COMP WR-1 stations as well as COMP WR-2 and its stations. In Pinole Shoal, COMPs PS-1 and PS-3 were low in PAH, but COMP PS-2 and its stations were consistently 100 to 300 µg/kg total PAH. The PAHs in COMP PS-4 were probably contributed by two stations, P XII.5 R and P XIV C, as the other six stations all had very low PAH concentrations.

3.3.3 Chlorinated Pesticides and Polychlorinated Biphenyls

The seven John F. Baldwin Ship Channel sediment composites and two reference sediments were analyzed in one batch for pesticides and PCBs (Appendix B, Tables B.14 and B.15). All QC criteria for these analyses were met. Pesticides and PCBs were undetected or below the method detection limit in all John F. Baldwin Ship Channel composite and reference

TABLE 3.6. Total Detected Polynuclear Aromatic Hydrocarbons (PAHs) in Sediment, John F. Baldwin Ship Channel Program (shading indicates John F. Baldwin sediment value greater than Deep Off-Shelf [R-OS] reference value)

Sediment Treatment	µg/kg dry weight Total Detected LPAH	Total Detected HPAH	Total PAH	Percent HPAH
COMP WR-1	42.3	226.2	269	84.3
WR-1-D[a]	5.9	25.8	32	81.5
WR-1-C	6.7	9.2	16	57.9
WR-1-B	36.4	217.4	254	85.7
WR-1-E[a]	43.0	290.7	334	87.1
WR-1-A	10.1	20.0	30	66.4
COMP WR-2	6.5	18.7	25	74.3
WR II.5 L	7.8	18.2	26	70.0
WR-A	6.4	8.0	14	55.5
WR II L	6.0	8.9	15	59.9
COMP PS-1	14.6	26.4	41	64.4
P II C	18.0	28.2	46	61.1
P III.5 R	19.8	37.9	58	65.7
P IV R	20.5	38.5	59	65.3
COMP PS-2	17.0	159.1	176	90.4
P V L	29.8	195.6	225	86.8
P V R	20.2	160.8	181	88.8
P V.5 C	17.6	65.9	83	78.9
P VI L	21.2	116.2	137	84.6
P VI R	20.4	148.4	169	87.9
P VI.5 C	20.7	173.7	194	89.4
P VII C	44.8	292.5	337	86.7
P VII.5 C	14.7	64.5	79	81.5
P VIII L	36.6	247.5	284	87.1
P VIII R	16.1	108.0	124	87.0
COMP PS-3	6.8	100.6	107	93.7
P VIII.5 C	12.1	74.7	87	86.1
P IX C	6.2	31.1	37	83.4
P IX.5 L	4.2	10.5	15	71.5
P X R	7.5	38.6	46	83.7
P X.5 C	2.5	8.7	11	77.6
COMP PS-4	16.3	106.7	123	86.8
P XI L	4.5	25.7	30	85.1
P XII RR	7.4	36.2	44	83.0
P XII R	8.6	32.0	41	78.9
P XII.5 R	36.4	206.2	243	85.0
P XII.5 C	11.1	29.6	41	72.6
P XIII R	10.7	41.5	52	79.5
P XIII L	8.4	35.6	44	81.0
P XIV C[a]	41.6	296.5	338	87.7

TABLE 3.6. (contd)

Sediment Treatment	Total Detected LPAH (µg/kg dry weight)	Total Detected HPAH (µg/kg dry weight)	Total PAH (µg/kg dry weight)	Percent HPAH
COMP CS-1	140.3	1257.3	1398	90.0
CS-1-A	36.3	755.7	792	95.4
CS-1-B	51.9	261.7	314	83.5
CS-1-C	7.2	49.4	57	87.3
R-BF	255.7	2345.7	2601	90.2
R-OS	14.9	44.9	60	75.1
C-SB	105.8	427.5	533	80.2
C-NE	12.8	7.7	21	37.5
C-WB	1.8	3.1	5	63.5

(a) Values are a mean of three replicates.

samples; therefore, samples from the individual sampling sites were not analyzed for these compounds.

3.3.4 Metals

Ten metals were measured in the John F. Baldwin Ship Channel, control, and reference sediments (Table 3.7). Complete results, including quality control data, are contained in Appendix B, Tables B.16 and B.17. Quality control criteria were met for all analyses except mercury. Mercury contamination was detected in method blanks for all three analytical batches at concentrations greater than allowable limits. The source of contamination was suspected to be the hydrofluoric acid used in the sediment digestion process. The sediment samples were re-digested using a new batch of hydrofluoric acid, and no blank contamination was detected in the second round of analyses. Although the holding time of 30 days was exceeded for the re-analyses, the data are considered acceptable because sediment samples were freeze-dried and stored frozen prior to re-digestion.

Silver (Ag) concentrations (Figure 3.23) ranged from 0.01 mg/kg dry weight at C-WB and C-NE to 0.52 mg/kg at R-BF. Most of the channel sediments had Ag concentrations of 0.05 to 0.2 mg/kg, and none exceeded Ag concentrations in the two reference sediments. Arsenic (As) concentrations ranged from 3.11 mg/kg (C-WB) to 19.4 mg/kg (CS-1-A) (Figure 3. 24). R-OS had relatively low As (3.8 mg/kg), which was exceeded by at least two times in nearly all of the

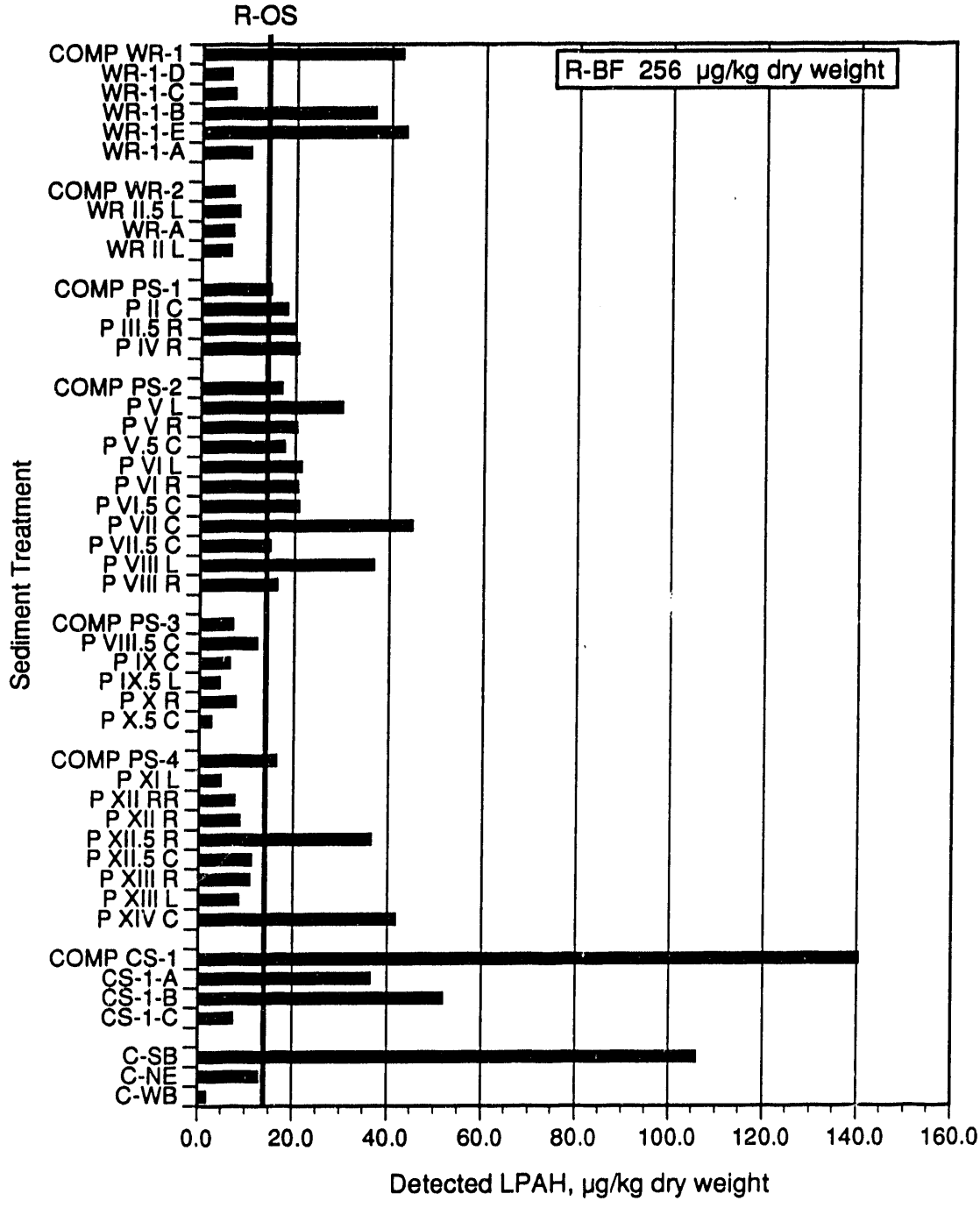


FIGURE 3.21. LPAH in John F. Baldwin Ship Channel Sediments

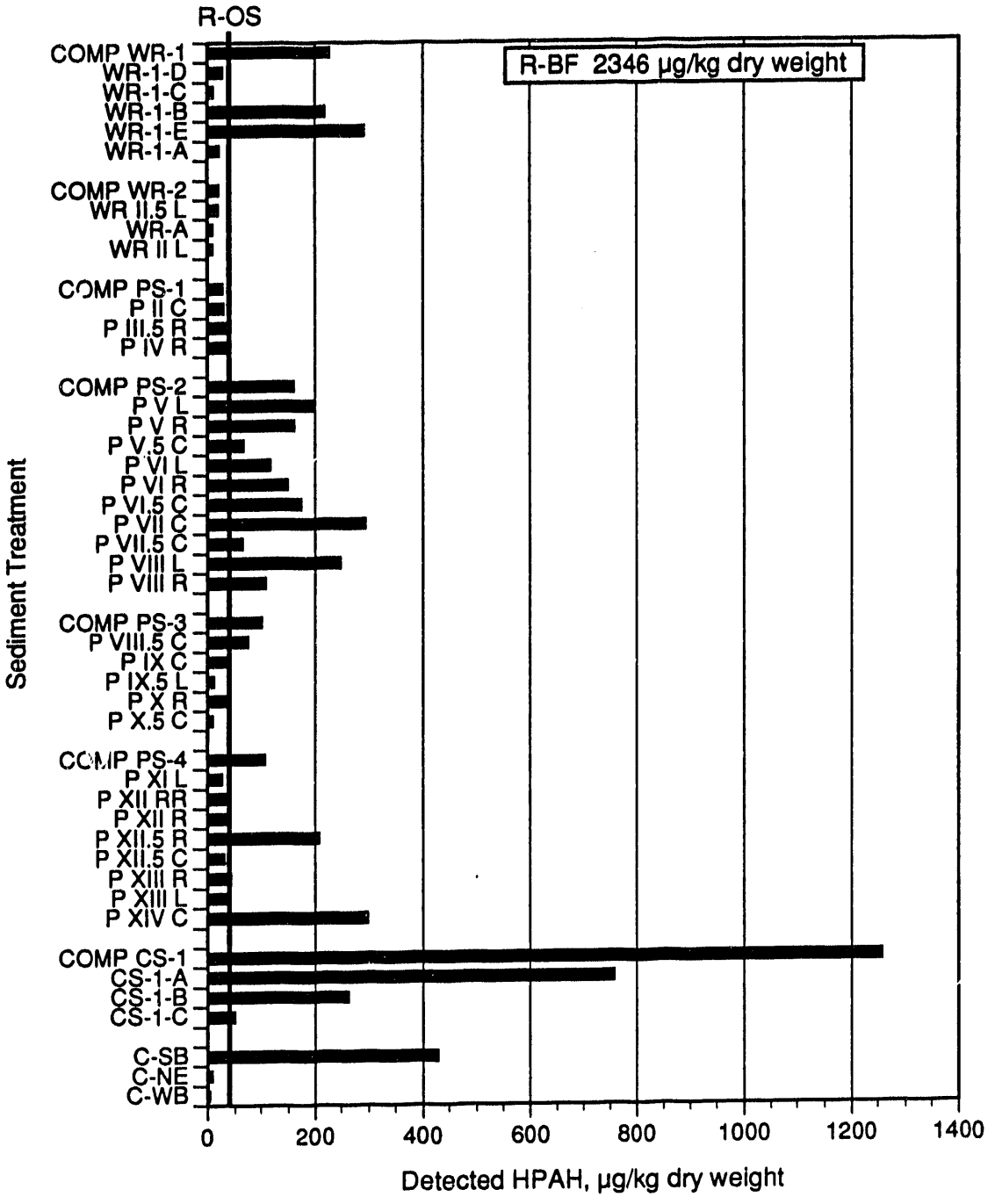


FIGURE 3.22. HPAH in John F. Baldwin Ship Channel Sediments

TABLE 3.7. Metals in Sediment, John F. Baldwin Ship Channel (shading indicates John F. Baldwin sediment value greater than Deep Off-Shelf [R-OS] reference value)

Sediment Treatment	Metals (mg/kg dry weight)									
	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP WR-1	0.09	12.50	0.16	177.0	26.1	0.034	79.6	12.1	0.37	69.3
WR-1-D[a]	0.06	13.30	0.15	174.7	24.1	0.022	84.2	9.9	0.28	67.3
WR-1-C	0.05	12.70	0.19	161.0	19.5	0.017	75.8	8.2	0.28	60.8
WR-1-B	0.07	12.70	0.21	147.0	27.7	0.049	81.6	8.0	0.28	70.8
WR-1-E	0.11	7.46	0.17	104.0	14.2	0.072	52.9	9.7	0.28	48.8
WR-1-A	0.05	9.55	0.14	181.0	23.5	0.027	92.9	9.6	0.46	69.3
COMP WR-2	0.05	8.21	0.16	209.0	22.4	0.016	77.4	13.7	0.56	63.3
WR II.5 L	0.06	9.11	0.14	242.0	21.8	0.021	82.9	7.0	0.37	69.4
WR-A	0.06	10.37	0.15	196.0	23.1	0.020	82.7	7.2	0.28	66.2
WR II L	0.04	7.36	0.10	177.0	21.9	0.016	81.7	6.9	0.56	65.4
COMP PS-1	0.11	7.57	0.20	184.0	37.8	0.050	109.7	12.4	0.16 U[b]	93.9
P II C	0.13	9.75	0.25	164.0	42.6	0.072	104.4	10.4	0.56	95.0
P III.5 R	0.12	10.33	0.22	200.0	41.8	0.062	107.7	9.3	0.56	97.0
P IV R	0.10	9.31	0.22	232.0	37.5	0.054	99.4	8.4	0.37	90.8
COMP PS-2	0.15	10.43	0.21	227.0	39.6	0.089	99.5	11.7	0.37	97.6
P V L	0.21	13.40	0.35	197.0	49.1	0.188	108.9	15.6	0.46	110.0
P V R	0.16	11.59	0.28	298.0	44.6	0.087	106.7	14.5	0.37	103.8
P V.5 C	0.11	9.79	0.23	291.0	37.8	0.081	106.6	10.8	0.46	98.3
P VI L	0.18	9.73	0.34	181.0	51.9	0.123	112.6	14.2	0.46	106.0
P VI R	0.14	10.70	0.21	185.0	37.1	0.087	101.1	13.2	0.37	97.8
P VI.5 C	0.05	10.71	0.16	249.0	33.8	0.077	101.0	12.0	0.37	88.3
P VII C	0.18	11.44	0.30	230.0	48.6	0.164	108.7	16.6	0.56	110.4
P VII.5 C	0.12	10.22	0.21	214.0	39.4	0.075	106.9	11.5	0.55	95.0
P VIII L	0.12	11.02	0.21	218.0	39.2	0.111	102.1	14.9	0.37	100.3
P VIII R	0.14	9.79	0.21	216.0	35.1	0.091	100.7	12.7	0.28	92.3

TABLE 3.7. (contd)

TABLE 3.7. (contd)

Sediment Treatment	Metals (mg/kg dry weight)									
	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP PS-3	0.05	7.97	0.12	235.0	23.1	0.032	90.0	11.3	0.16 U	73.0
P VIII.5 C	0.11	9.11	0.17	241.0	32.8	0.072	100.8	12.1	0.28	86.3
P IX C	0.06	10.58	0.12	248.0	25.1	0.049	90.2	9.8	0.19	72.5
P IX.5 L	0.04	8.90	0.20	288.0	23.9	0.102	94.4	83.3	0.28	92.1
P X R	0.07	8.71	0.14	358.0	26.3	0.033	100.8	11.3	0.28	79.4
P X.5 C	0.04	9.09	0.10	293.0	23.2	0.013	87.9	9.4	0.19	69.5
COMP PS-4	0.11	15.00	0.24	216.0	48.0	0.270	93.0	20.4	0.46	89.6
P XI L	0.07	8.56	0.13	289.0	29.9	0.040	97.6	9.7	0.37	76.4
P XII RR	0.06	10.72	0.13	434.0	35.6	0.100	106.5	11.3	0.28	86.6
P XII R	0.05	10.69	0.11	414.0	35.1	0.127	99.5	10.8	0.28	82.4
P XII.5 R	0.19	16.00	0.35	205.0	56.0	0.334	99.9	23.6	0.37	107.8
P XII.5 C	0.08	16.80	0.14	202.0	52.0	0.400	89.7	15.5	0.37	82.8
P XIII R	0.09	16.90	0.14	189.0	49.0	0.346	83.1	14.0	0.28	84.0
P XIII L	0.09	17.80	0.18	184.0	52.2	0.334	84.6	17.3	0.37	83.0
P XIV C[a]	0.22	17.47	0.44	333.7	49.3	0.283	104.5	29.3	0.28	122.6
COMP CS-1	0.08	12.20	0.15	210.0	32.8	0.159	82.9	14.0	0.37	74.8
CS-1-A	0.12	19.40	0.24	201.0	48.6	0.352	90.4	18.6	0.37	94.5
CS-1-B	0.19	18.40	0.25	210.0	57.0	0.469	104.2	26.9	0.56	105.0
CS-1-C	0.05	10.55	0.09	231.0	23.5	0.089	74.7	10.0	0.18	65.1
R-BF	0.52	10.40	0.21	198.0	54.5	0.345	104.9	34.4	0.37	142.0
R-OS[a]	0.42	3.86	0.52	196.0	21.9	0.055	67.4	8.8	1.23	76.1
C-SB	0.26	11.61	1.05	108.0	38.3	0.094	42.9	14.9	1.38	98.4
C-NE	0.01	4.60	0.05	74.5	8.4	0.056	23.5	4.4	0.19	21.0
C-WB	0.01	3.11	0.07	227.0	13.9	0.002	46.8	6.5	0.16 U	47.3

(a) Values are a mean of three replicates.
(b) U Undetected above given concentration.

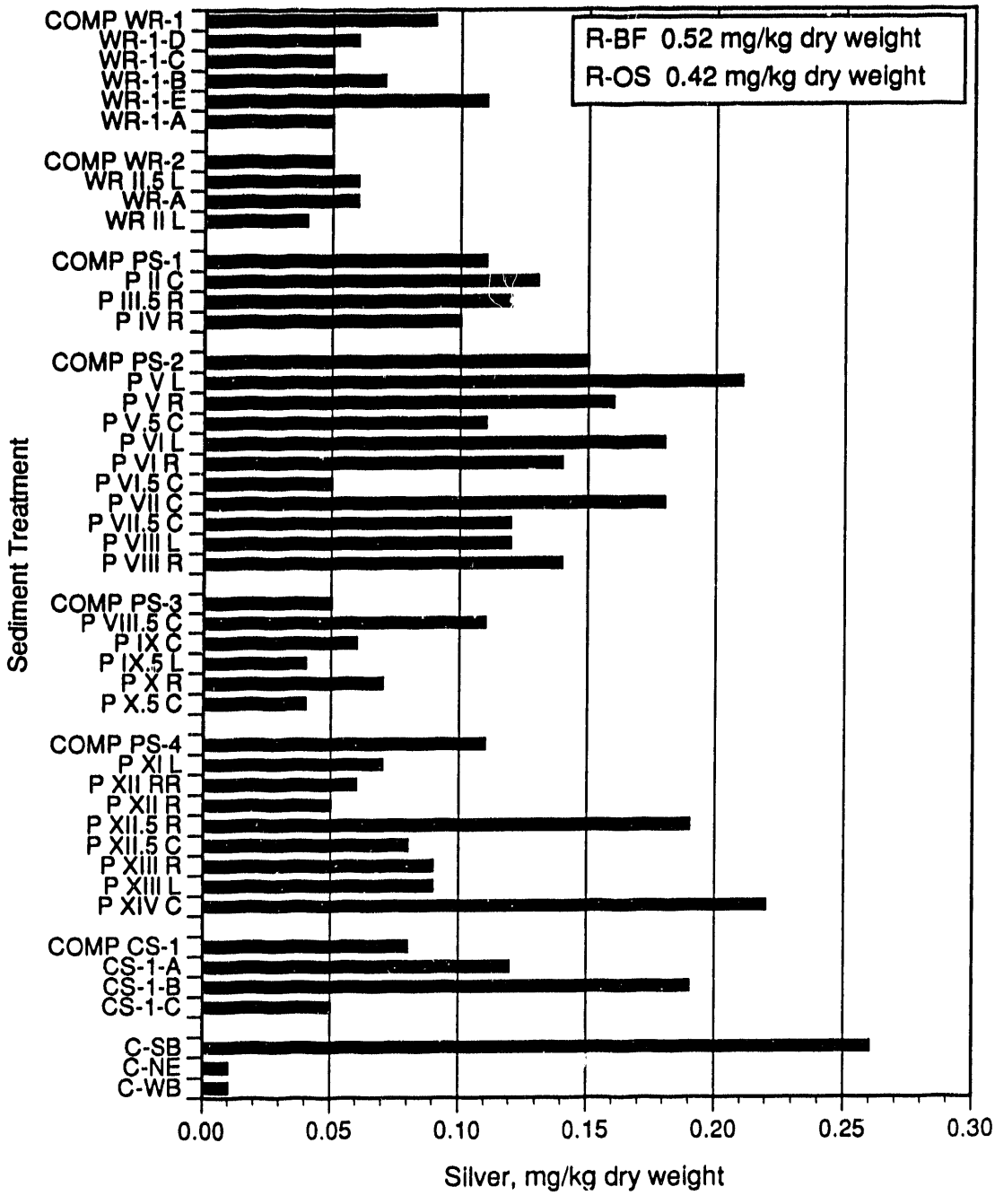


FIGURE 3.23. Silver in John F. Baldwin Ship Channel Sediments

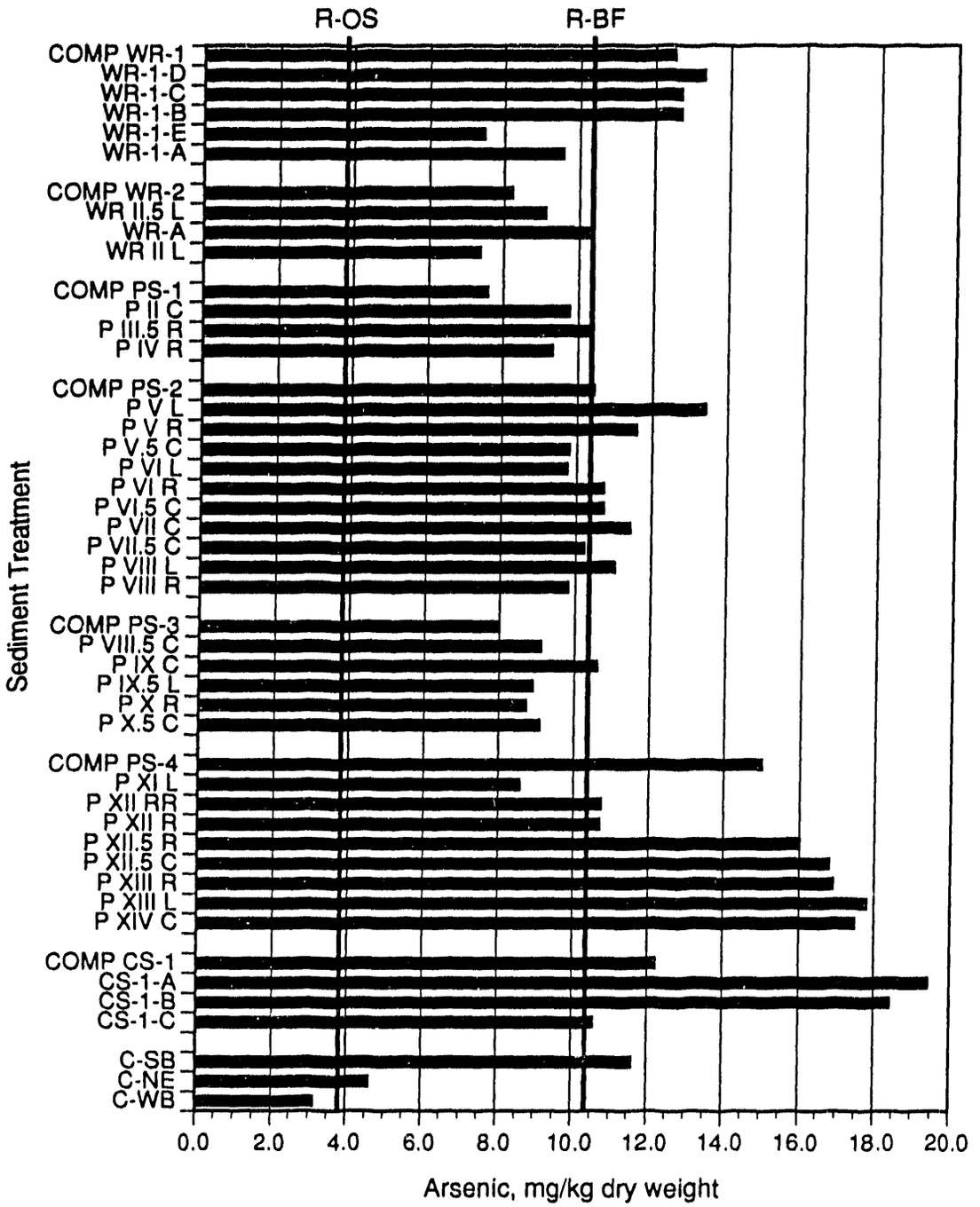
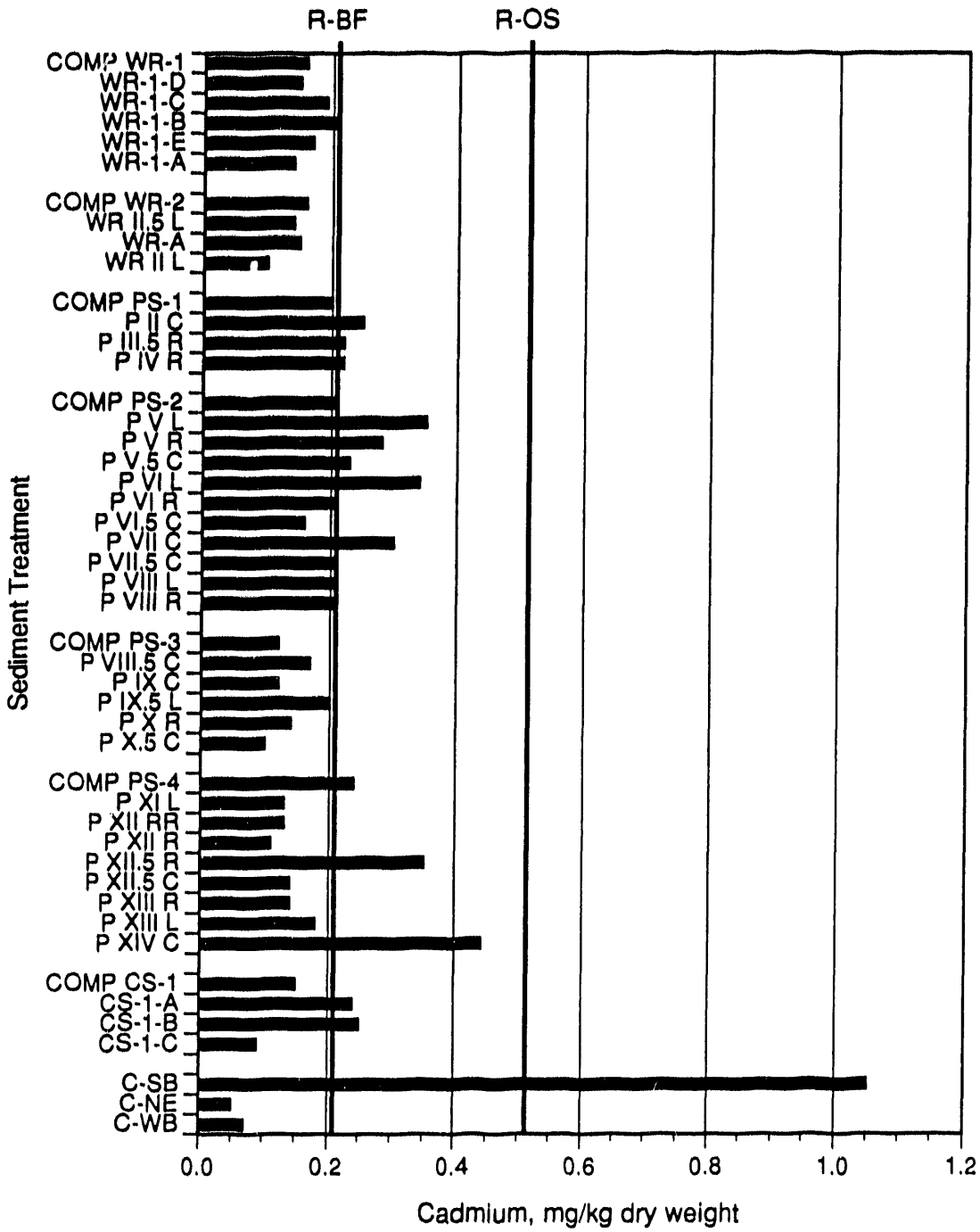


FIGURE 3.24. Arsenic in John F. Baldwin Ship Channel Sediments

channel stations. Approximately one-half of the channel stations had As exceeding the in-bay reference R-BF. Cadmium (Cd) levels measured in the sediment treatments ranged from 0.05 mg/kg in control sediment C-NE to 1.05 mg/kg in control sediment C-SB (Figure 3.25), with most channel stations in the 0.1 to 0.3 mg/kg range. Only stations P V L, P VI L, P XII.5 R, and P XIV C had greater than 0.3 mg/kg Cd, but all had less than 0.5 mg/kg Cd; therefore, none exceeded the Cd concentration in R-OS. Approximately half the stations exceeded the Cd concentration in R-BF, but usually by less than two times.

Chromium (Cr) concentrations ranged from 74.5 mg/kg in control sediment C-NE to a high of 434.0 mg/kg at P XII RR, with most channel sediments having 100 to 250 mg/kg Cr (Figure 3.26). Both reference sediments had approximately 200 mg/kg Cr, which was exceeded by about half the channel sediments. However, only P XII R and P XII RR exceeded the reference by more than two times. Copper (Cu) concentrations ranged from 8.4 mg/kg for C-NE to 57.0 mg/kg for CS-1-B (Figure 3.27). CS-1-B and P XII.5 R were the only channel sediments that had Cu concentrations higher than the reference sediment R-BF; however, nearly all channel sediments exceeded R-OS in Cu concentration. Mercury (Hg) was lowest in control sediment C-WB (0.002 mg/kg), but ranged from 0.013 to 0.469 mg/kg in John F. Baldwin Ship Channel stations, generally increasing up the channel from West Richmond to Carquinez Strait (Figure 3.28). Stations in COMPs WR-1, WR-2, and PS-1 were similar or lower in Hg than R-OS, but most of the stations in COMPs PS-2, PS-3, PS-4, and CS-1 had Hg exceeding R-OS. Only four channel sediments had higher Hg levels than the reference sediment R-BF. Nickel (Ni) concentrations in channel sediments ranged from 52.9 mg/kg in WR-1-E to 112.6 mg/kg in P VI L, with most concentrations around 100 mg/kg (Figure 3.29). Nickel concentrations in channel sediments were similar to those in R-BF, but most were slightly higher than the Ni concentrations in R-OS.

The concentration of lead (Pb) in channel sediments ranged from 7.0 mg/kg in WR II.5 L to 83.3 mg/kg in P IX.5 L (Figure 3.30). Most channel stations had Pb concentrations of 10 to 15 mg/kg with very few between 20 and 30 mg/kg. The second highest concentration of Pb was observed in reference sediment R-BF at 34.4 mg/kg; this concentration was not exceeded by any channel station other than P IX.5 L. Relative to R-OS, most channel sediments had similar or slightly higher Pb concentrations. Selenium (Se) was detected in concentrations ranging from 0.18 mg/kg at CS-1-C to 0.56 mg/kg in six channel stations, with over 1 mg/kg found at R-OS and C-SB (Figure 3.31). Selenium in channel stations was similar to or slightly higher



FIGUFE 3.25. Cadmium in John F. Baldwin Ship Channel Sediments

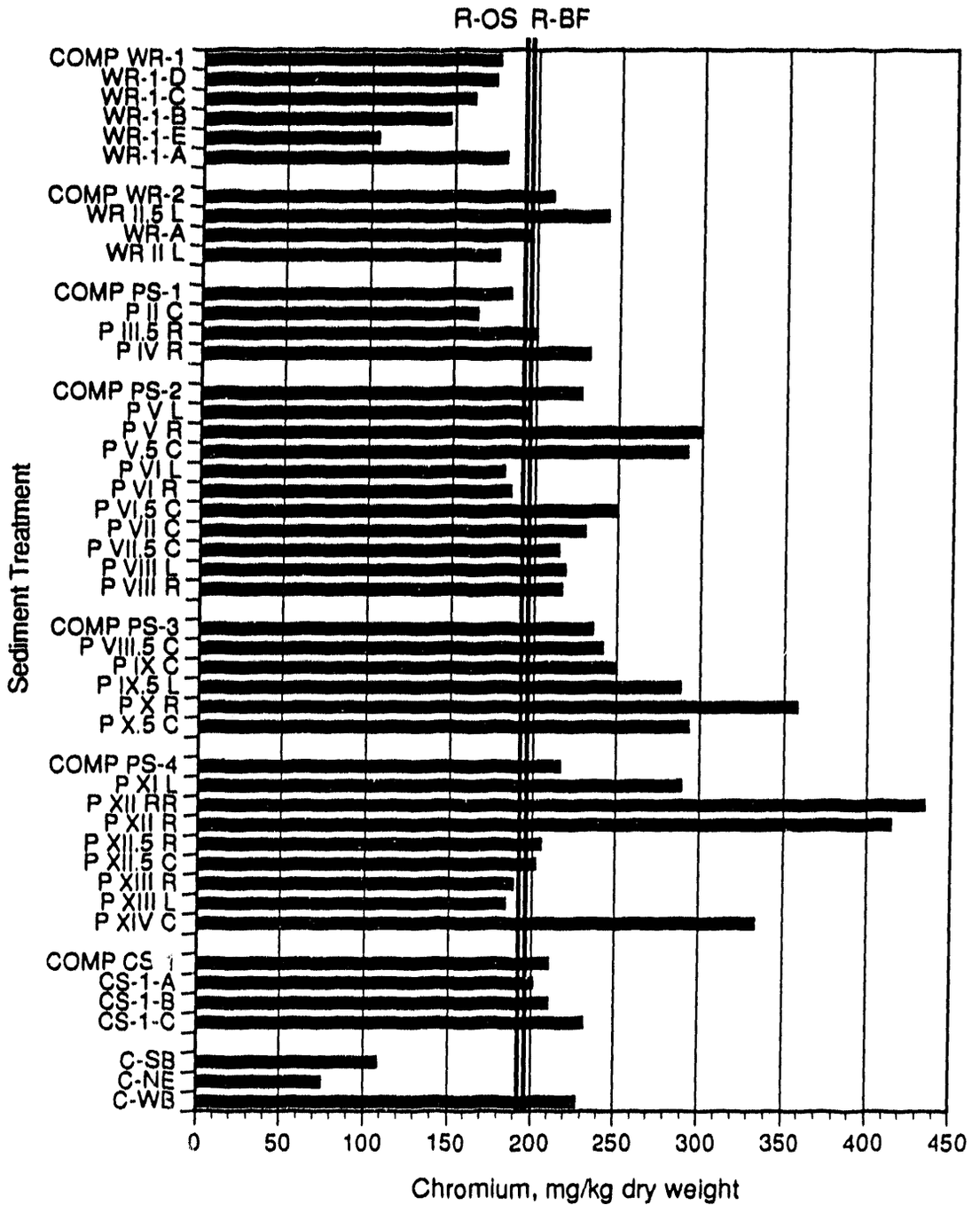


FIGURE 3.26. Chromium in John F. Baldwin Ship Channel Sediments

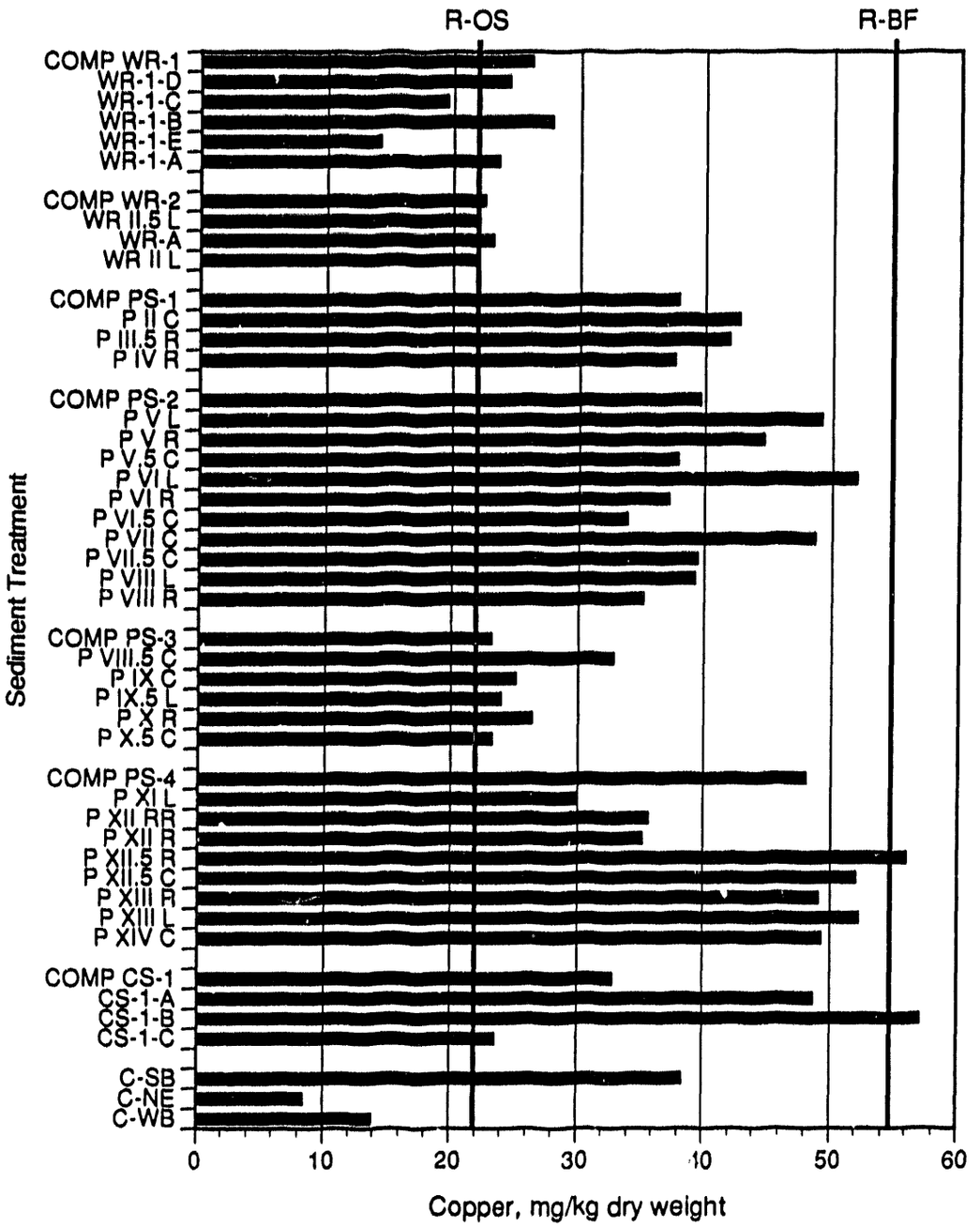
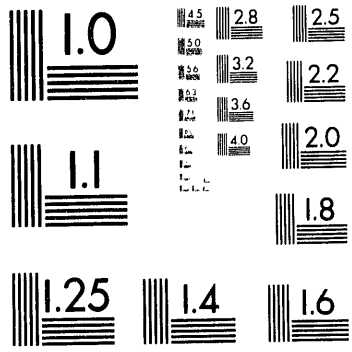


FIGURE 3.27. Copper in John F. Baldwin Ship Channel Sediments


1.0
1.1
1.25
1.4
1.6
1.8
2.0
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2 of 5

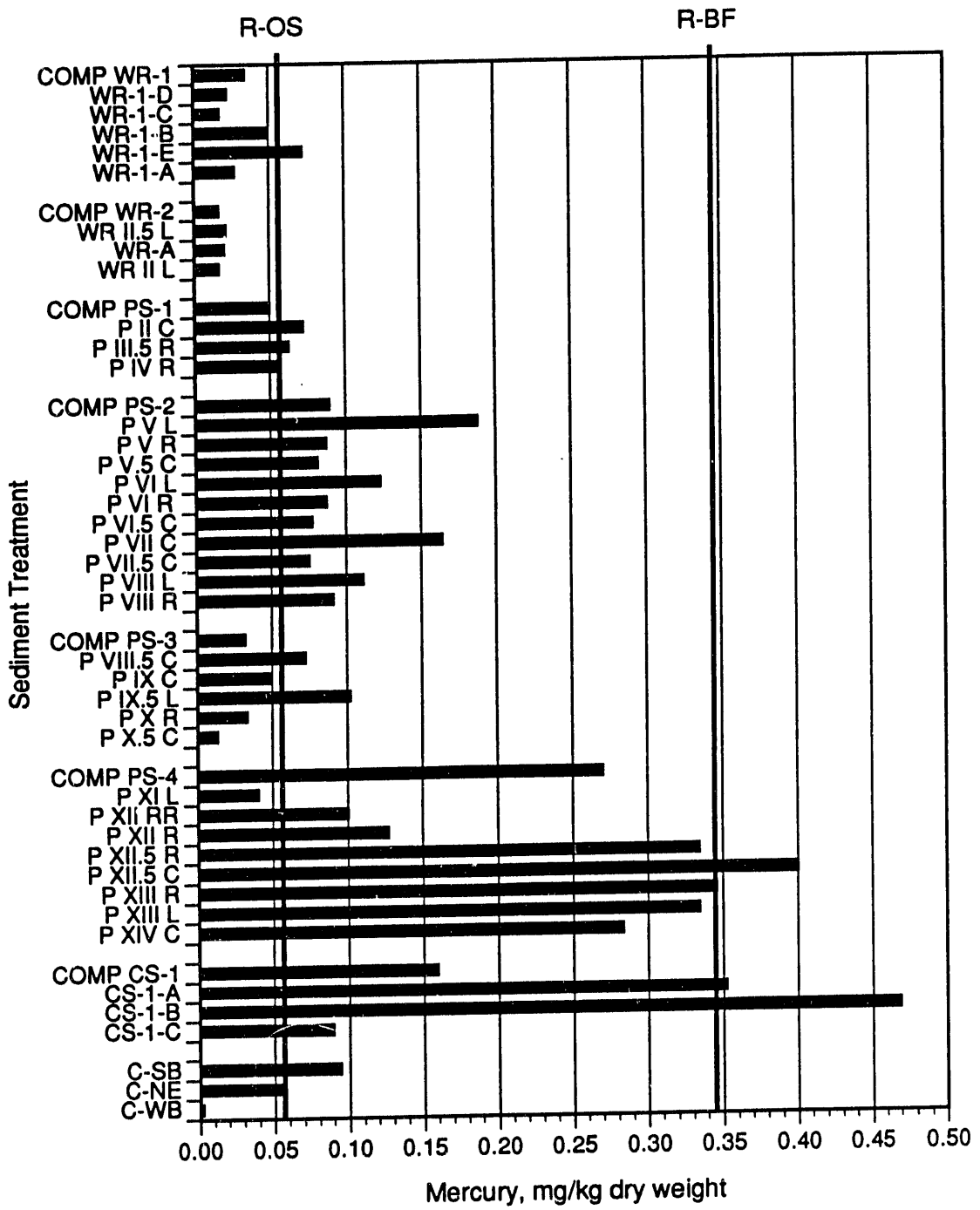


FIGURE 3.28. Mercury in John F. Baldwin Ship Channel Sediments

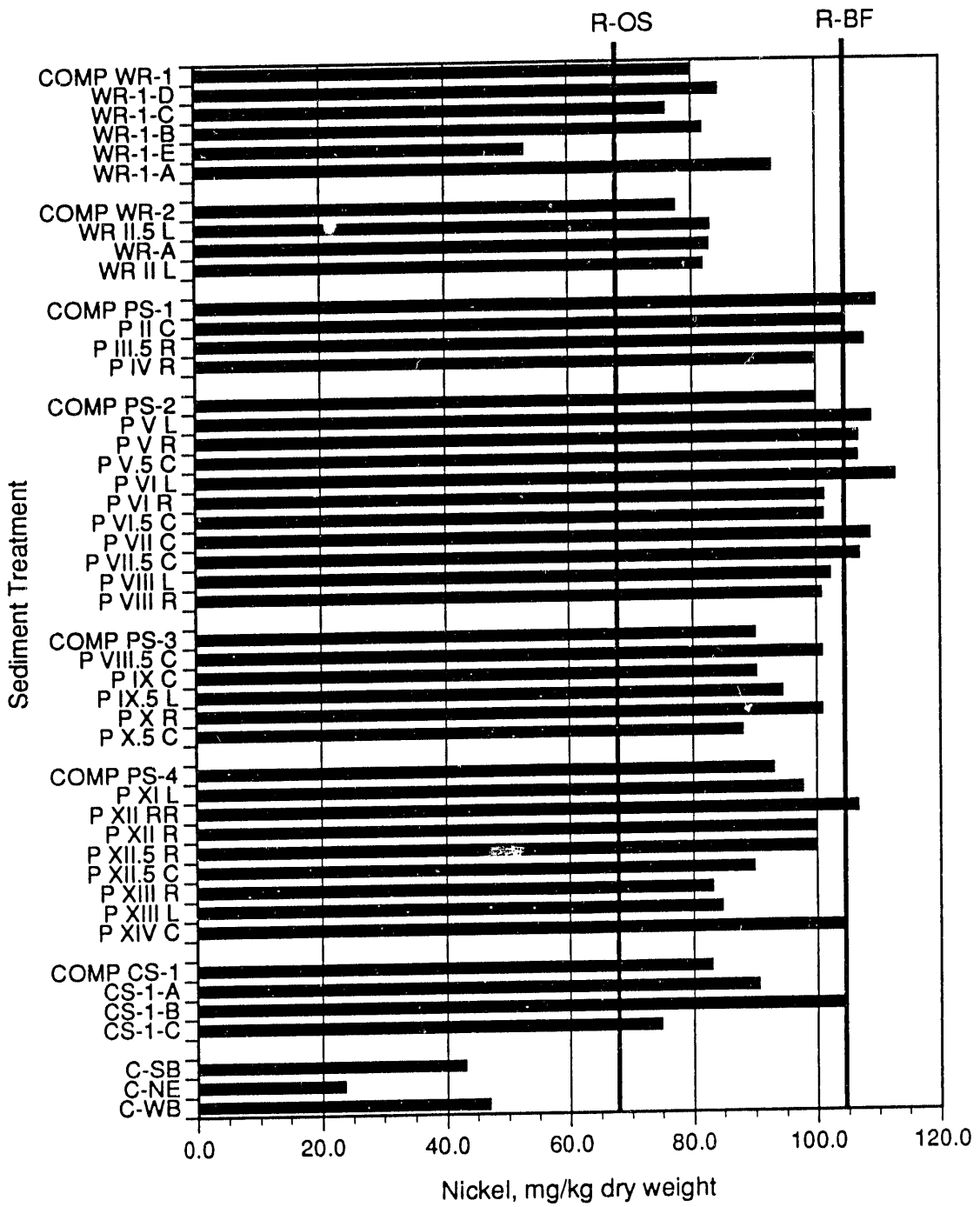


FIGURE 3.29. Nickel in John F. Baldwin Ship Channel Sediments

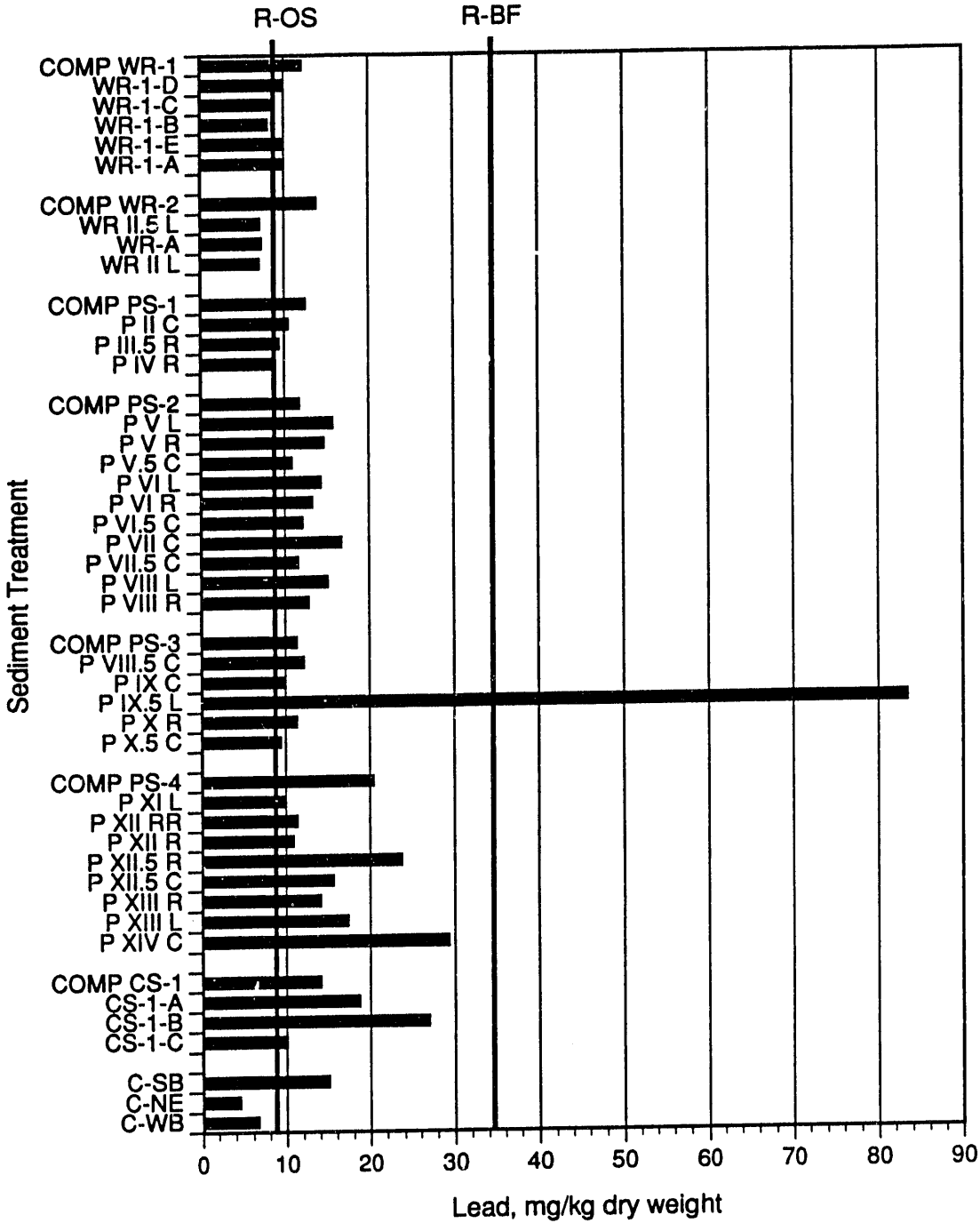


FIGURE 3.30. Lead in John F. Baldwin Ship Channel Sediments

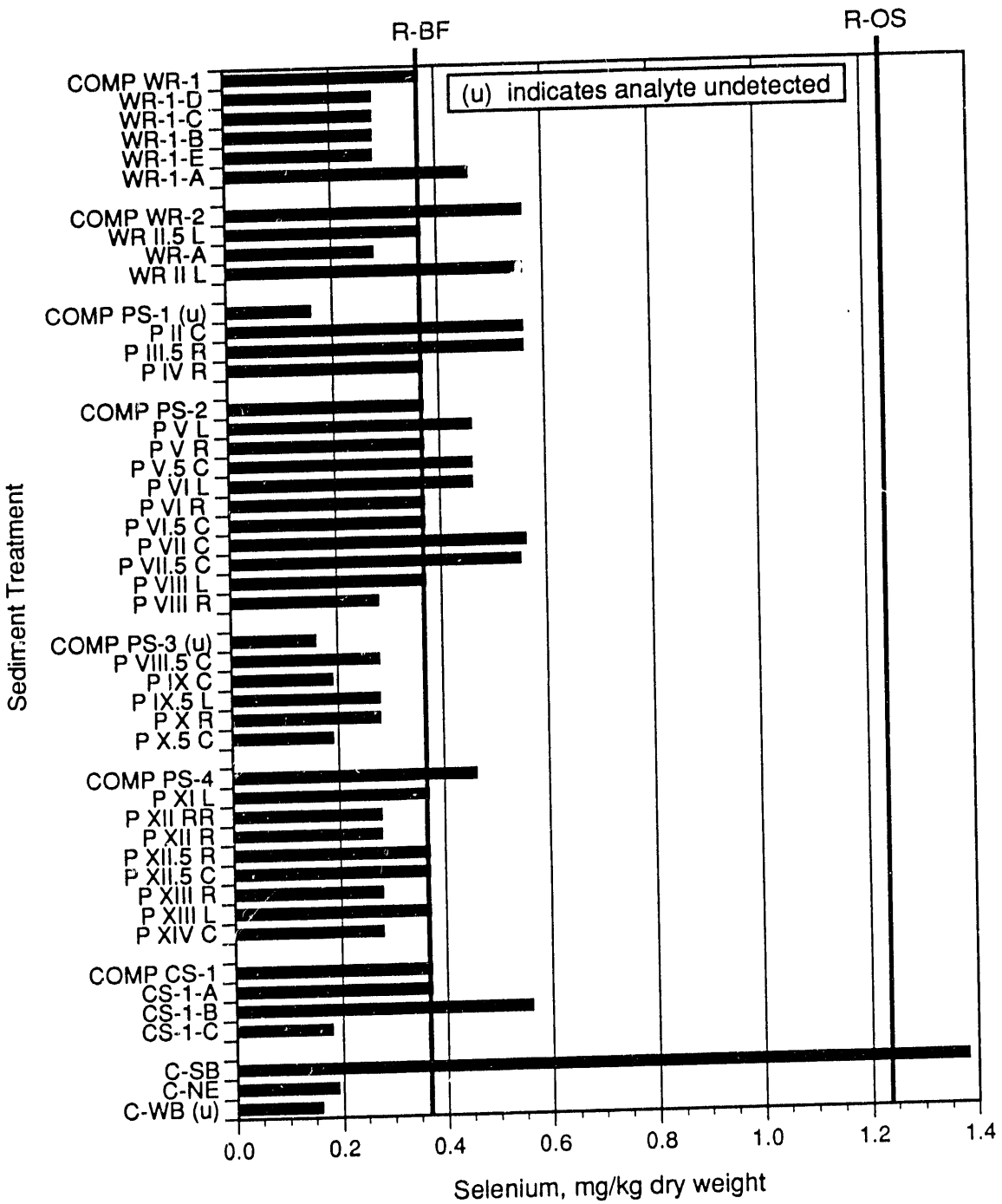


FIGURE 3.31. Selenium in John F. Baldwin Ship Channel Sediments

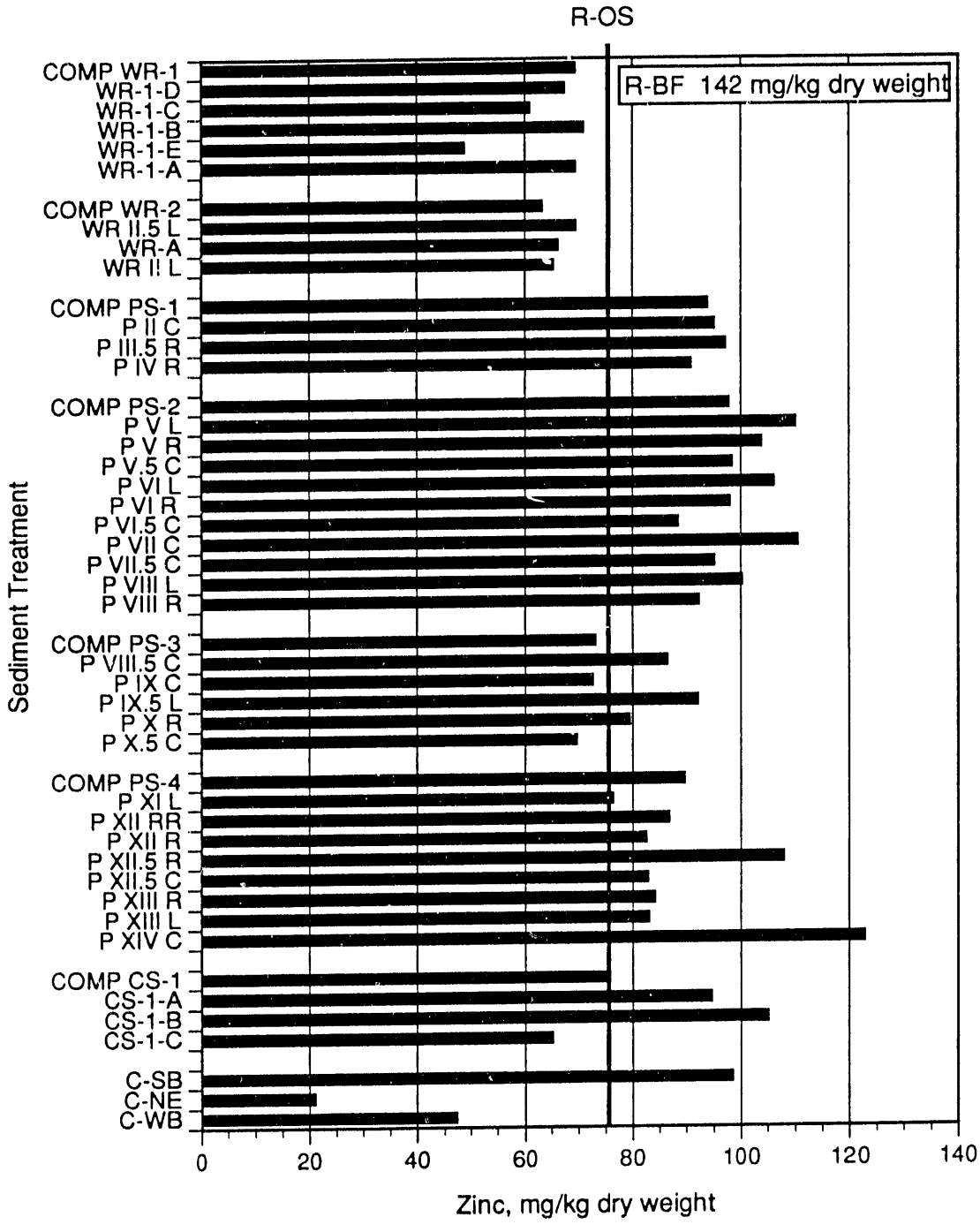


FIGURE 3.32. Zinc in John F. Baldwin Ship Channel Sediments

than Se in R-BF. Zinc (Zn) concentrations ranged from 21.0 mg/kg in C-NE to 142.0 mg/kg in R-BF (Figure 3.32). Most John F. Baldwin Ship Channel sediments had 60 to 100 mg/kg Zn, with West Richmond stations at the low end of the range and Pinole Shoal stations at the higher end. Pinole Shoal and Carquinez Strait stations were similar to or slightly exceeded Zn in R-OS, no channel stations exceeded R-BF in Zn concentration.

3.3.5 Butyltins

John F. Baldwin Ship Channel sediment butyltin results, including quality control data, are presented in Appendix B, Tables B.18 and B.19. A small amount of tributyltin was detected in the method blanks for all three batches at concentrations less than the quality control limit of five times the detection limit; therefore, the sample values are not blank-corrected. Surrogate recoveries ranged from 27% to 107%, and were generally between 40% and 80%. Recoveries for both the tripentyl- and propyltin surrogates were less than 40% in three samples, and recovery of the propyltin surrogate compound only was less than 40% in ten samples. Matrix spike recoveries were within quality control limits for tributyltin, but were less than 40% for dibutyltin in four of six analyses. These four dibutyltin MS recoveries were between 20% and 39%. Analytical results for the NRCC SRM PACS-1 were corrected for propyltin surrogate recovery before comparison to the certified values. Sample results had a percent difference of less than 30% from the mean certified value in two of the three analytical batches. Results of triplicate analyses for analytical precision were within quality control limits. The RPD between MS and MSD analyses were greater than 30% for tributyltin in one analytical batch and for dibutyltin in two batches. Although the butyltin data are generally acceptable, care should be taken in interpreting dibutyltin results because of low surrogate and MS recoveries of the dibutyltin species.

Results of butyltin analyses showed that tri-, di-, and monobutyltin were undetected in all but five samples, only one of which was from the John F. Baldwin Ship Channel. Tributyltin was detected at a level of 4.1 µg/kg (dry weight) at P X.5 C. Dibutyltin was detected in the reference sediments R-BF and R-OS at levels of 3.2 µg/kg and 3.9 µg/kg dry weight, respectively. Dibutyltin was also detected in the control sediments C-SB and C-WB at levels of 4.7 µg/kg and 3.8 µg/kg, respectively. These butyltin concentrations are very low compared to those sometimes found in urbanized waterways or marinas.

3.4 TOXICOLOGICAL TESTING RESULTS

Suspended-particulate-phase toxicity tests were conducted on the SPP of the seven John F. Baldwin Ship Channel sediment composites. Three concentrations of SPP,10%, 50%, and 100%, were prepared and tested along with a seawater control (0% SPP), as described in Sections 2.2.4, and 2.3. Three species of sensitive marine organisms were exposed to the SPP treatments: the mysid shrimp *H. sculpta*, juvenile speckled sanddab *C. stigmaeus*, and larvae of the echinoderm *Dendraster excentricus*.

Solid-phase toxicity tests were conducted to evaluate seven John F. Baldwin Ship Channel composite sediment treatments, two reference sediment treatments, and three control sediment treatments. The test treatments were COMPs WR-1, WR-2, PS-1, PS-2, PS-3, PS-4, and CS-1, the reference treatments were R-BF and R-OS, and the control treatments were C-SB, C-WB, and C-NE. To assess the acute toxicity of the sediment, three species of sensitive marine organisms were exposed for 10 days to the solid-phase treatments: the amphipod *R. abronius*, the polychaete *N. caecoides*, and the bentnose clam *M. nasuta*. A 28-day exposure of *M. nasuta* and *N. caecoides* to the sediment treatments was conducted to assess bioaccumulation of contaminants into the organism tissues.

The results of the SPP and solid-phase toxicity tests are presented below. Complete results, water quality monitoring, observation, and reference toxicant test data relating to the SPP tests are contained in Appendixes C through E. Data relating to the solid-phase tests are contained in Appendixes F through H.

3.4.1 96-h Suspended-Particulate-Phase Static Test with *Holmesimysis sculpta*

The 96-h mysid test was conducted following the procedures described in Section 2.4.1. Ten *H. sculpta* were exposed in each of four replicates per concentration for each of seven treatments. Survival data for all replicates, daily observations, and water quality data are presented in Appendix C. All water quality parameters were within acceptable ranges throughout the test. Table 3.8 shows that the test with *H. sculpta* was validated by >90% control survival for four treatments (COMPs WR-1, WR-2, PS-1, and PS-2), but was invalid for three treatments because the control (0% SPP) treatments had less than 90% survival. If all 28 control replicates are considered, the mean control survival in the *H. sculpta* test was 89.3%, very closely 90%. The *H. sculpta* showed no reduction in survival when exposed to the various concentrations of

TABLE 3.8. Results of the 96-h Suspended-Particulate-Phase Test with *H. sculpta*

Sediment Treatment	Concentration (Percent SPP)	Mean Percent Surviving	Survival in 100% SPP Significantly Lower Than Survival in 0% SPP	96-h LC50 (Percent SPP)
COMP WR-1	0	97.5		
COMP WR-1	10	90.0		
COMP WR-1	50	95.0		
COMP WR-1	100	97.5	No	>100
COMP WR-2	0	92.5		
COMP WR-2	10	100.0		
COMP WR-2	50	95.0		
COMP WR-2	100	92.5	No	>100
COMP PS-1	0	95.0		
COMP PS-1	10	77.5		
COMP PS-1	50	92.5		
COMP PS-1	100	95.0	No	>100
COMP PS-2	0	92.5		
COMP PS-2	10	92.5		
COMP PS-2	50	97.5		
COMP PS-2	100	95.0	No	>100
COMP PS-3	0	82.5		
COMP PS-3	10	95.0		
COMP PS-3	50	97.5		
COMP PS-3	100	95.0	No	>100
COMP PS-4	0	77.5		
COMP PS-4	10	92.5		
COMP PS-4	50	90.0		
COMP PS-4	100	92.5	No	>100
COMP CS-1	0	87.5		
COMP CS-1	10	97.5		
COMP CS-1	50	97.5		
COMP CS-1	100	90.0	No	>100

SPP prepared from sediment composites (Table 3.8); in fact survival at the highest SPP concentration was either equal to or was better than that observed in the control treatments. Therefore, the *H. sculpta* SPP test was not rerun, t-tests comparing the response to 0% and 100% SPP concentrations were not conducted, and LC50s for all treatments were determined to be >100% SPP.

Results of a reference toxicant test showed that *H. sculpta* were very sensitive to Cu, at less than 50 µg/L. This compares reasonably well with a LC50 of 27 µg/L Cu reported by Hunt et al. (1989) for a similar test with *H. sculpta*. This test was the first instance at MSL of using Cu

to replace Zn as a reference toxicant for *H. sculpta*. As 50 µg/L was the lowest Cu concentration tested, and mortality at that level was nearly 100%, a more accurate LC50 could not be established.

3.4.2 96-h Suspended-Particulate-Phase Static Test with *Citharichthys stigmaeus*

The 96-h sanddab test was conducted following the procedures described in Section 2.4.2. Ten *C. stigmaeus* were added to each of four replicates per concentration for each of the seven treatments. Survival data for all replicates is presented in Appendix D, Table D.1. The test was validated by >90% (97.5% to100%) survival in all control (0% SPP) treatments. Water quality monitoring data (Appendix D, Table D.3) showed that all parameters remained within acceptable ranges during the test. The *C. stigmaeus* reference toxicant test with Cu resulted in a LC50 estimate of 0.97 mg/L Cu, meaning that a 50% decrease in survival could be expected at this concentration. This compares very well with LC50s of 1.20 mg/L and 1.23 mg/L calculated in two previous tests with *C. stigmaeus*. All other data (water quality and observations) related to the *C. stigmaeus* SPP and reference toxicant tests are reported in Appendix D.

Mean percent survival for each SPP treatment and concentration is presented in Table 3.9. Survival of *C. stigmaeus* ranged from 92.5% to 100%. The 100% SPP of COMP PS-4 had 92.5% survival; all other mean responses were greater than 95%. COMPs WR-1, PS-1, and CS-1 had no effect on *C. stigmaeus* at any SPP concentration. T-tests were performed on the arcsine square root of the proportion surviving in the 100% versus the 0% SPP for COMPs WR-2 and PS-4. No treatments were found to have significantly lower survival in the 100% SPP (Table 3.9). Survival was never below 50% in any treatment; therefore, LC50 concentrations were determined to be >100% SPP.

3.4.3 72-h Suspended-Particulate-Phase Static Test with Larval *Dendraster excentricus*

The 72-h echinoderm test was conducted following the procedures described in Section 2.4.3. The larvae of *D. excentricus* were exposed in each of four replicates per concentrations (0%, 10%, 50%, and 100%) for each of seven treatments. Survival and embryo development data for all replicates are presented in Appendix E, Table E.1. All water quality parameters were within acceptable ranges throughout the test. The test was validated by >88% survival in all the 0% SPP treatments (88.2% to 96.6%) (Table 3.10), based on an initial stocking density of 252 embryos per 10 mL of test solution (approximately 7560 embryos per test container). In a reference toxicant test with copper sulfate, the EC50 of 9.35 µg/L (as Cu) is within the Cu EC50

TABLE 3.9. Results of the 96-h Suspended-Particulate-Phase Test with *C. stigmaeus*

Sediment Treatment	Concentration (Percent SPP)	Mean Percent Surviving	Survival in 100% SPP Significantly Lower Than Survival in 0% SPP	96-h LC50 (Percent SPP)
COMP WR-1	0	100.0		
COMP WR-1	10	100.0		
COMP WR-1	50	100.0		
COMP WR-1	100	100.0	No	>100
COMP WR-2	0	97.5		
COMP WR-2	10	97.5		
COMP WR-2	50	100.0		
COMP WR-2	100	95.0	No	>100
COMP PS-1	0	100.0		
COMP PS-1	10	100.0		
COMP PS-1	50	100.0		
COMP PS-1	100	100.0	No	>100
COMP PS-2	0	100.0		
COMP PS-2	10	97.5		
COMP PS-2	50	100.0		
COMP PS-2	100	100.0	No	>100
COMP PS-3	0	97.5		
COMP PS-3	10	97.5		
COMP PS-3	50	100.0		
COMP PS-3	100	97.5	No	>100
COMP PS-4	0	100.0		
COMP PS-4	10	100.0		
COMP PS-4	50	100.0		
COMP PS-4	100	92.5	No	>100
COMP CS-1	0	100.0		
COMP CS-1	10	100.0		
COMP CS-1	50	100.0		
COMP CS-1	100	100.0	No	>100

range of 5.3 to 11.5 µg/L reported by EPA in the water quality criteria for Cu (EPA 1985). The EC50 is the concentration of toxicant that can be expected to cause a 50% reduction in normal embryo development.

The mean proportion of normal and the mean proportion survival (total embryos observed) in each SPP treatment is presented in Table 3.10. Embryo survival and embryo development in the 0% and 100% concentrations of each SPP treatment were compared in a two-sample t-test. Statistically significant differences in survival were detected in 100% SPP of COMPs PS-1, PS-2, PS-3, and CS-1, relative to their respective controls. However, LC50s (the

TABLE 3.10. Results of the 72-h Suspended-Particulate-Phase Test with *D. excentricus*

Sediment Treatment	Concentration (Percent SPP)	Proportion Normal[a]	Development in 100% SPP Significantly Lower Than Development in 0% SPP	EC50 (Percent SPP)	Proportion Survival	Survival in 100% SPP Significantly Lower Than Survival in 0% SPP	LC50 (Percent SPP)
COMP WR-1	0	0.94			0.97		
COMP WR-1	10	0.92			0.96		
COMP WR-1	50	0.90			0.93		
COMP WR-1	100	0.85	No	>100	0.93[b]	No	>100
COMP WR-2	0	0.87			0.90[b]		
COMP WR-2	10	0.88			0.91		
COMP WR-2	50	0.84			0.89		
COMP WR-2	100	0.64	Yes	>100	0.86	No	>100
COMP PS-1	0	0.84			0.88		
COMP PS-1	10	0.85			0.88		
COMP PS-1	50	0.00			0.96		
COMP PS-1	100	0.00	Yes[c]	22.5	0.49	Yes	>100
COMP PS-2	0	0.84			0.88		
COMP PS-2	10	0.84			0.87		
COMP PS-2	50	0.19			0.89		
COMP PS-2	100	0.00	Yes[c]	29.0	0.50	Yes	>100
COMP PS-3	0	0.89			0.92		
COMP PS-3	10	0.88			0.91		
COMP PS-3	50	0.85			0.91[b]		
COMP PS-3	100	0.56	Yes	>100	0.80	Yes	>100
COMP PS-4	0	0.88			0.90		
COMP PS-4	10	0.89			0.92		
COMP PS-4	50	0.81			0.84		
COMP PS-4	100	0.09	Yes	71.6	0.80	No	>100
COMP CS-1	0	0.92			0.95		
COMP CS-1	10	0.88			0.91		
COMP CS-1	50	0.87			0.90[b]		
COMP CS-1	100	0.65	Yes	>100	0.75	Yes	>100

(a) Based on stocking density of 252 embryos per 10 mL.
(b) A proportion survival of 1.00 was used for any replicate with number surviving greater than the stocking density.
(c) Difference in response is biologically significant but technically cannot be called statistically significant; t value could not be calculated because there was no variance in the 100% SPP response.

percent SPP expected to cause 50% reduction in survival) could not be calculated because there was never a 50% reduction in embryo survival relative to the controls. Therefore, the LC50s for all treatments were determined to be >100%.

The John F. Baldwin Ship Channel SPP treatments affected normal embryo development (development to pluteus stage) more than embryo survival. The normal development endpoint is more indicative of the organisms that are likely to survive to adulthood; therefore, this endpoint is more useful (environmentally sensitive) for assessing environmental impacts. All 100% SPP treatments resulted in significant differences in normal development relative to controls, except for COMP WR-1 (Table 3.10). Three treatments had more than a 50% reduction in normal development, and the following EC50s were calculated: COMP PS-1, 22.5% SPP; COMP PS-2, 29.0% SPP; and COMP PS-4, 71.6% SPP. Only COMP WR-1 showed no significant reduction in either survival or development.

3.4.4 10-Day Solid-Phase Static Test with *Rhepoxynius abronius*

The 10-day test of the acute toxicity of 11 solid-phase sediment treatments to the amphipod *R. abronius* was conducted following the procedures described in Section 2.4.4. Twenty *R. abronius* were exposed in each of five replicates of each sediment treatment. Survival data for all replicates is contained in Appendix F, Table F.1. The test was validated by 99.0% survival in the West Beach control sediment (C-WB), the native sediment of *R. abronius*. In a reference toxicant test with cadmium chloride, an LC50 of 1.58 mg/L as Cd was estimated. This LC50 is higher than the 0.92 mg/L value cited for Cd toxicity to *R. abronius* in the recent ASTM guide for conducting toxicity tests with marine amphipods (ASTM 1990), but it compares very well with the mean LC50 of 1.46 mg/L (sd = 0.50 mg/L) obtained in eight recent *R. abronius* reference toxicant tests conducted at MSL. The control survival and Cd LC50 indicate that the response of the *R. abronius* population was as expected.

Water quality monitoring data (Appendix F, Table F.4) showed that salinity in several test containers was below the acceptable range for the test. *R. abronius* is sensitive to salinity changes and does not tolerate salinities less than 25‰ (ASTM 1990). In COMP WR-1 rep 2, salinity decreased from 31.5‰ to 28.5‰; in COMP PS-4 rep 2, salinity decreased from 30.0‰ to 26.0‰; and in C-SB rep 5, salinity decreased from 30.5‰ to 25.5‰. While these salinities were not below 25‰, the change occurred relatively early in the 10-day exposure (between day 2 and day 5), and probably contributed to the high mortality in those replicates (100% mortality in COMP WR-1 rep 2 and COMP PS-4 rep 2, 45% mortality in C-SB rep 5). Daily observations

showed an unusually high number of *R. abronius* on the sediment surface in those three containers beginning on test day 5 and continuing to test day 10. The reason for the change in salinities and emergence of *R. abronius* could not be determined. Notable salinity decreases also occurred in COMP PS-1 rep 4 (30.0‰ to 25.5‰ on test day 10) and COMP PS-2 rep 3 (31.5‰ to 22.0‰ on test day 9 or 10). Mortality was slightly higher in those replicates, but was not sufficiently different from other replicates to reject the data points.

A second 10-day exposure was conducted with only COMPs WR-1, PS-2, PS-4, C-SB, and the *R. abronius* control sediment C-WB. Control survival of 97% and a Cd LC50 of 1.66 mg/L for the second group of animals showed (Appendix F, Tables F.9 through F.16) that *R. abronius* responded as expected to controlled test conditions. In the second *R. abronius* test, no unusual salinity changes or *R. abronius* behavior were observed, and survival was comparable in all five replicates for each sediment treatment. *R. abronius* survival in the second exposure was very similar to survival in replicates that were unaffected by salinity changes in the first exposure (Table 3.11). The results of the retest confirmed that poor survival during the initial exposure was isolated to a few replicates and was not characteristic of the sediment treatment. Because the poor survival in COMP WR-1 rep 2 and COMP PS-4 rep 2 was probably attributable to the testing conditions and not the sediment being tested, survival data for those replicates were not included in the treatment mean survival calculation, ANOVA, and Dunnett's Test. With the anomalous replicate data removed from the data set, ANOVA and Dunnett's Test showed that no statistically significant differences in response, and no increase in mortality >10%, occurred between test composites and the Deep Off-Shelf reference sediment R-OS (Tables 3.11 and 3.12).

3.4.5 10-Day Solid-Phase Flow-Through Test with *Nephtys caecoides* and *Macoma nasuta*

The 10-day test of the acute toxicity of 11 solid-phase sediment treatments to the polychaete *N. caecoides* and the bentnose clam *M. nasuta* was conducted as described in Section 2.4.5. Twenty individuals of each species were exposed in each of five replicates for each sediment treatment. Survival data for each species in all replicates are contained in Appendix G, Tables G.1 and G.5. The test was validated by 99.0% survival of *N. caecoides* in its native control sediment C-NE and by 98.0% survival of *M. nasuta* in its native control sediment C-SB. All water quality parameters were within the acceptable range for the duration of the test (Appendix G, Table G.8).

TABLE 3.11. Results of the 10-Day Solid-Phase Test With *R. abronius*

Sediment Treatment	All Replicates Mean Percent Survival	s.d.	Anomalous Replicate Removed Mean Percent Survival	s.d.	Retest, All Replicates Mean Percent Survival	s.d.	Significance
R-OS	87.0	8.4	NA[a]	NA	NA	NA	NA
COMP WR-1	76.0	42.6	95.0	4.1	91.0	4.2	NS[b]
COMP WR-2	97.0	2.7	NA	NA	NA	NA	NS
COMP PS-1	82.0	7.6	NA	NA	NA	NA	NS
COMP PS-2	83.0	12.5	87.5	8.7	88.0	9.8	NS
COMP PS-3	96.0	2.2	NA	NA	NA	NA	NS
COMP PS-4	76.0	42.6	95.0	4.1	94.0	4.2	NS
COMP CS-1	95.0	0.0	NA	NA	NA	NA	NS
R-BF[c]	92.0	4.5	NA	NA	NA	NA	NA
C-SB[c]	89.0	19.2	97.5	2.9	97.0	2.7	NA
C-WB[c]	99.0	2.2	NA	NA	97.0	4.5	NA

(a) NA Not applicable.
(b) NS Difference between treatment and reference not statistically significant and not >20%.
(c) Treatment not included in Dunnett's Test data set.

TABLE 3.12. ANOVA Results for 10-Day Solid-Phase Test With *R. abronius* (excluding treatments R-BF, C-SB, and C-WB)

Source of Variation	Sum of Squares	d.f.	Mean Square	F-Ratio	Significance Level
Treatment	0.446	7	0.064	4.458	0.0017
Residual	0.429	30	0.014		

Mean survival of *N. caecoides* and *M. nasuta* in the 10-day acute solid phase test is presented in Table 3.13. The ANOVA data are presented in Table 3.14. *N. caecoides* survival in treatments other than the control ranged from 94% to 97%. *N. caecoides* survival in the reference treatments was 94.0% in R-OS and 95.0% in R-BF. There was no statistically significant difference in *N. caecoides* survival between any test treatment and R-OS. *M. nasuta* survival in treatments other than the control ranged from 90.0% to 99.0%, while survival in the reference sediments was 96.0% in R-OS and 99.0% in R-BF. There was no statistically significant difference in *M. nasuta* survival between any test treatment and R-OS.

3.4.6 28-Day Solid-Phase Flow-Through Test with *Nephtys caecoides* and *Macoma nasuta*

The 28-day test for biooaccumulation of contaminants from 11 solid-phase sediment treatments in the polychaete *N. caecoides* and the bentnose clam *M. nasuta* was conducted as described in Section 2.4.6. Twenty-five *M. nasuta* and 40 *N. caecoides* were exposed in each of five replicates for each sediment treatment. Survival data for each species in all replicates are contained in Appendix H, Tables H.1 and H.5. The test was validated by 95.0% survival of *N. caecoides* in its native control sediment C-NE, and by 93.6% survival of *M. nasuta* in its native control sediment C-SB (Table 3.15). All water quality parameters were within the acceptable range for the duration of the test (Appendix H, Table H.8).

Mean survival of *N. caecoides* and *M. nasuta* in the 28-day bioaccumulation test is presented in Table 3.15. *N. caecoides* survival in treatments other than the control ranged from 83.5% to 92.0%. *N. caecoides* survival in the reference treatments was 90.5% in R-OS and 91.5% in R-BF. *M. nasuta* survival in treatments other than the control ranged from 88.8% to 97.6%, while survival in the reference sediments was 93.6% in R-BF and 96.8% in R-OS. Because the endpoint of the 28-day exposure is tissue bioaccumulation rather than acute toxicity, survival between test and reference treatments was not statistically compared.

3.5 TISSUE BIOACCUMULATION RESULTS

Contaminants of concern (PAHs, chlorinated pesticides, PCBs, metals, and butyltins) were measured in the tissues of *M. nasuta* and *N. caecoides* after the 28-day exposure to test, reference, and control sediments. If a contaminant was detected (no qualifier or J qualifier) in tissues exposed to any replicate test treatment, and if the mean tissue concentration of the test replicates was greater than the mean tissue value for any reference treatment, a statistical

TABLE 3.13. Results of the 10-Day Solid-Phase Test With *M. nasuta* and *N. caecoides*

S I	Sediment Treatment	*M. nasuta* Mean Percent Survival	*M. nasuta* Significance	*N. caecoides* Mean Percent Survival	*N. caecoides* Significance
R	R-OS	96.0	NA(a)	94.0	NA
C	COMP WR-1	97.0	NS(b)	94.0	NS
C	COMP WR-2	99.0	NS	97.0	NS
C	COMP PS-1	90.0	NS	95.0	NS
C	COMP PS-2	98.0	NS	95.0	NS
C	COMP PS-3	93.0	NS	95.0	NS
C	COMP PS-4	97.0	NS	94.0	NS
C	COMP CS-1	96.0	NS	96.0	NS
R	R-BF(c)	99.0	NA	95.0	NA
C	C-SB(c)	98.0	NA	96.0	NA
C	C-NE(c)	94.0	NA	99.0	NA

(a) NA Not applicable.
(b) NS Difference between treatment and reference not statistically significant and not >10%.
(c) Treatment not included in Dunnett's Test data set.

TABLE 3.14. ANOVA Results for 10-Day Solid-Phase Test With *M. nasuta* and *N. caecoides* (excluding treatments R-BF, C-SB, and C-NE)

Source of Variation	Sum of Squares	d.f.	Mean Square	F-Ratio	Significance Level
M. nasuta					
Treatment	0.236	7	0.034	1.355	0.2580
Residual	0.796	32	0.025		
N. caecoides					
Treatment	0.040	7	0.006	0.212	0.9802
Residual	0.865	32	0.027		

TABLE 3.15. Results of the 28-Day Solid-Phase Test with *M. nasuta* and *N. caecoides*

Sediment Treatment	*M. nasuta* Mean Percent Surviving	*N. caecoides* Mean Percent Surviving
COMP WR-1	96.0	92.0
COMP WR-2	90.4	91.5
COMP PS-1	88.8	83.5
COMP PS-2	92.8	90.5
COMP PS-3	93.6	92.0
COMP PS-4	94.4	91.5
COMP CS-1	97.6	91.5
R-OS	96.8	90.5
R-BF	93.6	91.5
C-SB	93.6	92.0
C-NE	92.0	95.0

comparison between treatment and reference concentrations was made. Contaminant concentrations in tissues exposed to test treatments (COMPs) and the Deep Off-Shelf reference (R-OS) were statistically compared by ANOVA and Dunnett's Test with an experiment-wise error rate of $\alpha = 0.05$. Background (pre-exposure), control, and R-BF tissue concentrations were not included in the statistical analysis. Mean contaminant concentrations and the results of the statististical comparisons are presented in the following sections.

3.5.1 Polynuclear Aromatic Hydrocarbon Bioaccumulation in *Macoma nasuta*

Quality control data for PAH analysis of *M. nasuta* tissue are provided in Appendix I, Tables I.7 through I.9. Overall, the QC data for these analyses show that the sample data are of acceptable accuracy and precision. Tissue samples were processed in four analytical batches. Achieved detection limits of up to 4.86 µg/kg wet weight were far below the target detection limit of 20 µg/kg wet weight. Naphthalene and phenanthrene were detected in the procedural blanks for two batches and one batch, respectively; however, blank concentrations were less than the QC limit of five times the method detection limit (MDL) so the data are not blank-corrected. Surrogate recoveries were within QC limits in all samples (Appendix I, Table I.9). Matrix spike and matrix spike duplicate (MS/MSD) recoveries were generally within QC limits, except for some HPAHs in Batches 5 and 7; exceedances are noted in Appendix I,

Tables I.7 and I.8. Precision between MS/MSD recoveries was excellent in all batches; with RPDs ≤13%. The recoveries of two PAH compounds (anthracene and benzo[g,h,i]perylene) in the tissue SRM typically exceeded the percent difference criteria. The analytical results were below the MDL, but the certified concentrations for these compounds in the SRM are even lower. Concentrations of the other six PAHs in the tissue SRM were nearly all within the percent difference criteria. Analytical precision was generally acceptable. In most cases where the RSD QC limit of 30% was exceeded, it was because the values were very low.

Data for PAHs in *M. nasuta* tissues, reported on both a wet weight and dry weight basis, are contained in Appendix I, Tables I.1 through I. 6. Mean dry weight values for LPAH and HPAH are shown in Tables 3.16 and 3.17, respectively. The PAHs in all *M. nasuta* tissues were generally quite low. Most PAHs were undetected (flagged with a U qualifier) or estimated below the MDL (flagged with a J qualifier) in most treatments. The LPAH naphthalene and the intermediate molecular weight PAHs phenanthrene, fluoranthene, pyrene, and chrysene were the only compounds found to have concentrations above the MDL in the majority of test treatments. *M. nasuta* exposed to the Bay Farm reference sediment R-BF were an exception: most PAH compounds were present in tissues, reflecting the higher sediment PAH levels in R-BF.

Macoma nasuta exposed to R-OS had very low levels of tissue PAH: less than 11 µg/kg (wet weight) total PAH or less than 96 µg/kg on a dry weight basis in individual replicates. *M. nasuta* exposed to John F. Baldwin Ship Channel sediments had variable total PAH (38 to 197 µg/kg dry weight in individual replicates). Statistical comparisons to R-OS were conducted for all PAHs because some of the treatment mean values were higher than reference mean values, even though the MDLs were below target levels and some individual detected values were below the MDL for the replicate.

The results of Dunnett's Test for the PAH compounds that were statistically compared are included in Tables 3.16 and 3.17. The ANOVA data for those comparisons are presented in Table 3.18. Relative to R-OS, only pyrene, fluoranthene, and benzo(b)fluoranthene were found to be significantly elevated in tissues exposed to certain composites. Both pyrene and fluoranthene were significantly greater in *M. nasuta* exposed to COMPs PS-2, PS-4, and CS-1 than in those exposed to R-OS. Only pyrene was significantly greater in *M. nasuta* exposed to COMPs WR-1 and PS-3, relative to R-OS. Benzo(b)fluoranthene was significantly greater than R-OS in COMP CS-1, but in both cases the detected values were extremely low (below MDLs in all replicates). The magnitude of significant bioaccumulation of pyrene and fluoranthene was

TABLE 3.16. Mean Concentrations of Low Molecular Weight PAHs in Tissues of *M. nasuta* Exposed to John F. Baldwin Ship Channel Sediments (no test treatment means were significantly greater than R-OS when compared by Dunnett's Test)

	Mean LPAH (µg/kg dry weight)					
Treatment	Naph-thalene	Acenaph-thylene	Acenaph-thene	Fluorene	Phenan-threne	Anthracene
R-OS	11.6	12.0 UJ[a]	2.7 J[b]	2.7 J	12.0	2.0 J
COMP WR-1	25.6	19.6 UJ	11.6 UJ	4.8 UJ	16.8	3.9 UJ
COMP WR-2	20.7	13.8 UJ	7.6 UJ	3.2 J	11.9	2.5 UJ
COMP PS-1	18.4	10.6 UJ	5.5 UJ	2.8 J	11.4	1.7 J
COMP PS-2	18.6	15.6 UJ	5.7 UJ	2.7 J	13.2	1.4 J
COMP PS-3	14.8	13.9 UJ	5.5	3.8	11.5	3.0
COMP PS-4	15.9	18.3 U[c]	4.2 UJ	3.4 J	14.8	1.5 J
COMP CS-1	22.4	15.9 UJ	6.8 UJ	2.6 J	15.1	2.7 UJ
R-BF[d]	23.5	4.6 UJ	4.3 UJ	3.9 J	18.7	4.5
Background [d]	17.4	14.9 U	5.3 UJ	3.2 J	19.9	0.8 J
C-SB[d]	11.9	8.3 UJ	4.4 UJ	2.9 J	11.3	1.7 J
C-NE[d]	15.9	16.0 U	4.9 UJ	2.7 J	14.2	2.5 UJ

(a) UJ Undetected or detected below the method detection limit in all replicates; value is the mean of detected values and dry weight detection limits.
(b) J Detected below the method detection limit in all replicates.
(c) U Undetected in all replicates; value is mean of dry weight detection limits.
(d) Treatment not included in Dunnett's Test data set.

relatively low, with test treatment concentrations two to four times the reference concentrations (Table 3.17). To put the magnitude of individual contaminant concentrations in perspective, the highest mean PAH value of 24.9 µg/kg dry weight pyrene in COMP CS-1 is approximately 2.5 µg/kg wet weight, just a fraction of the target detection limit (about one tenth).

3.5.2 Chlorinated Pesticide and Polychlorinated Biphenyl Bioaccumulation in *Macoma nasuta*

The QC results for the analysis of pesticides and PCBs in *M. nasuta* tissue are provided in Appendix I, Tables I.14, I.15, I.18, and I.19. In general, the QC data for these analyses show that the data are of acceptable accuracy and precision. Achieved detection limits were generally much lower than the target detection limits, and no blank contamination was detected. Surrogate recoveries were within QC limits in all but two samples (one triplicate sample, and one MSD sample). The MS/MSD RPDs for several compounds exceeded QC limits; however, the analytical precision for triplicate analyses was excellent. The matrix spiking solution contained both pesticide compounds and Aroclor 1254. The MS/MSD recoveries for some target

TABLE 3.17. Mean Concentrations of High Molecular Weight PAHs in Tissues of *M. nasuta* Exposed to John F. Baldwin Ship Channel Sediments (bold type indicates value is significantly greater than R-OS when compared by Dunnett's Test; box indicates value is >2 times but ≤5 times R-OS; shaded box indicates value is >5 times but ≤10 times R-OS)

	Mean HPAH (µg/kg dry weight)									
Treatment	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene
R-OS	9.9	6.0	3.9 J[a]	6.6	3.0 J	1.5 J	4.8 UJ[b]	7.6 UJ	6.4 UJ	4.3 UJ
COMP WR-1	12.3	**12.3**	4.0 J	6.3 J	5.3 J	3.0 J	1.6 J	10.3 UJ	12.9 U[c]	3.4 J
COMP WR-2	11.3	7.3	2.1 J	5.6	4.4 UJ	3.3 UJ	10.6 U	11.1 UJ	8.7 U	9.8 UJ
COMP PS-1	8.4	4.2 J	2.3 J	4.7 J	2.1 J	1.2 J	11.8 U	14.1 U	7.1 UJ	14.3 UJ
COMP PS-2	**15.0**	**19.5**	3.8 J	7.2	5.0 J	2.5 J	2.2 J	5.6 UJ	6.6 UJ	8.0 UJ
COMP PS-3	10.7	**10.0**	4.2	5.8	4.4 J	2.9 J	4.2 UJ	6.6 UJ	8.1 UJ	10.4 UJ
COMP PS-4	**23.3**	**24.2**	4.1 J	9.0	5.0 J	2.4 J	3.8 UJ	6.3 UJ	5.2 UJ	5.5 UJ
COMP CS-1	**20.7**	**24.9**	4.6 J	8.7	**5.9 J**	3.4 J	9.2 UJ	4.9 UJ	7.1 UJ	7.2 UJ
R-BF[d]	57.3	73.1	16.3	23.9	41.5	18.0	28.1	16.8	6.8 UJ	23.4
Background[d]	18.1	7.5	2.2 J	9.5	3.0 J	0.9 J	0.9 J	0.7 J	0.4 J	1.6 J
C-SB[d]	24.4	16.0	4.4 J	7.5	8.7	4.0 J	1.4 J	2.6 J	4.7 UJ	3.6 J
C-NE[d]	14.9	8.6	2.5 J	7.9	4.7 UJ	2.8 UJ	10.5 U	12.6 U	8.6 U	8.6 UJ

(a) J Detected below the method detection limit in all replicates.
(b) UJ Undetected or detected below the method detection limit in all replicates; value is the mean of detected values and dry weight detection limits.
(c) U Undetected in all replicates; value is mean of dry weight detection limits.
(d) Treatment not included in Dunnett's Test data set.

TABLE 3.18. ANOVA Results for Chemical Parameters in Tissues of *M. nasuta* Compared to the Deep Off-Shelf Reference R-OS

Parameter	Sum of Squares		Degrees of Freedom		F-ratio	p-value
	Treatment	Residual	Treatment	Residual		
Polynuclear Aromatic Hydrocarbons						
Naphthalene	2.639	10.625	7	32	1.136	0.3662
Acenapthylene	0.893	57.628	5	24	0.074	0.9956
Acenapthene	4.353	20.840	7	32	0.955	0.4798
Fluorene	0.762	3.084	5	24	1.187	0.3449
Phenanthrene	0.286	2.130	4	20	0.672	0.6188
Anthracene	1.244	15.384	4	20	0.404	0.8032
Fluoranthene	3.587	1.838	6	28	9.107	0.0001
Pyrene	10.229	2.137	6	28	22.332	0.0001
Benzo(a)anthracene	0.581	5.793	4	20	0.502	0.7349
Chrysene	0.795	2.883	3	16	1.470	0.2603
Benzo(b)fluoranthene	2.261	6.624	6	28	1.593	0.1863
Benzo(k)fluoranthene	2.260	9.319	6	28	1.132	0.3698
Benzo(a)pyrene	1.685	7.482	1	8	1.802	0.2163
Indeno(1,2,3)pyrene	0.719	12.242	2	12	0.352	0.7101
Dibenzo(a,h)anthracene	2.489	30.739	4	20	0.405	0.8030
Benzo(g,h,i)perylene	8.730	29.214	6	28	1.394	0.2515
Chlorinated Pesticides						
Aldrin	NA[a]	NA	NA	NA	NA	NA
Alpha BHC	1.653	20.549	6	28	0.375	0.8884
Beta BHC	0.277	1.618	1	8	1.371	0.2753
Delta BHC	NA	NA	NA	NA	NA	NA
cis-(alpha) Chlordane	4.211	17.561	7	32	1.096	0.3891
trans-(gamma) Chlordane	0.064	0.858	3	16	0.401	0.7542
4,4'-DDD	35.674	17.258	7	32	9.450	0.0001
4,4'-DDE	6.892	4.283	7	32	7.355	0.0001
4,4'-DDT	NA	NA	NA	NA	NA	NA
Dieldrin	0.270	10.333	2	12	0.157	0.8564
Endosulfan I	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	0.196	1.192	3	16	0.875	0.4744
Endrin	1.645	24.345	6	28	0.315	0.9235
Endrin aldehyde	0.627	24.303	6	28	0.120	0.9930
Heptachlor	0.574	3.112	5	24	0.886	0.5059
Heptachlor epoxide	1.662	6.123	3	16	1.448	0.2661
Lindane	1.052	13.765	4	20	0.382	0.8188
Toxaphene	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls						
Aroclor 1242	NA	NA	NA	NA	NA	NA
Aroclor 1248	2.150	11.072	7	32	0.888	0.5274
Aroclor 1254	0.726	2.215	4	20	1.639	0.2036
Aroclor 1260	NA	NA	NA	NA	NA	NA

TABLE 3.18. (contd)

Parameter	Sum of Squares Treatment	Sum of Squares Residual	Degrees of Freedom Treatment	Degrees of Freedom Residual	F-ratio	p-value
Metals						
Silver	1.385	2.583	7	32	2.451	0.0394
Arsenic	0.222	0.950	7	32	1.067	0.4064
Cadmium	0.668	1.370	7	32	2.229	0.0578
Chromium	0.486	1.166	7	32	1.907	0.1011
Copper	0.400	1.090	7	32	1.677	0.1502
Mercury	1.491	2.104	7	32	3.238	0.0103
Nickel	0.555	0.754	7	32	3.366	0.0084
Lead	2.557	4.212	7	32	2.775	0.0226
Selenium	0.380	0.945	7	32	1.839	0.1138
Zinc	0.130	0.724	7	32	0.819	0.5787
Butyltins						
Tributyltin	18.470	2.382	6	27	34.889	0.0001
Dibutyltin	0.041	1.551	1	8	0.213	0.6570
Monobutyltin	0.141	1.040	4	20	0.677	0.6159

(a) NA Not applicable; undetected in all replicates or, if detected, treatment mean ≤ R-OS mean.

pesticide compounds were elevated because of coelution of PCB congeners present in Aroclor 1254. Sample results, however, do not appear to be affected by the coelution of PCB congeners and pesticide compounds.

Data for pesticides in *M. nasuta* tissues, reported on both a wet weight and dry weight basis, are contained in Appendix I, Tables I.10 through I.13. Data for PCBs in *M. nasuta* tissues are contained in Appendix I, Tables I.16 and I.17. Of 19 pesticide compounds analyzed, 6 were undetected in *M. nasuta* exposed to all test treatments; 8 others were detected at very low concentrations in one or two replicates. Of the four PCB aroclor equivalents, only two were consistently detected in *M. nasuta*. In Table 3.19, only the pesticide and PCB compounds that were detected in the majority of replicates of more than three treatments are reported. Statistical comparisons were conducted on any compound with a detected value and treatment mean greater than R-OS mean (Table 3.18), but 4,4'-DDD was the only compound found to be significantly greater in *M. nasuta* exposed to John F. Baldwin Ship Channel sediments than in *M. nasuta* exposed to R-OS. Bioaccumulation of 4,4'-DDD was statistically significant in COMPs

TABLE 3.19. Mean Concentrations of Chlorinated Pesticides and Polychlorinated Biphenyls (PCBs) in Tissues of *M. nasuta* Exposed to John F. Baldwin Ship Channel Sediments (bold type indicates value is significantly greater than R-OS when compared by Dunnett's Test; box indicates value is >2 times but ≤5 times R-OS; shaded box indicates value is >5 times but ≤10 times R-OS)

	Mean Concentration (ug/kg dry weight)							
Treatment	alpha-BHC	Endrin	Endrin Aldehyde	4,4'-DDE	4,4'-DDD	cis-(alpha) Chlordane	aroclor 1248	aroclor 1254
R-OS	3.9	6.3 UJ	2.3 UJ	7.4	2.3	1.6	31.5	26.7 U
COMP WR-1	3.3	13.4 UJ	3.7 UJ	5.4	6.3	4.4	46.6	46.5
COMP WR-2	2.8	8.1 UJ	2.5 UJ	3.5	1.3	2.1	71.0	28.7 U
COMP PS-1	2.7	6.5 UJ	3.0	3.0	4.1	3.1	67.5	31.8 U
COMP PS-2	3.5	7.2 UJ	2.9 UJ	6.5	**12.5**	1.9	48.4	35.3
COMP PS-3	0.95 U	5.4 UJ	1.9 UJ	5.2	**7.2**	2.9	56.5	41.5
COMP PS-4	2.2	7.8 UJ	3.1 UJ	6.9	**15.8**	2.2	59.7	41.2
COMP CS-1	2.1	7.9 UJ	3.0 UJ	2.6	3.1	2.1	44.8	33.5 U
R-BF(d)	2.2	11.8 UJ	3.2 UJ	7.8	4.8	3.7	37.5 U	103.9
Background (d)	0.92	9.0 U	2.6 U	1.4	0.62 U	0.94	38.4	26.3 U
C-SB(d)	2.5	4.1 UJ	1.9 UJ	4.0	1.6	0.91	22.4 U	22.4 U
C-NE(d)	0.99	9.7 U	2.2 UJ	4.0	1.3	2.2	34.3	28.3 U

(a) J Detected below the method detection limit in all replicates.
(b) UJ Undetected or detected below the method detection limit in all replicates; value is the mean of detected values and dry weight detection limits.
(c) U Undetected in all replicates; value is mean of dry weight detection limits.
(d) Treatment not included in Dunnett's Test data set.

PS-2, PS-3, and PS-4, with mean concentrations 3 to 7 times higher than reference (Table 3.19). As with the PAH compounds, the actual contaminant concentrations are very low: for COMP PS-4, the high mean 4,4'-DDD (15.8 µg/kg dry weight or 1.7 µg/kg wet weight) is actually lower than the target detection limit of 2 µg/kg wet weight.

3.5.3 Metals Bioaccumulation in *Macoma nasuta*

The QC data for metals analysis of *M. nasuta* tissue are provided in Appendix I, Table I.22. The QC data for these analyses show that the sample data are of acceptable accuracy and precision. All achieved detection limits were lower than target detection limits. Metals were undetected or found at extremely low concentrations in blanks; for both the atomic absorption and ICP/MS methods, sample concentrations are corrected for the amount in the blanks. Matrix spike recoveries were below the QC limit for chromium in two batches and for nickel in one batch, and above the QC limit for lead in one batch. The recoveries of chromium, nickel, and lead in the associated SRM samples, however, were within QC limits. Recoveries of metals in SRM samples were all within the QC limit of 30% difference from the certified value. The QC criteria for analytical precision were met for all metals with the following exceptions: silver in one batch, cadmium in one batch, chromium in two batches, and lead in two batches (Table I.22).

Data for metals in *M. nasuta* tissues, reported on both a wet weight and dry weight basis, are contained in Appendix I, Tables I.20 and I.21. Mean dry weight values for metals in *M. nasuta* are listed in Table 3.20. In general, metals did not appear to be accumulated by *M. nasuta*: with few exceptions the treatment means are similar to background levels in unexposed *M. nasuta*. All metals were detected in all replicates of *M. nasuta* exposed to John F. Baldwin Ship Channel sediments; therefore, all were statistically compared to *M. nasuta* exposed to R-OS. Lead was found to be significantly elevated in *M. nasuta* exposed to COMP PS-4. The actual mean lead concentration in M. nasuta exposed to COMP PS-4 was 3.39 mg/kg dry weight, approximately three times the 1.18 mg/kg in R-OS (Table 3.20). The elevated lead appears to be due to one very high replicate value (10 mg/kg dry weight in COMP PS-4, rep 3), but there were no analytical or quality control problems that justified removing that value from the data set. However, if the anomalous value was eliminated, the mean lead concentration for COMP PS-4 would be 1.71 mg/kg dry weight, and the difference from R-OS would not be statistically significant.

TABLE 3.20. Mean Concentrations of Metals in the Tissues of *M. nasuta* Exposed to John F. Baldwin Ship Channel Sediments (bold type indicates value is significantly greater than R-OS when compared by Dunnett's Test; box indicates value is >2 times but ≤5 times R-OS; shaded box would indicate value is >5 times but ≤10 times R-OS)

Sediment Treatment	Mean Concentration (mg/kg dry weight)									
	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
R-OS	0.35	23.0	0.20	2.93	16.4	0.11	5.93	1.18	1.56	100
COMP WR-1	0.24	23.6	0.15	2.66	12.3	0.08	4.47	0.98	1.48	100
COMP WR-2	0.28	27.5	0.16	2.45	14.5	0.07	4.45	1.27	1.21	112
COMP PS-1	0.26	23.6	0.20	2.68	14.7	0.08	4.99	1.10	1.26	111
COMP PS-2	0.33	25.1	0.22	2.69	16.1	0.14	5.83	1.18	1.53	115
COMP PS-3	0.26	22.1	0.16	2.66	17.0	0.09	5.62	1.30	1.53	99
COMP PS-4	0.23	24.3	0.18	3.55	17.3	0.10	5.30	**3.39**	1.58	105
COMP CS-1	0.20	27.1	0.16	2.43	15.0	0.08	4.39	1.42	1.53	102
R-BF(d)	0.29	23.6	0.20	2.56	15.4	0.12	4.72	2.62	1.32	115
Background(d)	0.29	27.0	0.23	2.26	13.5	0.10	3.72	1.42	1.51	122
C-SB(d)	0.33	27.7	0.23	1.85	17.1	0.10	4.20	1.59	1.69	110
C-NE(d)	0.34	23.9	0.18	1.76	15.2	0.11	3.15	0.93	1.32	104

(d) **Treatment not included in Dunnett's Test data set.**

3.5.4 Butyltin Bioaccumulation in *Macoma nasuta*

The QC results for butyltin analyses in *M. nasuta* tissue are provided in Appendix I, Table I.24. In general, the butyltin data are acceptable. Target detection limits were achieved, and no blank contamination was detected. Surrogate recoveries were generally within QC limits. The recovery of one surrogate compound was below the QC limit of 40 percent in three samples. Tissue samples from outside the study area were used to perform MS and MSD analyses because of insufficient tissue sample volume. Matrix spike and MSD recoveries were within QC limits. The QC criteria for analytical precision were met.

Data for butyltins in *M. nasuta* tissues, reported on both a wet weight and dry weight basis, are contained in Appendix I, Table I.23. Mean dry weight values for butyltins in *M. nasuta* are listed in Table 3.21. Tributyltin (TBT) was detected in all treatments, although sometimes at levels below the MDL. *M. nasuta* exposed to COMP PS-3 had consistently higher TBT concentrations (79.1 to 108.8 µg/kg dry weight in individual replicates) than any of the other treatments, suggesting that any TBT in COMP PS-3 sediment is readily bioavailable. Comp PS-3 was the

TABLE 3.21. Mean Concentrations of Butyltins in the Tissues of *M. nasuta* Exposed to John F. Baldwin Ship Channel Sediments (bold type indicates value is significantly greater than R-OS when compared by Dunnett's Test; box indicates value is >2 times but ≤5 times R-OS; shaded box indicates value is >5 times but ≤10 times R-OS)

Treatment	Mean Butyltin Concentration (µg/kg dry weight) Tributyltin	Dibutyltin	Monobutyltin
R-OS	11.4	16.4 UJ[a]	68.7
COMP WR-1	12.1 UJ	17.2 U[b]	60.9
COMP WR-2	9.8	16.0 U	50.4 U
COMP PS-1	9.7 J[c]	17.5 U	60.6
COMP PS-2	13.4 UJ	18.0 U	56.7 U
COMP PS-3	88.7	17.4 UJ	53.3
COMP PS-4	11.5 UJ	17.5 U	55.9
COMP CS-1	12.0	19.1 U	60.1 U
R-BF[d]	13.6	18.8 U	71.7
Background[d]	10.0	17.6 U	47.3 UJ
C-SB[d]	10.5 UJ	16.7 U	67.8
C-NE[d]	20.7	65.0	78.7 U

(a) UJ Undetected or detected below the method detection limit in all replicates; value is the mean of detected values and dry weight detection limits.
(b) U Undetected in all replicates; value is mean of dry weight detection limits.
(c) J Detected below the method detection limit in all replicates.
(d) Treatment not included in Dunnett's Test data set.

only treatment with statistically significant TBT bioaccumulation compared to R-OS. A review of sediment chemistry data shows that TBT was estimated below the MDL in COMP PS-3 (1.7 µg/kg dry weight) but was detected in sediment from contributing Station P X.5 C (4.1 µg/kg dry weight). Dibutyltin was undetected or below the MDL in all test and reference treatments. Monobutyltin was detected in several treatments but mean treatment values were lower than the mean R-OS value.

3.5.5 Polynuclear Aromatic Hydrocarbon Bioaccumulation in *Nephtys caecoides*

Quality control data for PAH analysis of *N. caecoides* tissue are provided in Appendix J, Tables J.7 through J.9. Overall, the results for these analyses are acceptable. Achieved detection limits were generally lower than the target detection limits. Phenanthrene was detected in one procedural blank at a concentration of 5 µg/kg; this concentration is less than five times the MDL and associated data were not corrected. Surrogate recoveries were excellent in all but one sample (C-NE, rep 2). The MS/MSD recoveries were generally within QC limits with

the exception of some HPAHs in batches 2 and 3; exceedances are noted in Appendix J, Tables J.7 and J.8. The MS/MSD RPDs were within QC limits in all batches of samples. Triplicate precision was acceptable for all compounds except naphthalene and phenanthrene in one batch of samples, and anthracene, fluoranthene, chrysene, and benzo(a)anthracene in another batch. In most cases the apparently poor precision was due to concentrations estimated below the MDL. The recoveries of several PAH compounds in the tissue SRM exceeded the percent difference criteria. These compounds are certified at concentrations below the MDL.

Data for PAHs in *N. caecoides* tissues, reported on both a wet weight and dry weight basis, are contained in Appendix J, Tables J.1 through J.6. Mean dry weight values for LPAH and HPAH are shown in Tables 3.22 and 3.23, respectively. The PAHs in all *N. caecoides* tissues were generally quite low. Most PAHs were undetected (flagged with a U qualifier) or estimated below the MDL (flagged with a J qualifier) in most treatments. The LPAHs naphthalene and phenanthrene were the only compounds found to have concentrations above the MDL

TABLE 3.22. Mean Concentrations of Low Molecular Weight PAHs in Tissues of *N. caecoides* Exposed to John F. Baldwin Ship Channel Sediments (no test treatment means were significantly greater than R-OS when compared by Dunnett's Test)

	Mean LPAH (µg/kg dry weight)					
Treatment	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
R-OS	27.9	32.6 UJ[a]	18.4 UJ	9.5 UJ	12.4	14.7 UJ
COMP WR-1	29.5	37.1 U[b]	20.1 U	7.2 UJ	13.6	10.8 UJ
COMP WR-2	54.4 J[c]	65.3 U	35.4 U	34.4 UJ	26.6	28.9 U
COMP PS-1	41.9	54.5 U	29.5 U	16.7 UJ	19.8	20.9 UJ
COMP PS-2	22.3	33.9 U	18.3 U	3.9 J	11.3 J	15.0 U
COMP PS-3	35.6	44.7 U	24.2 U	17.6 UJ	17.2	15.6 UJ
COMP PS-4	27.6	35.3 U	16.7 UJ	4.0 J	15.8	13.3 UJ
COMP CS-1	29.0 J	42.9 U	23.2 U	9.4 UJ	15.0	12.1 UJ
R-BF[d]	33.3	44.3 U	24.0 U	21.6 UJ	17.6	12.5 UJ
Background [d]	36.6 J	61.7 U	25.8 UJ	11.3 UJ	22.4	20.4 UJ
C-SB[d]	31.8 J	48.8 U	24.1 UJ	18.1 UJ	12.2 J	10.5 UJ
C-NE[d]	56.8	56.1 UJ	31.6 UJ	20.1 UJ	26.0	14.3 UJ

(a) UJ Undetected or detected below the method detection limit in all replicates; value is the mean of detected values and dry weight detection limits.
(b) U Undetected in all replicates; value is mean of dry weight detection limits.
(c) J Detected below the method detection limit in all replicates.
(d) Treatment not included in Dunnett's Test data set.

TABLE 3.23. Mean Concentrations of High Molecular Weight PAHs in Tissues of *N. caecoides* Exposed to John F. Baldwin Ship Channel Sediments (bold type indicates value is significantly greater than R-OS when compared by Dunnett's Test; box indicates value is >2 times but ≤5 times R-OS; shaded box indicates value is >5 times but ≤10 times R-OS)

	Mean HPAH (ug/kg dry weight)									
Treatment	Fluoranthene	Pyrene	Benzo(a) anthracene	Chrysene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(a) pyrene	Indeno (1,2,3-c,d) pyrene	Dibenzo (a,h)anthracene	Benzo (g,h,i) perylene
R-OS	4.4 J[a]	4.6 J	12.0 UJ[b]	2.7 J	24.7 UJ	20.6 UJ	24.4 U[c]	25.7 UJ	17.7 UJ	34.9 UJ
COMP WR-1	5.1 J	**7.9** J	18.1 UJ	3.7 J	23.6 UJ	19.5 UJ	24.3 U	24.2 UJ	16.4 UJ	32.6 UJ
COMP WR-2	5.2 J	5.0 J	43.1 UJ	**26.6 UJ**	49.3 U	41.1 U	42.9 U	51.5 U	35.0 U	69.8 U
COMP PS-1	4.6 J	4.6 J	27.7 UJ	14.6 UJ	35.9 UJ	29.7 UJ	35.8 U	43.0 U	29.2 U	53.8 UJ
COMP PS-2	6.1 J	**14.9**	16.9 UJ	4.5 J	17.2 UJ	14.2 UJ	22.2 U	26.7 U	18.2 U	29.7 UJ
COMP PS-3	5.3 J	**7.8** J	21.4 UJ	12.3 UJ	26.7 UJ	22.1 UJ	29.3 U	35.2 U	23.9 U	47.7 U
COMP PS-4	**7.3** J	**16.2**	16.8 UJ	4.7 J	26.7 U	22.2 U	23.2 U	27.8 U	18.9 U	37.7 U
COMP CS-1	6.4 J	**15.4 J**	15.1 UJ	3.6 J	32.4 U	27.0 U	28.1 U	33.8 U	23.0 U	45.8 U
R-BF[d]	14.3 J	36.3	20.4 UJ	11.7 J	27.9 UJ	23.1 UJ	29.1 U	34.9 U	23.8 U	47.4 U
Background [d]	12.5 J	15.6 J	18.0 UJ	4.4 J	31.9 UJ	35.6 UJ	40.5 U	48.7 U	33.1 U	66.0 U
C-SB[d]	8.9 J	11.1 J	18.5 UJ	5.9 J	21.1 UJ	17.4 UJ	32.0 U	38.4 U	26.2 U	52.1 U
C-NE[d]	11.5 UJ	13.5 UJ	23.6 UJ	17.8 UJ	40.1 UJ	33.5 UJ	37.2 UJ	44.7 UJ	30.7 UJ	60.1 UJ

(a) J Detected below the method detection limit in all replicates.
(b) UJ Undetected or detected below the method detection limit in all replicates; value is the mean of detected values and dry weight detection limits.
(c) U Undetected in all replicates; value is mean of dry weight detection limits.
(d) Treatment not included in Dunnett's Test data set.

in the majority of test treatments. Fluoranthene, pyrene, and chrysene were detected below the MDL in the majority of treatments, but were statistically compared to R-OS if their mean values exceeded R-OS. As with *M. nasuta*, *N. caecoides* exposed to the Bay Farm reference sediment R-BF usually had the highest concentrations of PAH, reflecting the high sediment PAH levels in R-BF.

N. caecoides exposed to R-OS had very low levels of tissue PAH: loss than 16 µg/kg (wet weight) total PAH or less than 95 µg/kg on a dry weight basis in individual replicates. *N. caecoides* exposed to John F. Baldwin Ship Channel sediments had variable total PAH (33 to 216 µg/kg dry weight in individual replicates). Statistical comparisons to R-OS were conducted for 11 of the 16 PAHs: compounds that were detected in at least one replicate and that had treatment mean values higher than reference mean values. Five compounds were undetected in all replicates of all test treatments and therefore were not statistically compared [acenaphthylene, acenaphthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, and dibenzo(a,h)anthracene].

The results of Dunnett's Test for the PAH compounds that were statistically compared are included in Tables 3.22 and 3.23. The ANOVA data for those comparisons are presented in Table 3.24. Relative to R-OS, only fluoranthene, pyrene, and chrysene were found to be statistically significantly elevated in tissues exposed to certain composites. Both pyrene and fluoranthene were significantly greater in *N. caecoides* exposed to COMP PS-4 than in those exposed to R-OS. Only pyrene was significantly greater in *N. caecoides* exposed to COMPs WR-1, PS-2, PS-3, and CS-1 relative to R-OS. Chrysene was undetected in three replicates of COMP WR-2 and detected below the MDL in the other two replicates, but was detected below the MDL in all five replicates of R-OS (Appendix J, Table J.6). Chrysene appeared significantly elevated in COMP WR-2: the COMP WR-2 mean value is high because the dry weight detection limit values were used for the undetected replicates in the mean calculation. The magnitude of statistically significant bioaccumulation of pyrene and fluoranthene was relatively low, with test treatment concentrations two to three times the reference concentrations (Table 3.23). To put the magnitude of individual contaminant concentrations in perspective, the highest mean PAH value of 26.6 µg/kg dry weight chrysene in COMP WR-2 is approximately 4.6 µg/kg wet weight, or about one fourth of the target detection limit for the program.

TABLE 3.24. ANOVA Results for Chemical Parameters in Tissues of *N. caecoides* Compared to the Deep Off-Shelf Reference R-OS

Parameter	Sum of Squares		Degrees of Freedom		F-ratio	p-value
	Treatment	Residual	Treatment	Residual		
Polynuclear Aromatic Hydrocarbons						
Naphthalene	1.806	6.615	7	32	1.248	0.3067
Acenapthylene	NA(a)	NA	NA	NA	NA	NA
Acenapthene	NA	NA	NA	NA	NA	NA
Fluorene	5.822	24.432	4	20	1.191	0.3450
Phenanthrene	1.091	9.159	6	28	0.556	0.7614
Anthracene	0.141	14.673	2	12	0.058	0.9441
Fluoranthene	1.172	2.797	7	32	1.915	0.0996
Pyrene	8.937	2.253	6	28	18.511	0.0001
Benzo(a)anthracene	8.163	53.623	7	32	0.696	0.6750
Chrysene	9.013	25.910	7	32	1.590	0.1741
Benzo(b)fluoranthene	0.360	13.850	2	12	0.156	0.8574
Benzo(k)fluoranthene	0.255	17.077	2	12	0.089	0.9151
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Indeno(1,2,3)pyrene	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	1.090	5.890	1	8	1.480	0.2585
Chlorinated Pesticides						
Aldrin	NA	NA	NA	NA	NA	NA
Alpha BHC	1.509	9.781	3	16	0.823	0.5004
Beta BHC	6.587	19.060	7	32	1.580	0.1772
Delta BHC	NA	NA	NA	NA	NA	NA
cis-(alpha) Chlordane	5.525	22.953	7	32	1.100	0.3866
trans-(gamma) Chlordane	1.522	2.713	6	28	2.618	0.0384
4,4'-DDD	12.621	7.553	5	24	8.021	0.0001
4,4'-DDE	1.634	5.555	7	32	1.345	0.2622
4,4'-DDT	NA	NA	NA	NA	NA	NA
Dieldrin	3.913	19.819	4	20	0.987	0.4370
Endosulfan I	NA	NA	NA	NA	NA	NA
Endosulfan II	0.012	0.650	1	8	0.149	0.7098
Endosulfan sulfate	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	0.098	0.454	1	8	1.726	0.2253
Lindane	1.729	16.966	6	28	0.476	0.8206
Toxaphene	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls						
Aroclor 1242	NA	NA	NA	NA	NA	NA
Aroclor 1248	0.430	1.685	1	8	2.041	0.1910
Aroclor 1254	1.234	2.560	5	24	2.313	0.0753
Aroclor 1260	NA	NA	NA	NA	NA	NA

TABLE 3.24. (contd)

Parameter	Sum of Squares Treatment	Sum of Squares Residual	Degrees of Freedom Treatment	Degrees of Freedom Residual	F-ratio	p-value
Metals						
Silver	3.999	10.977	7	32	1.665	0.1532
Arsenic	0.315	0.308	7	32	4.669	0.0011
Cadmium	0.538	2.660	7	32	0.924	0.5013
Chromium	0.636	3.509	7	32	0.829	0.5714
Copper	0.407	1.075	7	32	1.732	0.1367
Mercury	0.128	0.670	7	32	0.874	0.5374
Nickel	0.342	1.178	7	32	1.329	0.2690
Lead	0.604	3.821	7	32	0.723	0.6539
Selenium	1.258	2.375	7	32	2.423	0.0413
Zinc	0.059	0.153	7	32	1.773	0.1275
Butyltins						
Tributyltin	4.181	18.939	7	32	1.009	0.4434
Dibutyltin	0.049	5.590	1	8	0.070	0.7984
Monobutyltin	0.333	7.272	2	12	0.275	0.7641

(a) NA Not applicable; undetected in all replicates or, if detected, treatment mean ≤ R-OS mean.

3.5.6 Chlorinated Pesticide and Polychlorinated Biphenyl Bioaccumulation in *Nephtys caecoides*

Quality control data for the analysis of pesticides and PCBs in *N. caecoides* tissue are provided in Appendix J, Tables J.14, J.15, J.18 and J.19. In general, the QC data show that these analyses are of acceptable accuracy and precision. Detection limits were lower than the target detection limits, and no blank contamination was detected. Surrogate recoveries were within QC limits in all but four samples. Analytical precision was excellent. As stated above for *M. nasuta*, the matrix spiking solution contained both pesticide compounds and Aroclor 1254. The MS/MSD recoveries for some target pesticide compounds were elevated because of coelution of PCB congeners present in Aroclor 1254. Sample results, however, do not appear to be affected by the coelution of PCB congeners and pesticide compounds.

Data for pesticides and PCBs in *N. caecoides* tissues, reported on both a wet weight and dry weight basis, are contained in Appendix J, Tables J.10 through J.13. Data for PCBs in *N. caecoides* tissues are contained in Tables J.16 and J.17. Nine of the 19 pesticide compounds analyzed were undetected in all replicates of all treatments and were not compared statistically.

Several pesticides were detected in one or two replicates of some of the composites; treatments with detected pesticides were statistically compared to R-OS if the treatment mean exceeded the R-OS mean tissue concentration. Seven pesticides and PCB Aroclor 1254 were detected in four or more composites, and were compared to R-OS values using Dunnett's Test. The ANOVA data for all statistical comparisons are reported in Table 3.24. Mean dry weight values and the results of Dunnett's Test for those compounds that were consistently detected are reported in Table 3.25.

Two compounds, 4,4'-DDD and trans-(gamma) chlordane were found to be statistically significantly greater in *N. caecoides* exposed to John F. Baldwin Ship Channel sediments than in *N. caecoides* exposed to R-OS. Bioaccumulation of 4,4'-DDD was statistically significant in COMPs PS-2 and PS-4, with mean concentrations four to five times higher than reference (Table 3.25). Bioaccumulation of trans-chlordane was statistically significant in COMP PS-1, at a magnitude of less than twice the R-OS value, with the difference being mostly due to detection limit values that vary with sample mass. Trans-chlordane was detected in only one out of five replicates each for COMP PS-1 and R-OS. As with the PAH compounds, the magnitude of the actual contaminant concentrations is very small: for COMP PS-4, the high mean 4,4'-DDD (10.0 µg/kg dry weight or 1.7 µg/kg wet weight) is actually lower than the target detection limit of 2 µg/kg wet weight.

3.5.7 Metals Bioaccumulation in *Nephtys caecoides*

Quality control data for metals analyses of *N. caecoides* tissue are provided in Appendix J, Table J.22. All target detection limits were met. Some metals were detected at very low levels in method blanks; all sample values were corrected for the amount in blanks during quantitation. Accuracy was excellent for metals in *N. caecoides* tissues: QC criteria for MS recoveries were met for all analyses, and concentrations of metals in SRMs were within QC limits except for nickel in one batch. Analytical precision exceeded QC limits for silver in two batches and chromium in one batch of samples. *N. caecoides* tissue samples were reanalyzed for mercury because an equipment malfunction during the initial digestion process affected the analytical results. The tissue samples were re-digested and reanalyzed. All QC criteria were met in the second round of analyses. Although the holding time of 30 days was exceeded for the reanalyses, the data are considered acceptable because tissue samples were stored frozen prior to re-digestion.

TABLE 3.25. Mean Concentrations of Chlorinated Pesticides and Polychlorinated Biphenyls (PCBs) in Tissues of *N. caecoides* Exposed to John F. Baldwin Ship Channel Sediments (bold type indicates value is significantly greater than R-OS when compared by Dunnett's Test; box indicates value is >2 times but ≤5 times R-OS; shaded box would indicate value is >5 times but ≤10 times R-OS)

	Mean Concentration (µg/kg dry weight)							
Treatment	Beta-BHC	Lindane	Dieldrin	4,4'-DDE	4,4'-DDD	cis-(alpha) Chlordane	trans- (gamma) Chlordane	Aroclor 1254
R-OS	8.8	6.5	13.2 UJ[a]	8.9	2.1	7.3	6.2	63.0
COMP WR-1	2.5	3.6	16.2 UJ	8.4	2.3	10.1	6.0	52.9
COMP WR-2	10.5	6.3	34.0 UJ	9.5	2.7 U[b]	6.3	11.6 U	115.6 U
COMP PS-1	7.9	3.4 U	24.9 UJ	8.0	2.3 U	9.4	**9.4 UJ**	91.6 UJ
COMP PS-2	5.8	6.8	6.9 UJ	11.4	**8.9**	11.6	5.0	52.7
COMP PS-3	13.7	5.6	15.4 UJ	9.0	4.3	8.6	7.7	77.5
COMP PS-4	6.1	7.3	5.6 J[c]	12.5	**10.0**	9.9	5.5	72.7
COMP CS-1	12.3	5.0	10.3 UJ	7.4	2.6	12.9	7.1	75.9 U
R-BF[d]	3.7	7.9	7.0 J	12.7	3.1	9.6	7.8	138.6
Background [d]	3.8 U	11.0	5.9	10.9	2.6 U	14.1	10.6 UJ	109.3 U
C-SB[d]	21.5	4.8	19.5 UJ	9.8	2.0 U	7.5	8.2	80.7
C-NE[d]	8.8	4.0 U	13.9 UJ	9.5	2.7 U	13.6	10.9	115.7 U

(a) UJ Undetected or detected below the method detection limit in all replicates; value is the mean of detected values and dry weight detection limits.
(b) U Undetected in all replicates; value is mean of dry weight detection limits.
(c) J Detected below the method detection limit in all replicates.
(d) Treatment not included in Dunnett's Test data set.

Data for metals in *N. caecoides* tissues, reported on both a wet weight and dry weight basis, are contained in Appendix J, Tables J.20 and J.21. Mean dry weight values for metals are shown in Table 3.26. All metals were detected in all replicates of *N. caecoides* exposed to John F. Baldwin Ship Channel sediments; therefore, all were statistically compared to *N. caecoides* exposed to R-OS (Table 3.24). No metals were statistically significantly elevated above reference in any *N. caecoides* exposed to John F. Baldwin Ship Channel composites.

3.5.8 Butyltin Bioaccumulation in *Nephtys caecoides*

The QC data for butyltin analysis of *N. caecoides* tissue are provided in Appendix J, Table J.24. The QC results for butyltin analyses are generally acceptable. The target detection limit of 5 µg/kg wet weight was not met for these analyses because of insufficient sample volume; actual detection limits were generally four to ten times higher. Tributyltin was detected in the procedural blanks; however, blank concentrations were less than two times the MDL, and the associated sample values were not blank-corrected. Surrogate recoveries were within QC limits for all except seven samples. Matrix spike recoveries exceeded QC limits in one of four analytical batches; however, the associated MSD recoveries were within limits. Triplicate analysis was not possible in two of four analytical batches because of insufficient sample volume; duplicate analyses were performed instead. Precision between replicates exceeded QC limits in three of four batches, but RPDs for the MS/MSDs in two of those three batches were acceptable. In Batch 4, both replicate and MS/MSD precision was unacceptable, and care should be taken when interpreting the results for samples in that batch because of poor analytical precision. The PAH tissue extracts for eight samples were analyzed for butyltins because of insufficient sample volume. These samples are flagged in Appendix J, Table J.23, because there is no associated MS/MSD or replicate data.

Data for butyltins in *N. caecoides* tissues, reported on both a wet weight and dry weight basis, are contained in Appendix J, Table J.23. Mean dry weight values for butyltins in *N. caecoides* are shown in Table 3.27. Tributyltin was detected in all treatments in the hundreds of parts per billion range. Table 3.27 shows that about 300 µg/kg TBT (dry weight) was present in *N. caecoides* before exposure to any test sediments, and the only test treatment with a much greater TBT concentration than background is COMP CS-1 with a mean of nearly 800 µg/kg. Concentrations of TBT in *N. caecoides* exposed to COMP CS-1 were not significantly greater than in those exposed to R-OS when compared in Dunnett's Test. Dibutyltin and monobutyltin were also detected in COMP CS-1 but were not significantly elevated relative to R-OS. Dibutyltin was undetected in all other test treatments; monobutlytin was detected in COMP WR-2 but at a mean value less than R-OS.

TABLE 3.26. Mean Concentrations of Metals in the Tissues of *N. caecoides* Exposed to John F. Baldwin Ship Channel Sediments (no test treatment means were significantly greater than R-OS when compared by Dunnett's Test)

Sediment Treatment	Mean Concentration (mg/kg dry weight)									
	Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
R-OS	0.10	26.9	1.00	1.26	17.1	0.08	3.80	0.90	1.71	194
COMP WR-1	0.06	27.9	1.04	1.08	13.8	0.07	3.06	1.12	1.20	209
COMP WR-2	0.06	23.9	1.08	0.81	15.5	0.07	2.77	0.70	1.12	189
COMP PS-1	0.06	25.0	0.90	1.25	15.3	0.07	3.55	0.73	1.64	191
COMP PS-2	0.06	28.1	0.87	1.06	12.5	0.07	3.42	0.85	1.63	193
COMP PS-3	0.39	24.5	1.65	0.98	16.8	0.07	2.98	0.68	1.63	190
COMP PS-4	0.08	30.5	1.00	0.94	14.2	0.08	3.00	0.86	1.81	197
COMP CS-1	0.07	30.6	1.01	1.34	14.3	0.07	3.08	0.84	1.90	209
R-BF(a)	0.07	29.9	0.99	0.97	15.7	0.08	2.85	1.03	1.56	204
Background(a)	0.06	22.4	0.91	1.13	14.0	0.06	2.44	0.50	0.93	168
C-SB(a)	0.07	26.6	1.00	1.30	15.3	0.06	4.99	0.66	1.19	194
C-NE(a)	0.07	24.1	0.97	0.93	14.6	0.10	3.05	1.05	1.74	197

(a) Treatment not included in Dunnett's Test data set.

TABLE 3.27. Mean Concentrations of Butyltins in the Tissues of *N. caecoides* Exposed to John F. Baldwin Ship Channel Sediments (no test treatment means were significantly greater than R-OS when compared by Dunnett's Test)

Treatment	Mean Butyltin Concentration (µg/kg dry weight)		
	Tributyltin	Dibutyltin	Monobutyltin
R-OS	254.7	150.0 U(a)	136.5 U
COMP WR-1	243.5	158.8 U	144.6 U
COMP WR-2	398.5	126.8 U	134.0
COMP PS-1	351.3	131.3 U	119.6 U
COMP PS-2	248.5	123.4 U	112.3 U
COMP PS-3	339.1	166.1 U	123.4 UJ(b)
COMP PS-4	443.7	125.2 U	113.9 U
COMP CS-1	793.7	161.7	203.0
R-BF(c)	433.3	125.6 UJ	114.5 UJ
Background(c)	309.4	202.5 U	184.3 U
C-SB(c)	126.1	108.2 U	82.4 UJ
C-NE(c)	259.3	119.2 UJ	117.8 U

(a) U Undetected in all replicates; value is mean of dry weight detection limits.
(b) UJ Undetected or detected below the method detection limit in all replicates; value is the mean of detected values and dry weight detection limits.
(c) Treatment not included in Dunnett's Test data set.

4.0 DISCUSSION

In this section, the analyses and evaluations of John F. Baldwin Ship Channel dredged material relative to the Deep Off-Shelf reference sediment are discussed in the context of the Tier III guidelines given in *Evaluation of Dredged Material for Ocean Disposal — Testing Manual* (EPA/USACE 1991). These guidelines for determination of compliance with criteria for ocean disposal, defined under CFR 40, Section 227.13(c), include assessments of water column toxicity, deposited sediment (solid phase) toxicity, and deposited sediment bioaccumulation. Physical and chemical analyses of John F. Baldwin Ship Channel sediments are used in support of toxicity tests and bioaccumulation results to evaluate appropriate disposal options.

4.1 SEDIMENT CHARACTERISTICS

Geologic evaluations showed that proposed dredged material from the John F. Baldwin Ship Channel is composed of unconsolidated Younger Bay Mud. Sediments in the channel are transported and redistributed by current action, resulting in vertical stratification (layering) of sediment deposits without much vertical mixing. Physical and chemical analyses were conducted on a sample composed of all material between the mudline and -47 ft MLLW from each station. Mudline elevations over the entire John F. Baldwin Ship Channel project area ranged from -33.3 to -45.6 ft MLLW. Sediments from the West Richmond and north central Pinole Shoal reaches of the channel were coarser-grained than sediment from the Deep Off-Shelf reference site, and had lower levels of organic carbon, volatile solids, and oil and grease. Sediment from the western part of Pinole Shoal (COMPs PS-1 and PS-2) were of similar or finer grain-size distribution than R-OS, as were sediments from Pinole Shoal near Davis Point (COMP PS-4) and Carquinez Strait.

With few exceptions, contaminant levels in John F. Baldwin Ship Channel sediments were similar to or slightly elevated above the R-OS reference and in general were much lower than in proposed dredged material from more urbanized and industrial waterways in San Francisco Bay (Pinza et al. 1992; Ward et al. 1992; Kohn et al. 1992). The sediment chemistry results are intended to provide information about chemical contaminants of concern that could potentially cause toxicity or bioaccumulation, and are discussed in more detail with the bioassay results for each reach of the channel.

4.2 TIER III EVALUATIONS

4.2.1 Water Column Effects

Estimates of toxicity in the water column were evaluated by exposing three sensitive marine species (*H. sculpta*, *C. stigmaeus*, and *D. excentricus*) to three concentrations of SPP and a dilution water control (Sequim Bay seawater). Results showed there was no acute toxicity to *H. sculpta* and *C. stigmaeus*, but that the 100% SPP of four composites was acutely toxic to *D. excentricus* larvae (Table 4.1). Despite those instances of significant toxicity, no LC50s could be calculated because mortality did not exceed 50% of the population relative to the control. Under 1991 Implementation Manual guidelines, 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 after allowing 4 h for initial mixing. Therefore, concentrations exceeding 1% SPP of proposed John F. Baldwin Ship Channel dredged material would be unacceptable at the edge of the mixing zone.

Exposure to some sediment composites from the Pinole Shoal reach did result in significantly increased abnormal growth and development of the echinoderm, *D. excentricus*. Median effective concentrations (EC50s), or concentrations effecting a 50% decrease in normal development relative to a control, were estimated as 22.5%, 29.0%, and 71.6% SPP for COMPs PS-1, PS-2, and PS-4, respectively. The normal development endpoint is probably more indicative of the organisms that will survive to adulthood than the total number (normally plus abnor-

TABLE 4.1. Suspended-Particulate-Phase Toxicity Test Results, John F. Baldwin Ship Channel (bold type indicates mean survival in 100% SPP significantly lower than control in 2-sample T-test, $\alpha = 0.05$)

	Mysid *H. sculpta*			Echinoderm Larvae *D. excentricus*			Sanddab *C. stigmaeus*		
	Mean Survival (%)		LC50 as	Mean Survival (%)		LC50 as	Mean Survival (%)		LC50 as
Treatment	0% SPP	100% SPP	% SPP	0% SPP	100% SPP	% SPP	0% SPP	100% SPP	% SPP
COMP WR-1	97.5	97.5	>100	97	93	>100	100	100	>100
COMP WR-2	92.5	92.5	>100	90	86	>100	97.5	95.0	>100
COMP PS-1	95.0	95.0	>100	88	**49**	>100	100	100	>100
COMP PS-2	92.5	95.0	>100	88	**50**	>100	100	100	>100
COMP PS-3	82.5	95.0	>100	92	**80**	>100	97.5	97.5	>100
COMP PS-4	77.5	92.5	>100	90	80	>100	100	92.5	>100
COMP CS-1	87.5	90.0	>100	95	**75**	>100	100	100	>100

mally developed) of surviving larvae. The most environmentally protective approach would be to base the LPC on the EC50s. Compliance using this approach would mean the material was acceptable if concentrations did not exceed 0.23% SPP for COMP PS-1, 0.29% SPP for COMP PS-2 , or 0.72% SPP for COMP PS-4 at the edge of the mixing zone after initial mixing.

4.2.2 Deposited Sediment (Solid-Phase) Acute Toxicity

Deposited sediment toxicity was determined by exposing three species of marine organisms (*M. nasuta*, *N. caecoides*, and *R. abronius*) to test sediment treatments in 10-day solid-phase tests. If the difference in mortality between proposed dredged material (test treatments) and a reference treatment is statistically significant and that difference exceeds 10% (20% for *R. abronius*), the test material does not comply with the benthic bioassay criteria of CFR 40, Section 227.13(c) and Appendix A of the 1991 Implementation Manual. The solid-phase tests of John F. Baldwin Ship Channel sediments showed no acute toxicity to *M. nasuta*, *N. caecoides*, or *R. abronius* (Table 4.2). The potential dredged material from all reaches of the John F. Baldwin Ship Channel complies with the benthic bioassay criteria and there is no reason to believe that acute toxicity will result from ocean disposal.

TABLE 4.2. Comparison of John F. Baldwin Ship Channel Solid-Phase Acute Toxicity to the Deep Off-Shelf Reference R-OS (bold type would indicate mean survival statistically significantly lower than reference based on Dunnett's Test; shading would indicate >10% difference between treatment and reference mean for *N. caecoides* and *M. nasuta*, >20% difference for *R. abronius*)

Treatment	Mean Percent Survival in 10-day Solid-Phase Test		
	R. abronius	*N. caecoides*	*M. nasuta*
R-OS	87.0	94.0	96.0
COMP WR-1	95.0	94.0	97.0
COMP WR-2	97.0	97.0	99.0
COMP PS-1	82.0	95.0	90.0
COMP PS-2	83.0	95.0	98.0
COMP PS-3	96.0	95.0	93.0
COMP PS-4	95.0	94.0	97.0
COMP CS-1	95.0	96.0	96.0
C-WB	99.0	NA(a)	NA
C-NE	NA	99.0	94.0
C-SB	89.0	96.0	98.0

(a) NA Not applicable.

4.2.3 Deposited Sediment Bioaccumulation

The potential for bioaccumulation of contaminants was evaluated through 28-day solid-phase exposures of *M. nasuta* and *N. caecoides* to John F. Baldwin Ship Channel sediments followed by chemical analysis of the organism tissues. The tissue contaminant concentrations were compared to existing Food and Drug Administration (FDA) limits, and were statistically compared between exposures to potential dredged material and reference sediment. If any statistically significant bioaccumulation was detected, other parameters such as the number of compounds that were bioaccumulated, the number of species that bioaccumulated a compound, the magnitude of actual contaminant concentrations, and the degree or magnitude of bioaccumulation relative to reference, and related sediment toxicity were examined.

M. nasuta and *N. caecoides* tissue contaminant concentrations were orders of magnitude below the FDA action limits after exposure to John F. Baldwin Ship Channel sediments (Table 4.3). Although the majority of contaminants were not bioaccumulated by *M. nasuta* and *N. caecoides*, statistically significant elevations of several contaminants were detected when compared to the Deep Off-Shelf reference R-OS using Dunnett's Test (Table 4.4). Table 4.4 shows that low molecular weight PAHs and PCBs were not bioaccumulated by either *M. nasuta* or *N. caecoides*, and that metals and butyltins were not bioaccumulated by *N. caecoides*.

Only one of ten metals, lead, was bioaccumulated from one treatment (COMP PS-4) by *M. nasuta*. As discussed in Section 3.5, the COMP PS-4 mean was elevated because of one high replicate value, and, if the anomalous value was eliminated, COMP PS-4 would not be significantly different than R-OS. The COMP PS-4 mean (including rep 3) would be 0.43 mg/kg on a wet weight basis, but there are no FDA action limits for lead in any edible food product including fish and shellfish. Tributyltin was bioaccumulated from one treatment (COMP PS-3) by *M. nasuta*. The mean TBT value in COMP PS-3 was 88.7 µg/kg dry weight, about eight times higher than the 11.4 µg/kg in R-OS. The equivalent value for TBT in COMP PS-3 on a wet weight basis would be 10.5 µg/kg, but there are no FDA action limits for TBT in fish and shellfish.

Several high molecular weight PAHs and the pesticide 4,4'-DDD were bioaccumulated by both *M. nasuta* and *N. caecoides* exposed to some sediment treatments (Table 4.4). The actual concentrations of these compounds are very low, below the target detection limits in all cases, but above achieved detection limits in the case of 4,4'-DDD (both species) and

TABLE 4.3. Comparison of FDA Action Levels With Contaminant Levels in *M. nasuta* and *N. caecoides* Exposed to John F. Baldwin Ship Channel Sediments

Contaminant	FDA Action Level (mg/kg wet weight)	Maximum Concentration (mg/kg wet weight) *M. nasuta*	*N. caecoides*
Methyl Mercury	1.0	0.021(a)	0.018(a)
Benzene Hexachloride (BHC)	0.3	0.0015(b)	0.0055(a)
Chlordane	0.3	0.0009	0.0034
DDT + DDE	5.0	0.0009	0.0027
Dieldrin + Aldrin	0.3	0.0008	0.0024
Endrin	0.3	0.0009	U(c)
Heptachlor + Heptachlor Epoxide	0.3	0.0014	0.0005
Toxaphene	5.0	U	U
PCBs	2.0	0.0179	0.0195

(a) Value is for total mercury; methyl mercury is fraction of total but was not analyzed separately.
(b) Total BHCs (alpha-, beta-, delta-, and gamma-BHC).
(c) NM Not measured.
(d) U Undetected in all replicates of all test treatments.

fluoranthene and pyrene (*M. nasuta* only). The 4,4'-DDD is of some potential concern because, despite the extremely low concentrations, it was bioaccumulated by both *M. nasuta* and *N. caecoides* exposed to COMPs PS-2 and PS-4. The highest magnitude of 4,4'-DDD bioaccumulation was the sevenfold elevation in *M. nasuta* exposed to COMP PS-4. The highest values are orders of magnitude less than the FDA action levels of the more active forms of DDT. A few PAHs were also bioaccumulated by both species, but in *N. caecoides*, all of the statistically significant differences could be attributed to the environmentally conservative approach of using values that were estimated below the achieved detection limit (J flagged); if the actual dry weight detection limit for each replicate were substituted for J-flagged values, there would be no significant differences in *N. caecoides* PAH between test treatments and R-OS. This was also true for *N. caecoides* bioaccumulation of gamma-chlordane from COMP PS-1 and for *M. nasuta* bioaccumulation of benzo(b)fluoranthene from COMP CS-1 and pyrene from COMP PS-3. The

TABLE 4.4. Summary of Acute Toxicity and Bioaccumulation for John F. Baldwin Ship Channel Composites Relative to the Deep Off-Shelf Reference

Sediment Treatment	Acute Toxicity	*M. nasuta* Bioaccumulation					*N. caecoides* Bioaccumulation				
		PAH[a]	PEST[b]	PCB	Metals	Butyltins	PAH	PEST	PCB	Metals	Butyltins
COMP WR-1	---[c]	Pyr	—	—	—	—	Pyr	—	—	—	—
COMP WR-2	—	—	—	—	—	—	Chr	—	—	—	—
COMP PS-1	E[d]	—	—	—	—	—	—	g-CHL	—	—	—
COMP PS-2	E	Flt, Pyr	DDD	—	—	—	Pyr	DDD	—	—	—
COMP PS-3	—	Pyr	DDD	—	—	TBT	Pyr	—	—	—	—
COMP PS-4	E	Flt, Pyr	DDD	—	Pb	—	Flt, Pyr	DDD	—	—	—
COMP CS-1	—	Flt, Pyr, BbF	—	—	—	—	Pyr	—	—	—	—

(a) PAHs: Pyr = Pyrene, Chr = Chrysene, Flt = Fluoranthene, BbF = Benzo(b)fluoranthene.
(b) Pesticides: g-CHL = gamma-Chlordane, DDD = 4,4'-DDD.
(c) --- No statistically significant acute toxicity or bioaccumulation.
(d) E Significant effect on echinoderm larval development (but not survival) in SPP test.

significant *M. nasuta* bioaccumulation of pyrene from COMPs other than PS-3 and of fluoranthene were true significant differences in values above achieved detection limits; again, actual concentrations were extremely low even though the magnitude of bioaccumulation in test treatments ranged from 1.5 to 4.5 times higher than reference.

4.3 CONCLUSIONS

Based on the Tier III evaluation of the results of this study, ocean disposal of proposed dredged material from the John F. Baldwin Ship Channel should not result in significant adverse water column or deposited sediment acute toxicity effects, but computer modeling is required to determine if concentrations of suspended and dissolved material in the water column would exceed an LPC of 0.1% at the edge of the mixing zone, allowing for initial mixing. Water column tests showed that normal development (as opposed to survival) of echinoderm larvae was significantly decreased by exposure to COMPs PS-1, PS-2, and PS-4. An environmentally protective approach would be to determine if water column concentrations of suspended and dissolved material from those composites would exceed these LPCs based on median effective concentrations (EC50s): 0.23%, 0.29% and 0.72% SPP for COMPs PS-1, PS-2 and PS-4, respectively.

Deposited sediment bioaccumulation effects as a result of ocean disposal are not as easily established through the Tier III evaluation. Bioaccumulation of contaminants from John F. Baldwin Ship Channel sediments was of lower magnitude than has been observed in proposed dredged material from other major San Francisco Bay waterways. Some bioaccumulation of contaminants was measured, but actual concentrations were relatively low and magnitudes of accumulation were low to moderate (generally less than five times reference). In any one class of compounds (e.g., PAHs), no more than three individual compounds were bioaccumulated. No more than four different compounds were accumulated by any one species exposed to any one treatment; no more than three different compounds were accumulated by both species exposed to any one treatment. Of the 24 instances of significant bioaccumulation (Table 4.4, Figure 4.1), 10 would not be significant if detection limit values were substituted for values detected below MDLs. Of the remaining 14 instances, approximately 80% are less than a fivefold elevation relative to R-OS. Higher magnitudes of bioaccumulation were observed for 4,4'-DDD (COMPs PS-2 and PS-4) and TBT (COMP PS-3) in *M. nasuta*.

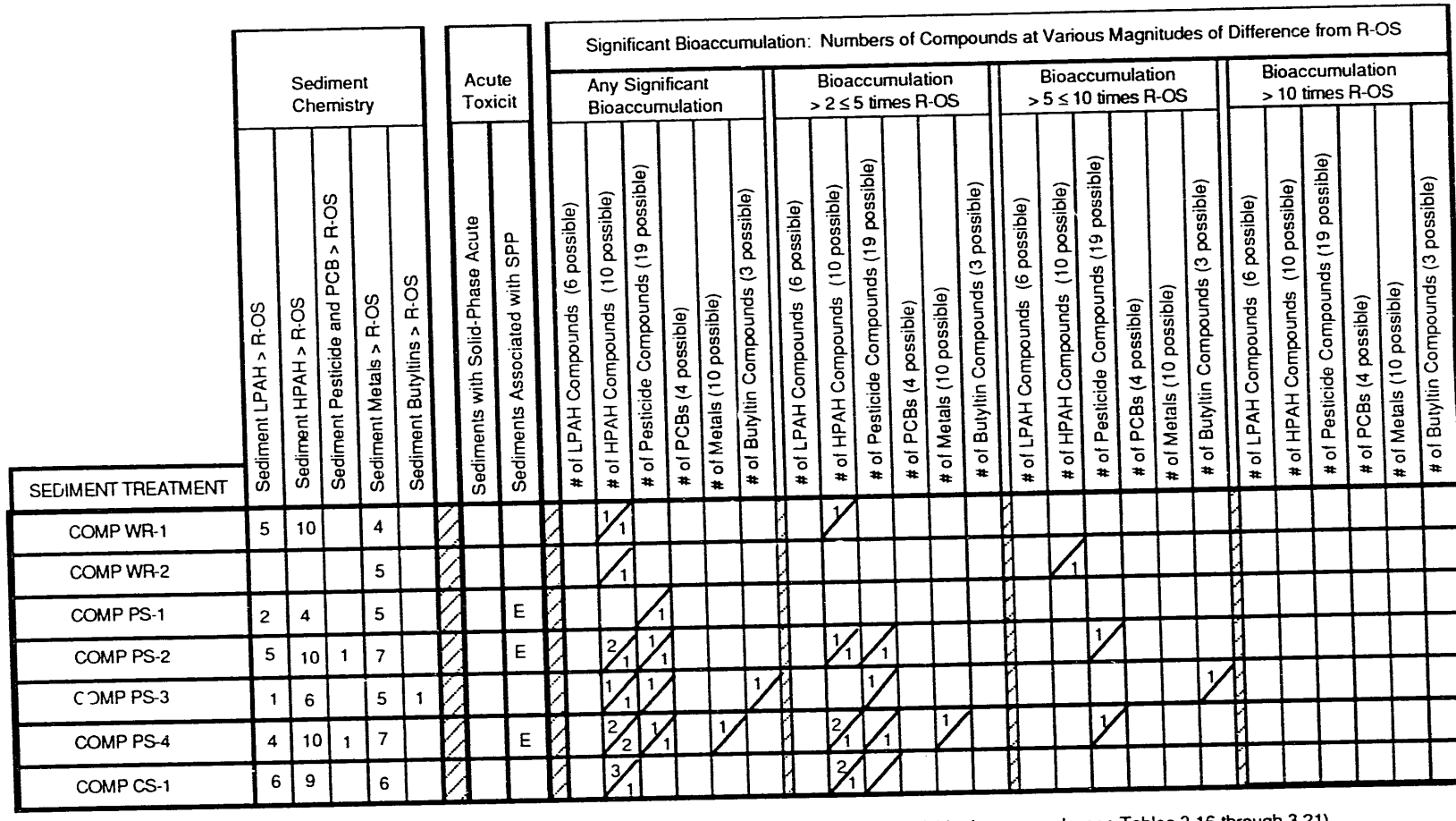


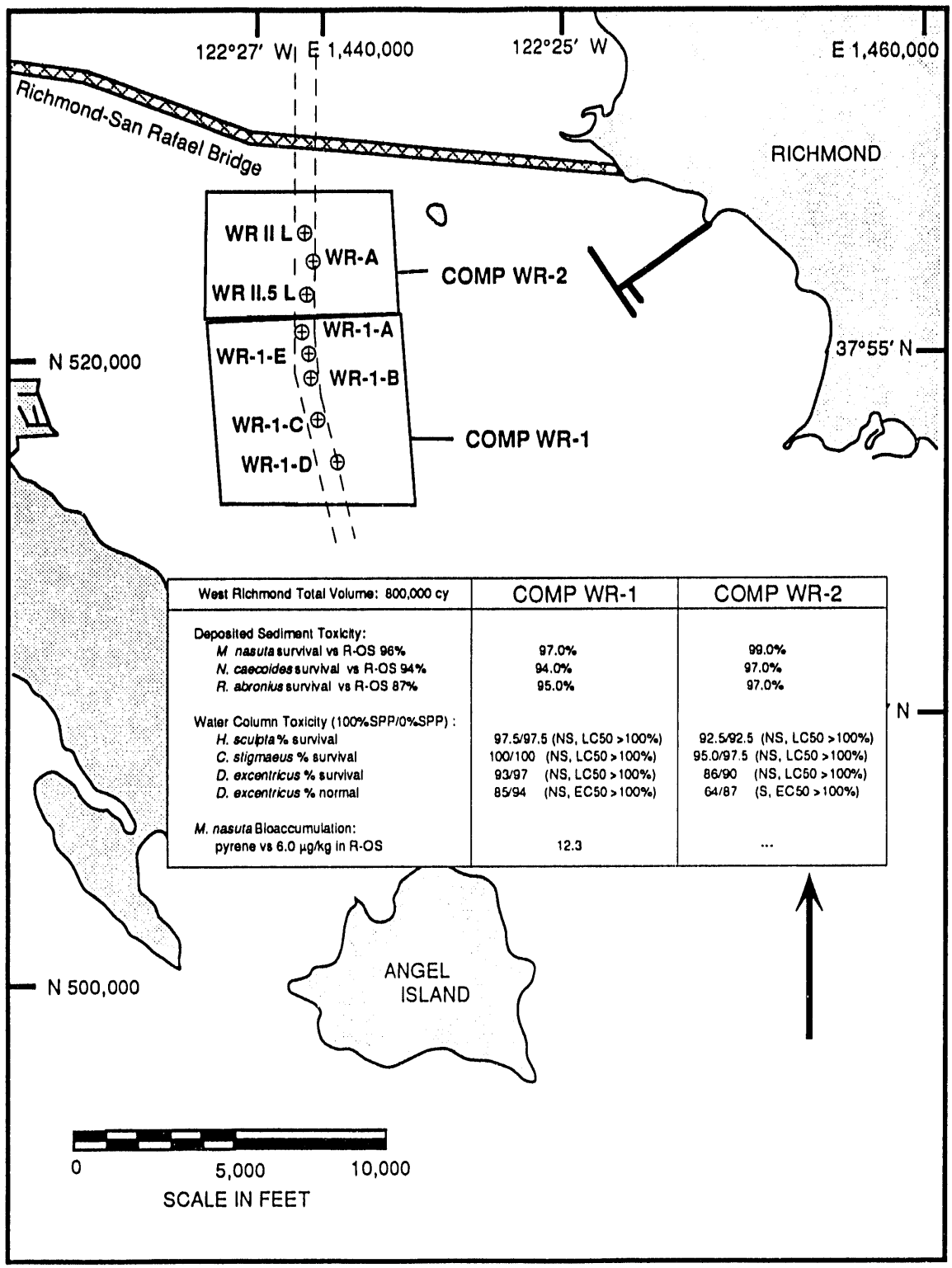
FIGURE 4.1. Matrix of Sediment Chemistry, Significant Acute Toxicity, and Bioaccumulation for John F. Baldwin Ship Channel Sediments Relative to the Deep Off-Shelf Reference R-OS

In addition to summarizing bioaccumulation results for John F. Baldwin Ship Channel sediments relative to the Deep Off-Shelf reference R-OS, Figure 4.1 shows the number of sediment contaminants elevated above R-OS and acute toxicity relative to R-OS. These comparisons are related to ocean disposal criteria for each reach of the channel. This summary is intended to assist USACE, EPA, and other resource agencies in evaluating the potential effects of ocean disposal of dredged material from the John F. Baldwin Ship Channel.

COMPs WR-1 and WR-2 in the West Richmond reach of the John F. Baldwin Ship Channel represent approximately 800,000 cubic yards of dredged material (Figure 4.2). Depths in the West Richmond reach averaged -39.5 ft MLLW. Sediment from the West Richmond reach is considerably more coarse-grained than the ocean reference site R-OS. West Richmond sediment passed benthic bioassay criteria for ocean disposal, and there was no reduction in echinoderm survival or normal development. Exposure of *M. nasuta* and *N. caecoides* to COMPs WR-1 and WR-2 resulted in fewer instances of significant bioaccumulation than any other parts of the channel.

Relative to R-OS, bioaccumulation was limited to the HPAHs pyrene and chrysene at very low concentrations in *M. nasuta* and/or *N. caecoides* (maximum mean concentration for a detected compound significantly greater than R-OS was 26.6 µg/kg dry weight). Bioaccumulation of pyrene occurred in both *M. nasuta* and *N. caecoides* exposed to COMP WR-1 (twofold elevations), but *N. caecoides* concentrations were below achieved detection limits. Apparent bioaccumulation of chrysene occurred only in *N. caecoides*. Mean chrysene in R-OS was extremely low because all values were detected below the MDLs, but chrysene was not detected at all in three COMP WR-2 replicates, and use of the detection limit values for those replicates raised the COMP WR-2 mean. Sediment chemistry results show that HPAH concentrations were highest (200 to 300 µg/kg) in contributing stations WR-1-B and WR-1-E. Organic compounds such as the PAHs may be more bioavailable because of the low organic carbon content in the coarser-grained sediment.

The Pinole Shoal reach of the John F. Baldwin Ship Channel is approximately 10 miles long and comprises nearly 90% of the project's dredged material volume, or 7 million cubic yards (Figure 4.3). Depths at sampling stations ranged from -33.3 to -45.6 ft MLLW, averaging 39.3 ft MLLW over the entire reach. The southwestern portion, represented by COMP PS-1, was generally deeper, averaging -44.0 ft MLLW. The largest volumes of sediment are probably represented by COMPs PS-2 and PS-3 in central Pinole Shoal, where the average mudline



West Richmond Total Volume: 800,000 cy	COMP WR-1	COMP WR-2
Deposited Sediment Toxicity:		
M. nasuta survival vs R-OS 96%	97.0%	99.0%
N. caecoides survival vs R-OS 94%	94.0%	97.0%
R. abronius survival vs R-OS 87%	95.0%	97.0%
Water Column Toxicity (100%SPP/0%SPP) :		
H. sculpta % survival	97.5/97.5 (NS, LC50 >100%)	92.5/92.5 (NS, LC50 >100%)
C. stigmaeus % survival	100/100 (NS, LC50 >100%)	95.0/97.5 (NS, LC50 >100%)
D. excentricus % survival	93/97 (NS, LC50 >100%)	86/90 (NS, LC50 >100%)
D. excentricus % normal	85/94 (NS, EC50 >100%)	64/87 (S, EC50 >100%)
M. nasuta Bioaccumulation: pyrene vs 6.0 µg/kg in R-OS	12.3	...

FIGURE 4.2. Sediment Evaluation Results, West Richmond Reach of the John F. Baldwin Ship Channel

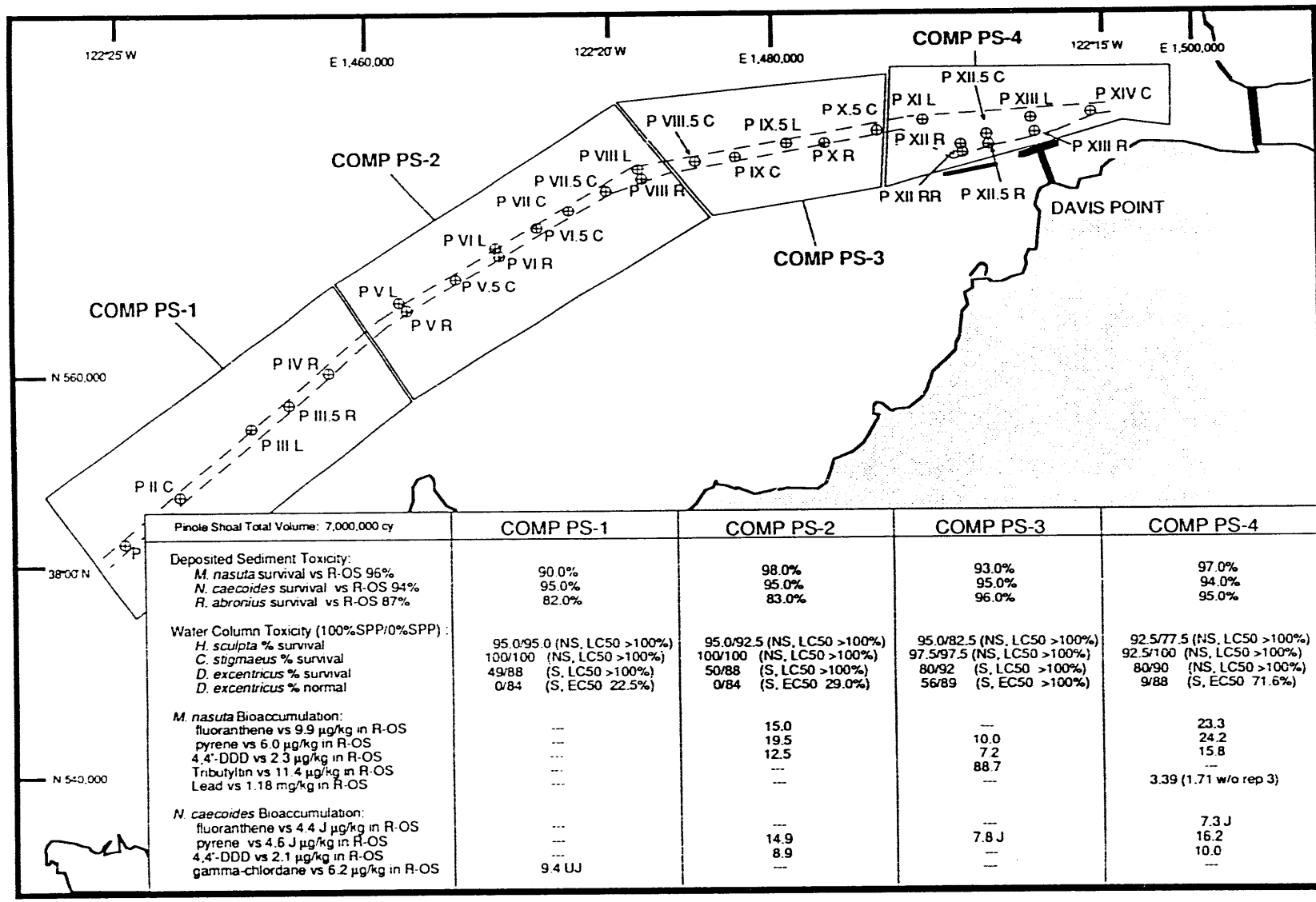
elevation (depth) was about -37.5 ft MLLW. Because of proximity of COMP PS-4 sampling stations to channel edges and piers in the Davis Point area, depths were most variable there (-33.3 to -43.5 ft MLLW, average -40.9 ft MLLW).

COMP PS-1 sediments were the finest-grained of any from the channel, and contained about 25% more silt and clay than R-OS. Contaminant levels in COMP PS-1 were relatively low. No acute solid-phase toxicity occurred and no truly significant bioaccumulation occurred, but there were observable effects on *D. excentricus* (echinoderm) larvae. Although no LC50 could be calculated, there was a significant reduction in *D. excentricus* survival in the 100% SPP, as well as significant reduction in normal development (EC50 of 22.5% SPP) relative to control. As stated earlier, modeling to determine compliance with LPCs would be necessary.

COMP PS-2 sediments were physically most similar to R-OS, but as a composite had more elevated contaminant levels (Figure 4.1). Most PAHs and most metals exceeded R-OS, and the pesticide 4,4'-DDD was detected (but below MDL) in COMP PS-2. COMP PS-2 passed benthic bioassay criteria for ocean disposal, but, as with COMP PS-1, compliance with water column LPCs must be determined. Bioaccumulation of 4,4'-DDD occurred in both *M. nasuta* and *N. caecoides*, and although the concentrations were low, the magnitude of elevation from reference was 5.4 times for *M. nasuta* and 4.2 times for *N. caecoides*. Low levels of HPAH (pyrene, fluoranthene) were bioaccumulated by *M. nasuta*.

Sediment from all stations in COMP PS-3 contained more sand than R-OS. Contaminant levels were very low, and the sediment was not acutely toxic to benthic or water column organisms. The PAHs were not accumulated to the same degree as from other Pinole Shoal composites, but there was an eightfold magnification of TBT in *M. nasuta*, and a threefold magnification of 4,4'-DDD in *M. nasuta*. There was no corresponding bioaccumulation in *N. caecoides*. The 4,4'-DDD concentrations are very low (COMP PS-3 mean 7.2 µg/kg dry weight in *M. nasuta*), but the TBT ranged from 79.1 to 108.8 µg/kg dry weight in individual replicates (mean 88.7 µg/kg). The high proportion of sand and low organic carbon in COMP PS-3 indicate that organic contaminants might be more bioavailable from these sediments.

COMP PS-4 sediments were physically variable: half the stations were coarser-grained than R-OS and half contained more silt and clay. As a composite, COMP PS-4 contains about 8% more silt and clay, and had more elevated contaminant levels than any other except COMP PS-2 (Figure 4.1). Like COMP PS-2, most PAHs and most metals in COMP PS-4 exceeded



Pinole Shoal Total Volume: 7,000,000 cy	COMP PS-1	COMP PS-2	COMP PS-3	COMP PS-4
Deposited Sediment Toxicity:				
M. nasuta survival vs R-OS 96%	90.0%	98.0%	93.0%	97.0%
N. caecoides survival vs R-OS 94%	95.0%	95.0%	95.0%	94.0%
R. abronius survival vs R-OS 87%	82.0%	83.0%	96.0%	95.0%
Water Column Toxicity (100%SPP/0%SPP) :				
H. sculpta % survival	95.0/95.0 (NS, LC50 >100%)	95.0/92.5 (NS, LC50 >100%)	95.0/82.5 (NS, LC50 >100%)	92.5/77.5 (NS, LC50 >100%)
C. stigmaeus % survival	100/100 (NS, LC50 >100%)	100/100 (NS, LC50 >100%)	97.5/97.5 (NS, LC50 >100%)	92.5/100 (NS, LC50 >100%)
D. excentricus % survival	49/88 (S, LC50 >100%)	50/88 (S, LC50 >100%)	80/92 (S, LC50 >100%)	80/90 (NS, LC50 >100%)
D. excentricus % normal	0/84 (S, EC50 22.5%)	0/84 (S, EC50 29.0%)	56/89 (S, EC50 >100%)	9/88 (S, EC50 71.6%)
M. nasuta Bioaccumulation:				
fluoranthene vs 9.9 µg/kg in R-OS	---	15.0	---	23.3
pyrene vs 6.0 µg/kg in R-OS	---	19.5	10.0	24.2
4,4'-DDD vs 2.3 µg/kg in R-OS	---	12.5	7.2	15.8
Tributyltin vs 11.4 µg/kg in R-OS	---	---	88.7	---
Lead vs 1.18 mg/kg in R-OS	---	---	---	3.39 (1.71 w/o rep 3)
N. caecoides Bioaccumulation:				
fluoranthene vs 4.4 J µg/kg in R-OS	---	---	---	7.3 J
pyrene vs 4.6 J µg/kg in R-OS	---	14.9	7.8 J	16.2
4,4'-DDD vs 2.1 µg/kg in R-OS	---	8.9	---	10.0
gamma-chlordane vs 6.2 µg/kg in R-OS	9.4 UJ	---	---	---

FIGURE 4.3. Sediment Evaluation Results, Pinole Shoal Reach of the John F. Baldwin Ship Channel

R-OS, and the pesticide 4,4'-DDD was detected (but below MDL). COMP PS-4 passed benthic bioassay criteria for ocean disposal, and there was no reduction in echinoderm survival. Based on reduced echinoderm normal development, compliance with water column LPCs should be determined. Bioaccumulation of 4,4'-DDD occurred in both *M. nasuta* and *N. caecoides*, and although the concentrations were low, the magnitude of elevation from reference was 6.9 times for *M. nasuta* and 4.8 times for *N. caecoides*. Low levels of pyrene and fluoranthene were bioaccumulated by *M. nasuta* and *N. caecoides* (below MDLs for *N. caecoides*).

The three stations in the small section of channel in Carquinez Strait near the Benicia-Martinez Bridge represent an estimated 70,000 to 100,000 cubic yards of dredged material (Figure 4.4). Mudline elevations ranged from -40.3 to -42.0 ft MLLW, averaging -41.4 ft MLLW. Sediment from these stations was physically variable, but as a composite was coarser-grained than R-OS and elevated in PAHs and metals. Both benthic and water column bioassay criteria were met for COMP CS-1, although compliance with the 0.1% LPC should be determined. Significant bioaccumulation of fluoranthene and pyrene occurred in *M. nasuta*, but actual concentrations were very low (highest mean was 24.9 µg/kg dry weight pyrene). No other compounds were significantly bioaccumulated from COMP CS-1.

In conclusion, proposed dredged material from the John F. Baldwin Ship Channel meets the deposited sediment toxicity (benthic bioassay) criteria for ocean disposal, but some water column and bioaccumulation effects were observed. Evaluation of water column effects can be refined by modeling the disposal scenario to estimate concentrations of dissolved and suspended material. The FDA action limits for contaminants in fish and shellfish are established for nine compounds that were measured in organisms exposed to John F. Baldwin Ship Channel sediment; none of the FDA limits were exceeded. Significant accumulation above detection limits and at a magnitude greater than five times reference were observed for TBT in one Pinole Shoal composite, a compound for which there is no FDA action limit or other guideline for assessing impact to human health or the environment. Careful management of the large volume of dredged material from the John F. Baldwin Ship Channel will minimize the impacts of ocean disposal.

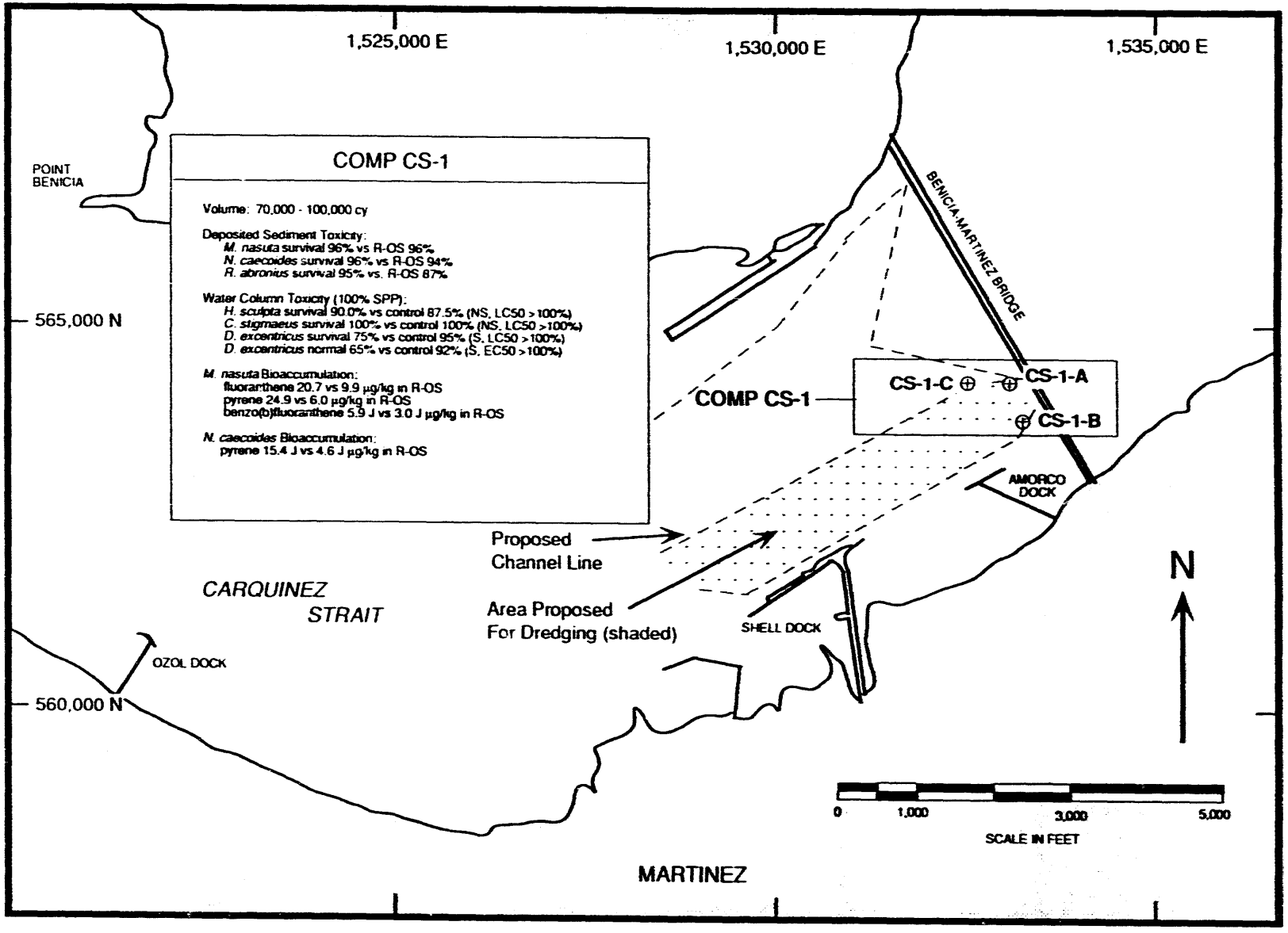


FIGURE 4.4. Sediment Evaluation Results, Carquinez Strait Reach of the John F. Baldwin Ship Channel

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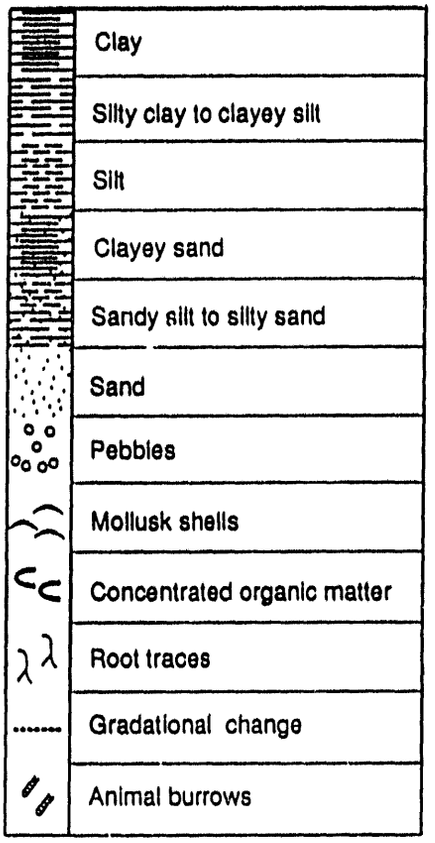
APPENDIX A

GEOLOGIC CORE DATA LOGS

J. F. Baldwin III Project

Key to Core Data Logs (After ASTM Procedure D2488-84)

Lithology:



Silt/Clay Characteristics

Dilatancy:

N = none
S = slow
R = rapid

Toughness:

L = low
M = medium
H = high

Plasticity:

N = none
L = low
M = medium
H = High

Type:

See soil group classification in ASTM D2488-84

Color (wet):

Selected from Munsell Soil Color Chart

Consistency:

H = hard
F = firm
S = soft
VS = very soft

Cementation:

N = not cemented
W = weakly cemented
M = moderately cemented
S = strongly cemented

Structure:

S = stratified
L = laminated
F = fissured
SL = slickensided
Ln = lensed
Bl = blocky
M = mottled
H = homogeneous

HCl Reaction:

N = none
W = weak
S = strong

Maximum Particle Size:

P = pebble
G = granule
VCS = very coarse sand
CS = coarse sand
MS = medium sand
FS = fine sand
VFS = very fine sand
Z = silt

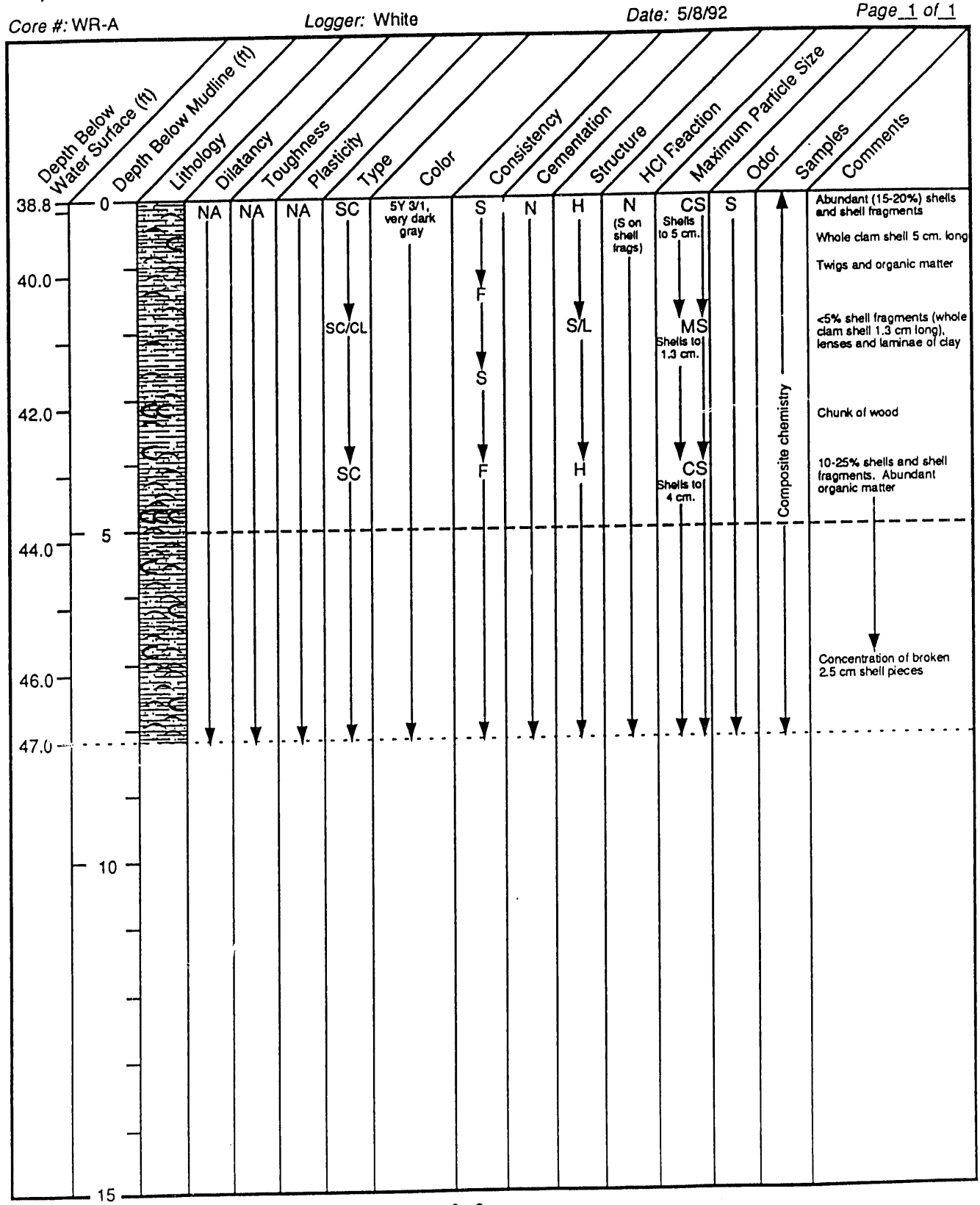
Odor:

N = none
S = sulfide
P = petroleum
O = other
w/HCl = odor apparent after HCl application

Core Data Log

Project: J. F. Baldwin III

Core #: WR-A *Logger:* White *Date:* 5/8/92 *Page* 1 *of* 1

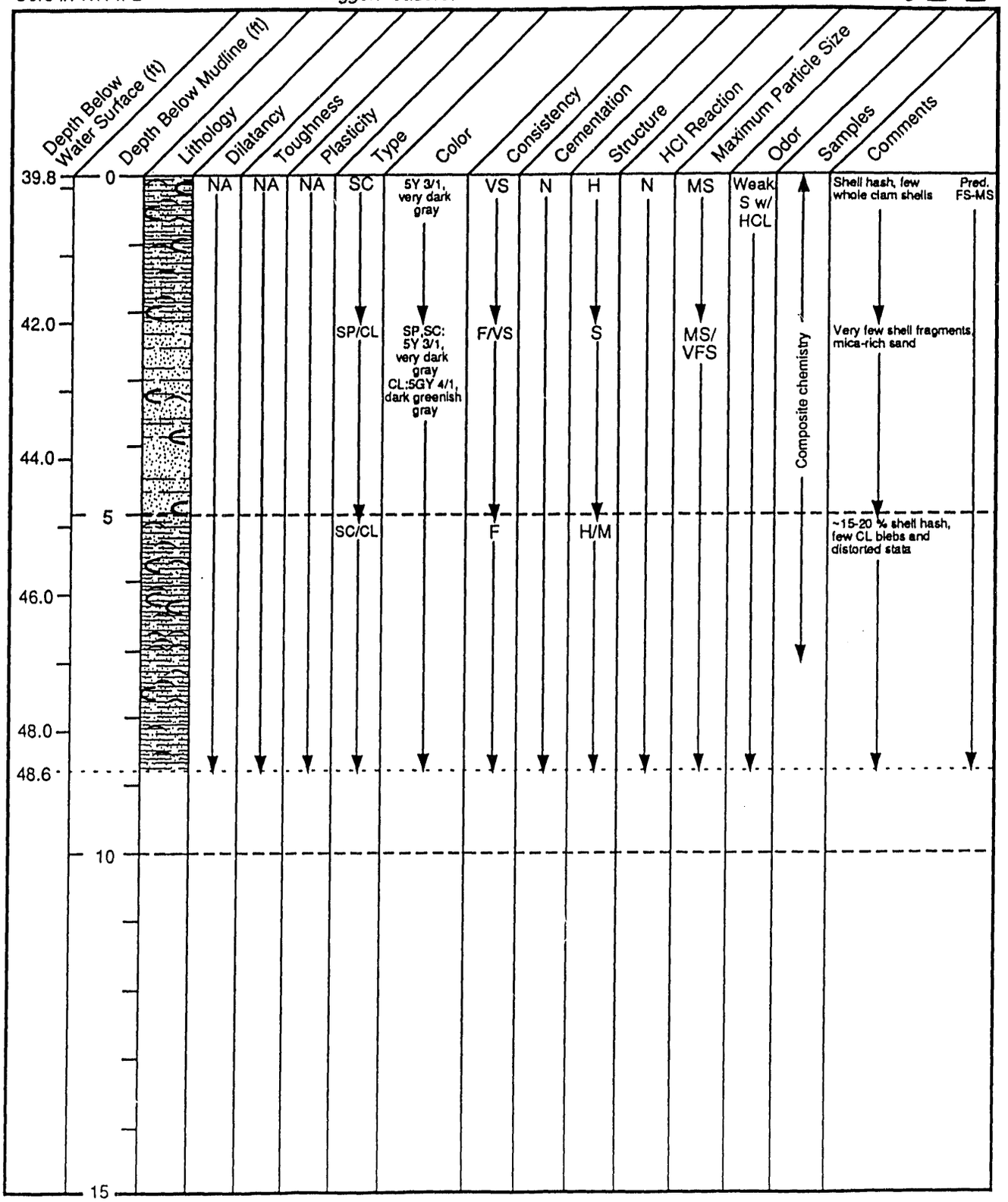


JF BALDWIN

Core Data Log

Project: J. F. Baldwin III

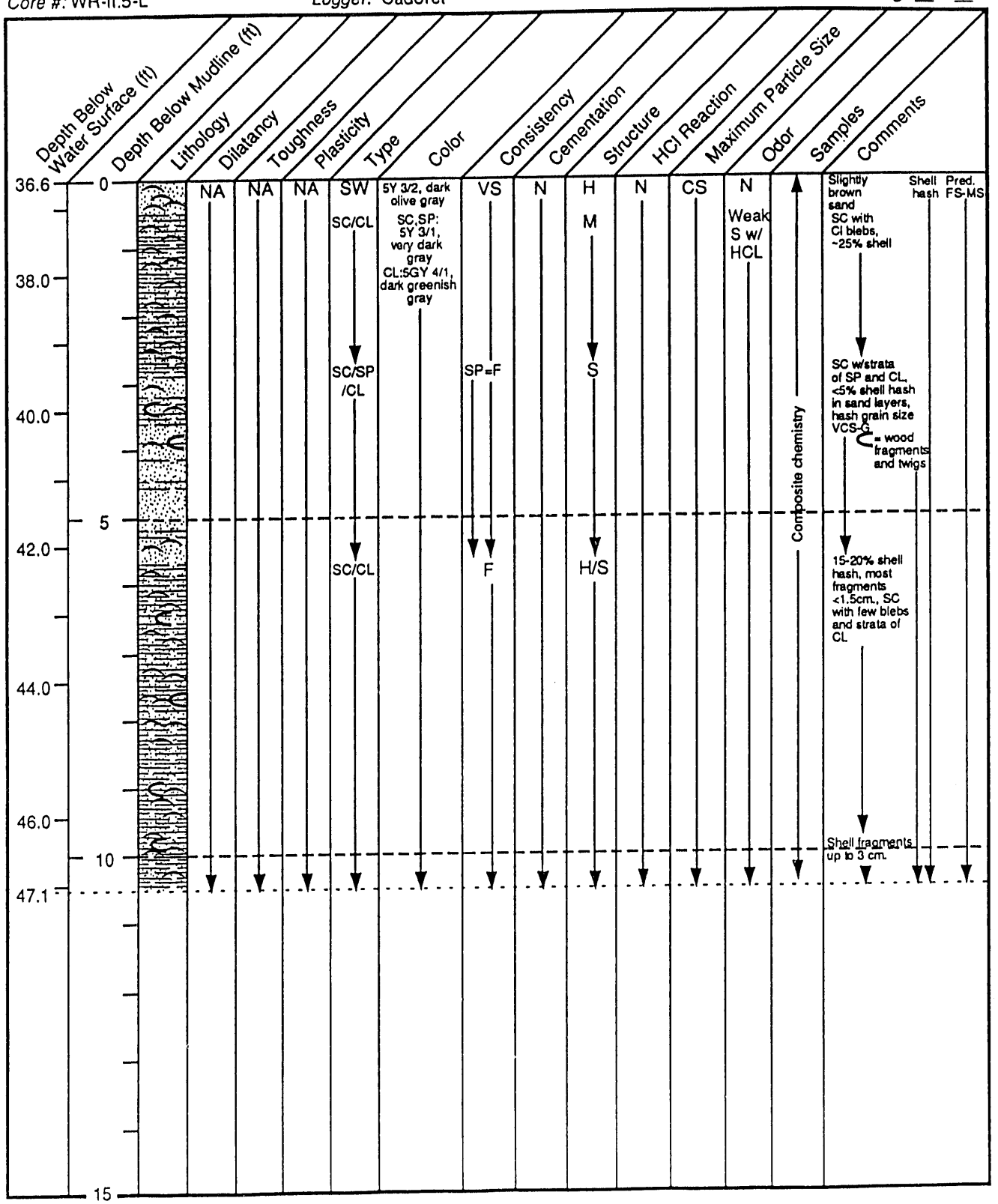
Core #: WR-II-L *Logger:* Cadoret *Date:* 5/8/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

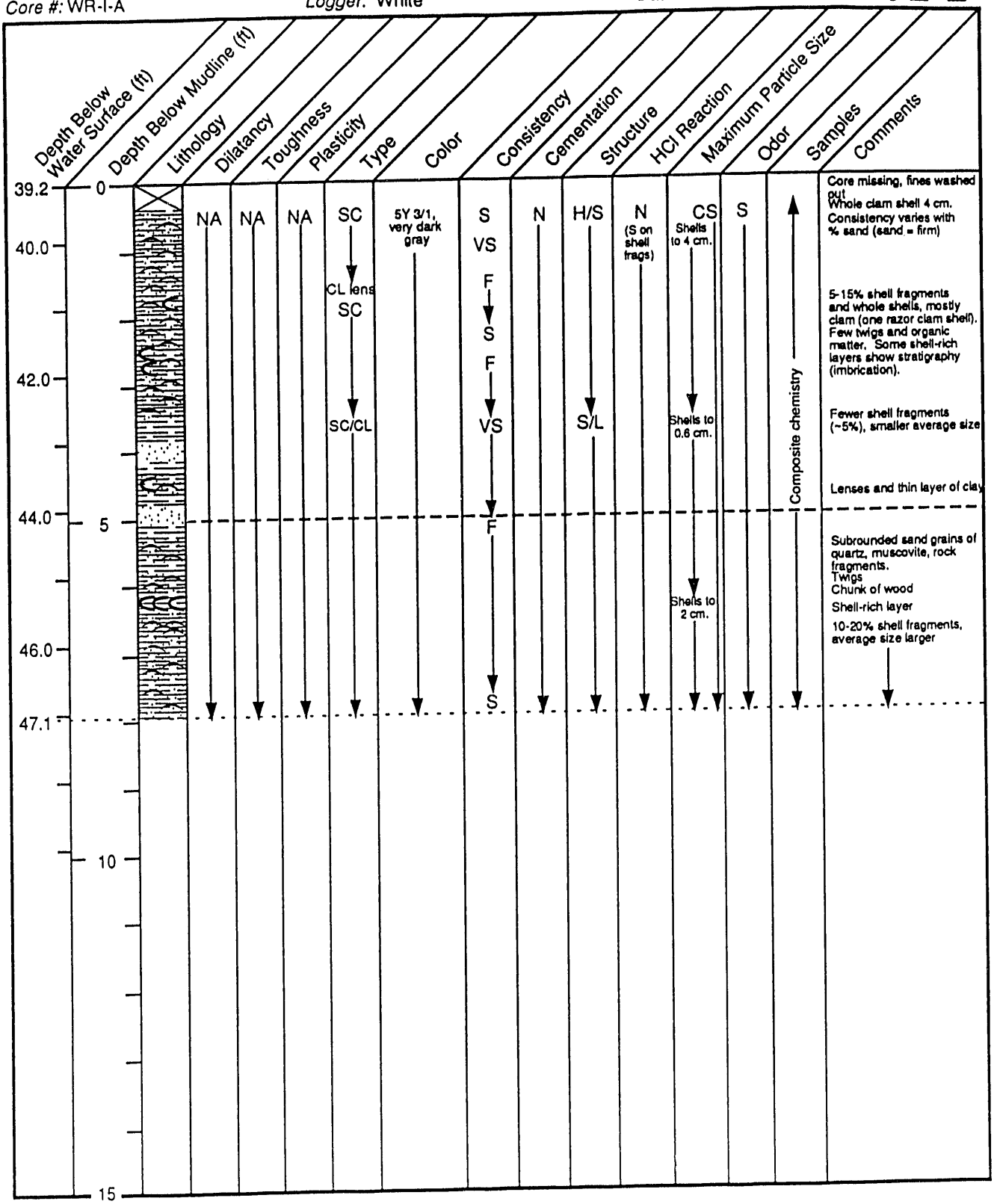
Core #: WR-II.5-L *Logger:* Cadoret *Date:* 5/8/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

Core #: WR-I-A *Logger:* White *Date:* 5/8/92 *Page* 1 *of* 1



JF BALDWIN

Core Data Log

Project: J. F. Baldwin III

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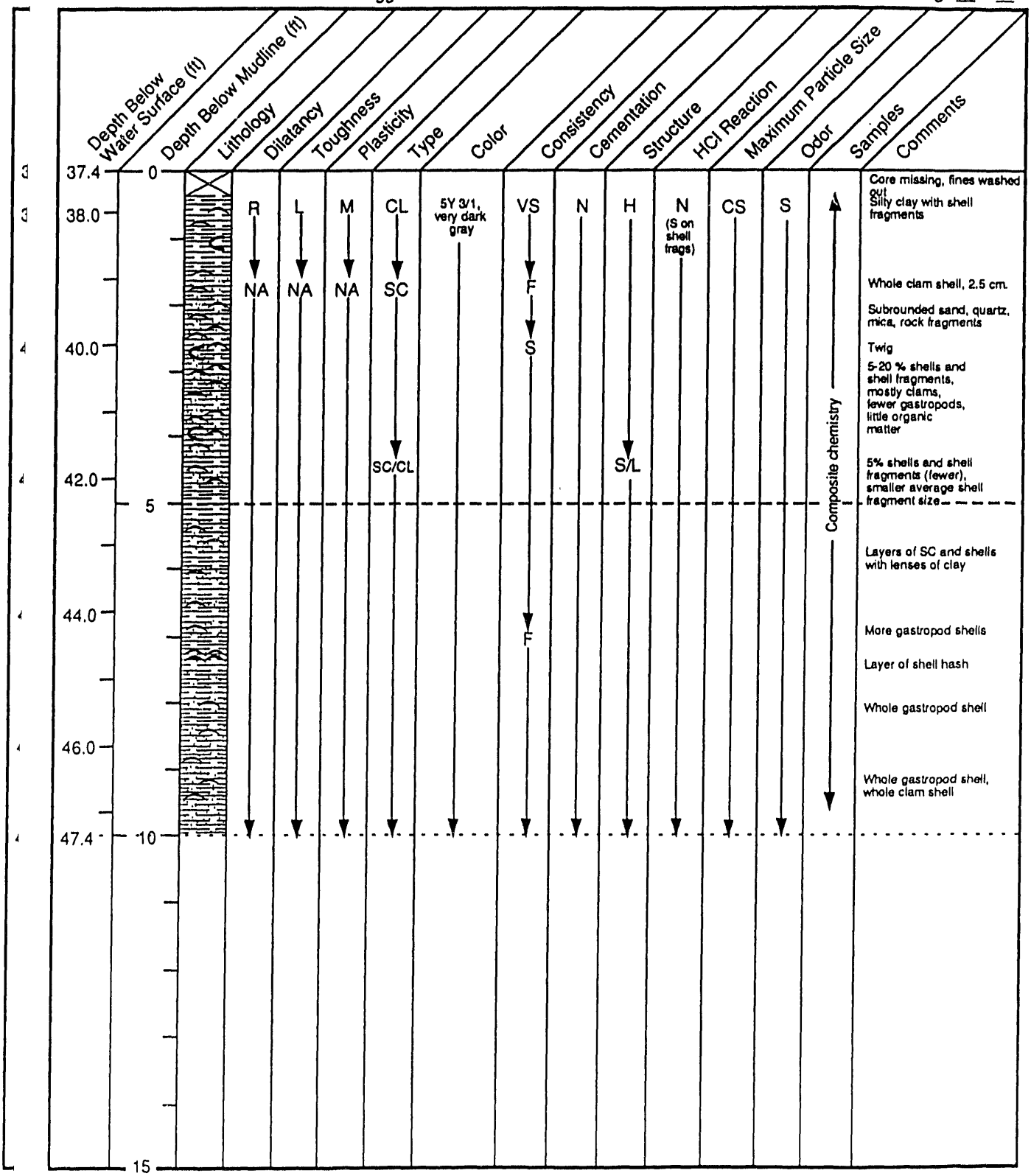

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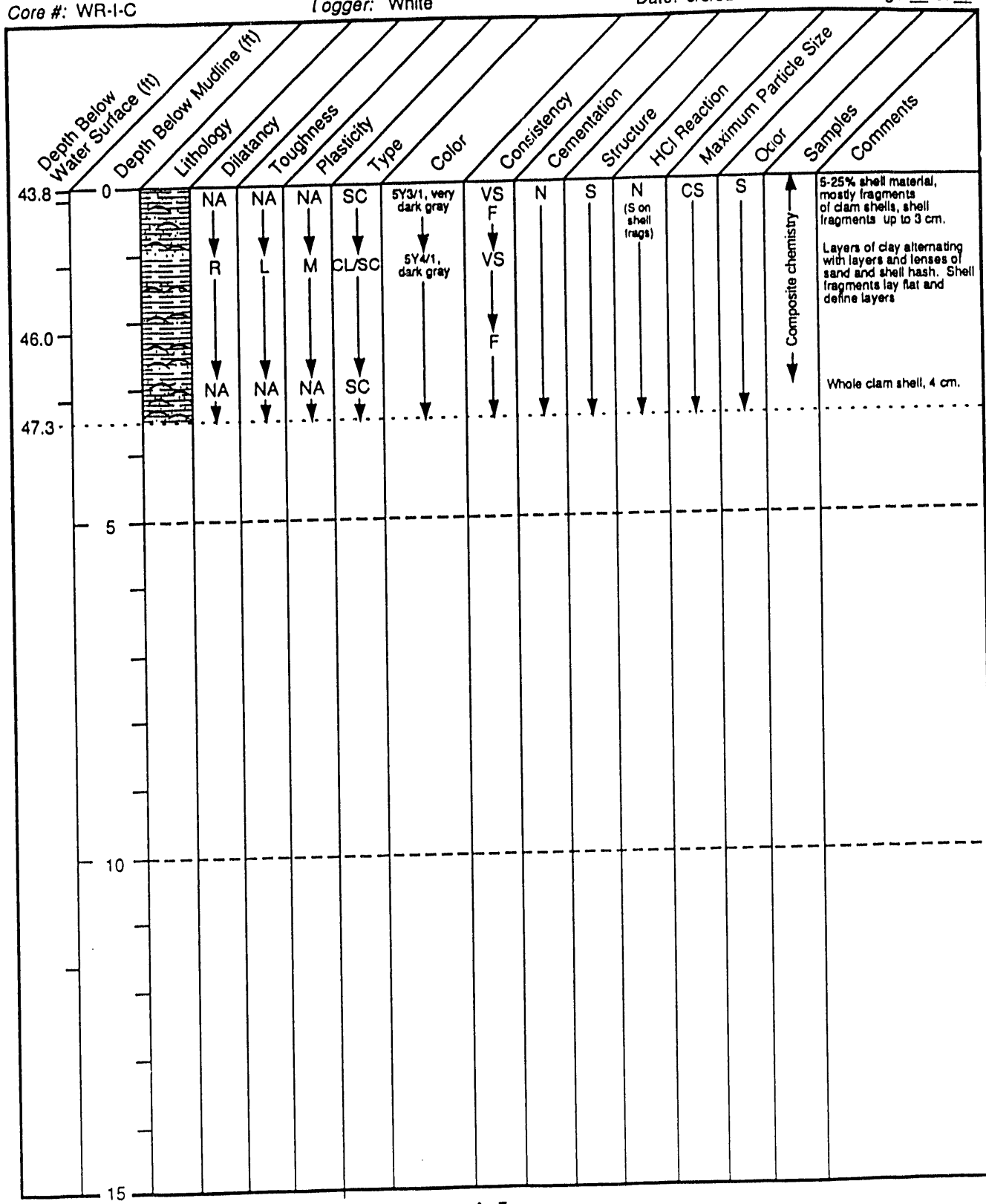

JF BALDWIN

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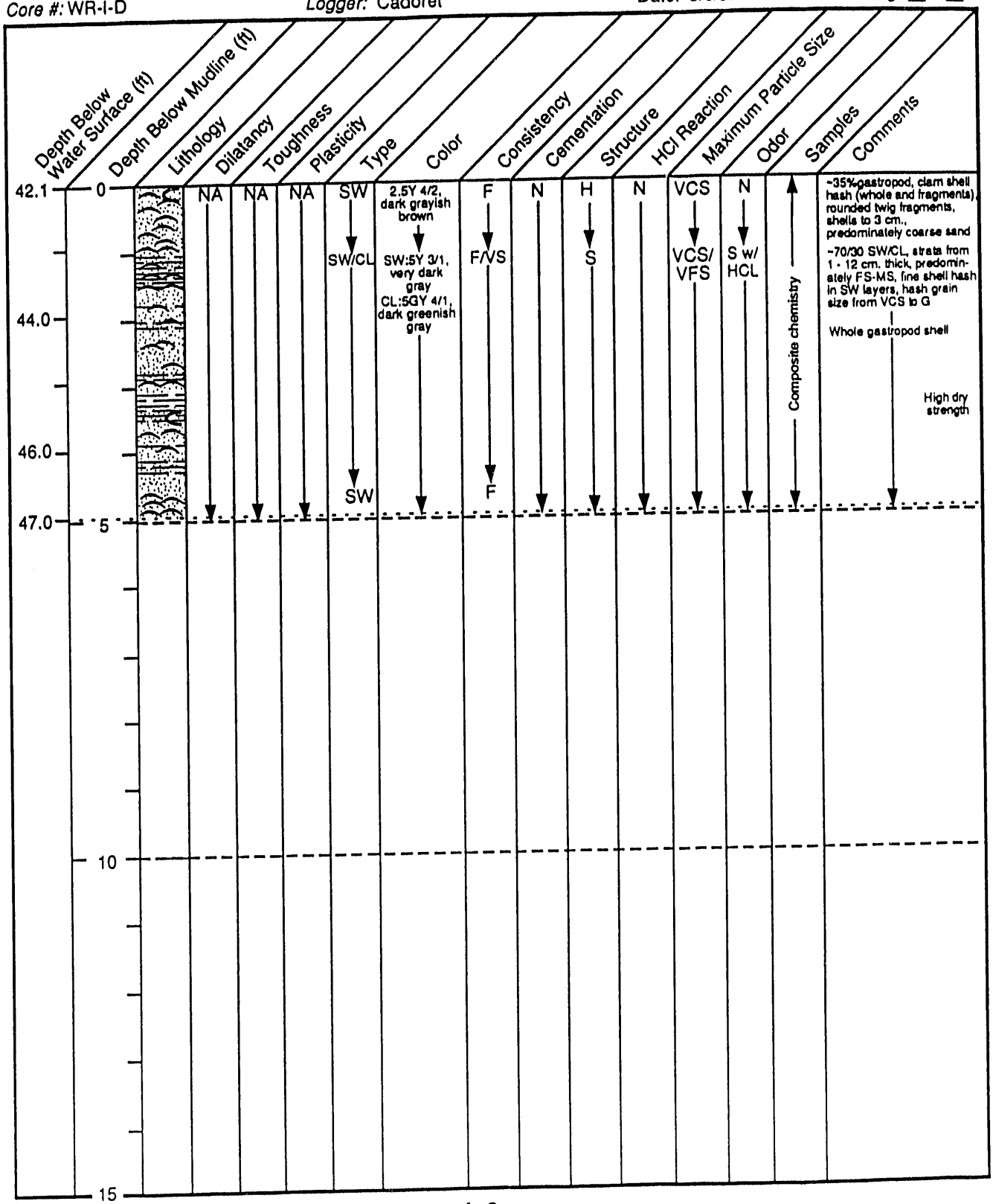
Core #: WR-I-D *Logger:* Cadoret *Date:* 5/8/92 *Page* 1 *of* 1



JF BALDWIN

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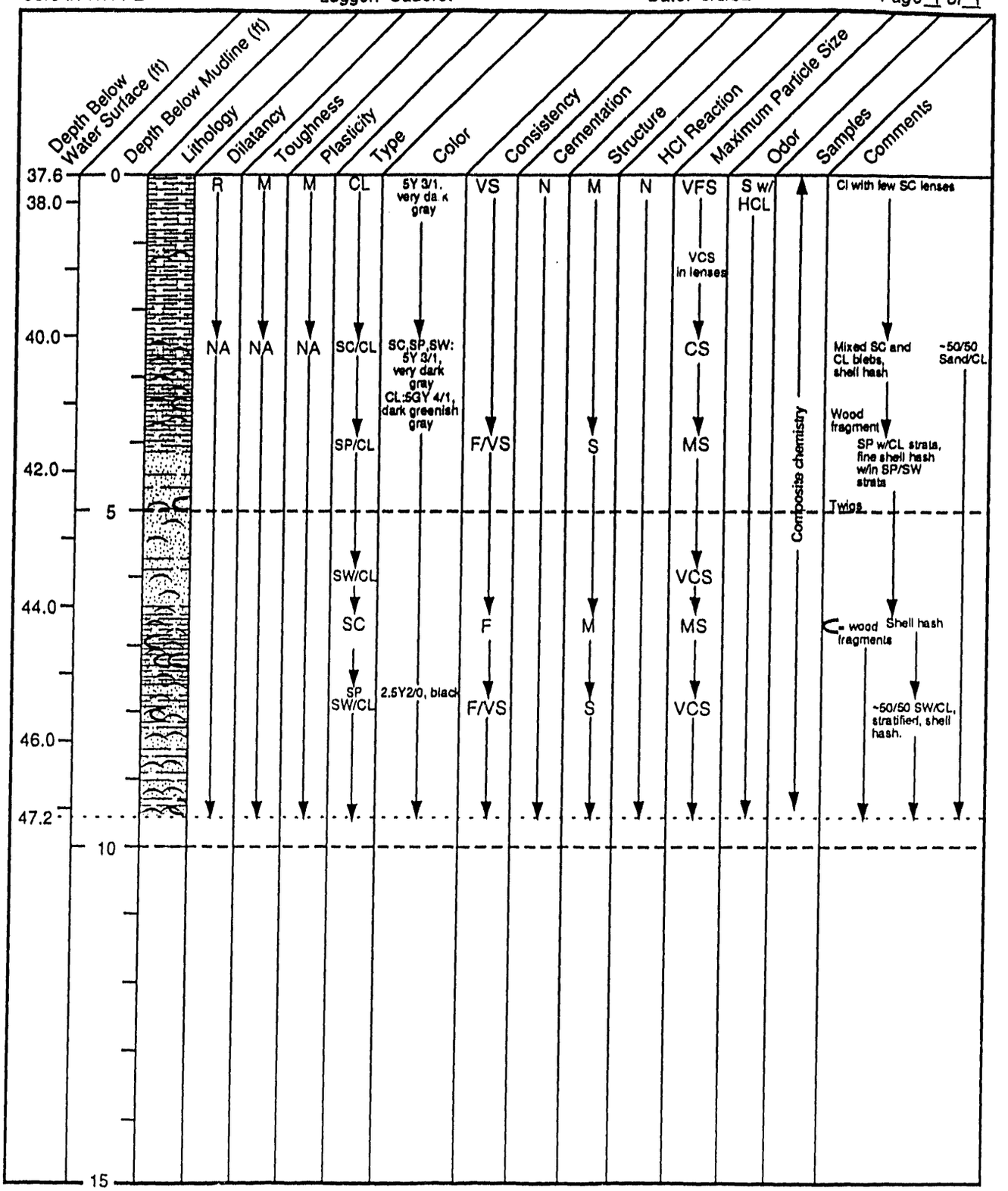
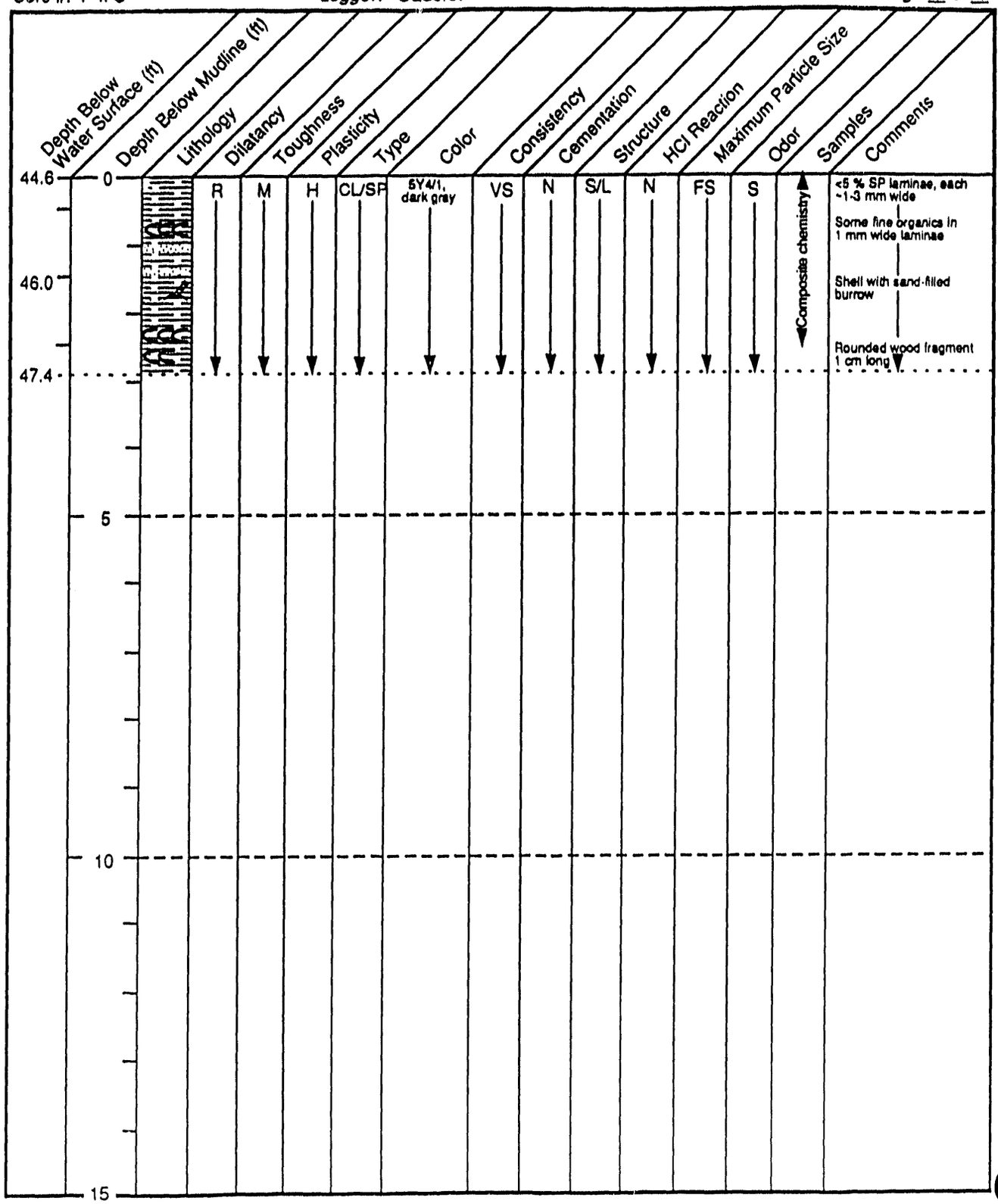


Core Data Log

Project: J. F. Baldwin III

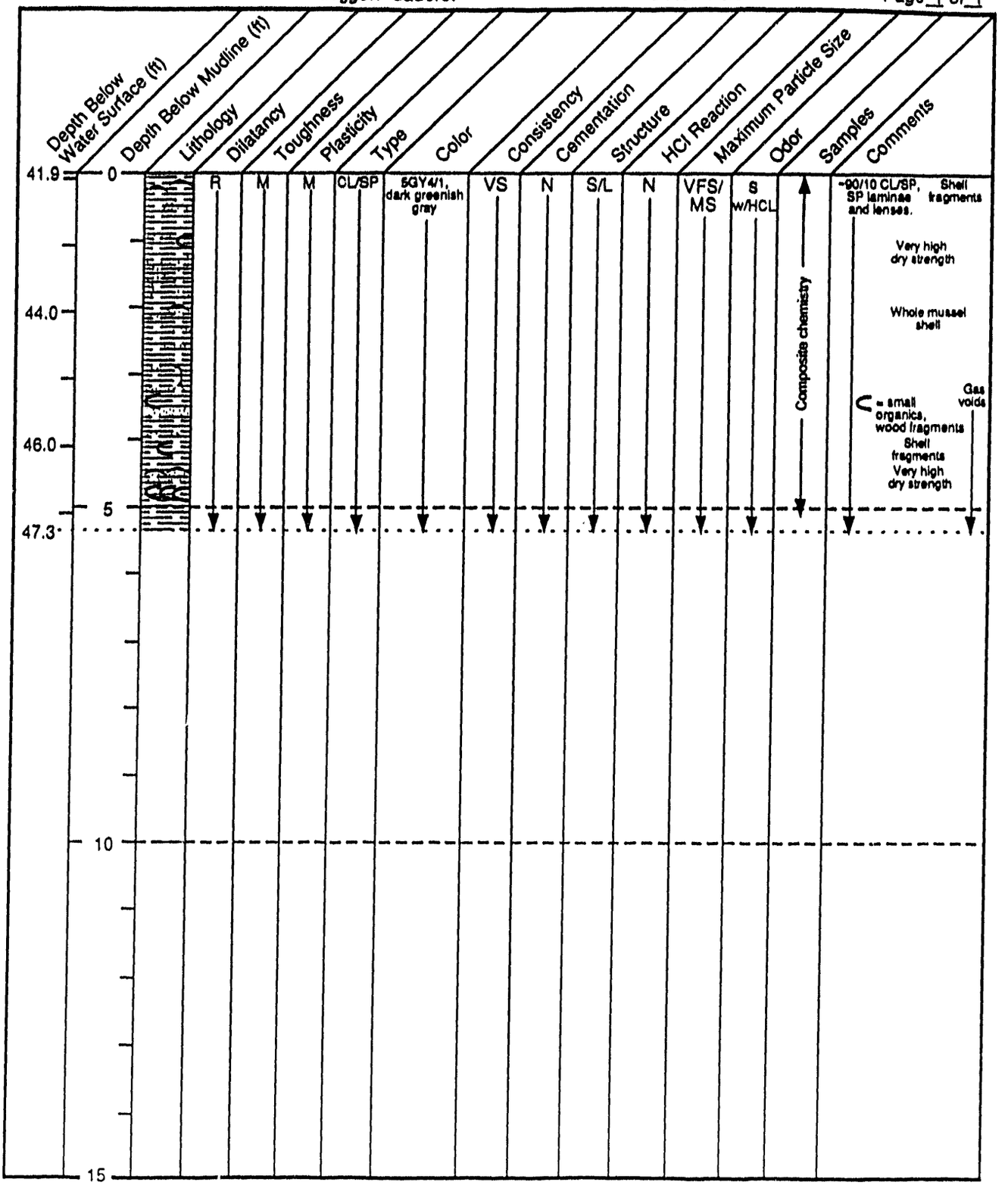
Core #: P II C *Logger:* Cadoret *Date:* 5/6/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

Core #: P III.5 R *Logger:* Cadoret *Date:* 5/8/92 *Page* 1 *of* 1



Core Data Log

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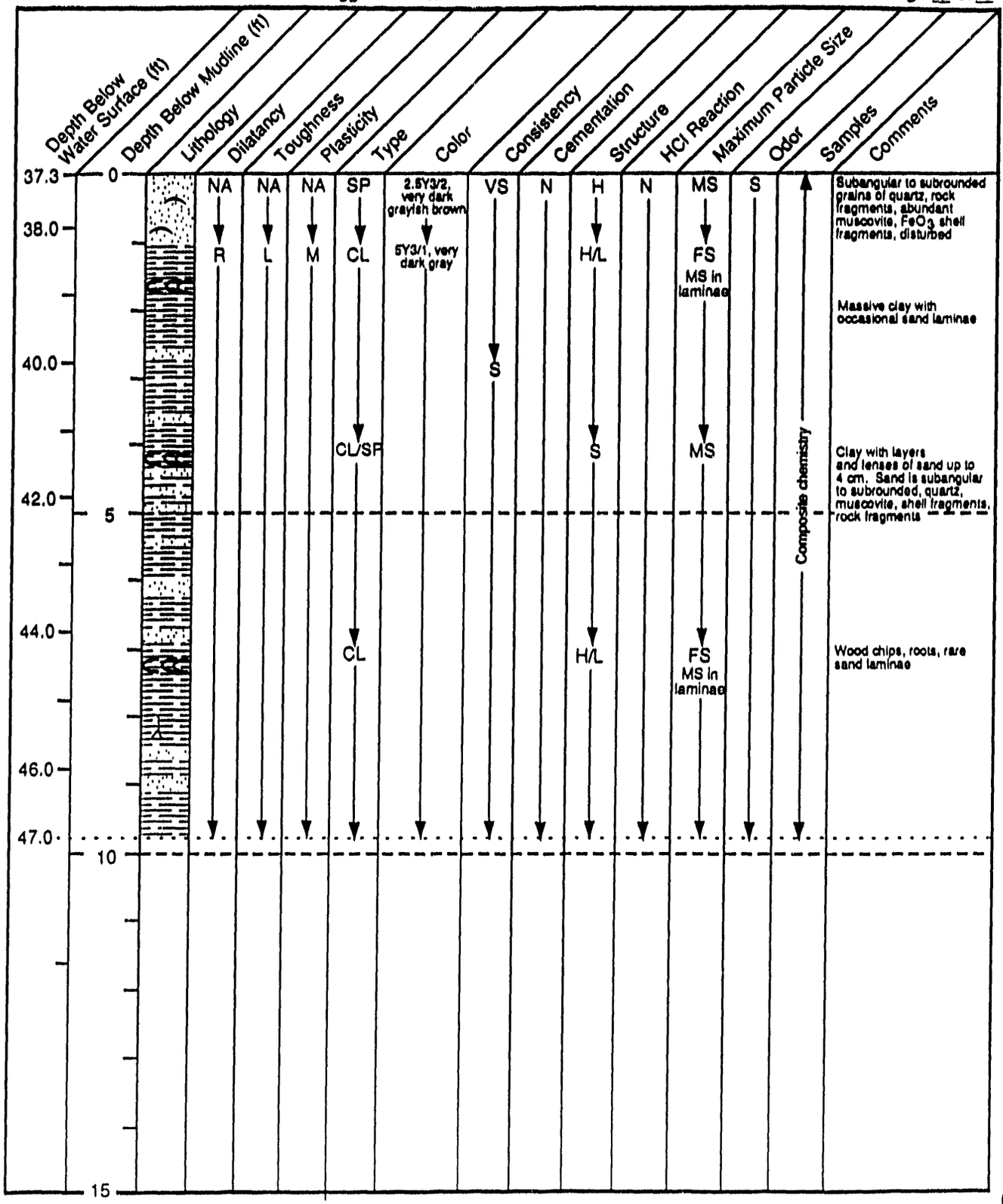
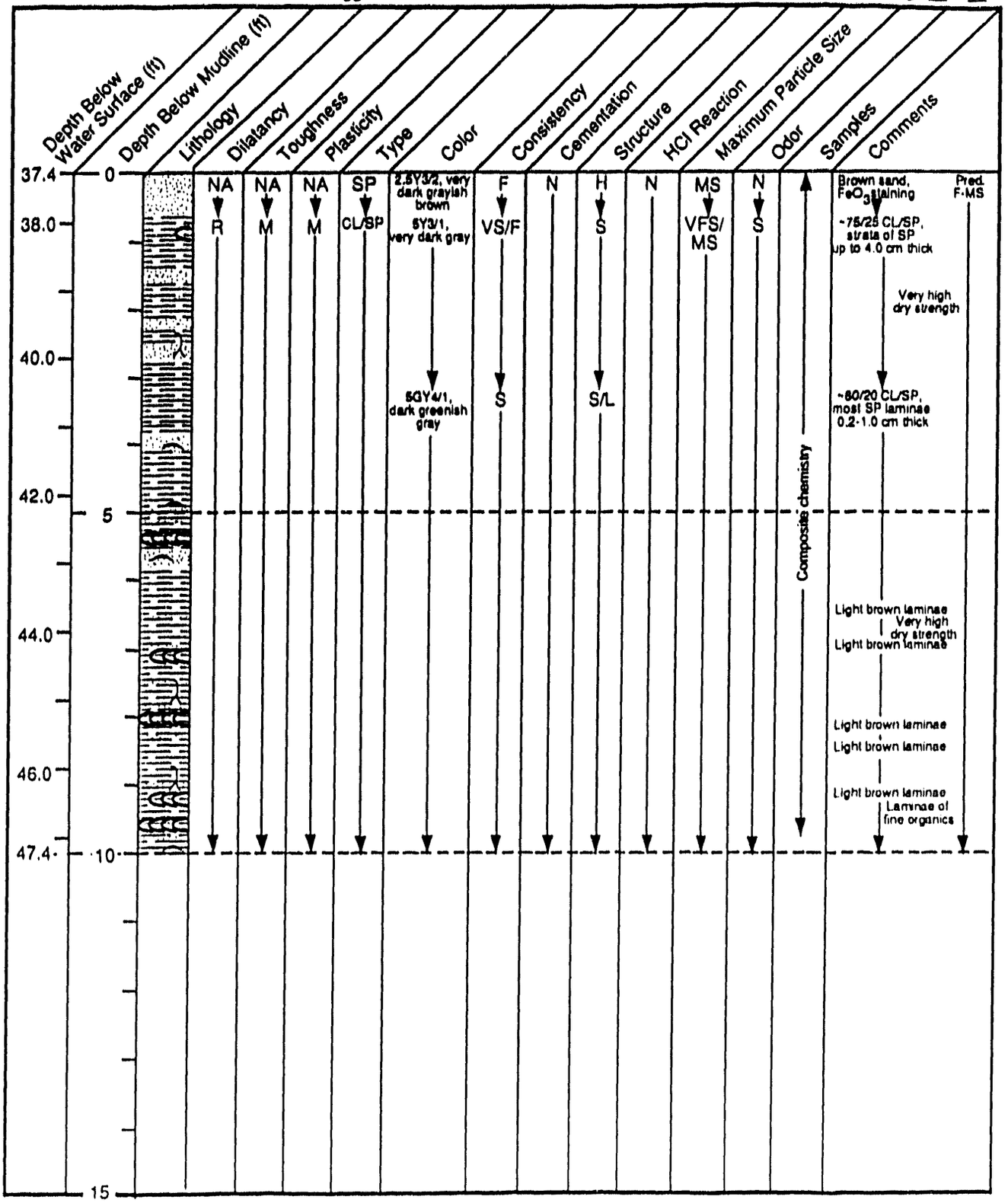


Core Data Log

Project: J. F. Baldwin III

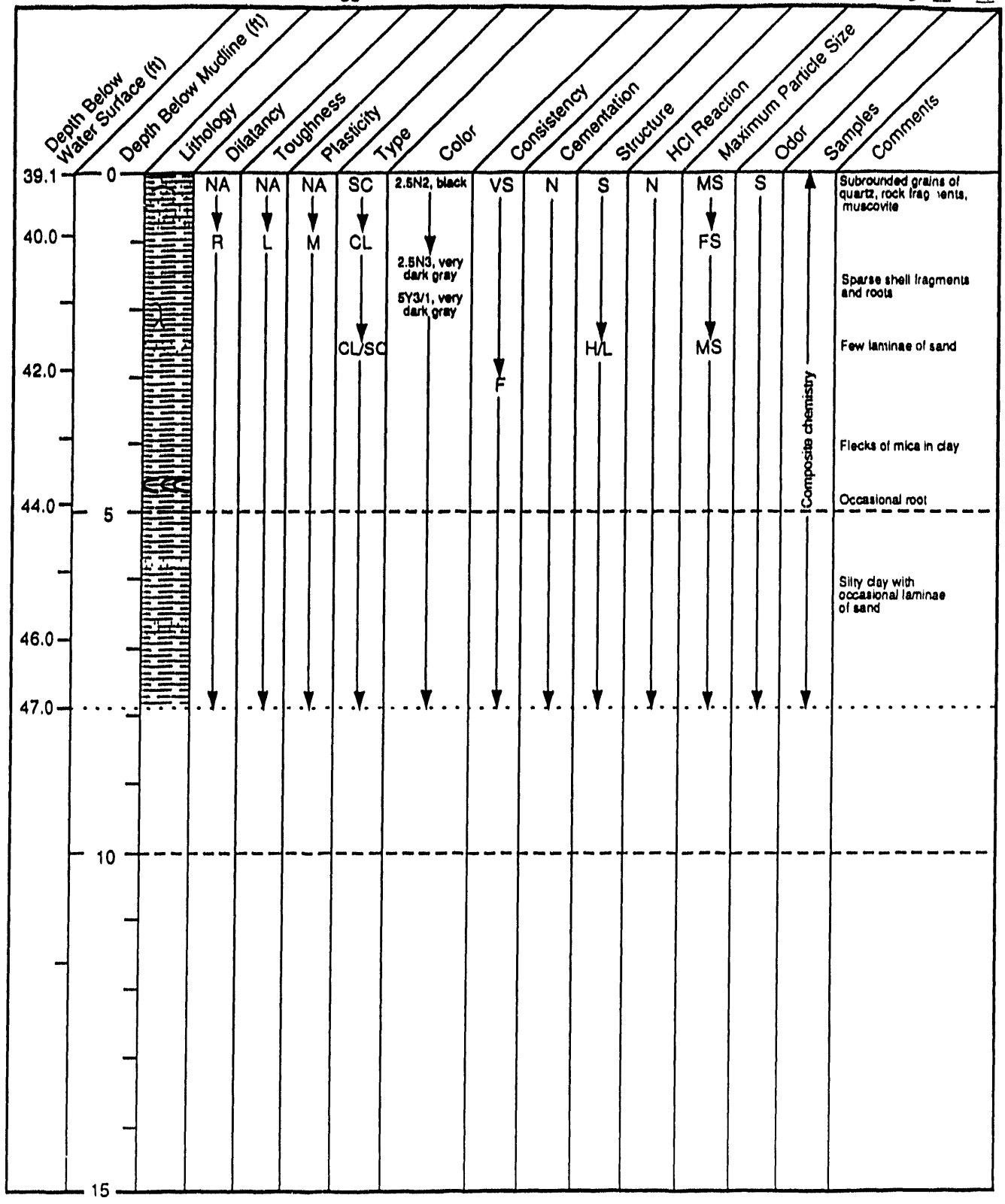
Core #: P V R *Logger:* Cadoret *Date:* 5/8/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

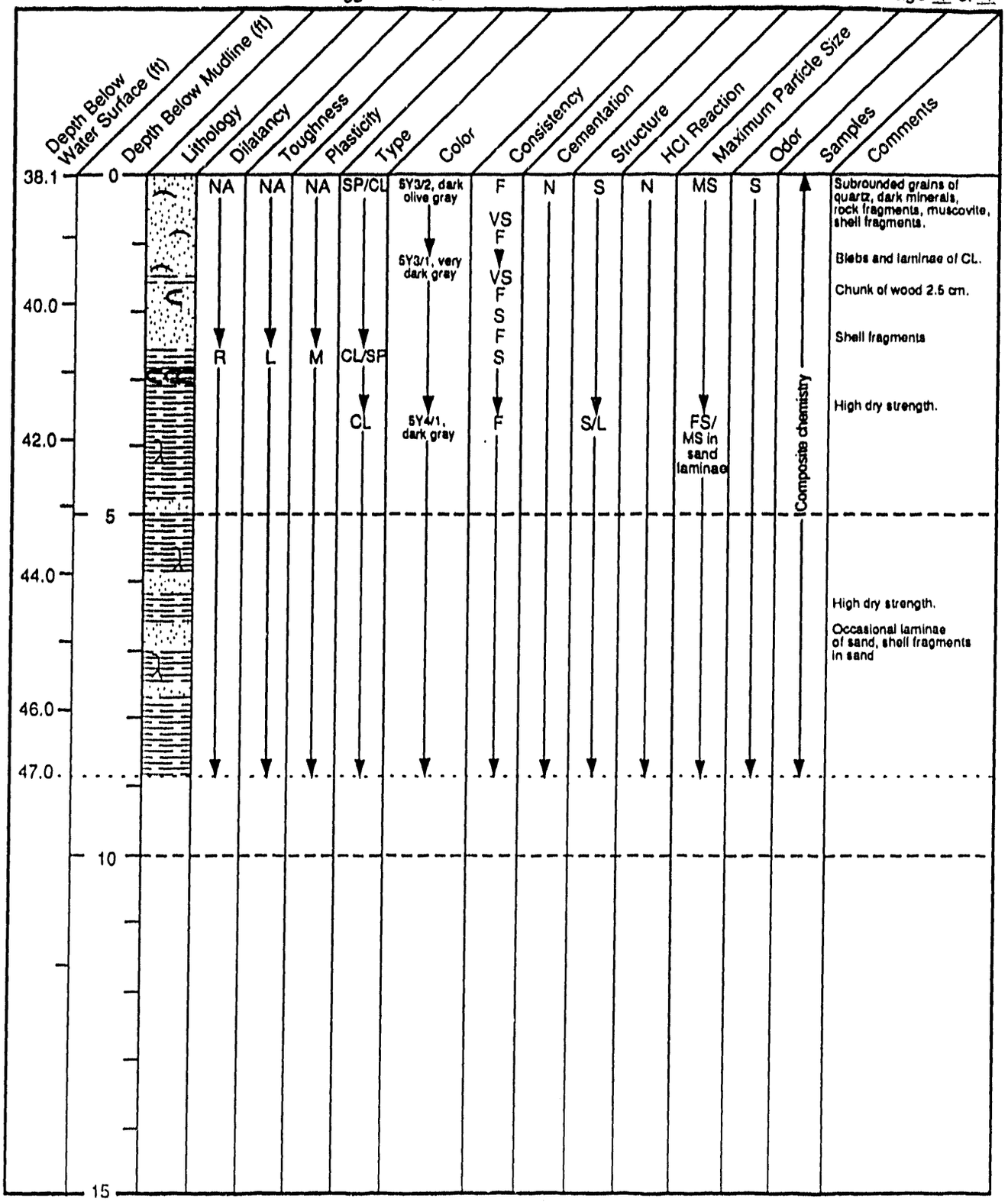
Core #: P V L *Logger:* White *Date:* 5/8/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

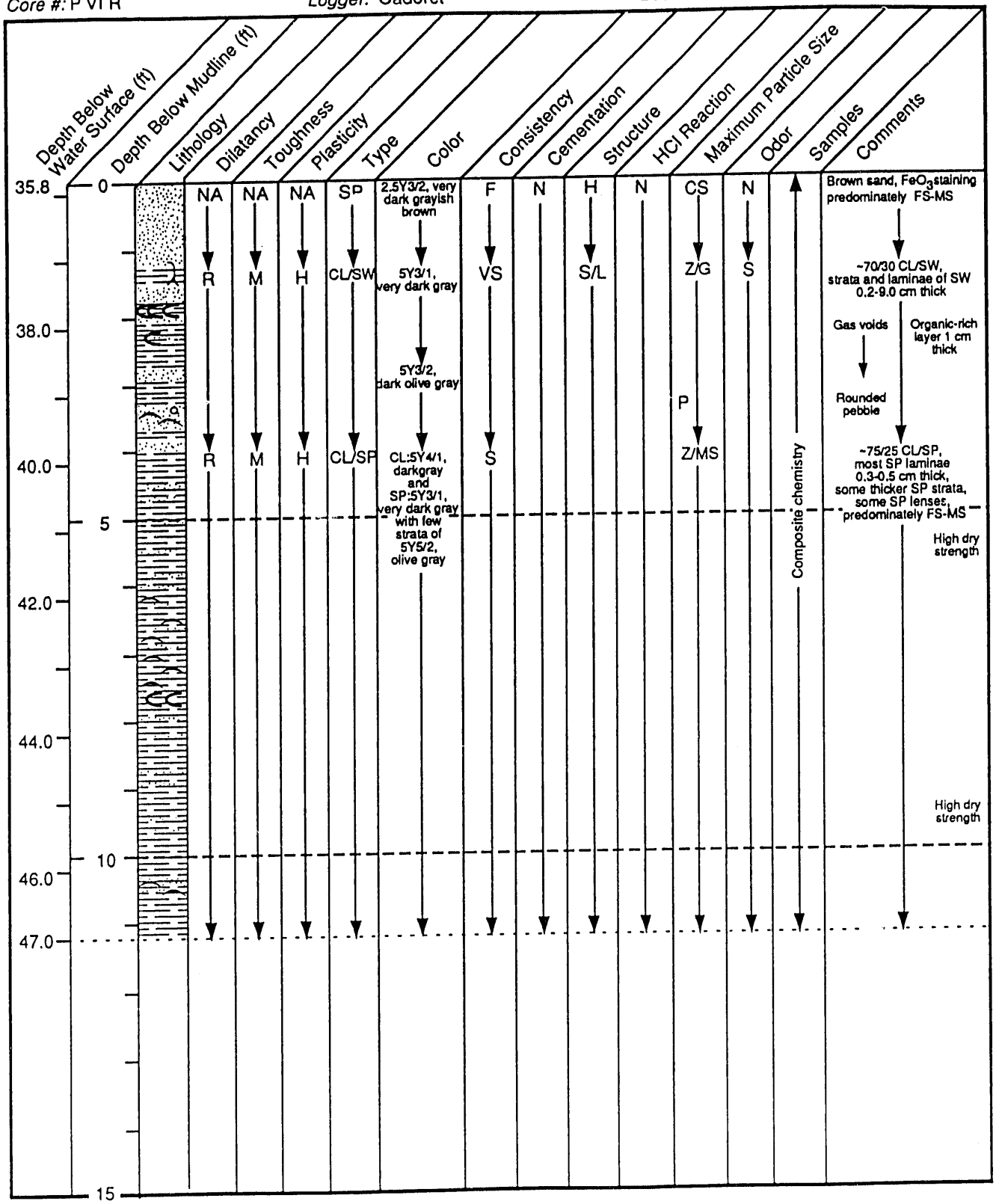
Core #: P V.5 C *Logger:* White *Date:* 5/7/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

Core #: P VI R *Logger:* Cadoret *Date:* 5/7/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

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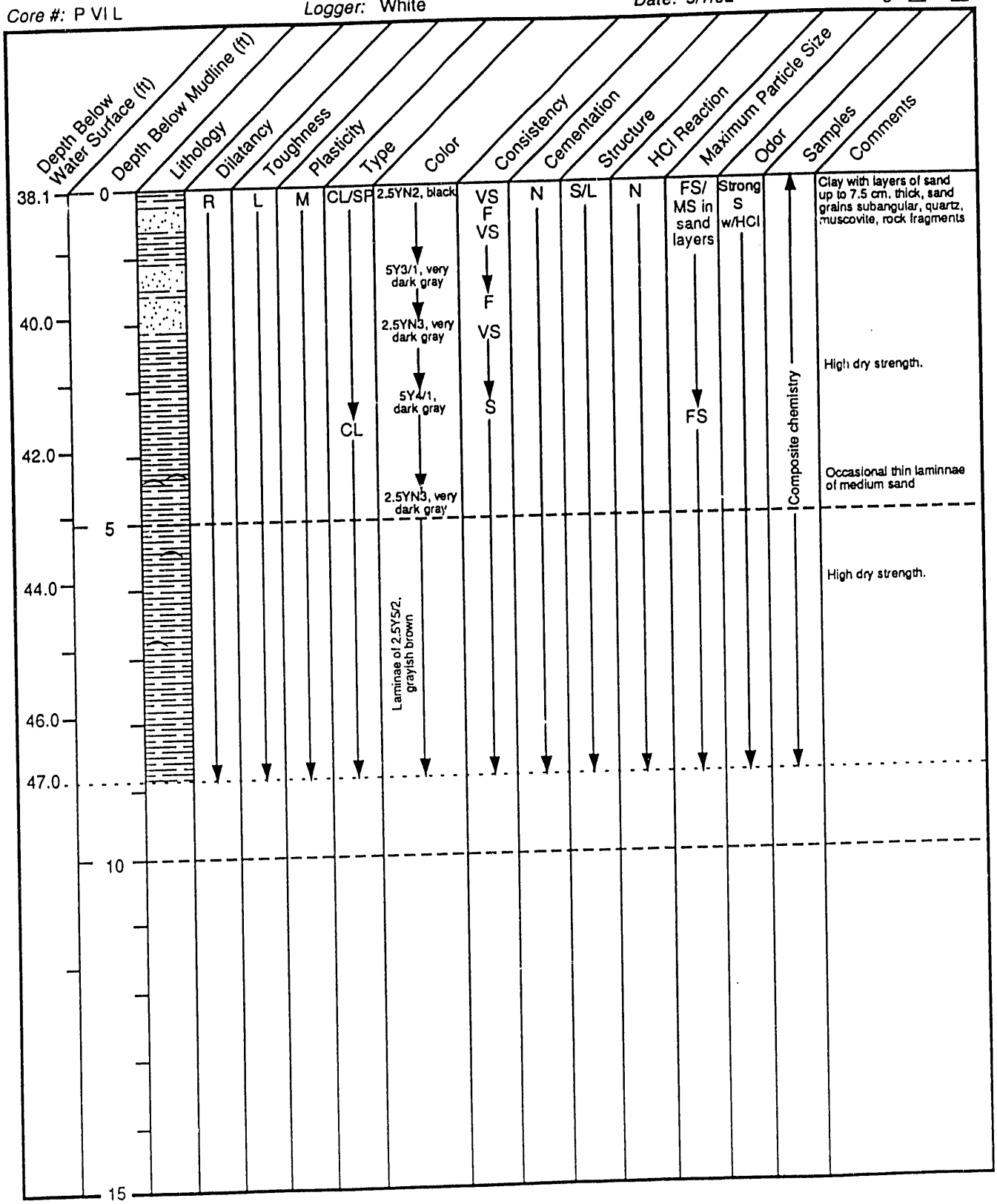
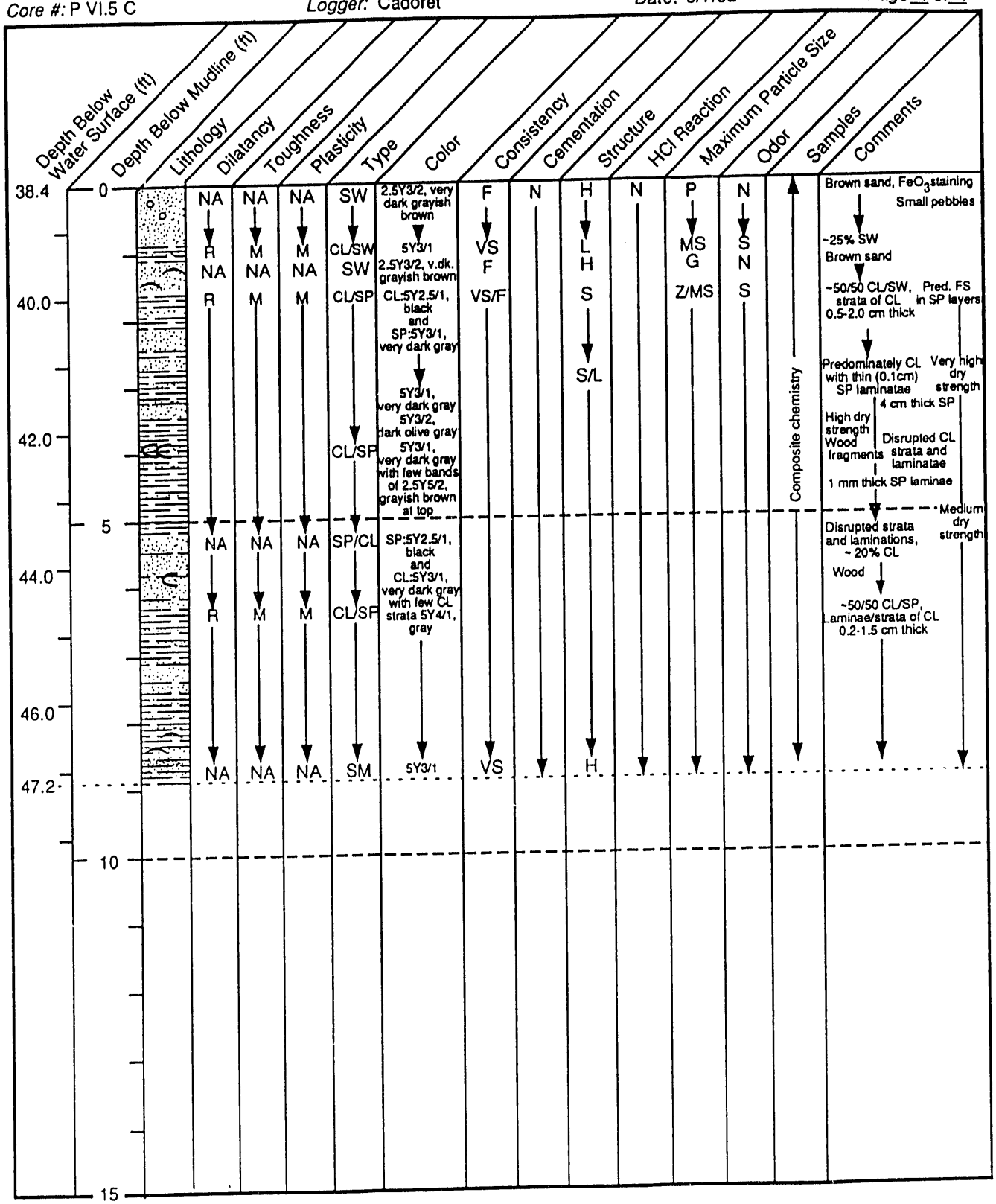


JF BALDWIN

Core Data Log

Project: J. F. Baldwin III

Core #: P VI.5 C *Logger:* Cadoret *Date:* 5/7/92 *Page* 1 of 1



Core Data Log

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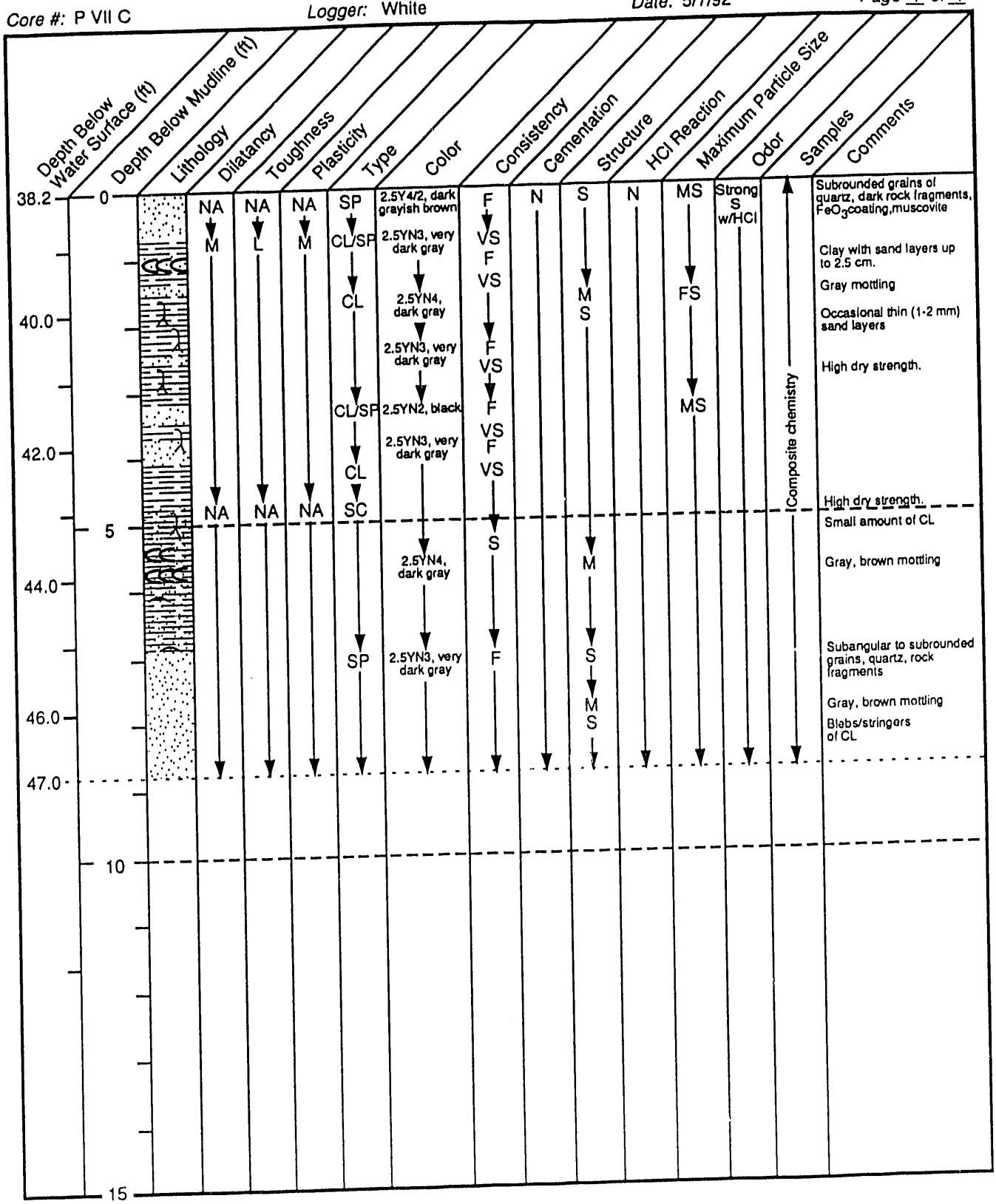
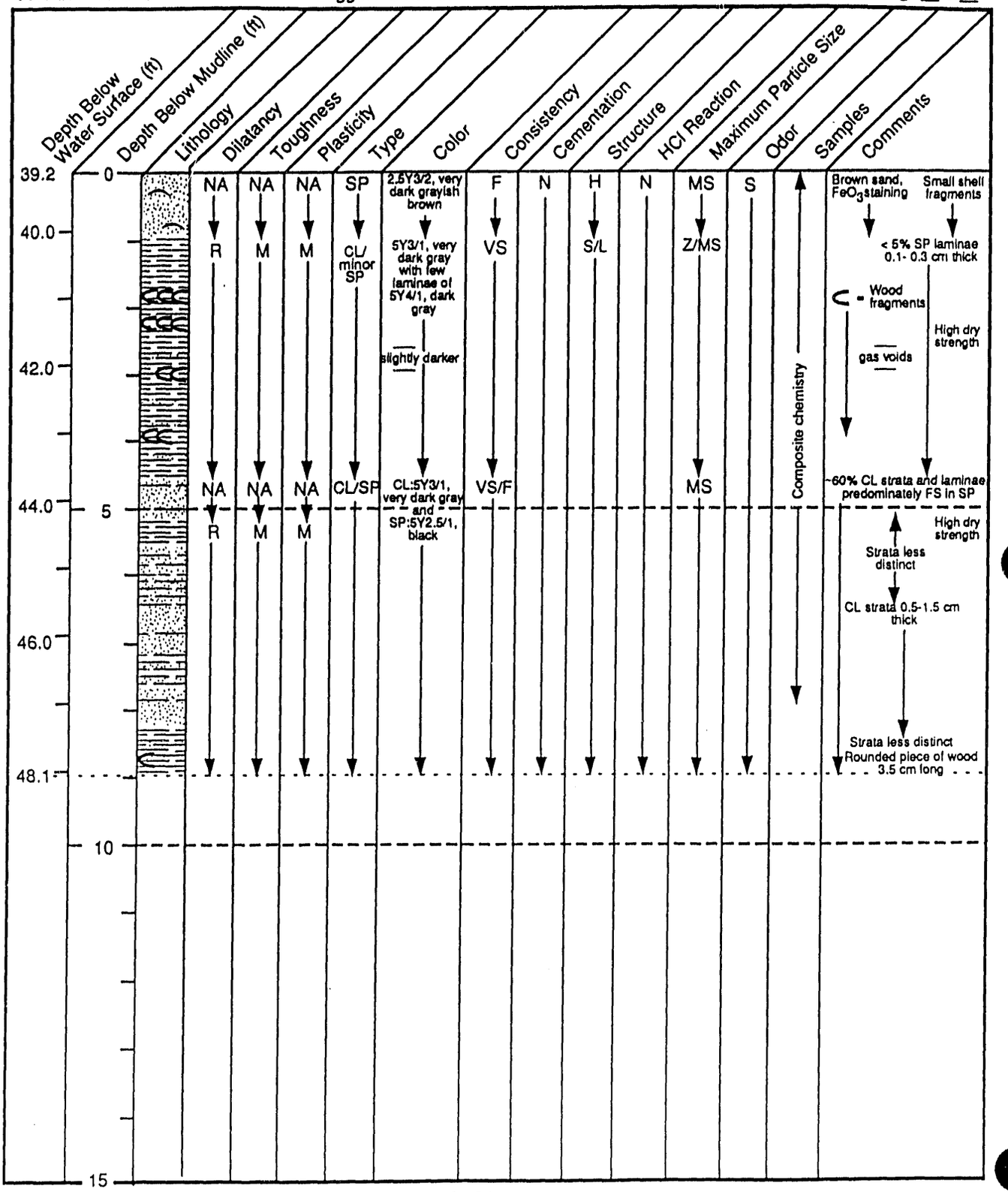


Core Data Log

Project: J. F. Baldwin III

Core #: P VII.5 C *Logger:* Cadoret *Date:* 5/7/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

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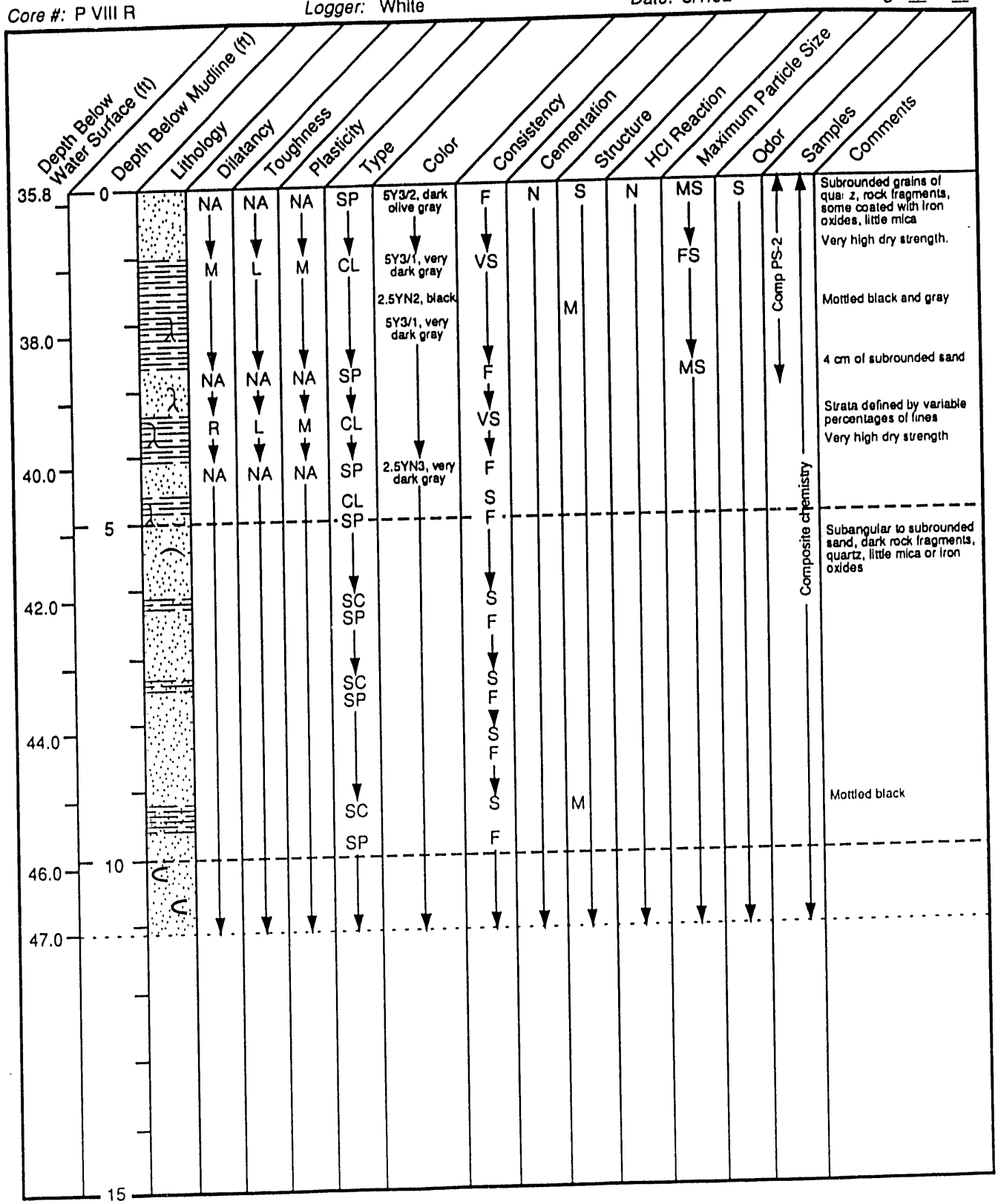

JF BALDWIN

Core Data Log

Project: J. F. Baldwin III

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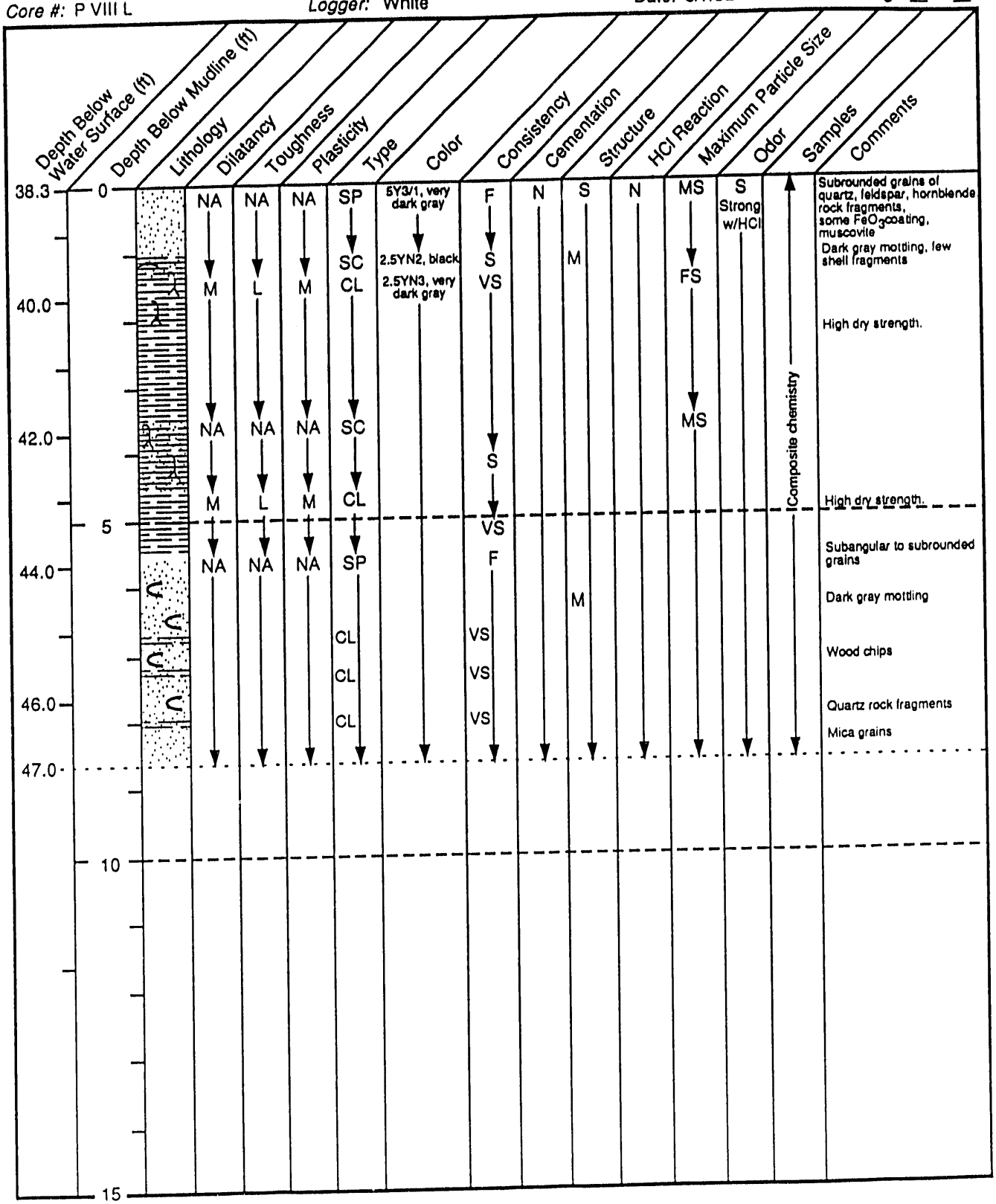

Core Data Log

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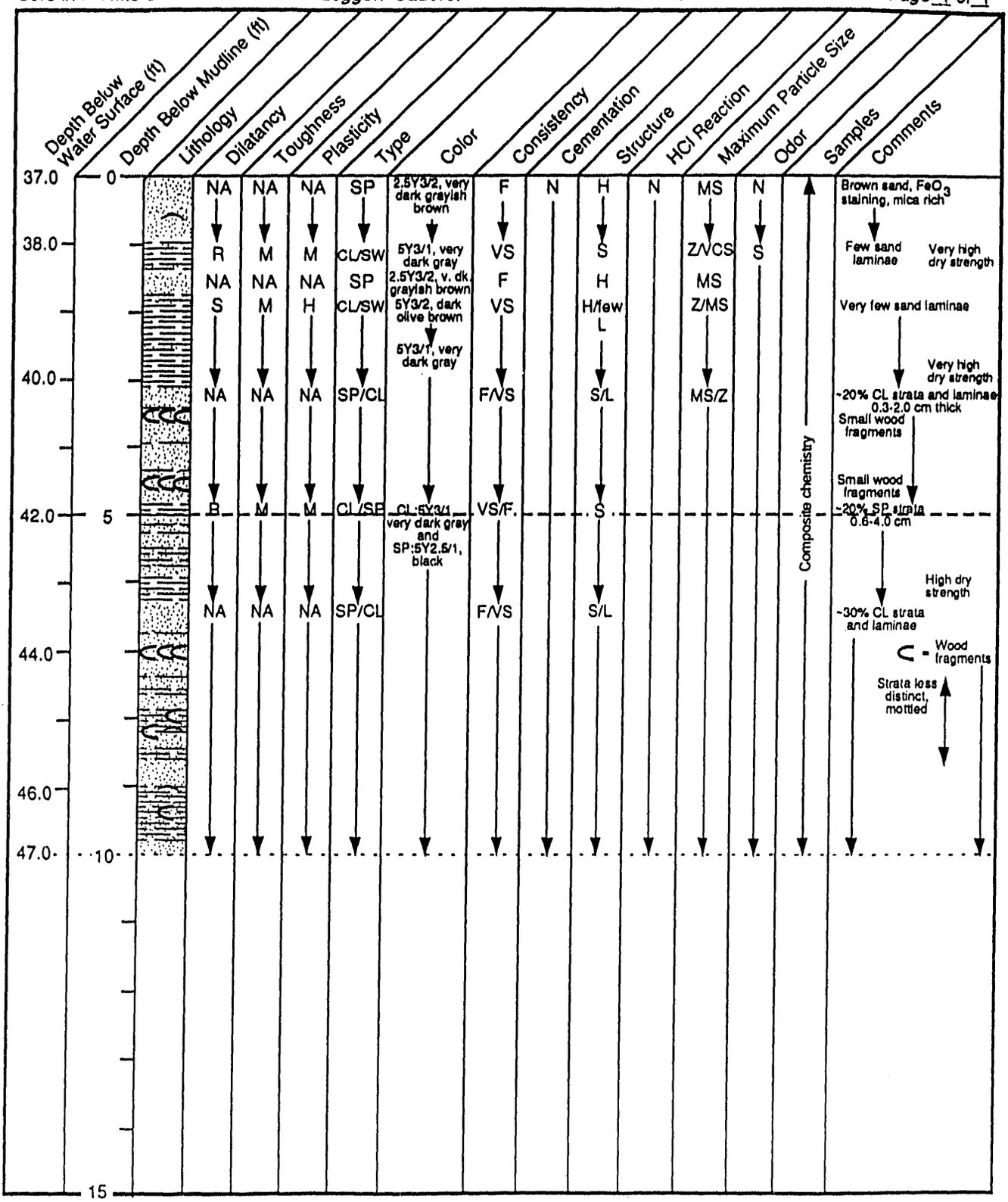

Core Data Log

Project: J. F. Baldwin III

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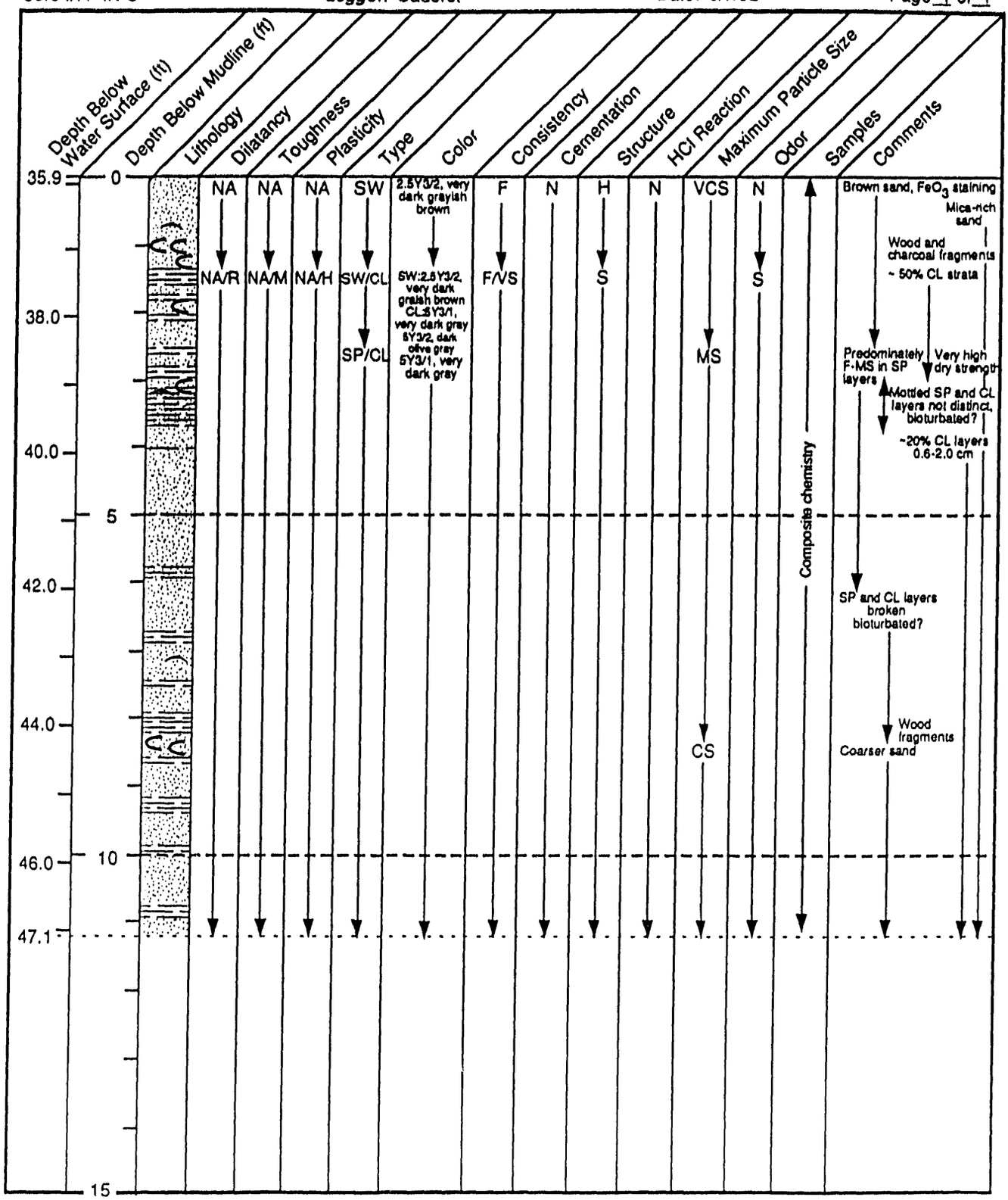

Core Data Log

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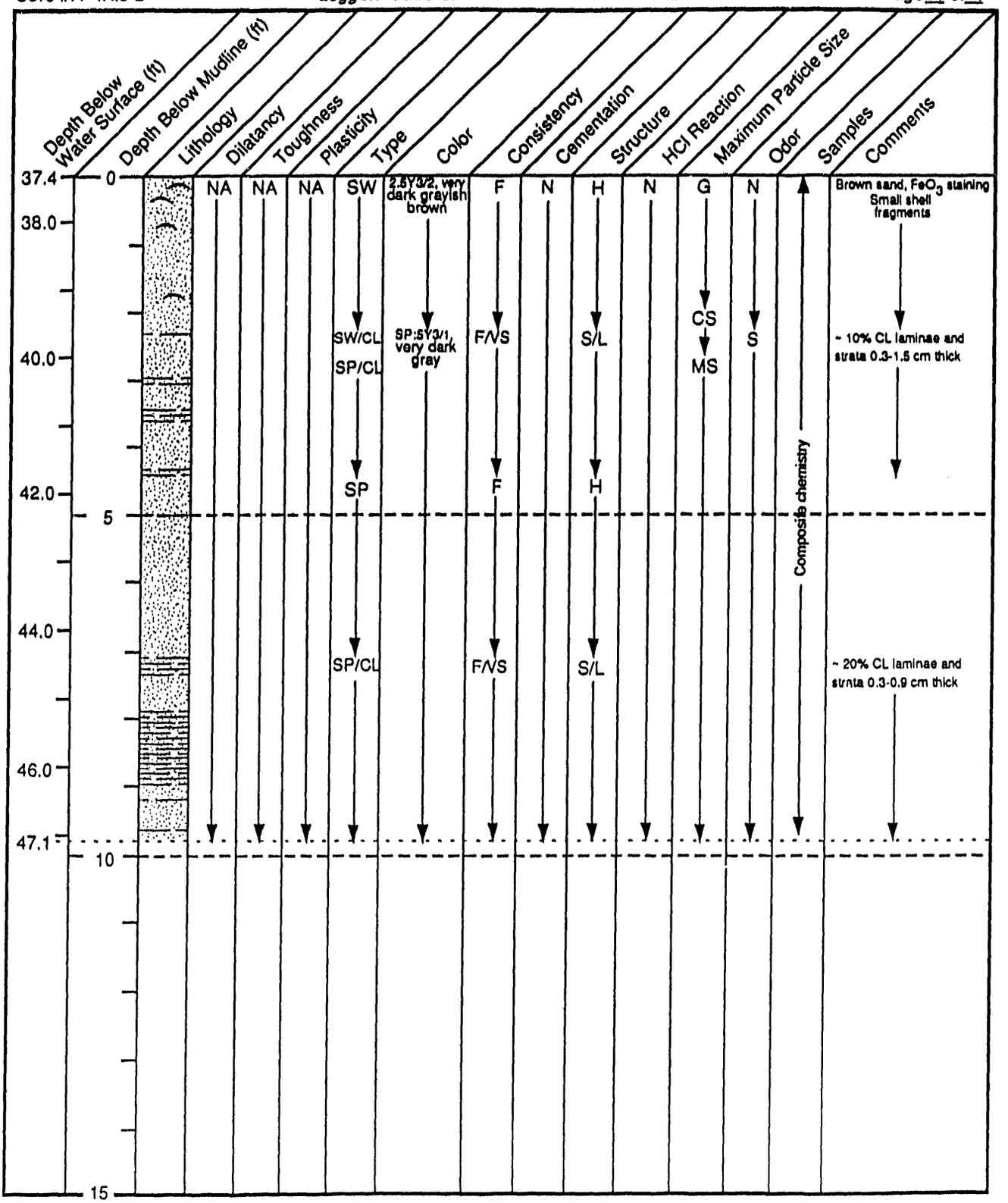

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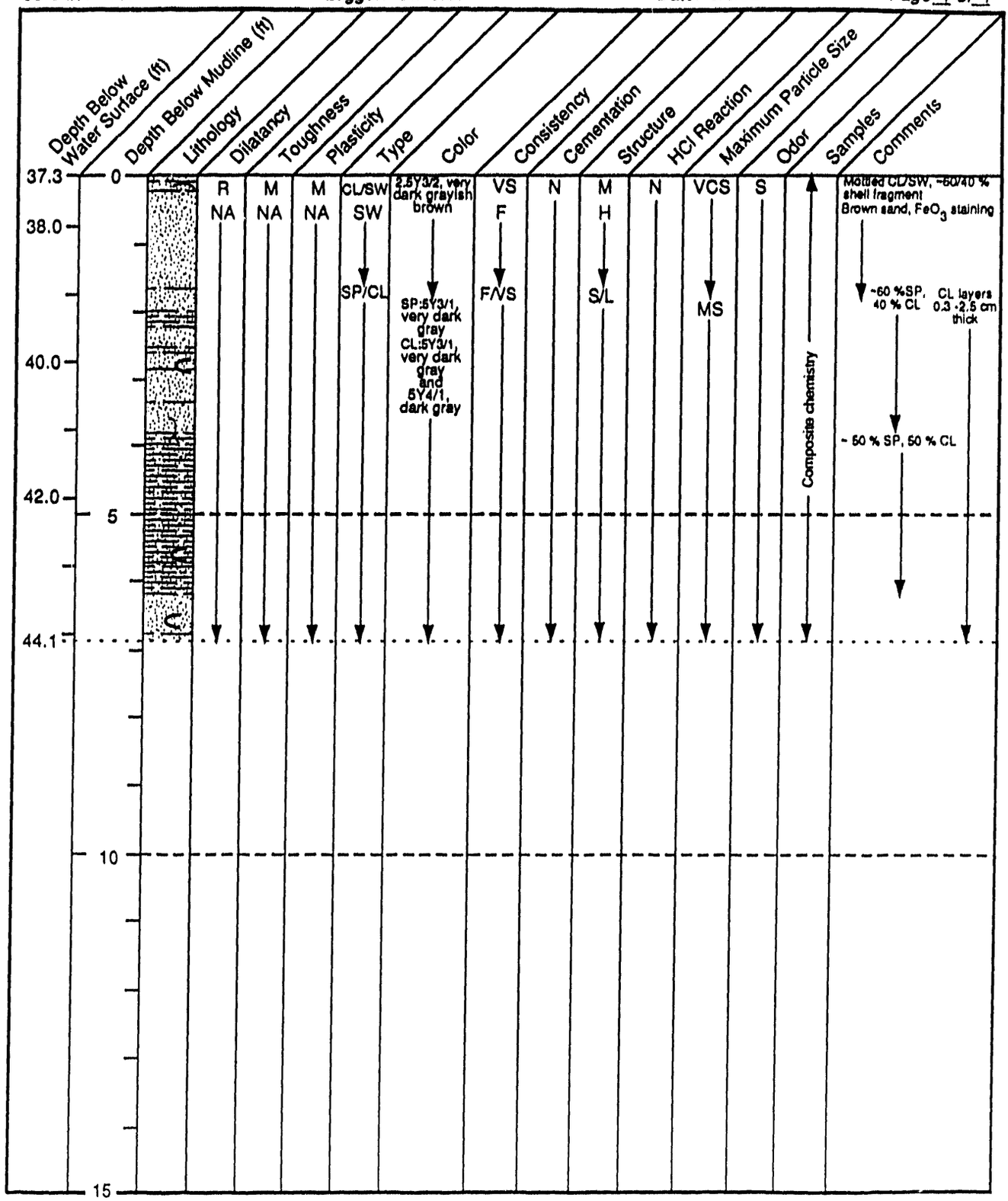
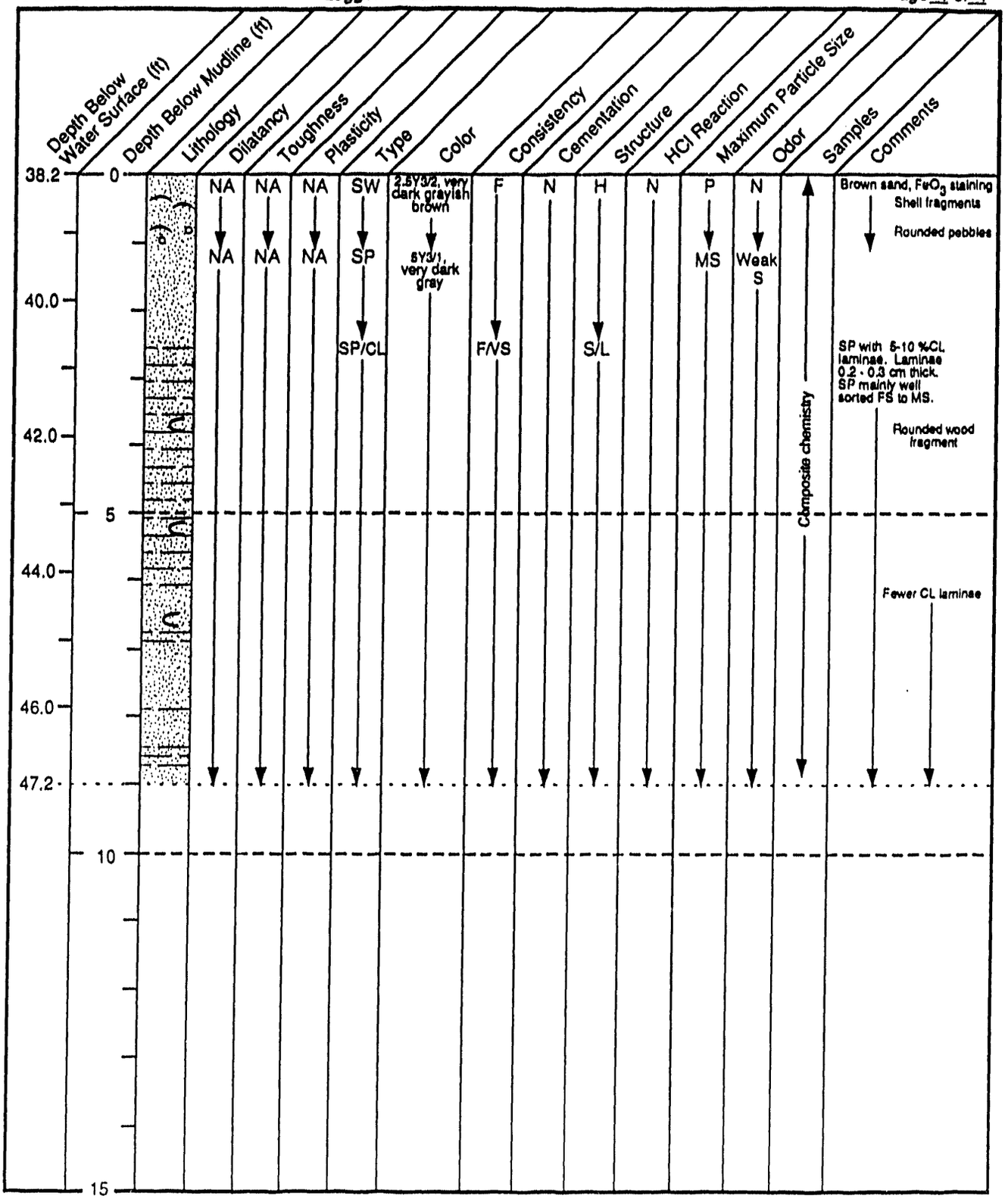


Core Data Log

Project: J. F. Baldwin III

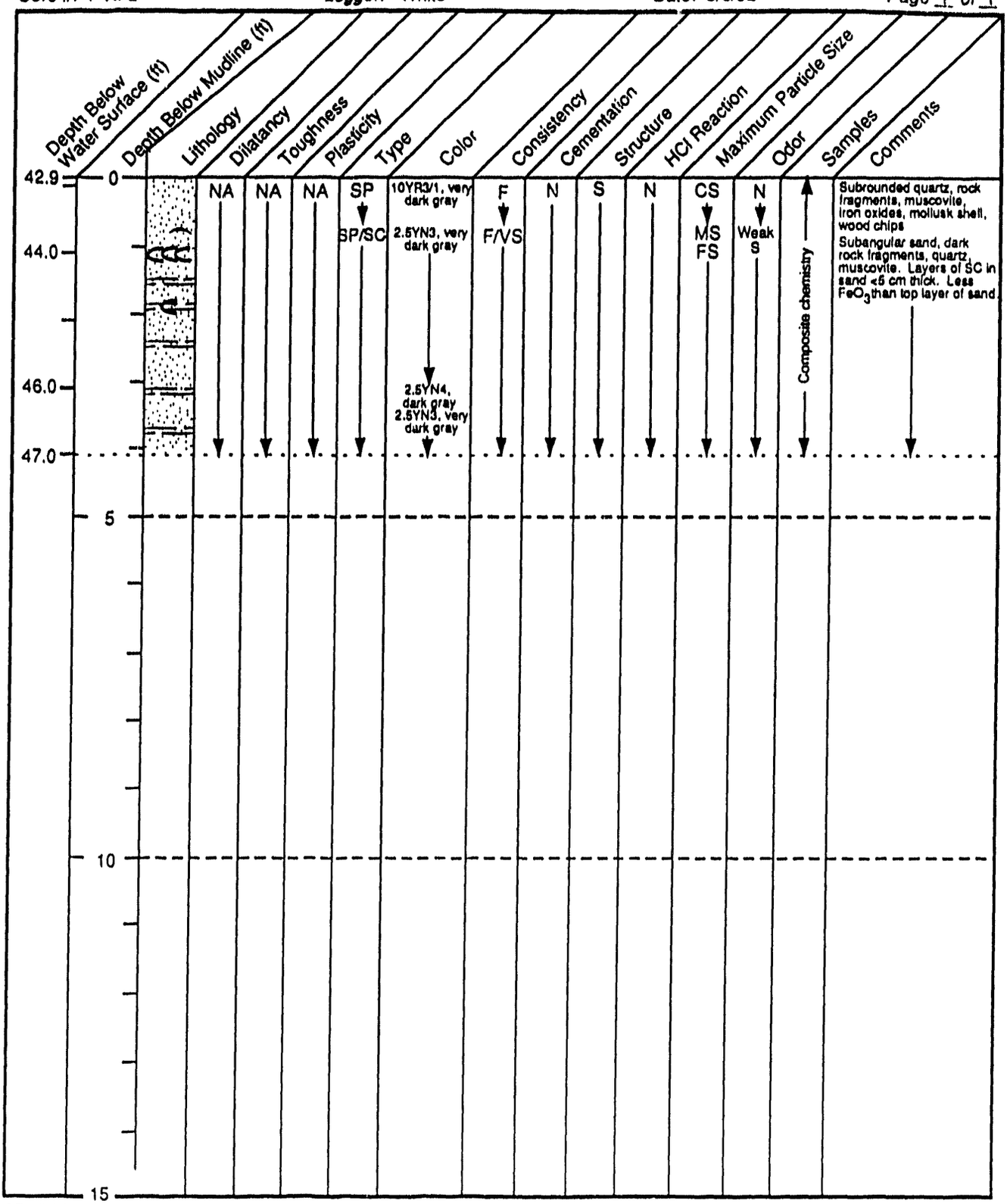
Core #: P X.5 C *Logger:* Cadoret *Date:* 5/6/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

Core #: P XI L *Logger:* White *Date:* 5/6/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

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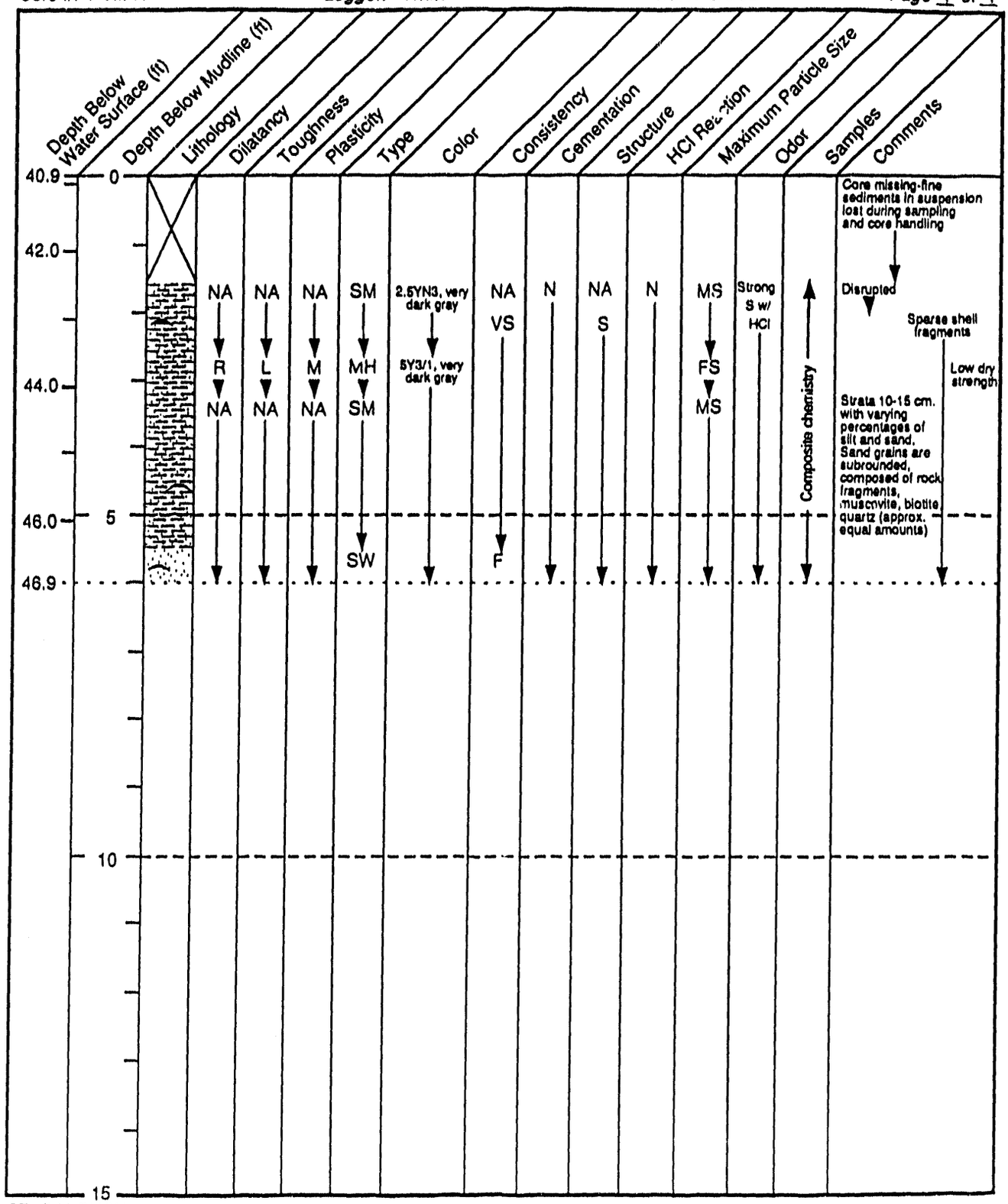
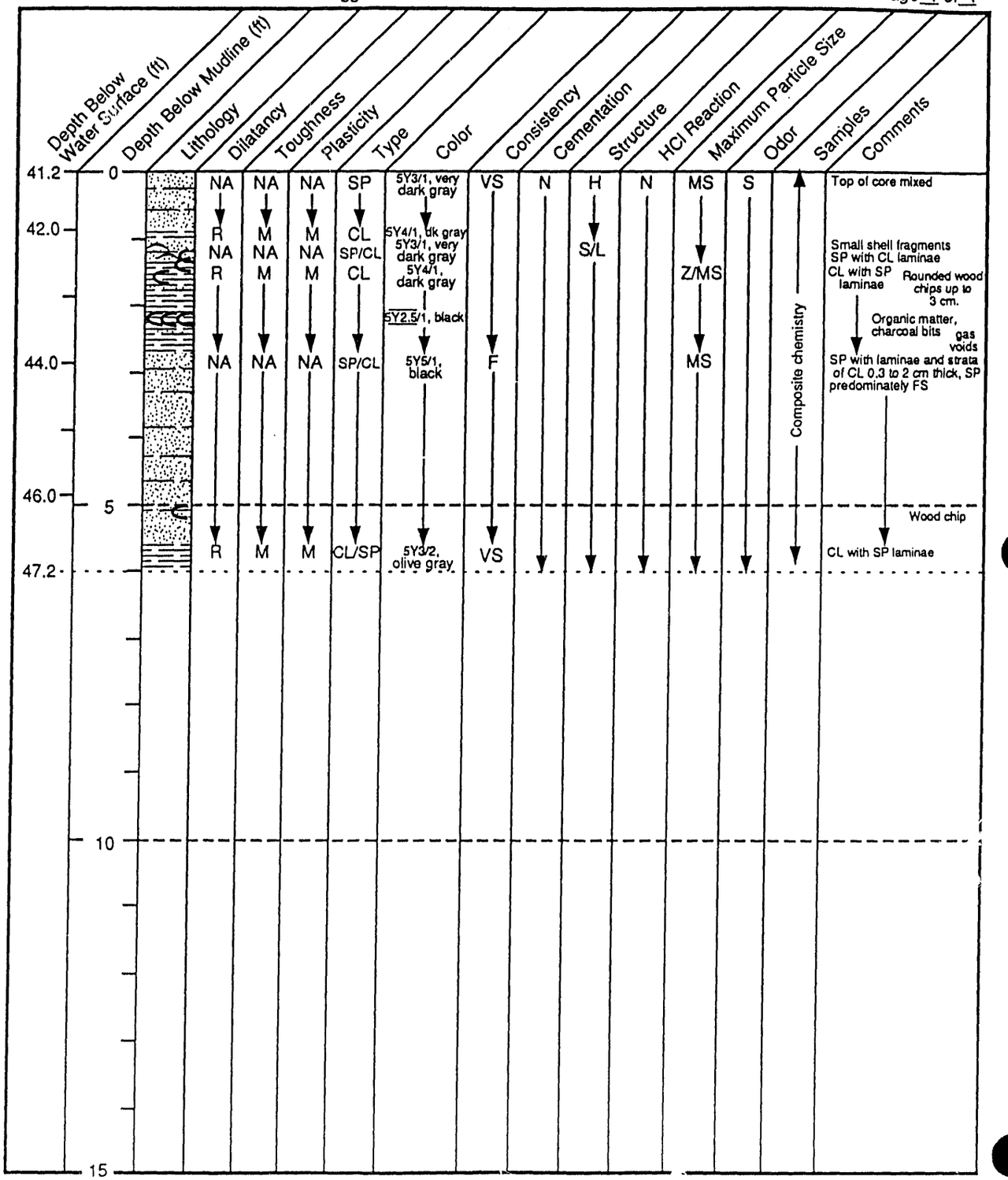


Core Data Log

Project: J. F. Baldwin III

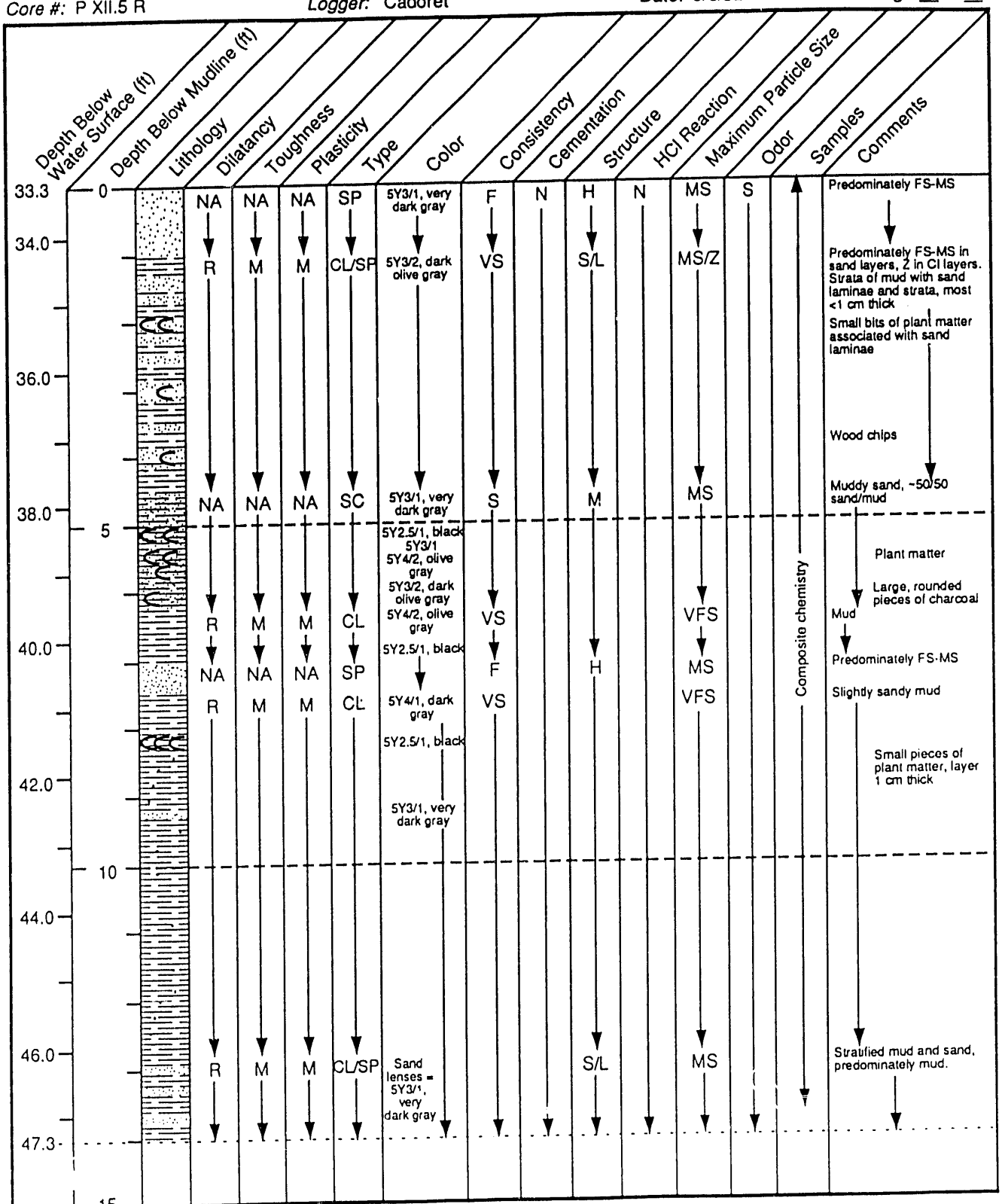
Core #: P XII RR *Logger:* Cadoret *Date:* 5/6/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

Core #: P XII.5 R *Logger:* Cadoret *Date:* 5/6/92 *Page* 1 *of* 1

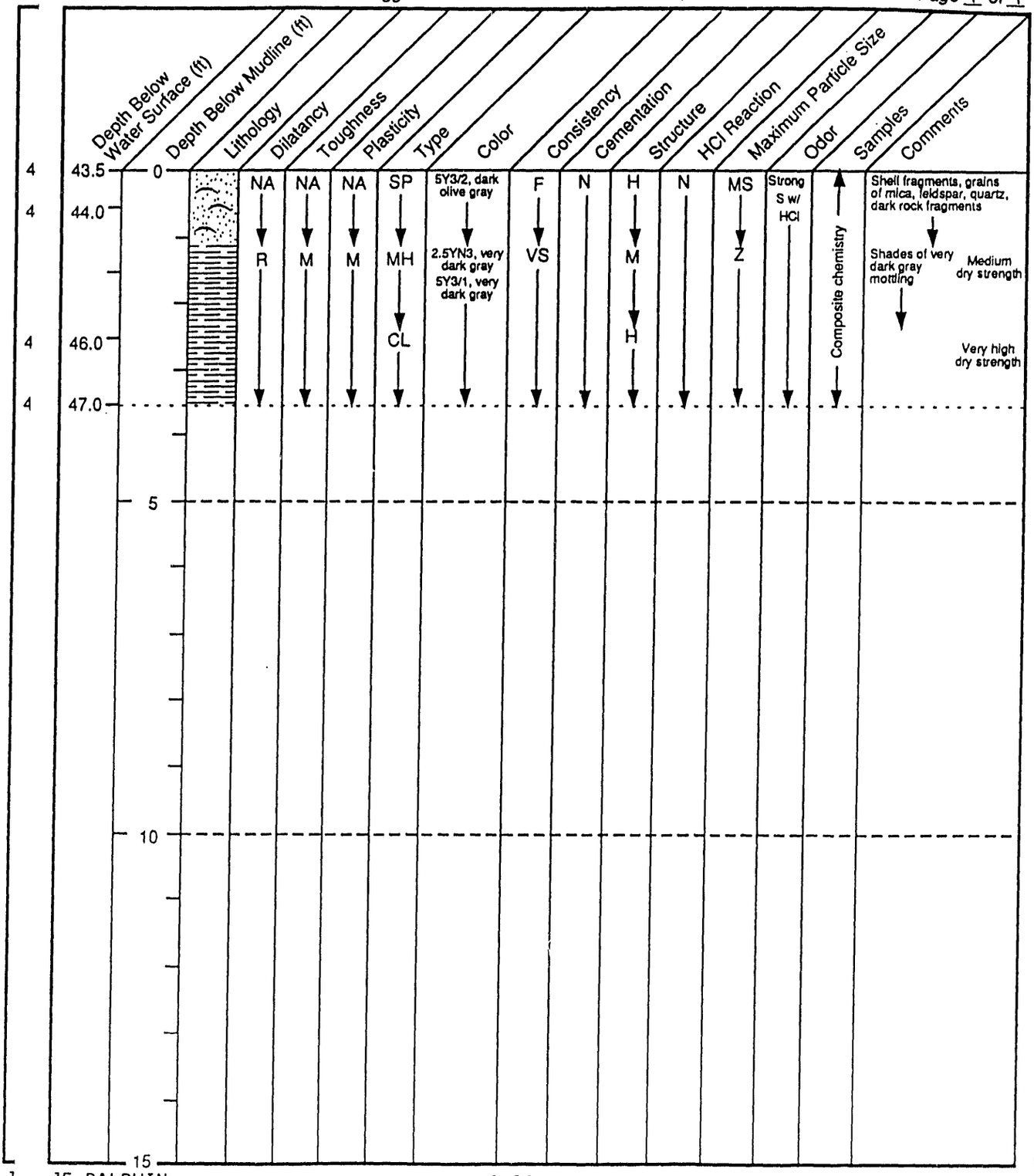


JF BALDWIN

Core Data Log

Project: J. F. Baldwin III

Core #: P XII.5 C *Logger:* White *Date:* 5/5/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

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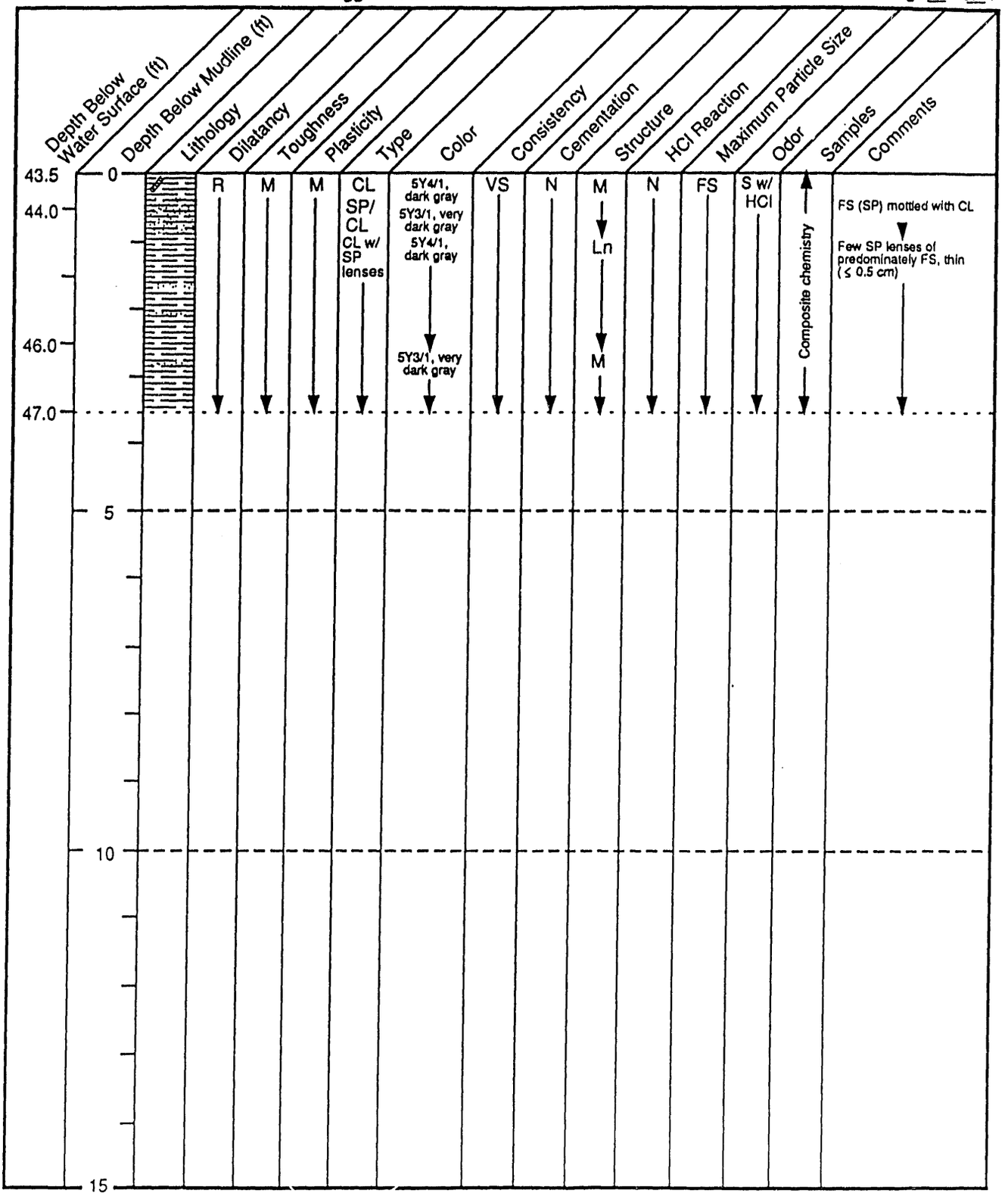

Core Data Log

Project: J. F. Baldwin III

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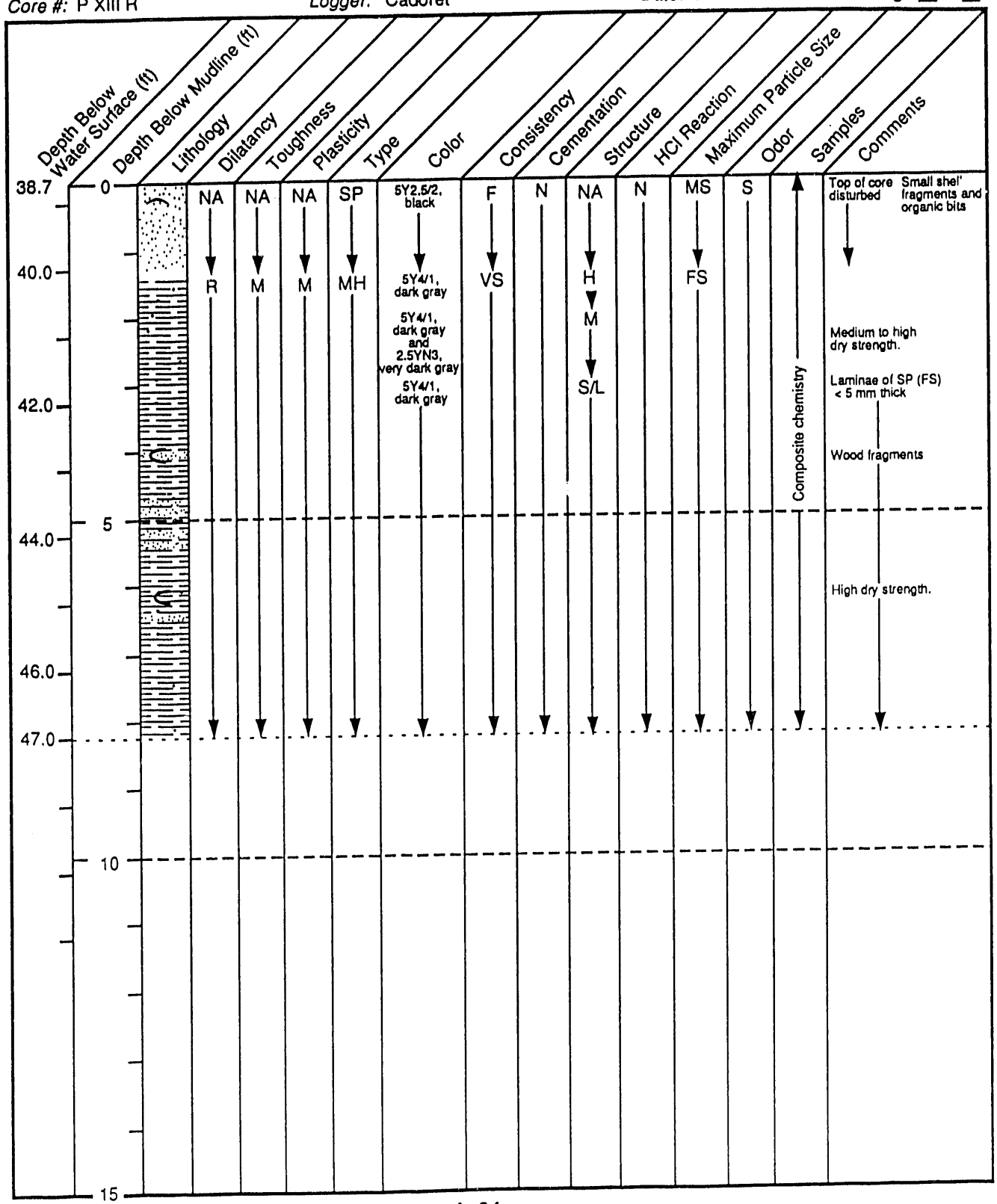
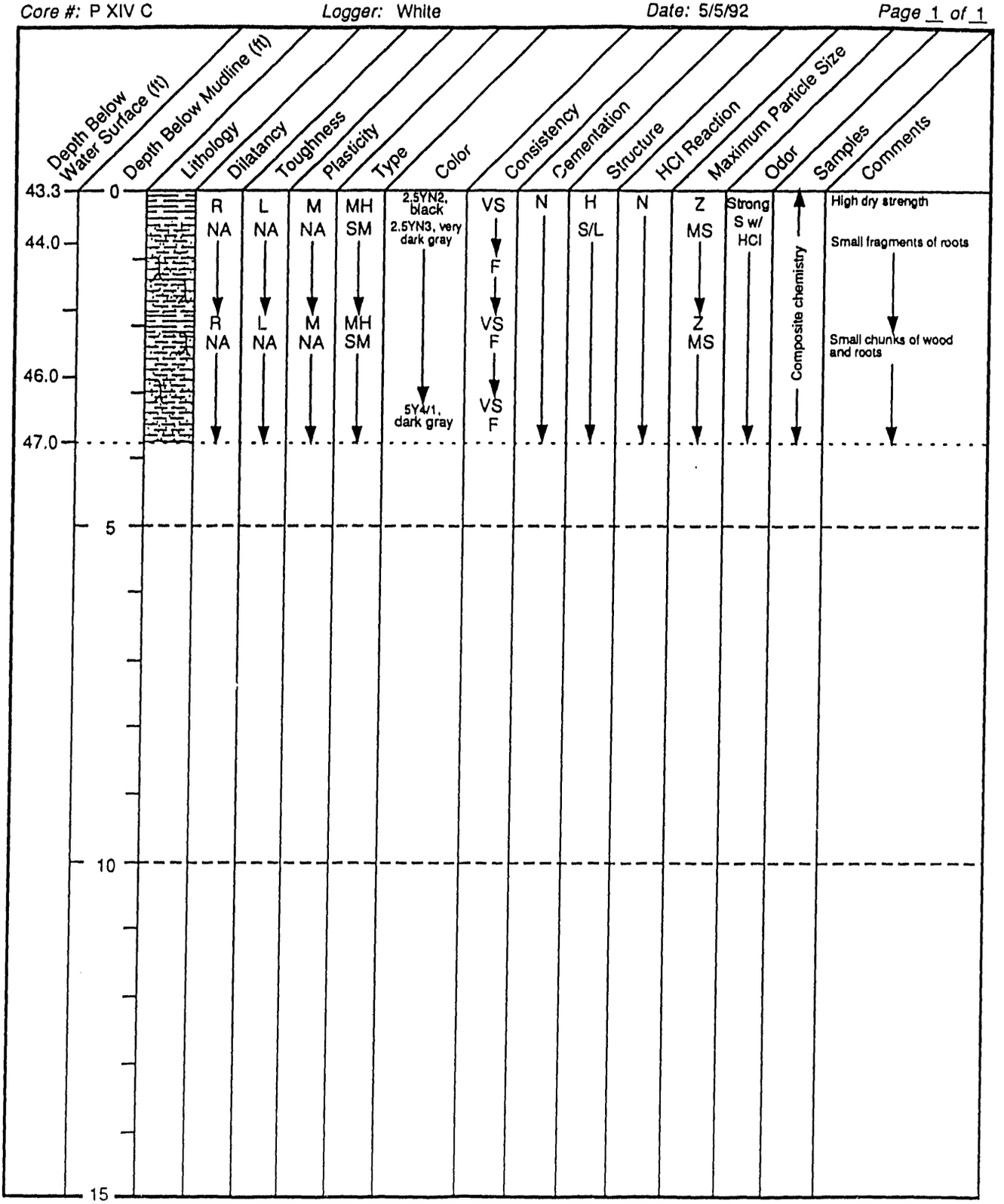


Core Data Log

Project: J. F. Baldwin III

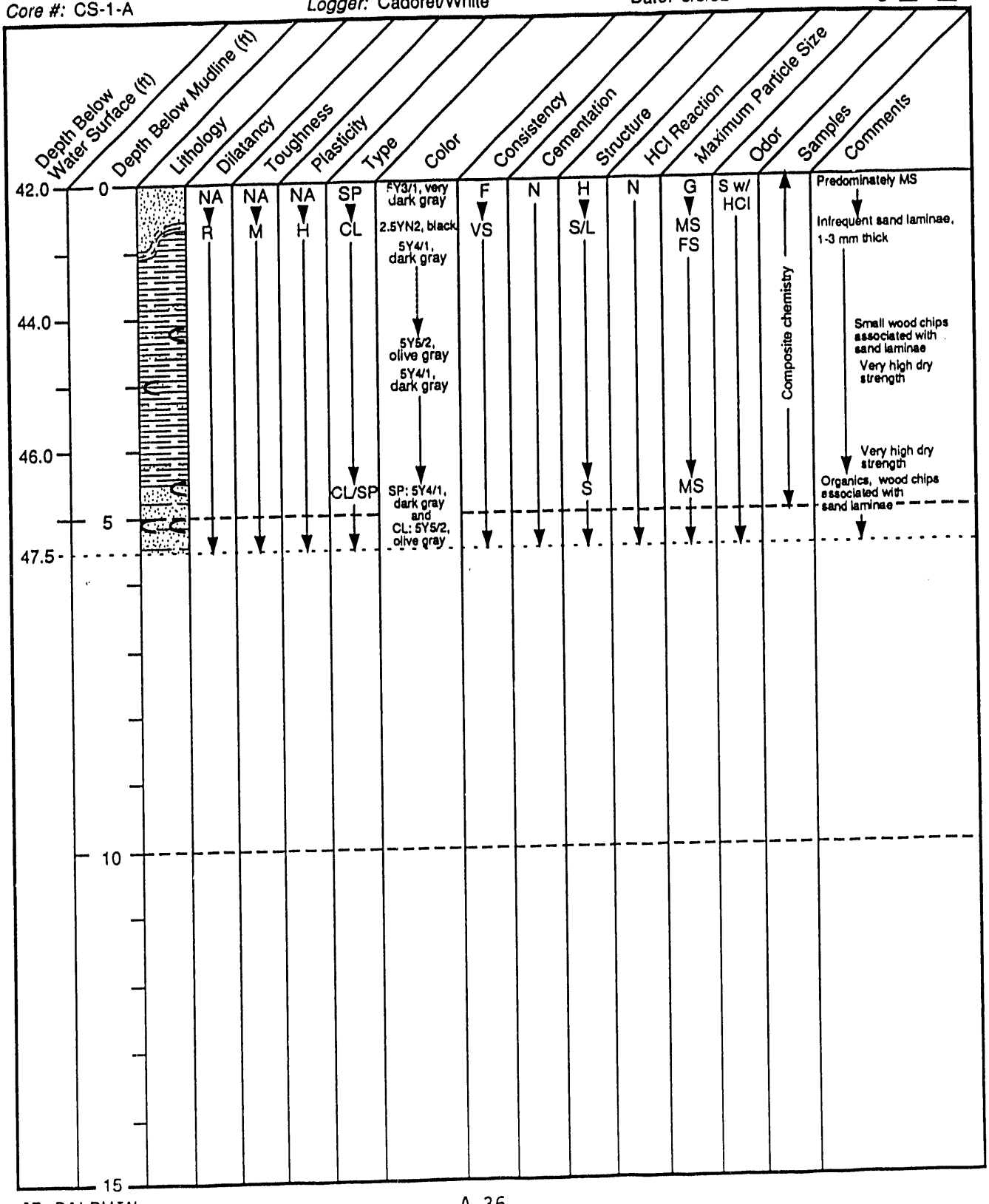
Core #: P XIV C *Logger:* White *Date:* 5/5/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

Core #: CS-1-A *Logger:* Cadoret/White *Date:* 5/5/92 *Page__ of_1*

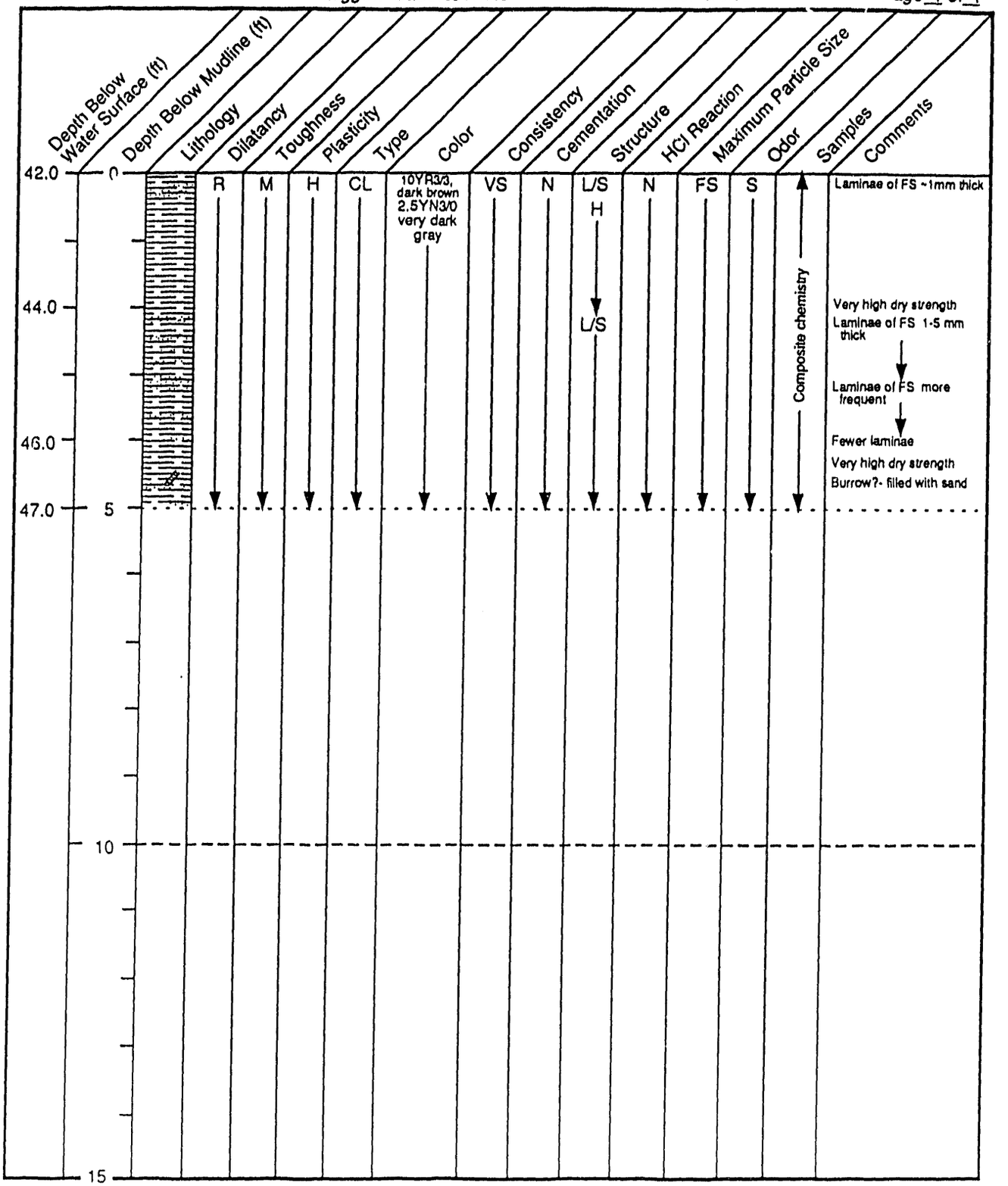


JF BALDWIN

Core Data Log

Project: J. F. Baldwin III

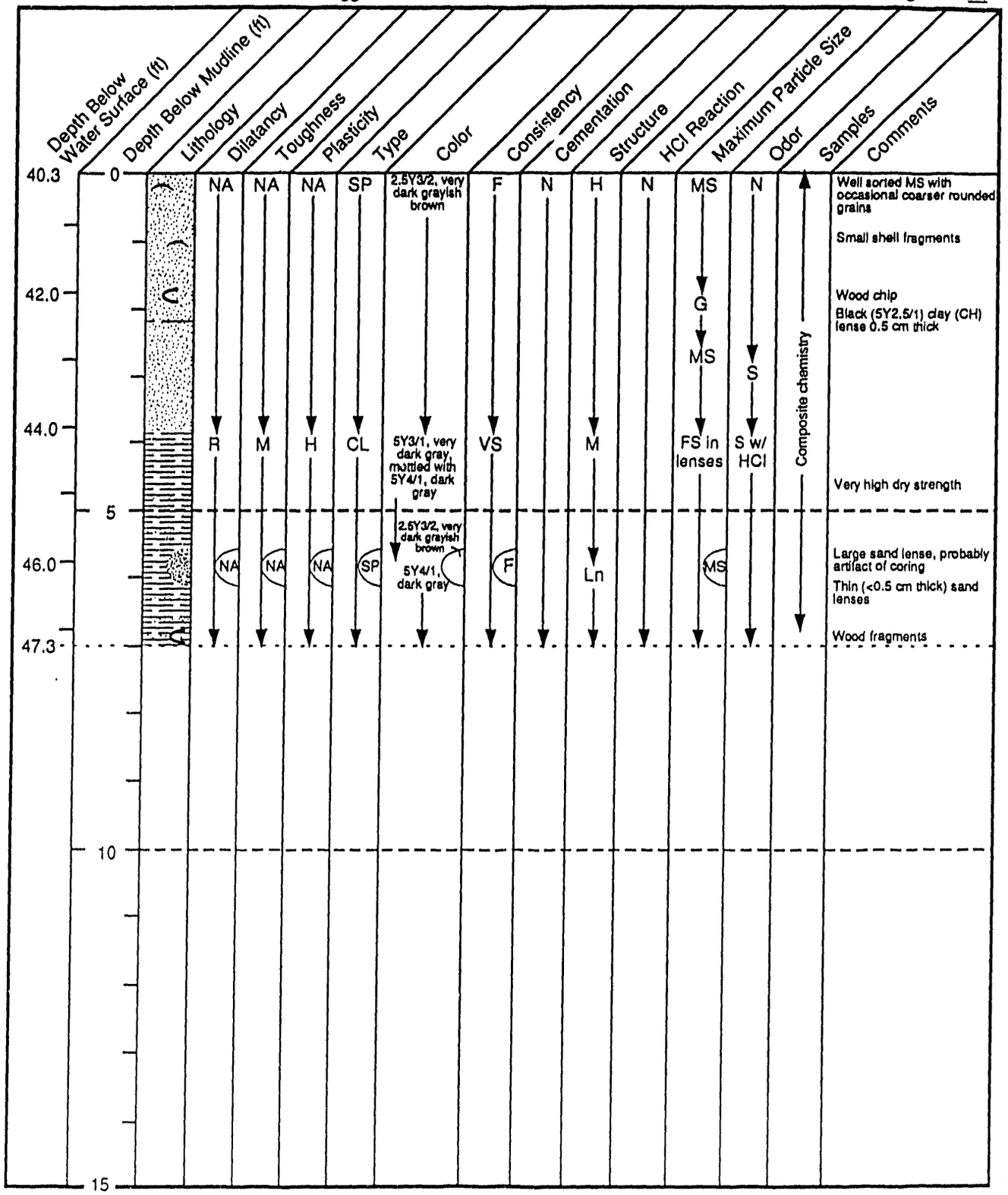
Core #: CS-1-B *Logger:* Cadoret/White *Date:* 5/5/92 *Page* 1 *of* 1



Core Data Log

Project: J. F. Baldwin III

Core #: CS-1-C *Logger:* Cadoret *Date:* 5/5/92 *Page* 1 *of* 1



APPENDIX B

SEDIMENT CHEMISTRY AND QUALITY CONTROL DATA

TABLE B.1. Summary of Sediment Grain Size, Including Quality Control Data, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Percent Dry Weight Gravel µm> 2000	Sand 62.5-2000	Silt 3.9-62.5	Clay < 3.9
COMP WR-1	A	3	68	15	14
WR-1-D	B	3	75	12	10
WR-1-C	C	9	65	15	11
WR-1-B	C	7	59	18	16
WR-1-E	B	2	64	18	16
WR-1-A	C	3	71	15	11
COMP WR-2	A	5	73	11	11
WR II.5 L	C	5	70	13	12
WR-A	C	10	67	14	9
WR II L	C	3	74	13	10
COMP PS-1	A	1	24	42	33
P II C	B	0	7	49	44
P III.5 R Replicate 1	C	0	13	45	42
P III.5 R Replicate 2	C	0	14	43	43
P III.5 R Replicate 3	C	0	14	44	42
P IV R	B	0	31	39	30
COMP PS-2 Replicate 1	A	0	53	26	21
COMP PS-2 Replicate 2	A	0	53	26	21
COMP PS-2 Replicate 3	A	0	53	25	22
P V L	B	0	15	45	40
P V R	B	0	35	35	30
P V.5 C	C	0	44	30	26
P VI L	B	0	21	42	37
P VI R	B	0	45	30	25
P VI.5 C	C	0	65	19	16
P VII C	C	0	38	32	30
P VII.5 C	C	0	47	31	22
P VIII L	C	0	60	20	20
P VIII R	B	0	64	19	17
COMP PS-3	A	0	85	7	8
P VIII.5 C	C	0	68	17	15
P IX C	B	0	83	9	8
P IX.5 L	B	0	89	6	5
P X R	B	0	83	8	9
P X.5 C	B	1	86	8	5

TABLE B.1. (contd)

Sediment Treatment	Batch	Percent Dry Weight Gravel µm> 2000	Sand 62.5-2000	Silt 3.9-62.5	Clay < 3.9
COMP PS-4	A	0	42	29	29
P XI L	B	1	73	14	12
P XII RR	B	0	62	19	19
P XII R Replicate 1	B	0	63	18	19
P XII R Replicate 2	B	0	63	18	19
P XII R Replicate 3	B	0	63	17	20
P XII.5 R	B	0	28	34	38
P XII.5 C	B	0	26	38	36
P XIII R	A	0	22	39	39
P XIII L	A	0	9	41	50
P XIV C	A	0	60	18	22
COMP CS-1	A	1	62	17	20
CS-1-A	A	0	32	32	36
CS-1-B	A	0	11	34	55
CS-1-C	A	0	75	13	12
R-BF	A	0	4	54	42
R-OS	A	0	50	29	21
C-SB	A	0	13	49	38
C-NE	A	0	99	1	0
C-WB	A	0	99	0	1
Quality Control Summary					
COMP PS-2 Replicate 1	A	0	53	26	21
COMP PS-2 Replicate 2	A	0	53	26	21
COMP PS-2 Replicate 3	A	0	53	25	22
RSD		0%	0%	2%	3%
P XII R Replicate 1	B	0	63	18	19
P XII R Replicate 2	B	0	63	18	19
P XII R Replicate 3	B	0	63	17	20
RSD		0%	0%	3%	3%
P III.5 R Replicate 1	C	0	13	45	42
P III.5 R Replicate 2	C	0	14	43	43
P III.5 R Replicate 3	C	0	14	44	42
RSD		0%	4%	2%	1%

TABLE B.2. Sediment Grain Size Analysis, Dry Weight, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	phi / mm >	Percent in Size Fraction (dry weight)															
			4750	4750-2000	2000-850	850-425	425-250	250-106	106-75	75-62.5	4 62.5-31.2	5 31.2-15.6	6 15.6-7.8	7 7.8-3.9	8 3.9-1.9	9 1.9-0.9	10 0.9-0.4	11 <0.4
COMP WR-1	1		1	2	5	7	20	34	2	0	4	5	4	2	2	2	2	6
WR-1-D	2		1	2	5	9	20	40	1	0	2	5	3	2	2	1	2	4
WR-1-C	3		5	4	11	14	15	24	1	0	4	5	3	3	2	2	1	5
WR-1-B	3		4	3	6	5	19	27	1	1	5	6	4	3	3	3	2	7
WR-1-E	2		0	2	5	5	17	34	2	1	5	6	4	3	3	3	4	5
WR-1-A	3		0	3	4	3	18	44	2	0	4	5	3	3	2	1	2	5
COMP WR-2	1		2	3	5	5	18	43	2	0	3	4	2	2	2	2	1	4
WR II.5 L	3		2	3	4	5	19	40	2	0	3	5	3	2	2	2	2	4
WR-A	3		6	4	7	5	16	37	1	1	4	4	3	3	1	2	2	4
WR II L	3		0	3	2	3	17	49	2	1	3	4	4	2	2	1	2	4
COMP PS-1	1		1	0	0	1	3	16	3	1	8	15	11	8	6	5	5	15
P II C	2		0	0	0	1	1	3	1	1	10	16	14	9	8	7	8	17
P III.5 R Replicate 1	3		0	0	0	0	2	8	2	1	8	16	13	8	6	6	5	16
P III.5 R Replicate 2	3		0	0	0	1	1	8	3	1	6	16	13	8	6	6	6	16
P III.5 R Replicate 3	3		0	0	0	1	1	9	2	1	7	16	13	8	6	4	7	17
P IV R	2		0	0	0	1	3	22	3	2	9	14	10	6	7	5	14	3
COMP PS-2 Replicate 1	1		0	0	0	1	6	40	5	1	6	8	6	6	4	4	3	9
COMP PS-2 Replicate 2	1		0	0	1	1	5	40	5	1	6	8	6	6	4	3	4	9
COMP PS-2 Replicate 3	1		0	0	1	0	6	40	5	1	6	7	6	6	4	4	3	8
P V L	2		0	0	0	0	1	10	3	1	10	14	12	9	8	8	7	16
P V R	2		0	0	0	1	2	26	4	2	8	11	10	6	6	5	5	10
P V.5 C	3		0	0	0	1	5	35	2	1	6	9	8	7	5	5	4	12
P VI L	2		0	0	0	0	2	13	4	2	8	14	12	8	8	6	6	14
P VI R	2		0	0	0	2	4	32	5	2	6	10	8	6	5	4	5	10
P VI.5 C	3		0	0	0	1	5	53	4	2	5	5	5	4	4	3	3	3
P VII C	3		0	0	0	1	4	25	6	2	7	10	8	7	7	5	5	8
P VII.5 C	3		0	0	0	1	6	33	5	2	7	10	8	6	5	4	4	8
P VIII L	3		0	0	0	10	5	41	3	1	4	6	5	5	4	4	4	5
P VIII R	2		0	0	0	2	9	48	4	1	5	5	4	5	3	4	3	5
COMP PS-3	1		0	0	1	3	16	62	2	1	2	2	2	1	2	1	1	3
P VIII.5 C	3		0	0	0	2	7	53	5	1	4	5	4	4	3	3	3	5
P IX C	2		0	0	0	3	19	57	3	1	2	3	2	2	2	2	1	2
P IX.5 L	2		0	0	0	2	18	66	3	0	2	2	1	1	1	1	1	1
P X R	2		0	0	0	2	11	67	3	0	1	2	3	2	2	2	1	3
P X.5 C	2		0	1	1	6	11	65	2	1	2	2	2	2	1	1	1	1

TABLE B.2. (contd)

Sediment Treatment	Batch	phi / µm >	Percent in Size Fraction (dry weight)															
			4750	4750-2000	2000-850	850-425	425-250	250-106	106-75	75-62.5	4 62.5-31.2	5 31.2-15.6	6 15.6-7.8	7 7.8-3.9	8 3.9-1.9	9 1.9-0.9	10 0.9-0.4	11 <0.4
COMP PS-4	1		0	0	1	1	6	27	4	3	6	6	8	9	7	6	4	11
P XI L	2		0	1	1	4	9	56	3	0	2	4	4	4	3	2	2	4
P XII RR	2		0	0	0	1	3	52	5	1	4	5	6	4	5	3	3	5
P XII R Replicate 1	2		0	0	0	1	6	52	3	1	4	5	4	5	5	3	3	8
P XII R Replicate 2	2		0	0	1	0	6	52	3	1	4	4	5	5	4	4	3	7
P XII R Replicate 3	2		0	0	1	0	6	52	3	1	4	4	5	4	5	4	3	7
P XII.5 R	2		0	0	0	0	1	20	5	2	6	8	9	11	8	7	6	12
P XII.5 C	2		0	0	1	0	5	12	5	3	10	9	10	9	9	6	6	12
P XIII R	1		0	0	0	0	3	9	7	3	10	9	9	11	9	6	5	14
P XIII L	1		0	0	0	0	0	2	4	3	6	10	12	13	12	8	7	15
P XIV C	1		0	0	0	1	5	49	4	1	2	4	6	6	5	5	3	7
COMP CS-1	1		0	1	0	6	31	21	3	1	2	5	4	6	5	4	4	7
CS-1-A	1		0	0	0	1	7	18	4	2	6	8	3	15	9	7	5	11
CS-1-B	1		0	0	0	0	0	8	2	1	3	7	12	12	12	11	9	20
CS-1-C	1		0	0	1	5	38	28	2	1	3	3	4	3	3	2	2	3
R-BF	1		0	0	0	0	1	1	1	1	13	18	10	13	14	16	7	2
R-OS	1		0	0	1	2	4	12	20	11	17	6	3	3	2	3	2	4
C-SB	1		0	0	0	2	2	4	3	2	9	14	14	12	10	8	5	8
C-NE	1		0	0	0	2	29	68	0	0	1	0	0	0	0	0	0	0
C-WB	1		0	0	0	4	42	52	1	0	0	0	0	0	0	0	0	0

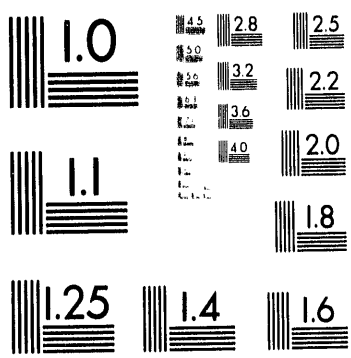

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TABLE B.3. Quality Control Data for Grain Size Analysis, Dry Weight, John B. Baldwin Ship Channel Program

Sediment Treatment	Batch	phi:	Percent in Size Fraction (dry weight)														
		μm:>	4750	4750-2000	2000-850	850-425	425-250	250-106	106-75	75-62.5	4 62.5-31.2	5 31.2-15.6	6 15.6-7.8	7 7.8-3.9	8 3.9-1.9	9 1.9-0.9	10 0.9-0.4	11 <0.4
COMP PS-2 Replicate 1	A		0	0	0	1	6	40	5	1	6	8	6	6	4	4	3	9
COMP PS-2 Replicate 2	A		0	0	1	1	5	40	5	1	6	8	6	6	4	3	4	9
COMP PS-2 Replicate 3	A		0	0	1	0	6	40	5	1	6	7	6	6	4	4	3	8
RSD			0%	0%	87%(a)	87%(a)	10%	0%	0%	0%	0%	8%	0%	0%	0%	16%	17%	7%
P XII R Replicate 1	B		0	0	0	1	6	52	3	1	4	5	4	5	5	3	3	8
P XII R Replicate 2	B		0	0	1	0	6	52	3	1	4	4	5	5	4	4	3	7
P XII R Replicate 3	B		0	0	1	0	6	52	3	1	4	4	5	4	5	4	3	7
RSD			0%	0%	87%(a)	173%(a)	0%	0%	0%	0%	0%	13%	12%	12%	12%	16%	0%	8%
P III.5 R Replicate 1	C		0	0	0	0	2	8	2	1	8	16	13	8	6	6	5	16
P III.5 R Replicate 2	C		0	0	0	1	1	8	3	1	6	16	13	8	6	6	6	16
P III.5 R Replicate 3	C		0	0	0	1	1	9	2	1	7	16	13	8	6	4	7	17
RSD			0%	0%	0%	87%(a)	43%(a)	7%	25%(a)	0%	14%	0%	0%	0%	0%	22%(a)	17%	4%

(a) RSD exceeds quality control target range of ≤20% because values are so low. Precision between measurements is very good.

TABLE B.4. Sediment Total Organic Carbon (TOC) and Total Volatile Solids (TVS), John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	TOC (percent dry weight)	TVS (percent dry weight)
Target DL[a]		0.1	0.1
Achieved DL		0.01	0.1
COMP WR-1	A	0.33	3.58
WR-1-D Replicate 1	C	0.40	3.21
WR-1-D Replicate 2	C	0.44	3.09
WR-1-D Replicate 3	C	0.38	3.03
WR-1-C	C	0.64	3.03
WR-1-B	C	0.61	4.06
WR-1-E	C	0.52	3.69
WR-1-A	C	0.56	3.39
COMP WR-2	A	0.60	3.31
WR II.5 L	C	0.45	3.10
WR-A	C	0.58	3.34
WR II L	C	0.45	2.71
COMP PS-1	A	0.90	5.50
P II C	B	1.14	6.12
P III.5 R	C	0.89	4.95
P IV R	C	0.86	5.04
COMP PS-2	A	0.62	4.18
P V L	B	1.04	5.94
P V R	B	0.76	4.16
P V.5 C	C	0.76	4.46
P VI L	B	0.86	5.43
P VI R	C	0.70	4.01
P VI.5 C	C	0.32	3.42
P VII C	C	0.78	4.66
P VII.5 C	C	0.66	3.90
P VIII L	C	0.63	4.07
P VIII R	C	0.54	3.53
COMP PS-3	A	0.20	2.26
P VIII.5 C	C	0.39	2.87
P IX C	C	0.29	2.33
P IX.5 L	B	0.16	1.55
P X R	B	0.22	2.32
P X.5 C	B	0.18	2.10
COMP PS-4	A	0.48	5.58
P XI L	B	0.36	2.55
P XII RR	B	0.37	3.65
P XII R	B	0.34	3.86
P XII.5 R	B	0.74	6.17

TABLE B.4. (contd)

S T	Sediment Treatment	Batch	TOC (percent dry weight)	TVS (percent dry weight)
	P XII.5 C	B	0.39	6.61
	P XIII R	B	0.47	6.62
	P XIII L	A	0.39	7.49
	P XIV C Replicate 1	B	0.64	4.18
	P XIV C Replicate 2	B	0.61	4.58
	P XIV C Replicate 3	B	0.60	4.55
C	COMP CS-1	A	0.42	4.09
	CS-1-A	A	0.42	6.20
	CS-1-B	A	0.74	7.99
	CS-1-C	B	0.15	2.56
F	R-BF	A	1.10	7.60
F	R-OS Replicate 1	A	0.76	3.40
F	R-OS Replicate 2	A	0.76	3.45
F	R-OS Replicate 3	A	0.73	3.91
(	C-SB	A	2.41	7.82
(	C-NE	A	0.06	0.88
(	C-WB	A	0.05	0.83

(a) DL Detection limit.

TABLE B.5. Quality Control Data for Total Organic Carbon (TOC) and Total Volatile Solids (TVS) in Sediment, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	TOC (percent dry weight)	TVS (percent dry weight)
Method Blank			
Blank	A	0.006	NA[a]
Blank	B	0.005	NA
Blank	C	0.006	NA
Blank	D	0.006	NA
Standard Reference Material			
Accepted Value			
MESS-1 Replicate 1		2.16	NA
MESS-1 Replicate 2		2.27	NA
MESS-1 Replicate 3		2.33	NA
Analytical Triplicates			
R-OS Replicate 1	A	0.76	3.4
R-OS Replicate 2	A	0.76	3.45
R-OS Replicate 3	A	0.73	3.91
RSD		2%	8%
P XIV C Replicate 1	B	0.64	4.18
P XIV C Replicate 2	B	0.61	4.58
P XIV C Replicate 3	B	0.60	4.55
RSD		3%	5%
WR-1-D Replicate 1	C	0.40	3.21
WR-1-D Replicate 2	C	0.44	3.09
WR-1-D Replicate 3	C	0.38	3.03
RSD		8%	3%

(a) NA Not applicable.

TABLE B.6. Sediment Results for Oil and Grease and Total Petroleum Hydrocarbons (TPH), Dry Weight, John F. Baldwin Program

Sediment Treatment	Batch	Oil & Grease (mg/kg dry weight)	TPH (mg/kg dry weight)
Target DL[a]		20	20
Achieved DL		12	12
COMP WR-1	A	14 U[b]	14 U
WR-1-D	B	14 U	14 U
WR-1-C	C	19	14 U
WR-1-B	C	18	15 U
WR-1-E	B	24	15 U
WR-1-A	C	17	14 U
COMP WR-2	A	14 U	14 U
WR II.5 L	C	14 U	14 U
WR-A	C	25	14 U
WR II L	C	17	14 U
COMP PS-1	A	24	20
P II C	B	30	19 U
P III.5 R	C	61	20 U
P IV R	C	38	23
COMP PS-2	A	37	29
P V L	B	90	57
P V R	B	63	23
P V.5 C Replicate 1	C	42	22
P V.5 C Replicate 2	C	50	36
P V.5 C Replicate 3	C	37	25
P VI L	B	60	27
P VI R	B	59	30
P VI.5 C	C	47	26
P VII C	C	72	47
P VII.5 C	C	32	25
P VIII L	C	88	44
P VIII R	B	56	50
COMP PS-3 Replicate 1	A	15	14 U
COMP PS-3 Replicate 2	A	18	14 U
COMP PS-3 Replicate 3	A	18	14 U
P VIII.5 C	C	48	20
P IX C	C	15	13 U
P IX.5 L Replicate 1	B	13 U	13 U
P IX.5 L Replicate 2	B	15	13 U
P IX.5 L Replicate 3	B	13 U	13 U
P X R	B	13 U	13 U
P X.5 C	B	13 U	13 U

TABLE B.6. (contd)

Sediment Treatment	Batch	Oil & Grease (mg/kg dry weight)	TPH (mg/kg dry weight)
COMP PS-4	A	43	24
P XI L	B	14 U	14 U
P XII RR	B	27	14 U
P XII R	A	18	14 U
P XII.5 R	B	135	87
P XII.5 C	B	34	16 U
P XIII R	A	22	17 U
P XIII L	A	22	18 U
P XIV C	A	112	91
COMP CS-1	A	15 U	15 U
CS-1-A	A	38	38
CS-1-B	A	50	21
CS-1-C	A	13 U	13 U
R-BF	A	156	119
R-OS	A	29	17 U
C-SB	A	153	29 U
C-NE	A	12 U	12 U
C-WB	A	12 U	12 U

(a) DL Detection limit.
(b) U Analyte was not present above the level of associated value.

TABLE B.7. Quality Control Summary for Oil and Grease and Total Petroleum Hydrocarbons (TPHs), Dry Weight, in Sediment, John F. Baldwin Program

Sediment Treatment	Batch	Oil & Grease (mg/kg dry weight)	TPH (mg/kg dry weight)
Method Blanks			
Blank[a]	A	15 U[b]	15 U
Blank[a]	A	15 U	15 U
Blank[a]	A	15 U	15 U
Blank[a]	A	15 U	15 U
Matrix Spikes			
C-NE[c]	A	7	7
C-NE MS	A	168	163
Concentration Recovered		161	156
Spike Amount		125	125
Percent Recovery		129%	125%
C-NE[c]	A	7	7
C-NE MSD	A	167	162
Concentration Recovered		160	155
Spike Amount		125	125
Percent Recovery		128%	124%
MS/MSD RPD		1%	1%
MS/MSD I-Stat		0.00	0.00
P VIII R[c]	B	56	50
P VIII R MS	B	234	220
Concentration Recovered		178	170
Spike Amount		148	148
Percent Recovery		120%	114%
P VIII R[c]	B	56	50
P VIII R MSD	B	231	227
Concentration Recovered		175	176
Spike Amount		150	150
Percent Recovery		117%	118%
MS/MSD RPD		3%	3%
MS/MSD I-Stat		0.01	0.02
P IX C[c]	C	15	9
P IX C MS	C	187	193
Concentration Recovered		173	184
Spike Amount		134	134
Percent Recovery		129%	137%

TABLE B.7. (contd)

Sediment Treatment	Batch	Oil & Grease (mg/kg dry weight)	TPH (mg/kg dry weight)
P IX C[c]	C	15	9
P IX C MSD	C	197	208
Concentration Recovered		182	199
Spike Amount		135	135
Percent Recovery		135%	148%
MS/MSD RPD		5%	8%
MS/MSD I-Stat		0.03	0.04
Analytical Replicates			
COMP PS-3 Replicate 1	A	15	14 U
COMP PS-3 Replicate 2	A	18	14 U
COMP PS-3 Replicate 3	A	18	14 U
RSD		9%	NA
P IX.5 L Replicate 1	B	13 U	13 U
P IX.5 L Replicate 2	B	15	13 U
P IX.5 L Replicate 3	B	13 U	13 U
RSD		NA	NA
P V.5 C Replicate 1	C	42	22
P V.5 C Replicate 2	C	50	36
P V.5 C Replicate 3	C	37	25
RSD		15%	27%

(a) Dry weight value converted from wet weight based on average dry weight of all samples in batch.
(b) U Analyte was not present above the level of associated value.
(c) Sample spiked is different aliquot than sample reported in Table B.6.

TABLE B.8. Total Polynuclear Aromatic Hydrocarbons (PAHs), Dry Weight, in Sediment, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Percent Dry Weight	µg/kg dry weight Total LPAHs	Total HPAHs	Total PAHs
COMP WR-1	A	70.75	42	226	269
WR-1-D Replicate 1	B	72.15	6	33	39
WR-1-D Replicate 2	B	72.15	6	24	30
WR-1-D Replicate 3	B	72.15	6	21	26
WR-1-C	C	72.17	7	9	16
WR-1-B	C	66.17	36	217	254
WR-1-E Replicate 1	C	66.43	35	258	293
WR-1-E Replicate 2	C	66.43	54	349	403
WR-1-E Replicate 3	C	66.43	40	265	305
WR-1-A	C	69.75	10	20	30
COMP WR-2	A	73.02	6	19	25
WR II.5 L	C	72.27	8	18	26
WR-A	C	71.11	6	8	14
WR II L	C	72.22	6	9	15
COMP PS-1	A	53.93	15	26	41
P II C	B	52.64	18	28	46
P III.5 R	C	51.17	20	38	58
P IV R	C	55.86	20	38	59
P V L	B	54.25	30	196	225
P V R	B	60.57	20	161	181
P V.5 C	C	64.44	18	66	83
P VI L	B	59.86	21	116	137
P VI R	B	63.13	20	148	169
P VI.5 C	C	68.78	21	174	194
P VII C	C	61.29	45	293	337
P VII.5 C	C	67.72	15	64	79
P VIII L	C	65.79	37	248	284
P VIII R	B	67.43	16	108	124
COMP PS-3	A	74.04	7	101	107
P VIII.5 C	C	68.70	12	75	87
P IX C	C	74.19	6	31	37
P IX.5 L	B	78.65	4	11	15
P X R	B	77.05	8	39	46
P X.5 C	B	76.16	3	9	11
COMP PS-2	A	64.78	17	159	176
COMP PS-4	A	62.43	16	107	123
P XI L	B	73.11	4	26	30
P XII RR	B	70.57	7	36	44
P XII R	B	70.30	9	32	41
P XII.5 R	B	58.36	36	206	243

TABLE B.8. (contd)

Sediment Treatment	Batch	Percent Dry Weight	µg/kg dry weight Total LPAHs	Total HPAHs	Total PAHs
P XII.5 C	B	62.48	11	30	41
P XIII R	B	59.67	11	42	52
P XIII L	A	54.77	8	36	44
P XIV C Replicate 1	A	63.53	54	331	386
P XIV C Replicate 2	A	63.53	36	281	317
P XIV C Replicate 3	A	63.53	34	278	312
COMP CS-1	A	68.63	140	1257	1398
CS-1-A	A	60.79	36	756	792
CS-1-B	A	51.65	52	262	314
CS-1-C	A	79.67	7	49	57
R-BF	A	38.52	256	2346	2601
R-OS	A	58.29	15	45	60
C-SB	A	34.03	106	428	533
C-NE	A	80.99	13	8	21
C-WB	A	81.69	2	3	5

TABLE B.9. Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAHs), Dry Weight, in Sediment, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Percent Dry Weight	Low PAH (ug/kg dry weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Target DL[a]			20	20	20	20	20	20
Achieved Low DL			<0.79	2.05	1.58	1.54	2.64	2.03
Achieved High DL			<0.79	3.16	2.44	1.64	2.64	3.06
COMP WR-1	A	70.75	3.53	1.83 J[b]	1.29 J[c]	3.20	31.35	1.08 J
WR-1-D Replicate 1	B	72.15	1.51	0.24 J	1.82 U	0.68 J	3.43	0.44 J
WR-1-D Replicate 2	B	72.15	1.40	2.38 U	1.83 U	0.64 J	3.31	0.32 J
WR-1-D Replicate 3	B	72.15	1.97	2.38 U	1.84 U	0.67 J	2.69	0.32 J
WR-1-C	C	72.17	1.70	2.36 U	1.81 U	1.02 J	3.64	0.35 J
WR-1-B	C	66.17	8.36	1.79 J	1.71 J	2.18	18.84	3.53
WR-1-E Replicate 1	C	66.43	6.33	2.07 J	1.89 J	2.24	18.16	4.13
WR-1-E Replicate 2	C	66.43	6.24	3.18	2.60	3.20	30.07	8.57
WR-1-E Replicate 3	C	66.43	5.73	3.00	1.83 J	2.41	22.65	4.82
WR-1-A	C	69.75	2.27	2.40 U	1.85 U	1.30 J	5.80	0.75 J
COMP WR-2	A	73.02	1.31	0.07 J	0.20 J	0.92 J	3.87	0.11 J
WR II.5 L	C	72.27	1.51	0.19 J	0.23 J	0.88 J	4.47	0.50 J
WR-A	C	71.11	1.33	2.36 U	1.82 U	0.91 J	3.90	0.29 J
WR II L	C	72.22	1.24	2.39 U	1.84 U	0.92 J	3.45	0.37 J
COMP PS-1	A	53.93	3.25	3.16 U	2.44 U	3.18	8.17	3.06 U
P II C	B	52.64	3.44	3.15 U	2.43 U	4.75	9.00	0.79 J
P III.5 R	C	51.17	3.30	0.30 J	0.63 J	3.53	10.53	1.50 J
P IV R	C	55.86	2.83	2.94 U	0.62 J	2.62	6.86	1.15 J
P V L	B	54.25	6.07	1.43 J	1.18 J	4.19	13.83	3.12
P V R	B	60.57	4.02	1.08 J	0.76 J	3.02	9.47	1.83 J
P V.5 C	C	64.44	2.85	0.49 J	0.73 J	2.61	8.46	2.44 J
P VI L	B	59.86	4.02	0.89 J	0.92 J	3.63	9.70	2.03 J
P VI R	B	63.13	3.73	0.83 J	1.14 J	2.87	10.28	1.53 J
P VI.5 C	C	68.78	4.15	1.20 J	0.84 J	2.28	9.60	2.59
P VII C	C	61.29	6.53	3.20	1.55 J	4.58	21.99	6.94
P VII.5 C	C	67.72	2.72	0.59 J	0.50 J	2.14	7.09	1.62 J
P VIII L	C	65.79	5.78	2.35 J	1.87 J	3.72	17.43	5.42
P VIII R	B	67.43	3.39	0.63 J	0.72 J	2.59	7.13	1.68 J
COMP PS-3	A	74.04	1.49	0.69 J	0.37 J	0.81 J	2.31 J	1.14 J
P VIII.5 C	C	68.70	2.67	0.52 J	0.30 J	1.47 J	5.40	1.69 J
P IX C	C	74.19	1.70	0.19 J	1.69 U	0.67 J	2.85	0.77 J
P IX.5 L	B	78.65	1.23	0.35 J	0.33 J	0.43 J	1.55 J	0.29 J
P X R	B	77.05	3.39	0.34 J	1.64 U	0.61 J	2.55	0.62 J
P X.5 C	B	76.16	0.91	2.12 U	1.63 U	0.39 J	1.21 J	2.05 U
COMP PS-2	A	64.78	3.40	0.72 J	0.64 J	2.42	8.81	0.97 J
COMP PS-4	A	62.43	2.75	0.42 J	1.08 J	3.50	7.68	0.85 J
P XI L	B	73.11	1.43	2.23 U	1.72 U	0.61 J	2.16 J	0.29 J
P XII RR	B	70.57	2.30	2.36 U	1.82 U	1.36 J	3.12	0.64 J
P XII R	B	70.30	2.00	0.27 J	0.55 J	1.84	3.52	0.39 J
P XII.5 R	B	58.36	5.61	1.35 J	1.74 J	6.77	16.78	4.14
P XII.5 C	B	62.48	2.28	0.40 J	0.64 J	2.58	4.65	0.59 J
P XIII R	B	59.67	2.61	0.46 J	0.55 J	2.66	3.77	0.68 J
P XIII L	A	54.77	1.84	0.34 J	0.51 J	1.85 J	3.61	0.23 J
P XIV C Replicate 1	A	63.53	7.20	2.97	2.74	5.54	34.05	1.98 J
P XIV C Replicate 2	A	63.53	7.93	2.96	1.33 J	4.29	16.05	3.45
P XIV C Replicate 3	A	63.53	6.49	2.00 J	1.72 J	5.24	16.79	2.14 J

TABLE B.9. (contd)

Sediment Treatment	Batch	Percent Dry Weight	Low PAH (µg/kg dry weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
COMP CS-1	A	68.63	20.28	9.51	4.93	8.90	93.27	3.40
CS-1-A	A	60.79	6.10	3.43	1.52 J	2.94	19.53	2.79
CS-1-B	A	51.65	6.87	3.21	1.53 J	8.31	30.92	1.04 J
CS-1-C	A	79.67	1.23	0.11 J	0.25 J	1.28	3.08	1.27 J
R-BF	A	38.52	36.67	17.15	8.91	16.38	170.30	6.30
R-OS	A	58.29	2.58	0.29 J	0.43 J	1.63 J	8.77	1.20 J
C-SB	A	34.03	18.61	4.68 J	2.66 J	11.33	58.30	10.26
C-NE	A	80.99	3.44	2.05 U	1.58 U	1.23 J	7.94	0.21 J
C-WB	A	81.69	0.79	2.10 U	1.61 U	0.26 J	0.74 J	2.03 U

(a) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(b) U Analyte was not present above the level of associated value.

TABLE B.10. High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAHs), Dry Weight, in Sediment, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Percent Dry Weight	HPAHs (µg/kg dry weight) Fluoranthene	Pyrene	Benz(a)-Anthracene	Chrysene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzo(a)-pyrene	Indeno (1,2,3-c,d) pyrene	Dibenz(a,h) anthracene	Benzo (g,h,i) perylene
Target DL[a]			20	20	20	20	20	20	20	20	20	20
Achieved Low DL									1.49	3.63	3.22	
Achieved High DL									3.31	5.49	2.09	5.95
COMP WR-1	A	70.75	38.37	50.63	9.20	19.35	20.63	15.35	28.99	19.96	1.71 J[b]	22.04
WR-1-D Replicate 1	B	72.15	4.75	5.72	1.86 J	3.19	3.89	1.96 J	3.70	3.24 J	0.47 J	3.88 J
WR-1-D Replicate 2	B	72.15	3.46 J	4.26	1.26 J	2.34 J	3.13	1.67 J	2.24	2.41 J	0.32 J	2.90 J
WR-1-D Replicate 3	B	72.15	2.68 J	3.55 J	1.14 J	2.05 J	2.55	1.40 J	2.24	2.15 J	0.30 J	2.67 J
WR-1-C	C	72.17	1.13 J	1.36 J	0.53 J	1.34 J	1.75 J	0.34 J	0.48 J	0.67 J	0.21 J	1.41 J
WR-1-B	C	66.17	31.25	42.80	11.74	14.49	26.73	12.03	25.01	24.43	1.99 J	26.96
WR-1-E Replicate 1	C	66.43	34.66	50.46	14.60	15.92	29.73	15.29	26.94	31.84	2.48 J	35.80
WR-1-E Replicate 2	C	66.43	54.23	77.29	20.31	29.45	34.63	17.02	35.56	37.43	2.86	40.57
WR-1-E Replicate 3	C	66.43	38.06	55.19	14.29	16.42	27.15	15.98	27.88	32.19	2.59	35.17
WR-1-A	C	69.75	2.88 J	3.81 J	1.19 J	2.16 J	3.05	0.85 J	1.35 J	1.71 J	0.33 J	2.70 J
COMP WR-2	A	73.02	3.04 J	3.61 J	0.74 J	2.25 J	2.89	1.29 J	1.74 U[c]	1.93 J	0.29 J	2.65 J
WR II.5 L	C	72.27	2.75 J	3.61 J	1.14 J	1.86 J	2.47	0.99 J	1.40 J	1.46 J	0.22 J	2.27 J
WR-A	C	71.11	1.05 J	1.13 J	0.55 J	1.30 J	1.62 J	0.24 J	0.26 J	0.47 J	0.19 J	1.20 J
WR II L	C	72.22	1.31 J	1.35 J	0.55 J	1.33 J	1.60 J	0.24 J	0.37 J	0.61 J	0.21 J	1.35 J
COMP PS-1	A	53.93	7.14	7.37	1.59 J	4.87	2.96 J	2.49 J	2.31 U	5.49 U	3.22 U	5.95 U
P II C	B	52.64	5.26 J	5.26 J	1.35 J	4.70	5.19	0.70 J	0.82 J	1.24 J	0.46 J	3.24 J
P III.5 R	C	51.17	7.16	7.51	1.89 J	4.62	5.44	1.44 J	1.73 J	2.64 J	0.59 J	4.91 J
P IV R	C	55.86	6.95	7.70	2.29 J	5.02	5.36	2.00 J	2.73	2.22 J	2.99 U	4.21 J
P V L	B	54.25	27.47	42.49	9.41	16.16	21.67	10.46	18.22	21.14	2.09 J	26.45
P V R	B	60.57	20.44	31.95	7.56	11.73	17.91	10.09	16.32	19.86	1.66 J	23.26
P V.5 C	C	64.44	9.73	13.66	3.88	6.08	8.58	3.33	5.16	6.37	0.73 J	8.34
P VI L	B	59.86	17.50	24.51	6.38	10.55	13.59	6.95	10.25	11.31	1.32 J	13.81
P VI R	B	63.13	22.67	29.83	6.80	11.38	18.17	7.24	16.02	16.28	1.51 J	18.53
P VI.5 C	C	68.78	24.10	37.85	8.35	10.56	19.38	8.51	17.14	20.85	1.36 J	25.56
P VII C	C	61.29	43.27	62.20	15.93	22.70	30.74	15.06	27.04	32.80	2.56 J	40.24
P VII.5 C	C	67.72	9.52	12.48	3.57	5.38	8.53	2.68 J	4.68	7.06	0.74 J	9.82
P VIII L	C	65.79	38.59	50.91	13.64	17.98	26.72	12.47	24.01	28.43	2.32 J	32.44
P VIII R	B	67.43	15.13	21.64	5.18	9.15	12.09	6.08	11.26	12.10	1.15 J	14.24

TABLE B.10. (contd)

Sediment Treatment	Batch	Percent Dry Weight	HPAHs (µg/kg dry weight) Fluoranthene	Pyrene	Benz(a)-Anthracene	Chrysene	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene	Benzo(a)-pyrene	Indeno (1,2,3-c,d) pyrene	Dibenz(a,h) anthracene	Benzo (g,h,i) perylene
COMP PS-3	A	74.04	3.89 J	6.23	1.77 J	2.61 J	24.77	16.85	19.96	11.69	2.35 J	10.45
P VIII.5 C	C	68.70	9.66	15.72	4.21	5.71	9.26	3.53	6.92	8.14	0.89 J	10.67
P IX C	C	74.19	3.97 J	6.99	1.58 J	2.59 J	3.64	1.62 J	2.72	3.23 J	0.39 J	4.37
P IX.5 L	B	78.65	1.24 J	1.89 J	0.69 J	0.98 J	1.20 J	0.85 J	0.92 J	0.92 J	0.33 J	1.49 J
P X R	B	77.05	4.93	7.41	2.16 J	3.93	5.32	2.49 J	3.11	3.84	0.44 J	4.99
P X.5 C	B	76.16	1.17 J	1.36 J	0.64 J	0.89 J	1.41 J	0.76 J	0.58 J	0.66 J	2.15 U	1.21 J
COMP PS-2	A	64.78	21.09	29.33	5.85	20.38	20.16	11.21	16.51	15.71	1.63 J	17.20
COMP PS-4	A	62.43	18.72	23.78	4.49	9.78	9.92	6.83	10.07	10.20	1.00 J	11.93
P XI L	B	73.11	2.82 J	4.34	1.11 J	2.01 J	3.71	1.64 J	2.60	3.04 J	0.26 J	4.14 J
P XII RR	B	70.57	5.08	8.46	2.71	5.68	3.35	1.45 J	3.08	2.45 J	0.60 J	3.32 J
P XII R	B	70.30	5.97	6.68	1.71 J	2.73 J	3.57	2.09 J	2.56	2.86 J	0.35 J	3.52 J
P XII.5 R	B	58.36	30.64	43.81	12.36	21.55	23.62	10.12	18.28	20.02	2.49 J	23.30
P XII.5 C	B	62.48	6.34	7.19	1.93 J	2.69 J	2.96	1.47 J	1.47 J	2.43 J	0.46 J	2.63 J
P XIII R	B	59.67	7.56	7.52	3.89	3.71 J	4.25	2.84 J	2.65	3.12 J	0.57 J	5.40 J
P XIII L	A	54.77	9.80	7.94	2.29 J	3.85 J	3.93	3.02 J	2.26 U	2.10 J	0.35 J	2.34 J
P XIV C Replicate 1	A	63.53	69.50	89.68	9.44	22.37	31.25	13.00	14.99	36.20	2.35 J	42.33
P XIV C Replicate 2	A	63.53	49.54	70.13	11.17	19.81	26.07	9.13	29.61	29.13	1.71 J	34.34
P XIV C Replicate 3	A	63.53	51.20	70.86	8.58	15.76	22.99	10.83	28.34	31.36	1.85 J	35.93
COMP CS-1	A	68.63	212.93	246.43	37.50	122.75	168.65	110.58	1.83 U	176.42	14.12	167.95
CS-1-A	A	60.79	148.35	225.12	36.86	96.07	85.90	56.52	1.88 U	50.76	4.43	51.73
CS-1-B	A	51.65	75.08	72.86	11.53	29.39	22.22	18.19	2.33 U	16.24	2.07 J	14.10
CS-1-C	A	79.67	17.24	14.02	2.28 J	3.68	3.60	2.53 J	2.38	1.63 J	0.32 J	1.74 J
R-BF	A	38.52	391.10	452.67	70.06	226.13	307.58	226.74	3.31 U	318.78	48.74	303.93
R-OS	A	58.29	5.62 J	6.87	3.06 J	4.76	6.29	2.35 J	4.21	4.63 J	0.65 J	6.49
C-SB	A	34.03	122.35	83.35	28.11	45.25	44.71	21.98	22.24	26.50	3.29 J	29.76
C-NE	A	80.99	1.08 J	1.57 J	0.63 J	2.13 J	1.16 J	0.23 J	1.49 U	0.27 J	2.09 U	0.62 J
C-WB	A	81.69	1.18 J	0.78 J	0.17 J	0.37 J	0.26 J	0.19 J	1.53 U	3.63 U	2.13 U	0.16 J

(a) DL Detection limit.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) U Analyte was not present above the level of associated value.

TABLE B.11. Quality Control Data for Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAHs), Dry Weight, in Sediment, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Percent Dry Weight	LPAHs(µg/kg dry weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Method Blanks								
Blank 1	A	65.85[a]	0.23 J[b]	2.68 U[c]	2.07 U	1.64 U	0.09 J	2.60 U
Blank 2	B	68.23[a]	0.60 J	2.52 U	1.94 U	1.54 U	0.32 J	2.44 U
Blank 3	C	62.28[a]	0.43 J	2.55 U	1.97 U	1.56 U	2.64 U	2.47 U
Matrix Spikes								
CS-1-C	A	79.67	1.23	0.11 J	0.25 J	1.28	3.08	1.27 J
CS-1-C MS	A	79.67	141.74	133.61	144.31	154.56	158.39	127.65
Concentration Recovered			140.51	133.5	144.06	153.28	155.31	126.38
Amount Spiked			140.71	143.95	140.71	144.03	140.71	140.71
Percent Recovery			100%	93%	102%	106%	110%	90%
CS-1-C	A	79.67	1.23	0.11 J	0.25 J	1.28	3.08	1.27 J
CS-1-C MSD	A	79.67	151.55	148.92	153.74	166.84	174.08	143.47
Concentration Recovered			150.32	148.81	153.49	165.56	171	142.2
Amount Spiked			149.37	152.80	149.37	152.89	149.37	149.37
Percent Recovery			101%	97%	103%	108%	114%	95%
RPD			1%	5%	0%	2%	4%	6%
I-Stat			0.00	0.02	0.00	0.01	0.02	0.03
P VI R	B	63.13	3.73	0.83 J	1.14 J	2.87	10.28	1.53 J
P VI R MS	B	63.13	188.89	161.18	183.58	228.95	221.3	64.54
Concentration Recovered			185.16	160.35	182.44	226.08	211.02	63.01
Amount Spiked			196.37	200.88	196.37	201.00	196.37	196.37
Percent Recovery			94%	80%	93%	112%	107%	32%[d]
P VI R	B	63.13	3.73	0.83 J	1.14 J	2.87	10.28	1.53 J
P VI R MSD	B	63.13	189.65	133.27	193.42	234.18	216.69	106.72
Concentration Recovered			185.92	132.44	192.28	231.31	206.41	105.19
Amount Spiked			194.16	198.63	194.16	198.74	194.16	194.16
Percent Recovery			96%	67%	99%	116%	106%	54%
RPD			2%	18%	6%	3%	1%	51%[e]
I-Stat			0.01	0.09	0.03	0.02	0.01	0.26
WR-1-A	C	69.75	2.27	2.40 U	1.85 U	1.30 J	5.80	0.75 J
WR-1-A MS	C	69.75	162.94	203.86	163.18	184.93	184.85	173.59
Concentration Recovered			160.67	203.86	163.18	183.63	179.05	172.84
Amount Spiked			177.64	181.73	177.64	181.83	177.64	177.64
Percent Recovery			90%	112%	92%	101%	101%	97%
WR-1-A	C	69.75	2.27	2.40 U	1.85 U	1.30 J	5.80	0.75 J
WR-1-A MSD	C	69.75	172.99	195.71	173.26	194.61	203.02	181.95
Concentration Recovered			170.72	195.71	173.26	193.31	197.22	181.2
Amount Spiked			177.52	181.61	177.52	181.71	177.52	177.52
Percent Recovery			96%	108%	98%	106%	111%	102%
RPD			6%	4%	6%	5%	10%	5%
I-Stat			0.03	0.02	0.03	0.03	0.05	0.02

TABLE B.11. (contd)

Sediment Treatment	Batch	Percent Dry Weight	LPAHs(µg/kg dry weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Standard Reference Material								
Certified Value			NC(f)	NC	NC	NC	577 ±59.0	202 ±42.0
SRM 1941	A		NA(g)	NA	NA	NA	581.38 (h)	106.7(h)
SRM 1941	B		NA	NA	NA	NA	482.66 (h)	70.46(h)
SRM 1941	C		NA	NA	NA	NA	571.69	208.84
Analytical Replicates								
P XIV C Replicate 1	A	63.53	7.20	2.97	2.74	5.54	34.05	1.98 J
P XIV C Replicate 2	A	63.53	7.93	2.96	1.33 J	4.29	16.05	3.45
P XIV C Replicate 3	A	63.53	6.49	2.00 J	1.72 J	5.24	16.79	2.14 J
RSD			10%	21%	38%(e)	13%	46%(e)	32%(e)
WR-1-D Replicate 1	B	72.15	1.51	0.24 J	1.82 U	0.68 J	3.43	0.44 J
WR-1-D Replicate 2	B	72.15	1.40	2.38 U	1.83 U	0.64 J	3.31	0.32 J
WR-1-D Replciate 3	B	72.15	1.97	2.38 U	1.84 U	0.67 J	2.69	0.32 J
RSD			19%	NA	NA	3%	13%	19%
WR-1-E Replicate 1	C	66.43	6.33	2.07 J	1.89 J	2.24	18.16	4.13
WR-1-E Replicate 2	C	66.43	6.24	3.18	2.60	3.20	30.07	8.57
WR-1-E Replicate 3	C	66.43	5.73	3.00	1.83 J	2.41	22.65	4.82
RSD			5%	22%	20%	20%	25%	41%(e)

(a) Percent dry weight used to calculate blank concentration based on average of dry weight of samples in batch.
(b) J Analyte detected below method detection limits (MDL), but above instrument detection limit (IDL).
(c) U Analyte was not present above the level of associated value.
(d) Recovery outside quality control range of 40%-120%.
(e) Value exceeds relative precision range of ≤30%.
(f) NC Not certified.
(g) NA Not applicable.
(h) Value outside SRM range.

TABLE B.12. Quality Control Data for High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAHs), Dry Weight, in Sediment, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Percent Dry Weight	HPAHs (µg/kg dry weight) Fluoranthene	Pyrene	Benz(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene
Method Blanks												
Blank 1	A	65.85[a]	0.09 J[b]	0.06 J	2.93 U[c]	0.14 J	0.13 J	0.13 J	1.95 U	4.65 U	2.73 U	5.04 U
Blank 2	B	68.23[a]	5.01 U	0.11 J	2.76 U	3.40 U	2.60 U	3.09 U	1.84 U	4.37 U	2.57 U	4.75 U
Blank 3	C	62.28[a]	5.07 U	0.13 J	2.79 U	3.44 U	2.63 U	3.13 U	1.86 U	4.43 U	2.60 U	4.80 U
Matrix Spikes												
CS-1-C	A	79.67	17.24	14.02	2.28 J	3.68	3.60	2.53 J	2.38	1.63 J	0.32 J	1.74 J
CS-1-C MS	A	79.67	166.11	165.98	154.71	157.90	165.01	164.05	149.03	155.54	150.55	149.13
Concentration Recovered			148.87	151.96	152.43	154.22	161.41	161.52	146.65	153.91	150.23	147.39
Amount Spiked			140.71	140.66	140.71	144.03	140.71	140.71	140.66	140.71	140.71	140.71
Percent Recovery			106%	108%	108%	107%	115%	115%	104%	109%	107%	105%
CS-1-C	A	79.67	17.24	14.02	2.28 J	3.68	3.60	2.53 J	2.38	1.63 J	0.32 J	1.74 J
CS-1-C MSD	A	79.67	184.74	184.99	176.42	184.40	189.50	183.32	158.06	179.23	172.10	168.95
Concentration Recovered			167.5	170.97	174.14	180.72	185.90	180.79	155.68	177.60	171.78	167.21
Amount Spiked			149.37	149.31	149.37	152.89	149.37	149.37[d]	149.31	149.37	149.37	149.37
Percent Recovery			112%	115%	117%	118%	124%	121%	104%	119%	115%	112%
RPD			6%	6%	7%	10%	8%	5%	0%	8%	7%	7%
I-Stat			0.03	0.03	0.04	0.05	0.04	0.03	0.00	0.04	0.04	0.03
P VI R	B	63.13	22.67	29.83	6.80	11.38	18.17	7.24	16.02	16.28	1.51 J	18.53
P VI R MS	B	63.13	237.09	228.97	190.35	238.15	252.11	231.41	216.50	249.23	256.24	228.70
Concentration Recovered			214.42	199.14	183.55	226.77	233.94	224.17	200.48	232.95	254.73	210.17
Amount Spiked			196.29	196.37	196.37	201.00	196.37	196.37	196.29	196.37	196.37	196.37
Percent Recovery			109%	101%	93%	113%	119%	114%	102%	119%	130%[d]	107%
P VI R	B	63.13	22.67	29.83	6.80	11.38	18.17	7.24	16.02	16.28	1.51 J	18.53
P VI R MSD	B	63.13	226.18	225.48	204.72	236.45	257.36	224.20	203.48	252.59	254.78	249.24
Concentration Recovered			203.51	195.65	197.92	225.07	239.19	216.96	187.46	236.31	253.27	230.71
Amount Spiked			194.08	194.16	194.16	198.74	194.16[d]	194.16	194.08	194.16[d]	194.16[d]	194.16
Percent Recovery			105%	101%	102%	113%	123%	112%	97%	122%	130%	119%
RPD			4%	1%	9%	0%	3%	2%	6%	3%	1%	10%
I-Stat			0.02	0.00	0.04	0.00	0.02	0.01	0.03	0.01	0.00	0.05

TABLE B.12. (contd)

Sediment Treatment	Batch	Percent Dry Weight	HPAHs (µg/kg dry weight) Fluoranthene	Pyrene	Benz(a)-Anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno (1,2,3-c,d) pyrene	Dibenz(a,h)anthracene	Benzo (g,h,i) perylene
WR-1-A	C	69.75	2.88 J	3.81 J	1.19 J	2.16 J	3.05	0.85 J	1.35 J	1.71 J	0.33 J	2.70 J
WR-1-A MS	C	69.75	188.33	186.66	198.88	193.70	217.28	188.33	168.86	222.88	234.26	198.55
Concentration Recovered			185.45	182.85	197.69	191.54	214.23	187.48	167.51	221.17	233.93	195.85
Amount Spiked			177.57	177.64	177.64	181.83	177.64	177.64	177.57	177.64	177.64	177.64
Percent Recovery			104%	103%	111%	105%	121%(d)	106%	94%	125%(d)	132%(d)	110%
WR-1-A	C	69.75	2.88 J	3.81 J	1.19 J	2.16 J	3.05	0.85 J	1.35 J	1.71 J	0.33 J	2.70 J
WR-1-A MSD	C	69.75	204.49	201.71	209.94	200.85	223.72	199.64	180.21	230.23	225.99	202.13
Concentration Recovered			201.61	197.9	208.75	198.69	220.67	198.79	178.86	228.52	225.66	199.43
Amount Spiked			177.45	177.52	177.52	181.71	177.52	177.52	177.45	177.52	177.52	177.52
Percent Recovery			114%	111%	118%	109%	124%(d)	112%	101%	129%(d)	127%(d)	112%
RPD			8%	8%	6%	4%	3%	6%	7%	3%	4%	2%
I-Stat			0.04	0.04	0.03	0.02	0.02	0.03	0.03	0.02	0.02	0.01
Standard Reference Material												
Certified Value			1220 ±240	1080 ±200	550 ±79.0	NC(e)	780 ±190.0	444 ±49.0	670 ±130.0	569 ±40.0	NC	516 ±83.0
SRM 1941	A		1181.50(f)	1057.30(g)	443.45(g)	NA(f)	874.13	538.01(g)	772.62	570.88(g)	NA	464.27
SRM 1941	B		903.46	785.04	358.51(g)	NA	893.64	537.57(g)	718.09	682.26(g)	NA	564.41
SRM 1941	C		1049.40	926.82	479.28	NA	920.95	593.43(g)	602.78	741.71(g)	NA	609.64(g)

TABLE B.12. (contd)

Sediment Treatment	Batch	Percent Dry Weight	HPAHs (µg/kg dry weight) Fluor-anthene	Pyrene	Benz(a)-Anthra-cene	Chrysene	Benzo(b) fluor-anthene	Benzo(k)-fluor-anthene	Benzo(a)-pyrene	Indeno (1,2,3-c,d) pyrene	Dibenz(a,h) anthra-cene	Benzo (g,h,i) perylene
Analytical Replicates												
P XIV C Replicate 1	A	63.53	69.50	89.68	9.44	22.37	31.25	13.00	14.99	36.20	2.35 J	42.33
P XIV C Replicate 2	A	63.53	49.54	70.13	11.17	19.81	26.07	9.13	29.61	29.13	1.71 J	34.34
P XIV C Replicate 3	A	63.53	51.20	70.86	8.58	15.76	22.99	10.83	28.34	31.36	1.85 J	35.93
RSD			20%	14%	14%	17%	16%	18%	33%(h)	11%	17%	11%
WR-1-D Replicate 1	B	72.15	4.75	5.72	1.86 J	3.19	3.89	1.96 J	3.70	3.24 J	0.47 J	3.88 J
WR-1-D Replicate 2	B	72.15	3.46 J	4.26	1.26 J	2.34 J	3.13	1.67 J	2.24	2.41 J	0.32 J	2.90 J
WR-1-D Replicate 3	B	72.15	2.68 J	3.55 J	1.14 J	2.05 J	2.55	1.40 J	2.24	2.15 J	0.30 J	2.67 J
RSD			29%	25%	27%	23%	21%	17%	31%(h)	22%	26%	20%
WR-1-E Replicate 1	C	66.43	34.66	50.46	14.60	15.92	29.73	15.29	26.94	31.84	2.48 J	35.80
WR-1-E Replicate 2	C	66.43	54.23	77.29	20.31	29.45	34.63	17.02	35.56	37.43	2.86	40.57
WR-1-E Replicate 3	C	66.43	38.06	55.19	14.29	16.42	27.15	15.98	27.88	32.19	2.59	35.17
RSD			25%	23%	21%	37%(h)	12%	5%	16%	9%	7%	8%

(a) Percent dry weight used to calculate blank concentration based on average of dry weight of samples in batch.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) U Analyte was not present above the level of associated value.
(d) Recovery outside quality control range (40%-120%).
(e) NC Not certified.
(f) NA Not applicable.
(g) Value outside SRM range for certified value.
(h) Value exceeds relative precision range of ≤30%.

TABLE B.13. Surrogate Recoveries for Polynuclear Aromatic Hydrocarbons (PAHs), Dry Weight, in Sediment, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Surrogate Percent Recovery: Naphthalene-d8	Acenaphthene-d10	Benzo(a)pyrene-d12
COMP WR-1	A	61.68	59.74	2.04[a]
WR-1-D Replicate 1	B	61.43	65.97	17.57[a]
WR-1-D Replicate 2	B	60.42	61.08	20.76[a]
WR-1-D Replicate 3	B	58.87	63.83	22.91[a]
WR-1-C	C	52.71	62.26	51.58
WR-1-B	C	56.82	65.68	57.87
WR-1-E Replicate 1	C	60.64	67.90	59.43
WR-1-E Replicate 2	C	55.18	61.72	54.38
WR-1-E Replicate 3	C	49.36	60.51	52.33
WR-1-A	C	61.74	68.24	62.60
COMP WR-2	A	65.42	62.51	2.88[a]
WR II.5 L	C	58.02	68.92	58.43
WR-A	C	58.35	70.96	63.17
WR II L	C	55.76	66.35	56.95
COMP PS-1	A	73.51	73.15	0.00[a]
P II C	B	49.02	60.49	16.95[a]
P III.5 R	C	50.63	66.32	57.56
P IV R	C	56.96	58.54	77.46
P V L	B	50.78	60.67	17.47[a]
P V R	B	51.94	63.33	32.85[a]
P V.5 C	C	58.35	68.11	60.11
P VI L	B	52.78	64.95	32.19[a]
P VI R	B	59.34	68.06	16.30[a]
P VI.5 C	C	60.88	67.22	58.33
P VII C	C	49.91	68.49	60.49
P VII.5 C	C	48.19	61.41	58.44
P VIII L	C	57.69	66.98	59.55
P VIII R	B	53.19	61.40	14.45[a]
COMP PS-3	A	68.61	70.92	52.48
P VIII.5 C	C	56.42	69.87	59.81
P IX C	C	61.95	70.50	57.37
P IX.5 L	B	53.54	57.77	32.96[a]
P X R	B	53.78	65.86	33.69[a]
P X.5 C	B	56.42	57.59	36.82[a]
COMP PS-2	A	63.04	62.67	5.78[a]

TABLE B.13. (contd)

Sediment Treatment	Batch	Surrogate Percent Recovery: Naphthalene-d8	Acenaphthene-d10	Benzo(a)pyrene-d12
COMP PS-4	A	64.82	66.90	9.22[a]
P XI L	B	56.67	62.22	23.47[a]
P XII RR	B	60.20	70.46	37.95[a]
P XII R	B	64.50	68.64	11.84[a]
P XII.5 R	B	54.91	70.08	34.78[a]
P XII.5 C	B	58.69	61.43	12.42[a]
P XIII R	B	66.36	70.19	15.89[a]
P XIII L	A	60.22	57.61	2.47[a]
P XIV C Replicate 1	A	49.87	69.26	6.37[a]
P XIV C Replicate 2	A	51.38	83.66	21.31[a]
P XIV C Replicate 3	A	58.56	84.06	10.60[a]
COMP CS-1	A	58.21	62.68	0.00[a]
CS-1-A	A	61.82	60.69	0.00[a]
CS-1-B	A	42.81	60.47	2.88[a]
CS-1-C	A	64.50	63.68	16.45[a]
R-BF	A	58.36	62.10	0.00[a]
R-OS	A	67.40	70.93	40.67
C-SB	A	60.25	70.19	60.94
C-NE	A	73.35	72.34	42.34
C-WB	A	67.48	62.50	0.00[a]
Quality Control Data				
Method Blanks				
Blank 1	A	72.37	72.67	57.35
Blank 2	B	76.64	72.47	65.86
Blank 3	C	65.41	62.19	75.27
Matrix Spikes				
CS-1-C	A	64.50	63.68	16.45[a]
CS-1-C MS	A	70.00	70.00	54.00
CS-1-C MSD	A	65.00	66.00	56.00
P VI R	B	59.34	68.06	16.30[a]
P VI R MS	B	65.00	69.00	15.00[a]
P VI R MSD	B	59.00	69.00	37.00[a]
WR-1-A	C	61.74	68.24	62.60
WR-1-A MS	C	56.00	66.00	62.00
WR-1-A MSD	C	60.00	66.00	62.00

TABLE B.13. (contd)

Sediment Treatment	Batch	Surrogate Percent Recovery: Naphthalene-d8	Acenaphthene-d10	Benzo(a)pyrene-d12
Standard Reference Material				
Certified Value				
SRM 1941	A	59.54	73.87	19.49[a]
SRM 1941	B	48.66	75.16	8.31[a]
SRM 1941	C	60.36	78.93	59.14
Analytical Replicates				
P XIV C Replicate 1	A	49.87	69.26	6.37[a]
P XIV C Replicate 2	A	51.38	83.66	21.31[a]
P XIV C Replicate 3	A	58.56	84.06	10.60[a]
WR-1-D Replicate 1	B	61.43	65.97	17.57[a]
WR-1-D Replicate 2	B	60.42	61.08	20.76[a]
WR-1-D Replicate 3	B	58.87	63.83	22.91[a]
WR-1-E Replicate 1	C	60.64	67.90	59.43
WR-1-E Replicate 2	C	55.18	61.72	54.38
WR-1-E Replicate 3	C	49.36	60.51	52.33

(a) Recovery outside quality control range of 40%-120%.

TABLE B.14. Chlorinated Pesticides and Polychlorinated Biphenyls (PCBs) in Sediment, John F. Baldwin Ship Channel Program

Analyte	Sample Concentration (µg/kg dry weight)									
	COMP WR-1	COMP WR-1 Duplicate	COMP WS-2	COMP PS-1	COMP PS-2	COMP PS-3	COMP PS-4	COMP CS-1	R-BF	R-OS
Alpha-BHC	0.7 U(a)	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Beta-BHC	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	1.0 U	0.7 U
Delta-BHC	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	1.0 U	0.7 U
Gamma-BHC(Lindane)	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Heptachlor	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Aldrin	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Heptachlor Epoxide	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Endosulfan I	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Dieldrin	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
4,4'-DDE	1.4 U	1.4 U	1.4 U	1.4 U	0.6 J(b)	1.4 U	0.5 J	1.4 U	1.0 C(c) J	0.8 J
Endrin	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Endosulfan II	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
4,4'-DDD	1.4 U	1.4 U	1.4 U	1.4 U	0.7 J	1.4 U	0.6 J	1.4 U	0.8 CJ	1.4 U
Endosulfan Sulfate	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
4,4'-DDT	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Methoxychlor	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U
Endrin Ketone	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Gamma-Chlordane	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	1.0 U	0.7 U
Alpha-Chlordane	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Toxaphene	70.0 U	70.0 U	70.0 U	70.0 U	70.0 U	70.0 U	70.0 U	70.0 U	70.0 U	70.0 U
Aroclor-1242/1016	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U
Aroclor-1248	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U
Aroclor-1254	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	8.8 J	14.0 U
Aroclor-1260	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	17.0 U	14.0 U
Aroclor-1221	28.0 U	28.0 U	28.0 U	28.0 U	28.0 U	28.0 U	28.0 U	28.0 U	28.0 U	28.0 U
Aroclor-1232	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U	14.0 U
Surrogate Percent Recoveries										
Decachlorobiphenyl	75.3	79.0	76.4	57.1	72.8	77.1	74.3	74.5	82.5	85.4
Tetrachlorometaxylene	69.4	72.9	71.2	50.0	69.5	78.8	73.6	76.3	106.0	91.1

(a) U Analyte was not present above the level of associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) C Indicates a probable value which is unable to be confirmed due to matrix interference.

TABLE B.15. Quality Control Summary for Chlorinated Pesticides and Polychlorinated Biphenyls (PCBs), in Sediment, John F. Baldwin Ship Channel Program

Analyte	Method Blank	Matrix Spike: COMP PS-3 MS	Matrix Spike: MS Amount Spiked	Matrix Spike: MS Percent Recovery	Matrix Spike Duplicate: COMP PS-3 MSD	Matrix Spike Duplicate: MSD Amount Spiked	Matrix Spike Duplicate: MSD Percent Recovery	MS/MSD RPD	Analytical Replicates: COMP WR-1	Analytical Replicates: COMP WR-1
Alpha-BHC	0.7 U[a]	0.7 U	NS[b]	NA[c]	0.7 U	NS	NA	NA	0.7 U	0.7 U
Beta-BHC	0.7 U	0.7 U	NS	NA	0.7 U	NS	NA	NA	0.7 U	0.7 U
Delta-BHC	0.7 U	0.7 U	NS	NA	0.7 U	NS	NA	NA	0.7 U	0.7 U
Gamma-BHC(Lindane)	0.7 U	2.3	3.25	70.8	2.6	3.22	79.5	11.6	0.7 U	0.7 U
Heptachlor	0.7 U	2.1	3.25	65.2	2.3	3.22	72.7	10.9	0.7 U	0.7 U
Aldrin	0.7 U	2.5	3.25	75.7	2.8	3.22	85.4	12.0	0.7 U	0.7 U
Heptachlor Epoxide	0.7 U	0.7 U	NS	NA	0.7 U	NS	NA	NA	0.7 U	0.7 U
Endosulfan I	0.7 U	0.7 U	NS	NA	0.7 U	NS	NA	NA	0.7 U	0.7 U
Dieldrin	1.4 U	4.4	6.50	67.2	4.9	6.44	75.8	12.0	1.4 U	1.4 U
4,4'-DDE	1.4 U	1.4 U	NS	NA	1.4 U	NS	NA	NA	1.4 U	1.4 U
Endrin	1.4 U	4.8	6.50	73.4	5.3	6.44	81.7	10.7	1.4 U	1.4 U
Endosulfan II	1.4 U	1.4 U	NS	NA	1.4 U	NS	NA	NA	1.4 U	1.4 U
4,4'-DDD	1.4 U	1.4 U	NS	NA	1.4 U	NS	NA	NA	1.4 U	1.4 U
Endosulfan Sulfate	1.4 U	1.4 U	NS	NA	1.4 U	NS	NA	NA	1.4 U	1.4 U
4,4'-DDT	1.4 U	5.1	6.50	79.1	5.8	6.44	89.9	12.8	1.4 U	1.4 U
Methoxychlor	7.0 U	7.0 U	NS	NA	7.0 U	NS	NA	NA	7.0 U	7.0 U
Endrin Ketone	1.4 U	1.4 U	NS	NA	1.4 U	NS	NA	NA	1.4 U	1.4 U
Gamma-Chlordane	0.7 U	0.7 U	NS	NA	0.7 U	NS	NA	NA	0.7 U	0.7 U
Alpha-Chlordane	0.7 U	0.7 U	NS	NA	0.7 U	NS	NA	NA	0.7 U	0.7 U
Toxaphene	70.0 U	70.0 U	NS	NA	70.0 U	NS	NA	NA	70.0 U	70.0 U
Aroclor-1242/1016	14.0 U	14.0 U	NS	NA	14.0 U	NS	NA	NA	14.0 U	14.0 U
Aroclor-1248	14.0 U	14.0 U	NS	NA	14.0 U	NS	NA	NA	14.0 U	14.0 U
Aroclor-1254	14.0 U	14.0 U	NS	NA	14.0 U	NS	NA	NA	14.0 U	14.0 U
Aroclor-1260	14.0 U	14.0 U	NS	NA	14.0 U	NS	NA	NA	14.0 U	14.0 U
Aroclor-1221	28.0 U	28.0 U	NS	NA	28.0 U	NS	NA	NA	28.0 U	28.0 U
Aroclor-1232	14.0 U	14.0 U	NS	NA	14.0 U	NS	NA	NA	14.0 U	14.0 U
Surrogate Percent Recoveries										
Decachlorobiphenyl	79.0	65.1			74.4				75.3	79.0
Tetrachlorometaxylene	75.7	59.2			64.0				69.4	72.9

(a) U Analyte was not present above the level of associated value.
(b) NS Not spiked.
(c) NA Not applicable.

TABLE B.16. Concentrations of Metals in Sediment, Dry Weight, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Metals (mg/kg dry weight)									
		Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Target DL(a)		0.02	2.5	0.1	33.0	5.5	0.01	7.5	6.2	0.2	7.8
Achieved DL		0.01	2.5	0.01	33.0	5.5	0.01	7.5	6.2	0.16	7.8
COMP WR-1	A	0.09	12.50	0.16	177.0	26.1	0.034	79.6	12.1	0.37	69.3
WR-1-D Replicate 1	C	0.06	13.60	0.16	195.0	24.3	0.021	82.6	9.8	0.28	67.5
WR-1-D Replicate 2	C	0.06	13.10	0.14	164.0	24.3	0.024	86.5	8.9	0.28	66.0
WR-1-D Replicate 3	C	0.06	13.20	0.14	165.0	23.7	0.020	83.5	11.0	0.28	68.4
WR-1-C	C	0.05	12.70	0.19	161.0	19.5	0.017	75.8	8.2	0.28	60.8
WR-1-B	C	0.07	12.70	0.21	147.0	27.7	0.049	81.6	8.0	0.28	70.8
WR-1-E	C	0.11	7.46	0.17	104.0	14.2	0.072	52.9	9.7	0.28	48.8
WR-1-A	C	0.05	9.55	0.14	181.0	23.5	0.027	92.9	9.6	0.46	69.3
COMP WR-2	A	0.05	8.21	0.16	209.0	22.4	0.016	77.4	13.7	0.56	63.3
WR II.5 L	C	0.06	9.11	0.14	242.0	21.8	0.021	82.9	7.0	0.37	69.4
WR-A	C	0.06	10.37	0.15	196.0	23.1	0.020	82.7	7.2	0.28	66.2
WR II L	C	0.04	7.36	0.10	177.0	21.9	0.016	81.7	6.9	0.56	65.4
COMP PS-1	A	0.11	7.57	0.20	184.0	37.8	0.050	109.7	12.4	0.16 U[b]	93.9
P II C	B	0.13	9.75	0.25	164.0	42.6	0.072	104.4	10.4	0.56	95.0
P III.5 R	C	0.12	10.33	0.22	200.0	41.8	0.062	107.7	9.3	0.56	97.0
P IV R	C	0.10	9.31	0.22	232.0	37.5	0.054	99.4	8.4	0.37	90.8
COMP PS-2	A	0.15	10.43	0.21	227.0	39.6	0.089	99.5	11.7	0.37	97.6
P V L	B	0.21	13.40	0.35	197.0	49.1	0.188	108.9	15.6	0.46	110.0
P V R	B	0.16	11.59	0.28	298.0	44.6	0.087	106.7	14.5	0.37	103.8
P V.5 C	C	0.11	9.79	0.23	291.0	37.8	0.081	106.6	10.8	0.46	98.3
P VI L	B	0.18	9.73	0.34	181.0	51.9	0.123	112.6	14.2	0.46	106.0
P VI R	B	0.14	10.70	0.21	185.0	37.1	0.087	101.1	13.2	0.37	97.8
P VI.5 C	C	0.05	10.71	0.16	249.0	33.8	0.077	101.0	12.0	0.37	88.3
P VII C	C	0.18	11.44	0.30	230.0	48.6	0.164	108.7	16.6	0.56	110.4
P VII.5 C	C	0.12	10.22	0.21	214.0	39.4	0.075	106.9	11.5	0.55	95.0
P VIII L	C	0.12	11.02	0.21	218.0	39.2	0.111	102.1	14.9	0.37	100.3
P VIII R	B	0.14	9.79	0.21	216.0	35.1	0.091	100.7	12.7	0.28	92.3
COMP PS-3	A	0.05	7.97	0.12	235.0	23.1	0.032	90.0	11.3	0.16 U	73.0
P VIII.5 C	C	0.11	9.11	0.17	241.0	32.8	0.072	100.8	12.1	0.28	86.3
P IX C	C	0.06	10.58	0.12	248.0	25.1	0.049	90.2	9.8	0.19	72.5
P IX.5 L	B	0.04	8.90	0.20	288.0	23.9	0.102	94.4	83.3	0.28	92.1
P X R	B	0.07	8.71	0.14	358.0	26.3	0.033	100.8	11.3	0.28	79.4
P X.5 C	B	0.04	9.09	0.10	293.0	23.2	0.013	87.9	9.4	0.19	69.5
COMP PS-4	A	0.11	15.00	0.24	216.0	48.0	0.270	93.0	20.4	0.46	89.6
P XI L	B	0.07	8.56	0.13	289.0	29.9	0.040	97.6	9.7	0.37	76.4
P XII RR	B	0.06	10.72	0.13	434.0	35.6	0.100	106.5	11.3	0.28	86.6
P XII R	B	0.05	10.69	0.11	414.0	35.1	0.127	99.5	10.8	0.28	82.4
P XII.5 R	B	0.19	16.00	0.35	205.0	56.0	0.334	99.9	23.6	0.37	107.8
P XII.5 C	B	0.08	16.80	0.14	202.0	52.0	0.400	89.7	15.5	0.37	82.8
P XIII R	B	0.09	16.90	0.14	189.0	49.0	0.346	83.1	14.0	0.28	84.0
P XIII L	A	0.09	17.80	0.18	184.0	52.2	0.334	84.6	17.3	0.37	83.0
P XIV C Replicate 1	B	0.22	18.80	0.46	336.0	49.4	0.281	103.3	30.7	0.28	124.9
P XIV C Replicate 2	B	0.22	16.10	0.44	312.0	49.4	0.277	104.0	26.2	0.28	120.3
P XIV C Replicate 3	B	0.22	17.50	0.43	353.0	49.2	0.290	106.2	31.0	0.28	122.6
COMP CS-1	A	0.08	12.20	0.15	210.0	32.8	0.159	82.9	14.0	0.37	74.8
CS-1-A	A	0.12	19.40	0.24	201.0	48.6	0.352	90.4	18.6	0.37	94.5
CS-1-B	A	0.19	18.40	0.25	210.0	57.0	0.469	104.2	26.9	0.56	105.0
CS-1-C	A	0.05	10.55	0.09	231.0	23.5	0.089	74.7	10.0	0.18	65.1
R-BF	A	0.52	10.40	0.21	198.0	54.5	0.345	104.9	34.4	0.37	142.0
R-OS Replicate 1	A	0.43	3.95	0.52	179.0	22.2	0.056	69.6	8.3	1.20	76.7
R-OS Replicate 2	A	0.42	3.25	0.52	230.0	23.5	0.056	67.3	10.4	1.28	75.2
R-OS Replicate 3	A	0.42	4.37	0.52	179.0	19.9	0.053	65.4	7.8	1.21	76.5

TABLE B.16. (contd)

Sediment Treatment	Batch	Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
C-SB	A	0.26	11.61	1.05	108.0	38.3	0.094	42.9	14.9	1.38	98.4
C-NE	A	0.01	4.60	0.05	74.5	8.4	0.056	23.5	4.4	0.19	21.0
C-WB	A	0.01	3.11	0.07	227.0	13.9	0.002	46.8	6.5	0.16 U	47.3

(a) DL Detection limit.
(b) Analyte was not present above the level of associated value.

TABLE B.17. Quality Control Data for Sediment, Dry Weight, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Method Blank											
Blank Replicate 1	A	0.01	NA[a]	0.01 U[b]	NA	NA	0.006 U	NA	NA	0.16 U	NA
Blank Replicate 2	A	0.01	NA	0.01 U	NA	NA	0.006 U	NA	NA	0.16 U	NA
Blank Replicate 3	B	0.01	NA	0.01 U	NA	NA	0.017 U	NA	NA	0.16 U	NA
Blank Replicate 4	B	0.01	NA	0.01 U	NA	NA	0.017 U	NA	NA	0.16 U	NA
Blank Replicate 5	C	0.01	NA	0.01 U	NA	NA	0.017 U	NA	NA	0.16 U	NA
Blank Replicate 6	C	0.02	NA	0.01 U	NA	NA	0.017 U	NA	NA	0.16 U	NA
Matrix Spike											
COMP PS-3	A	0.05	7.97	0.12	235.0	23.1	0.032	90.0	11.3	0.16 U	73.0
COMP PS-3 MS	A	1.15	NA	1.27	NA	NA	0.980	NA	NA	2.32	NA
Concentration Recovered		1.10	NA	1.15	NA	NA	0.948	NA	NA	2.32	NA
Amount Spiked		1.00	NA	1.00	NA	NA	1	NA	NA	2	NA
Percent Recovery		110%	NA	115%	NA	NA	95%	NA	NA	116%	NA
COMP PS-3	A	0.05	7.97	0.12	235.0	23.1	0.032	90.0	11.3	0.16 U	73.0
COMP PS-3 MSD	A	1.12	NA	1.32	NA	NA	1.03	NA	NA	2.31	NA
Concentration Recovered		1.07	NA	1.20	NA	NA	1.00	NA	NA	2.31	NA
Amount Spiked		1.00	NA	1.00	NA	NA	1	NA	NA	2	NA
Percent Recovery		107%	NA	120%	NA	NA	100%	NA	NA	116%	NA
MS/MSD RPD		3%	NA	4%	NA	NA	5%	NA	NA	0%	NA
MS/MSD I-Stat		0.01	NA	0.02	NA	NA	0.03	NA	NA	0.00	NA
P XIII R	B	0.09	16.90	0.14	189.0	49.0	0.346	83.1	14.0	0.28	84.0
P XIII R MS	B	1.11	NA	1.03	NA	NA	1.435	NA	NA	2.52	NA
Concentration Recovered		1.02	NA	0.89	NA	NA	1.089	NA	NA	2.24	NA
Amount Spiked		1.00	NA	1.00	NA	NA	1	NA	NA	2	NA
Percent Recovery		102%	NA	89%	NA	NA	109%	NA	NA	112%	NA
P XIII R	B	0.09	16.90	0.14	189.0	49.0	0.346	83.1	14.0	0.28	84.0
P XIII R MSD	B	1.08	NA	1.05	NA	NA	1.340	NA	NA	2.41	NA
Concentration Recovered		0.99	NA	0.91	NA	NA	0.994	NA	NA	2.13	NA
Amount Spiked		1.00	NA	1.00	NA	NA	1	NA	NA	2	NA
Percent Recovery		99%	NA	91%	NA	NA	99%	NA	NA	107%	NA
MS/MSD RPD		3%	NA	2%	NA	NA	9%	NA	NA	5%	NA
MS/MSD I-Stat		0.01	NA	0.01	NA	NA	0.05	NA	NA	0.03	NA

TABLE B.17. (contd)

Sediment Treatment	Batch	Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
WR-1-E	C	0.11	7.46	0.17	104.0	14.2	0.072	52.9	9.7	0.28	48.8
WR-1-E MS	C	1.18	NA	1.28	NA	NA	1.080	NA	NA	2.42	NA
Concentration Recovered		1.07	NA	1.11	NA	NA	1.008	NA	NA	2.14	NA
Amount Spiked		1.00	NA	1.00	NA	NA	1	NA	NA	2	NA
Percent Recovery		107%	NA	111%	NA	NA	101%	NA	NA	107%	NA
WR-1-E	C	0.11	7.46	0.17	104.0	14.2	0.072	52.9	9.7	0.28	48.8
WR-1-E MSD	C	1.18	NA	1.29	NA	NA	1.101	NA	NA	2.52	NA
Concentration Recovered		1.07	NA	1.12	NA	NA	1.029	NA	NA	2.24	NA
Amount Spiked		1.00	NA	1.00	NA	NA	1	NA	NA	2	NA
Percent Recovery		107%	NA	112%	NA	NA	103%	NA	NA	112%	NA
MS/MSD RPD		0%	NA	1%	NA	NA	2%	NA	NA	5%	NA
MS/MSD I-Stat		0.00	NA	0.00	NA	NA	0.01	NA	NA	0.02	NA
Standard Reference Material											
Certified Value		NC[c]	11.6 ±1.3	0.36 ±0.07	76.0 ±3.0	18.0 ±3.0	0.063 ±0.012	32.0 ±3.0	28.2 ±1.8	NC	138.0 ±6.0
1646 Replicate 1	A	0.12	11.6	0.42	78	20.7	0.074	31.1	27.4	0.74	130.0
1646 Replicate 2	A	0.12	12.2	0.44	65	19.8	0.076	31.8	25.0	0.74	129.4
1646 Replicate 3	B	0.17	11.4	0.35	74	17.6	0.075	31.3	27.3	0.65	133.0
1646 Replicate 4	B	0.13	11.0	0.37	68	20.5	0.072	33.4	28.2	0.74	125.5
1646 Replicate 5	C	0.13	12.0	0.40	68	18.8	0.073	33.4	28.2	0.65	126.8
1646 Replicate 6	C	0.12	ND[d]	0.41	ND	ND	0.079	ND	ND	0.65	ND
1646	C	ND	ND	0.37	ND	ND	ND	ND	ND	ND	ND
Analytical Triplicates											
R-OS Replicate 1	A	0.43	3.95	0.52	179.0	22.2	0.056	69.6	8.3	1.20	76.7
R-OS Replicate 2	A	0.42	3.25	0.52	230.0	23.5	0.056	67.3	10.4	1.28	75.2
R-OS Replicate 3	A	0.42	4.37	0.52	179.0	19.9	0.053	65.4	7.8	1.21	76.5
RSD		1%	15%	0%	15%	8%	3%	3%	16%	4%	1%
P XIV C Replicate 1	B	0.22	18.80	0.46	336.0	49.4	0.281	103.3	30.7	0.28	124.9
P XIV C Replicate 2	B	0.22	16.10	0.44	312.0	49.4	0.277	104.0	26.2	0.28	120.3
P XIV C Replicate 3	B	0.22	17.50	0.43	353.0	49.2	0.290	106.2	31.0	0.28	122.6
RSD		0%	8%	3%	6%	0%	2%	1%	9%	0%	2%

TABLE B.17. (contd)

Sediment Treatment	Batch	Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
WR-1-D Replicate 1	C	0.06	13.60	0.16	195.0	24.3	0.021	82.6	9.8	0.28	67.5
WR-1-D Replicate 2	C	0.06	13.10	0.14	164.0	24.3	0.024	86.5	8.9	0.28	66.0
WR-1-D Replicate 3	C	0.06	13.20	0.14	165.0	23.7	0.020	83.5	11.0	0.28	68.4
RSD		0%	2%	8%	10%	1%	10%	2%	11%	0%	2%

(a) NA Not applicable.
(b) U Analyte was not present aove the level of associated value.
(c) NC Not certified.
(d) ND No data.

TABLE B.18. Sediment Butlytin Results, Dry Weight, John F. Baldwin Ship Channel Program

Sediment Treatment	Batch	Surrogate Percent Recovery: Tri-pentyltin	Surrogate Percent Recovery: Propyltin	(µg/kg dry weight): Tributyltin	(µg/kg dry weight): Dibutyltin	(µg/kg dry weight): Monobutyltin
Target DL[a]				5.0	5.0	5.0
Achieved DL High				4.4	4.7	8.9
Achieved DL Low				0.8	0.2	0.6
COMP WR-1	A	53.64	57.64	2.8 U[c]	2.7 U	5.6 U
WR-1-D	B	43.10	40.17	2.2 U	2.1 U	4.5 U
WR-1-C	C	27.15[b]	27.15[b]	2.6 U	2.5 U	5.4 U
WR-1-B	C	59.77	56.10	2.6 U	2.5 U	5.4 U
WR-1-E	B	55.47	56.76	2.5 U	2.4 U	5.0 U
WR-1-A	C	52.96	52.53	2.3 U	2.2 U	4.6 U
COMP WR-2	A	50.91	45.11	2.9 U	2.8 U	6.0 U
WR II.5 L	C	51.00	39.59[b]	2.7 U	2.6 U	5.5 U
WR-A	C	49.32	46.24	2.5 U	2.4 U	5.2 U
WR II L Replicate 1	C	52.94	42.38	2.7 U	2.6 U	5.4 U
WR II L Replicate 2	C	47.50	41.05	2.7 U	2.6 U	5.4 U
WR II L Replicate 3	C	40.49	36.16[b]	2.4 U	2.3 U	4.9 U
COMP PS-1	A	90.71	77.68	2.9 U	2.8 U	6.0 U
P II C	B	62.97	52.58	2.4 U	2.3 U	4.9 U
P III.5 R	C	47.59	32.11[b]	2.4 U	2.3 U	4.8 U
P IV R	C	40.59	31.11[b]	2.8 U	2.7 U	5.7 U
COMP PS-2	A	41.17	43.82	2.9 U	2.7 U	5.8 U
P V L	B	48.61[b]	38.89[b]	2.6 U	2.5 U	5.4 U
P V R	B	75.92	51.24	2.6 U	2.5 U	5.2 U
P V.5 C	C	54.14	51.89	2.4 U	2.3 U	4.8 U
P VI L	B	52.99	46.18	2.4 U	2.3 U	4.9 U
P VI R	B	59.94	46.70	2.4 U	2.3 U	4.8 U
P VI.5 C	C	40.68	36.20[b]	2.5 U	2.4 U	5.1 U
P VII C	C	54.60	51.64	2.7 U	2.6 U	5.6 U
P VII.5 C	C	38.90[b]	38.00[b]	1.8 J[d]	2.4 U	5.2 U
P VIII L	C	41.02	38.80[b]	2.6 U	2.5 U	5.3 U
P VIII R	B	54.00	47.01	2.7 U	2.6 U	5.4 U
COMP PS-3	A	53.27	49.10	1.7 J	3.0 U	6.5 U
P VIII.5 C	C	43.74	36.36[b]	2.4 U	2.3 U	4.8 U
P IX C	C	49.35	40.54	2.7 U	2.6 U	5.4 U
P IX.5 L	B	55.56	47.97	3.1 U	3.0 U	6.4 U
P X R	B	43.73	41.88	2.8 U	2.7 U	5.7 U
P X.5 C	B	58.29	54.32	4.1	2.1 U	4.5 U
COMP PS-4	A	107.18	96.99	2.9 U	2.8 U	5.9 U
P XI L	B	36.66[b]	37.03	0.8 J	2.6 U	5.5 U
P XII RR	B	76.08	57.86	2.4 U	2.3 U	5.0 U
P XII R	B	71.81	57.72	2.6 U	2.5 U	5.2 U
P XII.5 R Replicate 1	B	63.77	57.98	2.7 U	2.6 U	5.6 U
P XII.5 R Replicate 2	B	59.38	48.58	2.8 U	2.7 U	5.7 U
P XII.5 R Replicate 3	B	75.96	57.70	2.5 U	2.4 U	5.0 U
P XII.5 C	B	47.79	44.00	2.8 U	2.7 U	5.8 U
P XIII R	B	53.35	41.72	2.6 U	2.5 U	5.4 U
P XIII L Replicate 1	A	78.59	87.35	2.9 U	0.6 J	5.9 U
P XIII L Replicate 2	A	56.25	64.69	2.9 U	2.8 U	5.9 U
P XIII L Replicate 3	A	72.38	77.43	2.8 U	2.7 U	5.8 U
P XIV C	A	84.46	81.26	3.4 U	3.3 U	7.0 U

TABLE B.18. (contd)

Sediment Treatment	Batch	Surrogate Percent Recovery: Tri-pentyltin	Surrogate Percent Recovery: Propyltin	(µg/kg dry weight): Tributyltin	(µg/kg dry weight): Dibutyltin	(µg/kg dry weight): Monobutyltin
COMP CS-1	A	47.86	47.35	2.8 U	2.7 U	5.7 U
CS-1-A	A	88.91	83.69	2.8 U	0.2 J	5.8 U
CS-1-B	A	89.43	88.38	3.8 U	0.6 J	0.7 J
CS-1-C	A	66.25	74.05	4.4 U	4.2 U	8.9 U
R-BF	A	37.34[b]	45.24	2.8 U	3.2	5.7 U
R-OS	A	50.63	47.18	2.7 U	3.9	0.7 J
C-SB	A	61.49	59.57	2.8 U	4.7	1.5 J
C-NE	A	43.68	42.21	2.8 U	2.7 J	0.6 J
C-WB	A	72.63	69.25	2.6 U	3.8	1.1 J

(a) DL Detection limit.
(b) Value outside of quality control limit range (40%-120%).
(c) U Analyte was not present above the level of associated value.
(d) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE B.19. Quality Control Data for Sediment Butyltin Analysis, Dry Weight, John F. Baldwin Ship Channel program

Sediment Treatment	Batch	Size Grams	Surrogate Percent Recovery: Tripentyltin	Propyltin	Pentylbutylitin	Tetrabutyltin	(µg/kg dry weight): Tributyltin	Dibutyltin	Monobutyltin
Method Blanks									
Blank	A	8.000	62.49	56.63	100.75	83.02	6.2	2.9 U[a]	6.1 U
Blank	B	5.000	47.35	36.05[b]	96.26	68.54	4.2	2.5 U	5.3 U
Blank	C	5.000	61.35	47.69	88.02	75.41	5.8	2.7 U	5.8 U
Matrix Spikes									
COMP CS-1	A	13.660	47.86	47.35	88.32	88.81	2.8 U	2.7 U	5.7 U
COMP CS-1 MS	A	13.420	67.16	75.34	131.09	69.19	48.7	29.1	1.5 J[c]
Concentration Recovered							48.7	29.1	1.5
Amount Spiked							74.5	74.5	74.5
Percent Recovery							65%	39%[b]	2%[b]
COMP CS-1	A	13.660	47.86	47.35	88.32	88.81	2.8 U	2.7 U	5.7 U
COMP CS-1 MSD	A	14.020	91.20	97.09	141.77	61.63	62.8	34.5	1.9 J
Concentration Recovered							62.8	34.5	1.9
Amount Spiked							71.3	71.3	71.3
Percent Recovery							88%	48%	3%[b]
RPD MS/MSD							30%	21%	28%
I-Stat MS/MSD							0.15	0.11	0.14
P IX.5 L	B	8.090	55.56	47.97	80.09	57.71	3.1 U	3.0 U	6.4 U
P IX.5 L MS	B	7.760	58.57	71.76	107.13	40.87	23.6	16.9	5.1
Concentration Recovered							23.6	16.9	5.1
Amount Spiked							32.2	32.2	32.2
Percent Recovery							73%	52%	16%[b]
P IX.5 L	B	8.090	55.56	47.97	80.09	57.71	3.1 U	3.0 U	6.4 U
P IX.5 L MSD	B	8.200	45.17	41.60	102.17	61.03	14.7	10.9	4.3 J
Concentration Recovered							14.7	10.9	4.3
Amount Spiked							32.2	32.2	32.2
Percent Recovery							46%	34%[b]	13%[b]
RPD MS/MSD							46%[d]	43%[d]	17%
I-Stat MS/MSD							0.23	0.22	0.09
WR-1-B	C	6.990	59.77	56.10	95.32	75.20	2.6 U	2.5 U	5.4 U
WR-1-B MS	C	6.890	44.92	45.31	97.12	71.77	14.8	7.4	2.9 J
Concentration Recovered							14.8	7.4	2.9
Amount Spiked							36.3	36.3	36.3
Percent Recovery							41%	20%[b]	8%[b]
WR-1-B	C	6.990	59.77	56.10	95.32	75.20	2.6 U	2.5 U	5.4 U
WR-1-B MSD	C	6.640	53.58	46.66	105.75	79.17	18.0	13.0	2.7 J
Concentration Recovered							18.0	13.0	2.7
Amount Spiked							37.6	37.6	37.6
Percent Recovery							48%	35%[b]	7%
RPD MS/MSD							16%	52%[d]	11%
I-Stat MS/MSD							0.08	0.26	0.05
Standard Reference Material									
Certified Value			NC	NC	NC	NC[e]	1270 ±220	1160 ±180	280 ±170
PACS	A	0.720	45.64	50.25	114.18	80.16	707	679	357.4
PACS	B	0.250	48.50	43.02	101.88	79.48	1013	937	397.1
PACS	C	0.250	56.51	43.99	89.46	86.33	1111	912	440.8

TABLE B.19. (contd)

Sediment Treatment	Batch	Size Grams	Surrogate Percent Recovery: Tri-pentyl-tin	Propyl-tin	Pentyl-butylytin	Tetra-butylytin	(µg/kg dry weight): Tri-butylytin	Di-butylytin	Mono-butylytin
Analytical Triplicates									
P XIII L Replicate 1	A	11.020	78.59	87.35	109.62	86.68	2.9 U	0.6 J	5.9 U
P XIII L Replicate 3	A	11.180	72.38	77.43	112.21	88.59	2.8 U	2.7 U	5.8 U
P XIII L Replicate 2	A	11.280	56.25	64.69	113.59	86.03	2.9 U	2.8 U	5.9 U
RSD			17%	15%	2%	2%	NA(f)	NA	NA
P XII.5 R Replicate 1	B	5.950	59.38	48.58	88.99	83.64	2.8 U	2.7 U	5.7 U
P XII.5 R Replicate 2	B	5.900	75.96	57.70	101.32	80.12	2.5 U	2.4 U	5.0 U
P XII.5 R Replicate 3	B	5.900	63.77	57.98	91.59	71.15	2.7 U	2.6 U	5.6 U
RSD			13%	10%	7%	8%	NA	NA	NA
WR II L Replicate 1	C	8.310	40.49	36.16	104.52	91.05	2.4 U	2.3 U	4.9 U
WR II L Replicate 2	C	7.540	47.50	41.05	93.73	82.08	2.7 U	2.6 U	5.4 U
WR II L Replicate 3	C	7.360	52.94	42.38	94.08	70.58	2.7 U	2.6 U	5.4 U
RSD			7%	2%	0%	9%	NA	NA	NA

(a) U Analyte was not present above the level of associated value.
(b) Recovery outside of quality control range of 40%-120%.
(c) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(d) Value exceeds relative precision range of ≤30%.
(e) NC Not certified.
(f) NA Not applicable.

APPENDIX C

96-h STATIC SUSPENDED-PARTICULATE-PHASE TEST WITH *HOLMESIMYSIS sculpta*

TABLE C.1. Results for All Replicates in 96-h *H. sculpta* Suspended-Particulate-Phase Test, John F. Baldwin Ship Channel Program

			H. sculpta				
Sediment Treatment	Concentration (Percent SPP)	Replicate	Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP WR-1	0	1	10	9	1	0.90	
COMP WR-1	0	2	10	10	0	1.00	97.5
COMP WR-1	0	3	10	10	0	1.00	
COMP WR-1	0	4	10	10	0	1.00	
COMP WR-1	10	1	10	9	1	0.90	
COMP WR-1	10	2	10	9	1	0.90	90.0
COMP WR-1	10	3	10	9	1	0.90	
COMP WR-1	10	4	10	9	1	0.90	
COMP WR-1	50	1	10	9	1	0.90	
COMP WR-1	50	2	10	10	0	1.00	95.0
COMP WR-1	50	3	10	10	0	1.00	
COMP WR-1	50	4	10	9	1	0.90	
COMP WR-1	100	1	10	10	0	1.00	
COMP WR-1	100	2	10	9	1	0.90	97.5
COMP WR-1	100	3	10	10	0	1.00	
COMP WR-1	100	4	10	10	0	1.00	
COMP WR-2	0	1	10	10	0	1.00	
COMP WR-2	0	2	10	10	0	1.00	92.5
COMP WR-2	0	3	10	8	2	0.80	
COMP WR-2	0	4	10	9	1	0.90	
COMP WR-2	10	1	10	10	0	1.00	
COMP WR-2	10	2	10	10	0	1.00	100.0
COMP WR-2	10	3	10	10	0	1.00	
COMP WR-2	10	4	10	10	0	1.00	
COMP WR-2	50	1	10	10	0	1.00	
COMP WR-2	50	2	10	10	0	1.00	95.0
COMP WR-2	50	3	10	9	1	0.90	
COMP WR-2	50	4	10	9	1	0.90	
COMP WR-2	100	1	10	10	0	1.00	
COMP WR-2	100	2	10	10	0	1.00	92.5
COMP WR-2	100	3	10	10	0	1.00	
COMP WR-2	100	4	10	7	3	0.70	
COMP PS-1	0	1	10	10	0	1.00	
COMP PS-1	0	2	10	9	1	0.90	95.0
COMP PS-1	0	3	10	9	1	0.90	
COMP PS-1	0	4	10	10	0	1.00	
COMP PS-1	10	1	10	9	1	0.90	
COMP PS-1	10	2	10	7	3	0.70	77.5
COMP PS-1	10	3	10	7	3	0.70	
COMP PS-1	10	4	10	8	2	0.80	
COMP PS-1	50	1	10	10	0	1.00	
COMP PS-1	50	2	10	10	0	1.00	92.5
COMP PS-1	50	3	10	9	1	0.90	
COMP PS-1	50	4	10	8	2	0.80	

TABLE C.1. (contd)

			H. sculpta				
Sediment Treatment	Concentration (Percent SPP)	Replicate	Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP PS-1	100	1	10	10	0	1.00	
COMP PS-1	100	2	10	9	1	0.90	95.0
COMP PS-1	100	3	10	10	0	1.00	
COMP PS-1	100	4	10	9	1	0.90	
COMP PS-2	0	1	10	9	1	0.90	
COMP PS-2	0	2	10	10	0	1.00	92.5
COMP PS-2	0	3	10	9	1	0.90	
COMP PS-2	0	4	10	9	1	0.90	
COMP PS-2	10	1	10	9	1	0.90	
COMP PS-2	10	2	10	9	1	0.90	92.5
COMP PS-2	10	3	10	10	0	1.00	
COMP PS-2	10	4	10	9	1	0.90	
COMP PS-2	50	1	10	10	0	1.00	
COMP PS-2	50	2	10	10	0	1.00	97.5
COMP PS-2	50	3	10	10	0	1.00	
COMP PS-2	50	4	10	9	1	0.90	
COMP PS-2	100	1	10	9	1	0.90	
COMP PS-2	100	2	10	10	0	1.00	95.0
COMP PS-2	100	3	10	9	1	0.90	
COMP PS-2	100	4	10	10	0	1.00	
COMP PS-3	0	1	10	8	2	0.80	
COMP PS-3	0	2	10	9	1	0.90	82.5
COMP PS-3	0	3	10	7	3	0.70	
COMP PS-3	0	4	10	9	1	0.90	
COMP PS-3	10	1	10	9	1	0.90	
COMP PS-3	10	2	10	9	1	0.90	95.0
COMP PS-3	10	3	10	10	0	1.00	
COMP PS-3	10	4	10	10	0	1.00	
COMP PS-3	50	1	10	10	0	1.00	
COMP PS-3	50	2	10	9	1	0.90	97.5
COMP PS-3	50	3	10	10	0	1.00	
COMP PS-3	50	4	10	10	0	1.00	
COMP PS-3	100	1	10	9	1	0.90	
COMP PS-3	100	2	10	10	0	1.00	95.0
COMP PS-3	100	3	10	9	1	0.90	
COMP PS-3	100	4	10	10	0	1.00	
COMP PS-4	0	1	10	7	3	0.70	
COMP PS-4	0	2	10	7	3	0.70	77.5
COMP PS-4	0	3	10	9	1	0.90	
COMP PS-4	0	4	10	8	2	0.80	
COMP PS-4	10	1	10	10	0	1.00	
COMP PS-4	10	2	10	9	1	0.90	92.5
COMP PS-4	10	3	10	9	1	0.90	
COMP PS-4	10	4	10	9	1	0.90	

TABLE C.1. (contd)

			H. sculpta				
Sediment Treatment	Concentration (Percent SPP)	Replicate	Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP PS-4	50	1	10	10	0	1.00	
COMP PS-4	50	2	10	8	2	0.80	90.0
COMP PS-4	50	3	10	9	1	0.90	
COMP PS-4	50	4	10	9	1	0.90	
COMP PS-4	100	1	10	9	1	0.90	
COMP PS-4	100	2	10	10	0	1.00	92.5
COMP PS-4	100	3	10	9	1	0.90	
COMP PS-4	100	4	10	9	1	0.90	
COMP CS-1	0	1	10	9	1	0.90	
COMP CS-1	0	2	10	10	0	1.00	87.5
COMP CS-1	0	3	10	10	0	1.00	
COMP CS-1	0	4	10	6	4	0.60	
COMP CS-1	10	1	10	10	0	1.00	
COMP CS-1	10	2	10	9	1	0.90	97.5
COMP CS-1	10	3	10	10	0	1.00	
COMP CS-1	10	4	10	10	0	1.00	
COMP CS-1	50	1	10	10	0	1.00	
COMP CS-1	50	2	10	9	1	0.90	97.5
COMP CS-1	50	3	10	10	0	1.00	
COMP CS-1	50	4	15	15	0	1.00	
COMP CS-1	100	1	10	10	0	1.00	
COMP CS-1	100	2	10	7	3	0.70	90.0
COMP CS-1	100	3	10	10	0	1.00	
COMP CS-1	100	4	10	9	1	0.90	

TABLE C.2. Daily Observations for 96-h *H. sculpta* Suspended-Particulate-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Concentration (Percent SPP)	Replicate	*H. sculpta* 4h Alive	4h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
COMP WR-1	0	1	10	0	10	0	9	1	9	0	9	0
COMP WR-1	0	2	10	0	10	0	10	0	10	0	10	0
COMP WR-1	0	3	10	0	10	0	10	0	10	0	10	0
COMP WR-1	0	4	10	0	10	0	10	0	10	0	10	0
COMP WR-1	10	1	10	0	10	0	10	0	9	1	9	0
COMP WR-1	10	2	10	0	10	0	10	0	9	1	9	0
COMP WR-1	10	3	10	0	10	0	10	0	10	0	9	1
COMP WR-1	10	4	10	0	10	0	10	0	10	0	9	1
COMP WR-1	50	1	9	1	10	0	10	0	9	1	9	0
COMP WR-1	50	2	10	0	10	0	10	0	10	0	10	0
COMP WR-1	50	3	9	1	10	0	10	0	10	0	10	0
COMP WR-1	50	4	10	0	10	0	10	0	9	1	9	0
COMP WR-1	100	1	10	0	10	0	10	0	10	0	10	0
COMP WR-1	100	2	10	0	10	0	10	0	9	1	9	0
COMP WR-1	100	3	10	0	10	0	10	0	10	0	10	0
COMP WR-1	100	4	10	0	10	0	10	0	10	0	10	0
COMP WR-2	0	1	10	0	10	0	10	0	10	0	10	0
COMP WR-2	0	2	10	0	10	0	10	0	10	0	10	0
COMP WR-2	0	3	10	0	9	1	9	0	8	1	8	0
COMP WR-2	0	4	10	0	9	1	9	0	9	0	9	0
COMP WR-2	10	1	10	0	10	0	10	0	10	0	10	0
COMP WR-2	10	2	10	0	10	0	10	0	10	0	10	0
COMP WR-2	10	3	10	0	10	0	10	0	10	0	10	0
COMP WR-2	10	4	10	0	10	0	10	0	10	0	10	0
COMP WR-2	50	1	10	0	10	0	10	0	10	0	10	0
COMP WR-2	50	2	10	0	10	0	10	0	10	0	10	0
COMP WR-2	50	3	10	0	10	0	10	0	9	1	9	0
COMP WR-2	50	4	10	0	10	0	10	0	10	0	9	1
COMP WR-2	100	1	10	0	10	0	10	0	10	0	10	0
COMP WR-2	100	2	10	0	10	0	10	0	10	0	10	0
COMP WR-2	100	3	10	0	10	0	10	0	10	0	10	0
COMP WR-2	100	4	10	0	8	2	7	1	7	0	7	0

TABLE C.2. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*H. sculpta* 4h Alive	4h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
COMP PS-1	0	1	10	0	10	0	10	0	10	0	10	0
COMP PS-1	0	2	10	0	10	0	10	0	9	1	9	0
COMP PS-1	0	3	10	0	10	0	10	0	10	0	9	1
COMP PS-1	0	4	10	0	10	0	10	0	10	0	10	0
COMP PS-1	10	1	10	0	10	0	10	0	9	1	9	0
COMP PS-1	10	2	10	0	9	1	8	1	8	0	7	1
COMP PS-1	10	3	10	0	10	0	10	0	7	2	7	0
COMP PS-1	10	4	10	0	9	1	9	0	8	1	8	0
COMP PS-1	50	1	10	0	10	0	10	0	10	0	10	0
COMP PS-1	50	2	10	0	10	0	10	0	10	0	10	0
COMP PS-1	50	3	10	0	9	1	9	0	9	0	9	0
COMP PS-1	50	4	10	0	10	0	9	1	8	1	8	0
COMP PS-1	100	1	10	0	10	0	10	0	10	0	10	0
COMP PS-1	100	2	10	0	10	0	9	1	9	0	9	0
COMP PS-1	100	3	10	0	10	0	10	0	10	0	10	0
COMP PS-1	100	4	10	0	10	0	10	0	9	1	9	0
COMP PS-2	0	1	10	0	9	1	9	0	9	0	9	0
COMP PS-2	0	2	10	0	10	0	10	0	10	0	10	0
COMP PS-2	0	3	10	0	9	1	9	0	9	0	9	0
COMP PS-2	0	4	10	0	9	1	9	0	9	0	9	0
COMP PS-2	10	1	10	0	9	1	9	0	9	0	9	0
COMP PS-2	10	2	10	0	9	1	9	0	9	0	9	0
COMP PS-2	10	3	10	0	10	0	10	0	10	0	10	0
COMP PS-2	10	4	10	0	9	1	9	0	9	0	9	0
COMP PS-2	50	1	10	0	10	0	10	0	10	0	10	0
COMP PS-2	50	2	10	0	10	0	10	0	10	0	10	0
COMP PS-2	50	3	10	0	10	0	10	0	10	0	10	0
COMP PS-2	50	4	10	0	10	0	9	1	9	0	9	0
COMP PS-2	100	1	10	0	9	1	9	0	9	0	9	0
COMP PS-2	100	2	10	0	10	0	10	0	10	0	10	0
COMP PS-2	100	3	10	0	10	0	10	0	9	1	9	0
COMP PS-2	100	4	10	0	10	0	10	0	10	0	10	0

TABLE C.2. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*H. sculpta* 4h Alive	4h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
COMP PS-3	0	1	10	0	9	1	9	0	9	0	8	1
COMP PS-3	0	2	10	0	9	1	9	0	9	0	9	0
COMP PS-3	0	3	10	0	7	3	7	0	7	0	7	0
COMP PS-3	0	4	10	0	10	0	10	0	9	1	9	0
COMP PS-3	10	1	10	0	10	0	9	1	9	0	9	0
COMP PS-3	10	2	10	0	9	1	9	0	9	0	9	0
COMP PS-3	10	3	10	0	10	0	10	0	10	0	10	0
COMP PS-3	10	4	10	0	10	0	10	0	10	0	10	0
COMP PS-3	50	1	10	0	10	0	10	0	10	0	10	0
COMP PS-3	50	2	10	0	9	1	9	0	9	0	9	0
COMP PS-3	50	3	10	0	10	0	10	0	10	0	10	0
COMP PS-3	50	4	10	0	10	0	10	0	10	0	10	0
COMP PS-3	100	1	10	0	10	0	10	0	10	0	9	1
COMP PS-3	100	2	10	0	10	0	10	0	10	0	10	0
COMP PS-3	100	3	10	0	10	0	10	0	9	1	9	0
COMP PS-3	100	4	10	0	10	0	10	0	10	0	10	0
COMP PS-4	0	1	10	0	9	1	9	0	7	2	7	0
COMP PS-4	0	2	10	0	8	2	8	0	7	1	7	0
COMP PS-4	0	3	10	0	9	1	9	0	9	0	9	0
COMP PS-4	0	4	10	0	9	1	9	0	9	0	8	1
COMP PS-4	10	1	10	0	10	0	10	0	10	0	10	0
COMP PS-4	10	2	10	0	10	0	10	0	9	1	9	0
COMP PS-4	10	3	10	0	9	1	9	0	9	0	9	0
COMP PS-4	10	4	10	0	10	0	9	1	9	0	9	0
COMP PS-4	50	1	10	0	10	0	10	0	10	0	10	0
COMP PS-4	50	2	10	0	9	1	9	0	9	0	8	1
COMP PS-4	50	3	10	0	10	0	10	0	9	1	9	0
COMP PS-4	50	4	10	0	9	1	9	0	9	0	9	0
COMP PS-4	100	1	10	0	9	1	9	0	9	0	9	0
COMP PS-4	100	2	10	0	10	0	10	0	10	0	10	0
COMP PS-4	100	3	10	0	9	1	9	0	9	0	9	0
COMP PS-4	100	4	10	0	9	1	9	0	9	0	9	0

TABLE C.2. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*H. sculpta* 4h Alive	4h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
COMP CS-1	0	1	10	0	9	1	9	0	9	0	9	0
COMP CS-1	0	2	10	0	10	0	10	0	10	0	10	0
COMP CS-1	0	3	10	0	10	0	10	0	10	0	10	0
COMP CS-1	0	4	10	0	6	4	6	0	6	0	6	0
COMP CS-1	10	1	10	0	10	0	10	0	10	0	10	0
COMP CS-1	10	2	10	0	10	0	10	0	9	1	9	0
COMP CS-1	10	3	10	0	10	0	10	0	10	0	10	0
COMP CS-1	10	4	10	0	10	0	10	0	10	0	10	0
COMP CS-1	50	1	10	0	10	0	10	0	10	0	10	0
COMP CS-1	50	2	10	0	9	1	9	0	9	0	9	0
COMP CS-1	50	3	10	0	10	0	10	0	10	0	10	0
COMP CS-1	50	4	15	0	10	0	15	0	15	0	15	0
COMP CS-1	100	1	10	0	10	0	10	0	10	0	10	0
COMP CS-1	100	2	10	0	8	2	7	1	7	0	7	0
COMP CS-1	100	3	10	0	10	0	10	0	10	0	10	0
COMP CS-1	100	4	10	0	10	0	10	0	9	1	9	0

TABLE C.3. Water Quality Summary for 96-h *H. sculpta* Suspended-Particulate-Phase Test, John F. Baldwin Ship Channel Program

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		13.0	17.0	7.53	8.53	4.0	---	30.0	34.0
COMP WR-1	0	14.1	14.9	7.93	8.12	7.7	8.1	30.0	32.0
COMP WR-1	10	14.1	14.9	7.85	8.10	7.6	8.4	30.5	31.5
COMP WR-1	50	14.1	14.8	7.63	8.10	6.3	8.4	31.0	31.5
COMP WR-1	100	14.1	14.8	7.87	8.15	7.6	8.3	31.0	32.5
COMP WR-2	0	14.4	15.2	7.84	8.06	7.3	8.2	30.0	32.0
COMP WR-2	10	14.4	15.1	8.01	8.12	7.8	8.2	30.5	32.0
COMP WR-2	50	14.6	15.1	8.02	8.13	7.7	8.2	30.5	32.0
COMP WR-2	100	14.5	15.2	8.12	8.19	7.4	8.2	30.5	31.5
COMP PS-1	0	14.1	14.9	7.90	8.06	7.7	8.3	30.0	31.5
COMP PS-1	10	14.1	14.9	7.96	8.11	7.6	8.2	30.5	32.0
COMP PS-1	50	14.0	14.9	7.87	8.12	7.6	8.3	30.5	31.5
COMP PS-1	100	14.0	14.7	8.00	8.14	7.7	8.2	30.5	31.5
COMP PS-2	0	14.5	15.1	7.76	8.10	5.9	8.2	30.0	32.0
COMP PS-2	10	14.3	15.3	7.97	8.07	7.4	8.3	30.0	32.0
COMP PS-2	50	14.4	15.0	7.94	8.09	7.6	8.2	30.0	31.5
COMP PS-2	100	14.4	15.1	7.96	8.15	7.6	8.1	30.0	31.5
COMP PS-3	0	14.4	15.2	7.97	8.08	7.4	8.3	30.5	31.5
COMP PS-3	10	14.4	15.2	7.90	8.07	7.4	8.2	30.5	31.5
COMP PS-3	50	14.4	15.1	7.78	8.14	6.9	8.2	30.0	31.5
COMP PS-3	100	14.5	15.2	8.01	8.18	7.4	8.2	30.5	31.5
COMP PS-4	0	14.5	14.9	7.93	8.10	7.4	8.3	30.5	31.5
COMP PS-4	10	14.4	14.9	7.97	8.18	7.6	8.1	30.5	32.0
COMP PS-4	50	14.5	14.9	7.96	8.10	7.6	8.1	30.0	31.5
COMP PS-4	100	14.5	14.9	7.95	8.09	7.4	8.2	30.0	31.5
COMP CS-1	0	14.4	15.0	7.84	8.12	5.7	8.1	30.5	32.0
COMP CS-1	10	14.4	15.0	8.00	8.12	7.6	8.1	30.0	31.5
COMP CS-1	50	14.5	14.9	7.95	8.05	7.4	8.1	30.0	31.5
COMP CS-1	100	14.4	15.0	7.88	8.11	7.2	8.2	30.0	31.0

TABLE C.4. Results for All Replicates in 96-h *H. sculpta* Reference Toxicant Test, John F. Baldwin Ship Channel Program

		H. sculpta				
Copper (µg/L)	Replicate	Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
0	1	10	9	1	0.90	
0	2	10	9	1	0.90	0.87
0	3	10	8	2	0.80	
50	1	10	0	10	0.00	
50	2	10	1	9	0.10	0.03
50	3	10	0	10	0.00	
100	1	10	0	10	0.00	
100	2	10	0	10	0.00	0.00
100	3	10	0	10	0.00	
150	1	10	0	10	0.00	
150	2	10	0	10	0.00	0.00
150	3	10	0	10	0.00	
200	1	10	0	10	0.00	
200	2	10	0	10	0.00	0.00
200	3	10	0	10	0.00	

TABLE C.5. Daily Observations of 96-h *H. sculpta* Reference Toxicant Test, John F. Baldwin Ship Channel Program

Copper (µg/L)	Replicate	*H. sculpta* 3h Alive	3h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
0	1	10	0	9	1	9	0	9	0	9	0
0	2	10	0	9	1	9	0	9	0	9	0
0	3	10	0	10	0	9	1	8	1	8	0
50	1	10	0	4	6	1	3	0	1	TRM[a]	TRM
50	2	10	0	8	2	3	5	1	2	1	0
50	3	10	0	8	2	4	4	0	4	TRM	TRM
100	1	10	0	4	6	0	4	TRM	TRM	TRM	TRM
100	2	10	0	0	10	TRM	TRM	TRM	TRM	TRM	TRM
100	3	10	0	2	8	2	0	0	2	TRM	TRM
150	1	10	0	3	7	0	3	TRM	TRM	TRM	TRM
150	2	10	0	10	0	1	9	0	1	TRM	TRM
150	3	10	0	0	10	TRM	TRM	TRM	TRM	TRM	TRM
200	1	10	0	0	10	TRM	TRM	TRM	TRM	TRM	TRM
200	2	10	0	0	10	TRM	TRM	TRM	TRM	TRM	TRM
200	3	10	0	0	10	TRM	TRM	TRM	TRM	TRM	TRM

(a) TRM Terminated.

TABLE C.6. Water Quality Summary for 96-h *H. sculpta* Reference Toxicant Test, John F. Baldwin Ship Channel Program

Copper (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	13.0	17.0	7.48	8.48	4.0	---	30.0	34.0
0	14.6	15.2	7.92	8.08	7.8	8.1	30.5	32.5
50	14.6	15.4	7.96	8.05	8.0	8.2	30.0	32.5
100	14.6	15.2	7.94	8.04	8.0	8.2	30.0	32.0
150	14.9	15.2	7.97	8.01	7.8	8.3	30.5	31.5
200	15.0	15.2	7.91	7.96	8.0	8.1	30.0	31.0

APPENDIX D

96-h STATIC SUSPENDED-PARTICULATE-PHASE TEST WITH *CITHARICHTHYS stigmaeus*

TABLE D.1. Results for All Replicates in 96-h *C. stigmaeus* Suspended-Particulate-Phase Test, John F. Baldwin Ship Channel Program

Sc Ty	Sediment Treatment	Concentration (Percent SPP)	Replicate	*C. stigmaeus* Number Initiated	Number Alive	Number Dead or Missing	Proportion Surviving	Mean Percent Surviving
C(	COMP WR-1	0	1	10	10	0	1.00	
C(	COMP WR-1	0	2	10	10	0	1.00	
C(	COMP WR-1	0	3	10	10	0	1.00	
C(	COMP WR-1	0	4	10	10	0	1.00	100.0
C(	COMP WR-1	10	1	10	10	0	1.00	
C(	COMP WR-1	10	2	10	10	0	1.00	
C(	COMP WR-1	10	3	10	10	0	1.00	
C(	COMP WR-1	10	4	10	10	0	1.00	100.0
C(	COMP WR-1	50	1	10	10	0	1.00	
C(	COMP WR-1	50	2	10	10	0	1.00	
C(	COMP WR-1	50	3	10	10	0	1.00	
C(	COMP WR-1	50	4	10	10	0	1.00	100.0
C(	COMP WR-1	100	1	10	10	0	1.00	
C(	COMP WR-1	100	2	10	10	0	1.00	
C	COMP WR-1	100	3	10	10	0	1.00	
C	COMP WR-1	100	4	10	10	0	1.00	100.0
C	COMP WR-2	0	1	10	10	0	1.00	
C	COMP WR-2	0	2	10	10	0	1.00	
C	COMP WR-2	0	3	10	10	0	1.00	
C	COMP WR-2	0	4	10	9	1	0.90	97.5
C	COMP WR-2	10	1	10	10	0	1.00	
C	COMP WR-2	10	2	10	10	0	1.00	
C	COMP WR-2	10	3	10	10	0	1.00	
C	COMP WR-2	10	4	10	9	1	0.90	97.5
C	COMP WR-2	50	1	10	10	0	1.00	
C	COMP WR-2	50	2	10	10	0	1.00	
C	COMP WR-2	50	3	10	10	0	1.00	
C	COMP WR-2	50	4	10	10	0	1.00	100.0
C	COMP WR-2	100	1	10	10	0	1.00	
C	COMP WR-2	100	2	10	10	0	1.00	
C	COMP WR-2	100	3	10	9	1	0.90	
C	COMP WR-2	100	4	10	9	1	0.90	95.0
C	COMP PS-1	0	1	10	10	0	1.00	
C	COMP PS-1	0	2	10	10	0	1.00	
C	COMP PS-1	0	3	10	10	0	1.00	
C	COMP PS-1	0	4	10	10	0	1.00	100.0
C	COMP PS-1	10	1	10	10	0	1.00	
C	COMP PS-1	10	2	10	10	0	1.00	
C	COMP PS-1	10	3	10	10	0	1.00	
C	COMP PS-1	10	4	10	10	0	1.00	100.0
C	COMP PS-1	50	1	10	10	0	1.00	
C	COMP PS-1	50	2	10	10	0	1.00	
C	COMP PS-1	50	3	10	10	0	1.00	
C	COMP PS-1	50	4	10	10	0	1.00	100.0

TABLE D.1. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*C. stigmacus* Number Initiated	Number Alive	Number Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP PS-1	100	1	10	10	0	1.00	
COMP PS-1	100	2	10	10	0	1.00	
COMP PS-1	100	3	10	10	0	1.00	
COMP PS-1	100	4	10	10	0	1.00	100.0
COMP PS-2		1	10	10	0	1.00	
COMP PS-2	0	2	10	10	0	1.00	
COMP PS-2	0	3	10	10	0	1.00	
COMP PS-2	0	4	10	10	0	1.00	100.0
COMP PS-2	10	1	10	10	0	1.00	
COMP PS-2	10	2	10	10	0	1.00	
COMP PS-2	10	3	10	9	1	0.90	
COMP PS-2	10	4	10	10	0	1.00	97.5
COMP PS-2	50	1	10	10	0	1.00	
COMP PS-2	50	2	10	10	0	1.00	
COMP PS-2	50	3	10	10	0	1.00	
COMP PS-2	50	4	10	10	0	1.00	100.0
COMP PS-2	100	1	10	10	0	1.00	
COMP PS-2	100	2	10	10	0	1.00	
COMP PS-2	100	3	10	10	0	1.00	
COMP PS-2	100	4	10	10	0	1.00	100.0
COMP PS-3	0	1	10	10	0	1.00	
COMP PS-3	0	2	10	9	1	0.90	
COMP PS-3	0	3	10	10	0	1.00	
COMP PS-3	0	4	10	10	0	1.00	97.5
COMP PS-3	10	1	10	9	1	0.90	
COMP PS-3	10	2	10	10	0	1.00	
COMP PS-3	10	3	10	10	0	1.00	
COMP PS-3	10	4	10	10	0	1.00	97.5
COMP PS-3	50	1	10	10	0	1.00	
COMP PS-3	50	2	10	10	0	1.00	
COMP PS-3	50	3	10	10	0	1.00	
COMP PS-3	50	4	10	10	0	1.00	100.0
COMP PS-3	100	1	10	10	0	1.00	
COMP PS-3	100	2	10	10	0	1.00	
COMP PS-3	100	3	10	10	0	1.00	
COMP PS-3	100	4	10	9	1	0.90	97.5
COMP PS-4	0	1	10	10	0	1.00	
COMP PS-4	0	2	10	10	0	1.00	
COMP PS-4	0	3	10	10	0	1.00	
COMP PS-4	0	4	10	10	0	1.00	100.0
COMP PS-4	10	1	10	10	0	1.00	
COMP PS-4	10	2	10	10	0	1.00	
COMP PS-4	10	3	10	10	0	1.00	
COMP PS-4	10	4	10	10	0	1.00	100.0

TABLE D.1. (contd)

Se Ir	Sediment Treatment	Concentration (Percent SPP)	Replicate	*C. stigmaeus* Number Initiated	Number Alive	Number Dead or Missing	Proportion Surviving	Mean Percent Surviving
C(	COMP PS-4	50	1	10	10	0	1.00	
C(	COMP PS-4	50	2	10	10	0	1.00	
C(	COMP PS-4	50	3	10	10	0	1.00	
C(	COMP PS-4	50	4	10	10	0	1.00	100.0
C(	COMP PS-4	100	1	10	10	0	1.00	
C(	COMP PS-4	100	2	10	8	2	0.80	
C(	COMP PS-4	100	3	10	9	1	0.90	
C(	COMP PS-4	100	4	10	10	0	1.00	92.5
C(	COMP CS-1	0	1	10	10	0	1.00	
C(	COMP CS-1	0	2	10	10	0	1.00	
C(	COMP CS-1	0	3	10	10	0	1.00	
C(	COMP CS-1	0	4	10	10	0	1.00	100.0
C(	COMP CS-1	10	1	10	10	0	1.00	
C(	COMP CS-1	10	2	10	10	0	1.00	
C(	COMP CS-1	10	3	10	10	0	1.00	
C(	COMP CS-1	10	4	10	10	0	1.00	100.0
C	COMP CS-1	50	1	10	10	0	1.00	
C	COMP CS-1	50	2	10	10	0	1.00	
C	COMP CS-1	50	3	10	10	0	1.00	
C	COMP CS-1	50	4	10	10	0	1.00	100.0
C	COMP CS-1	100	1	10	10	0	1.00	
C	COMP CS-1	100	2	10	10	0	1.00	
C	COMP CS-1	100	3	10	10	0	1.00	
C	COMP CS-1	100	4	10	10	0	1.00	100.0

TABLE D.2. Daily Observations for 96-h *C. stigmaeus* Suspended-Particulate-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Concentration (Percent SPP)	Replicate	*C. stigmaeus* 3h Alive	3h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
COMP WR-1	0	1	10	0	10	0	10	0	10	0	10	0
COMP WR-1	0	2	10	0	10	0	10	0	10	0	10	0
COMP WR-1	0	3	10	0	10	0	10	0	10	0	10	0
COMP WR-1	0	4	10	0	10	0	10	0	10	0	10	0
COMP WR-1	10	1	10	0	10	0	10	0	10	0	10	0
COMP WR-1	10	2	10	0	10	0	10	0	10	0	10	0
COMP WR-1	10	3	10	0	10	0	10	0	10	0	10	0
COMP WR-1	10	4	10	0	10	0	10	0	10	0	10	0
COMP WR-1	50	1	10	0	10	0	10	0	10	0	10	0
COMP WR-1	50	2	10	0	10	0	10	0	10	0	10	0
COMP WR-1	50	3	10	0	10	0	10	0	10	0	10	0
COMP WR-1	50	4	10	0	10	0	10	0	10	0	10	0
COMP WR-1	100	1	10	0	10	0	10	0	10	0	10	0
COMP WR-1	100	2	10	0	10	0	10	0	10	0	10	0
COMP WR-1	100	3	10	0	10	0	10	0	10	0	10	0
COMP WR-1	100	4	10	0	10	0	10	0	10	0	10	0
COMP WR-2	0	1	10	0	10	0	10	0	10	0	10	0
COMP WR-2	0	2	10	0	10	0	10	0	10	0	10	0
COMP WR-2	0	3	10	0	10	0	10	0	10	0	10	0
COMP WR-2	0	4	10	0	10	0	10	0	10	0	9	1
COMP WR-2	10	1	10	0	10	0	10	0	10	0	10	0
COMP WR-2	10	2	10	0	10	0	10	0	10	0	10	0
COMP WR-2	10	3	10	0	10	0	10	0	10	0	10	0
COMP WR-2	10	4	10	0	9	1	9	0	9	0	9	0
COMP WR-2	50	1	10	0	10	0	10	0	10	0	10	0
COMP WR-2	50	2	10	0	10	0	10	0	10	0	10	0
COMP WR-2	50	3	10	0	10	0	10	0	10	0	10	0
COMP WR-2	50	4	10	0	10	0	10	0	10	0	10	0
COMP WR-2	100	1	10	0	10	0	10	0	10	0	10	0
COMP WR-2	100	2	10	0	10	0	10	0	10	0	10	0
COMP WR-2	100	3	10	0	10	0	10	0	10	0	9	1
COMP WR-2	100	4	10	0	10	0	10	0	10	0	9	1
COMP PS-1	0	1	10	0	10	0	10	0	10	0	10	0
COMP PS-1	0	2	10	0	10	0	10	0	10	0	10	0
COMP PS-1	0	3	10	0	10	0	10	0	10	0	10	0
COMP PS-1	0	4	10	0	10	0	10	0	10	0	10	0
COMP PS-1	10	1	10	0	10	0	10	0	10	0	10	0
COMP PS-1	10	2	10	0	10	0	10	0	10	0	10	0
COMP PS-1	10	3	10	0	10	0	10	0	10	0	10	0
COMP PS-1	10	4	10	0	10	0	10	0	10	0	10	0
COMP PS-1	50	1	10	0	10	0	10	0	10	0	10	0
COMP PS-1	50	2	10	0	10	0	10	0	10	0	10	0
COMP PS-1	50	3	10	0	10	0	10	0	10	0	10	0
COMP PS-1	50	4	10	0	10	0	10	0	10	0	10	0

TABLE D.2. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*C. stigmaeus* 3h Alive	3h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
COMP PS-1	100	1	10	0	10	0	10	0	10	0	10	0
COMP PS-1	100	2	10	0	10	0	10	0	10	0	10	0
COMP PS-1	100	3	10	0	10	0	10	0	10	0	10	0
COMP PS-1	100	4	10	0	10	0	10	0	10	0	10	0
COMP PS-2	0	1	10	0	10	0	10	0	10	0	10	0
COMP PS-2	0	2	10	0	10	0	10	0	10	0	10	0
COMP PS-2	0	3	10	0	10	0	10	0	10	0	10	0
COMP PS-2	0	4	10	0	10	0	10	0	10	0	10	0
COMP PS-2	10	1	10	0	10	0	10	0	10	0	10	0
COMP PS-2	10	2	10	0	10	0	10	0	10	0	10	0
COMP PS-2	10	3	10	0	10	0	10	0	10	0	9	1
COMP PS-2	10	4	10	0	10	0	10	0	10	0	10	0
COMP PS-2	50	1	10	0	10	0	10	0	10	0	10	0
COMP PS-2	50	2	10	0	10	0	10	0	10	0	10	0
COMP PS-2	50	3	10	0	10	0	10	0	10	0	10	0
COMP PS-2	50	4	10	0	10	0	10	0	10	0	10	0
COMP PS-2	100	1	10	0	10	0	10	0	10	0	10	0
COMP PS-2	100	2	10	0	10	0	10	0	10	0	10	0
COMP PS-2	100	3	10	0	10	0	10	0	10	0	10	0
COMP PS-2	100	4	10	0	10	0	10	0	10	0	10	0
COMP PS-3	0	1	10	0	10	0	10	0	10	0	10	0
COMP PS-3	0	2	10	0	10	0	10	0	9	1	9	0
COMP PS-3	0	3	10	0	10	0	10	0	10	0	10	0
COMP PS-3	0	4	10	0	10	0	10	0	10	0	10	0
COMP PS-3	10	1	10	0	9	1	9	0	9	0	9	0
COMP PS-3	10	2	10	0	10	0	10	0	10	0	10	0
COMP PS-3	10	3	10	0	10	0	10	0	10	0	10	0
COMP PS-3	10	4	10	0	10	0	10	0	10	0	10	0
COMP PS-3	50	1	10	0	10	0	10	0	10	0	10	0
COMP PS-3	50	2	10	0	10	0	10	0	10	0	10	0
COMP PS-3	50	3	10	0	10	0	10	0	10	0	10	0
COMP PS-3	50	4	10	0	10	0	10	0	10	0	10	0
COMP PS-3	100	1	10	0	10	0	10	0	10	0	10	0
COMP PS-3	100	2	10	0	10	0	10	0	10	0	10	0
COMP PS-3	100	3	10	0	10	0	10	0	10	0	10	0
COMP PS-3	100	4	10	0	10	0	10	0	10	0	9	1
COMP PS-4	0	1	10	0	10	0	10	0	10	0	10	0
COMP PS-4	0	2	10	0	10	0	10	0	10	0	10	0
COMP PS-4	0	3	10	0	10	0	10	0	10	0	10	0
COMP PS-4	0	4	10	0	10	0	10	0	10	0	10	0
COMP PS-4	10	1	10	0	10	0	10	0	10	0	10	0
COMP PS-4	10	2	10	0	10	0	10	0	10	0	10	0
COMP PS-4	10	3	10	0	10	0	10	0	10	0	10	0
COMP PS-4	10	4	10	0	10	0	10	0	10	0	10	0
COMP PS-4	50	1	10	0	10	0	10	0	10	0	10	0
COMP PS-4	50	2	10	0	10	0	10	0	10	0	10	0
COMP PS-4	50	3	10	0	10	0	10	0	10	0	10	0
COMP PS-4	50	4	10	0	10	0	10	0	10	0	10	0

TABLE D.2. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*C. stigmaeus* 3h Alive	3h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
COMP PS-4	100	1	10	0	10	0	10	0	10	0	10	0
COMP PS-4	100	2	10	0	8	2	8	0	8	0	8	0
COMP PS-4	100	3	10	0	9	1	9	0	9	0	9	0
COMP PS-4	100	4	10	0	10	0	10	0	10	0	10	0
COMP CS-1	0	1	10	0	10	0	10	0	10	0	10	0
COMP CS-1	0	2	10	0	10	0	10	0	10	0	10	0
COMP CS-1	0	3	10	0	10	0	10	0	10	0	10	0
COMP CS-1	0	4	10	0	10	0	10	0	10	0	10	0
COMP CS-1	10	1	10	0	10	0	10	0	10	0	10	0
COMP CS-1	10	2	10	0	10	0	10	0	10	0	10	0
COMP CS-1	10	3	10	0	10	0	10	0	10	0	10	0
COMP CS-1	10	4	10	0	10	0	10	0	10	0	10	0
COMP CS-1	50	1	10	0	10	0	10	0	10	0	10	0
COMP CS-1	50	2	10	0	10	0	10	0	10	0	10	0
COMP CS-1	50	3	10	0	10	0	10	0	10	0	10	0
COMP CS-1	50	4	10	0	10	0	10	0	10	0	10	0
COMP CS-1	100	1	10	0	10	0	10	0	10	0	10	0
COMP CS-1	100	2	10	0	10	0	10	0	10	0	10	0
COMP CS-1	100	3	10	0	10	0	10	0	10	0	10	0
COMP CS-1	100	4	10	0	10	0	10	0	10	0	10	0

TABLE D.3. Water Quality Summary for 96-h *C. stigmaeus* Suspended-Particulate-Phase Test, John F. Baldwin Ship Channel Program

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		13.0	17.0	7.90	8.90	6.0	---	28.0	32.0
COMP WR-1	0	15.2	16.4	7.95	8.09	7.6	8.1	30.5	32.0
COMP WR-1	10	15.3	16.1	7.87	8.09	7.0	8.0	30.5	31.5
COMP WR-1	50	14.8	16.0	8.01	8.14	7.6	8.1	30.5	32.
COMP WR-1	100	15.0	16.0	8.03	8.17	7.6	7.9	30.5	31.0
COMP WR-2	0	15.3	16.0	7.99	8.11	7.6	8.5	30.0	31.5
COMP WR-2	10	15.2	16.3	7.97	8.11	7.6	8.4	30.5	31.5
COMP WR-2	50	15.0	15.8	7.95	8.20	6.5	8.0	30.5	32.0
COMP WR-2	100	15.1	15.8	8.00	8.27	7.1	7.9	30.4	32.0
COMP PS-1	0	14.8	16.4	8.01	8.10	7.6	8.4	30.5	31.5
COMP PS-1	10	14.7	16.7	8.02	8.10	7.5	8.4	30.5	31.5
COMP PS-1	50	14.2	15.9	8.02	8.12	7.5	8.3	30.5	31.5
COMP PS-1	100	14.6	15.8	8.04	8.22	7.7	8.1	30.5	31.0
COMP PS-2	0	15.2	16.3	7.97	8.09	7.0	8.2	30.5	32.0
COMP PS-2	10	15.0	16.3	7.95	8.09	7.6	8.2	30.5	31.5
COMP PS-2	50	15.2	16.0	7.92	8.15	7.4	8.2	30.5	31.5
COMP PS-2	100	15.1	15.9	7.94	8.21	7.3	8.1	30.0	31.5
COMP PS-3	0	15.2	16.3	7.99	8.12	7.4	8.6	30.5	32.0
COMP PS-3	10	15.1	16.3	7.97	8.12	7.5	8.5	30.5	32.0
COMP PS-3	50	14.8	16.0	7.92	8.10	7.5	8.2	30.0	31.0
COMP PS-3	100	14.9	15.8	7.91	8.13	7.6	8.0	30.0	31.5
COMP PS-4	0	15.3	16.5	7.97	8.08	7.6	8.2	31.0	32.0
COMP PS-4	10	15.4	16.0	7.90	8.08	6.4	8.1	30.5	32.0
COMP PS-4	50	15.3	15.9	7.92	8.08	7.5	8.6	30.5	31.0
COMP PS-4	100	15.3	15.8	7.84	8.07	7.4	8.3	30.0	31.0
COMP CS-1	0	15.0	16.1	7.94	8.08	7.4	8.1	30.5	32.0
COMP CS-1	10	15.4	16.0	7.95	8.08	7.5	8.2	30.5	32.0
COMP CS-1	50	15.3	16.5	7.94	8.09	7.2	8.1	30.0	31.5
COMP CS-1	100	15.1	15.8	7.84	8.07	7.3	8.3	30.0	31.0

TABLE D.4. Results for All Replicates in 96-h *C. stigmaeus* Reference Toxicant Test, John F. Baldwin Ship Channel Program

		C. stigmaeus				
Copper (mg/L)	Replicate	Number Initiated	Number Alive	Number Dead or Missing	Proportion Surviving	Mean Percent Surviving
0.0	1	10	9	1	0.90	
0.0	2	10	10	0	1.00	
0.0	3	10	10	0	1.00	0.97
0.5	1	10	9	1	0.90	
0.5	2	10	8	2	0.80	
0.5	3	10	9	1	0.90	0.87
1.0	1	10	7	3	0.70	
1.0	2	10	4	6	0.40	
1.0	3	10	6	4	0.60	0.57
1.5	1	10	0	10	0.00	
1.5	2	10	0	10	0.00	
1.5	3	10	0	10	0.00	0.00
2.0	1	10	0	10	0.00	
2.0	2	10	0	10	0.00	
2.0	3	10	0	10	0.00	0.00

TABLE D.5. Daily Observations of 96-h *C. stigmaeus* Reference Toxicant Test, John F. Baldwin Ship Channel Program

Cc (µ	Copper (mg/L)	Replicate	*C. stigmaeus* 3h Alive	3h Dead	24h Alive	24h Dead	48h Alive	48h Dead	72h Alive	72h Dead	96h Alive	96h Dead
(	0.0	1	10	0	10	0	10	0	9	0	9	0
(	0.0	2	10	0	10	0	10	0	10	0	10	0
(	0.0	3	10	0	10	0	10	0	10	0	10	0
	0.5	1	10	0	10	0	10	0	10	0	9	1
	0.5	2	10	0	10	0	10	0	9	1	8	1
	0.5	3	10	0	10	0	10	0	9	1	9	0
	1.0	1	10	0	10	0	10	0	10	0	7	3
	1.0	2	10	0	10	0	8	2	6	2	4	2
	1.0	3	10	0	10	0	10	0	10	0	6	4
	1.5	1	10	0	10	0	6	4	0	6	0	0
	1.5	2	10	0	10	0	7	3	1	6	0	1
	1.5	3	10	0	10	0	3	7	0	3	0	0
	2.0	1	10	0	4	6	0	10	0	0	0	0
	2.0	2	10	0	10	0	0	10	0	0	0	0
	2.0	3	10	0	10	0	0	10	0	0	0	0

TABLE D.6. Water Quality Summary for 96-h *C. stigmaeus* Reference Toxicant Test, John F. Baldwin Ship Channel Program

Copper (mg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	13.0	17.0	7.44	8.44	6.0	---	28.0	32.0
0.0	15.2	16.7	7.94	8.07	7.4	7.9	30.5	32.5[a]
0.5	15.3	16.0	7.90	8.04	7.3	8.0	31.0	31.5
1.0	15.3	16.0	7.82	8.08	7.6	8.2	30.5	31.5
1.5	15.2	16.4	7.65	8.07	7.8	8.1	30.5	32.0
2.0	15.3	16.4	7.44	8.06	7.7	8.1	30.5	32.0

(a) Data point out of range.

APPENDIX E

72-h STATIC SUSPENDED-PARTICULATE-PHASE TEST WITH *DENDRASTER excentricus*

TABLE E.1. Results for All Replicates in 72-h *D. excentricus* Suspended-Particulate-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Concentration (Percent SPP)	Replicate	*D. excentricus* Normal Larvae	Normal Delayed	Abnormal	Proportion Normal[a]	All Replicates	Proportion Survival	All Replicates
COMP WR-1	0	1	228	5	0	0.90		0.92	
COMP WR-1	0	2	237	5	0	0.94		0.96	
COMP WR-1	0	3	246	7	0	0.98		1.00	
COMP WR-1	0	4	234	12	0	0.93	0.94	0.98	0.97
COMP WR-1	10	1	233	4	1	0.92		0.94	
COMP WR-1	10	2	235	9	0	0.93		0.97	
COMP WR-1	10	3	224	9	0	0.89		0.92	
COMP WR-1	10	4	236	16	0	0.94	0.92	1.00	0.96
COMP WR-1	50	1	225	7	0	0.89		0.92	
COMP WR-1	50	2	228	5	1	0.90		0.93	
COMP WR-1	50	3	215	12	0	0.85		0.90	
COMP WR-1	50	4	238	5	1	0.94	0.90	0.97	0.93
COMP WR-1	100	1	158	30	0	0.63		0.75	
COMP WR-1	100	2	243	9	0	0.96		1.00	
COMP WR-1	100	3	214	28	1	0.85		0.96	
COMP WR-1	100	4	245	15	0	0.97	0.85	1.00[b]	0.93
COMP WR-2	0	1	210	6	0	0.83		0.86	
COMP WR-2	0	2	248	10	0	0.98		1.00[b]	
COMP WR-2	0	3	224	9	0	0.89		0.92	
COMP WR-2	0	4	197	7	1	0.78	0.87	0.81	0.90
COMP WR-2	10	1	228	3	0	0.90		0.92	
COMP WR-2	10	2	219	11	0	0.87		0.91	
COMP WR-2	10	3	211	6	0	0.84		0.86	
COMP WR-2	10	4	227	12	1	0.90	0.88	0.95	0.91
COMP WR-2	50	1	207	17	1	0.82		0.89	
COMP WR-2	50	2	221	4	0	0.88		0.89	
COMP WR-2	50	3	212	11	0	0.84		0.88	
COMP WR-2	50	4	211	17	0	0.84	0.84	0.90	0.89
COMP WR-2	100	1	170	67	0	0.67		0.94	
COMP WR-2	100	2	145	52	0	0.58		0.78	
COMP WR-2	100	3	182	52	1	0.72		0.93	
COMP WR-2	100	4	153	41	0	0.61	0.64	0.77	0.86

TABLE E.1 (contd)

TABLE E.1. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*D. excentricus* Normal Larvae	Normal Delayed	Abnormal	Proportion Normal[a]	All Replicates	Proportion Survival	All Replicates
COMP PS-1	0	1	187	20	0	0.74		0.82	
COMP PS-1	0	2	204	6	0	0.81		0.83	
COMP PS-1	0	3	243	6	0	0.96		0.99	
COMP PS-1	0	4	216	9	0	0.86	0.84	0.89	0.88
COMP PS-1	10	1	210	4	0	0.83		0.85	
COMP PS-1	10	2	204	7	0	0.81		0.84	
COMP PS-1	10	3	228	5	0	0.90		0.92	
COMP PS-1	10	4	216	10	3	0.86	0.85	0.91	0.88
COMP PS-1	50	1	0	246	0	0.00		0.98	
COMP PS-1	50	2	0	228	0	0.00		0.90	
COMP PS-1	50	3	0	252	1	0.00		1.00	
COMP PS-1	50	4	0	236	0	0.00	0.00	0.94	0.96
COMP PS-1	100	1	0	129	0	0.00		0.51	
COMP PS-1	100	2	0	115	0	0.00		0.46	
COMP PS-1	100	3	0	119	0	0.00		0.47	
COMP PS-1	100	4	0	134	0	0.00	0.00	0.53	0.49
COMP PS-2	0	1	216	5	1	0.86		0.88	
COMP PS-2	0	2	201	16	1	0.80		0.87	
COMP PS-2	0	3	231	7	0	0.92		0.94	
COMP PS-2	0	4	199	11	1	0.79	0.84	0.84	0.88
COMP PS-2	10	1	226	9	1	0.90		0.94	
COMP PS-2	10	2	221	6	0	0.88		0.90	
COMP PS-2	10	3	204	8	1	0.81		0.85	
COMP PS-2	10	4	195	7	1	0.77	0.84	0.81	0.87
COMP PS-2	50	1	0	238	1	0.00		0.95	
COMP PS-2	50	2	193	7	2	0.77		0.80	
COMP PS-2	50	3	0	209	0	0.00		0.83	
COMP PS-2	50	4	0	249	0	0.00	0.19	0.99	0.89
COMP PS-2	100	1	0	152	0	0.00		0.60	
COMP PS-2	100	2	0	106	0	0.00		0.42	
COMP PS-2	100	3	0	110	0	0.00		0.44	
COMP PS-2	100	4	0	139	0	0.00	0.00	0.55	0.50

TABLE E.1. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*D. excentricus* Normal Larvae	Normal Delayed	Abnormal	Proportion Normal[a]	All Replicates	Proportion Survival	All Replicates
COMP PS-3	0	1	218	12	0	0.87		0.91	
COMP PS-3	0	2	217	8	0	0.86		0.89	
COMP PS-3	0	3	224	11	0	0.89		0.93	
COMP PS-3	0	4	234	7	0	0.93	0.89	0.96	0.92
COMP PS-3	10	1	204	11	1	0.81		0.86	
COMP PS-3	10	2	230	6	0	0.91		0.94	
COMP PS-3	10	3	231	9	0	0.92		0.95	
COMP PS-3	10	4	223	4	0	0.88	0.88	0.90	0.91
COMP PS-3	50	1	258	4	0	1.00[b]		1.00[b]	
COMP PS-3	50	2	233	6	0	0.92		0.95	
COMP PS-3	50	3	156	49	2	0.62		0.82	
COMP PS-3	50	4	214	4	1	0.85	0.85	0.87	0.91
COMP PS-3	100	1	67	114	0	0.27		0.72	
COMP PS-3	100	2	146	45	0	0.58		0.76	
COMP PS-3	100	3	186	25	1	0.74		0.84	
COMP PS-3	100	4	165	55	2	0.65	0.56	0.88	0.80
COMP PS-4	0	1	221	6	0	0.88		0.90	
COMP PS-4	0	2	214	9	0	0.85		0.88	
COMP PS-4	0	3	231	3	0	0.92		0.93	
COMP PS-4	0	4	217	10	1	0.86	0.88	0.90	0.90
COMP PS-4	10	1	237	6	0	0.94		0.96	
COMP PS-4	10	2	207	11	0	0.82		0.87	
COMP PS-4	10	3	220	7	1	0.87		0.90	
COMP PS-4	10	4	231	2	1	0.92	0.89	0.93	0.92
COMP PS-4	50	1	200	3	0	0.79		0.81	
COMP PS-4	50	2	199	10	0	0.79		0.83	
COMP PS-4	50	3	224	10	0	0.89		0.93	
COMP PS-4	50	4	198	6	1	0.79	0.81	0.81	0.84
COMP PS-4	100	1	0	186	0	0.00		0.74	
COMP PS-4	100	2	75	95	0	0.30		0.67	
COMP PS-4	100	3	14	202	0	0.06		0.86	
COMP PS-4	100	4	0	235	0	0.00	0.09	0.93	0.80

TABLE E.1. (contd)

Sediment Treatment	Concentration (Percent SPP)	Replicate	*D. excavatus* Normal Larvae	Normal Delayed	Abnormal	Proportion Normal[a]	All Replicates	Proportion Survival	All Replicates
COMP CS-1	0	1	216	8	0	0.86		0.89	
COMP CS-1	0	2	235	9	1	0.93		0.97	
COMP CS-1	0	3	236	5	0	0.94		0.96	
COMP CS-1	0	4	239	8	0	0.95	0.92	0.98	0.95
COMP CS-1	10	1	202	12	4	0.80		0.87	
COMP CS-1	10	2	222	6	0	0.88		0.90	
COMP CS-1	10	3	232	3	0	0.92		0.93	
COMP CS-1	10	4	227	5	1	0.90	0.88	0.92	0.91
COMP CS-1	50	1	212	17	0	0.84		0.91	
COMP CS-1	50	2	247	9	0	0.98		1.00[b]	
COMP CS-1	50	3	205	1	0	0.81		0.82	
COMP CS-1	50	4	215	5	0	0.85	0.87	0.87	0.90
COMP CS-1	100	1	163	15	0	0.65		0.71	
COMP CS-1	100	2	185	11	2	0.73		0.79	
COMP CS-1	100	3	194	15	0	0.77		0.83	
COMP CS-1	100	4	112	59	0	0.44	0.65	0.68	0.75

(a) Based on stocking density of 252 embryos per 10 mL.
(b) A proportion survival of 1.00 was used when the number surviving was greater than the stocking density.

TABLE E.2. Water Quality Summary for 72-h *D. excentricus* Suspended-Particulate-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Concentration (Percent SPP)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (g/kg)	
		Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range		14.0	18.0	7.62	8.62	6.0	---	28.0	32.0
COMP WR-1	0	15.4	16.0	8.00	8.27	7.2	7.9	31.0	32.0
COMP WR-1	10	15.4	16.0	8.06	8.28	7.3	7.8	30.5	32.0
COMP WR-1	50	15.4	16.1	8.02	8.32	7.3	7.9	31.0	32.0
COMP WR-1	100	15.5	16.0	8.10	8.34	7.1	7.9	31.0	32.0
COMP WR-2	0	15.5	15.8	8.03	8.28	7.3	8.0	31.0	32.0
COMP WR-2	10	15.4	16.0	8.04	8.29	7.2	7.9	30.5	32.0
COMP WR-2	50	15.5	16.1	8.04	8.30	7.3	7.9	31.0	32.0
COMP WR-2	100	15.5	15.9	8.13	8.31	7.2	7.9	31.0	32.0
COMP PS-1	0	15.3	16.1	8.00	8.23	6.9	8.0	31.0	32.0
COMP PS-1	10	15.4	16.0	8.06	8.27	7.3	7.8	31.0	32.0
COMP PS-1	50	15.4	16.1	8.05	8.37	7.3	7.8	30.5	32.0
COMP PS-1	100	15.5	16.1	8.13	8.40	7.3	7.9	30.5	31.5
COMP PS-2	0	15.2	15.8	8.09	8.24	7.2	7.9	31.0	32.0
COMP PS-2	10	15.2	16.0	8.04	8.29	7.1	7.8	31.0	32.0
COMP PS-2	50	15.3	16.1	7.98	8.37	7.3	7.9	30.5	32.0
COMP PS-2	100	15.5	16.1	8.04	8.40	7.3	8.0	30.0	32.0
COMP PS-3	0	15.3	16.0	8.06	8.25	7.0	8.0	31.0	32.0
COMP PS-3	10	15.4	16.0	8.00	8.27	7.3	7.8	30.5	32.0
COMP PS-3	50	15.3	16.0	7.96	8.33	7.3	7.9	30.5	32.0
COMP PS-3	100	15.5	16.1	8.02	8.35	7.2	7.9	30.5	32.5[a]
COMP PS-4	0	15.4	15.9	8.03	8.26	7.2	7.9	31.0	32.0
COMP PS-4	10	15.4	16.1	8.01	8.28	7.3	7.8	31.0	32.0
COMP PS-4	50	15.5	17.0	7.95	8.29	7.2	7.9	30.5	31.5
COMP PS-4	100	15.5	16.0	8.00	8.28	7.2	7.9	30.5	32.0
COMP CS-1	0	15.0	15.9	8.04	8.28	7.3	7.8	31.0	32.0
COMP CS-1	10	15.4	16.1	8.08	8.28	7.1	7.9	31.0	32.0
COMP CS-1	50	15.5	16.3	7.98	8.27	7.2	7.9	31.0	32.0
COMP CS-1	100	15.6	16.0	7.98	8.23	7.3	7.8	30.5	32.0

(a) Data point out of range.

TABLE E.3. Results for All Replicates in 72-h *D. excentricus* Reference Toxicant Test, John F. Baldwin Ship Channel Program

		D. excentricus						
Copper (ug/L)	Replicate	Normal Larvae	Normal Delayed	Abnormal	Proportion Normal[a]	All Replicates	Proportion Survival	All Replicates
0	1	249	18	1	0.99		1.00[b]	
0	2	221	13	0	0.88		0.93	
0	3	224	23	0	0.89	0.92	0.98	0.97
7.5	1	176	49	0	0.70		0.89	
7.5	2	203	65	0	0.81		1.00[b]	
7.5	3	167	68	0	0.66	0.72	0.93	0.94
12	1	28	208	0	0.11		0.94	
12	2	60	146	0	0.24		0.82	
12	3	33	189	0	0.13	0.16	0.88	0.88
25	1	0	218	0	0.00		0.87	
25	2	0	200	0	0.00		0.79	
25	3	0	270	0	0.00	0.00	1.00[b]	0.89
88	1	0	151	0	0.00		0.60	
88	2	0	86	0	0.00		0.34	
88	3	0	171	0	0.00	0.00	0.68	0.54

(a) Based on stocking density of 252 embryos per 10 mL.
(b) A proportion survival of 1.00 was used when number surviving was greater than the stocking density.

TABLE E.4. Water Quality Summary for 72-h *D. excentricus* Reference Toxicant Test, John F. Baldwin Ship Channel Program

Copper (µg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (g/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	14.0	18.0	7.64	8.64	6.0	---	28.0	32.0
0	15.6	16.1	8.02	8.24	7.3	7.9	31.5	32.0
7.5	15.7	16.1	7.99	8.23	7.4	7.9	31.0	32.0
12	15.7	15.8	8.13	8.24	7.4	7.9	31.0	32.0
25	15.6	16.1	8.00	8.21	7.4	7.9	30.0	31.5
88	15.6	16.1	8.03	8.26	7.3	8.0	31.0	32.0

APPENDIX F

10-DAY STATIC SOLID-PHASE TEST WITH *RHEPOXYNIUS abronius*

TABLE F.1. Results for All Replicates in 10-Day *R. abronius* Solid-Phase Test, John F. Baldwin Ship Channel Program

		R. abronius				
Sediment Treatment	Replicate	Number Initiated	Number Alive	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP WR-1	1	20	18	2	0.90	
COMP WR-1	2	20	0	20	0.00[a]	
COMP WR-1	3	20	19	1	0.95	95.0[a]
COMP WR-1	4	20	19	1	0.95	
COMP WR-1	5	20	20	0	1.00	
COMP WR-2	1	20	19	1	0.95	
COMP WR-2	2	20	20	0	1.00	
COMP WR-2	3	20	19	1	0.95	97.0
COMP WR-2	4	20	19	1	0.95	
COMP WR-2	5	20	20	0	1.00	
COMP PS-1	1	20	14	6	0.70	
COMP PS-1	2	20	18	2	0.90	
COMP PS-1	3	20	17	3	0.85	82.0
COMP PS-1	4	20	16	4	0.80	
COMP PS-1	5	20	17	3	0.85	
COMP PS-2	1	20	15	5	0.75	
COMP PS-2	2	20	19	1	0.95	
COMP PS-2	3	20	13	7	0.65	83.0
COMP PS-2	4	20	18	2	0.90	
COMP PS-2	5	20	18	2	0.90	
COMP PS-3	1	20	19	1	0.95	
COMP PS-3	2	20	19	1	0.95	
COMP PS-3	3	20	20	0	1.00	96.0
COMP PS-3	4	20	19	1	0.95	
COMP PS-3	5	20	19	1	0.95	
COMP PS-4	1	20	19	1	0.95	
COMP PS-4	2	20	0	20	0.00[a]	
COMP PS-4	3	20	18	2	0.90	95.0[a]
COMP PS-4	4	20	20	0	1.00	
COMP PS-4	5	20	19	1	0.95	
COMP CS-1	1	20	19	1	0.95	
COMP CS-1	2	20	19	1	0.95	
COMP CS-1	3	20	19	1	0.95	95.0
COMP CS-1	4	20	19	1	0.95	
COMP CS-1	5	20	19	1	0.95	
R-BF	1	20	20	0	1.00	
R-BF	2	20	18	2	0.90	
R-BF	3	20	18	2	0.90	92.0
R-BF	4	20	18	2	0.90	
R-BF	5	20	18	2	0.90	
R-OS	1	20	19	1	0.95	
R-OS	2	20	15	5	0.75	
R-OS	3	20	17	3	0.85	87.0
R-OS	4	20	17	3	0.85	
R-OS	5	20	19	1	0.95	

TABLE F.1. (contd)

		R. abronius				
Sediment Treatment	Replicate	Number Initiated	Number Alive	Dead or Missing	Proportion Surviving	Mean Percent Surviving
C-SB	1	20	20	0	1.00	
C-SB	2	20	19	1	0.95	
C-SB	3	20	20	0	1.00	89.0
C-SB	4	20	19	1	0.95	
C-SB	5	20	11	9	0.55	
C-WB	1	20	20	0	1.00	
C-WB	2	20	20	0	1.00	
C-WB	3	20	20	0	1.00	99.0
C-WB	4	20	19	1	0.95	
C-WB	5	20	20	0	1.00	

(a) Anomalous replicate not used in mean calculation or statistical analysis. Removal of anomalous data points justified by results of retest (see Tables F.9 through F.12).

TABLE F.2. Daily Observations of *R. abronius* on Sediment Surface During 10-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*R. abronius* on Sediment for Test Days 0 through 9									
		0	1	2	3	4	5	6	7	8	9
COMP WR-1	1	0	0	0	0	0	0	0	0	0	0
COMP WR-1	2	0	0	0	1	0	1	8	15	16	16
COMP WR-1	3	0	0	0	0	0	0	0	0	0	0
COMP WR-1	4	0	0	0	1	1	1	0	0	1	0
COMP WR-1	5	0	1	0	0	0	0	0	0	0	0
COMP WR-2	1	0	0	0	0	0	0	0	0	0	0
COMP WR-2	2	3	1	0	0	0	0	0	0	0	0
COMP WR-2	3	0	0	0	0	0	0	0	0	0	0
COMP WR-2	4	0	0	0	0	0	0	0	0	0	0
COMP WR-2	5	1	0	0	0	0	0	0	0	0	0
COMP PS-1	1	1	0	0	0	0	0	0	0	0	0
COMP PS-1	2	1	0	0	0	0	0	0	0	0	0
COMP PS-1	3	2	0	0	0	0	0	0	0	0	0
COMP PS-1	4	0	0	0	0	0	1	0	0	0	0
COMP PS-1	5	1	1	0	0	1	1	1	1	1	0
COMP PS-2	1	0	0	0	0	0	0	1	2	1	2
COMP PS-2	2	1	0	0	0	0	1	1	1	0	0
COMP PS-2	3	1	1	0	0	0	1	1	0	1	1
COMP PS-2	4	0	2	2	2	2	2	0	0	0	0
COMP PS-2	5	0	0	1	0	0	0	0	1	1	1
COMP PS-3	1	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	0	1	1	1	1	0	0	0	0	0
COMP PS-3	3	0	0	0	0	0	0	0	0	0	0
COMP PS-3	4	0	1	0	0	0	1	1	1	0	1
COMP PS-3	5	0	0	0	0	0	0	0	0	0	0
COMP PS-4	1	1	0	0	0	1	0	0	1	0	1
COMP PS-4	2	2	2	0	1	1	9	9	8	9	9
COMP PS-4	3	0	0	0	0	0	0	0	0	0	0
COMP PS-4	4	0	0	0	0	0	0	0	0	0	0
COMP PS-4	5	2	0	0	1	1	1	1	0	0	1
COMP CS-1	1	0	0	0	0	0	0	0	0	0	0
COMP CS-1	2	0	0	0	0	0	0	0	0	0	0
COMP CS-1	3	1	0	0	0	1	0	0	0	0	0
COMP CS-1	4	0	0	0	0	0	0	0	0	0	0
COMP CS-1	5	0	0	0	0	0	1	0	0	0	0
R-BF	1	0	0	0	0	0	0	0	0	0	0
R-BF	2	0	0	0	0	0	0	0	0	0	0
R-BF	3	0	0	0	0	0	0	0	0	0	0
R-BF	4	1	1	0	0	0	0	0	0	0	0
R-BF	5	0	0	0	0	0	0	0	0	0	0
R-OS	1	0	0	0	0	0	0	0	0	0	0
R-OS	2	0	1	1	1	0	3	9	5	4	5
R-OS	3	1	2	1	3	2	6	3	3	3	5
R-OS	4	0	0	1	3	5	4	4	2	2	2
R-OS	5	0	0	0	0	0	1	1	1	1	1
C-SB	1	2	0	0	0	0	0	0	0	0	0
C-SB	2	0	0	0	0	0	0	0	0	0	0
C-SB	3	0	1	0	0	0	0	0	0	0	0
C-SB	4	0	0	0	0	0	0	0	0	0	0
C-SB	5	0	0	0	0	0	3	9	8	5	8

TABLE F.2. (contd)

Se In	Sediment Treatment	Replicate	*R. abronius* on Sediment for Test Days 0 through 9									
			0	1	2	3	4	5	6	7	8	9
C-	C-WB	1	0	0	0	0	0	0	0	0	0	0
C-	C-WB	2	1	0	0	0	0	0	0	0	0	0
C-	C-WB	3	0	0	0	0	0	0	0	0	0	0
C-	C-WB	4	1	0	0	0	0	0	0	0	1	1
C-	C-WB	5	0	0	0	0	0	0	0	0	0	0

TABLE F.3. Daily Observations of *R. abronius* Floating on Water Surface During 10-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*R. abronius* Floating on Surface for Test Days 0 through 9									
		0	1	2	3	4	5	6	7	8	9
COMP WR-1	1	0	0	0	1	0	1	0	1	1	1
COMP WR-1	2	0	0	0	0	0	1	2	0	0	0
COMP WR-1	3	0	0	0	0	0	0	0	0	0	1
COMP WR-1	4	0	0	0	1	0	0	0	0	2	0
COMP WR-1	5	0	0	1	0	0	0	1	0	3	1
COMP WR-2	1	0	0	0	0	0	1	1	1	1	0
COMP WR-2	2	2	0	1	0	1	0	2	0	0	1
COMP WR-2	3	0	0	0	1	0	0	0	0	0	0
COMP WR-2	4	0	0	0	0	1	0	1	0	1	0
COMP WR-2	5	0	0	0	0	0	0	0	0	1	0
COMP PS-1	1	0	0	1	0	0	0	1	1	1	1
COMP PS-1	2	0	0	0	0	0	0	1	2	0	2
COMP PS-1	3	0	0	0	0	0	1	0	1	1	1
COMP PS-1	4	0	0	0	0	0	0	1	0	0	2
COMP PS-1	5	0	0	1	3	2	1	1	1	1	1
COMP PS-2	1	1	1	1	2	1	1	4	0	1	3
COMP PS-2	2	0	0	0	1	0	0	0	1	0	1
COMP PS-2	3	0	0	0	0	4	0	0	1	1	0
COMP PS-2	4	0	0	1	1	0	3	1	0	1	2
COMP PS-2	5	0	0	0	0	0	0	0	0	1	0
COMP PS-3	1	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	0	0	0	0	0	0	0	0	0	0
COMP PS-3	3	1	0	0	0	0	1	2	1	0	0
COMP PS-3	4	0	0	0	0	0	0	0	1	0	0
COMP PS-3	5	0	0	0	0	1	0	0	1	1	0
COMP PS-4	1	0	0	0	2	0	1	0	1	2	1
COMP PS-4	2	1	0	1	0	0	3	1	0	0	0
COMP PS-4	3	0	0	2	0	0	2	1	0	1	2
COMP PS-4	4	1	1	0	0	0	1	2	2	2	4
COMP PS-4	5	1	0	1	0	1	0	1	0	0	1
COMP CS-1	1	0	0	0	0	0	1	2	2	2	2
COMP CS-1	2	0	0	0	0	0	1	0	1	1	0
COMP CS-1	3	0	0	0	0	1	0	1	0	0	1
COMP CS-1	4	0	0	0	0	0	1	2	0	0	2
COMP CS-1	5	0	0	2	1	2	1	1	2	1	1
R-BF	1	0	0	0	0	0	0	1	1	0	0
R-BF	2	0	0	0	0	0	0	0	0	0	0
R-BF	3	0	0	0	0	1	0	0	0	0	0
R-BF	4	0	1	0	1	0	2	1	2	3	2
R-BF	5	0	0	0	1	0	1	2	0	0	0
R-OS	1	0	0	0	0	1	1	0	1	1	0
R-OS	2	0	0	0	0	0	0	0	0	0	0
R-OS	3	0	0	0	0	0	1	0	0	1	0
R-OS	4	0	1	0	1	0	0	0	0	0	2
R-OS	5	1	0	1	0	0	1	1	2	2	1
C-SB	1	0	0	0	0	0	0	0	1	0	0
C-SB	2	0	0	0	0	0	0	0	0	0	1
C-SB	3	0	0	0	0	0	0	0	0	0	0
C-SB	4	0	0	2	0	0	1	1	3	1	0
C-SB	5	1	0	0	1	1	0	0	0	0	0

TABLE F.3. (contd)

Se Ir	Sediment Treatment	Replicate	*R. abronius* Floating of Surface for Test Days 0 through 9									
			0	1	2	3	4	5	6	7	8	9
C-	C-WB	1	0	0	0	0	0	0	0	0	0	0
C-	C-WB	2	0	0	0	0	0	0	0	0	0	0
C-	C-WB	3	0	0	0	0	0	0	0	0	0	0
C-	C-WB	4	0	0	0	0	0	0	0	0	0	0
C-	C-WB	5	0	0	0	0	0	0	0	0	0	0

TABLE F.4. Water Quality Summary for 10-Day *R. abronius* Solid-Phase Test, John F. Baldwin Ship Channel Program

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	13.0	17.0	7.30	8.30	5.0	---	28.0	32.0
COMP WR-1	14.0	14.8	8.10	8.34(a)	6.7	8.2	28.5(b)	31.5
COMP WR-2	14.0	15.1	8.06	8.37(a)	5.9	8.2	30.0	31.0
COMP PS-1	13.9	14.9	8.02	8.34(a)	5.4	8.2	25.5(a,b)	30.5
COMP PS-2	13.9	15.0	7.96	8.31(a)	7.2	8.2	22.0(a,b)	31.5
COMP PS-3	14.0	15.3	7.89	8.29	5.4	8.4	29.5	31.5
COMP PS-4	13.7	14.9	7.74	8.18	7.2	8.3	26.0(a,b)	30.0
COMP CS-1	13.9	14.9	7.74	8.17	6.4	8.3	28.0	30.0
R-BF	13.9	15.1	7.90	8.15	6.8	8.3	29.5	31.0
R-OS	13.9	14.8	8.04	8.30	5.9	8.3	30.5	32.0
C-SB	13.9	15.3	8.03	8.36(a)	6.9	8.1	25.5(a,b)	32.0
C-WB	13.9	15.1	7.78	8.27	5.8	8.4	30.0	32.0

(a) Data point out of range. Temporarily high pH did not appear to influence mortality in affected replicates.
(b) Drop in salinity may have affected mortality in affected replicates; see Tables F.9 through F.12 for retest results.

TABLE F.5. Results for All Replicates in 96-h *R. abronius* Reference Toxicant Test (original 10-day test population), John F. Baldwin Ship Channel Program

		R. abronius				
Cadmium (mg/L)	Replicate	Number Initiated	Number Live	Dead or Missing	Proportion Suriviving	Mean Percent Suriviving
0.0	1	20	19	1	0.95	
0.0	2	20	19	1	0.95	97.0
0.0	3	20	20	0	1.00	
0.5	1	20	17	3	0.85	
0.5	2	20	20	0	1.00	95.0
0.5	3	20	20	0	1.00	
1.0	1	20	17	3	0.85	
1.0	2	20	16	4	0.80	85.0
1.0	3	20	18	2	0.90	
1.5	1	20	9	11	0.45	
1.5	2	20	12	8	0.60	55.0
1.5	3	20	12	8	0.60	
2.0	1	20	3	17	0.15	
2.0	2	20	5	15	0.25	25.0
2.0	3	20	7	13	0.35	

TABLE F.6. Daily Observations of *R. abronius* on Bottom of Test Chamber During 96-h Reference Toxicant Test (original 10-day test population), John F. Baldwin Ship Channel Program

Cadmium (mg/L)	Replicate	*R. abronius* on Bottom			
		2h	24h	48h	72h
0.0	1	20	20	20	19
0.0	2	20	19	18	20
0.0	3	20	19	20	20
0.5	1	20	20	20	20
0.5	2	20	19	20	20
0.5	3	20	20	18	17
1.0	1	20	20	19	18
1.0	2	20	20	20	19
1.0	3	20	20	17	18
1.5	1	20	19	17	20
1.5	2	19	19	18	20
1.5	3	20	19	19	19
2.0	1	20	18	18	20
2.0	2	20	19	17	20
2.0	3	20	18	17	20

TA TABLE F.7. Daily Observations of *R. abronius* Floating on Surface During 96-h Reference Toxicant Test (original 10-day test population), John F. Baldwin Ship Channel Program

Ca (m	Cadmium (mg/L)	Replicate	*R. abronius* Floating on Surface 24h	48h	72h
	0.0	1	0	0	1
	0.0	2	0	1	2	0
	0.0	3	0	1	0	0
	0.5	1	0	0	0	0
	0.5	2	0	1	0	0
	0.5	3	0	0	2	3
	1.0	1	0	0	1	2
	1.0	2	0	0	0	1
	1.0	3	0	0	3	2
	1.5	1	0	1	3	0
	1.5	2	1	1	2	0
	1.5	3	0	1	1	1
	2.0	1	0	2	2	0
	2.0	2	0	1	3	0
	2.0	3	0	2	3	0

TABLE F.8. Water Quality Summary for *R. abronius* 96-h Reference Toxicant Test (original 10-day test population), John F. Baldwin Ship Channel Program

Cadmium (mg/L)	Temperature (C°)		pH		Dissolved Oxygen (mg/L)		Salinity (oo/o)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	13.0	17.0	7.30	8.30	5.0	---	28.0	32.0
0.0	13.9	14.5	8.00	8.12	7.9	8.5	30.5	31.5
0.5	13.9	14.7	7.94	8.07	7.9	8.8	30.5	31.5
1.0	13.9	14.6	7.78	8.07	8.1	8.4	30.5	31.5
1.5	14.0	14.6	7.56	8.06	7.8	8.5	30.5	31.5
2.0	13.9	14.6	7.25[a]	8.03	7.9	8.7	30.5	31.5

(a) Data point out of range.

TABLE F.9. Results for All Replicates in 10-Day *R. abronius* Solid-Phase Retest, John F. Baldwin Ship Channel Program

		R. abronius				
Sediment Treatment	Replicate	Number Initiated	Number Alive	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP WR-1	1	20	18	2	0.90	
COMP WR-1	2	20	18	2	0.90	
COMP WR-1	3	20	19	1	0.95	91.0
COMP WR-1	4	20	19	1	0.95	
COMP WR-1	5	20	17	3	0.85	
COMP PS-2	1	20	17	3	0.85	
COMP PS-2	2	20	15	5	0.75	
COMP PS-2	3	20	20	0	1.00	88.0
COMP PS-2	4	20	17	3	0.85	
COMP PS-2	5	20	19	1	0.95	
COMP PS-4	1	20	18	2	0.90	
COMP PS-4	2	20	19	1	0.95	
COMP PS-4	3	20	20	0	1.00	94.0
COMP PS-4	4	20	18	2	0.90	
COMP PS-4	5	20	19	1	0.95	
C-SB	1	20	19	1	0.95	
C-SB	2	20	20	0	1.00	
C-SB	3	20	20	0	1.00	97.0
C-SB	4	20	19	1	0.95	
C-SB	5	20	19	1	0.95	
C-WB	1	20	19	1	0.95	
C-WB	2	20	20	0	1.00	
C-WB	3	20	20	0	1.00	97.0
C-WB	4	20	18	2	0.90	
C-WB	5	20	20	0	1.00	

TABLE F.10. Daily Observations of *R. abronius* on Sediment Surface During 10-Day Solid-Phase Retest, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*R. abronius* on Sediment Test Days 0 through 9									
		0	1	2	3	4	5	6	7	8	9
COMP WR-1	1	1	0	0	0	0	0	0	1	1	1
COMP WR-1	2	1	0	0	0	0	0	0	0	0	0
COMP WR-1	3	0	0	0	0	0	1	0	0	0	0
COMP WR-1	4	0	0	0	0	0	0	0	0	0	0
COMP WR-1	5	1	0	0	0	0	0	0	0	0	0
COMP PS-2	1	0	0	0	0	0	0	0	0	0	0
COMP PS-2	2	0	0	0	0	0	0	0	0	0	0
COMP PS-2	3	1	0	0	1	0	0	0	0	0	0
COMP PS-2	4	0	0	0	0	1	1	0	0	0	0
COMP PS-2	5	0	0	0	0	0	0	1	1	1	1
COMP PS-4	1	0	1	0	0	1	0	0	1	0	0
COMP PS-4	2	1	0	0	0	0	0	0	0	0	0
COMP PS-4	3	0	0	0	0	0	0	0	0	0	0
COMP PS-4	4	0	0	0	0	0	0	0	0	0	0
COMP PS-4	5	0	0	0	0	0	0	1	0	0	0
C-SB	1	0	0	0	0	0	1	0	0	0	0
C-SB	2	0	0	0	0	0	0	0	0	0	0
C-SB	3	0	0	0	0	0	0	0	0	0	0
C-SB	4	1	1	1	1	1	1	0	1	0	0
C-SB	5	0	0	0	1	0	0	0	0	0	0
C-WB	1	0	0	0	0	0	0	0	0	0	0
C-WB	2	0	0	0	0	0	0	0	0	0	0
C-WB	3	0	0	1	1	1	1	1	1	1	1
C-WB	4	0	0	0	0	0	0	1	1	1	1
C-WB	5	0	0	0	0	0	0	0	0	0	0

TABLE F.11. Daily Observations of *R. abronius* Floating on Water Surface During 10-Day Solid-Phase Retest, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*R. abronius* Floating on Surface for Test Days 0 through 9									
		0	1	2	3	4	5	6	7	8	9
COMP WR-1	1	1	0	0	0	0	0	1	1	1	0
COMP WR-1	2	0	0	0	1	0	3	2	0	2	1
COMP WR-1	3	0	0	0	0	0	1	2	1	1	2
COMP WR-1	4	0	0	0	0	1	1	1	0	0	0
COMP WR-1	5	0	1	0	1	0	2	1	0	1	1
COMP PS-2	1	0	0	0	0	2	2	3	2	1	1
COMP PS-2	2	1	0	0	0	1	1	1	2	2	1
COMP PS-2	3	0	0	0	0	0	3	0	1	0	0
COMP PS-2	4	0	1	0	0	1	1	1	2	0	4
COMP PS-2	5	0	0	1	0	0	0	1	1	1	1
COMP PS-4	1	0	0	1	2	1	0	1	1	2	2
COMP PS-4	2	0	0	0	1	1	0	1	2	2	3
COMP PS-4	3	1	0	0	0	0	3	0	0	1	2
COMP PS-4	4	0	0	0	0	0	0	0	2	0	2
COMP PS-4	5	0	0	0	0	0	0	1	0	1	1
C-SB	1	0	0	0	0	0	0	1	0	1	1
C-SB	2	1	0	0	0	0	0	0	0	0	0
C-SB	3	2	0	0	1	0	1	2	0	1	0
C-SB	4	0	1	0	0	1	0	0	0	0	0
C-SB	5	0	4	0	1	0	1	2	1	1	1
C-WB	1	0	0	0	0	0	0	0	0	0	0
C-WB	2	0	0	0	0	0	0	0	0	0	0
C-WB	3	0	0	0	0	0	0	0	0	0	0
C-WB	4	0	0	0	0	0	0	0	0	0	0
C-WB	5	0	0	0	0	0	0	0	0	0	0

TABLE F.12. Water Quality Summary for *R. abronius* 10-Day Solid-Phase Retest, John F. Baldwin Ship Channel Program

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	13.0	17.0	7.30	8.30	5.0	---	28.0	32.0
COMP WR-1	14.5	16.7	8.04	8.28	5.6	8.0	28.5	32.0
COMP PS-2	14.5	15.9	7.94	8.36(a)	7.0	8.1	28.5	31.0
COMP PS-4	14.4	15.9	7.73	8.29	5.9	8.1	28.0	32.0
C-SB	14.5	16.0	8.00	8.54(a)	6.4	8.0	28.5	32.0
C-WB	14.5	15.8	7.93	8.52(a)	6.4	8.1	30.0	32.0

(a) Data point out of range.

TABLE F.13. Results for All Replicates in 96-h *R. abronius* Reference Toxicant Test (10-day retest population), John F. Baldwin Ship Channel Program

		R. abronius				
Cadmium (mg/L)	Replicate	Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
0.0	1	20	20	0	1.00	
0.0	2	20	20	0	1.00	98.0
0.0	3	20	19	1	0.95	
0.5	1	20	19	1	0.95	
0.5	2	20	17	3	0.85	88.0
0.5	3	20	17	3	0.85	
1.0	1	20	13	7	0.65	
1.0	2	20	13	7	0.65	65.0
1.0	3	20	13	7	0.65	
2.0	1	20	11	9	0.55	
2.0	2	20	12	8	0.60	48.0
2.0	3	20	6	14	0.30	
4.0	1	20	3	17	0.15	
4.0	2	20	2	18	0.10	13.0
4.0	3	20	3	17	0.15	

TABLE F.14. Daily Observations of *R. abronius* on Bottom of Test Chamber During 96-h Reference Toxicant Test (10-day retest population), John F. Baldwin Ship Channel Program

Cadmium (mg/L)	Replicate	*R. abronius* on Bottom 3h	24h	48h	72h
0.0	1	NM[a]	18	18	19
0.0	2	NM	20	20	16
0.0	3	NM	20	20	19
0.5	1	NM	20	19	19
0.5	2	NM	18	16	19
0.5	3	NM	20	18	19
1.0	1	NM	20	18	20
1.0	2	NM	18	17	19
1.0	3	NM	18	17	19
2.0	1	NM	17	20	19
2.0	2	NM	20	18	20
2.0	3	NM	18	19	20
4.0	1	NM	17	19	20
4.0	2	NM	18	20	20
4.0	3	NM	18	16	20

(a) NM Observations not performed.

TABLE F.15. Daily Observations of *R. abronius* Floating on Surface During 96-h Reference Toxicant Test (10-day retest population), John F. Baldwin Ship Channel Program

Cadmium (mg/L)	Replicate	*R. abronius* Floating on Surface			
		3h	24h	48h	72h
0.0	1	NM[a]	2	2	1
0.0	2	NM	0	0	4
0.0	3	NM	0	0	1
0.5	1	NM	0	1	1
0.5	2	NM	2	4	1
0.5	3	NM	0	2	1
1.0	1	NM	0	2	0
1.0	2	NM	2	3	1
1.0	3	NM	2	3	1
2.0	1	NM	3	0	1
2.0	2	NM	0	2	0
2.0	3	NM	2	1	0
4.0	1	NM	3	1	0
4.0	2	NM	2	0	0
4.0	3	NM	2	4	0

(a) NM Observations not performed.

TABLE F.16. Water Quality Summary for *R. abronius* 96-h Reference Toxicant Test (10-day retest population), John F. Baldwin Ship Channel Program

Cadmium (mg/L)	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)	
	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	13.0	17.0	7.30	8.30	5.0	---	28.0	32.0
0.0	15.2	15.9	8.03	8.17	7.5	8.0	31.0	31.5
0.5	15.1	15.5	7.91	8.16	7.6	8.0	31.0	31.5
1.0	15.2	15.8	7.74	8.13	7.7	8.0	30.5	32.0
2.0	15.1	15.7	7.71	8.12	7.7	8.0	30.5	31.0
4.0	15.1	15.6	7.34	8.06	7.7	8.0	30.5	31.5

APPENDIX G

10-DAY FLOW-THROUGH SOLID-PHASE TEST WITH *NEPHTYS caecoides* AND *MACOMA nasuta*

TABLE G.1. Results for All Replicates in 10-Day *M. nasuta* Solid-Phase Test, John F. Baldwin Ship Channel Program

		M. nasuta				
Sediment Treatment	Replicate	Number Initiated	Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP WR-1	1	20	19	1	0.95	
COMP WR-1	2	20	20	0	1.00	
COMP WR-1	3	20	18	2	0.90	97.0
COMP WR-1	4	20	20	0	1.00	
COMP WR-1	5	20	20	0	1.00	
COMP WR-2	1	20	19	1	0.95	
COMP WR-2	2	20	20	0	1.00	
COMP WR-2	3	20	20	0	1.00	99.0
COMP WR-2	4	20	20	0	1.00	
COMP WR-2	5	20	20	0	1.00	
COMP PS-1	1	20	19	1	0.95	
COMP PS-1	2	20	16	4	0.80	
COMP PS-1	3	20	18	2	0.90	90.0
COMP PS-1	4	20	18	2	0.90	
COMP PS-1	5	20	19	1	0.95	
COMP PS-2	1	20	20	0	1.00	
COMP PS-2	2	20	18	2	0.90	
COMP PS-2	3	20	20	0	1.00	98.0
COMP PS-2	4	20	20	0	1.00	
COMP PS-2	5	20	20	0	1.00	
COMP PS-3	1	20	20	0	1.00	
COMP PS-3	2	20	18	2	0.90	
COMP PS-3	3	20	15	5	0.75	93.0
COMP PS-3	4	20	20	0	1.00	
COMP PS-3	5	20	20	0	1.00	
COMP PS-4	1	20	19	1	0.95	
COMP PS-4	2	20	20	0	1.00	
COMP PS-4	3	20	20	0	1.00	97.0
COMP PS-4	4	20	20	0	1.00	
COMP PS-4	5	20	18	2	0.90	
COMP CS-1	1	20	18	2	0.90	
COMP CS-1	2	20	19	1	0.95	
COMP CS-1	3	20	20	0	1.00	96.0
COMP CS-1	4	20	19	1	0.95	
COMP CS-1	5	20	20	0	1.00	

TABLE G.1. (contd)

S I	Sediment Treatment	Replicate	*M. nasuta* Number Initiated	Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
R	R-BF	1	20	20	0	1.00	
R	R-BF	2	20	20	0	1.00	
R	R-BF	3	20	21	0	1.00	99.0
R	R-BF	4	20	20	0	1.00	
R	R-BF	5	20	19	1	0.95	
R	R-OS	1	20	20	0	1.00	
R	R-OS	2	20	18	2	0.90	
R	R-OS	3	20	20	0	1.00	96.0
R	R-OS	4	20	20	0	1.00	
R	R-OS	5	20	18	2	0.90	
C	C-SB	1	20	19	1	0.95	
C	C-SB	2	20	20	0	1.00	
C	C-SB	3	20	20	0	1.00	98.0
C	C-SB	4	20	20	0	1.00	
C	C-SB	5	20	19	1	0.95	
C	C-NE	1	20	20	0	1.00	
C	C-NE	2	20	15	5	0.75	
C	C-NE	3	20	20	0	1.00	94.0
C	C-NE	4	20	19	1	0.95	
C	C-NE	5	20	20	0	1.00	

TABLE G.2. Daily Observations of *M. nasuta* on Sediment Surface During 10-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*M. nasuta* on Sediment for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
COMP WR-1	1	3	3	1	1	0	0	0	0	0	0
COMP WR-1	2	7	6	4	4	4	4	3	2	2	2
COMP WR-1	3	5	4	3	3	2	3	3	3	3	2
COMP WR-1	4	9	5	4	4	3	4	2	2	3	3
COMP WR-1	5	4	4	3	2	2	2	2	2	2	2
COMP WR-2	1	5	4	4	3	2	2	3	2	1	2
COMP WR-2	2	0	0	0	0	0	0	0	0	1	0
COMP WR-2	3	1	1	1	0	0	0	0	0	0	0
COMP WR-2	4	5	5	4	4	3	3	2	1	0	2
COMP WR-2	5	4	2	3	2	1	2	1	1	0	0
COMP PS-1	1	4	3	2	2	0	1	0	0	0	0
COMP PS-1	2	12	12	10	7	7	7	5	5	1	1
COMP PS-1	3	4	2	2	2	2	2	2	2	0	0
COMP PS-1	4	12	11	8	5	5	5	4	4	4	4
COMP PS-1	5	3	2	2	2	2	2	2	2	2	2
COMP PS-2	1	2	2	0	0	0	0	0	0	0	0
COMP PS-2	2	9	9	9	8	5	6	5	5	4	4
COMP PS-2	3	1	1	1	0	0	0	0	0	0	0
COMP PS-2	4	1	1	1	1	1	1	1	1	1	1
COMP PS-2	5	2	1	1	1	1	1	0	0	0	0
COMP PS-3	1	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	8	7	4	4	4	3	2	3	2	2
COMP PS-3	3	0	0	0	0	0	0	0	0	0	0
COMP PS-3	4	1	2	1	1	0	0	0	0	0	0
COMP PS-3	5	3	2	1	0	0	0	0	0	0	0
COMP PS-4	1	6	4	3	3	1	1	2	0	1	0
COMP PS-4	2	3	3	3	3	3	1	1	1	1	0
COMP PS-4	3	3	3	2	1	0	1	0	0	0	0
COMP PS-4	4	6	5	3	2	1	1	1	0	1	1
COMP PS-4	5	6	6	2	2	2	2	2	2	2	2
COMP CS-1	1	5	4	5	4	2	3	1	1	1	1
COMP CS-1	2	5	5	4	4	1	2	2	1	2	2
COMP CS-1	3	3	2	0	0	0	0	0	0	0	0
COMP CS-1	4	6	2	2	1	1	3	3	0	2	2
COMP CS-1	5	4	2	1	0	0	0	0	0	0	0

TABLE G.2. (contd)

Sediment Treatment	Replicate	*M. nasuta* on Sediment for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
R-BF	1	0	0	0	0	0	0	0	0	0	0
R-BF	2	1	1	0	1	0	0	0	0	0	0
R-BF	3	1	1	1	1	0	0	0	0	0	0
R-BF	4	2	2	3	2	0	1	0	0	0	0
R-BF	5	1	0	0	0	0	0	0	0	0	0
R-OS	1	2	2	0	0	0	0	1	0	1	0
R-OS	2	2	1	0	0	0	0	0	0	0	0
R-OS	3	3	2	2	2	2	0	0	0	0	0
R-OS	4	1	1	1	0	0	0	0	0	0	0
R-OS	5	3	2	2	0	1	1	1	0	0	0
C-SB	1	1	1	0	0	0	0	0	0	0	0
C-SB	2	2	2	2	2	0	1	1	1	1	0
C-SB	3	2	1	1	1	1	1	1	0	0	0
C-SB	4	3	3	1	1	0	0	0	0	0	1
C-SB	5	3	3	1	0	0	0	0	0	0	0
C-NE	1	3	4	2	1	3	2	2	3	4	4
C-NE	2	8	6	6	3	3	4	3	3	3	2
C-NE	3	0	0	0	0	0	0	0	0	0	0
C-NE	4	6	6	6	5	6	4	5	4	5	3
C-NE	5	4	2	1	1	2	3	5	2	2	1

TABLE G.3. Daily Observations of *M. nasuta* Siphons Exposed During 10-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*M. nasuta* Siphons Exposed for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
COMP WR-1	1	6	7	4	5	4	3	2	4	4	3
COMP WR-1	2	8	8	8	7	6	4	3	2	6	5
COMP WR-1	3	8	6	10	6	8	6	4	4	6	4
COMP WR-1	4	10	7	7	13	7	5	5	6	6	5
COMP WR-1	5	4	6	4	5	4	3	2	3	2	2
COMP WR-2	1	9	10	8	8	9	4	3	4	4	3
COMP WR-2	2	3	5	5	3	3	2	1	1	3	0
COMP WR-2	3	2	2	4	3	2	3	2	3	2	2
COMP WR-2	4	6	11	6	7	7	6	1	7	6	5
COMP WR-2	5	4	4	5	3	7	2	1	2	3	2
COMP PS-1	1	4	3	5	6	3	3	4	3	2	3
COMP PS-1	2	14	15	12	16	17	11	4	5	5	6
COMP PS-1	3	6	4	4	4	7	4	4	3	2	1
COMP PS-1	4	16	15	12	15	11	7	5	6	8	6
COMP PS-1	5	5	2	3	5	4	4	4	5	3	2
COMP PS-2	1	10	3	9	9	4	4	3	2	2	0
COMP PS-2	2	11	11	11	15	8	6	8	7	7	7
COMP PS-2	3	4	4	2	6	2	1	0	2	0	1
COMP PS-2	4	5	6	4	4	4	5	2	3	2	2
COMP PS-2	5	4	2	4	3	4	2	2	3	3	2
COMP PS-3	1	8	8	4	2	1	1	1	2	2	1
COMP PS-3	2	10	11	9	12	11	8	9	8	5	6
COMP PS-3	3	3	2	2	1	3	0	1	1	2	2
COMP PS-3	4	8	9	7	5	5	4	3	6	4	1
COMP PS-3	5	6	4	4	6	3	1	0	1	2	1
COMP PS-4	1	10	6	8	9	10	3	1	3	3	3
COMP PS-4	2	5	7	5	8	4	3	3	2	4	1
COMP PS-4	3	5	5	4	3	2	2	2	3	2	0
COMP PS-4	4	7	4	8	9	7	5	4	4	3	4
COMP PS-4	5	9	6	8	9	5	4	3	4	4	5
COMP CS-1	1	9	10	11	13	8	4	1	2	4	0
COMP CS-1	2	4	6	5	5	5	6	1	2	4	1
COMP CS-1	3	8	9	4	6	4	2	3	3	3	2
COMP CS-1	4	13	12	14	14	13	8	6	6	8	5
COMP CS-1	5	10	7	4	4	7	2	2	2	2	3

TABLE G.3. (contd)

Sediment Treatment	Replicate	*M. nasuta* Siphons Exposed for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
R-BF	1	2	1	2	0	0	2	1	1	1	1
R-BF	2	7	0	0	0	1	0	0	1	1	0
R-BF	3	1	1	0	1	0	0	0	0	0	0
R-BF	4	10	7	5	6	4	4	3	4	4	4
R-BF	5	2	1	0	1	3	1	0	0	0	0
R-OS	1	3	3	3	3	5	3	2	4	2	3
R-OS	2	5	3	6	4	2	3	0	0	1	0
R-OS	3	1	4	5	3	3	2	1	1	1	1
R-OS	4	4	6	1	6	0	3	0	0	0	2
R-OS	5	10	4	4	8	6	5	4	3	2	4
C-SB	1	2	1	1	2	1	0	1	0	0	0
C-SB	2	4	2	2	1	3	3	3	3	2	0
C-SB	3	4	3	0	5	1	0	0	0	1	0
C-SB	4	6	3	3	3	6	1	0	2	2	2
C-SB	5	6	8	3	5	6	4	1	3	1	1
C-NE	1	5	3	3	1	2	2	3	4	4	5
C-NE	2	9	6	4	7	5	3	4	4	3	3
C-NE	3	2	0	0	0	3	0	0	1	1	0
C-NE	4	7	4	5	7	7	5	3	5	3	4
C-NE	5	10	3	2	5	11	3	3	4	2	2

TABLE G.4. Daily Observations of *M. nasuta* Dead and Removed During 10-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*M. nasuta* Number Removed for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
COMP WR-1	1	0	1	0	0	0	0	0	0	0	0
COMP WR-1	2	0	0	0	0	0	0	0	0	0	0
COMP WR-1	3	0	0	0	0	0	0	0	0	1	0
COMP WR-1	4	0	0	0	0	0	0	0	0	0	0
COMP WR-1	5	0	0	0	0	0	0	0	0	0	0
COMP WR-2	1	0	0	0	0	0	0	0	1	0	0
COMP WR-2	2	0	0	0	0	0	0	0	0	0	0
COMP WR-2	3	0	0	0	0	0	0	0	0	0	0
COMP WR-2	4	0	0	0	0	0	0	0	0	0	0
COMP WR-2	5	0	0	0	0	0	0	0	0	0	0
COMP PS-1	1	0	0	0	0	0	0	0	0	0	0
COMP PS-1	2	0	0	1	0	0	0	0	3	0	0
COMP PS-1	3	0	0	0	0	0	0	0	0	0	0
COMP PS-1	4	0	0	0	0	1	0	0	0	0	0
COMP PS-1	5	0	0	0	0	0	0	0	0	0	1
COMP PS-2	1	0	0	0	0	0	0	0	0	0	0
COMP PS-2	2	0	0	0	1	0	1	0	0	0	0
COMP PS-2	3	0	0	0	0	0	0	0	0	0	0
COMP PS-2	4	0	0	0	0	0	0	0	0	0	0
COMP PS-2	5	0	0	0	0	0	0	0	0	0	0
COMP PS-3	1	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	0	0	0	0	0	0	0	0	0	1
COMP PS-3	3	0	0	0	0	0	0	0	0	0	0
COMP PS-3	4	0	0	0	0	0	0	0	0	0	0
COMP PS-3	5	0	0	0	0	0	0	0	0	0	0
COMP PS-4	1	0	0	0	1	0	0	0	0	0	0
COMP PS-4	2	0	0	0	0	0	0	0	0	0	0
COMP PS-4	3	0	0	0	0	0	0	0	0	0	0
COMP PS-4	4	0	0	0	0	0	0	0	0	0	0
COMP PS-4	5	0	2	0	0	0	0	0	0	0	0
COMP CS-1	1	0	0	1	0	0	0	0	0	0	1
COMP CS-1	2	0	1	0	0	0	0	0	0	0	0
COMP CS-1	3	0	0	0	0	0	0	0	0	0	0
COMP CS-1	4	0	0	0	0	0	0	0	0	0	0
COMP CS-1	5	0	0	0	0	0	0	0	0	0	0

TABLE G.4. (contd)

Sediment Treatment	Replicate	*M. nasuta* Number Removed for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
R-BF	1	0	0	0	0	0	0	0	0	0	0
R-BF	2	0	0	0	0	0	0	0	0	0	0
R-BF	3	0	0	0	0	0	0	0	0	0	0
R-BF	4	0	0	0	0	0	0	0	0	0	0
R-BF	5	0	0	0	0	0	1	0	0	0	0
R-OS	1	0	0	0	0	0	0	0	0	0	0
R-OS	2	0	0	0	0	0	0	0	0	0	0
R-OS	3	0	0	0	0	0	0	0	0	0	0
R-OS	4	0	0	0	0	0	0	0	0	0	0
R-OS	5	0	0	1	0	0	0	0	0	0	0
C-SB	1	0	0	0	0	0	0	0	0	0	0
C-SB	2	0	0	0	0	0	0	0	0	0	0
C-SB	3	0	0	0	0	0	0	0	0	0	0
C-SB	4	0	0	0	0	0	0	0	0	0	0
C-SB	5	0	0	0	0	0	0	0	0	0	0
C-NE	1	0	0	0	0	0	0	0	0	0	0
C-NE	2	0	1	2	0	0	1	0	0	1	0
C-NE	3	0	0	0	0	0	0	0	0	0	0
C-NE	4	0	0	0	0	1	0	0	0	0	0
C-NE	5	0	0	0	0	0	0	0	0	0	0

TABLE G.5. Results for All Replicates in 10-Day *N. caecoides* Solid-Phase Test, John F. Baldwin Ship Channel Program

		N. caecoides				
Sediment Treatment	Replicate	Number Initiated	Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP WR-1	1	20	20	0	1.00	
COMP WR-1	2	20	20	0	1.00	
COMP WR-1	3	20	17	3	0.85	94.0
COMP WR-1	4	20	20	0	1.00	
COMP WR-1	5	20	17	3	0.85	
COMP WR-2	1	20	20	0	1.00	
COMP WR-2	2	20	19	1	0.95	
COMP WR-2	3	20	18	2	0.90	97.0
COMP WR-2	4	20	20	0	1.00	
COMP WR-2	5	20	20	0	1.00	
COMP PS-1	1	20	20	0	1.00	
COMP PS-1	2	20	19	1	0.95	
COMP PS-1	3	20	18	2	0.90	95.0
COMP PS-1	4	20	19	1	0.95	
COMP PS-1	5	20	19	1	0.95	
COMP PS-2	1	20	18	2	0.90	
COMP PS-2	2	20	19	1	0.95	
COMP PS-2	3	20	20	0	1.00	95.0
COMP PS-2	4	20	18	2	0.90	
COMP PS-2	5	20	20	0	1.00	
COMP PS-3	1	20	20	0	1.00	
COMP PS-3	2	20	20	0	1.00	
COMP PS-3	3	20	20	0	1.00	95.0
COMP PS-3	4	20	17	3	0.85	
COMP PS-3	5	20	18	2	0.90	
COMP PS-4	1	20	19	1	0.95	
COMP PS-4	2	20	18	2	0.90	
COMP PS-4	3	20	18	2	0.90	94.0
COMP PS-4	4	20	20	0	1.00	
COMP PS-4	5	20	19	1	0.95	
COMP CS-1	1	20	19	1	0.95	
COMP CS-1	2	20	19	1	0.95	
COMP CS-1	3	20	19	1	0.95	96.0
COMP CS-1	4	20	19	1	0.95	
COMP CS-1	5	20	20	0	1.00	

TABLE G.5. (contd)

Sediment Treatment	Replicate	*N. caecoides* Number Initiated	Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
R-BF	1	20	17	3	0.85	
R-BF	2	20	20	0	1.00	
R-BF	3	20	20	0	1.00	95.0
R-BF	4	20	20	0	1.00	
R-BF	5	20	18	2	0.90	
R-OS	1	20	19	1	0.95	
R-OS	2	20	20	0	1.00	
R-OS	3	20	16	4	0.80	94.0
R-OS	4	20	19	1	0.95	
R-OS	5	20	20	0	1.00	
C-SB	1	20	19	1	0.95	
C-SB	2	20	17	3	0.85	
C-SB	3	20	20	0	1.00	96.0
C-SB	4	20	20	0	1.00	
C-SB	5	20	20	0	1.00	
C-NE	1	20	20	0	1.00	
C-NE	2	20	20	0	1.00	
C-NE	3	20	20	0	1.00	99.0
C-NE	4	20	20	0	1.00	
C-NE	5	20	19	1	0.95	

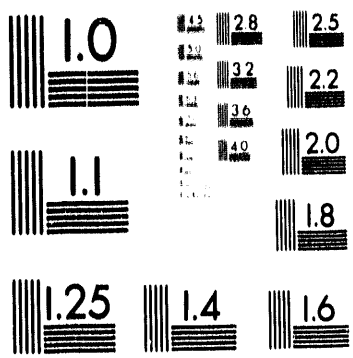
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0

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TABLE G.6. Daily Observations of *N. caecoides* on Sediment Surface During 10-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*N. caecoides* on Sediment for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
COMP WR-1	1	0	0	0	0	0	0	0	0	0	0
COMP WR-1	2	0	0	0	0	0	0	0	0	0	0
COMP WR-1	3	0	0	0	0	0	0	0	0	0	0
COMP WR-1	4	0	0	0	0	0	0	0	0	0	0
COMP WR-1	5	0	0	1	0	0	0	0	0	0	0
COMP WR-2	1	0	0	0	0	0	0	0	0	0	0
COMP WR-2	2	0	1	0	0	0	0	0	0	0	0
COMP WR-2	3	0	0	0	0	0	0	0	0	0	0
COMP WR-2	4	0	0	0	0	0	0	0	0	0	0
COMP WR-2	5	0	0	0	0	0	0	0	0	0	0
COMP PS-1	1	0	0	0	0	0	0	0	0	0	0
COMP PS-1	2	0	0	0	0	0	0	0	0	0	0
COMP PS-1	3	0	1	0	0	0	0	0	0	0	0
COMP PS-1	4	0	0	0	0	0	0	0	0	0	0
COMP PS-1	5	0	0	1	0	0	0	0	0	0	0
COMP PS-2	1	0	0	1	0	0	0	0	0	0	0
COMP PS-2	2	0	0	0	0	0	0	0	0	0	0
COMP PS-2	3	0	0	0	0	0	0	0	0	0	0
COMP PS-2	4	0	0	2	0	0	0	0	0	0	0
COMP PS-2	5	0	0	0	0	0	0	0	0	0	0
COMP PS-3	1	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	0	0	0	0	0	0	0	0	0	0
COMP PS-3	3	0	0	0	0	0	0	0	0	0	0
COMP PS-3	4	0	1	1	0	0	0	0	0	0	0
COMP PS-3	5	0	0	1	0	0	0	0	0	0	0
COMP PS-4	1	0	0	0	0	0	0	0	0	0	0
COMP PS-4	2	1	1	1	0	0	0	2	0	1	0
COMP PS-4	3	0	0	2	0	0	0	0	0	0	0
COMP PS-4	4	0	0	0	0	0	0	0	0	0	0
COMP PS-4	5	0	0	1	0	0	0	0	0	0	0
COMP CS-1	1	0	0	0	0	0	0	0	0	0	0
COMP CS-1	2	1	1	1	0	0	0	0	0	0	0
COMP CS-1	3	1	1	0	0	0	0	0	0	0	0
COMP CS-1	4	0	0	1	0	0	0	0	0	0	0
COMP CS-1	5	0	0	0	0	0	0	0	0	0	0

TABLE G.6. (contd)

S I	Sediment Treatment	Replicate	*N. caecoides* on Sediment for Test Days 1 through 10 1	2	3	4	5	6	7	8	9	10
R	R-BF	1	0	0	0	0	0	0	0	0	0	0
R	R-BF	2	0	0	0	0	0	0	0	0	0	0
R	R-BF	3	0	0	0	0	0	0	0	0	0	0
R	R-BF	4	0	0	0	0	0	0	0	1	0	0
R	R-BF	5	0	1	0	0	0	0	0	0	0	0
R	R-OS	1	0	0	1	0	0	0	0	0	0	0
R	R-OS	2	0	0	0	0	0	0	0	0	0	0
R	R-OS	3	0	0	1	0	0	0	0	0	0	0
R	R-OS	4	0	0	0	0	0	0	0	0	0	0
R	R-OS	5	0	0	0	0	0	0	0	0	0	0
C	C-SB	1	0	0	0	0	0	0	0	0	0	0
C	C-SB	2	0	0	1	0	0	0	0	0	0	0
C	C-SB	3	1	0	0	0	0	0	0	0	0	0
C	C-SB	4	0	0	0	0	0	0	0	0	0	0
C	C-SB	5	0	0	0	0	0	0	0	0	0	0
C	C-NE	1	0	0	0	0	0	0	0	0	0	0
C	C-NE	2	0	0	0	0	0	0	0	0	0	0
C	C-NE	3	0	0	0	0	0	0	0	0	0	0
C	C-NE	4	0	0	0	0	0	0	0	0	0	0
C	C-NE	5	0	0	0	0	0	0	0	0	0	0

TABLE G.7. Daily Observations of *N. caecoides* Dead and Removed During 10-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*N. caecoides* Number Removed for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
COMP WR-1	1	0	0	0	0	0	0	0	0	0	0
COMP WR-1	2	0	0	0	0	0	0	0	0	0	0
COMP WR-1	3	0	0	0	0	0	0	0	0	0	0
COMP WR-1	4	0	0	0	0	0	0	0	0	0	0
COMP WR-1	5	0	0	1	0	0	0	0	0	0	0
COMP WR-2	1	0	0	0	0	0	0	0	0	0	0
COMP WR-2	2	0	0	0	0	0	0	0	0	0	0
COMP WR-2	3	0	0	0	0	0	0	0	0	0	0
COMP WR-2	4	0	0	0	0	0	0	0	0	0	0
COMP WR-2	5	0	0	0	0	0	0	0	0	0	0
COMP PS-1	1	0	0	0	0	0	0	0	0	0	0
COMP PS-1	2	0	0	0	0	0	0	0	0	0	0
COMP PS-1	3	0	1	0	0	0	0	0	0	0	0
COMP PS-1	4	0	0	0	0	0	0	0	0	0	0
COMP PS-1	5	0	0	1	0	0	0	0	0	0	0
COMP PS-2	1	0	0	1	0	0	0	0	0	0	0
COMP PS-2	2	0	0	0	0	0	0	0	0	0	0
COMP PS-2	3	0	0	0	0	0	0	0	0	0	0
COMP PS-2	4	0	0	2	0	0	0	0	0	0	0
COMP PS-2	5	0	0	0	0	0	0	0	0	0	0
COMP PS-3	1	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	0	0	0	0	0	0	0	0	0	0
COMP PS-3	3	0	0	0	0	0	0	0	0	0	0
COMP PS-3	4	0	1	1	0	0	0	0	0	0	0
COMP PS-3	5	0	0	1	0	0	0	0	0	0	0
COMP PS-4	1	0	0	0	0	0	0	0	0	0	0
COMP PS-4	2	0	0	0	0	0	0	1	0	1	0
COMP PS-4	3	0	0	2	0	0	0	0	0	0	0
COMP PS-4	4	0	0	0	0	0	0	0	0	0	0
COMP PS-4	5	0	0	1	0	0	0	0	0	0	0
COMP CS-1	1	0	0	0	1	0	0	0	0	0	0
COMP CS-1	2	0	1	1	0	0	0	0	0	0	0
COMP CS-1	3	0	1	0	0	0	0	0	0	0	0
COMP CS-1	4	0	0	1	0	0	0	0	0	0	0
COMP CS-1	5	0	0	0	0	0	0	0	0	0	0

TABLE G.7. (contd)

Sediment Treatment	Replicate	*N. caecoides* Number Removed for Test Days 1 through 10									
		1	2	3	4	5	6	7	8	9	10
R-BF	1	0	0	0	0	0	0	0	0	0	0
R-BF	2	0	0	0	0	0	0	0	0	0	0
R-BF	3	0	0	0	0	0	0	0	0	0	0
R-BF	4	0	0	0	0	0	0	0	0	0	0
R-BF	5	0	0	0	0	0	0	0	0	0	0
R-OS	1	0	0	1	0	0	0	0	0	0	0
R-OS	2	0	0	0	0	0	0	0	0	0	0
R-OS	3	0	0	1	0	1	0	0	0	0	0
R-OS	4	0	0	0	0	0	0	0	0	0	0
R-OS	5	0	0	0	0	0	0	0	0	0	0
C-SB	1	0	0	0	0	0	0	0	0	0	0
C-SB	2	0	0	1	0	0	0	0	0	0	0
C-SB	3	0	0	0	0	0	0	0	0	0	0
C-SB	4	0	0	0	0	0	0	0	0	0	0
C-SB	5	0	0	0	0	0	0	0	0	0	0
C-NE	1	0	0	0	0	0	0	0	0	0	0
C-NE	2	0	0	0	0	0	0	0	0	0	0
C-NE	3	0	0	0	0	0	0	0	0	0	0
C-NE	4	0	0	0	0	0	0	0	0	0	0
C-NE	5	0	0	0	0	0	0	0	0	0	0

TABLE G.8. Water Quality Summary for 10-Day *M. nasuta/N. caecoides* Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (oo/o)		Flow Rate (mL/min)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	13.0	17.0	7.49	8.49	5.0	---	28.0	32.0	115	135
COMP WR-1	14.2	15.2	7.91	8.19	7.4	8.1	30.5	32.0	116	132
COMP WR-2	14.3	14.7	7.91	8.17	7.5	8.0	30.0	32.0	116	132
COMP PS-1	14.3	15.0	7.90	8.17	7.7	8.1	30.5	32.0	116	132
COMP PS-2	14.3	14.7	7.91	8.17	7.0	8.2	31.0	32.0	116	132
COMP PS-3	14.1	14.8	7.92	8.18	7.4	8.2	30.5	32.0	116	132
COMP PS-4	14.2	14.7	7.90	8.17	7.4	8.2	30.0	32.0	116	132
COMP CS-1	14.2	14.8	7.89	8.17	7.4	8.2	31.0	32.0	116	132
R-BF	14.3	14.9	7.92	8.17	7.4	8.2	30.5	32.0	116	134
R-OS	14.2	14.9	7.92	8.19	7.7	8.1	30.0	32.0	116	132
C-SB	14.3	14.8	7.91	8.17	7.2	8.1	31.0	32.0	116	134
C-NE	14.2	15.0	7.92	8.17	7.0	8.1	30.5	32.0	116	132

APPENDIX H

28-DAY FLOW-THROUGH SOLID-PHASE TEST WITH *NEPHTYS caecoides* AND *MACOMA nasuta*

TABLE H.1. Results for All Replicates in 28-Day *M. nasuta* Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*M. nasuta* Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP WR-1	1	25	22	3	0.88	
COMP WR-1	2	25	25	0	1.00	
COMP WR-1	3	25	25	0	1.00	96.0
COMP WR-1	4	25	24	1	0.96	
COMP WR-1	5	25	24	1	0.96	
COMP WR-2	1	25	23	2	0.92	
COMP WR-2	2	25	22	3	0.88	
COMP WR-2	3	25	20	5	0.80	90.4
COMP WR-2	4	25	24	1	0.96	
COMP WR-2	5	25	24	1	0.96	
COMP PS-1	1	25	23	2	0.92	
COMP PS-1	2	25	25	0	1.00	
COMP PS-1	3	25	24	1	0.96	88.8
COMP PS-1	4	25	23	2	0.92	
COMP PS-1	5	25	16	9	0.64	
COMP PS-2	1	25	24	1	0.96	
COMP PS-2	2	25	22	3	0.88	
COMP PS-2	3	25	25	0	1.00	92.8
COMP PS-2	4	25	24	1	0.96	
COMP PS-2	5	25	21	4	0.84	
COMP PS-3	1	25	25	0	1.00	
COMP PS-3	2	25	21	4	0.84	
COMP PS-3	3	25	22	3	0.88	93.6
COMP PS-3	4	25	24	1	0.96	
COMP PS-3	5	25	25	0	1.00	
COMP PS-4	1	25	25	0	1.00	
COMP PS-4	2	25	23	2	0.92	
COMP PS-4	3	25	25	0	1.00	94.4
COMP PS-4	4	25	22	3	0.88	
COMP PS-4	5	25	23	2	0.92	
COMP CS-1	1	25	24	1	0.96	
COMP CS-1	2	25	25	0	1.00	
COMP CS-1	3	25	24	1	0.96	97.6
COMP CS-1	4	25	25	0	1.00	
COMP CS-1	5	25	24	1	0.96	

TABLE H.1. (contd)

		M. nasuta				
Sediment Treatment	Replicate	Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
R-BF	1	25	25	0	1.00	
R-BF	2	25	24	1	0.96	
R-BF	3	25	23	2	0.92	93.6
R-BF	4	25	24	1	0.96	
R-BF	5	25	21	4	0.84	
R-OS	1	26	26	0	1.00	
R-OS	2	25	24	1	0.96	
R-OS	3	25	24	1	0.96	96.8
R-OS	4	25	23	2	0.92	
R-OS	5	25	25	0	1.00	
C-SB	1	25	22	3	0.88	
C-SB	2	25	23	2	0.92	
C-SB	3	25	22	3	0.88	93.6
C-SB	4	25	25	0	1.00	
C-SB	5	25	25	0	1.00	
C-NE	1	25	22	3	0.88	
C-NE	2	25	25	0	1.00	
C-NE	3	25	23	2	0.92	92.0
C-NE	4	25	21	4	0.84	
C-NE	5	25	24	1	0.96	

TABLE H.2. Daily Observations of *M. nasuta* on Sediment Surface During 28-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*M. nasuta* on Sediment for Test Days 0 through 27																											
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
COMP WR-1	1	5	3	3	2	0	1	1	0	0	2	0	1	1	0	2	1	2	2	2	1	0	1	0	0	0	0	0	0
COMP WR-1	2	5	1	0	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	3	5	1	1	1	0	0	0	0	0	0	0	6	0	0	0	3	0	1	0	0	0	0	0	0	0	0	1	0
COMP WR-1	4	10	6	6	5	2	2	2	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
COMP WR-1	5	5	3	2	2	1	1	1	1	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
COMP WR-2	1	12	4	3	1	1	0	0	0	0	1	1	0	0	0	0	3	1	2	1	0	1	?	1	1	1	0	0	0
COMP WR-2	2	5	2	2	2	2	2	2	2	2	1	1	1	0	1	0	1	2	0	0	0	0	0	1	1	1	0	0	0
COMP WR-2	3	9	5	5	3	4	2	1	1	1	2	2	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0
COMP WR-2	4	7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0
COMP WR-2	5	5	1	1	0	0	0	0	0	0	0	0	1	0	0	0	2	1	1	1	0	0	1	1	0	0	0	0	0
COMP PS-1	1	11	7	5	4	4	2	3	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	2	6	6	5	5	4	1	2	1	1	1	1	0	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0
COMP PS-1	3	13	9	5	5	3	2	3	2	2	2	2	3	1	1	1	1	1	1	1	0	0	1	1	1	1	1	1	0
COMP PS-1	4	7	3	1	3	2	1	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	5	16	10	7	5	4	4	3	1	2	2	2	3	1	1	2	1	0	1	1	0	0	2	0	0	0	0	0	1
COMP PS-2	1	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	2	8	2	2	2	2	2	2	1	1	1	1	1	0	1	1	2	2	2	1	0	0	3	0	0	0	0	0	0
COMP PS-2	3	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
COMP PS-2	4	3	2	2	2	2	1	2	2	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
COMP PS-2	5	10	3	3	3	2	1	2	2	1	1	0	0	1	1	0	1	0	1	1	0	1	0	0	1	0	0	0	0
COMP PS-3	1	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	9	6	5	5	4	4	4	3	1	0	0	0	1	1	1	2	1	1	1	0	0	0	0	0	0	0	2	0
COMP PS-3	3	2	3	3	2	1	2	3	0	0	0	0	0	0	1	0	1	1	0	1	0	0	3	1	1	0	0	0	1
COMP PS-3	4	7	7	5	4	3	3	3	3	1	2	1	1	1	0	0	1	2	0	0	0	0	1	0	0	0	1	1	0
COMP PS-3	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	1	10	4	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	2	11	4	3	2	3	2	2	2	2	3	3	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	3	8	4	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	4	12	5	3	2	3	0	1	0	0	0	0	0	0	0	0	1	2	1	1	0	0	0	0	0	0	0	0	0
COMP PS-4	5	8	4	3	4	3	0	1	1	1	1	0	1	0	0	0	1	1	2	2	1	0	1	0	0	1	1	1	0
COMP CS-1	1	6	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	2	10	4	2	1	1	0	1	1	1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0
COMP CS-1	3	3	3	0	3	2	0	0	0	0	0	0	0	0	0	0	2	1	1	1	0	0	1	0	0	0	0	0	0
COMP CS-1	4	0	0	0	0	0	0	0	6	0	0	0	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0
COMP CS-1	5	10	6	5	2	3	1	2	0	2	2	2	2	2	2	1	1	1	1	1	0	1	1	1	1	0	1	1	1

TABLE H.2. (contd)

Sediment Treatment	Replicate	*M. nasuta* on Sediment for Test Days 0 through 27																										
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
R-BF	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
R-BF	2	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
R-BF	3	3	2	2	1	0	0	1	0	1	0	0	0	0	0	0	3	1	1	1	0	0	1	1	0	1	0	0	0
R-BF	4	3	2	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
R-BF	5	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	1	6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	2	6	4	3	2	0	0	1	1	1	1	0	0	0	0	0	0	0	0	2	1	0	1	1	0	1	0	1	0
R-OS	3	5	3	2	1	1	2	2	0	2	1	0	0	1	0	0	2	1	1	0	0	0	1	0	0	0	0	0	0
R-OS	4	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	5	3	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0	0	0	0	0	0
C-SB	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
C-SB	2	7	2	1	1	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-SB	3	6	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
C-SB	4	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
C-SB	5	8	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	1	2	2	2	4	0	2	1	2	1	4	1	1	2	1	1	1	2	2	3	2	2	3	3	3	1	0	0	1
C-NE	2	5	1	0	1	1	1	1	1	1	1	0	2	1	1	1	1	2	3	1	0	0	2	0	1	1	1	1	1
C-NE	3	4	2	2	4	2	3	3	4	3	4	4	4	5	2	3	3	3	4	4	2	2	1	1	1	1	1	1	2
C-NE	4	10	4	3	3	3	4	4	5	3	4	5	5	4	4	5	5	4	4	3	2	3	5	4	4	4	2	2	3
C-NE	5	1	0	0	0	4	1	2	0	1	1	1	2	1	1	3	2	2	2	2	1	2	2	1	0	0	1	1	1

TABLE H.3. Daily Observations of *M. nasuta* Siphons Exposed During 28-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*M. nasuta* Siphons Exposed for Test Days 0 through 27																											
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
COMP WR-1	1	1	5	4	2	3	4	3	2	1	2	1	1	3	2	3	0	1	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	2	6	9	14	5	7	9	3	5	2	3	1	2	3	5	2	1	1	1	0	0	0	0	0	0	0	0	2	0
COMP WR-1	3	4	6	9	7	2	2	2	1	3	1	1	1	4	1	2	2	0	0	0	2	0	1	1	0	0	0	0	0
COMP WR-1	4	4	8	7	6	4	6	2	5	3	2	5	2	3	0	3	2	0	2	1	1	0	0	0	0	0	0	2	2
COMP WR-1	5	6	9	7	7	4	3	1	2	0	0	1	0	3	3	3	1	0	2	1	0	0	0	0	1	0	0	2	0
COMP WR-2	1	10	10	16	6	1	7	4	7	5	6	5	2	6	2	1	2	1	2	1	4	2	4	3	2	1	3	1	1
COMP WR-2	2	5	8	15	12	8	11	4	3	2	4	2	1	8	3	3	1	3	2	3	1	0	0	2	2	2	0	1	2
COMP WR-2	3	4	8	10	6	4	4	5	4	2	4	3	1	3	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
COMP WR-2	4	6	3	13	3	4	6	4	2	5	1	3	0	2	1	2	1	0	4	6	6	2	2	2	4	0	1	3	0
COMP WR-2	5	2	8	10	5	3	6	6	3	3	4	1	2	4	2	3	3	2	2	3	5	4	1	2	1	0	2	2	3
COMP PS-1	1	10	11	14	9	6	8	5	4	2	5	6	5	6	3	0	1	0	0	0	0	0	0	1	2	1	0	0	2
COMP PS-1	2	6	11	12	8	7	2	3	2	2	3	3	0	2	1	2	0	0	1	1	1	2	2	0	1	0	0	0	0
COMP PS-1	3	11	20	15	10	7	9	4	4	3	3	3	2	3	3	1	2	0	2	0	2	3	2	1	2	0	0	0	0
COMP PS-1	4	7	5	7	4	3	7	1	3	1	2	2	1	3	1	1	1	0	1	0	0	0	1	1	0	0	0	0	0
COMP PS-1	5	9	11	9	9	4	4	4	4	4	2	4	3	5	4	3	0	2	0	0	1	0	0	0	1	0	0	0	0
COMP PS-2	1	11	7	4	0	3	3	2	2	1	0	3	0	0	0	2	2	1	0	2	3	3	0	0	1	0	0	1	1
COMP PS-2	2	8	13	15	7	11	4	7	4	6	5	4	3	7	4	4	3	3	2	1	2	2	1	1	1	1	1	4	0
COMP PS-2	3	4	4	5	2	6	2	2	2	3	2	1	1	4	4	2	0	1	0	0	0	0	0	0	1	1	1	1	1
COMP PS-2	4	6	7	9	6	5	6	3	4	2	3	3	2	2	1	0	0	0	0	0	0	0	1	1	0	0	2	0	1
COMP PS-2	5	12	8	10	9	8	10	6	7	9	6	7	6	8	5	4	2	1	2	2	1	0	1	0	1	3	2	0	1
COMP PS-3	1	0	4	11	6	2	2	1	2	0	1	2	1	7	0	0	0	0	2	2	1	2	1	0	0	0	1	3	2
COMP PS-3	2	7	12	17	11	7	9	5	6	9	6	5	6	5	3	2	0	1	1	3	4	6	2	5	3	3	4	2	9
COMP PS-3	3	6	10	15	8	8	7	2	8	5	3	4	2	2	7	6	3	4	5	4	6	4	4	3	3	2	3	3	4
COMP PS-3	4	5	14	20	11	12	14	9	5	7	6	4	6	7	5	5	2	2	12	5	11	7	2	2	3	4	6	3	5
COMP PS-3	5	3	5	8	2	0	3	0	3	3	1	1	0	1	4	2	0	1	1	1	1	3	0	0	4	0	0	2	2
COMP PS-4	1	7	7	8	4	3	3	2	1	3	0	0	0	2	1	0	0	0	1	0	1	1	0	0	2	0	1	0	1
COMP PS-4	2	9	7	9	3	3	4	2	3	6	3	4	0	2	2	0	0	1	0	0	0	3	3	2	4	6	5	3	4
COMP PS-4	3	6	18	11	5	4	7	3	1	2	1	1	0	1	2	0	1	0	0	1	0	0	0	0	0	0	0	0	2
COMP PS-4	4	4	7	8	5	2	5	3	1	1	0	3	0	3	1	1	1	0	1	3	2	2	1	2	3	2	0	1	1
COMP PS-4	5	5	8	11	4	0	6	2	4	4	2	2	1	1	1	1	1	1	6	3	3	0	1	0	2	2	1	0	0
COMP CS-1	1	3	12	13	9	3	2	2	1	1	0	1	0	2	0	1	1	0	0	0	0	0	2	0	3	0	0	0	0
COMP CS-1	2	8	13	14	10	5	7	4	3	3	4	3	5	8	5	2	1	1	1	0	2	3	1	1	2	1	2	0	1
COMP CS-1	3	9	13	12	4	4	2	3	1	4	3	4	2	4	4	2	0	0	0	0	0	0	0	0	0	0	0	1	0
COMP CS-1	4	3	7	9	3	1	3	2	2	2	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
COMP CS-1	5	8	20	13	6	5	4	9	6	5	1	4	3	5	3	5	2	1	1	1	2	4	2	2	1	2	2	4	4

TABLE III.3. (cont'd)

Sediment Treatment	Replicate	No. of Annual Synthesis Segments for Each Shell Strength (Z)																								
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
R-MK	1	4	2	4	3	6	2	0	0	0	0	0	1	1	1	3	0	0	1	2	0	0	0	0	0	1	3	0	2
R-MK	2	2	4	4	4	0	2	0	0	0	0	0	0	1	1	0	2	0	0	1	0	0	1	0	0	0	1	0	0
R-MK	3	3	4	5	3	4	3	3	3	5	4	3	5	4	1	2	1	1	1	0	0	1	0	0	0	0	1	0	0
R-MK	4	5	2	3	2	3	2	2	2	2	2	1	2	1	2	1	0	1	1	0	0	1	0	0	1	0	1	0	1
R-MK	5	4	12	3	1	1	0	2	0	1	0	2	0	3	0	0	0	0	0	0	1	1	1	1	1	0	1	2	3
R-OS	1	5	7	6	2	2	2	0	1	2	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
R-OS	2	10	10	5	7	5	6	3	1	1	3	1	1	3	3	2	1	3	1	3	4	4	0	1	2	3	0	1	1
R-OS	3	5	8	13	11	6	8	3	3	4	2	2	3	17	3	2	4	2	1	3	2	0	0	1	0	3	1	1	0
R-OS	4	4	10	5	2	4	3	6	4	4	5	2	1	2	2	2	1	0	1	1	3	0	0	0	1	0	0	0	0
R-OS	5	5	6	3	3	3	4	1	6	1	2	2	1	6	7	4	2	2	2	1	2	6	2	1	2	1	1	2	1
C-SB	1	6	1	4	4	0	0	0	0	1	1	1	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0
C-SB	2	6	7	8	8	4	3	2	3	2	3	0	0	0	0	1	0	1	0	1	0	1	3	2	1	2	2	1	3	1	1
C-SB	3	3	3	4	0	3	3	3	1	4	3	3	4	3	1	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1
C-SB	4	4	5	7	5	3	4	3	6	4	4	5	4	3	1	0	0	1	4	0	3	3	0	0	7	5	3	3	2
C-SB	5	5	5	7	3	2	4	2	2	2	0	1	6	2	0	0	0	0	1	0	0	2	1	0	2	0	3	2	2
C-NE	1	7	2	6	8	3	4	2	2	1	3	1	4	4	2	3	0	1	2	1	2	3	2	1	1	1	1	0	0
C-NE	2	16	10	1	2	0	2	2	2	1	1	2	1	2	2	3	0	3	0	1	0	2	1	3	1	4	0	1	0
C-NE	3	6	5	4	3	1	4	2	4	3	3	4	2	3	2	6	2	3	4	1	6	2	1	0	2	1	1	0	2
C-NE	4	12	14	9	8	3	8	7	7	6	6	4	7	8	8	7	4	3	4	7	4	7	4	0	0	2	4	4	3
C-NE	5	4	2	3	1	1	3	1	0	3	1	2	0	2	4	2	2	1	4	5	2	2	2	0	0	0	0	0	0

TABLE H.4. Daily Observations of *M. nasuta* Dead and Removed During 28-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*M. nasuta* Number Removed for Test Days 0 through 27																											
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
COMP WR-1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
COMP WR-1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	5	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
COMP WR-2	3	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
COMP WR-2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
COMP PS-1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	5	0	0	0	0	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	1	0	1	0	0	1
COMP PS-2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
COMP PS-2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
COMP PS-2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	1	0
COMP PS-3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	1
COMP PS-3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1
COMP PS-3	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	2	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
COMP PS-4	5	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE H.4. (contd)

Sediment Treatment	Replicate	*M. nasuta* Number Removed for Test Days 0 through 27																										
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
R-BF	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-BF	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
R-BF	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
R-BF	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
R-BF	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
R-OS	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
R-OS	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-SB	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
C-SB	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-SB	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
C-SB	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-SB	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
C-NE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
C-NE	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0
C-NE	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

TABLE H.5. Results for All Replicates in 28-Day *N. caecoides* Solid-Phase Test, John F. Baldwin Ship Channel Program

		N. caecoides				
Sediment Treatment	Replicate	Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
COMP WR-1	1	40	38	2	0.95	
COMP WR-1	2	40	33	7	0.83	
COMP WR-1	3	40	38	2	0.95	92.0
COMP WR-1	4	40	37	3	0.93	
COMP WR-1	5	40	38	2	0.95	
COMP WR-2	1	40	38	2	0.95	
COMP WR-2	2	40	37	3	0.93	
COMP WR-2	3	40	35	5	0.88	91.5
COMP WR-2	4	40	37	3	0.93	
COMP WR-2	5	40	36	4	0.90	
COMP PS-1	1	40	33	7	0.83	
COMP PS-1	2	40	35	5	0.88	
COMP PS-1	3	40	34	6	0.85	83.5
COMP PS-1	4	40	32	8	0.80	
COMP PS-1	5	40	33	7	0.83	
COMP PS-2	1	40	39	1	0.98	
COMP PS-2	2	40	35	5	0.88	
COMP PS-2	3	40	35	5	0.88	90.5
COMP PS-2	4	40	40	0	1.00	
COMP PS-2	5	40	32	8	0.80	
COMP PS-3	1	40	34	6	0.85	
COMP PS-3	2	40	39	1	0.98	
COMP PS-3	3	40	36	4	0.90	92.0
COMP PS-3	4	40	38	2	0.95	
COMP PS-3	5	40	37	3	0.93	
COMP PS-4	1	40	34	6	0.85	
COMP PS-4	2	40	35	5	0.88	
COMP PS-4	3	40	39	1	0.98	91.5
COMP PS-4	4	40	39	1	0.98	
COMP PS-4	5	40	36	4	0.90	
COMP CS-1	1	40	34	6	0.85	
COMP CS-1	2	40	36	4	0.90	
COMP CS-1	3	40	40	0	1.00	91.5
COMP CS-1	4	40	39	1	0.98	
COMP CS-1	5	40	34	6	0.85	

TABLE H.5. (contd)

Sediment Treatment	Replicate	*N. caecoides* Number Initiated	Number Live	Dead or Missing	Proportion Surviving	Mean Percent Surviving
R-BF	1	40	33	7	0.83	
R-BF	2	40	35	5	0.88	
R-BF	3	40	39	1	0.98	91.5
R-BF	4	40	39	1	0.98	
R-BF	5	40	37	3	0.93	
R-OS	1	40	38	2	0.95	
R-OS	2	40	36	4	0.90	
R-OS	3	40	37	3	0.93	90.5
R-OS	4	40	33	7	0.83	
R-OS	5	40	37	3	0.93	
C-SB	1	40	39	1	0.98	
C-SB	2	40	32	8	0.80	
C-SB	3	40	35	5	0.88	92.0
C-SB	4	40	39	1	0.98	
C-SB	5	40	39	1	0.98	
C-NE	1	40	37	3	0.93	
C-NE	2	40	39	1	0.98	
C-NE	3	40	37	3	0.93	95.0
C-NE	4	40	40	0	1.00	
C-NE	5	40	37	3	0.93	

TABLE H.6. Daily Observations of *N. caecoides* on Sediment Surface During 28-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*N. caecoides* on Sediment for Test Days 0 through 27																											
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
COMP WR-1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	4	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
COMP WR-2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	3	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
COMP WR-2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	3	0	0	0	0	1	0	0	0	1	0	1	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	4	0	0	0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0
COMP PS-2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
COMP PS-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
COMP PS-3	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	1	0	0	0
COMP PS-3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	2	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	3	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	5	0	0	0	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	3	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

TABLE H.6. (contd)

Sediment Treatment	Replicate	*N. caecoides* on Sediment for Test Days 0 through 27																										
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
R-BF	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
R-BF	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-BF	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-BF	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-BF	5	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
R-OS	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	1
R-OS	5	0	0	0	0	0	0	0	0	0	1	1	1	0	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0
C-SB	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-SB	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-SB	3	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
C-SB	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
C-SB	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
C-NE	3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
C-NE	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1

TABLE H.7. Daily Observations of *N. caecoides* Dead and Removed During 28-Day Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	*N. caecoides* Number Removed for Test Days 0 through 27																										
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
COMP WR-1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
COMP WR-2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	3	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
COMP WR-2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP WR-2	5	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	3	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	4	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0
COMP PS-2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
COMP PS-2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-2	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
COMP PS-3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
COMP PS-3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-3	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP PS-4	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	3	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMP CS-1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

TABLE H.7. (contd)

Sediment Treatment	Replicate	*N. caecoides* Number Removed for Test Days 0 through 27																										
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
R-BF	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0
R-BF	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-BF	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-BF	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-BF	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
R-OS	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
R-OS	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
R-OS	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
C-SB	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-SB	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
C-SB	3	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
C-SB	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
C-SB	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-NE	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1

TABLE H.8. Water Quality Summary for 28-Day *M. nasuta/N. caecoides* Solid-Phase Test, John F. Baldwin Ship Channel Program

Sediment Treatment	Temperature (°C)		pH		Dissolved Oxygen (mg/L)		Salinity (o/oo)		Flow Rates (mL/min)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Acceptable Range	13.0	17.0	7.30	8.30	5.0	---	28.0	32.0	115	135
COMP WR-1	13.8	15.6	7.94	8.24	7.2	8.3	30.0	32.0	116	134
COMP WR-2	13.7	15.5	7.91	8.23	6.9	8.3	30.0	32.0	114(a)	132
COMP PS-1	13.6	15.4	7.90	8.18	7.4	8.1	30.0	32.0	116	134
COMP PS-2	13.6	15.7	7.89	8.19	7.0	8.3	30.0	32.0	116	134
COMP PS-3	13.6	15.6	7.90	8.22	7.3	8.3	30.0	32.0	116	132
COMP PS-4	13.8	15.6	7.91	8.22	7.0	8.2	30.0	32.0	116	134
COMP CS-1	13.8	15.8	7.92	8.21	7.5	8.3	30.5	32.0	116	134
R-BF	13.7	15.6	7.91	8.21	7.1	8.3	30.5	32.0	116	134
R-OS	13.7	15.6	7.89	8.24	7.5	8.3	30.0	32.0	114(a)	134
C-SB	13.7	15.4	7.92	8.22	7.3	8.2	30.0	32.0	116	132
C-NE	13.8	15.7	7.90	8.22	7.4	8.3	30.0	32.0	116	132

(a) Data point out of range.

APPENDIX I

MACOMA nasuta TISSUE CHEMISTRY AND QUALITY CONTROL DATA

TABLE I.1. Total Detected Polynuclear Aromatic Hydrocarbons (PAH), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* PAH (µg/kg wet weight) Total Detected LPAH	Total Detected HPAH	Total Detected PAH
COMP WR-1	1 Rep 1	7	10	8	18
COMP WR-1	1 Rep 2	7	5	5	10
COMP WR-1	1 Rep 3	7	6	6	12
COMP WR-1	2	5	3	5	8
COMP WR-1	3	7	5	4	9
COMP WR-1	4	7	8	6	14
COMP WR-1	5	6	4	6	10
COMP WR-2	1	6	4	3	7
COMP WR-2	2	6	5	5	10
COMP WR-2	3	7	3	4	7
COMP WR-2	4	6	4	2	6
COMP WR-2	5	7	4	3	7
COMP PS-1	1	6	5	3	8
COMP PS-1	2	6	2	2	4
COMP PS-1	3	7	4	2	6
COMP PS-1	4	5	2	2	4
COMP PS-1	5	7	5	4	9
COMP PS-2	1	5	3	7	10
COMP PS-2	2	7	5	7	12
COMP PS-2	3	5	4	5	9
COMP PS-2	4	8	5	7	12
COMP PS-2	5	8	4	6	10
COMP PS-3	1	5	2	3	5
COMP PS-3	2	7	5	5	10
COMP PS-3	3	6	7	9	16
COMP PS-3	4	6	3	4	7
COMP PS-3	5	6	2	2	4
COMP PS-4	1	5	3	8	11
COMP PS-4	2	5	3	7	10
COMP PS-4	3 Rep 1	8	5	9	14
COMP PS-4	3 Rep 2	8	6	8	14
COMP PS-4	3 Rep 3	8	6	8	14
COMP PS-4	4	8	5	8	13
COMP PS-4	5	6	5	9	14

TABLE I.1. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* PAH (µg/kg wet weight) Total Detected LPAH	Total Detected HPAH	Total Detected PAH
COMP CS-1	1	7	6	10	16
COMP CS-1	2	5	3	8	11
COMP CS-1	3	8	4	9	13
COMP CS-1	4	8	4	8	12
COMP CS-1	5	6	5	6	11
R-BF	1 Rep 1	6	9	31	40
R-BF	1 Rep 2	6	8	27	35
R-BF	1 Rep 3	6	7	26	33
R-BF	2	6	5	27	32
R-BF	3	8	4	18	22
R-BF	4	5	5	51	56
R-BF	5	8	5	27	32
R-OS	1	8	5	5	10
R-OS	2	5	2	2	4
R-OS	3	5	2	2	4
R-OS	4	7	4	3	7
R-OS	5	5	4	7	11
C-SB	1	8	3	7	10
C-SB	2	7	3	8	11
C-SB	3	6	5	11	16
C-SB	4	5	2	7	9
C-SB	5	5	3	7	10
C-NE	1	7	4	4	8
C-NE	2 Rep 1	5	2	4	6
C-NE	2 Rep 2	5	4	4	8
C-NE	2 Rep 3	5	2	3	5
C-NE	3	6	4	3	7
C-NE	4	7	5	5	10
C-NE	5	7	3	5	8
Background	1	8	5	4	9
Background	2	8	5	5	10
Background	3	8	4	6	10
Background	4	8	4	4	8
Background	5	8	8	7	15

TABLE I.2. Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAH), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Target DL[a]			20	20	20	20	20	20
Achieved DL High			4.63	4.54	2.46	2.65	2.06	2.01
Achieved DL Low			1.23	1.21	0.65	0.70	0.55	0.53
COMP WR-1	1 Rep 1	7	5.76	4.54 U[b]	2.46 U	0.56 J[c]	3.19	0.34 J
COMP WR-1	1 Rep 2	7	2.91 J	3.03 U	1.64 U	0.28 J	1.44	1.34 U
COMP WR-1	1 Rep 3	7	3.39 J	3.41 U	1.84 U	0.24 J	1.93	0.48 J
COMP WR-1	2	5	0.74 J	0.06 J	0.31 J	0.29 J	1.08	0.12 J
COMP WR-1	3	7	2.89	2.59 U	1.40 U	1.51 U	1.77	1.14 U
COMP WR-1	4	7	4.60	3.95 U	2.14 U	0.36 J	2.50	0.15 J
COMP WR-1	5	6	1.53	0.18 J	0.37 J	0.53 J	1.86	0.21 J
COMP WR-2	1	6	2.45	1.82 U	0.98 U	0.46 J	1.10	0.15 J
COMP WR-2	2	6	2.55	0.14 J	0.86 U	0.37 J	1.48	0.18 J
COMP WR-2	3	7	2.01	1.55 U	0.84 U	0.25 J	1.23	0.68 U
COMP WR-2	4	6	2.03	1.75 U	0.24 J	0.38 J	1.38	0.17 J
COMP WR-2	5	7	2.31	2.11 U	1.14 U	0.32 J	1.32	0.10 J
COMP PS-1	1	6	2.47	0.17 J	0.37 J	0.28 J	1.17	0.20 J
COMP PS-1	2	6	1.37	1.21 U	0.65 U	0.25 J	0.72	0.11 J
COMP PS-1	3	7	2.46 J	2.64 U	1.43 U	0.29 J	1.42	0.25 J
COMP PS-1	4	5	0.87 J	1.49 U	0.23 J	0.28 J	0.98	0.06 J
COMP PS-1	5	7	2.55 J	0.20 J	0.27 J	0.38 J	1.70	0.26 J
COMP PS-2	1	5	1.31 J	0.04 J	0.29 J	0.26 J	1.08	0.17 J
COMP PS-2	2	7	2.47	2.04 U	1.10 U	0.33 J	1.57	0.14 J
COMP PS-2	3	5	2.13 J	2.66 U	0.26 J	0.28 J	1.32	0.25 J
COMP PS-2	4	8	2.58	2.31 U	1.25 U	0.30 J	1.86	0.10 J
COMP PS-2	5	8	1.63	1.32 U	0.18 J	0.30 J	1.39	0.07 J
COMP PS-3	1	5	0.38 J	1.32 U	0.21 J	0.17 J	0.65	0.14 J
COMP PS-3	2	7	2.97	2.63 U	1.42 U	0.30 J	1.83	0.16 J
COMP PS-3	3	6	1.71	0.46 J	0.70	1.00	2.03	0.99
COMP PS-3	4	6	1.25 J	1.37 U	0.19 J	0.28 J	0.79	0.14 J
COMP PS-3	5	6	1.22 J	1.21 U	0.25 J	0.25 J	0.59	0.14 J
COMP PS-4	1	5	0.68 J	1.33 U	0.31 J	0.35 J	1.30	0.21 J
COMP PS-4	2	5	0.78 J	2.02 U	0.27 J	0.30 J	1.09	0.13 J
COMP PS-4	3 Rep 1	8	2.78	2.67 U	1.44 U	0.38 J	2.00	0.12 J
COMP PS-4	3 Rep 2	8	3.17	2.85 U	1.54 U	0.33 J	2.17	0.15 J
COMP PS-4	3 Rep 3	8	3.11	2.91 U	0.25 J	0.26 J	2.19	0.15 J
COMP PS-4	4	8	2.11	2.03 U	0.30 J	0.43 J	2.09	0.09 J
COMP PS-4	5	6	2.26	1.96 U	0.34 J	0.48 J	1.62	0.25 J
COMP CS-1	1	7	3.49	2.89 U	1.56 U	0.26 J	1.94	0.08 J
COMP CS-1	2	5	1.32 J	1.39 U	0.29 J	0.24 J	1.12	0.12 J
COMP CS-1	3	8	2.04	0.05 J	0.15 J	0.24 J	1.76	0.13 J
COMP CS-1	4	8	2.12	1.76 U	0.22 J	0.29 J	1.74	0.09 J
COMP CS-1	5	6	3.13	2.53 U	1.37 U	0.40 J	1.61	1.12 U

TABLE I.2. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
B-BF	1 Rep 1	8	3.64	0.59 J	0.83 J	0.80 J	2.44	0.87 J
B-BF	1 Rep 2	8	4.75	3.60 U	1.95 U	0.44 J	2.46	0.52 J
B-BF	1 Rep 3	8	3.75	0.18 J	0.37 J	0.38 J	2.07	0.42 J
B-BF	2	8	2.60 J	0.30 J	0.26 J	0.37 J	1.27	0.49 J
B-BF	3	8	1.64	0.06 J	0.14 J	0.25 J	1.53	0.17 J
B-BF	4	5	0.78 J	0.24 J	0.38 J	0.39 J	2.10	0.69
B-BF	5	8	2.03	0.14 J	0.24 J	0.37 J	1.96	0.28 J
B-DS	1	8	2.46	1.93 U	0.31 J	0.39 J	2.01	0.14 J
B-DS	2	5	0.70 J	1.43 U	0.34 J	0.28 J	0.88	0.10 J
B-DS	3	5	0.60 J	1.48 U	0.28 J	0.23 J	0.89	0.12 J
B-DS	4	7	1.72	1.59 U	0.21 J	0.23 J	1.30	0.13 J
B-DS	5	5	0.87 J	0.05 J	0.33 J	0.37 J	1.56	0.62 J
C-SB	1	8	1.41	1.33 U	0.72 U	0.19 J	1.09	0.12 J
C-SB	2	7	1.62	1.33 U	0.72 U	0.31 J	1.37	0.14 J
C-SB	3	8	2.08	0.34 J	0.44 J	0.55 J	1.44	0.41 J
C-SB	4	5	0.69 J	0.07 J	0.22 J	0.28 J	1.03	0.14 J
C-SB	5	5	0.68 J	1.33 U	0.25 J	0.27 J	1.17	0.13 J
C-NE	1	7	1.65	1.23 U	0.31 J	0.29 J	1.74	0.10 J
C-NE	2 Rep 1	5	0.76 J	1.76 U	0.25 J	0.22 J	1.02	0.11 J
C-NE	2 Rep 2	5	2.61 J	2.59 U	1.40 U	0.20 J	1.33	0.19 J
C-NE	2 Rep 3	5	0.83 J	2.00 U	0.23 J	0.18 J	0.82 J	0.06 J
C-NE	3	8	1.49 J	1.56 U	0.34 J	0.33 J	1.21	0.14 J
C-NE	4	7	2.38	1.94 U	1.05 U	0.28 J	1.90	0.86 U
C-NE	5	7	1.40 J	1.44 U	0.22 J	0.29 J	1.47	0.11 J
Background	1	8	1.65	1.41 U	0.37 J	0.42 J	2.26	0.09 J
Background	2	8	1.62 J	1.62 U	0.87 U	0.41 J	2.43	0.07 J
Background	3	8	1.54	1.33 U	0.19 J	0.38 J	1.99	0.15 J
Background	4	8	1.56	1.50 U	0.16 J	0.28 J	1.82	0.06 J
Background	5	8	3.80	2.85 U	1.54 U	0.41 J	3.21	0.11 J

(a) DL Detection limit.
(b) U Analyte was not present above the associted value.
(c) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE I.3. High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAH), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* HPAH (µg/kg wet weight)									
			Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
Target DL[a]			20	20	20	20	20	20	20	20	20	20
Achieved DL High			1.96	2.40	3.36	2.35	3.43	2.86	2.98	3.58	2.44	4.86
Achieved DL Low			0.52	0.64	0.89	0.62	0.91	0.76	0.79	0.95	0.65	1.29
COMP WR-1	1 Rep 1	7	1.79 J[b]	1.77 J	0.76 J	1.23 J	0.76 J	0.55 J	0.27 J	0.33 J	2.44 U[c]	0.66 J
COMP WR-1	1 Rep 2	7	1.27 J	1.16 J	0.39 J	0.85 J	0.50 J	0.34 J	0.19 J	0.14 J	1.63 U	0.38 J
COMP WR-1	1 Rep 3	7	1.36 J	1.25 J	0.50 J	0.86 J	0.73 J	0.28 J	0.16 J	0.20 J	1.83 U	0.52 J
COMP WR-1	2	5	1.32	1.29	0.25 J	0.52 J	0.44 J	0.23 J	0.17 J	0.21 J	0.72 U	0.23 J
COMP WR-1	3	7	1.08 J	1.07 J	0.32 J	0.49 J	0.60 J	0.22 J	0.09 J	2.04 U	1.39 U	0.39 J
COMP WR-1	4	7	1.32 J	1.30 J	0.63 J	0.81 J	0.65 J	0.44 J	0.27 J	3.11 U	2.12 U	0.42 J
COMP WR-1	5	6	1.57	1.75	0.43 J	0.61 J	0.57 J	0.35 J	0.13 J	0.38 J	0.80 U	0.30 J
COMP WR-2	1	6	1.11	0.80 J	0.21 J	0.51 J	1.37 U	1.14 U	1.19 U	1.43 U	0.97 U	1.94 U
COMP WR-2	2	6	1.68	0.92	0.30 J	0.85	0.41 J	0.17 J	1.05 U	0.24 J	0.86 U	1.71 U
COMP WR-2	3	7	1.41	0.96	0.22 J	0.77 J	0.24 J	0.16 J	1.02 U	1.22 U	0.83 U	0.15 J
COMP WR-2	4	6	0.95	0.59 J	0.18 J	0.33 J	0.19 J	0.13 J	1.15 U	1.38 U	0.94 U	1.87 U
COMP WR-2	5	7	0.98	0.68 J	0.22 J	0.57 J	0.24 J	0.25 J	1.38 U	1.66 U	1.13 U	0.12 J
COMP PS-1	1	6	0.88	0.36 J	0.25 J	0.63 J	0.47 J	0.14 J	1.07 U	1.28 U	0.87 U	1.74 U
COMP PS-1	2	6	0.70	0.33 J	0.15 J	0.37 J	0.18 J	0.10 J	0.79 U	0.95 U	0.65 U	1.29 U
COMP PS-1	3	7	0.72 J	0.34 J	0.30 J	0.53 J	0.19 J	0.15 J	1.73 U	2.08 U	1.41 U	2.82 U
COMP PS-1	4	5	0.84	0.41 J	0.12 J	0.26 J	0.05 J	0.03 J	0.97 U	1.17 U	0.80 U	1.59 U
COMP PS-1	5	7	1.28	0.77 J	0.38 J	0.69 J	0.22 J	0.19 J	1.65 U	1.98 U	0.09 J	0.23 J
COMP PS-2	1	5	1.85	2.86	0.35 J	0.64 J	0.51 J	0.24 J	0.10 J	0.22 J	0.72 U	0.24 J
COMP PS-2	2	7	1.85	2.35	0.46 J	0.99 J	0.49 J	0.34 J	0.10 J	0.17 J	1.09 U	0.34 J
COMP PS-2	3	5	1.44	1.68	0.48 J	0.76 J	0.49 J	0.35 J	0.24 J	2.10 U	1.43 U	2.84 U
COMP PS-2	4	8	1.61	2.17	0.49 J	0.76 J	0.79 J	0.24 J	0.51 J	0.30 J	0.10 J	0.42 J
COMP PS-2	5	8	1.46	1.65	0.29 J	0.74	0.51 J	0.17 J	0.30 J	0.16 J	0.06 J	0.37 J
COMP PS-3	1	5	0.77	0.74	0.22 J	0.34 J	0.23 J	0.18 J	0.06 J	1.04 U	0.71 U	1.41 U
COMP PS-3	2	7	1.41	1.25 J	0.41 J	0.86 J	0.55 J	0.27 J	0.13 J	0.19 J	1.41 U	0.41 J
COMP PS-3	3	6	1.63	1.45	1.06	1.01	0.94 J	0.78 J	0.25 J	0.94 J	0.58 J	0.71 J
COMP PS-3	4	6	1.02	1.04	0.26 J	0.46 J	0.37 J	0.15 J	0.90 U	0.23 J	0.73 U	1.46 U
COMP PS-3	5	6	0.66	0.65	0.21 J	0.31 J	0.20 J	0.12 J	0.79 U	0.95 U	0.65 U	1.29 U

TABLE I.3. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* HPAH (µg/kg wet weight)									
			Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
COMP PS-4	1	5	2.80	2.62	0.50 J	1.13	0.57 J	0.33 J	0.14 J	0.16 J	0.72 U	0.24 J
COMP PS-4	2	5	2.20	2.49	0.39 J	0.65 J	0.34 J	0.22 J	0.11 J	1.59 U	1.08 U	0.14 J
COMP PS-4	3 Rep 1	8	2.56	2.44	0.43 J	1.11 J	0.60 J	0.50 J	0.34 J	0.18 J	0.05 J	0.39 J
COMP PS-4	3 Rep 2	8	2.29	2.25	0.41 J	1.02 J	0.71 J	0.19 J	0.34 J	0.25 J	0.08 J	0.43 J
COMP PS-4	3 Rep 3	8	2.36	2.36	0.48 J	1.07 J	0.72 J	0.25 J	0.37 J	0.26 J	0.10 J	0.40 J
COMP PS-4	4	8	2.56	2.47	0.44 J	1.00 J	0.61 J	0.19 J	0.30 J	0.14 J	0.06 J	0.31 J
COMP PS-4	5	6	3.05	3.64	0.50 J	1.16	0.58 J	0.26 J	1.28 U	1.54 U	1.05 U	2.09 U
COMP CS-1	1	7	2.68	3.08	0.72 J	1.34 J	0.68 J	0.64 J	1.89 U	0.19 J	1.55 U	0.34 J
COMP CS-1	2	5	2.35	3.12	0.44 J	0.68 J	0.34 J	0.37 J	0.43 J	0.11 J	0.75 U	0.20 J
COMP CS-1	3	8	2.30	2.77	0.49 J	0.91	0.83 J	0.29 J	0.54 J	0.27 J	0.07 J	0.48 J
COMP CS-1	4	8	2.06	2.51	0.38 J	0.89 J	0.69 J	0.21 J	0.36 J	0.18 J	0.05 J	0.28 J
COMP CS-1	5	6	1.79	2.04	0.43 J	0.86 J	0.66 J	0.29 J	1.66 U	1.99 U	1.36 U	2.70 U
R-BF	1 Rep 1	6	5.40	6.74	2.03	2.70	3.97	2.31	3.27	2.20	0.39 J	2.47 J
R-BF	1 Rep 2	6	4.76	6.21	1.80 J	2.17	3.52	1.95 J	2.75	1.61 J	1.93 U	1.94 J
R-BF	1 Rep 3	6	4.57	5.97	1.57 J	2.04	3.68	1.73	2.51	1.53 J	1.31 U	2.32 J
R-BF	2	6	4.77	6.57	1.45 J	2.11	3.64	1.94	2.69	1.42 J	1.42 U	2.24 J
R-BF	3	8	3.34	3.79	0.90 J	1.59	3.03	0.78 J	1.80	0.98 J	0.12 J	1.53
R-BF	4	5	11.05	14.64	2.55	3.66	5.87	2.92	3.97	2.71	0.26 J	3.14
R-BF	5	8	5.04	5.92	1.45	2.29	4.37	1.39	2.64	1.53 J	0.24 J	2.45
R-OS	1	8	1.37	0.88 J	0.25 J	0.73 J	0.44 J	0.13 J	0.23 J	0.26 J	0.07 J	0.39 J
R-OS	2	5	0.83	0.46 J	0.18 J	0.29 J	0.15 J	0.07 J	0.10 J	1.13 U	0.77 U	0.08 J
R-OS	3	5	0.95	0.58 J	0.22 J	0.35 J	0.19 J	0.14 J	0.97 U	1.16 U	0.79 U	1.58 U
R-OS	4	7	0.86	0.42 J	0.21 J	0.47 J	0.25 J	0.11 J	1.04 U	1.25 U	0.85 U	0.21 J
R-OS	5	5	1.48	1.02	1.34 J	1.88	0.66 J	0.40 J	0.19 J	0.22 J	1.00 U	0.12 J
C-SB	1	8	2.15	1.19	0.32 J	0.67 J	0.86 J	0.24 J	0.30 J	0.28 J	0.07 J	0.51 J
C-SB	2	7	3.03	1.94	0.44 J	0.88	0.95 J	0.47 J	0.11 J	0.18 J	0.72 U	0.35 J
C-SB	3	6	3.10	2.22	0.79 J	1.03	1.24	0.65 J	0.18 J	0.59 J	0.26 J	0.50 J
C-SB	4	5	2.54	1.75	0.43 J	0.77	0.83 J	0.42 J	0.09 J	0.20 J	0.72 U	0.32 J
C-SB	5	5	2.33	1.58	0.41 J	0.71	0.86 J	0.41 J	0.08 J	0.20 J	0.71 U	0.30 J

TABLE I.3. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* HPAH (µg/kg wet weight) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
C-NE	1	7	1.73	1.06	0.20 J	0.82	0.27 J	0.10 J	0.81 U	0.97 U	0.66 U	0.12 J
C-NE	2 Rep 1	5	1.50	0.90 J	0.20 J	0.67 J	0.23 J	0.07 J	1.16 U	1.39 U	0.95 U	1.89 U
C-NE	2 Rep 2	5	1.40	0.92 J	0.32 J	0.62 J	0.21 J	0.11 J	1.70 U	2.04 U	1.39 U	2.76 U
C-NE	2 Rep 3	5	1.25	0.74 J	0.20 J	0.57 J	0.23 J	0.05 J	1.31 U	1.58 U	1.07 U	2.14 U
C-NE	3	6	1.17	0.61 J	0.26 J	0.48 J	1.18 U	0.98 U	1.02 U	1.23 U	0.84 U	1.67 U
C-NE	4	7	1.59	0.80 J	0.34 J	1.07	0.37 J	0.20 J	1.27 U	1.53 U	1.04 U	0.19 J
C-NE	5	7	1.82	1.13	0.25 J	1.12	0.46 J	0.15 J	0.95 U	1.14 U	0.77 U	0.15 J
Background	1	8	1.71	0.42 J	0.27 J	0.87	0.35 J	0.11 J	0.11 J	0.06 J	0.04 J	0.14 J
Background	2	8	2.24	0.99	0.23 J	0.84	0.35 J	0.11 J	0.10 J	0.07 J	0.05 J	0.19 J
Background	3	8	1.92	0.62 J	0.26 J	2.22	0.29 J	0.10 J	0.09 J	0.07 J	0.04 J	0.17 J
Background	4	8	1.87	0.76 J	0.18 J	0.70 J	0.29 J	0.09 J	0.08 J	0.07 J	0.03 J	0.14 J
Background	5	8	2.88	1.61	0.36 J	1.00 J	0.47 J	0.13 J	0.13 J	0.14 J	0.08 J	0.28 J

(a) DL Detection limit.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) U Analyte was not present above the associated value.

TABLE I.4. Total Detected Polynuclear Aromatic Hydrocarbons (PAH), Dry Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* PAH (µg/kg dry weight) Total Detected LPAH	Total Detected HPAH	Total Detected PAH
COMP WR-1	1 Rep 1	7	108	89	197
COMP WR-1	1 Rep 2	7	51	57	108
COMP WR-1	1 Rep 3	7	66	64	130
COMP WR-1	2	5	23	41	64
COMP WR-1	3	7	30	27	57
COMP WR-1	4	7	75	58	133
COMP WR-1	5	6	39	53	92
COMP WR-2	1	6	36	23	59
COMP WR-2	2	6	39	38	77
COMP WR-2	3	7	38	43	81
COMP WR-2	4	6	33	19	52
COMP WR-2	5	7	40	30	70
COMP PS-1	1	6	44	26	70
COMP PS-1	2	6	22	16	38
COMP PS-1	3	7	40	20	60
COMP PS-1	4	5	23	17	40
COMP PS-1	5	7	53	38	91
COMP PS-2	1	5	27	60	87
COMP PS-2	2	7	46	73	119
COMP PS-2	3	5	42	53	95
COMP PS-2	4	8	41	63	104
COMP PS-2	5	8	30	48	78
COMP PS-3	1	5	15	25	40
COMP PS-3	2	7	53	56	109
COMP PS-3	3	6	63	86	149
COMP PS-3	4	6	26	34	60
COMP PS-3	5	6	25	22	47
COMP PS-4	1	5	26	76	102
COMP PS-4	2	5	23	58	81
COMP PS-4	3 Rep 1	8	49	80	129
COMP PS-4	3 Rep 2	8	54	74	128
COMP PS-4	3 Rep 3	8	55	78	133
COMP PS-4	4	8	48	77	125
COMP PS-4	5	6	41	76	117

TABLE I.4. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* PAH (µg/kg dry weight) Total Detected LPAH	Total Detected HPAH	Total Detected PAH
COMP CS-1	1	7	59	99	158
COMP CS-1	2	5	27	71	98
COMP CS-1	3	8	42	86	128
COMP CS-1	4	8	38	65	103
COMP CS-1	5	6	45	53	98
R-BF	1 Rep 1	6	100	343	443
R-BF	1 Rep 2	6	89	291	380
R-BF	1 Rep 3	6	78	282	360
R-BF	2	6	56	283	339
R-BF	3	8	39	186	225
R-BF	4	5	39	427	466
R-BF	5	8	55	298	353
R-OS	1	8	45	41	86
R-OS	2	5	21	20	41
R-OS	3	5	19	22	41
R-OS	4	7	37	26	63
R-OS	5	5	33	63	96
C-SB	1	8	26	61	87
C-SB	2	7	34	83	117
C-SB	3	6	44	88	132
C-SB	4	5	23	70	93
C-SB	5	5	23	64	87
C-NE	1	7	43	45	88
C-NE	2 Rep 1	5	24	37	61
C-NE	2 Rep 2	5	44	37	81
C-NE	2 Rep 3	5	20	31	51
C-NE	3	6	32	23	55
C-NE	4	7	42	42	84
C-NE	5	7	32	47	79
Background	1	8	41	35	76
Background	2	8	37	42	79
Background	3	8	36	48	84
Background	4	8	34	37	71
Background	5	8	66	62	128

TABLE I.5. Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAH), Dry Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* LPAH (µg/kg dry weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
COMP WR-1	1 Rep 1	7	9.089	63.37	49.95 U[a]	27.07 U	6.16 J[b]	35.10	3.74 J
COMP WR-1	1 Rep 2	7	9.089	32.02 J	33.34 U	18.04 U	3.08 J	15.84	14.74 U
COMP WR-1	1 Rep 3	7	9.089	37.30 J	37.52 U	20.24 U	2.64 J	21.23	5.28 J
COMP WR-1	2	5	11.334	6.53 J	0.53 J	2.74 J	2.56 J	9.53	1.06 J
COMP WR-1	3	7	15.781	18.31	16.41 U	8.87 U	9.57 U	11.22	7.22 U
COMP WR-1	4	7	10.111	45.50	39.07 U	21.17 U	3.56 J	24.73	1.48 J
COMP WR-1	5	6	11.586	13.21	1.55 J	3.19 J	4.57 J	14.33	1.81 J
COMP WR-2	1	6	11.448	21.40	15.90 U	8.56 U	4.02 J	9.61	1.31 J
COMP WR-2	2	6	12.118	21.04	1.16 J	7.10 U	3.05 J	12.21	1.49 J
COMP WR-2	3	7	9.092	22.11	17.05 U	9.24 U	2.75 J	13.53	7.48 U
COMP WR-2	4	6	12.570	16.15	13.92 U	1.91 J	3.02 J	10.98	1.35 J
COMP WR-2	5	7	10.057	22.97	20.98 U	11.34 U	3.18 J	13.13	0.99 J
COMP PS-1	1	6	10.654	23.18	1.60 J	3.47 J	2.63 J	10.98	1.88 J
COMP PS-1	2	6	11.105	12.34	10.90 U	5.85 U	2.25 J	6.48	0.99 J
COMP PS-1	3	7	10.980	22.40 J	24.04 U	13.02 U	2.64 J	12.93	2.28 J
COMP PS-1	4	5	10.303	8.44 J	14.46 U	2.23 J	2.72 J	9.51	0.58 J
COMP PS-1	5	7	10.032	25.42 J	1.99 J	2.69 J	3.79 J	16.95	2.59 J
COMP PS-2	1	5	11.733	11.17 J	0.34 J	2.47 J	2.22 J	9.20	1.45 J
COMP PS-2	2	7	9.740	25.36	20.94 U	11.29 U	3.39 J	16.12	1.44 J
COMP PS-2	3	5	10.173	20.94 J	26.15 U	2.56 J	2.75 J	12.98	2.46 J
COMP PS-2	4	8	11.797	21.87	19.58 U	10.60 U	2.54 J	15.77	0.85 J
COMP PS-2	5	8	11.870	13.73	11.12 U	1.52 J	2.53 J	11.71	0.59 J
COMP PS-3	1	5	10.037	3.79 J	13.15 U	2.09 J	1.69 J	6.48	1.39 J
COMP PS-3	2	7	9.838	30.19	26.73 U	14.43 U	3.05 J	18.60	1.63 J
COMP PS-3	3	6	10.872	15.73	4.23 J	6.44	9.20	18.67	9.11
COMP PS-3	4	6	10.236	12.21 J	13.38 U	1.86 J	2.74 J	7.72	1.37 J
COMP PS-3	5	6	9.905	12.32 J	12.22 U	2.52 J	2.52 J	5.96	1.41 J
COMP PS-4	1	5	11.159	6.09 J	11.92 U	2.78 J	3.14 J	11.65	1.88 J
COMP PS-4	2	5	11.243	6.94 J	17.97 U	2.40 J	2.67 J	9.69	1.16 J
COMP PS-4	3 Rep 1	8	10.791	25.76	24.74 U	13.34 U	3.52 J	18.53	1.11 J
COMP PS-4	3 Rep 2	8	10.791	29.38	26.41 U	14.27 U	3.06 J	20.11	1.39 J
COMP PS-4	3 Rep 3	8	10.791	28.82	26.97 U	2.32 J	2.41 J	20.29	1.39 J
COMP PS-4	4	8	10.499	20.10	19.34 U	2.86 J	4.10 J	19.91	0.86 J
COMP PS-4	5	6	12.152	18.60	16.13 U	2.80 J	3.95 J	13.33	2.06 J
COMP CS-1	1	7	9.780	35.69	29.55 U	15.95 U	2.66 J	19.84	0.82 J
COMP CS-1	2	5	11.400	11.58 J	12.19 U	2.54 J	2.11 J	9.82	1.05 J
COMP CS-1	3	8	10.452	19.52	0.48 J	1.44 J	2.30 J	16.84	1.24 J
COMP CS-1	4	8	11.689	18.14	15.06 U	1.88 J	2.48 J	14.89	0.77 J
COMP CS-1	5	6	11.460	27.31	22.08 U	11.95 U	3.49 J	14.05	9.77 U
R-BF	1 Rep 1	6	9.180	39.65	6.43 J	9.04 J	8.71 J	26.58	9.48 J
R-BF	1 Rep 2	6	9.180	51.74	39.22 U	21.24 U	4.79 J	26.80	5.66 J
R-BF	1 Rep 3	6	9.180	40.85	1.96 J	4.03 J	4.14 J	22.55	4.58 J
R-BF	2	6	9.469	27.46 J	3.17 J	2.75 J	3.91 J	13.41	5.17 J
R-BF	3	8	9.606	17.07	0.62 J	1.46 J	2.60 J	15.93	1.77 J
R-BF	4	5	11.881	6.57 J	2.02 J	3.20 J	3.28 J	17.68	5.81
R-BF	5	8	9.158	22.17	1.53 J	2.62 J	4.04 J	21.40	3.06 J

TABLE I.5. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* LPAH (µg/kg dry weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
R-OS	1	8	11.691	21.04	16.51 U	2.65 J	3.34 J	17.19	1.20 J
R-OS	2	5	11.067	6.33 J	12.92 U	3.07 J	2.53 J	7.95	0.90 J
R-OS	3	5	11.042	5.43 J	13.40 U	2.54 J	2.08 J	8.06	1.09 J
R-OS	4	7	9.642	17.84	16.49 U	2.18 J	2.39 J	13.48	1.35 J
R-OS	5	5	11.549	7.53 J	0.43 J	2.86 J	3.20 J	13.51	5.37 J
C-SB	1	8	10.811	13.04	12.30 U	6.66 U	1.76 J	10.08	1.11 J
C-SB	2	7	10.029	16.15	13.26 U	7.18 U	3.09 J	13.66	1.40 J
C-SB	3	6	12.032	17.29	2.83 J	3.66 J	4.57 J	11.97	3.41 J
C-SB	4	5	10.540	6.55 J	0.66 J	2.09 J	2.66 J	9.77	1.33 J
C-SB	5	5	10.695	6.36 J	12.44 U	2.34 J	2.52 J	10.94	1.22 J
C-NE	1	7	9.545	17.29	12.89 U	3.25 J	3.04 J	18.23	1.05 J
C-NE	2 Rep 1	5	9.744	7.80 J	18.06 U	2.57 J	2.26 J	10.47	1.13 J
C-NE	2 Rep 2	5	9.744	26.79 J	26.58 U	14.37 U	2.05 J	13.65	1.95 J
C-NE	2 Rep 3	5	9.744	6.98 J	20.53 U	2.36 J	1.85 J	8.42	0.62 J
C-NE	3	6	11.007	13.54 J	14.17 U	3.09 J	3.00 J	10.99	1.27 J
C-NE	4	7	10.845	21.95	17.89 U	9.68 U	2.58 J	17.52	7.93 U
C-NE	5	7	10.906	12.84 J	13.20 U	2.02 J	2.66 J	13.48	1.01 J
Background	1	8	11.599	14.23	12.16 U	3.19 J	3.62 J	19.48	0.78 J
Background	2	8	12.370	13.10 J	13.10 U	7.03 U	3.31 J	19.64	0.57 J
Background	3	8	11.946	12.89	11.13 U	1.59 J	3.18 J	16.66	1.26 J
Background	4	8	11.489	13.58	13.06 U	1.39 J	2.44 J	15.84	0.52 J
Background	5	8	11.454	33.18	24.88 U	13.45 U	3.58 J	28.03	0.96 J

(a) U Analyte was not present above the associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE I.6. High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAH), Dry Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* HPAH (µg/kg dry weight)										
				Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
COMP WR-1	1 Rep 1	7	9.089	19.69 J[a]	19.47 J	8.36 J	13.53 J	8.36 J	6.05 J	2.97 J	3.63 J	26.85 U[b]	7.26 J
COMP WR-1	1 Rep 2	7	9.089	13.97 J	12.76 J	4.29 J	9.35 J	5.50 J	3.74 J	2.09 J	1.54 J	17.93 U	4.18 J
COMP WR-1	1 Rep 3	7	9.089	14.96 J	13.75 J	5.50 J	9.46 J	8.03 J	3.08 J	1.76 J	2.20 J	20.13 U	5.72 J
COMP WR-1	2	5	11.334	11.65	11.38	2.21 J	4.59 J	3.88 J	2.03 J	1.50 J	1.85 J	6.35 U	2.03 J
COMP WR-1	3	7	15.781	6.84 J	6.78 J	2.03 J	3.10 J	3.80 J	1.39 J	0.57 J	12.93 U	8.81 U	2.47 J
COMP WR-1	4	7	10.111	13.06 J	12.86 J	6.23 J	8.01 J	6.43 J	4.35 J	2.67 J	30.76 U	20.97 U	4.15 J
COMP WR-1	5	6	11.586	13.55	15.10	3.71 J	5.26 J	4.92 J	3.02 J	1.12 J	3.28 J	6.90 U	2.59 J
COMP WR-2	1	6	11.448	9.70	6.99 J	1.83 J	4.45 J	11.97 U	9.96 U	10.39 U	12.49 U	8.47 U	16.95 U
COMP WR-2	2	6	12.118	13.86	7.59	2.48 J	7.01	3.38 J	1.40 J	8.66 U	1.98 J	7.10 U	14.11 U
COMP WR-2	3	7	9.092	15.51	10.56	2.42 J	8.47 J	2.64 J	1.76 J	11.22 U	13.42 U	9.13 U	1.65 J
COMP WR-2	4	6	12.570	7.56	4.69 J	1.43 J	2.63 J	1.51 J	1.03 J	9.15 U	10.98 U	7.48 U	14.88 U
COMP WR-2	5	7	10.057	9.74	6.76 J	2.19 J	5.67 J	2.39 J	2.49 J	13.72 U	16.51 U	11.24 U	1.19 J
COMP PS-1	1	6	10.654	8.26	3.38 J	2.35 J	5.91 J	4.41 J	1.31 J	10.04 U	12.01 U	8.17 U	16.33 U
COMP PS-1	2	6	11.105	6.30	2.97 J	1.35 J	3.33 J	1.62 J	0.90 J	7.11 U	8.55 U	5.85 U	11.62 U
COMP PS-1	3	7	10.980	6.56 J	3.10 J	2.73 J	4.83 J	1.73 J	1.37 J	15.76 U	18.94 U	12.84 U	25.68 U
COMP PS-1	4	5	10.303	8.15	3.98 J	1.16 J	2.52 J	0.49 J	0.29 J	9.41 U	11.36 U	7.76 U	15.43 U
COMP PS-1	5	7	10.032	12.76	7.68 J	3.79 J	6.88 J	2.19 J	1.89 J	16.45 U	19.74 U	0.90 J	2.29 J
COMP PS-2	1	5	11.733	15.77	24.38	2.98 J	5.45 J	4.35 J	2.05 J	0.85 J	1.88 J	6.14 U	2.05 J
COMP PS-2	2	7	9.740	18.99	24.13	4.72 J	10.16 J	5.03 J	3.49 J	1.03 J	1.75 J	11.19 U	3.49 J
COMP PS-2	3	5	10.173	14.16	16.51	4.72 J	7.47 J	4.82 J	3.44 J	2.36 J	20.64 U	14.06 U	27.92 U
COMP PS-2	4	8	11.797	13.65	18.39	4.15 J	6.44 J	6.70 J	2.03 J	4.32 J	2.54 J	0.85 J	3.56 J
COMP PS-2	5	8	11.870	12.30	13.90	2.44 J	6.23	4.30 J	1.43 J	2.53 J	1.35 J	0.51 J	3.12 J
COMP PS-3	1	5	10.037	7.67	7.37	2.19 J	3.39 J	2.29 J	1.79 J	0.60 J	10.36 U	7.07 U	14.05 U
COMP PS-3	2	7	9.838	14.33	12.71 J	4.17 J	8.74 J	5.59 J	2.74 J	1.32 J	1.93 J	14.33 U	4.17 J
COMP PS-3	3	6	10.872	14.99	13.34	9.75	9.29	8.65 J	3.17 J	2.30 J	8.65 J	5.33 J	6.53 J
COMP PS-3	4	6	10.236	9.96	10.16	2.54 J	4.49 J	3.61 J	1.47 J	8.79 U	2.25 J	7.13 U	14.26 U
COMP PS-3	5	6	9.905	6.66	6.56	2.12 J	3.13 J	2.02 J	1.21 J	7.98 U	9.59 U	6.56 U	13.02 U
COMP PS-4	1	5	11.159	25.09	23.48	4.48 J	10.13	5.11 J	2.96 J	1.25 J	1.43 J	6.45 U	2.15 J
COMP PS-4	2	5	11.243	19.57	22.15	3.47 J	5.78 J	3.02 J	1.96 J	0.98 J	14.14 U	9.61 U	1.25 J
COMP PS-4	3 Rep 1	8	10.791	23.72	22.61	3.98 J	10.29 J	5.56 J	4.63 J	3.15 J	1.67 J	0.46 J	3.61 J
COMP PS-4	3 Rep 2	8	10.791	21.22	20.85	3.80 J	9.45 J	6.58 J	1.76 J	3.15 J	2.32 J	0.74 J	3.98 J
COMP PS-4	3 Rep 3	8	10.791	21.87	21.87	4.45 J	9.92 J	6.67 J	2.32 J	3.43 J	2.41 J	0.93 J	3.71 J
COMP PS-4	4	8	10.499	24.38	23.53	4.19 J	9.52 J	5.81 J	1.81 J	2.86 J	1.33 J	0.57 J	2.95 J
COMP PS-4	5	6	12.152	25.10	29.95	4.11 J	9.55	4.77 J	2.14 J	10.53 U	12.67 U	8.64 U	17.20 U

TABLE I.6. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* HPAH (µg/kg dry weight) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
COMP CS-1	1	7	9.780	27.40	31.49	7.36 J	13.70 J	6.95 J	6.54 J	19.33 U	1.94 J	15.85 U	3.48 J
COMP CS-1	2	5	11.400	20.61	27.37	3.86 J	5.96 J	2.98 J	3.25 J	3.77 J	0.96 J	6.58 U	1.75 J
COMP CS-1	3	8	10.452	22.01	26.50	4.69 J	8.71	7.94 J	2.77 J	5.17 J	2.58 J	0.67 J	4.59 J
COMP CS-1	4	8	11.689	17.62	21.47	3.25 J	7.61 J	5.90 J	1.80 J	3.08 J	1.54 J	0.43 J	2.40 J
COMP CS-1	5	6	11.460	15.62	17.80	3.75 J	7.50 J	5.76 J	2.53 J	14.49 U	17.36 U	11.87 U	23.56 U
R-BF	1 Rep 1	6	9.180	58.82	73.42	22.11	29.41	43.25	25.16	35.62	23.97	4.25 J	26.91 J
R-BF	1 Rep 2	6	9.180	51.85	67.65	19.61 J	23.64	38.34	21.24 J	29.96	17.54 J	21.02 U	21.13 J
R-BF	1 Rep 3	6	9.180	49.78	65.03	17.10 J	22.22	40.09	18.85	27.34	16.67 J	14.27 U	25.27 J
R-BF	2	6	9.469	50.37	69.38	15.31 J	22.28	38.44	20.49	28.41	15.00 J	15.00 U	23.66 J
R-BF	3	8	9.606	34.77	39.45	9.37 J	16.55	31.54	8.12 J	18.74	10.20 J	1.25 J	15.93
R-BF	4	5	11.881	93.01	123.22	21.46	30.81	49.41	24.58	33.41	22.8i	2.19 J	26.43
R-BF	5	8	9.158	55.03	64.64	15.83	25.01	47.72	15.18	28.83	16.71 J	2.62 J	26.75
R-OS	1	8	11.691	11.72	7.53 J	2.14 J	6.24 J	3.76 J	1.11 J	1.97 J	2.22 J	0.60 J	3.34 J
R-OS	2	5	11.067	7.50	4.16 J	1.63 J	2.62 J	1.36 J	0.63 J	0.90 J	10.21 U	6.96 U	0.72 J
R-OS	3	5	11.042	8.60	5.25 J	1.99 J	3.17 J	1.72 J	1.27 J	8.78 U	10.51 U	7.15 U	14.31 U
R-OS	4	7	9.642	8.92	4.36 J	2.18 J	4.87 J	2.59 J	1.14 J	10.79 U	12.96 U	8.82 U	2.18 J
R-OS	5	5	11.549	12.81	8.83	11.60 J	16.28	5.71 J	3.46 J	1.65 J	1.90 J	8.66 U	1.04 J
C-SB	1	8	10.811	19.89	11.01	2.96 J	6.20 J	7.95 J	2.22 J	2.77 J	2.59 J	0.65 J	4.72 J
C-SB	2	7	10.029	30.21	19.34	4.39 J	8.77	9.47 J	4.69 J	1.10 J	1.79 J	7.18 U	3.49 J
C-SB	3	6	12.032	25.76	18.45	6.57 J	8.56	10.31	5.40 J	1.50 J	4.90 J	2.16 J	4.16 J
C-SB	4	5	10.540	24.10	16.60	4.08 J	7.31	7.87 J	3.98 J	0.85 J	1.90 J	6.83 U	3.04 J
C-SB	5	5	10.695	21.79	14.77	3.83 J	6.64	8.04 J	3.83 J	0.75 J	1.87 J	6.64 U	2.81 J
C-NE	1	7	9.545	18.12	11.11	2.10 J	8.59	2.83 J	1.05 J	8.49 U	10.16 U	6.91 U	1.26 J
C-NE	2 Rep 1	5	9.744	15.39	9.24 J	2.05 J	6.88 J	2.36 J	0.72 J	11.90 U	14.27 U	9.75 U	19.40 U
C-NE	2 Rep 2	5	9.744	14.37	9.44 J	3.28 J	6.36 J	2.16 J	1.13 J	17.45 U	20.94 U	14.27 U	28.33 U
C-NE	2 Rep 3	5	9.744	12.83	7.59 J	2.05 J	5.85 J	2.36 J	0.51 J	13.44 U	16.22 U	10.98 U	21.96 U
C-NE	3	6	11.007	10.63	5.54 J	2.36 J	4.36 J	10.72 U	8.90 U	9.27 U	11.17 U	7.63 U	15.17 U
C-NE	4	7	10.845	14.66	7.38 J	3.14 J	9.87	3.41 J	1.84 J	11.71 U	14.11 U	9.59 U	1.75 J
C-NE	5	7	10.906	16.69	10.36	2.29 J	10.27	4.22 J	1.38 J	8.71 U	10.45 U	7.06 U	1.38 J

TABLE I.6. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* HPAH (µg/kg dry weight) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
Background	1	8	11.599	14.74	3.62 J	2.33 J	7.50	3.02 J	0.95 J	0.95 J	0.52 J	0.34 J	1.21 J
Background	2	8	12.370	18.11	8.00	1.86 J	6.79	2.83 J	0.89 J	0.81 J	0.57 J	0.40 J	1.54 J
Background	3	8	11.946	16.07	5.19 J	2.18 J	18.58	2.43 J	0.84 J	0.75 J	0.59 J	0.33 J	1.42 J
Background	4	8	11.489	16.28	6.62 J	1.57 J	6.09 J	2.52 J	0.78 J	0.70 J	0.61 J	0.26 J	1.22 J
Background	5	8	11.454	25.14	14.06	3.14 J	8.73 J	4.10 J	1.13 J	1.13 J	1.22 J	0.70 J	2.44 J

(a) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(b) U Analyte was not present above the associated value.

TABLE I.7. Quality Control Data for Low Molecular Polynuclear Aromatic Hydrocarbons (LPAH), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Method Blanks								
Blank 1		5	1.23 J[a]	1.56 U[b]	0.85 U	0.91 U	0.35 J	0.06 J
Blank 2		6	2.25 B[c]	1.73 U	0.93 U	0.09 J	0.74 J	0.76 U
Blank 3		7	1.98 J	2.12 U	1.15 U	1.24 U	0.79 J	0.94 U
Blank 4		8	2.71 B	1.78 U	0.96 U	1.04 U	1.31 B	0.79 U
Matrix Spikes								
COMP PS-2	3	5	2.13 J	2.66 U	0.26 J	0.28 J	1.32	0.25 J
COMP PS-2 MS	3	5	114.50	115.85	113.32	121.71	123.16	119.05
Concentration Recovered			112.37	113.19	113.06	121.43	121.84	118.80
Amount Spiked			114.43	114.43	114.43	114.43	114.43	114.43
Percent Recovery			98%	99%	99%	106%	106%	104%
COMP PS-2	3	5	2.13 J	2.66 U	0.26 J	0.28 J	1.32	0.25 J
COMP PS-2 MSD	3	5	120.16	121.93	118.23	118.05	131.63	127.30
Concentration Recovered			118.03	119.27	117.97	117.77	130.31	127.05
Amount Spiked			119.14	119.14	119.14	119.14	119.14	119.14
Percent Recovery			99%	100%	99%	99%	109%	107%
RPD			1%	1%	0%	7%	3%	3%
I-Stat			0.00	0.00	0.00	0.03	0.01	0.01
R-BF	2	6	2.60 J	0.30 J	0.26 J	0.37 J	1.27	0.49 J
R-BF MS	2	6	138.88	172.13	137.17	147.72	141.38	146.02
Concentration Recovered			136.28	171.83	136.91	147.35	140.11	145.53
Amount Spiked			135.94	135.94	135.94	135.94	135.94	135.94
Percent Recovery			100%	126%[d]	101%	108%	103%	107%
R-BF	2	6	2.60 J	0.30 J	0.26 J	0.37 J	1.27	0.49 J
R-BF MSD	2	6	103.54	126.83	104.83	110.74	105.28	106.80
Concentration Recovered			100.94	126.53	104.57	110.37	104.01	106.31
Amount Spiked			104.04	104.04	104.04	104.04	104.04	104.04
Percent Recovery			97%	122%[d]	101%	106%	100%	102%
RPD			3%	3%	0%	2%	3%	5%
I-Stat			0.02	0.02	0.00	0.01	0.02	0.02
COMP WR-1	4	7	4.60	3.95 U	2.14 U	0.36 J	2.50	0.15 J
COMP WR-1 MS	4	7	151.23	153.24	151.65	154.12	166.50	165.28
Concentration Recovered			146.63	153.24	151.65	153.76	164.00	165.13
Amount Spiked			146.44	146.44	146.44	146.44	146.44	146.44
Percent Recovery			100%	105%	104%	105%	112%	113%
COMP WR-1	4	7	4.60	3.95 U	2.14 U	0.36 J	2.50	0.15 J
COMP WR-1 MSD	4	7	147.49	152.03	144.79	149.22	161.20	158.93
Concentration Recovered			142.89	152.03	144.79	148.86	158.70	158.78
Amount Spiked			139.33	139.33	139.33	139.33	139.33	139.33
Percent Recovery			103%	109%	104%	107%	114%	114%
RPD			2%	4%	0%	2%	2%	1%
I-Stat			0.01	0.02	0.00	0.01	0.01	0.00

TABLE I.7. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Background		8	3.80	2.85 U	1.54 U	0.41 J	3.21	0.11 J
Background MS		8	107.22	108.60	104.28	103.95	109.05	103.58
Concentration Recovered			103.42	108.60	104.28	103.54	105.84	103.47
Amount Spiked			106.34	106.34	106.34	106.34	106.34	106.34
Percent Recovery			97%	102%	98%	97%	100%	97%
Background		8	3.80	2.85 U	1.54 U	0.41 J	3.21	0.11 J
Background MSD		8	98.46	105.03	95.33	96.48	102.07	97.01
Concentration Recovered			94.66	105.03	95.33	96.07	98.86	96.90
Amount Spiked			97.29	97.29	97.29	97.29	97.29	97.29
Percent Recovery			97%	108%	98%	99%	102%	100%
RPD			0%	6%	0%	2%	2%	3%
I-Stat			0.00	0.03	0.00	0.01	0.01	0.02
Blank Spikes								
LE22BS		5	1482.25	1328.79	1507.21	1538.56	1610.46	1536.56
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			99%	89%	100%	103%	107%	102%
LE30BS		6	1485.81	1708.28	1513.27	1604.76	1661.34	1770.46
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			99%	114%	101%	107%	111%	118%
LE35BS		7	1552.50	1529.65	1535.27	1565.65	1693.83	1669.67
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			104%	102%	102%	104%	113%	111%
LE40BS		8	1527.98	1481.75	1466.18	1454.5	1529.71	1491.54
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			102%	99%	98%	97%	102%	99%
Standard Reference Material								
Certified Value (µg/kg Dry)			NC[e]	NC	NC	NC	5.6 ±1.4	0.75 ±0.21
NIST1974		5	NA[f]	NA	NA	NA	5.54	1.56J[g]
NIST1974		6	NA	NA	NA	NA	5.83[g]	1.58J[g]
NIST1974		7	NA	NA	NA	NA	7.81[g]	1.70J[g]
NIST1974		8	NA	NA	NA	NA	8.15[g]	1.14J[g]
Analytical Triplicates								
C-NE	2 Rep 1	5	0.76 J	1.76 U	0.25 J	0.22 J	1.02	0.11 J
C-NE	2 Rep 2	5	2.61 J	2.59 U	1.40 U	0.20 J	1.33	0.19 J
C-NE	2 Rep 3	5	0.68 J	2.00 U	0.23 J	0.18 J	0.82 J	0.06 J
RSD			81%[h]	NA	NA	10%	24%	55%[h]
R-BF	1 Rep 1	6	3.64	0.59 J	0.83 J	0.80 J	2.44	0.87 J
R-BF	1 Rep 2	6	4.75	3.60 U	1.95 U	0.44 J	2.46	0.52 J
R-BF	1 Rep 3	6	3.75	0.18 J	0.37 J	0.38 J	2.07	0.42 J
RSD			15%	NA	NA	42%[h]	9%	39%[h]

TABLE I.7. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
COMP WR-1	1 Rep 1	7	5.76	4.54 U	2.46 U	0.56 J	3.19	0.34 J
COMP WR-1	1 Rep 2	7	2.91 J	3.03 U	1.64 U	0.28 J	1.44	1.34 U
COMP WR-1	1 Rep 3	7	3.39 J	3.41 U	1.84 U	0.24 J	1.93	0.48 J
RSD			38%(h)	NA	NA	48%(h)	41%(h)	NA
COMP PS-4	3 Rep 1	8	2.78	2.67 U	1.44 U	0.38 J	2.00	0.12 J
COMP PS-4	3 Rep 2	8	3.17	2.85 U	1.54 U	0.33 J	2.17	0.15 J
COMP PS-4	3 Rep 3	8	3.11	2.91 U	0.25 J	0.26 J	2.19	0.15 J
RSD			7%	NA	NA	19%	5%	12%

(a) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(b) U Analyte was not present above the associated value.
(c) B Procedural blank amount greater than MDL.
(d) Value outside of quality control range of 40% - 120%.
(e) NC Not certified.
(f) NA Not applicable.
(g) Value varies ≥30% from certified value.
(h) Value exceeds relative precision goal of ≤30%.

TABLE I.8. Quality Control Data for High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAH), Wet Weight, in the Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* HPAH (µg/kg wet weight) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
Method Blanks												
Blank 1		5	0.21 J[a]	0.33 J	0.16 J	0.10 J	1.18 U[b]	0.98 U	1.03 U	1.23 U	0.84 U	0.60 J
Blank 2		6	0.19 J	0.10 J	1.28 U	0.89 U	1.30 U	1.09 U	1.13 U	1.36 U	0.93 U	1.84 U
Blank 3		7	0.91 U	0.15 J	0.17 J	0.07 J	1.60 U	1.34 U	1.39 U	1.67 U	1.14 U	2.27 U
Blank 4		8	0.19 J	0.51 J	1.32 U	0.08 J	0.10 J	0.03 J	0.04 J	0.09 J	0.04 J	0.21 J
Matrix Spikes												
COMP PS-2	3	5	1.44	1.68	0.48 J	0.76	0.49 J	0.35 J	0.24 J	2.10 U	1.43 U	2.84 U
COMP PS-2 MS	3	5	135.03	135.25	141.59	139.02	143.36	155.42	138.41	153.84	161.62	147.12
Concentration Recovered			133.59	133.57	141.11	138.26	142.87	155.07	138.17	151.74	160.19	144.28
Amount Spiked			114.43	114.43	114.43	114.43	114.43	114.43	114.43	114.43	114.43	114.43
Percent Recovery			117%	117%	123%[c]	121%[c]	125%[c]	136%[c]	121%[c]	133%[c]	140%[c]	126%[c]
COMP PS-2	3	5	1.44	1.68	0.48 J	0.76	0.49 J	0.35 J	0.24 J	2.10 U	1.43 U	2.84 U
COMP PS-2 MSD	3	5	132.83	132.46	134.28	131.78	135.54	145.88	131.55	149.19	159.89	139.90
Concentration Recovered			131.39	130.78	133.80	131.02	135.05	145.53	131.31	147.09	158.46	137.06
Amount Spiked			119.14	119.14	119.14	119.14	119.14	119.14	119.14	119.14	119.14	119.14
Percent Recovery			110%	110%	112%	110%	113%	122%[c]	110%	123%[c]	133%[c]	115%
RPD			6%	6%	9%	10%	10%	11%	10%	7%	5%	10%
I-Stat			0.03	0.03	0.05	0.05	0.05	0.05	0.05	0.03	0.03	0.05
R-BF	2	6	4.77	6.57	1.45 J	2.11	3.64	1.94	2.69	1.42 J	1.42 U	2.24 J
R-BF MS	2	6	140.16	135.68	144.60	127.12	145.66	126.09	123.89	151.40	156.11	126.88
Concentration Recovered			135.39	129.11	143.15	125.01	142.02	124.15	121.2	149.98	154.69	124.64
Amount Spiked			135.94	135.94	135.94	135.94	135.94	135.94	135.94	135.94	135.94	135.94
Percent Recovery			100%	95%	105%	92%	104%	91%	89%	110%	114%	92%
R-BF	2	6	4.77	6.57	1.45 J	2.11	3.64	1.94	2.69	1.42 J	1.42 U	2.24 J
R-BF MSD	2	6	104.27	101.83	104.76	89.82	106.31	95.79	83.95	103.99	106.56	89.80
Concentration Recovered			99.50	95.26	103.31	87.71	102.67	93.85	81.26	102.57	105.14	87.56
Amount Spiked			104.04	104.04	104.04	104.04	104.04	104.04	104.04	104.04	104.04	104.04
Percent Recovery			96%	92%	99%	84%	99%	90%	78%	99%	101%	84%
RPD			4%	3%	6%	9%	6%	1%	13%	11%	12%	9%
I-Stat			0.02	0.02	0.03	0.05	0.03	0.01	0.07	0.05	0.06	0.05

TABLE I.8. (contd)

M. nasuta HPAH (µg/kg wet weight)

Sediment Treatment	Replicate	Batch	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
COMP WR-1	4	7	1.32 J	1.30 J	0.63 J	0.81	0.65 J	0.44 J	0.27 J	3.11 U	2.12 U	0.42 J
COMP WR-1 MS	4	7	172.20	169.45	180.36	177.86	180.17	182.20	179.28	169.25	176.14	166.02
Concentration Recovered			170.88	168.15	179.73	177.05	179.52	181.76	179.01	166.14	174.02	165.6
Amount Spiked			146.44	146.44	146.44	146.44	146.44	146.44	146.44	146.44	146.44	146.44
Percent Recovery			117%	115%	123%(c)	121%(c)	123%(c)	124%(c)	122%(c)	113%	119%	113%
COMP WR-1	4	7	1.32 J	1.30 J	0.63 J	0.81	0.65 J	0.44 J	0.27 J	3.11 U	2.12 U	0.42 J
COMP WR-1 MSD	4	7	169.79	164.82	172.65	171.09	178.41	174.61	174.11	160.36	168.23	158.71
Concentration Recovered			168.47	163.52	172.02	170.28	177.76	174.17	173.84	157.25	166.11	158.29
Amount Spiked			139.33	139.33	139.33	139.33	139.33	139.33	139.33	139.33	139.33	139.33
Percent Recovery			121%(c)	117%	123%(c)	122%(c)	128%(c)	125%(c)	125%(c)	113%	119%	114%
RPD			3%	2%	0%	1%	4%	1%	2%	1%	1%	1%
I-Stat			0.02	0.01	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00
Background		8	2.88	1.61	0.36 J	1.00	0.47 J	0.13 J	0.13 J	0.14 J	0.08 J	0.28 J
Background MS		8	106.88	99.09	107.68	107.77	111.28	106.18	102.47	113.02	112.23	104.71
Concentration Recovered			104.00	97.48	107.32	106.77	110.81	106.05	102.34	112.88	112.15	104.43
Amount Spiked			106.34	106.34	106.34	106.34	106.34	106.34	106.34	106.34	106.34	106.34
Percent Recovery			98%	92%	101%	100%	104%	100%	96%	106%	105%	98%
Background		8	2.88	1.61	0.36 J	1.00	0.47 J	0.13 J	0.13 J	0.14 J	0.08 J	0.28 J
Background MSD		8	100.31	93.40	101.80	97.55	105.17	101.76	95.21	102.11	104.53	94.49
Concentration Recovered			97.43	91.79	101.44	96.55	104.7	101.63	95.08	101.97	104.45	94.21
Amount Spiked			97.29	97.29	97.29	97.29	97.29	97.29	97.29	97.29	97.29	97.29
Percent Recovery			100%	94%	104%	99%	108%	104%	98%	105%	107%	97%
RPD			2%	2%	3%	1%	4%	4%	2%	1%	2%	1%
I-Stat			0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.00	0.01	0.01
Blank Spikes												
LE22BS		5	1723.34	1738.74	1736.34	1808.47	1720.88	1924.84	1707.27	1603.26	1782.47	1673.48
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			115%	116%	116%	121%(c)	115%	128 &	114%	107%	119%	112%
LE30BS		6	1586.11	1618.86	1693.20	1504.13	1807.17	1576.03	1530.14	1700.18	1772.72	1418.28
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			106%	108%	113%	100%	120%	105%	102%	113%	118%	95%

TABLE I.8. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* HPAH (µg/kg wet weight) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
LE35BS		7	1730.02	1706.13	1754.77	1779.24	1874.37	1770.81	1785.93	1707.74	1726.07	1682.20
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			115%	114%	117%	119%	125%(c)	118%	119%	114%	115%	112%
LE40BS		8	1466.73	1381.92	1503.66	1530.64	1544.27	1484.80	1435.51	1509.30	1491.73	1366.93
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			98%	92%	100%	102%	103%	99%	96%	101%	99%	91%
Standard Reference Material												
Certified Value (µg/kg Dry)			33.6 ±5.8	34.1 ±3.7	NC(d)	NC	6.5 ±1.2	NC	2.29 ±0.47	1.80 ±0.33	NC	2.47 ±0.28
NIST1974		5	32.10	33.16	NA(e)	NA	5.01	NA	1.94 J	1.55 J	NA	3.50 J(f)
NIST1974		6	31.95	32.11	NA	NA	4.51(f)	NA	1.11 J(f)	1.35 J	NA	2.78 J
NIST1974		7	39.52	38.63	NA	NA	8.22	NA	1.97 J	1.93 J	NA	4.28(f)
NIST1974		8	31.22	29.02	NA	NA	8.28	NA	2.20 J	2.22 J	NA	6.17(f)
Analytical Triplicates												
C-NE	2 Rep 1	5	1.50	0.90 J	0.20 J	0.67 J	0.23 J	0.07 J	1.16 U	1.39 U	0.95 U	1.89 U
C-NE	2 Rep 2	5	1.40	0.92 J	0.32 J	0.62 J	0.21 J	0.11 J	1.70 U	2.04 U	1.39 U	2.76 U
C-NE	2 Rep 3	5	1.25	0.74 J	0.20 J	0.57 J	0.23 J	0.05 J	1.31 U	1.58 U	1.07 U	2.14 U
RSD			9%	12%	29%	8%	5%	40%(g)	NA	NA	NA	NA
R-BF	1 Rep 1	6	5.40	6.74	2.03	2.70	3.97	2.31	3.27	2.20	0.39 J	2.47 J
R-BF	1 Rep 2	6	4.76	6.21	1.80 J	2.17	3.52	1.95 J	2.75	1.61 J	1.93 U	1.94 J
R-BF	1 Rep 3	6	4.57	5.97	1.57 J	2.04	3.68	1.73	2.51	1.53 J	1.31 U	2.32 J
RSD			9%	6%	13%	15%	6%	15%	14%	21%	NA	13%
COMP WR-1	1 Rep 1	7	1.79 J	1.77 J	0.76 J	1.23 J	0.76 J	0.55 J	0.27 J	0.33 J	2.44 U	0.66 J
COMP WR-1	1 Rep 2	7	1.27 J	1.16 J	0.39 J	0.85 J	0.50 J	0.34 J	0.19 J	0.14 J	1.63 U	0.38 J
COMP WR-1	1 Rep 3	7	1.36 J	1.25 J	0.50 J	0.86 J	0.73 J	0.28 J	0.16 J	0.20 J	1.83 U	0.52 J
RSD			19%	24%	35%(g)	22%	21%	36%(g)	28%	43%(g)	NA	27%

TABLE I.8. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* HPAH (µg/kg wet weight) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
COMP PS-4	3 Rep 1	8	2.56	2.44	0.43 J	1.11 J	0.60 J	0.50 J	0.34 J	0.18 J	0.05 J	0.39 J
COMP PS-4	3 Rep 2	8	2.29	2.25	0.41 J	1.02 J	0.71 J	0.19 J	0.34 J	0.25 J	0.08 J	0.43 J
COMP PS-4	3 Rep 3	8	2.36	2.36	0.48 J	1.07 J	0.72 J	0.25 J	0.37 J	0.26 J	0.10 J	0.40 J
RSD			6%	4%	8%	4%	10%	52%(g)	5%	19%	33%(g)	5%

(a) J Analyte detected below method detection limit (MDL), but above instument detection limit (IDL).
(b) U Analyte was not present above the associated value.
(c) Value outside of quality control range of 40% - 120%.
(d) NC Not certified.
(e) NA Not applicable.
(f) Value varies ≥30% from certified value.
(g) Value exceeds relative precision goal of ≤30%.

TABLE I.9. Surrogate Percent Recoveries for Polynuclear Aromatic Hydrocarbons (PAH), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries: Naphthalene d8	Acenaphthene d10	Benzo[a]pyrene d12
COMP WR-1	1 Rep 1	7	67	57	61
COMP WR-1	1 Rep 2	7	69	60	67
COMP WR-1	1 Rep 3	7	59	51	58
COMP WR-1	2	5	71	63	65
COMP WR-1	3	7	76	67	68
COMP WR-1	4	7	74	63	69
COMP WR-1	5	6	70	69	62
COMP WR-2	1	6	70	66	62
COMP WR-2	2	6	73	71	60
COMP WR-2	3	7	69	60	67
COMP WR-2	4	6	76	71	68
COMP WR-2	5	7	61	54	54
COMP PS-1	1	6	77	76	65
COMP PS-1	2	6	70	69	63
COMP PS-1	3	7	79	67	69
COMP PS-1	4	5	67	61	59
COMP PS-1	5	7	73	64	65
COMP PS-2	1	5	72	65	65
COMP PS-2	2	7	72	63	66
COMP PS-2	3	5	74	65	74
COMP PS-2	4	8	76	69	68
COMP PS-2	5	8	73	67	67
COMP PS-3	1	5	66	61	66
COMP PS-3	2	7	72	63	68
COMP PS-3	3	6	72	70	64
COMP PS-3	4	6	75	72	64
COMP PS-3	5	6	74	71	67
COMP PS-4	1	5	62	57	61
COMP PS-4	2	5	78	71	75
COMP PS-4	3 Rep 1	8	74	68	68
COMP PS-4	3 Rep 2	8	70	63	63
COMP PS-4	3 Rep 3	8	67	62	61
COMP PS-4	4	8	79	74	73
COMP PS-4	5	6	74	71	66

TABLE I.9. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries: Naphthalene d8	Acenaphthene d10	Benzo[a]pyrene d12
COMP CS-1	1	7	70	60	65
COMP CS-1	2	5	65	56	62
COMP CS-1	3	8	69	65	66
COMP CS-1	4	8	75	70	69
COMP CS-1	5	6	77	73	70
R-BF	1 Rep 1	6	72	67	57
R-BF	1 Rep 2	6	75	69	62
R-BF	1 Rep 3	6	76	72	63
R-BF	2	6	77	71	66
R-BF	3	8	69	64	64
R-BF	4	5	67	59	54
R-BF	5	8	71	65	64
R-OS	1	8	73	66	66
R-OS	2	5	69	60	62
R-OS	3	5	69	61	71
R-OS	4	7	76	66	70
R-OS	5	5	79	67	66
C-SB	1	8	63	59	57
C-SB	2	7	76	67	71
C-SB	3	6	77	74	61
C-SB	4	5	67	57	58
C-SB	5	5	70	60	69
C-NE	1	7	68	62	67
C-NE	2 Rep 1	5	62	54	65
C-NE	2 Rep 2	5	70	60	63
C-NE	2 Rep 3	5	71	63	61
C-NE	3	6	76	75	69
C-NE	4	7	64	56	58
C-NE	5	7	73	66	71
Background	1	8	72	66	70
Background	2	8	79	72	72
Background	3	8	71	66	65
Background	4	8	73	68	67
Background	5	8	67	64	66

TABLE I.9. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries: Naphthalene d8	Acenaphthene d10	Benzo[a]pyrene d12
Quality Control Samples					
Method Blanks					
Blank 1		5	80	67	68
Blank 2		6	81	70	58
Blank 3		7	73	63	63
Blank 4		8	85	75	73
Matrix Spikes					
COMP PS-2	3	5	74	65	74
COMP PS-2 MS	3	5	77	68	78
COMP PS-2 MSD	3	5	78	66	79
R-BF	2	6	77	71	66
R-BF MS	2	6	82	78	70
R-BF MSD	2	6	84	78	67
COMP WR-1	4	7	74	63	69
COMP WR-1 MS	4	7	72	60	66
COMP WR-1 MSD	4	7	65	57	64
Background	5	8	67	64	66
Background MS	5	8	81	74	73
Background MSD	5	8	76	72	76
Blank Spikes					
Blank Spike 1		5	75	63	74
Blank Spike 2		6	74	65	70
Blank Spike 3		7	72	61	67
Blank Spike 4		8	79	70	72
Standard Reference Material					
NIST1974		5	83	71	74
NIST1974		6	83	75	62
NIST1974		7	64	56	56
NIST1974		8	71	64	62

TABLE I.9. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries: Naphthalene d8	Acenaphthene d10	Benzo[a]pyrene d12
Analytical Replicates					
C-NE	2 Rep 1	5	62	54	65
C-NE	2 Rep 2	5	70	60	63
C-NE	2 Rep 3	5	71	63	61
R-BF	1 Rep 1	6	72	67	57
R-BF	1 Rep 2	6	75	69	62
R-BF	1 Rep 3	6	76	72	63
OMP WR-1	1 Rep 1	7	67	57	61
OMP WR-1	1 Rep 2	7	69	60	67
OMP WR-1	1 Rep 3	7	59	51	58
COMP PS-4	3 Rep 1	8	74	68	68
COMP PS-4	3 Rep 2	8	70	63	63
COMP PS-4	3 Rep 3	8	67	62	61

TABLE I.10. Chlorinated Pesticides (alphabetical, Aldrin - 4,4'-DDT), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight)								
			Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Target DL[a]			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Achieved DL High			0.274	0.281	0.281	0.281	0.143	0.804	0.189	0.383	0.590
Achieved DL Low			0.073	0.074	0.074	0.074	0.038	0.213	0.050	0.102	0.157
COMP WR-1	1 Rep 1	7	0.274 U[b]	0.281 U	0.281 U	0.281 U	0.880	0.804 U	1.748	0.962	0.590 U
COMP WR-1	1 Rep 2	7	0.183 U	0.187 U	0.187 U	0.187 U	0.600	0.537 U	1.140	0.655	0.394 U
COMP WR-1	1 Rep 3	7	0.206 U	0.211 U	0.211 U	0.211 U	0.713	0.603 U	1.303	0.783	0.443 U
COMP WR-1	2	5	0.081 U	0.557	0.082 U	0.082 U	0.128	0.236 U	0.338	0.343	0.173 U
COMP WR-1	3	7	0.156 U	0.160 U	0.160 U	0.160 U	0.510	0.458 U	0.999	0.552	0.336 U
COMP WR-1	4	7	0.238 U	0.244 U	0.244 U	0.244 U	0.744	0.699 U	0.165 U	0.868	0.513 U
COMP WR-1	5	6	0.090 U	0.632	0.092 U	0.092 U	0.232	0.264 U	0.594	0.384	0.194 U
COMP WR-2	1	6	0.110 U	0.658	0.431	0.112 U	0.238	0.293 J	0.410	0.351	0.236 U
COMP WR-2	2	6	0.096 U	0.583	0.099 U	0.099 U	0.267	0.283 U	0.067 U	0.386	0.207 U
COMP WR-2	3	7	0.093 U	0.096 U	0.096 U	0.096 U	0.308	0.210 J	0.064 U	0.340	0.201 U
COMP WR-2	4	6	0.106 U	0.108 U	0.108 U	0.108 U	0.243	0.309 U	0.073 U	0.391	0.227 U
COMP WR-2	5	7	0.127 U	0.130 U	0.130 U	0.130 U	0.066 U	0.373 U	0.088 U	0.451	0.274 U
COMP PS-1	1	6	0.098 U	0.101 U	0.101 U	0.101 U	0.232	0.288 U	0.437	0.356	0.212 U
COMP PS-1	2	6	0.073 U	0.430	0.075 U	0.075 U	0.203	0.214 U	0.335	0.243	0.157 U
COMP PS-1	3	6	0.159 U	0.163 U	0.163 U	0.163 U	0.543	0.467 U	1.043	0.222 U	0.343 U
COMP PS-1	4	5	0.090 U	0.601	0.092 U	0.092 U	0.139	0.263 U	0.289	0.235	0.193 U
COMP PS-1	5	7	0.152 U	0.155 U	0.155 U	0.155 U	0.513	0.352 J	0.105 U	0.532	0.327 U
COMP PS-2	1	5	0.081 U	0.531	0.083 U	0.083 U	0.150	0.238 U	1.688	0.825	0.175 U
COMP PS-2	2	7	0.123 U	0.126 U	0.126 U	0.126 U	0.409	0.361 U	1.435	0.662	0.265 U
COMP PS-2	3	5	0.160 U	0.989	0.164 U	0.164 U	0.084 U	0.471 U	1.182	0.694	0.345 U
COMP PS-2	4	8	0.139 U	0.143 U	0.143 U	0.143 U	0.073 U	0.408 U	1.442	0.823	0.300 U
COMP PS-2	5	8	0.080 U	0.082 U	0.082 U	0.082 U	0.325	0.234 U	1.149	0.596	0.172 U
COMP PS-3	1	5	0.080 U	0.081 U	0.081 U	0.081 U	0.137	0.137 J	0.569	0.410	0.171 U
COMP PS-3	2	7	0.158 U	0.162 U	0.162 U	0.162 U	0.509	0.465 U	1.184	0.666	0.341 U
COMP PS-3	3	6	0.078 U	0.079 U	0.079 U	0.079 U	0.248	0.228 U	0.710	0.648	0.167 U
COMP PS-3	4	6	0.083 U	0.085 U	0.085 U	0.085 U	0.385	0.243 U	0.543	0.285	0.178 U
COMP PS-3	5	6	0.073 U	0.074 U	0.074 U	0.074 U	0.200	0.213 U	0.640	0.649	0.157 U

TABLE I.10. (contd)

M. mercenaria Pesticides (µg/kg wet weight)

Sediment Treatment	Replicate	Batch	Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
COMP PS-4	1	5	0.080 U	0.082 U	0.082 U	0.082 U	0.140	0.236 U	1.932	0.758	0.173 U
COMP PS-4	2	5	0.122 U	0.746	0.125 U	0.125 U	0.185	0.358 U	1.514	0.689	0.263 U
COMP PS-4	3 Rep 1	8	0.161 U	0.165 U	0.165 U	0.165 U	0.084 U	0.472 U	1.484	0.696	0.347 U
COMP PS-4	3 Rep 2	8	0.172 U	0.176 U	0.176 U	0.176 U	0.090 U	0.504 U	1.620	0.774	0.370 U
COMP PS-4	3 Rep 3	8	0.176 U	0.180 U	0.180 U	0.180 U	0.091 U	0.515 U	1.778	0.867	0.378 U
COMP PS-4	4	8	0.123 U	0.126 U	0.126 U	0.126 U	0.539	0.360 U	1.535	0.766	0.264 U
COMP PS-4	5	6	0.118 U	0.121 U	0.121 U	0.121 U	0.281	0.346 U	2.277	0.888	0.254 U
COMP CS-1	1	7	0.174 U	0.178 U	0.178 U	0.178 U	0.545	0.387 J	1.078	0.592	0.375 U
COMP CS-1	2	5	0.084 U	0.593	0.086 U	0.086 U	0.142	0.246 U	0.276	0.302	0.181 U
COMP CS-1	3	8	0.100 U	0.102 U	0.102 U	0.102 U	0.052 U	0.292 U	0.069 U	0.139 U	0.214 U
COMP CS-1	4	8	0.106 U	0.108 U	0.108 U	0.108 U	0.055 U	0.311 U	0.073 U	0.148 U	0.228 U
COMP CS-1	5	6	0.153 U	0.156 U	0.156 U	0.156 U	0.283	0.448 U	0.105 U	0.213 U	0.329 U
R-BF	1 Rep 1	6	0.159 U	0.163 U	0.163 U	0.163 U	0.394	0.466 U	0.892	0.727	0.342 U
R-BF	1 Rep 2	6	0.217 U	0.222 U	0.222 U	0.222 U	0.468	0.637 U	1.116	0.760	0.468 U
R-BF	1 Rep 3	6	0.147 U	0.151 U	0.151 U	0.151 U	0.419	0.431 U	0.798	0.572	0.317 U
R-BF	2	6	0.160 U	0.164 U	0.164 U	0.164 U	0.347	0.470 U	0.111 U	0.668	0.345 U
R-BF	3	8	0.080 U	0.082 U	0.082 U	0.082 U	0.307	0.235 U	0.420	0.583	0.173 U
R-BF	4	5	0.081 U	0.620	0.083 U	0.083 U	0.213	0.217 J	0.880	1.103	0.174 U
R-BF	5	8	0.118 U	0.121 U	0.121 U	0.121 U	0.476	0.347 U	0.082 U	0.839	0.254 U
R-OS	1	8	0.117 U	0.119 U	0.119 U	0.119 U	0.061 U	0.342 U	0.081 U	0.927	0.251 U
R-OS	2	5	0.087 U	0.577	0.089 U	0.089 U	0.153	0.254 U	0.382	0.774	0.186 U
R-OS	3	5	0.089 U	0.611	0.091 U	0.091 U	0.141	0.261 U	0.366	0.841	0.192 U
R-OS	4	7	0.096 U	0.098 U	0.098 U	0.098 U	0.312	0.281 U	0.066 U	0.603	0.206 U
R-OS	5	5	0.112 U	0.770	0.115 U	0.115 U	0.183	0.329 U	0.391	0.934	0.241 U
C-SB	1	8	0.081 U	0.082 U	0.082 U	0.082 U	0.042 U	0.236 U	0.056 U	0.112 U	0.173 U
C-SB	2	7	0.080 U	0.082 U	0.082 U	0.082 U	0.042 U	0.236 U	0.056 U	0.314	0.173 U
C-SB	3	6	0.091 U	0.094 U	0.094 U	0.094 U	0.240	0.268 U	0.467	1.094	0.197 U
C-SB	4	5	0.081 U	0.528	0.083 U	0.083 U	0.142	0.237 U	0.286	0.328	0.174 U
C-SB	5	5	0.080 U	0.535	0.082 U	0.082 U	0.042 U	0.235 U	0.055 U	0.362	0.173 U
C-NE	1	7	0.074 U	0.076 U	0.076 U	0.076 U	0.217	0.217 U	0.051 U	0.345	0.160 U
C-NE	2 Rep 1	5	0.106 U	0.109 U	0.109 U	0.109 U	0.186	0.312 U	0.388	0.375	0.229 U
C-NE	2 Rep 2	5	0.156 U	0.160 U	0.160 U	0.160 U	0.222	0.458 U	0.452	0.410	0.336 U
C-NE	2 Rep 3	5	0.121 U	0.124 U	0.124 U	0.124 U	0.180	0.354 U	0.360	0.355	0.260 U
C-NE	3	6	0.094 U	0.096 U	0.096 U	0.096 U	0.049 U	0.276 U	0.065 U	0.593	0.203 U
C-NE	4	7	0.117 U	0.120 U	0.120 U	0.120 U	0.390	0.343 U	0.081 U	0.425	0.252 U
C-NE	5	7	0.087 U	0.089 U	0.089 U	0.089 U	0.287	0.255 U	0.060 U	0.337	0.187 U

TABLE I.10. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight)								
			Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Background	1	8	0.085 U	0.087 U	0.087 U	0.087 U	0.044 U	0.249 U	0.059 U	0.118 U	0.183 U
Background	2	8	0.098 U	0.100 U	0.100 U	0.100 U	0.344	0.286 U	0.067 U	0.214	0.210 U
Background	3	8	0.080 U	0.082 U	0.082 U	0.082 U	0.042 U	0.235 U	0.055 U	0.112 U	0.172 U
Background	4	8	0.091 U	0.093 U	0.093 U	0.093 U	0.047 U	0.266 U	0.063 U	0.127 U	0.195 U
Background	5	8	0.172 U	0.176 U	0.176 U	0.176 U	0.090 U	0.505 U	0.119 U	0.240 U	0.370 U

(a) DL Detection Limit.
(b) U Analyte was not present above the associated value.

TABLE I.11. Chlorinated Pesticides (alphabetical, Dieldrin - Toxaphene), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight)									
			Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
Target DL[a]			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	30
Achieved DL High			2.928	0.804	0.804	0.804	2.761	0.804	0.573	0.314	0.281	8.042
Achieved DL Low			0.776	0.213	0.213	0.213	0.732	0.213	0.152	0.083	0.074	2.133
COMP WR-1	1 Rep 1	7	0.808 J[b]	0.804 U[c]	0.804 U	0.804 U	2.761 U	0.804 U	0.573 U	0.314 U	0.281 U	8.042 U
COMP WR-1	1 Rep 2	7	0.571 J	0.537 U	0.537 U	0.537 U	1.843 U	0.537 U	0.383 U	0.210 U	0.187 U	5.369 U
COMP WR-1	1 Rep 3	7	0.603 J	0.603 U	0.603 U	0.603 U	2.071 U	0.603 U	0.430 U	0.236 U	0.211 U	6.034 U
COMP WR-1	2	5	0.231 J	0.236 U	0.236 U	0.236 U	0.131 J	0.034 J	0.168 U	0.222	0.082 U	2.362 U
COMP WR-1	3	7	1.667 J	0.458 U	0.458 U	0.458 U	1.572 U	0.458 U	0.326 U	0.179 U	0.160 U	4.578 U
COMP WR-1	4	7	0.674 J	0.699 U	0.699 U	0.699 U	2.399 U	0.699 U	0.498 U	0.273 U	0.244 U	6.990 U
COMP WR-1	5	6	0.237 J	0.264 U	0.264 U	0.264 U	0.906 U	0.125 J	0.271	0.463	0.092 U	2.639 U
COMP WR-2	1	6	0.264 J	0.322 U	0.322 U	0.368	0.836 J	0.283 J	0.224 J	0.126 U	0.112 U	3.216 U
COMP WR-2	2	6	0.275 J	0.283 U	0.283 U	0.283 U	0.869 J	0.100 J	0.357	1.057	0.099 U	2.827 U
COMP WR-2	3	7	0.997 U	0.274 U	0.274 U	0.274 U	0.434 J	0.274 U	0.195 U	0.107 U	0.096 U	2.739 U
COMP WR-2	4	6	0.300 J	0.309 U	0.309 U	0.309 U	1.062 U	0.309 U	0.574	0.121 U	0.108 U	3.095 U
COMP WR-2	5	7	0.371 J	0.373 U	0.373 U	0.373 U	1.282 U	0.373 U	0.266 U	0.146 U	0.130 U	3.734 U
COMP PS-1	1	6	0.220 J	0.288 U	0.288 U	0.311	0.569 J	0.248 J	0.601	0.113 U	0.101 U	2.882 U
COMP PS-1	2	6	0.199 J	0.214 U	0.214 U	0.498	0.588 J	0.409	0.163	0.084 U	0.075 U	2.137 U
COMP PS-1	3	6	1.700 U	0.467 U	0.467 U	0.467 U	0.595 J	0.467 U	0.703	0.183 U	0.163 U	4.670 U
COMP PS-1	4	5	0.210 J	0.263 U	0.263 U	0.194 J	0.131 J	0.033 J	0.187 U	0.103 U	0.688	2.629 U
COMP PS-1	5	7	0.533 J	0.446 U	0.446 U	0.446 U	1.529 U	0.446 U	0.521	0.174 U	0.155 U	4.455 U
COMP PS-2	1	5	0.223 J	0.238 U	0.238 U	0.238 U	0.184 J	0.085 J	0.170 U	0.093 U	0.550	2.378 U
COMP PS-2	2	7	0.374 J	0.361 U	0.361 U	0.361 U	1.238 U	0.361 U	0.257 U	0.141 U	0.126 U	3.606 U
COMP PS-2	3	5	1.713 U	0.471 U	0.471 U	0.471 U	0.307 J	0.471 U	0.335 U	0.184 U	0.164 U	4.706 U
COMP PS-2	4	8	1.490 U	0.409 U	0.409 U	0.409 U	1.404 U	0.409 U	0.292 U	0.160 U	0.143 U	4.091 U
COMP PS-2	5	8	0.851 U	0.234 U	0.234 U	0.234 U	0.802 U	0.234 U	0.167 U	0.091 U	0.082 U	2.337 U
COMP PS-3	1	5	0.849 U	0.233 U	0.233 U	0.233 U	0.163 J	0.050 J	0.166 U	0.091 U	0.081 U	2.333 U
COMP PS-3	2	7	0.507 J	0.465 U	0.465 U	0.465 U	1.595 U	0.465 U	0.331 U	0.182 U	0.162 U	4.647 U
COMP PS-3	3	6	0.253 J	0.228 U	0.228 U	0.228 U	0.344 J	0.060 J	0.289	0.089 U	0.079 U	2.278 U
COMP PS-3	4	6	0.233 J	0.243 U	0.243 U	0.243 U	0.220 J	0.243 U	0.150 J	0.254	0.085 U	2.425 U
COMP PS-3	5	6	0.776 U	0.213 U	0.213 U	0.267	0.365 J	0.110 J	0.209	0.400	0.074 U	2.133 U

TABLE I.11. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight)									
			Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Heptachlor	Heptachlor epoxide	Lindane	Toxaphene
COMP PS-4	1	5	0.219 J	0.236 U	0.236 U	0.236 U	0.810 U	0.236 U	0.153 J	0.092 U	0.082 U	2.361 U
COMP PS-4	2	5	0.266 J	0.358 U	0.358 U	0.358 U	0.198 J	0.358 U	0.255 U	0.140 U	0.738	3.580 U
COMP PS-4	3 Rep 1	8	1.719 U	0.472 U	0.472 U	0.472 U	1.621 U	0.472 U	0.337 U	0.185 U	0.165 U	4.722 U
COMP PS-4	3 Rep 2	8	1.836 U	0.504 U	0.504 U	0.504 U	1.731 U	0.504 U	0.360 U	0.197 U	0.176 U	5.044 U
COMP PS-4	3 Rep 3	8	1.875 U	0.515 U	0.515 U	0.515 U	1.768 U	0.515 U	0.367 U	0.201 U	0.180 U	5.149 U
COMP PS-4	4	8	1.311 U	0.360 U	0.360 U	0.360 U	1.236 U	0.360 U	0.257 U	0.141 U	0.126 U	3.600 U
COMP PS-4	5	6	0.269 J	0.346 U	0.346 U	0.346 U	0.307 J	0.290 J	0.247 U	0.135 U	0.121 U	3.461 U
COMP CS-1	1	7	0.496 J	0.511 U	0.511 U	0.511 U	0.630 J	0.511 U	0.364 U	0.200 U	0.178 U	5.106 U
COMP CS-1	2	5	0.202 J	0.246 U	0.246 U	0.246 U	0.133 J	0.031 J	0.176 U	0.096 U	0.647	2.465 U
COMP CS-1	3	8	1.063 U	0.292 U	0.292 U	0.292 U	1.002 U	0.292 U	0.208 U	0.114 U	0.102 U	2.920 U
COMP CS-1	4	8	1.132 U	0.311 U	0.311 U	0.311 U	1.067 U	0.311 U	0.222 U	0.122 U	0.736	3.108 U
COMP CS-1	5	6	0.416 J	0.448 U	0.448 U	0.448 U	1.537 U	0.448 U	0.360	0.175 U	0.156 U	4.477 U
R-BF	1 Rep 1	6	0.473 J	0.466 U	0.466 U	0.466 U	1.601 U	0.265 J	0.838	0.182 U	0.163 U	4.665 U
R-BF	1 Rep 2	6	0.537 J	0.637 U	0.637 U	0.637 U	2.188 U	0.294 J	1.139	0.249 U	0.222 U	6.373 U
R-BF	1 Rep 3	6	0.396 J	0.431 U	0.431 U	0.431 U	1.481 U	0.184 J	0.714	0.169 U	0.151 U	4.314 U
R-BF	2	6	0.433 J	0.470 U	0.470 U	0.470 U	1.614 U	0.470 U	0.335 U	0.184 U	0.164 U	4.702 U
R-BF	3	8	0.857 U	0.235 U	0.235 U	0.235 U	0.808 U	0.235 U	0.168 U	0.092 U	0.082 U	2.355 U
R-BF	4	5	0.446 J	0.237 U	0.237 U	0.237 U	0.177 J	0.237 U	0.169 U	0.093 U	0.766	2.370 U
R-BF	5	8	1.262 U	0.347 U	0.347 U	0.347 U	1.190 U	0.347 U	0.247 U	0.136 U	0.121 U	3.467 U
R-OS	1	8	1.246 U	0.342 U	0.342 U	0.342 U	1.175 U	0.342 U	0.244 U	0.134 U	0.119 U	3.422 U
R-OS	2	5	0.218 J	0.254 U	0.254 U	0.254 U	0.157 J	0.050 J	0.181 U	0.099 U	0.089 U	2.537 U
R-OS	3	5	0.951 U	0.261 U	0.261 U	0.261 U	0.897 U	0.261 U	0.186 U	0.102 U	0.091 U	2.612 U
R-OS	4	7	1.022 U	0.281 U	0.281 U	0.281 U	0.964 U	0.281 U	0.200 U	0.110 U	0.098 U	2.808 U
R-OS	5	5	0.276 J	0.329 U	0.329 U	0.329 U	0.201 J	0.329 U	0.234 U	0.129 U	0.705	3.288 U
C-SB	1	8	0.860 U	0.236 U	0.236 U	0.236 U	0.811 U	0.236 U	0.168 U	0.092 U	0.082 U	2.361 U
C-SB	2	7	0.860 U	0.236 U	0.236 U	0.236 U	0.810 U	0.236 U	0.168 U	0.092 U	0.082 U	2.361 U
C-SB	3	6	0.203 J	0.268 U	0.268 U	0.233 J	0.247 J	0.241 J	0.542	0.414	0.094 U	2.682 U
C-SB	4	5	0.204 J	0.237 U	0.237 U	0.181 J	0.148 J	0.072 J	0.169 U	0.092 U	0.083 U	2.365 U
C-SB	5	5	0.856 U	0.235 U	0.235 U	0.235 U	0.165 J	0.235 U	0.168 U	0.092 U	0.082 U	2.351 U
C-NE	1	7	0.239 J	0.217 U	0.217 U	0.217 U	0.746 U	0.172 J	0.155 U	0.221	0.076 U	2.173 U
C-NE	2 Rep 1	5	0.300 J	0.312 U	0.312 U	0.312 U	1.072 U	0.095 J	0.223 U	0.122 U	0.109 U	3.122 U
C-NE	2 Rep 2	5	0.440 J	0.458 U	0.458 U	0.458 U	1.571 U	0.097 J	0.326 U	0.179 U	0.160 U	4.577 U
C-NE	2 Rep 3	5	0.306 J	0.354 U	0.354 U	0.354 U	1.216 U	0.120 J	0.252 U	0.138 U	0.124 U	3.541 U
C-NE	3	6	1.006 U	0.276 U	0.276 U	0.276 U	0.948 U	0.276 U	0.485	0.270	0.096 U	2.763 U
C-NE	4	7	0.292 J	0.343 U	0.343 U	0.343 U	1.178 U	0.343 U	0.245 U	0.134 U	0.120 U	3.432 U
C-NE	5	7	0.265 J	0.255 U	0.255 U	0.255 U	0.876 U	0.255 U	0.182 U	0.100 U	0.089 U	2.552 U

TABLE I.11. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight)									
			Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Heptachlor	Heptachlor epoxide	Lindane	Toxaphene
Background	1	8	0.906 U	0.249 U	0.249 U	0.249 U	0.854 U	0.249 U	0.177 U	0.097 U	0.087 U	2.488 U
Background	2	8	1.041 U	0.286 U	0.286 U	0.286 U	0.982 U	0.286 U	0.204 U	0.112 U	0.100 U	2.860 U
Background	3	8	0.855 U	0.235 U	0.235 U	0.235 U	0.807 U	0.235 U	0.168 U	0.092 U	0.082 U	2.350 U
Background	4	8	0.968 U	0.266 U	0.266 U	0.266 U	0.912 U	0.266 U	0.189 U	0.104 U	0.093 U	2.657 U
Background	5	8	1.838 U	0.505 U	0.505 U	0.505 U	1.733 U	0.505 U	0.360 U	0.197 U	0.176 U	5.048 U

(a) DL Detection Limit.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) U Analyte was not present above the associated value.

TABLE I.12. Chlorinated Pesticides (alphabetical, Aldrin - 4,4'-DDT), Dry Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* Pesticides (µg/kg dry weight)								
				Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
COMP WR-1	1 Rep 1	7	9.089	3.015 U[a]	3.092 U	3.092 U	3.092 U	9.682	8.846 U	19.232	10.584	6.491 U
COMP WR-1	1 Rep 2	7	9.089	2.013 U	2.057 U	2.057 U	2.057 U	6.601	5.908 U	12.543	7.207	4.335 U
COMP WR-1	1 Rep 3	7	9.089	2.266 U	2.321 U	2.321 U	2.321 U	7.845	6.634 U	14.336	8.615	4.874 U
COMP WR-1	2	5	11.334	0.715 U	4.914	0.723 U	0.723 U	1.129	2.082 U	2.982	3.026	1.526 U
COMP WR-1	3	7	15.781	0.989 U	1.014 U	1.014 U	1.014 U	3.232	2.902 U	6.330	3.498	2.129 U
COMP WR-1	4	7	10.111	2.354 U	2.413 U	2.413 U	2.413 U	7.358	6.913 U	1.632 U	8.585	5.074 U
COMP WR-1	5	6	11.586	0.777 U	5.455	0.794 U	0.794 U	2.002	2.279 U	5.127	3.314	1.674 U
COMP WR-2	1	6	11.448	0.961 U	5.748	3.765	0.978 U	2.079	2.559 J[b]	3.581	3.066	2.061 U
COMP WR-2	2	6	12.118	0.792 U	4.811	0.817 U	0.817 U	2.203	2.335 U	0.553 U	3.185	1.708 U
COMP WR-2	3	7	9.092	1.023 U	1.056 U	1.056 U	1.056 U	3.388	2.310 J	0.704 U	3.740	2.211 U
COMP WR-2	4	6	12.570	0.843 U	0.859 U	0.859 U	0.859 U	1.933	2.458 U	0.581 U	3.111	1.806 U
COMP WR-2	5	7	10.057	1.263 U	1.293 U	1.293 U	1.293 U	0.656 U	3.709 U	0.875 U	4.484	2.724 U
COMP PS-1	1	6	10.654	0.920 U	0.948 U	0.948 U	0.948 U	2.178	2.703 U	4.102	3.341	1.990 U
COMP PS-1	2	6	11.105	0.657 U	3.872	0.675 U	0.675 U	1.828	1.927 U	3.017	2.188	1.414 U
COMP PS-1	3	6	10.980	1.448 U	1.485 U	1.485 U	1.485 U	4.945	4.253 U	9.499	2.022 U	3.124 U
COMP PS-1	4	5	10.303	0.874 U	5.833	0.893 U	0.893 U	1.349	2.553 U	2.805	2.281	1.873 U
COMP PS-1	5	7	10.032	1.515 U	1.545 U	1.545 U	1.545 U	5.114	3.509 J	1.047 U	5.303	3.260 U
COMP PS-2	1	5	11.733	0.690 U	4.526	0.707 U	0.707 U	1.278	2.028 U	14.387	7.031	1.492 U
COMP PS-2	2	7	9.740	1.263 U	1.294 U	1.294 U	1.294 U	4.199	3.706 U	14.733	6.797	2.721 U
COMP PS-2	3	5	10.173	1.573 U	9.722	1.612 U	1.612 U	0.826 U	4.630 U	11.619	6.822	3.391 U
COMP PS-2	4	8	11.797	1.178 U	1.212 U	1.212 U	1.212 U	0.619 U	3.467 U	12.223	6.976	2.543 U
COMP PS-2	5	8	11.870	0.674 U	0.691 U	0.691 U	0.691 U	2.738	1.971 U	9.680	5.021	1.449 U
COMP PS-3	1	5	10.037	0.797 U	0.807 U	0.807 U	0.807 U	1.365	1.365 J	5.669	4.085	1.704 U
COMP PS-3	2	7	9.838	1.606 U	1.647 U	1.647 U	1.647 U	5.174	4.727 U	12.035	6.770	3.466 U
COMP PS-3	3	6	10.872	0.717 U	0.727 U	0.727 U	0.727 U	2.281	2.097 U	6.531	5.960	1.536 U
COMP PS-3	4	6	10.236	0.811 U	0.830 U	0.830 U	0.830 U	3.761	2.374 U	5.305	2.784	1.739 U
COMP PS-3	5	6	9.905	0.737 U	0.747 U	0.747 U	0.747 U	2.019	2.150 U	6.461	6.552	1.585 U

TABLE I.12. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* Pesticides (µg/kg dry weight)								
				Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
COMP PS-4	1	5	11.159	0.717 U	0.735 U	0.735 U	0.735 U	1.255	2.115 U	17.313	6.793	1.550 U
COMP PS-4	2	5	11.243	1.085 U	6.635	1.112 U	1.112 U	1.645	3.184 U	13.466	6.128	2.339 U
COMP PS-4	3 Rep 1	8	10.791	1.492 U	1.529 U	1.529 U	1.529 U	0.778 U	4.374 U	13.752	6.450	3.216 U
COMP PS-4	3 Rep 2	8	10.791	1.594 U	1.631 U	1.631 U	1.631 U	0.834 U	4.671 U	15.013	7.173	3.429 U
COMP PS-4	3 Rep 3	8	10.791	1.631 U	1.668 U	1.668 U	1.668 U	0.843 U	4.772 U	16.477	8.034	3.503 U
COMP PS-4	4	8	10.499	1.172 U	1.200 U	1.200 U	1.200 U	5.134	3.429 U	14.620	7.296	2.515 U
COMP PS-4	5	6	12.152	0.971 U	0.996 U	0.996 U	0.996 U	2.312	2.847 U	18.738	7.307	2.090 U
COMP CS-1	1	7	9.780	1.779 U	1.820 U	1.820 U	1.820 U	5.573	3.957 J	11.022	6.053	3.834 U
COMP CS-1	2	5	11.400	0.737 U	5.202	0.754 U	0.754 U	1.246	2.158 U	2.421	2.649	1.588 U
COMP CS-1	3	8	10.452	0.957 U	0.976 U	0.976 U	0.976 U	0.498 U	2.794 U	0.660 U	1.330 U	2.047 U
COMP CS-1	4	8	11.689	0.907 U	0.924 U	0.924 U	0.924 U	0.471 U	2.661 U	0.625 U	1.266 U	1.951 U
COMP CS-1	5	6	11.460	1.335 U	1.361 U	1.361 U	1.361 U	2.469	3.909 U	0.916 U	1.859 U	2.871 U
R-BF	1 Rep 1	6	9.180	1.732 U	1.776 U	1.776 U	1.776 U	4.292	5.076 U	9.717	7.919	3.725 U
R-BF	1 Rep 2	6	9.180	2.364 U	2.418 U	2.418 U	2.418 U	5.098	6.939 U	12.157	8.279	5.098 U
R-BF	1 Rep 3	6	9.180	1.601 U	1.645 U	1.645 U	1.645 U	4.564	4.695 U	8.693	6.231	3.453 U
R-BF	2	6	9.469	1.690 U	1.732 U	1.732 U	1.732 U	3.665	4.964 U	1.172 U	7.055	3.643 U
R-BF	3	8	9.606	0.833 U	0.854 U	0.854 U	0.854 U	3.196	2.446 U	4.372	6.069	1.801 U
R-BF	4	5	11.881	0.682 U	5.218	0.699 U	0.699 U	1.793	1.826 J	7.407	9.284	1.465 U
R-BF	5	8	9.158	1.288 U	1.321 U	1.321 U	1.321 U	5.198	3.789 U	0.895 U	9.161	2.774 U
R-OS	1	8	11.691	1.001 U	1.018 U	1.018 U	1.018 U	0.522 U	2.925 U	0.693 U	7.929	2.147 U
R-OS	2	5	11.067	0.786 U	5.214	0.804 U	0.804 U	1.382	2.295 U	3.452	6.994	1.681 U
R-OS	3	5	11.042	0.806 U	5.533	0.824 U	0.824 U	1.277	2.364 U	3.315	7.616	1.739 U
R-OS	4	7	9.642	0.996 U	1.016 U	1.016 U	1.016 U	3.236	2.914 U	0.685 U	6.254	2.136 U
R-OS	5	5	11.549	0.970 U	6.667	0.996 U	0.996 U	1.585	2.849 U	3.386	8.087	2.087 U
C-SB	1	8	10.811	0.749 U	0.758 U	0.758 U	0.758 U	0.388 U	2.183 U	0.518 U	1.036 U	1.600 U
C-SB	2	7	10.029	0.798 U	0.818 U	0.818 U	0.818 U	0.419 U	2.353 U	0.558 U	3.131	1.725 U
C-SB	3	6	12.032	0.756 U	0.781 U	0.781 U	0.781 U	1.995	2.227 U	3.881	9.092	1.637 U
C-SB	4	5	10.540	0.769 U	5.009	0.787 U	0.787 U	1.347	2.249 U	2.713	3.112	1.651 U
C-SB	5	5	10.695	0.748 U	5.002	0.767 U	0.767 U	0.393 U	2.197 U	0.514 U	3.385	1.618 U
C-NE	1	7	9.545	0.775 U	0.796 U	0.796 U	0.796 U	2.273	2.273 U	0.534 U	3.614	1.676 U
C-NE	2 Rep 1	5	9.744	1.088 U	1.119 U	1.119 U	1.119 U	1.909	3.202 U	3.982	3.849	2.350 U
C-NE	2 Rep 2	5	9.744	1.601 U	1.642 U	1.642 U	1.642 U	2.278	4.700 U	4.639	4.208	3.448 U
C-NE	2 Rep 3	5	9.744	1.242 U	1.273 U	1.273 U	1.273 U	1.847	3.633 U	3.695	3.643	2.668 U
C-NE	3	6	11.007	0.854 U	0.872 U	0.872 U	0.872 U	0.445 U	2.507 U	0.591 U	5.387	1.844 U
C-NE	4	7	10.845	1.079 U	1.107 U	1.107 U	1.107 U	3.596	3.163 U	0.747 U	3.919	2.324 U
C-NE	5	7	10.906	0.798 U	0.816 U	0.816 U	0.816 U	2.632	2.338 U	0.550 U	3.090	1.715 U

TABLE I.12. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* Pesticides (µg/kg dry weight)								
				Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Background	1	8	11.599	0.733 U	0.750 U	0.750 U	0.750 U	0.379 U	2.147 U	0.509 U	1.017 U	1.578 U
Background	2	8	12.370	0.792 U	0.808 U	0.808 U	0.808 U	2.781	2.312 U	0.542 U	1.730	1.698 U
Background	3	8	11.946	0.670 U	0.686 U	0.686 U	0.686 U	0.352 U	1.967 U	0.460 U	0.938 U	1.440 U
Background	4	8	11.489	0.792 U	0.809 U	0.809 U	0.809 U	0.409 U	2.315 U	0.548 U	1.105 U	1.697 U
Background	5	8	11.454	1.502 U	1.537 U	1.537 U	1.537 U	0.786 U	4.409 U	1.039 U	2.095 U	3.230 U

(a) U Analyte was not present above the level of associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE I.13. Chlorinated Pesticides (alphabetical, Dieldrin - Toxaphene), Dry Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* Pesticides (µg/kg dry weight)									
				Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
COMP WR-1	1 Rep 1	7	9.089	8.890 J[a]	8.846 U[b]	8.846 U	8.846 U	30.377 U	8.846 U	6.304 U	3.455 U	3.092 U	88.481 U
COMP WR-1	1 Rep 2	7	9.089	6.282 J	5.908 U	5.908 U	5.908 U	20.277 U	5.908 U	4.214 U	2.310 U	2.057 U	59.071 U
COMP WR-1	1 Rep 3	7	9.089	6.634 J	6.634 U	6.634 U	6.634 U	22.786 U	6.634 U	4.731 U	2.597 U	2.321 U	66.388 U
COMP WR-1	2	5	11.334	2.038 J	2.082 U	2.082 U	2.082 U	1.156 J	0.300 J	1.482 U	1.959	0.723 U	20.840 U
COMP WR-1	3	7	15.781	10.563 U	2.902 U	2.902 U	2.902 U	9.961 U	2.902 U	2.066 U	1.134 U	1.014 U	29.010 U
COMP WR-1	4	7	10.111	6.666 J	6.913 U	6.913 U	6.913 U	23.727 U	6.913 U	4.925 U	2.700 U	2.413 U	69.133 U
COMP WR-1	5	6	11.586	2.046 J	2.279 U	2.279 U	2.279 U	7.820 U	1.079 J	2.339	3.996	0.794 U	22.777 U
COMP WR-2	1	6	11.448	2.306 J	2.813 U	2.813 U	3.215	7.303 J	2.472 J	1.957 J	1.101 U	0.978 U	28.092 U
COMP WR-2	2	6	12.118	2.269 J	2.335 U	2.335 U	2.335 U	7.171 J	0.825 J	2.946	8.723	0.817 U	23.329 U
COMP WR-2	3	7	9.092	10.966 U	3.014 U	3.014 U	3.014 U	4.773 J	3.014 U	2.145 U	1.177 U	1.056 U	30.125 U
COMP WR-2	4	6	12.570	2.387 J	2.458 U	2.458 U	2.458 U	8.449 U	2.458 U	4.566	0.963 U	0.859 U	24.622 U
COMP WR-2	5	7	10.057	3.689 J	3.709 U	3.709 U	3.709 U	12.747 U	3.709 U	2.645 U	1.452 U	1.293 U	37.128 U
COMP PS-1	1	6	10.654	2.065 J	2.703 U	2.703 U	2.919	5.341 J	2.328 J	5.641	1.061 U	0.948 U	27.051 U
COMP PS-1	2	6	11.105	1.792 J	1.927 U	1.927 U	4.484	5.295 J	3.683	1.468	0.756 U	0.675 U	19.244 U
COMP PS-1	3	6	10.980	15.483 U	4.253 U	4.253 U	4.253 U	5.419 J	4.253 U	6.403	1.667 U	1.485 U	42.532 U
COMP PS-1	4	5	10.303	2.038 J	2.553 U	2.553 U	1.883 J	1.271 J	0.320 J	1.815 U	1.000 U	6.678	25.517 U
COMP PS-1	5	7	10.032	5.313 J	4.446 U	4.446 U	4.446 U	15.241 U	4.446 U	5.193	1.734 U	1.545 U	44.408 U
COMP PS-2	1	5	11.733	1.901 J	2.028 U	2.028 U	2.028 U	1.568 J	0.724 J	1.449 U	0.793 U	4.688	20.268 U
COMP PS-2	2	7	9.740	3.840 J	3.706 U	3.706 U	3.706 U	12.710 U	3.706 U	2.639 U	1.448 U	1.294 U	37.023 U
COMP PS-2	3	5	10.173	16.839 U	4.630 U	4.630 U	4.630 U	3.018 J	4.630 U	3.293 U	1.809 U	1.612 U	46.260 U
COMP PS-2	4	8	11.797	12.630 U	3.467 U	3.467 U	3.467 U	11.901 U	3.467 U	2.475 U	1.356 U	1.212 U	34.678 U
COMP PS-2	5	8	11.870	7.169 U	1.971 U	1.971 U	1.971 U	6.757 U	1.971 U	1.407 U	0.767 U	0.691 U	19.688 U
COMP PS-3	1	5	10.037	8.459 U	2.321 U	2.321 U	2.321 U	1.624 J	0.498 J	1.654 U	0.907 U	0.807 U	23.244 U
COMP PS-3	2	7	9.838	5.153 J	4.727 U	4.727 U	4.727 U	16.213 U	4.727 U	3.365 U	1.850 U	1.647 U	47.235 U
COMP PS-3	3	6	10.872	2.327 J	2.097 U	2.097 U	2.097 U	3.164 J	0.552 J	2.658	0.819 U	0.727 U	20.953 U
COMP PS-3	4	6	10.236	2.276 J	2.374 U	2.374 U	2.374 U	2.149 J	2.374 U	1.465 J	2.481	0.830 U	23.691 U
COMP PS-3	5	6	9.905	7.834 U	2.150 U	2.150 U	2.696	3.685 J	1.111 J	2.110	4.038	0.747 U	21.535 U

TABLE I.13. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* Pesticides (µg/kg dry weight)									
				Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
COMP PS-4	1	5	11.159	1.963 J	2.115 U	2.115 U	2.115 U	7.259 U	2.115 U	1.371 J	0.824 U	0.735 U	21.158 U
COMP PS-4	2	5	11.243	2.366 J	3.184 U	3.184 U	3.184 U	1.761 J	3.184 U	2.268 U	1.245 U	6.564	31.842 U
COMP PS-4	3 Rep 1	8	10.791	15.930 U	4.374 U	4.374 U	4.374 U	15.022 U	4.374 U	3.123 U	1.714 U	1.529 U	43.759 U
COMP PS-4	3 Rep 2	8	10.791	17.014 U	4.671 U	4.671 U	4.671 U	16.041 U	4.671 U	3.336 U	1.826 U	1.631 U	46.743 U
COMP PS-4	3 Rep 3	8	10.791	17.376 U	4.772 U	4.772 U	4.772 U	16.384 U	4.772 U	3.401 U	1.863 U	1.668 U	47.716 U
COMP PS-4	4	8	10.499	12.487 U	3.429 U	3.429 U	3.429 U	11.773 U	3.429 U	2.448 U	1.343 U	1.200 U	34.289 U
COMP PS-4	5	6	12.152	2.214 J	2.847 U	2.847 U	2.847 U	2.526 J	2.386 J	2.033 U	1.111 U	0.996 U	28.481 U
COMP CS-1	1	7	9.780	5.072 J	5.225 U	5.225 U	5.225 U	6.442 J	5.225 U	3.722 U	2.045 U	1.820 U	52.209 U
COMP CS-1	2	5	11.400	1.772 J	2.158 U	2.158 U	2.158 U	1.167 J	0.272 J	1.544 U	0.842 U	5.675	21.623 U
COMP CS-1	3	8	10.452	10.170 U	2.794 U	2.794 U	2.794 U	9.587 U	2.794 U	1.990 U	1.091 U	0.976 U	27.937 U
COMP CS-1	4	8	11.689	9.684 U	2.661 U	2.661 U	2.661 U	9.128 U	2.661 U	1.899 U	1.044 U	6.297	26.589 U
COMP CS-1	5	6	11.460	3.630 J	3.909 U	3.909 U	3.909 U	13.412 U	3.909 U	3.141	1.527 U	1.361 U	39.066 U
R-BF	1 Rep 1	6	9.180	5.153 J	5.076 U	5.076 U	5.076 U	17.440 U	2.887 J	9.129	1.983 U	1.776 U	50.817 U
R-BF	1 Rep 2	6	9.180	5.850 J	6.939 U	6.939 U	6.939 U	23.835 U	3.203 J	12.408	2.713 U	2.418 U	69.425 U
R-BF	1 Rep 3	6	9.180	4.314 J	4.695 U	4.695 U	4.695 U	16.133 U	2.004 J	7.778	1.841 U	1.645 U	46.993 U
R-BF	2	6	9.469	4.573 J	4.964 U	4.964 U	4.964 U	17.045 U	4.964 U	3.538 U	1.943 U	1.732 U	49.657 U
R-BF	3	8	9.606	8.922 U	2.446 U	2.446 U	2.446 U	8.411 U	2.446 U	1.749 U	0.958 U	0.854 U	24.516 U
R-BF	4	5	11.881	3.754 J	1.995 U	1.995 U	1.995 U	1.490 J	1.995 U	1.422 U	0.783 U	6.447	19.948 U
R-BF	5	8	9.158	13.780 U	3.789 U	3.789 U	3.789 U	12.994 U	3.789 U	2.697 U	1.485 U	1.321 U	37.858 U
R-OS	1	8	11.691	10.658 U	2.925 U	2.925 U	2.925 U	10.050 U	2.925 U	2.087 U	1.146 U	1.018 U	29.270 U
R-OS	2	5	11.067	1.970 J	2.295 U	2.295 U	2.295 U	1.419 J	0.452 J	1.635 U	0.895 U	0.804 U	22.924 U
R-OS	3	5	11.042	8.613 U	2.364 U	2.364 U	2.364 U	8.124 U	2.364 U	1.684 U	0.924 U	0.824 U	23.655 U
R-OS	4	7	9.642	10.599 U	2.914 U	2.914 U	2.914 U	9.998 U	2.914 U	2.074 U	1.141 U	1.016 U	29.123 U
R-OS	5	5	11.549	2.390 J	2.849 U	2.849 U	2.849 U	1.740 J	2.849 U	2.026 U	1.117 U	6.104	28.470 U
C-SB	1	8	10.811	7.955 U	2.183 U	2.183 U	2.183 U	7.502 U	2.183 U	1.554 U	0.851 U	0.758 U	21.839 U
C-SB	2	7	10.029	8.575 U	2.353 U	2.353 U	2.353 U	8.077 U	2.353 U	1.675 U	0.917 U	0.818 U	23.542 U
C-SB	3	6	12.032	1.687 J	2.227 U	2.227 U	1.937 J	2.053 J	2.003 J	4.505	3.441	0.781 U	22.291 U
C-SB	4	5	10.540	1.935 J	2.249 U	2.249 U	1.717 J	1.404 J	0.683 J	1.603 U	0.873 U	0.787 U	22.438 U
C-SB	5	5	10.695	8.004 U	2.197 U	2.197 U	2.197 U	1.543 J	2.197 U	1.571 U	0.860 U	0.767 U	21.982 U
C-NE	1	7	9.545	2.504 J	2.273 U	2.273 U	2.273 U	7.816 U	1.802 J	1.624 U	2.315	0.796 U	22.766 U
C-NE	2 Rep 1	5	9.744	3.079 J	3.202 U	3.202 U	3.202 U	11.002 U	0.975 J	2.289 U	1.252 U	1.119 U	32.040 U
C-NE	2 Rep 2	5	9.744	4.516 J	4.700 U	4.700 U	4.700 U	16.123 U	0.995 J	3.346 U	1.837 U	1.642 U	46.972 U
C-NE	2 Rep 3	5	9.744	3.140 J	3.633 U	3.633 U	3.633 U	12.479 U	1.232 J	2.586 U	1.416 U	1.273 U	36.340 U
C-NE	3	6	11.007	9.140 U	2.507 U	2.507 U	2.507 U	8.613 U	2.507 U	4.406	2.453	0.872 U	25.102 U
C-NE	4	7	10.845	2.692 J	3.163 U	3.163 U	3.163 U	10.862 U	3.163 U	2.259 U	1.236 U	1.107 U	31.646 U
C-NE	5	7	10.906	2.430 J	2.338 U	2.338 U	2.338 U	8.032 U	2.338 U	1.669 U	0.917 U	0.816 U	23.400 U

TABLE I.13. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* Pesticides (µg/kg dry weight)									
				Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
Background	1	8	11.599	7.811 U	2.147 U	2.147 U	2.147 U	7.363 U	2.147 U	1.526 U	0.836 U	0.750 U	21.450 U
Background	2	8	12.370	8.416 U	2.312 U	2.312 U	2.312 U	7.939 U	2.312 U	1.649 U	0.905 U	0.808 U	23.120 U
Background	3	8	11.946	7.157 U	1.967 U	1.967 U	1.967 U	6.755 U	1.967 U	1.406 U	0.770 U	0.686 U	19.672 U
Background	4	8	11.489	8.425 U	2.315 U	2.315 U	2.315 U	7.938 U	2.315 U	1.645 U	0.905 U	0.809 U	23.126 U
Background	5	8	11.454	16.047 U	4.409 U	4.409 U	4.409 U	15.130 U	4.409 U	3.143 U	1.720 U	1.537 U	44.072 U

(a) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(b) U Analyte was not present above the level of associated value.

TABLE I.14. Quality Control Data for Chlorinated Pesticides (alphabetical, Aldrin - 4,4'-DDT), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Method Blank											
Blank 1		1	0.094 U[a]	0.097 U	0.097 U	0.097 U	0.049 U	0.277 U	0.065 U	0.132 U	0.203 U
Blank 2		2	0.104 U	0.107 U	0.107 U	0.107 U	0.054 U	0.305 U	0.072 U	0.145 U	0.224 U
Blank 3		3	0.128 U	0.131 U	0.131 U	0.131 U	0.067 U	0.376 U	0.089 U	0.179 U	0.276 U
Blank 4		4	0.107 U	0.110 U	0.110 U	0.110 U	0.056 U	0.315 U	0.074 U	0.150 U	0.231 U
Matrix Spike											
COMP PS-2	3	5	0.160 U	0.989	0.164 U	0.164 U	0.084 U[b]	0.471 U	1.182	0.694	0.345 U
COMP PS-2 MS	3		12.348	15.864	14.056	16.450	NA	12.421	18.395	15.600	11.731
Concentration Recovered			12.348	14.875	14.056	16.450	NA	12.421	17.213	14.906	11.731
Amount Spiked			11.443	12.045[d]	11.443[d]	11.443[d]	NS[c]	12.084	11.443[d]	11.443[d]	11.449
Percent Recovery			108%	123%[d]	123%[d]	144%[d]	NA	103%	150%[d]	130%[d]	102%
COMP PS-2	3	5	0.160 U	0.989	0.164 U	0.164 U	0.084 U	0.471 U	1.182	0.694	0.345 U
COMP PS-2 MSD	3		12.188	17.368	14.657	17.094	NA	12.944	16.460	16.233	11.351
Concentration Recovered			12.188	16.379	14.657	17.094	NA	12.944	15.278	15.539	11.351
Amount Spiked			11.914	12.540[d]	11.914[d]	11.914[d]	NS	12.581	11.914[d]	11.914[d]	11.921
Percent Recovery			102%	131%[d]	123%[d]	143%[d]	NA	103%	126%[d]	130%[d]	95%
RPD			5%	6%	0%	0%	NA	0%	16%	0%	7%
I-STAT			0.03	0.03	0.00	0.00	NA	0.00	0.08	0.00	0.04
R-BF	2	6	0.160 U	0.164 U	0.164 U	0.164 U	0.347	0.470 U	0.111 U	0.668	0.345 U
R-BF MS	2		15.189	18.537	12.401	16.247	NA	14.801	20.795	18.701	17.222
Concentration Recovered			15.189	18.537	12.401	16.247	NA	14.801	20.795	18.033	17.222
Amount Spiked			13.594	14.309[d]	13.594	13.594	NS	14.356	13.594[d]	13.594[d]	13.602[d]
Percent Recovery			112%	130%[d]	91%	120%	NA	103%	153%[d]	133%[d]	127%[d]
R-BF	2	6	0.160 U	0.164 U	0.164 U	0.164 U	0.347	0.470 U	0.111 U	0.668	0.345 U
R-BF MSD	2		11.519	16.686	13.538	20.016	NA	10.884	16.224	17.158	12.044
Concentration Recovered			11.519	16.686	13.538	20.016	NA	10.884	16.224	16.490	12.044
Amount Spiked			10.404	10.951[d]	10.404[d]	10.404[d]	NS	10.987	10.404[d]	10.404[d]	10.410
Percent Recovery			111%	152%[d]	130%[d]	192%[d]	NA	99%	156%[d]	158%[d]	116%
RPD			1%	16%	35%[e]	47%[e]	NA	4%	2%	18%	9%
I-STAT			0.00	0.08	0.18	0.23	NA	0.02	0.01	0.09	0.05

TABLE I.14. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
COMP WR-1	4	7	0.238 U	0.244 U	0.244 U	0.244 U	0.744	0.699 U	0.165 U	0.868	0.513 U
COMP WR-1 MS	4		19.317	21.502	17.854	21.696	NA	17.294	16.668	16.185	14.998
Concentration Recovered			19.317	21.502	17.854	21.696	NA	17.294	16.668	15.317	14.998
Amount Spiked			14.644	15.413 (d)	14.644 (d)	14.644 (d)	NS	15.464	14.644	14.644	14.652
Percent Recovery			132%	140% (d)	122% (d)	148% (d)	NA	112%	114%	105%	102%
COMP WR-1	4	7	0.238 U	0.244 U	0.244 U	0.244 U	0.744	0.699 U	0.165 U	0.868	0.513 U
COMP WR-1 MSD	4		20.000	17.574	17.322	21.282	NA	17.001	17.417	16.986	15.896
Concentration Recovered			20.000	17.574	17.322	21.282	NA	17.001	17.417	16.118	15.896
Amount Spiked			13.933	14.665	13.933 (d)	13.933 (d)	NS	14.713	13.933 (d)	13.933	13.940
Percent Recovery			144% (d)	120%	124% (d)	153% (d)	NA	116%	125% (d)	116%	114%
RPD			8%	15%	2%	3%	NA	3%	9%	10%	11%
I-STAT			0.04	0.08	0.01	0.02	NA	0.02	0.05	0.05	0.05
Background	5	8	0.172 U	0.176 U	0.176 U	0.176 U	0.090 U	0.505 U	0.119 U	0.240 U	0.370 U
Background MS	5		12.030	15.040	15.921	15.171	NA	11.909	13.342	13.441	11.233
Concentration Recovered			12.030	15.04	15.921	15.171	NA	11.909	13.342	13.441	11.233
Amount Spiked			10.634	11.192 (d)	10.634 (d)	10.634 (d)	NS	11.229	10.634 (d)	10.634 (d)	10.639
Percent Recovery			113%	134% (d)	150% (d)	143% (d)	NA	106%	125% (d)	126% (d)	106%
Background	5	8	0.172 U	0.176 U	0.176 U	0.176 U	0.090 U	0.505 U	0.119 U	0.240 U	0.370 U
Background MSD	5		10.522	13.548	14.717	14.139	NA	10.494	13.310	13.362	11.110
Concentration Recovered			10.522	13.548	14.717	14.139	NA	10.494	13.310	13.362	11.110
Amount Spiked			9.729	10.240 (d)	9.729 (d)	9.729 (d)	NS	10.274	9.729 (d)	9.729 (d)	9.734
Percent Recovery			108%	132% (d)	151% (d)	145% (d)	NA	102%	137% (d)	137% (d)	114%
RPD			4%	2%	1%	2%	NA	4%	9%	8%	8%
I-STAT			0.02	0.01	0.01	0.01	NA	0.02	0.04	0.04	0.04
Analytical Triplicates											
C-NE	2 Rep 1	5	0.106 U	0.109 U	0.109 U	0.109 U	0.186	0.312 U	0.388	0.375	0.229 U
C-NE	2 Rep 2	5	0.156 U	0.160 U	0.160 U	0.160 U	0.222	0.458 U	0.452	0.410	0.336 U
C-NE	2 Rep 3	5	0.121 U	0.124 U	0.124 U	0.124 U	0.180	0.354 U	0.360	0.355	0.260 U
RSD			NA	NA	NA	NA	12%	NA	12%	7%	NA

TABLE I.14. (contd)

Sediment Treatment	Replicate	Batch	Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-chlordane	Trans-(gamma) chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
			M. nasuta Pesticides (µg/kg wet weight)								
R-BF	1 Rep 1	6	0.159 U	0.163 U	0.163 U	0.163 U	0.394	0.466 U	0.892	0.727	0.342 U
R-BF	1 Rep 2	6	0.217 U	0.222 U	0.222 U	0.222 U	0.468	0.637 U	1.116	0.760	0.468 U
R-BF	1 Rep 3	6	0.147 U	0.151 U	0.151 U	0.151 U	0.419	0.431 U	0.798	0.572	0.317 U
RSD			NA	NA	NA	NA	9%	NA	17%	15%	NA
COMP WR-1	1 Rep 1	7	0.274 U	0.281 U	0.281 U	0.281 U	0.880	0.804 U	1.748	0.962	0.590 U
COMP WR-1	1 Rep 2	7	0.183 U	0.187 U	0.187 U	0.187 U	0.600	0.537 U	1.140	0.655	0.394 U
COMP WR-1	1 Rep 3	7	0.206 U	0.211 U	0.211 U	0.211 U	0.713	0.603 U	1.303	0.783	0.443 U
RSD			NA	NA	NA	NA	19%	NA	23%	19%	NA
COMP PS-4	3 Rep 1	8	0.161 U	0.165 U	0.165 U	0.165 U	0.084 U	0.472 U	1.484	0.696	0.347 U
COMP PS-4	3 Rep 2	8	0.172 U	0.176 U	0.176 U	0.176 U	0.090 U	0.504 U	1.620	0.774	0.370 U
COMP PS-4	3 Rep 3	8	0.176 U	0.180 U	0.180 U	0.180 U	0.091 U	0.515 U	1.778	0.867	0.378 U
RSD			NA	NA	NA	NA	NA	NA	9%	11%	NA

(a) U Analyte was not present above the level of the associated value.
(b) NA Not applicable.
(c) NS Not spiked.
(d) Value outside of quality control range of 40%-120%.
(e) Value exceeds relative precision range of ≤ 30%.

TABLE I.15. Quality Control Data for Chlorinated Pesticides (alphabetical, Dieldrin - Toxaphene), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight) Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
Method Blank												
Blank 1		1	1.007 U[a]	0.277 U	0.277 U	0.277 U	0.950 U	0.277 U	0.197 U	0.108 U	0.097 U	2.766 U
Blank 2		2	1.112 U	0.305 U	0.305 U	0.305 U	1.049 U	0.305 U	0.218 U	0.119 U	0.107 U	3.055 U
Blank 3		3	1.369 U	0.376 U	0.376 U	0.376 U	1.291 U	0.376 U	0.268 U	0.147 U	0.131 U	3.760 U
Blank 4		4	1.146 U	0.315 U	0.315 U	0.315 U	1.081 U	0.315 U	0.224 U	0.123 U	0.110 U	3.149 U
Matrix Spike												
COMP PS-2	3	5	1.713 U	0.471 U	0.471 U	0.471 U	0.307 J[b]	0.471 U	0.335 U	0.184 U	0.164 U	4.706 U[c]
COMP PS-2 MS	3		11.301	14.723	13.687	14.166	13.982	2.318	11.144	10.307	15.325	NA
Concentration Recovered			11.301	14.723	13.687	14.166	13.675	2.318	11.144	10.307	15.325	NS[d]
Amount Spiked			11.443	11.443	11.443	11.443[e]	11.713	11.438	11.443	11.449	11.443	NA
Percent Recovery			93%	129%[e]	120%	124%[e]	117%	20%[e]	97%	90%	134%[e]	
COMP PS-2	3	5	1.713 U	0.471 U	0.471 U	0.471 U	0.307 J	0.471 U	0.335 U	0.184 U	0.164 U	4.706 U
COMP PS-2 MSD	3		11.219	15.150	12.768	13.736	12.798	3.685	11.573	11.640	16.543	NA
Concentration Recovered			11.219	15.150	12.768	13.736	12.491	3.685	11.573	11.640	16.543	NA
Amount Spiked			11.914	11.914	11.914	11.914	12.195	11.909	11.914	11.921	11.914	NS
Percent Recovery			94%	127%[e]	107%	115%	102%	31%[e]	97%	90%	139%[e]	NA
RPD			5%	1%	11%	7%	13%	42%[f]	0%	8%	4%	NA
I-STAT			0.02	0.01	0.05	0.04	0.07	0.21	0.00	0.04	0.02	NA
R-BF	2	6	0.433 J	0.470 U	0.470 U	0.470 U	1.614 U	0.470 U	0.335 U	0.184 U	0.164 U	4.702 U
R-BF MS	2		14.370	15.308	15.458	15.897	16.519	4.556	14.162	14.986	15.110	NA
Concentration Recovered			13.937	15.308	15.458	15.897	16.519	4.556	14.162	14.986	15.110	NA
Amount Spiked			13.594	13.594	13.594	13.594	13.914	13.588	13.594	13.602	13.594	NS
Percent Recovery			103%	113%	114%	117%	119%	34%[e]	104%	110%	111%	NA
R-BF	2	6	0.433 J	0.470 U	0.470 U	0.470 U	1.614 U	0.470 U	0.335 U	0.184 U	0.164 U	4.702 U
R-BF MSD	2		11.577	11.846	10.315	11.447	13.150	3.529	10.254	11.150	16.288	NA
Concentration Recovered			11.144	11.846	10.315	11.447	13.150	3.529	10.254	11.150	16.288	NA
Amount Spiked			10.404	10.404	10.404	10.404	10.649	10.400	10.404	10.410	10.404	NS
Percent Recovery			107%	114%	99%	110%	123%[e]	34%	99%	107%	157%[e]	NA
RPD			4%	1%	14%	6%	4%	1%	6%	3%	34%[f]	NA
I-STAT			0.02	0.01	0.07	0.03	0.02	0.01	0.03	0.01	0.17	NA

TABLE I.15. (contd)

Sediment Treatment	Replicate	Batch	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Heptachlor	Heptachlor epoxide	Lindane	Toxaphene
			Matrix: Pesticides (µg/kg wet weight)									
COMP WR-1	4	7	0.674 J	0.699 U	0.699 U	0.699 U	2.399 U	0.699 U	0.498 U	0.273 U	0.244 U	6.990 U
COMP WR-1 MS	4		15.925	22.160	14.940	16.467	18.963	0.542	16.050	13.594	20.093	NA
Concentration Recovered			15.251	22.16	14.940	16.467	18.963	0.542	16.050	13.594	20.093	NS
Amount Spiked			14.644	14.644	14.644	14.644	14.989	14.637	14.644	14.652	14.644	NA
Percent Recovery			104%	151%(e)	102%	112%	127%(e)	4%(e)	110%	93%	137%(e)	
COMP WR-1	4	7	0.674 J	0.699 U	0.699 U	0.699 U	2.399 U	0.699 U	0.498 U	0.273 U	0.244 U	6.990 U
COMP WR-1 MSD	4		18.657	21.537	17.705	17.792	20.744	0.161	16.440	12.845	17.792	NA
Concentration Recovered			17.983	21.537	17.705	17.792	20.744	0.161	16.440	12.845	17.792	NA
Amount Spiked			13.933	13.933	13.933	13.933	14.261	13.926	13.933	13.940	13.933	NS
Percent Recovery			129%(e)	155%(e)	127%(e)	128%(e)	145%(e)	1%(e)	118%	92%	128%(e)	NA
RPD			21%	2%	22%	13%	14%	105%(f)	7%	1%	7%	NA
I-STAT			0.11	0.01	0.11	0.06	0.07	0.52	0.04	0.00	0.04	NA
Background	5	8	1.838 U	0.505 U	0.505 U	0.505 U	1.733 U	0.505 U	0.360 U	0.197 U	0.176 U	5.048 U
Background MS	5		10.655	13.361	13.330	12.853	11.219	1.037	12.492	11.856	14.664	NA
Concentration Recovered			10.655	13.361	13.330	12.853	11.219	1.037	12.492	11.856	14.664	NA
Amount Spiked			10.634	10.634	10.634	10.634	10.884	10.629	10.634	10.639	10.634	NS
Percent Recovery			100%	126%(e)	125%(e)	121%(e)	103%	10%	117%	111%	138%(e)	NA
Background	5	8	1.838 U	0.505 U	0.505 U	0.505 U	1.733 U	0.505 U	0.360 U	0.197 U	0.176 U	5.048 U
Background MSD	5		9.982	11.633	12.423	11.852	10.401	0.905	11.104	10.603	13.538	NA
Concentration Recovered			9.982	11.633	12.423	11.852	10.401	0.905	11.104	10.603	13.538	NA
Amount Spiked			9.729	9.729	9.729	9.729	9.958	9.724	9.729	9.734	9.729	NS
Percent Recovery			103%	120%	128%(e)	122%(e)	104%	9%	114%	109%	139%(e)	NA
RPD			2%	5%	2%	1%	1%	5%	3%	2%	1%	NA
I-STAT			0.01	0.02	0.01	0.00	0.01	0.02	0.01	0.01	0.00	NA
Analytical Triplicates												
C-NE	2 Rep 1	5	0.300 J	0.312 U	0.312 U	0.312 U	1.072 U	0.095 J	0.223 U	0.122 U	0.109 U	3.122 U
C-NE	2 Rep 2	5	0.440 J	0.458 U	0.458 U	0.458 U	1.571 U	0.097 J	0.326 U	0.179 U	0.160 U	4.577 U
C-NE	2 Rep 3	5	0.306 J	0.354 U	0.354 U	0.354 U	1.216 U	0.120 J	0.252 U	0.138 U	0.124 U	3.541 U
RSD			23%	NA	NA	NA	NA	13%	NA	NA	NA	NA

TABLE I.15. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* Pesticides (µg/kg wet weight) Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
R-BF	1 Rep 1	6	0.473 J	0.466 U	0.466 U	0.466 U	1.601 U	0.265 J	0.838	0.182 U	0.163 U	4.665 U
R-BF	1 Rep 2	6	0.537 J	0.637 U	0.637 U	0.637 U	2.188 U	0.294 J	1.139	0.249 U	0.222 U	6.373 U
R-BF	1 Rep 3	6	0.396 J	0.431 U	0.431 U	0.431 U	1.481 U	0.184 J	0.714	0.169 U	0.151 U	4.314 U
RSD			15%	NA	NA	NA	NA	23%	24%	NA	NA	NA
COMP WR-1	1 Rep 1	7	0.808 J	0.804 U	0.804 U	0.804 U	2.761 U	0.804 U	0.573 U	0.314 U	0.281 U	8.042 U
COMP WR-1	1 Rep 2	7	0.571 J	0.537 U	0.537 U	0.537 U	1.843 U	0.537 U	0.383 U	0.210 U	0.187 U	5.369 U
COMP WR-1	1 Rep 3	7	0.603 J	0.603 U	0.603 U	0.603 U	2.071 U	0.603 U	0.430 U	0.236 U	0.211 U	6.034 U
RSD			19%	NA	NA	NA	NA	NA	NA	NA	NA	NA
COMP PS-4	3 Rep 1	8	1.719 U	0.472 U	0.472 U	0.472 U	1.621 U	0.472 U	0.337 U	0.185 U	0.165 U	4.722 U
COMP PS-4	3 Rep 2	8	1.836 U	0.504 U	0.504 U	0.504 U	1.731 U	0.504 U	0.360 U	0.197 U	0.176 U	5.044 U
COMP PS-4	3 Rep 3	8	1.875 U	0.515 U	0.515 U	0.515 U	1.768 U	0.515 U	0.367 U	0.201 U	0.180 U	5.149 U
RSD			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(a) U Analyte was not present above the level of associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) NA Not applicable.
(d) NS Not spiked.
(e) Value outside of quality control range 40%-120%.
(f) Value exceeds relative precision range ≤ 30%.

TABLE I.16. Polychlorinated Biphenyls (PCB), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate		Batch	*M. nasuta* PCBs (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
Target DL[a]				20	20	20	20
Achieved DL High				8.042	8.042	8.042	8.042
Achieved DL Low				2.133	2.133	2.133	2.133
COMP WR-1	1	Rep 1	7	8.042 U[b]	8.042 U	8.042 U	8.042 U
COMP WR-1	1	Rep 2	7	5.369 U	5.369 U	5.369 U	5.369 U
COMP WR-1	1	Rep 3	7	6.034 U	6.034 U	6.034 U	6.034 U
COMP WR-1	2		5	2.362 U	4.609	2.362 U	2.362 U
COMP WR-1	3		7	4.578 U	4.578 U	4.578 U	4.578 U
COMP WR-1	4		7	6.990 U	6.990 U	6.990 U	6.990 U
COMP WR-1	5		6	2.639 U	2.639 U	4.875	2.639 U
COMP WR-2	1		6	3.216 U	9.723	3.216 U	3.216 U
COMP WR-2	2		6	2.827 U	10.292	2.827 U	2.827 U
COMP WR-2	3		7	2.739 U	5.682	2.739 U	2.739 U
COMP WR-2	4		6	3.095 U	10.753	3.095 U	3.095 U
COMP WR-2	5		7	3.734 U	3.734 U	3.734 U	3.734 U
COMP PS-1	1		6	2.882 U	10.248	2.882 U	2.882 U
COMP PS-1	2		6	2.137 U	10.758	2.137 U	2.137 U
COMP PS-1	3		6	4.670 U	8.168	4.670 U	4.670 U
COMP PS-1	4		5	2.629 U	2.629 U	2.629 U	2.629 U
COMP PS-1	5		7	4.455 U	4.455 U	4.455 U	4.455 U
COMP PS-2	1		5	2.378 U	2.378 U	3.767	2.378 U
COMP PS-2	2		7	3.606 U	3.606 U	4.382	3.606 U
COMP PS-2	3		5	4.706 U	4.706 U	4.607 J[c]	4.706 U
COMP PS-2	4		8	4.091 U	5.681	4.091 U	4.091 U
COMP PS-2	5		8	2.337 U	10.724	2.337 U	2.337 U
COMP PS-3	1		5	2.333 U	2.333 U	4.472	2.333 U
COMP PS-3	2		7	4.647 U	8.680	4.647 U	4.647 U
COMP PS-3	3		6	2.278 U	2.278 U	5.200	2.278 U
COMP PS-3	4		6	2.425 U	2.425 U	4.769	2.425 U
COMP PS-3	5		6	2.133 U	12.500	2.133 U	2.133 U
COMP PS-4	1		5	2.361 U	2.361 U	4.330	2.361 U
COMP PS-4	2		5	3.580 U	3.580 U	4.643	3.580 U
COMP PS-4	3	Rep 1	8	4.722 U	4.722 U	4.722 U	4.722 U
COMP PS-4	3	Rep 2	8	5.044 U	5.044 U	5.044 U	5.044 U
COMP PS-4	3	Rep 3	8	5.149 U	5.149 U	5.149 U	5.149 U
COMP PS-4	4		8	3.600 U	17.940	3.600 U	3.600 U
COMP PS-4	5		6	3.461 U	3.461 U	5.546	3.461 U
COMP CS-1	1		7	5.106 U	8.793	5.106 U	5.106 U
COMP CS-1	2		5	2.465 U	2.465 U	2.465 U	2.465 U
COMP CS-1	3		8	2.920 U	2.920 U	2.920 U	2.920 U
COMP CS-1	4		8	3.108 U	5.293	3.108 U	3.108 U
COMP CS-1	5		6	4.477 U	4.477 U	4.477 U	4.477 U
R-BF	1	Rep 1	6	4.665 U	4.665 U	4.665 U	4.665 U
R-BF	1	Rep 2	6	6.373 U	6.373 U	6.373 U	6.373 U
R-BF	1	Rep 3	6	4.314 U	4.314 U	4.314 U	4.314 U
R-BF	2		6	4.702 U	4.702 U	4.702 U	4.702 U
R-BF	3		8	2.355 U	2.355 U	8.307	2.355 U
R-BF	4		5	2.370 U	2.370 U	18.216	2.370 U
R-BF	5		8	3.467 U	3.467 U	15.947	3.467 U

TABLE I.16. (contd)

Sediment Treatment	Replicate		Batch	*M. nasuta* PCBs (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
R-OS	1		8	3.422 U	3.422 U	3.422 U	3.422 U
R-OS	2		5	2.537 U	5.183	2.537 U	2.537 U
R-OS	3		5	2.612 U	2.612 U	2.612 U	2.612 U
R-OS	4		7	2.808 U	2.808 U	2.808 U	2.808 U
R-OS	5		5	3.288 U	3.288 U	3.288 U	3.288 U
C-SB	1		8	2.361 U	2.361 U	2.361 U	2.361 U
C-SB	2		7	2.361 U	2.361 U	2.361 U	2.36. U
C-SB	3		6	2.682 U	2.682 U	2.682 U	2.682 U
C-SB	4		5	2.365 U	2.365 U	2.365 U	2.365 U
C-SB	5		5	2.351 U	2.351 U	2.351 U	2.351 U
C-NE	1		7	2.173 U	2.173 U	2.173 U	2.173 U
C-NE	2	Rep 1	5	3.122 U	3.122 U	3.122 U	3.122 U
C-NE	2	Rep 2	5	4.577 U	4.577 U	4.577 U	4.577 U
C-NE	2	Rep 3	5	3.541 U	3.541 U	3.541 U	3.541 U
C-NE	3		6	2.763 U	2.763 U	2.763 U	2.763 U
C-NE	4		7	3.432 U	6.705	3.432 U	3.432 U
C-NE	5		7	2.552 U	2.552 U	2.552 U	2.552 U
Background	1		8	2.488 U	2.488 U	2.488 U	2.488 U
Background	2		8	2.860 U	10.363	2.860 U	2.860 U
Background	3		8	2.350 U	2.350 U	2.350 U	2.350 U
Background	4		8	2.657 U	2.657 U	2.657 U	2.657 U
Background	5		8	5.048 U	5.048 U	5.048 U	5.048 U

(a) DL Detection Limit.
(b) U Analyte was not present above associated value.
(c) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE I.17. Polychlorinated Biphenyls (PCB), Dry Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate		Batch	Percent Dry Weight	*M. nasuta* PCBs (µg/kg dry weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
COMP WR-1	1	Rep 1	7	9.089	88.481 U[a]	88.481 U	88.481 U	88.481 U
COMP WR-1	1	Rep 2	7	9.089	59.071 U	59.071 U	59.071 U	59.071 U
COMP WR-1	1	Rep 3	7	9.089	66.388 U	66.388 U	66.388 U	66.388 U
COMP WR-1	2		5	11.334	20.840 U	40.665	20.840 U	20.840 U
COMP WR-1	3		7	15.781	29.010 U	29.010 U	29.010 U	29.010 U
COMP WR-1	4		7	10.111	69.133 U	69.133 U	69.133 U	69.133 U
COMP WR-1	5		6	11.586	22.777 U	22.777 U	42.077	22.777 U
COMP WR-2	1		6	11.448	28.092 U	84.932	28.092 U	28.092 U
COMP WR-2	2		6	12.118	23.329 U	84.932	23.329 U	23.329 U
COMP WR-2	3		7	9.092	30.125 U	62.495	30.125 U	30.125 U
COMP WR-2	4		6	12.570	24.622 U	85.545	24.622 U	24.622 U
COMP WR-2	5		7	10.057	37.128 U	37.128 U	37.128 U	37.128 U
COMP PS-1	1		6	10.654	27.051 U	96.189	27.051 U	27.051 U
COMP PS-1	2		6	11.105	19.244 U	96.875	19.244 U	19.244 U
COMP PS-1	3		6	10.980	42.532 U	74.390	42.532 U	42.532 U
COMP PS-1	4		5	10.303	25.517 U	25.517 U	25.517 U	25.517 U
COMP PS-1	5		7	10.032	44.408 U	44.408 U	44.408 U	44.408 U
COMP PS-2	1		5	11.733	20.268 U	20.268 U	32.106	20.268 U
COMP PS-2	2		7	9.740	37.023 U	37.023 U	44.990	37.023 U
COMP PS-2	3		5	10.173	46.260 U	46.260 U	45.287 J[b]	46.260 U
COMP PS-2	4		8	11.797	34.678 U	48.156	34.678 U	34.678 U
COMP PS-2	5		8	11.870	19.688 U	90.345	19.688 U	19.688 U
COMP PS-3	1		5	10.037	23.244 U	23.244 U	44.555	23.244 U
COMP PS-3	2		7	9.838	47.235 U	88.229	47.235 U	47.235 U
COMP PS-3	3		6	10.872	20.953 U	20.953 U	47.829	20.953 U
COMP PS-3	4		6	10.236	23.691 U	23.691 U	46.590	23.691 U
COMP PS-3	5		6	9.905	21.535 U	126.199	21.535 U	21.535 U
COMP PS-4	1		5	11.159	21.158 U	21.158 U	38.803	21.158 U
COMP PS-4	2		5	11.243	31.842 U	31.842 U	41.297	31.842 U
COMP PS-4	3	Rep 1	8	10.791	43.759 U	43.759 U	43.759 U	43.759 U
COMP PS-4	3	Rep 2	8	10.791	46.743 U	46.743 U	46.743 U	46.743 U
COMP PS-4	3	Rep 3	8	10.791	47.716 U	47.716 U	47.716 U	47.716 U
COMP PS-4	4		8	10.499	34.289 U	170.873	34.289 U	34.289 U
COMP PS-4	5		6	12.152	28.481 U	28.481 U	45.639	28.481 U
COMP CS-1	1		7	9.780	52.209 U	89.908	52.209 U	52.209 U
COMP CS-1	2		5	11.400	21.623 U	21.623 U	21.623 U	21.623 U
COMP CS-1	3		8	10.452	27.937 U	27.937 U	27.937 U	27.937 U
COMP CS-1	4		8	11.689	26.589 U	45.282	26.589 U	26.589 U
COMP CS-1	5		6	11.460	39.066 U	39.066 U	39.066 U	39.066 U
R-BF	1	Rep 1	6	9.180	50.817 U	50.817 U	50.817 U	50.817 U
R-BF	1	Rep 2	6	9.180	69.425 U	69.425 U	69.425 U	69.425 U
R-BF	1	Rep 3	6	9.180	46.993 U	46.993 U	46.993 U	46.993 U
R-BF	2		6	9.469	49.657 U	49.657 U	49.657 U	49.657 U
R-BF	3		8	9.606	24.516 U	24.516 U	86.477	24.516 U
R-BF	4		5	11.881	19.948 U	19.948 U	153.320	19.948 U
R-BF	5		8	9.158	37.858 U	37.858 U	174.132	37.858 U

TABLE I.17. (contd)

Sediment Treatment	Replicate		Batch	Percent Dry Weight	*M. nasuta* PCBs (µg/kg dry weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
R-OS	1		8	11.691	29.270 U	29.270 U	29.270 U	29.270 U
R-OS	2		5	11.067	22.924 U	46.833	22.924 U	22.924 U
R-OS	3		5	11.042	23.655 U	23.655 U	23.655 U	23.655 U
R-OS	4		7	9.642	29.123 U	29.123 U	29.123 U	29.123 U
R-OS	5		5	11.549	28.470 U	28.470 U	28.470 U	28.470 U
C-SB	1		8	10.811	21.839 U	21.839 U	21.839 U	21.839 U
C-SB	2		7	10.029	23.542 U	23.542 U	23.542 U	23.542 U
C-SB	3		6	12.032	22.291 U	22.291 U	22.291 U	22.291 U
C-SB	4		5	10.540	22.438 U	22.438 U	22.438 U	22.438 U
C-SB	5		5	10.695	21.982 U	21.982 U	21.982 U	21.982 U
C-NE	1		7	9.545	22.766 U	22.766 U	22.766 U	22.766 U
C-NE	2	Rep 1	5	9.744	32.040 U	32.040 U	32.040 U	32.040 U
C-NE	2	Rep 2	5	9.744	46.972 U	46.972 U	46.972 U	46.972 U
C-NE	2	Rep 3	5	9.744	36.340 U	36.340 U	36.340 U	36.340 U
C-NE	3		6	11.007	25.102 U	25.102 U	25.102 U	25.102 U
C-NE	4		7	10.845	31.646 U	61.826	31.646 U	31.646 U
C-NE	5		7	10.906	23.400 U	23.400 U	23.400 U	23.400 U
Background	1		8	11.599	21.450 U	21.450 U	21.450 U	21.450 U
Background	2		8	12.370	23.120 U	83.775	23.120 U	23.120 U
Background	3		8	11.946	19.672 U	19.672 U	19.672 U	19.672 U
Background	4		8	11.489	23.126 U	23.126 U	23.126 U	23.126 U
Background	5		8	11.454	44.072 U	44.072 U	44.072 U	44.072 U

(a) U Analyte was not present above associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE I.18. Quality Control Summary for Polychlorinated Biphenyls (PCBs), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* PCBs (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
Method Blank						
Blank 1		1	2.766 U[a]	2.766 U	2.766 U	2.766 U
Blank 2		2	3.055 U	3.055 U	3.055 U	3.055 U
Blank 3		3	3.760 U	3.760 U	3.760 U	3.760 U
Blank 4		4	3.149 U	3.149 U	3.149 U	3.149 U
Matrix Spike						
COMP PS-2	3	5	4.706 U	4.706 U	4.607 J[b]	4.706 U
COMP PS-2 MS	3		NA[c]	NA	233.495	NA
Concentration Recovered			NA	NA	228.888	NA
Amount Spiked			NS[d]	NS	166.885	NS
Percent Recovery			NA	NA	137%[e]	NA
COMP PS-2	3	5	4.706 U	4.706 U	4.607 J	4.706 U
COMP PS-2 MSD	3		NA	NA	234.352	NA
Concentration Recovered			NA	NA	229.745	NA
Amount Spiked			NS	NS	173.751	NS
Percent Recovery			NA	NA	132%[e]	NA
RPD			NA	NA	4%	NA
I-STAT			NA	NA	0.02	NA
R-BF	2	6	4.702 U	4.702 U	4.702 U	4.702 U
R-BF MS	2		NA	NA	236.949	NA
Concentration Recovered			NA	NA	236.949	NA
Amount Spiked			NS	NS	198.254	NS
Percent Recovery			NA	NA	120%	NA
R-BF	2	6	4.702 U	4.702 U	4.702 U	4.702 U
R-BF MSD	2		NA	NA	153.053	NA
Concentration Recovered			NA	NA	153.053	NA
Amount Spiked			NS	NS	151.733	NS
Percent Recovery			NA	NA	101%	NA
RPD			NA	NA	17%	NA
I-STAT			NA	NA	0.08	NA

TABLE I.18. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* PCBs (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
COMP WR-1	4	7	6.990 U	6.990 U	6.990 U	6.990 U
COMP WR-1 MS	4		NA	NA	232.175	NA
Concentration Recovered			NA	NA	232.175	NA
Amount Spiked			NS	NS	213.563	NS
Percent Recovery			NA	NA	109%	NA
COMP WR-1	4	7	6.990 U	6.990 U	6.990 U	6.990 U
COMP WR-1 MSD	4		NA	NA	207.695	NA
Concentration Recovered			NA	NA	207.695	NA
Amount Spiked			NS	NS	203.189	NS
Percent Recovery			NA	NA	102%	NA
RPD			NA	NA	6%	NA
I-STAT			NA	NA	0.03	NA
Background	5	8	5.048 U	5.048 U	5.048 U	5.048 U
Background MS	5		NA	NA	191.078	NA
Concentration Recovered			NA	NA	191.078	NA
Amount Spiked			NS	NS	155.078	NS
Percent Recovery			NA	NA	123%(e)	NA
Background	5	8	5.048 U	5.048 U	5.048 U	5.048 U
Background MSD	5		NA	NA	169.647	NA
Concentration Recovered			NA	NA	169.647	NA
Amount Spiked			NS	NS	141.882	NS
Percent Recovery			NA	NA	120%	NA
RPD			NA	NA	3%	NA
I-STAT			NA	NA	0.02	NA
Analytical Triplicates						
C-NE	2 Rep 1	5	3.122 U	3.122 U	3.122 U	3.122 U
C-NE	2 Rep 2	5	4.577 U	4.577 U	4.577 U	4.577 U
C-NE	2 Rep 3	5	3.541 U	3.541 U	3.541 U	3.541 U
RSD			NA	NA	NA	NA
R-BF	1 Rep 1	6	4.665 U	4.665 U	4.665 U	4.665 U
R-BF	1 Rep 2	6	6.373 U	6.373 U	6.373 U	6.373 U
R-BF	1 Rep 3	6	4.314 U	4.314 U	4.314 U	4.314 U
RSD			NA	NA	NA	NA

TABLE I.18. (contd)

Sediment Treatment	Replicate	Batch	*M. nasuta* PCBs (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
COMP WR-1	1 Rep 1	7	8.042 U	8.042 U	8.042 U	8.042 U
COMP WR-1	1 Rep 2	7	5.369 U	5.369 U	5.369 U	5.369 U
COMP WR-1	1 Rep 3	7	6.034 U	6.034 U	6.034 U	6.034 U
RSD			NA	NA	NA	NA
COMP PS-4	3 Rep 1	8	4.722 U	4.722 U	4.722 U	4.722 U
COMP PS-4	3 Rep 2	8	5.044 U	5.044 U	5.044 U	5.044 U
COMP PS-4	3 Rep 3	8	5.149 U	5.149 U	5.149 U	5.149 U
RSD			NA	NA	NA	NA

(a) U Analyte was not present above the level of the associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) NA Not applicable.
(d) NS Not spiked.
(e) Value outside of quality control range 40% - 120%.

TABLE I.19. Surrogate Percent Recoveries for Chlorinated Pesticides and Polychlorinated Biphenyls (PCBs), Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries DBOFB	CL5(112)
COMP WR-1	1 Rep 1	7	71	77
COMP WR-1	1 Rep 2	7	78	81
COMP WR-1	1 Rep 3	7	59	76
COMP WR-1	2	5	82	88
COMP WR-1	3	7	84	81
COMP WR-1	4	7	72	85
COMP WR-1	5	6	99	95
COMP WR-2	1	6	92	83
COMP WR-2	2	6	95	83
COMP WR-2	3	7	85	78
COMP WR-2	4	6	74	116
COMP WR-2	5	7	72	61
COMP PS-1	1	6	106	89
COMP PS-1	2	6	96	83
COMP PS-1	3	6	94	86
COMP PS-1	4	5	82	88
COMP PS-1	5	7	76	84
COMP PS-2	1	5	81	88
COMP PS-2	2	7	77	84
COMP PS-2	3	5	84	105
COMP PS-2	4	8	85	96
COMP PS-2	5	8	69	103
COMP PS-3	1	5	77	88
COMP PS-3	2	7	89	84
COMP PS-3	3	6	96	77
COMP PS-3	4	6	94	85
COMP PS-3	5	6	91	83
COMP PS-4	1	5	85	89
COMP PS-4	2	5	103	101
COMP PS-4	3 Rep 1	8	79	102
COMP PS-4	3 Rep 2	8	66	85
COMP PS-4	3 Rep 3	8	61	85
COMP PS-4	4	8	69	102
COMP PS-4	5	6	94	86

TABLE I.19. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries DBOFB	CL5(112)
COMP CS-1	1	7	83	85
COMP CS-1	2	5	74	81
COMP CS-1	3	8	69	89
COMP CS-1	4	8	89	84
COMP CS-1	5	6	83	88
R-BF	1 Rep 1	6	82	84
R-BF	1 Rep 2	6	120	144[a]
R-BF	1 Rep 3	6	86	78
R-BF	2	6	84	94
R-BF	3	8	73	88
R-BF	4	5	75	79
R-BF	5	8	68	87
R-OS	1	8	73	89
R-OS	2	5	78	95
R-OS	3	5	81	85
R-OS	4	7	86	76
R-OS	5	5	101	101
C-SB	1	8	76	79
C-SB	2	7	79	75
C-SB	3	6	93	85
C-SB	4	5	83	97
C-SB	5	5	81	89
C-NE	1	7	69	72
C-NE	2 Rep 1	5	75	98
C-NE	2 Rep 2	5	73	95
C-NE	2 Rep 3	5	75	93
C-NE	3	6	106	105
C-NE	4	7	77	71
C-NE	5	7	92	82
Background	1	8	74	86
Background	2	8	96	98
Background	3	8	80	97
Background	4	8	86	88
Background	5	8	76	89

TABLE I.19. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries DBOFB	CL5(112)
Quality Control Data				
Method Blank				
Blank 1		1	65	68
Blank 2		2	78	73
Blank 3		3	68	66
Blank 4		4	62	81
Matrix Spike				
COMP PS-2	3	5	84	105
COMP PS-2 MS	3		77	107
COMP PS-2	3	5	84	105
COMP PS-2 MSD	3		75	106
R-BF	2	6	84	94
R-BF MS	2		91	115
R-BF	2	6	84	94
R-BF MSD	2		93	106
COMP WR-1	4	7	72	85
COMP WR-1 MS	4		80	117
COMP WR-1	4	7	72	85
COMP WR-1 MSD	4		86	129[a]
Background	5	8	76	89
Background MS	5		66	88
Background	5	8	76	89
Background MSD	5		73	92
Analytical Triplicates				
C-NE	2 Rep 1	5	75	98
C-NE	2 Rep 2	5	73	95
C-NE	2 Rep 3	5	75	93
R-BF	1 Rep 1	6	82	84
R-BF	1 Rep 2	6	120	144[a]
R-BF	1 Rep 3	6	86	78

TABLE I.19. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries DBOFB	CL5(112)
COMP WR-1	1 Rep 1	7	71	77
COMP WR-1	1 Rep 2	7	78	81
COMP WR-1	1 Rep 3	7	59	76
COMP PS-4	3 Rep 1	8	79	102
COMP PS-4	3 Rep 2	8	66	85
COMP PS-4	3 Rep 3	8	61	85

(a) Value outside of quality control range 40%-120%.

TABLE I.20. Metals, Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate		Batch	Percent Dry Weight	*M. nasuta* Metals (mg/kg wet weight)									
					Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP WR-1	1		4	11.53	0.014	3.14	0.012	0.31	1.10	0.007	0.51	0.097	0.18	13
COMP WR-1	2		1	12.09	0.042	2.33	0.015	0.28	1.75	0.012	0.51	0.150	0.18	11
COMP WR-1	3		3	12.60	0.028	3.00	0.018	0.39	1.35	0.012	0.62	0.071	0.14	11
COMP WR-1	4	Rep 1	4	11.26	0.035	2.94	0.016	0.23	1.82	0.007	0.46	0.157	0.14	12
COMP WR-1	4	Rep 2	4	11.26	0.032	2.87	0.019	0.41	1.55	0.007	0.54	0.148	0.20	12
COMP WR-1	4	Rep 3	4	11.26	0.054	2.69	0.018	0.27	1.63	0.007	0.47	0.150	0.18	12
COMP WR-1	5		1	12.73	0.020	2.89	0.028	0.32	1.50	0.011	0.56	0.118	0.21	13
COMP WR-2	1		2	12.40	0.038	3.62	0.026	0.21	1.76	0.008	0.42	0.166	0.12	15
COMP WR-2	2		2	12.92	0.035	3.32	0.022	0.30	1.83	0.010	0.55	0.185	0.14	15
COMP WR-2	3		3	11.24	0.027	3.03	0.021	0.42	1.81	0.008	0.62	0.117	0.17	11
COMP WR-2	4		1	13.17	0.041	2.77	0.014	0.29	2.13	0.012	0.62	0.146	0.17	18
COMP WR-2	5		3	12.15	0.032	4.20	0.018	0.28	1.45	0.007	0.54	0.174	0.15	11
COMP PS-1	1		2	12.17	0.033	3.19	0.026	0.35	1.59	0.007	0.57	0.159	0.13	12
COMP PS-1	2		2	11.85	0.028	2.22	0.022	0.29	1.86	0.007	0.62	0.128	0.16	10
COMP PS-1	3		3	11.85	0.024	3.05	0.027	0.32	1.78	0.008	0.60	0.140	0.18	14
COMP PS-1	4		1	12.54	0.025	2.28	0.024	0.34	1.65	0.011	0.62	0.116	0.12	16
COMP PS-1	5		4	12.57	0.053	3.66	0.023	0.34	2.10	0.014	0.62	0.125	0.17	16
COMP PS-2	1		1	14.45	0.048	3.18	0.026	0.49	3.18	0.018	1.07	0.243	0.25	14
COMP PS-2	2		4	12.58	0.039	3.31	0.024	0.36	1.70	0.019	0.75	0.114	0.22	15
COMP PS-2	3		1	11.58	0.030	2.47	0.027	0.36	1.78	0.012	0.72	0.120	0.19	15
COMP PS-2	4		4	10.90	0.052	3.34	0.031	0.23	1.64	0.016	0.54	0.133	0.14	12
COMP PS-2	5		4	11.98	0.033	3.02	0.024	0.23	1.74	0.018	0.55	0.127	0.16	13
COMP PS-3	1		1	11.22	0.029	2.46	0.014	0.29	1.66	0.012	0.68	0.155	0.15	10
COMP PS-3	2		3	12.23	0.023	3.64	0.018	0.37	1.49	0.008	0.71	0.169	0.18	13
COMP PS-3	3		1	11.34	0.032	2.09	0.019	0.27	2.36	0.013	0.65	0.120	0.18	11
COMP PS-3	4		1	12.38	0.034	3.00	0.023	0.38	2.06	0.009	0.65	0.187	0.21	12
COMP PS-3	5		2	12.46	0.036	2.03	0.022	0.28	2.58	0.013	0.66	0.147	0.20	12
COMP PS-4	1		1	12.96	0.040	2.81	0.029	0.44	3.29	0.017	0.80	0.341	0.22	12
COMP PS-4	2		1	13.62	0.039	3.04	0.017	0.39	2.27	0.014	0.66	0.153	0.22	17
COMP PS-4	3		4	12.59	0.015	2.62	0.019	0.42	1.91	0.009	0.60	1.272	0.19	10
COMP PS-4	4		4	11.95	0.033	3.11	0.024	0.63	1.94	0.014	0.83	0.220	0.17	13
COMP PS-4	5		2	12.37	0.022	3.82	0.021	0.36	1.64	0.009	0.47	0.156	0.21	15
COMP CS-1	1		3	13.25	0.021	2.99	0.016	0.25	2.12	0.012	0.42	0.155	0.24	14
COMP CS-1	2		1	11.18	0.019	2.74	0.022	0.29	1.74	0.012	0.61	0.172	0.13	15
COMP CS-1	3		4	12.13	0.023	3.51	0.022	0.28	1.97	0.009	0.53	0.189	0.22	12
COMP CS-1	4		4	12.19	0.032	3.69	0.016	0.31	1.85	0.009	0.54	0.171	0.18	11

TABLE I.20. (contd)

Sediment Treatment	Replicate		Batch	Percent Dry Weight	*M. nasuta* Metals (mg/kg wet weight)									
					Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP CS-1	5		2	11.53	0.025	3.37	0.020	0.33	1.36	0.008	0.52	0.165	0.15	10
R-BF	1		1	10.92	0.038	2.11	0.023	0.23	1.63	0.014	0.46	0.177	0.10	13
R-BF	2	Rep 1	2	12.06	0.022	2.95	0.022	0.21	1.63	0.011	0.49	0.713	0.19	11
R-BF	2	Rep 2	2	12.06	0.029	3.08	0.016	0.22	1.69	0.011	0.52	0.433	0.21	11
R-BF	2	Rep 3	2	12.06	0.027	3.05	0.025	0.20	1.88	0.010	0.48	0.593	0.20	12
R-BF	3		4	11.74	0.022	3.02	0.034	0.39	1.40	0.015	0.57	0.235	0.13	17
R-BF	4		1	14.02	0.048	3.14	0.023	0.37	2.43	0.021	0.81	0.398	0.19	15
R-BF	5		4	12.04	0.040	3.06	0.019	0.35	2.25	0.012	0.56	0.218	0.19	13
R-OS	1		4	12.44	0.038	2.69	0.018	0.43	1.50	0.010	0.70	0.116	0.17	13
R-OS	2		1	12.29	0.041	2.68	0.024	0.39	2.24	0.017	0.89	0.141	0.21	10
R-OS	3	Rep 1	1	12.15	0.045	2.55	0.033	0.30	2.42	0.018	0.69	0.156	0.23	16
R-OS	3	Rep 2	1	12.15	0.051	2.44	0.026	0.31	2.28	0.018	0.71	0.151	0.24	16
R-OS	3	Rep 3	1	12.15	0.049	2.50	0.028	0.36	2.60	0.018	0.74	0.173	0.23	16
R-OS	4		3	12.25	0.044	3.64	0.026	0.38	1.68	0.008	0.62	0.147	0.12	11
R-OS	5		1	13.38	0.048	2.85	0.025	0.31	2.41	0.018	0.78	0.173	0.25	13
C-SB	1		4	11.48	0.038	3.74	0.038	0.25	1.65	0.015	0.59	0.155	0.22	17
C-SB	2		3	11.73	0.036	3.18	0.023	0.19	1.56	0.007	0.33	0.198	0.17	13
C-SB	3		2	12.08	0.039	3.81	0.019	0.21	1.74	0.007	0.38	0.202	0.25	10
C-SB	4		1	11.34	0.033	2.85	0.028	0.22	2.28	0.013	0.61	0.159	0.21	13
C-SB	5		1	10.60	0.040	2.36	0.024	0.19	2.47	0.013	0.48	0.194	0.12	11
C-NE	1		4	12.89	0.049	3.39	0.025	0.21	1.52	0.014	0.32	0.071	0.18	15
C-NE	2		1	11.15	0.039	2.12	0.021	0.24	1.97	0.015	0.50	0.097	0.13	10
C-NE	3		2	11.51	0.047	2.77	0.017	0.16	1.82	0.013	0.34	0.122	0.15	10
C-NE	4		3	11.84	0.036	2.88	0.022	0.29	1.75	0.011	0.43	0.116	0.17	13
C-NE	5		3	11.80	0.031	3.07	0.023	0.14	1.90	0.012	0.30	0.140	0.15	14
Background	1		3	13.94	0.052	3.86	0.042	0.31	1.64	0.016	0.51	0.124	0.24	16
Background	2		3	13.43	0.037	2.75	0.027	0.26	1.87	0.012	0.58	0.157	0.19	16
Background	3		3	12.81	0.042	4.15	0.029	0.30	1.93	0.014	0.49	0.149	0.18	13
Background	4		3	14.03	0.035	3.83	0.032	0.30	1.78	0.013	0.53	0.115	0.23	21

TABLE I.20. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* Metals (mg/kg wet weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Background	5	3	13.34	0.033	3.62	0.028	0.36	1.87	0.013	0.48	0.351	0.18	16
Background	5 Rep 1	4	13.34	0.033	ND(a)	0.032	0.22	ND	ND	0.41	0.165	ND	ND
Background	5 Rep 2	4	13.34	0.032	ND	0.028	0.29	ND	ND	0.43	0.358	ND	ND
Background	5 Rep 3	4	13.34	0.030	ND	0.029	0.40	ND	ND	0.43	0.217	ND	ND

(a) ND No data.

TABLE I.21. Metals, Dry Weight, in the Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate		Batch	Percent Dry Weight	*M. nasuta* Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Target DL[a]					0.1	2.0	0.1	1.0	4.3	0.01	1.0	1.0	1.0	35
Achieved DL					0.009	1.2	0.004	0.28	2.4	0.005	0.07	0.005	0.5	25
COMP WR-1	1		4	11.53	0.120	27.2	0.100	2.73	9.6	0.061	4.44	0.839	1.59	114
COMP WR-1	2		1	12.09	0.347	19.3	0.128	2.31	14.5	0.102	4.22	1.240	1.45	95
COMP WR-1	3		3	12.60	0.224	23.8	0.146	3.11	10.8	0.096	4.89	0.560	1.14	86
COMP WR-1	4	Rep 1	4	11.26	0.308	26.1	0.138	2.04	16.2	0.065	4.11	1.390	1.22	103
COMP WR-1	4	Rep 2	4	11.26	0.281	25.5	0.166	3.61	13.8	0.065	4.81	1.310	1.82	104
COMP WR-1	4	Rep 3	4	11.26	0.478	23.9	0.161	2.43	14.5	0.063	4.16	1.330	1.56	103
COMP WR-1	5		1	12.73	0.155	22.7	0.217	2.48	11.8	0.085	4.43	0.926	1.68	102
COMP WR-2	1		2	12.40	0.307	29.2	0.206	1.68	14.2	0.068	3.35	1.340	0.99	124
COMP WR-2	2		2	12.92	0.270	25.7	0.169	2.35	14.2	0.077	4.27	1.430	1.05	113
COMP WR-2	3		3	11.24	0.240	27.0	0.189	3.72	16.1	0.074	5.50	1.040	1.49	99
COMP WR-2	4		1	13.17	0.315	21.0	0.109	2.23	16.2	0.094	4.67	1.110	1.32	139
COMP WR-2	5		3	12.15	0.262	34.6	0.151	2.29	12.0	0.058	4.47	1.430	1.20	87
COMP PS-1	1		2	12.17	0.268	26.2	0.213	2.85	13.1	0.055	4.71	1.310	1.04	99
COMP PS-1	2		2	11.85	0.235	18.7	0.188	2.41	15.7	0.062	5.25	1.080	1.36	87
COMP PS-1	3		3	11.85	0.201	25.7	0.227	2.73	15.0	0.067	5.10	1.180	1.55	122
COMP PS-1	4		1	12.54	0.197	18.2	0.191	2.73	13.2	0.088	4.91	0.929	0.98	125
COMP PS-1	5		4	12.57	0.419	29.1	0.180	2.67	16.7	0.115	4.96	0.993	1.38	124
COMP PS-2	1		1	14.45	0.329	22.0	0.182	3.42	22.0	0.128	7.39	1.680	1.76	99
COMP PS-2	2		4	12.58	0.307	26.3	0.192	2.86	13.5	0.150	5.98	0.909	1.71	120
COMP PS-2	3		1	11.58	0.257	21.3	0.237	3.12	15.4	0.101	6.23	1.040	1.61	132
COMP PS-2	4		4	10.90	0.478	30.6	0.282	2.13	15.0	0.151	4.98	1.220	1.25	114
COMP PS-2	5		4	11.98	0.273	25.2	0.200	1.94	14.5	0.148	4.59	1.060	1.34	112
COMP PS-3	1		1	11.22	0.258	21.9	0.129	2.58	14.8	0.104	6.09	1.380	1.34	90
COMP PS-3	2		3	12.23	0.184	29.8	0.151	3.01	12.2	0.063	5.77	1.380	1.48	106
COMP PS-3	3		1	11.34	0.281	18.4	0.165	2.39	20.8	0.118	5.70	1.060	1.57	101
COMP PS-3	4		1	12.38	0.274	24.2	0.187	3.10	16.6	0.072	5.24	1.510	1.70	101
COMP PS-3	5		2	12.46	0.289	16.3	0.179	2.22	20.7	0.105	5.32	1.180	1.58	96

TABLE I.21. (contd)

Sediment Treatment	Replicate		Batch	Percent Dry Weight	*M. nasuta* Metals (mg/kg dry weight)									
					Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP PS-4	1		1	12.96	0.307	21.7	0.224	3.39	25.4	0.133	6.16	2.630	1.73	90
COMP PS-4	2		1	13.62	0.283	22.3	0.127	2.83	16.7	0.103	4.84	1.120	1.58	123
COMP PS-4	3		4	12.59	0.120	20.8	0.151	3.37	15.2	0.072	4.75	10.100	1.51	81
COMP PS-4	4		4	11.95	0.274	26.0	0.205	5.25	16.2	0.117	6.94	1.840	1.39	110
COMP PS-4	5		2	12.37	0.176	30.9	0.170	2.90	13.2	0.069	3.82	1.260	1.68	119
COMP CS-1	1		3	13.25	0.156	22.6	0.119	1.86	16.0	0.087	3.15	1.170	1.80	103
COMP CS-1	2		1	11.18	0.167	24.5	0.197	2.62	15.6	0.108	5.47	1.540	1.19	130
COMP CS-1	3		4	12.13	0.191	28.9	0.181	2.34	16.2	0.078	4.39	1.560	1.85	99
COMP CS-1	4		4	12.19	0.261	30.3	0.128	2.51	15.2	0.076	4.39	1.400	1.49	92
COMP CS-1	5		2	11.53	0.215	29.2	0.177	2.84	11.8	0.067	4.55	1.430	1.33	84
R-BF	1		1	10.92	0.345	19.3	0.207	2.12	14.9	0.130	4.21	1.620	0.91	121
R-BF	2	Rep 1	2	12.06	0.184	24.5	0.183	1.76	13.5	0.093	4.10	5.910	1.59	92
R-BF	2	Rep 2	2	12.06	0.238	25.5	0.132	1.83	14.0	0.095	4.34	3.590	1.78	94
R-BF	2	Rep 3	2	12.06	0.226	25.3	0.211	1.66	15.6	0.087	4.00	4.920	1.63	96
R-BF	3		4	11.74	0.188	25.7	0.287	3.31	11.9	0.132	4.82	2.000	1.13	144
R-BF	4		1	14.02	0.344	22.4	0.165	2.66	17.3	0.152	5.76	2.840	1.32	106
R-BF	5		4	12.04	0.333	25.4	0.159	2.94	18.7	0.098	4.65	1.810	1.55	109
R-OS	1		4	12.44	0.302	21.6	0.146	3.42	12.1	0.080	5.63	0.933	1.35	101
R-OS	2		1	12.29	0.337	21.8	0.198	3.17	18.2	0.142	7.25	1.150	1.67	81
R-OS	3	Rep 1	1	12.15	0.370	21.0	0.269	2.47	19.9	0.149	5.71	1.280	1.89	131
R-OS	3	Rep 2	1	12.15	0.423	20.1	0.218	2.52	18.8	0.149	5.85	1.240	1.97	131
R-OS	3	Rep 3	1	12.15	0.401	20.6	0.229	2.98	21.4	0.149	6.09	1.420	1.93	133
R-OS	4		3	12.25	0.358	29.7	0.215	3.08	13.7	0.068	5.04	1.200	1.01	88
R-OS	5		1	13.38	0.360	21.3	0.186	2.31	18.0	0.132	5.83	1.290	1.86	98
C-SB	1		4	11.48	0.329	32.6	0.328	2.20	14.4	0.129	5.14	1.350	1.90	145
C-SB	2		3	11.73	0.327	27.1	0.193	1.63	13.3	0.061	2.81	1.690	1.45	112
C-SB	3		2	12.08	0.320	31.5	0.160	1.72	14.4	0.060	3.13	1.670	2.11	80
C-SB	4		1	11.34	0.290	25.1	0.248	1.91	20.1	0.118	5.42	1.400	1.85	112
C-SB	5		1	10.60	0.376	22.3	0.224	1.80	23.3	0.121	4.51	1.830	1.12	102
C-NE	1		4	12.89	0.384	26.3	0.192	1.66	11.8	0.111	2.49	0.547	1.36	118
C-NE	2		1	11.15	0.351	19.0	0.189	2.15	17.7	0.136	4.47	0.869	1.19	94
C-NE	3		2	11.51	0.411	24.1	0.146	1.40	15.8	0.112	2.98	1.060	1.30	84
C-NE	4		3	11.84	0.302	24.3	0.187	2.46	14.8	0.097	3.27	0.980	1.42	107
C-NE	5		3	11.80	0.262	26.0	0.192	1.15	16.1	0.105	2.54	1.190	1.31	117



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TABLE I.21. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*M. nasuta* Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Background	1	3	13.94	0.374	27.7	0.300	2.24	11.8	0.113	3.67	0.892	1.70	112
Background	2	3	13.43	0.278	20.5	0.200	1.90	13.9	0.092	4.32	1.170	1.42	122
Background	3	3	12.81	0.324	32.4	0.223	2.34	15.1	0.111	3.80	1.160	1.39	104
Background	4	3	14.03	0.250	27.3	0.226	2.12	12.7	0.091	3.79	0.819	1.67	146
Background	5	3	13.34	0.251	27.1	0.209	2.67	14.0	0.098	3.57	2.630	1.35	124
Background	5 Rep 1	4	13.34	0.250	ND(b)	0.240	1.67	ND	ND	3.10	1.240	ND	ND
Background	5 Rep 2	4	13.34	0.240	ND	0.211	2.18	ND	ND	3.21	2.680	ND	ND
Background	5 Rep 3	4	13.34	0.224	ND	0.214	2.98	ND	ND	3.22	1.630	ND	ND

(a) DL Detection limit.
(b) ND No data.

TABLE I.22. Quality Control Data for Metals, Dry Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*M. nasuta* Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Method Blank												
Blank 1			0.001 U[a]	0.45 U	0.004	1.20	0.75	0.006 U	0.09	0.002	0.37 U	1.27
Blank 2			0.001	0.43 U	0.005	1.19	0.65	0.006 U	0.05	0.002	0.34 U	0.62
Blank 3			0.008	ND[b]	0.005	1.32	ND	0.002	0.04	0.001	ND	ND
Blank 4			0.001	ND	0.002	1.09	ND	0.002	0.06	0.005	ND	ND
Matrix Spike												
COMP PS-3	1	1	0.258	21.9[c]	0.129	2.58	14.8	0.104	6.09	1.380	1.34	90
COMP PS-3 MS	1	1	1.210	NA	2.840	7.82	NA	0.580	10.80	6.840	NA	NA
Concentration Recovered			0.952	NA	2.711	5.24	NA	0.476	4.710	5.460	NA	NA
Amount Spiked			1.0	NS[d]	2.5	5.0	NS	0.5	5.0	5.0	NS	NS
Percent Recovery			95%	NA	108%	105%	NA	95%	94%	109%	NA	NA
COMP CS-1	5	2	0.215	29.2	0.177	2.84	11.8	0.067	4.55	1.430	1.33	84
COMP CS-1 MS	5	2	1.010	NA	2.610	6.02	NA	0.541	8.40	7.440	NA	NA
Concentration Recovered			0.795	NA	2.433	3.18	NA	0.474	3.85	6.010	NA	NA
Amount Spiked			1.0	NS	2.5	5.0	NS	0.5	5.0	5.0	NS	NS
Percent Recovery			80%	NA	97%	64%[e]	NA	95%	77%	120%	NA	NA
COMP PS-1	5	4	0.419	29.1	0.180	2.67	16.7	0.115	4.96	0.993	1.38	124
COMP PS-1 MS	5	4	1.370	NA	2.750	7.39	NA	0.582	9.54	5.560	NA	NA
Concentration Recovered			0.951	NA	2.57	4.72	NA	0.467	4.58	4.567	NA	NA
Amount Spiked			1.0	NS	2.5	5.0	NS	0.5	5.0	5.0	NS	NS
Percent Recovery			95%	NA	103%	94%	NA	93%	92%	91%	NA	NA
Background	5	4	0.250	27.3	0.226	2.12	12.7	0.091	3.79	0.819	1.67	146
Background MS	5	4	1.150	NA	2.760	4.90	NA	NA	6.78	7.870	NA	NA
Concentration Recovered			0.9	NA	2.534	2.78	NA	NA	2.99	7.051	NA	NA
Amount Spiked			1.0	NS	2.5	5.0	NS	NS	5.0	5.0	NS	NS
Percent Recovery			90%	NA	101%	56%[e]	NA	NA	60%[e]	141%[e]	NA	NA

TABLE I.22. (contd)

Sediment Treatment	Replicate		Batch	*M. nasuta* Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Standard Reference Material													
Certified Values				1.68 ±0.15	14.0 ±1.2	4.15 ±0.38	1.43 ±0.46	66.3 ±4.3	0.064 ±0.007	2.25 ±0.44	0.371 ±0.014	2.21 ±0.24	830 ±57
SRM1566A			1	1.700	14.49	4.570	1.96	64.4	0.062	1.85	0.394	2.25	845
SRM1566A			2	1.230	14.80	4.300	1.34	66.2	0.060	1.76	0.369	2.46	861
SRM1566A			3	1.470	15.43	4.310	1.38	65.9	0.061	1.68	0.371	2.20	856
SRM1566A			4	1.560	15.12	4.180	1.45	65.6	0.062	2.63	0.495	2.07	864
Analytical Triplicate													
R-OS	3	Rep 1	1	0.370	21.0	0.269	2.47	19.90	0.149	5.71	1.280	1.89	131
R-OS	3	Rep 2	1	0.423	20.1	0.218	2.52	18.80	0.149	5.85	1.240	1.97	131
R-OS	3	Rep 3	1	0.401	20.6	0.229	2.98	21.40	0.149	6.09	1.420	1.93	133
RSD				7%	2%	11%	11%	7%	0%	3%	7%	2%	1%
R-BF	2	Rep 1	2	0.184	24.5	0.183	1.76	13.52	0.093	4.10	5.910	1.59	92
R-BF	2	Rep 2	2	0.238	25.5	0.132	1.83	14.00	0.095	4.34	3.590	1.78	94
R-BF	2	Rep 3	2	0.226	25.3	0.211	1.66	15.60	0.087	4.00	4.920	1.63	96
RSD				13%	2%	23%(f)	5%	8%	5%	4%	24%(f)	6%	2%
COMP WR-1	4	Rep 1	4	0.308	26.1	0.138	2.04	16.2	0.065	4.11	1.390	1.22	103
COMP WR-1	4	Rep 2	4	0.281	25.5	0.166	3.61	13.8	0.065	4.81	1.310	1.82	104
COMP WR-1	4	Rep 3	4	0.478	23.9	0.161	2.43	14.5	0.063	4.16	1.330	1.56	103
RSD				30%(f)	5%	10%	30%(f)	8%	2%	9%	3%	20%	1%
Background	5	Rep 1	4	0.250	ND	0.240	1.67	ND	ND	3.10	1.240	ND	ND
Background	5	Rep 2	4	0.240	ND	0.211	2.18	ND	ND	3.21	2.680	ND	ND
Background	5	Rep 3	4	0.224	ND	0.214	2.98	ND	ND	3.22	1.630	ND	ND
RSD				6%	NA	7%	29%(f)	NA	NA	2%	40%(f)	NA	NA

(a) U Analyte was not present above the level of associated value.
(b) ND No data available.
(c) NA Not applicable.
(d) NS Not spiked.
(e) NS Value outside of quality control range 75% - 125%.
(f) Value exceeds relative precision range ≤ 20%.

TABLE I.23. Butyltin Results, Dry and Wet Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery: Tri-pentyltin	Surrogate Percent Recovery: Tetra-butyltin	*M. nasuta* Butyltins (µg/kg dry weight): Tri-butyltin	Di-butyltin	Mono-butyltin	Percent Dry Weight	*M. nasuta* Butyltins (µg/kg wet weight): Tri-butyltin	Di-butyltin	Mono-butyltin
Target DL[a]			NA[b]	NA	5.0	5.0	5.0	NA	NA	NA	NA
Achieved DL High			NA	NA	52.4	52.4	164.8	NA	NA	NA	NA
Achieved DL Low			NA	NA	12.4	12.2	38.3	NA	NA	NA	NA
COMP WR-1	1	3	53	75	19.1 U[c]	19.1 U	60.2 U	11.53	2.20 U	2.20 U	6.94 U
COMP WR-1	2	1	53	68	10.4 J[d]	11.9 U	64.3	12.09	1.26 J	1.44 U	7.77
COMP WR-1	3	3	61	64	13.7 J	22.6 U	71.1 U	12.60	1.73 J	2.85 U	8.96 U
COMP WR-1	4	3	58	74	9.5 J	19.4 U	60.9 U	11.26	1.07 J	2.18 U	6.86 U
COMP WR-1	5	1	45	77	8.0 J	12.8 U	47.8	12.73	1.02 J	1.63 U	6.08
COMP WR-2	1	2	55	93	7.3 J	15.5 U	48.8 U	12.40	0.91 J	1.92 U	6.05 U
COMP WR-2	2	2	34[e]	92	8.0 J	15.7 U	49.5 U	12.92	1.03 J	2.03 U	6.40 U
COMP WR-2	3	2	76	81	12.4	17.7 U	55.6 U	11.24	1.39	1.99 U	6.25 U
COMP WR-2	4	1	59	90	8.4 J	13.0 U	41.0 U	13.17	1.11 J	1.71 U	5.40 U
COMP WR-2	5	2	54	79	12.7 J	18.2 U	57.1 U	12.15	1.54 J	2.21 U	6.94 U
COMP PS-1	1	2	54	90	8.5 J	16.1 U	77.8	12.17	1.03 J	1.96 U	9.47
COMP PS-1	2	2	58	84	8.1 J	17.1 U	53.8 U	11.85	0.96 J	2.03 U	6.38 U
COMP PS-1	3	2	49	92	11.7 J	15.7 U	49.4 U	11.85	1.39 J	1.86 U	5.85 U
COMP PS-1	4	1	68	86	11.4 J	15.8 U	49.7 U	12.54	1.43 J	1.98 U	6.23 U
COMP PS-1	5	3	62	63	9.0 J	23.0 U	72.4 U	12.57	1.13 J	2.89 U	9.10 U
COMP PS-2	1 Rep 1	1	52	73	15.5 U	15.1 U	47.7 U	14.45	2.24 U	2.18 U	6.89 U
COMP PS-2	1 Rep 2	1	56	79	13.7 U	13.4 U	42.3 U	14.45	1.98 U	1.94 U	6.11 U
COMP PS-2	1 Rep 3	1	65	80	14.7 U	14.4 U	45.2 U	14.45	2.12 U	2.08 U	6.53 U
COMP PS-2	2	3	48	67	6.6 J	21.4 U	67.4 U	12.58	0.83 J	2.69 U	8.48 U
COMP PS-2	3	1	73	82	10.2 J	14.1 U	44.3 U	11.58	1.18 J	1.63 U	5.13 U
COMP PS-2	4	3	ND[f]	ND	ND	ND	ND	10.90	ND	ND	ND
COMP PS-2	5 Rep 1	3	45	61	23.8 U	23.8 U	74.9 U	11.98	2.85 U	2.85 U	8.97 U
COMP PS-2	5 Rep 2	3	54	78	18.5 U	18.5 U	58.2 U	11.98	2.22 U	2.22 U	6.97 U
COMP PS-2	5 Rep 3	3	55	59	24.5 U	24.5 U	77.0 U	11.98	2.94 U	2.94 U	9.22 U
COMP PS-3	1	1	80	80	108.8	12.7 J	48.2 U	11.22	12.21	1.42 J	5.41 U
COMP PS-3	2	2	61	84	79.1	17.1 U	63.9	12.23	9.67	2.09 U	7.81
COMP PS-3	3	1	54	95	85.8	16.1 U	50.6 U	11.34	9.73	1.83 U	5.74 U
COMP PS-3	4	1	82	92	88.0	12.2 U	38.3 U	12.38	10.89	1.51 U	4.74 U
COMP PS-3	5	2	52	50	82.0	29.0 U	65.6 J	12.46	10.22	3.61 U	8.17 J

TABLE I.23. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery		*M. nasuta* Butyltins (µg/kg dry weight)			Percent Dry Weight	*M. nasuta* Butyltins (µg/kg wet weight)		
			Tri-pentyltin	Tetra-butyltin	Tri-butyltin	Di-butyltin	Mono-butyltin		Tri-butyltin	Di-butyltin	Mono-butyltin
COMP PS-4	1	1	54	85	9.3 J	16.6 U	52.2 U	12.96	1.21 J	2.15 U	6.77 U
COMP PS-4	2	1	57	85	9.4 J	14.5 U	45.6 U	13.62	1.28 J	1.97 U	6.21 U
COMP PS-4	3	3	61	72	7.6 J	20.1 U	63.1 U	12.59	0.96 J	2.53 U	7.94 U
COMP PS-4	4	3	31(e)	75	19.7 U	19.3 U	60.6 U	11.95	2.35 U	2.31 U	7.24 U
COMP PS-4	5	2	54	85	11.3 J	17.0 U	58.1	12.37	1.40 J	2.10 U	7.19
COMP CS-1	1	2	84	94	15.4	15.4 U	48.3 U	13.25	2.04	2.04 U	6.40 U
COMP CS-1	2	1	53	86	11.1 J	15.4 U	48.5 U	11.18	1.24 J	1.72 U	5.42 U
COMP CS-1	3	3	55	80	11.3 J	17.9 U	56.3 U	12.13	1.37 J	2.17 U	6.83 U
COMP CS-1	4	3	65	57	12.5 J	25.1 U	79.0 U	12.19	1.52 J	3.06 U	9.63 U
COMP CS-1	5	2	49	66	9.7 J	21.8 U	68.6 U	11.53	1.12 J	2.51 U	7.91 U
R-BF	1	1	63	87	16.4	12.8 U	89.7	10.92	1.79	1.40 U	9.80
R-BF	2	2	51	59	11.7 J	24.3 U	76.5 U	12.06	1.41 J	2.93 U	9.23 U
R-BF	3	3	44	68	9.6 J	21.3 U	66.9 U	11.74	1.13 J	2.50 U	7.85 U
R-BF	4	1	52	84	17.3	14.7 U	60.0	14.02	2.43	2.06 U	8.41
R-BF	5	3	49	69	13.0 J	20.8 U	65.4 U	12.04	1.57 J	2.50 U	7.87 U
R-OS	1	3	79	43	14.8 J	33.8 U	106.4 U	12.44	1.84 J	4.20 U	13.24 U
R-OS	2	1	68	105	10.5 J	11.3 J	51.4 U	12.29	1.29 J	1.39 J	6.32 U
R-OS	3	1	55	97	10.6 J	15.8 U	49.6 U	12.15	1.29 J	1.92 U	6.03 U
R-OS	4	2	64	89	9.1	8.7 J	51.0 U	12.25	1.11	1.07 J	6.25 U
R-OS	5	1	71	68	12.0 J	12.4 U	85.1	13.38	1.61 J	1.66 U	11.39
C-SB	1	3	44	84	5.5 J	17.1 U	56.2	11.48	0.63 J	1.96 U	6.45
C-SB	2 Rep 1	2	44	86	16.8 U	16.8 U	92.1	11.73	1.97 U	1.97 U	10.80
C-SB	2 Rep 2	2	46	92	15.6 U	15.6 U	115.7	11.73	1.83 U	1.83 U	13.57
C-SB	2 Rep 3	2	66	87	16.5 U	16.5 U	167.8	11.73	1.94 U	1.94 U	19.68
C-SB	3	2	40	72	7.3 J	19.9 U	62.7 U	12.08	0.88 J	2.40 U	7.57 U
C-SB	4	1	74	81	11.7 J	14.6 U	45.8 U	11.34	1.33 J	1.66 U	5.19 U
C-SB	5	1	59	88	11.7 J	15.6 U	49.0 U	10.60	1.24 J	1.65 U	5.19 U
C-NE	1	3	56	78	16.7 J	45.2	58.0 U	12.89	2.15 J	5.83	7.48 U
C-NE	2	1	69	88	10.0 J	64.9	53.3 U	11.15	1.12 J	7.24	5.94 U
C-NE	3	2	44	27(e)	52.4 U	71.8	164.8 U	11.51	6.03 U	8.26	18.97 U
C-NE	4	2	71	85	10.9	73.8	53.5 U	11.84	1.29	8.74	6.33 U
C-NE	5	3	54	71	13.7 J	69.2	63.9 U	11.80	1.62 J	8.17	7.54 U

TABLE I.23. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery: Tri-pentyltin	Surrogate Percent Recovery: Tetra-butyltin	*M. nasuta* Butyltins (µg/kg dry weight): Tri-butyltin	*M. nasuta* Butyltins (µg/kg dry weight): Di-butyltin	*M. nasuta* Butyltins (µg/kg dry weight): Mono-butyltin	Percent Dry Weight	*M. nasuta* Butyltins (µg/kg wet weight): Tri-butyltin	*M. nasuta* Butyltins (µg/kg wet weight): Di-butyltin	*M. nasuta* Butyltins (µg/kg wet weight): Mono-butyltin
Background	1	3	33(e)	76	5.0 J	18.9 U	59.4 U	13.94	0.70 J	2.63 U	8.28 U
Background	2	3	51	63	7.2 J	22.9 U	50.4 J	13.43	0.97 J	3.08 U	6.77 J
Background	3	3	46	73	7.6 J	19.6 U	43.0 J	12.81	0.97 J	2.51 U	5.51 J
Background	4	3	62	76	7.3	3.8 U	11.9 U	14.03	1.02	0.53 U	1.67 U
Background	5	3	69	63	22.8 U	22.8 U	71.8 U	13.34	3.04 U	3.04 U	9.58 U

(a) DL Detection limit.
(b) NA Not applicable.
(c) U Analyte was not present above the associated values.
(d) J Analyte detected below method detection limits (MDL), but above instrument detection limit (IDL).
(e) Recovery outside quality control range (40% - 120%).
(f) ND No data; sample lost during extraction.

TABLE I.24. Quality Control Data for Butyltins, Dry Weight, in Tissue of *M. nasuta*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery: Tri-pentyltin	Surrogate Percent Recovery: Tetra-butyltin	*M. nasuta* Butyltins (µg/kg dry weight): Tri-butyltin	Di-butyltin	Mono-butyltin
Method Blank							
Blank	1	1	90	80	14.4 U[a]	14.2 U	44.5 U
Blank	2	1	80[b]	87	15.9 U	15.6 U	52.0
Blank	1	2	30[b]	82	17.5 U	17.5 U	55.2 U
Blank	2	2	39[b]	79	18.2 U	18.2 U	57.2 U
Blank	1	3	63	60	24.1 U	24.1 U	75.8 U
Matrix Spike							
Blank 1		1	53	92	9.9 J[c]	16.7 U	52.4 U
Blank 1 MS		1	51	89	239.1	224.6	74.3
Concentration Recovered					229.2	224.6	74.3
Amount Spiked					431.0	431.0	431.0
Percent Recovery					53%	52%	17%[b]
Blank 1		1	53	92	9.9 J	16.7 U	52.4 U
Blank 1 MSD		1	71	85	284.0	283.6	60.7
Concentration Recovered					274.1	283.6	60.7
Amount Spiked					424.0	424.0	424.0
Percent Recovery					65%	67%	14%[b]
RPD					19%	25%	19%
I-stat					0.10	0.12	0.09
Blank 2		2	53	79	12.2 J	18.3 U	57.4 U
Blank 2 MS		2	53	80	231.0	233.4	68.1
Concentration Recovered					218.8	233.4	68.1
Amount Spiked					431.0	431.0	431.0
Percent Recovery					51%	54%	16%[b]
Blank 2		2	53	19[b]	12.2 J	18.3 U	57.4 U
Blank 2 MSD		2	62	61	278.3	252.9	81.2
Concentration Recovered					266.1	252.9	81.2
Amount Spiked					423.7	423.7	423.7
Percent Recovery					63%	60%	19%[b]
RPD					21%	10%	19%
I-stat					0.11	0.05	0.10
Blank 3		3	37[b]	72	20.1 U	20.1 U	63.3 U
Blank 3 MS		3	56	83	196.1	206.6	63.8
Concentration Recovered					196.1	206.6	63.8
Amount Spiked					431.0	431.0	431.0
Percent Recovery					45%	48%	15%[b]
Blank 3		3	37[b]	72	20.1 U	20.1 U	63.3 U
Blank 3 MSD		3	49	78	180.8	191.3	49.2 J
Concentration Recovered					180.8	191.3	49.2
Amount Spiked					431.0	431.0	431.0
Percent Recovery					42%	44%	11%[b]
RPD					8%	8%	26%
I-stat					0.04	0.04	0.13

TABLE I.24. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery: Tri-pentyltin	Surrogate Percent Recovery: Tetra-butyltin	*M. nasuta* Butyltins (µg/kg dry weight): Tri-butyltin	Di-butyltin	Mono-butyltin
Analytical Triplicates							
COMP PS-2	1 Rep 1	1	52	73	15.5 U	15.1 U	47.7 U
COMP PS-2	1 Rep 2	1	56	79	13.7 U	13.4 U	42.3 U
COMP PS-2	1 Rep 3	1	65	80	14.7 U	14.4 U	45.2 U
RSD					NA(d)	NA	NA
C-SB	2 Rep 1	2	44	86	16.8 U	16.8 U	92.1
C-SB	2 Rep 2	2	45	92	15.6 U	15.6 U	115.7
C-SB	2 Rep 3	2	65	90	16.5 U	16.5 U	167.8
RSD					NA	NA	31%(e)
COMP PS-2	5 Rep 1	3	45	61	23.8 U	23.8 U	74.9 U
COMP PS-2	5 Rep 2	3	54	78	18.5 U	18.5 U	58.2 U
COMP PS-2	5 Rep 3	3	55	59	24.5 U	24.5 U	77.0 U
RSD					NA	NA	NA

(a) U Analyte was not present above the level of associated value.
(b) Recovery outside of quality control range (40% - 120%)
(c) J Analyte detected below method detection limit (MDL), but above the instument detection limit (IDL).
(d) Not applicable.
(e) Value exceeds relative precision range ≤ 30%.

APPENDIX J

NEPHTYS caecoides TISSUE CHEMISTRY AND QUALITY CONTROL DATA

TABLE J.1. Total Detected Polynuclear Aromatic Hydrocarbons (PAH), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* PAH (µg/kg wet weight) Total Detected LPAH	Total Detected HPAH	Total Detected PAH
COMP WR-1	1	3	10.1	2.6	12.7
COMP WR-1	2	1	6.5	6.7	13.2
COMP WR-1	3	3	4.5	3.4	7.9
COMP WR-1	4	3	4.6	1.6	6.2
COMP WR-1	5	2	10.7	3.1	13.8
COMP WR-2	1	2	32.8	3.3	36.1
COMP WR-2	2	2	11.9	1.4	13.3
COMP WR-2	3	3	4.8	1.4	6.2
COMP WR-2	4	2	16.1	2.0	18.1
COMP WR-2	5	3	5.5	2.1	7.6
COMP PS-1	1	2	17.1	1.4	18.5
COMP PS-1	2	2	15.4	1.3	16.7
COMP PS-1	3	3	5.5	8.5	14.0
COMP PS-1	4	1	10.2	2.3	12.5
COMP PS-1	5	3	7.2	2.3	9.5
COMP PS-2	1	1	6.9	6.6	13.5
COMP PS-2	2	3	6.4	2.7	9.1
COMP PS-2	3	1	9.4	4.6	14.0
COMP PS-2	4	4	4.5	5.7	10.2
COMP PS-2	5	4	4.7	4.9	9.6
COMP PS-3	1	1	10.2	4.4	14.6
COMP PS-3	2	3	7.5	4.8	12.3
COMP PS-3	3	2	9.7	2.2	11.9
COMP PS-3	4	2	11.7	2.8	14.5
COMP PS-3	5	2	10.0	1.7	11.7
COMP PS-4	1	1	10.4	5.6	16.0
COMP PS-4	2	1	5.9	4.5	10.4
COMP PS-4	3	4	5.4	5.4	10.8
COMP PS-4	4	4	5.7	3.8	9.5
COMP PS-4	5	2	12.8	4.9	17.7
COMP CS-1	1	3	5.9	4.3	10.2
COMP CS-1	2	1	9.0	5.4	14.4
COMP CS-1	3	4	6.1	4.5	10.6
COMP CS-1	4	4	6.2	3.9	10.1
COMP CS-1	5	2	14.4	5.1	19.5

TABLE J.1. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* PAH (µg/kg wet weight) Total Detected LPAH	Total Detected HPAH	Total Detected PAH
R-BF	1	2	14.9	13.4	28.3
R-BF	2	2	10.6	10.7	21.3
R-BF	3	4	5.0	10.7	15.7
R-BF	4	2	10.9	10.8	21.7
R-BF	5	4	5.6	11.3	16.9
R-OS	1	4	5.0	1.9	6.9
R-OS	2	1	7.6	1.8	9.4
R-OS	3	1	10.4	5.4	15.8
R-OS	4	3	7.5	2.9	10.4
R-OS	5	1	7.6	1.7	9.3
C-SB	1	4	4.6	4.7	9.3
C-SB	2	3	14.2	9.6	23.8
C-SB	3	2	5.0	3.9	8.9
C-SB	4	1	8.4	3.9	12.3
C-SB	5	1	9.9	4.5	14.4
C-NE	1	4	4.3	2.2	6.5
C-NE	2	1	15.5	12.9	28.4
C-NE	3 Rep 1	2	34.3	5.4	39.7
C-NE	3 Rep 2	2	71.3	13.0	84.3
C-NE	3 Rep 3	2	29.4	2.9	32.3
C-NE	4	3	4.3	2.5	6.8
C-NE	5 Rep 1	3	13.6	4.9	18.5
C-NE	5 Rep 2	3	13.2	6.7	19.9
C-NE	5 Rep 3	3	9.3	3.5	12.8
Background	1 Rep 1	1	12.8	3.0	15.8
Background	1 Rep 2	1	12.8	3.3	16.1
Background	1 Rep 3	1	18.9	4.0	22.9
Background	2	4	10.1	12.5	22.6
Background	3	4	5.8	4.3	10.1
Background	4	4	7.0	3.5	10.5
Background	5 Rep 1	4	8.9	4.7	13.6
Background	5 Rep 2	4	11.9	4.9	16.8
Background	5 Rep 3	4	7.3	3.0	10.3

TABLE J.2. Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAH), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Target DL[a]			20	20	20	20	20	20
Achieved DL High			30.69	30.14	16.31	17.60	13.66	13.32
Achieved DL Low			3.83	3.76	2.03	2.20	1.70	1.66
COMP WR-1	1	3	7.11	6.84 U[b]	3.70 U	0.49 J[c]	2.25 J	0.29 J
COMP WR-1	2	1	3.71 J	5.28 U	2.86 U	0.56 J	2.23 J	2.33 U
COMP WR-1	3	3	3.04 J	6.18 U	3.34 U	0.33 J	1.13 J	2.73 U
COMP WR-1	4	3	2.91 J	5.12 U	2.77 U	0.28 J	1.28 J	0.14 J
COMP WR-1	5	2	6.92	6.57 U	3.55 U	3.83 U	3.82	2.90 U
COMP WR-2	1	2	22.46 J	23.56 U	12.75 U	13.76 U	10.36 J	10.41 U
COMP WR-2	2	2	7.82 J	8.70 U	4.71 U	5.08 U	4.09	3.85 U
COMP WR-2	3	3	3.01 J	6.57 U	3.56 U	0.42 J	1.36 J	2.91 U
COMP WR-2	4	2	10.01 J	11.52 U	6.23 U	6.73 U	6.12	5.09 U
COMP WR-2	5	3	4.10 J	6.80 U	3.68 U	3.97 U	1.37 J	3.00 U
COMP PS-1	1	2	11.25	10.67 U	5.78 U	6.23 U	5.88	4.72 U
COMP PS-1	2	2	10.24 J	10.82 U	5.85 U	6.32 U	5.14	4.78 U
COMP PS-1	3	3	3.22 J	7.08 U	3.83 U	0.56 J	1.51 J	0.25 J
COMP PS-1	4	1	6.43 J	8.25 U	4.47 U	1.00 J	2.76 J	3.65 U
COMP PS-1	5	3	4.98 J	10.29 U	5.57 U	0.48 J	1.78 J	4.55 U
COMP PS-2	1	1	3.74 J	5.50 U	2.98 U	0.89 J	2.31 J	2.43 U
COMP PS-2	2	3	4.55	4.27 U	2.31 U	0.36 J	1.47 J	1.89 U
COMP PS-2	3	1	5.51 J	8.05 U	4.36 U	1.06 J	2.86 J	3.56 U
COMP PS-2	4	4	2.60 J	4.88 U	2.64 U	0.36 J	1.57 J	2.16 U
COMP PS-2	5	4	2.61 J	6.22 U	3.37 U	0.66 J	1.43 J	2.75 U
COMP PS-3	1	1	6.38	6.77 U	3.66 U	0.96 J	2.90 J	2.99 U
COMP PS-3	2	3	4.97 J	8.38 U	4.53 U	0.65 J	1.58 J	0.26 J
COMP PS-3	3	2	6.45 J	7.89 U	4.27 U	4.60 U	3.25 J	3.48 U
COMP PS-3	4	2	7.10 J	7.33 U	3.97 U	4.28 U	4.61	3.24 U
COMP PS-3	5	2	6.87 J	9.27 U	5.01 U	5.41 U	3.11 J	4.09 U
COMP PS-4	1	1	5.45 J	6.37 U	3.45 U	1.11 J	3.85	2.81 U
COMP PS-4	2	1	3.37 J	4.52 U	2.45 U	0.48 J	2.07	2.00 U
COMP PS-4	3	4	3.26 J	6.75 U	3.65 U	0.68 J	1.46 J	2.98 U
COMP PS-4	4	4	3.08 J	4.64 U	0.54 J	0.48 J	1.46 J	0.13 J
COMP PS-4	5	2	7.91	7.09 U	3.84 U	0.54 J	4.34	3.13 U
COMP CS-1	1	3	3.36 J	7.26 U	3.93 U	0.63 J	1.70 J	0.20 J
COMP CS-1	2	1	5.14 J	6.91 U	3.74 U	0.92 J	2.97 J	3.05 U
COMP CS-1	3	4	3.53 J	6.89 U	3.73 U	0.67 J	1.91 J	3.04 U
COMP CS-1	4	4	3.77 J	6.64 U	3.59 U	0.58 J	1.66 J	0.15 J
COMP CS-1	5	2	9.52 J	9.41 U	5.09 U	5.49 U	4.84	4.16 U
R-BF	1	2	9.89	8.26 U	4.47 U	4.82 U	4.96	3.65 U
R-BF	2	2	6.74 J	8.57 U	4.64 U	5.01 U	3.82 J	3.79 U
R-BF	3	4	3.07 J	6.68 U	3.61 U	0.31 J	1.22 J	0.38 J
R-BF	4	2	6.64 J	6.76 U	3.66 U	3.95 U	4.23	2.99 U
R-BF	5	4	3.48 J	9.03 U	4.89 U	5.27 U	1.60 J	0.54 J

TABLE J.2. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
R-OS	1	4	3.29 J	6.27 U	3.39 U	0.44 J	1.26 J	2.77 U
R-OS	2	1	4.64 J	6.32 U	3.42 U	0.77 J	2.19 J	2.79 U
R-OS	3	1	4.28 J	0.54 J	0.94 J	0.86 J	3.35	0.47 J
R-OS	4	3	5.97 J	9.79 U	5.30 U	5.72 U	1.50 J	4.33 U
R-OS	5	1	5.09	4.39 U	2.38 U	0.61 J	1.87 J	1.94 U
C-SB	1	4	2.69 J	4.71 U	0.47 J	0.43 J	0.84 J	0.19 J
C-SB	2	3	10.53 J	19.95 U	10.80 U	11.65 U	3.04 J	0.64 J
C-SB	3	2	2.99 J	4.47 U	2.42 U	2.61 U	1.97 J	1.98 U
C-SB	4	1	5.47 J	6.55 U	3.55 U	0.68 J	2.26 J	2.90 U
C-SB	5	1	6.35 J	7.64 U	4.13 U	0.90 J	2.61 J	3.38 U
C-NE	1	4	2.17 J	4.23 U	2.29 U	0.41 J	1.54 J	0.15 J
C-NE	2	1	6.03 J	0.88 J	1.49 J	2.06 J	3.71 J	1.32 J
C-NE	3 Rep 1	2	21.15 J	25.98 U	14.06 U	15.17 U	13.12	11.48 U
C-NE	3 Rep 2	2	52.84	30.14 U	16.31 U	17.60 U	18.48	13.32 U
C-NE	3 Rep 3	2	20.10	16.50 U	8.93 U	9.63 U	9.34	7.29 U
C-NE	4	3	2.01 J	3.76 U	2.03 U	0.44 J	1.74	0.15 J
C-NE	5 Rep 1	3	9.70 J	17.23 U	9.33 U	0.99 J	2.56 J	0.33 J
C-NE	5 Rep 2	3	9.08 J	19.27 U	10.43 U	0.81 J	2.72 J	0.63 J
C-NE	5 Rep 3	3	6.43 J	11.44 U	6.19 U	0.70 J	1.92 J	0.22 J
Background	1 Rep 1	1	7.62 J	9.78 U	5.29 U	1.41 J	3.81 J	4.32 U
Background	1 Rep 2	1	8.29 J	12.95 U	7.01 U	7.57 U	4.51 J	5.72 U
Background	1 Rep 3	1	12.39 J	13.06 U	7.06 U	1.70 J	4.79 J	5.77 U
Background	2	4	5.92 J	13.31 U	7.20 U	1.25 J	2.95 J	5.88 U
Background	3	4	2.29 J	4.66 U	2.52 U	0.84 J	2.63	2.06 U
Background	4	4	2.79 J	3.78 U	0.52 J	0.98 J	2.48	0.19 J
Background	5 Rep 1	4	4.31 J	10.96 U	0.59 J	1.05 J	2.67 J	0.26 J
Background	5 Rep 2	4	6.27 J	11.06 U	0.85 J	0.92 J	3.58 J	0.31 J
Background	5 Rep 3	4	3.33 J	5.94 U	0.58 J	0.75 J	2.38 J	0.21 J

(a) DL Detection limit.
(b) U Analyte was not present above the level of associated value.
(c) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE J.3. High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAH), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* HPAH (µg/kg wet weight)									
			Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
Target DL[a]			20	20	20	20	20	20	20	20	20	20
Achieved DL High			12.97	15.89	22.29	15.60	22.76	18.97	19.77	23.76	16.16	32.21
Achieved DL Low			1.62	1.98	2.78	1.95	2.84	2.37	2.47	2.96	2.02	4.02
COMP WR-1	1	3	0.81 J[b]	1.29 J	5.06 U[c]	0.49 J	5.16 U	4.30 U	4.49 U	5.39 U	3.67 U	7.31 U
COMP WR-1	2	1	1.12 J	1.44 J	0.39 J	0.75 J	0.85 J	0.62 J	3.46 U	0.58 J	0.35 J	0.62 J
COMP WR-1	3	3	0.81 J	1.24 J	0.77 J	0.58 J	4.66 U	3.89 U	4.05 U	4.87 U	3.31 U	6.60 U
COMP WR-1	4	3	0.44 J	0.90 J	3.79 U	0.30 J	3.87 U	3.23 U	3.36 U	4.04 U	2.75 U	5.48 U
COMP WR-1	5	2	0.89 J	1.43 J	4.86 U	0.77 J	4.96 U	4.13 U	4.31 U	5.18 U	3.52 U	7.02 U
COMP WR-2	1	2	1.68 J	1.66 J	17.42 U	12.20 U	17.79 U	14.83 U	15.46 U	18.57 U	12.63 U	25.17 U
COMP WR-2	2	2	0.69 J	0.68 J	6.43 U	4.50 U	6.57 U	5.48 U	5.71 U	6.86 U	4.66 U	9.30 U
COMP WR-2	3	3	0.55 J	0.55 J	4.86 U	0.27 J	4.96 U	4.14 U	4.31 U	5.18 U	3.53 U	7.03 U
COMP WR-2	4	2	1.07 J	0.88 J	8.52 U	5.96 U	8.70 U	7.25 U	7.56 U	9.08 U	6.18 U	12.31 U
COMP WR-2	5	3	0.60 J	0.62 J	0.58 J	0.30 J	5.13 U	4.28 U	4.46 U	5.36 U	3.65 U	7.26 U
COMP PS-1	1	2	0.67 J	0.74 J	7.89 U	5.53 U	8.06 U	6.72 U	7.00 U	8.41 U	5.72 U	11.40 U
COMP PS-1	2	2	0.65 J	0.65 J	8.00 U	5.60 U	8.17 U	6.81 U	7.10 U	8.53 U	5.80 U	11.56 U
COMP PS-1	3	3	1.09 J	1.08 J	0.99 J	0.79 J	0.65 J	0.36 J	4.65 U	5.58 U	3.80 U	3.58 J
COMP PS-1	4	1	0.85 J	0.96 J	6.10 U	0.50 J	6.23 U	5.19 U	5.41 U	6.50 U	4.43 U	8.82 U
COMP PS-1	5	3	0.69 J	0.55 J	0.73 J	0.35 J	7.77 U	6.48 U	6.75 U	8.11 U	5.52 U	11.00 U
COMP PS-2	1	1	1.20 J	3.27	4.07 U	0.99 J	0.39 J	0.32 J	3.61 U	4.33 U	2.95 U	0.44 J
COMP PS-2	2	3	0.67 J	1.48 J	3.16 U	0.51 J	3.22 U	2.69 U	2.80 U	3.36 U	2.29 U	4.56 U
COMP PS-2	3	1	1.12 J	2.79 J	5.96 U	0.67 J	6.08 U	5.07 U	5.28 U	6.35 U	4.32 U	8.61 U
COMP PS-2	4	4	1.17 J	2.68	0.46 J	0.95 J	0.27 J	0.12 J	3.20 U	3.85 U	2.62 U	5.22 U
COMP PS-2	5	4	1.05 J	2.47 J	0.60 J	0.76 J	4.70 U	3.92 U	4.08 U	4.90 U	3.34 U	6.65 U
COMP PS-3	1	1	1.19 J	1.96 J	0.38 J	0.82 J	5.11 U	4.26 U	4.44 U	5.33 U	3.63 U	7.23 U
COMP PS-3	2	3	0.95 J	1.36 J	0.88 J	0.77 J	0.50 J	0.30 J	5.50 U	6.60 U	4.49 U	8.95 U
COMP PS-3	3	2	0.90 J	1.34 J	5.83 U	4.08 U	5.95 U	4.96 U	5.17 U	6.21 U	4.23 U	8.43 U
COMP PS-3	4	2	0.93 J	1.25 J	5.42 U	0.57 J	5.53 U	4.61 U	4.81 U	5.78 U	3.93 U	7.83 U
COMP PS-3	5	2	0.70 J	1.00 J	6.85 U	4.80 U	7.00 U	5.83 U	6.08 U	7.30 U	4.97 U	9.90 U
COMP PS-4	1	1	1.57 J	3.20 J	4.71 U	0.84 J	4.81 U	4.01 U	4.18 U	5.02 U	3.41 U	6.80 U
COMP PS-4	2	1	1.12 J	2.71	3.34 U	0.64 J	3.41 U	2.85 U	2.97 U	3.56 U	2.42 U	4.83 U
COMP PS-4	3	4	1.22 J	2.83 J	0.52 J	0.81 J	5.10 U	4.25 U	4.43 U	5.32 U	3.62 U	7.22 U
COMP PS-4	4	4	0.84 J	2.04 J	0.26 J	0.69 J	3.50 U	2.92 U	3.04 U	3.66 U	2.49 U	4.96 U
COMP PS-4	5	2	1.32 J	2.67 J	5.24 U	0.89 J	5.35 U	4.46 U	4.65 U	5.59 U	3.80 U	7.57 U

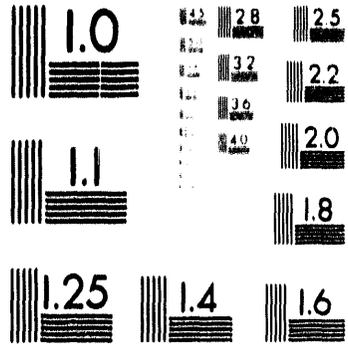
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TABLE J.3. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* HPAH (µg/kg wet weight)									
			Fluoranthene	Pyrene	Benzo[a]-anthracene	Chrysene	Benzo[b]-fluoranthene	Benzo[k]-fluoranthene	Benzo[a]-pyrene	Indeno-[1,2,3-c,d]-pyrene	Dibenzo-[a,h]-anthracene	Benzo-[g,h,i]-perylene
COMP CS-1	1	3	1.03 J	2.51 J	0.17 J	0.60 J	5.48 U	4.57 U	4.76 U	5.72 U	3.89 U	7.76 U
COMP CS-1	2	1	1.34 J	3.38 J	5.11 U	0.68 J	5.22 U	4.35 U	4.53 U	5.45 U	3.71 U	7.39 U
COMP CS-1	3	4	0.94 J	2.47 J	0.56 J	0.49 J	5.20 U	4.34 U	4.52 U	5.43 U	3.69 U	7.36 U
COMP CS-1	4	4	1.02 J	1.96 J	0.50 J	0.44 J	5.02 U	4.18 U	4.36 U	5.24 U	3.56 U	7.10 U
COMP CS-1	5	2	1.22 J	2.98 J	6.96 U	0.90 J	7.10 U	5.92 U	6.17 U	7.42 U	5.04 U	10.05 U
R-BF	1	2	2.93 J	7.94	6.11 U	2.54 J	6.23 U	5.20 U	5.42 U	6.51 U	4.43 U	8.82 U
R-BF	2	2	2.53 J	6.27	6.34 U	1.94 J	6.47 U	5.39 U	5.62 U	6.75 U	4.60 U	9.16 U
R-BF	3	4	2.12 J	5.50	0.46 J	1.98 J	0.39 J	0.20 J	4.38 U	5.26 U	3.58 U	7.14 U
R-BF	4	2	2.54 J	6.34	5.00 U	1.92 J	5.11 U	4.26 U	4.44 U	5.33 U	3.63 U	7.23 U
R-BF	5	4	2.54 J	6.20	0.55 J	2.02 J	6.82 U	5.68 U	5.92 U	7.12 U	4.84 U	9.65 U
R-OS	1	4	0.50 J	0.64 J	0.45 J	0.34 J	4.73 U	3.95 U	4.11 U	4.94 U	3.36 U	6.70 U
R-OS	2	1	0.73 J	0.71 J	4.67 U	0.35 J	4.77 U	3.98 U	4.15 U	4.98 U	3.39 U	6.75 U
R-OS	3	1	0.87 J	0.93 J	0.55 J	0.60 J	0.51 J	0.41 J	2.92 U	0.43 J	0.46 J	0.63 J
R-OS	4	3	0.81 J	0.92 J	0.45 J	0.71 J	7.39 U	6.16 U	6.42 U	7.72 U	5.25 U	10.46 U
R-OS	5	1	0.70 J	0.67 J	3.25 U	0.28 J	3.32 U	2.76 U	2.88 U	3.46 U	2.35 U	4.69 U
C-SB	1	4	1.63 J	1.75 J	0.44 J	0.84 J	3.56 U	2.97 U	3.09 U	3.71 U	2.53 U	5.04 U
C-SB	2	3	2.46 J	2.38 J	1.82 J	1.62 J	0.77 J	0.52 J	13.09 U	15.72 U	10.70 U	21.32 U
C-SB	3	2	1.22 J	1.79 J	3.31 U	0.87 J	3.38 U	2.82 U	2.94 U	3.53 U	2.40 U	4.78 U
C-SB	4	1	1.32 J	1.73 J	4.85 U	0.82 J	4.95 U	4.12 U	4.30 U	5.16 U	3.51 U	7.00 U
C-SB	5	1	1.34 J	2.16 J	5.65 U	1.04 J	5.77 U	4.81 U	5.01 U	6.02 U	4.09 U	8.16 U
C-NE	1	4	0.67 J	0.81 J	0.29 J	0.44 J	3.20 U	2.66 U	2.78 U	3.34 U	2.27 U	4.52 U
C-NE	2	1	1.90 J	2.11 J	1.16 J	1.46 J	1.21 J	1.12 J	0.88 J	1.05 J	0.98 J	1.06 J
C-NE	3 Rep 1	2	2.21 J	3.16 J	19.22 U	13.45 U	19.62 U	16.35 U	17.05 U	20.48 U	13.93 U	27.77 U
C-NE	3 Rep 2	2	12.98 U	15.89 U	22.29 U	15.60 U	22.76 U	18.97 U	19.77 U	23.76 U	16.16 U	32.21 U
C-NE	3 Rep 3	2	1.34 J	1.52 J	12.20 U	8.54 U	12.45 U	10.38 U	10.82 U	13.00 U	8.84 U	17.63 U
C-NE	4	3	0.70 J	0.79 J	0.20 J	0.47 J	0.20 J	0.11 J	2.47 U	2.96 U	2.02 U	4.02 U
C-NE	5 Rep 1	3	1.32 J	1.32 J	1.47 J	0.78 J	13.01 U	10.85 U	11.31 U	13.58 U	9.24 U	18.41 U
C-NE	5 Rep 2	3	1.93 J	1.66 J	1.81 J	1.25 J	14.55 U	12.13 U	12.64 U	15.19 U	10.33 U	20.59 U
C-NE	5 Rep 3	3	0.90 J	1.11 J	0.88 J	0.62 J	8.63 U	7.20 U	7.50 U	9.01 U	6.13 U	12.22 U

TABLE J.3. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* HPAH (µg/kg wet weight)										
			Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
Background	1 Rep 1	1	1.12 J	1.43 J	7.23 U	0.46 J	7.38 U	6.16 U	6.42 U	7.71 U	5.24 U	10.45 U
Background	1 Rep 2	1	1.45 J	1.33 J	9.58 U	0.55 J	9.78 U	8.15 U	8.50 U	10.21 U	6.95 U	13.84 U
Background	1 Rep 3	1	1.60 J	1.71 J	9.66 U	0.73 J	9.86 U	8.22 U	8.56 U	10.29 U	7.00 U	13.95 U
Background	2	4	1.40 J	5.28 J	1.15 J	0.56 J	2.12 J	8.38 U	8.73 U	10.49 U	7.14 U	14.22 U
Background	3	4	1.26 J	1.64 J	0.54 J	0.82 J	3.52 U	2.93 U	3.06 U	3.67 U	2.50 U	4.98 U
Background	4	4	1.31 J	1.18 J	0.32 J	0.45 J	0.12 J	0.10 J	2.48 U	2.98 U	2.03 U	4.04 U
Background	5 Rep 1	4	1.50 J	1.51 J	0.93 J	0.80 J	8.28 U	6.90 U	7.19 U	8.64 U	5.88 U	11.71 U
Background	5 Rep 2	4	1.52 J	1.58 J	1.10 J	0.70 J	8.35 U	6.96 U	7.25 U	8.71 U	5.93 U	11.81 U
Background	5 Rep 3	4	1.20 J	0.99 J	0.43 J	0.39 J	4.49 U	3.74 U	3.90 U	4.68 U	3.19 U	6.35 U

(a) DL Detection limit.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) U Analyte was not present above the level of associated value.

TABLE J.4. Total Detected Polynuclear Aromatic Hydrocarbons (PAH), Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* PAH (µg/kg dry weight) Total Detected LPAH	Total Detected HPAH	Total Detected PAH
COMP WR-1	1	3	57.8	14.8	72.6
COMP WR-1	2	1	45.7	47.3	93.0
COMP WR-1	3	3	26.1	19.7	45.8
COMP WR-1	4	3	26.7	9.5	36.2
COMP WR-1	5	2	71.8	20.7	92.5
COMP WR-2	1	2	195.6	19.9	215.5
COMP WR-2	2	2	67.4	7.8	75.2
COMP WR-2	3	3	26.1	7.5	33.6
COMP WR-2	4	2	86.0	10.4	96.4
COMP WR-2	5	3	31.9	12.2	44.1
COMP PS-1	1	2	101.1	8.3	109.4
COMP PS-1	2	2	84.7	7.2	91.9
COMP PS-1	3	3	31.1	47.9	79.0
COMP PS-1	4	1	63.6	14.4	78.0
COMP PS-1	5	3	41.3	13.2	54.5
COMP PS-2	1	1	41.9	39.9	81.8
COMP PS-2	2	3	35.7	14.9	50.6
COMP PS-2	3	1	57.2	27.8	85.0
COMP PS-2	4	4	25.8	32.2	58.0
COMP PS-2	5	4	26.9	28.0	54.9
COMP PS-3	1	1	57.2	24.3	81.5
COMP PS-3	2	3	45.2	28.8	74.0
COMP PS-3	3	2	53.6	12.4	66.0
COMP PS-3	4	2	63.6	14.9	78.5
COMP PS-3	5	2	55.3	9.4	64.7
COMP PS-4	1	1	64.5	34.7	99.2
COMP PS-4	2	1	35.3	26.7	62.0
COMP PS-4	3	4	32.8	32.7	65.5
COMP PS-4	4	4	34.4	23.2	57.6
COMP PS-4	5	2	74.2	28.3	102.5
COMP CS-1	1	3	36.8	26.9	63.7
COMP CS-1	2	1	52.7	31.5	84.2
COMP CS-1	3	4	35.2	25.7	60.9
COMP CS-1	4	4	34.0	21.6	55.6
COMP CS-1	5	2	80.0	28.4	108.4

TABLE J.4. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* PAH (µg/kg dry weight) Total Detected LPAH	Total Detected HPAH	Total Detected PAH
R-BF	1	2	81.9	73.9	155.8
R-BF	2	2	57.4	58.3	115.7
R-BF	3	4	29.9	63.9	93.8
R-BF	4	2	60.3	59.9	120.2
R-BF	5	4	32.4	65.1	97.5
R-OS	1	4	29.2	11.3	40.5
R-OS	2	1	52.8	12.4	65.2
R-OS	3	1	62.5	32.3	94.8
R-OS	4	3	40.3	15.6	55.9
R-OS	5	1	45.2	9.8	55.0
C-SB	1	4	25.1	25.3	50.4
C-SB	2	3	78.4	52.8	131.2
C-SB	3	2	27.3	21.4	48.7
C-SB	4	1	46.5	21.4	67.9
C-SB	5	1	61.1	28.1	89.2
C-NE	1	4	22.9	11.9	34.8
C-NE	2	1	89.6	74.8	164.4
C-NE	3 Rep 1	2	191.7	30.0	221.7
C-NE	3 Rep 2	2	398.9	72.6	471.5
C-NE	3 Rep 3	2	164.7	16.0	180.7
C-NE	4	3	24.1	13.7	37.8
C-NE	5 Rep 1	3	82.2	29.6	111.8
C-NE	5 Rep 2	3	80.1	40.2	120.3
C-NE	5 Rep 3	3	56.1	21.2	77.3
Background	1 Rep 1	1	102.8	24.1	126.9
Background	1 Rep 2	1	102.5	26.7	129.2
Background	1 Rep 3	1	151.2	32.3	183.5
Background	2	4	69.2	85.6	154.8
Background	3	4	46.5	34.4	80.9
Background	4	4	49.8	24.9	74.7
Background	5 Rep 1	4	54.7	29.2	83.9
Background	5 Rep 2	4	73.6	30.2	103.8
Background	5 Rep 3	4	44.7	18.6	63.3

TABLE J.5. Low Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAH), Dry Weight, in Tissues of *N. caecoides*, John F. Baldwin Ship Channel Program

Se Ir	Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* LPAH (µg/kg dry weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
C(	COMP WR-1	1	3	17.55	40.51	38.97 U[a]	21.08 U	2.79 J[b]	12.82 J	1.65 J
C(	COMP WR-1	2	1	14.22	26.09 J	37.13 U	20.11 U	3.94 J	15.68 J	16.39 U
C(	COMP WR-1	3	3	17.25	17.62 J	35.83 U	19.36 U	1.91 J	6.55 J	15.83 U
C(	COMP WR-1	4	3	17.28	16.84 J	29.63 U	16.03 U	1.62 J	7.41 J	0.81 J
C(	COMP WR-1	5	2	14.96	46.26	43.92 U	23.7[illegible] U	25.60 U	25.53	19.39 U
C(	COMP WR-2	1	2	16.78	133.85 J	140.41 U	75.98 U	82.00 U	61.74 J	62.04 U
C(	COMP WR-2	2	2	17.67	44.26 J	49.24 U	26.66 U	28.75 U	23.15	21.79 U
C(	COMP WR-2	3	3	18.32	16.43 J	35.86 U	19.43 U	2.29 J	7.42 J	15.88 U
C(	COMP WR-2	4	2	18.75	53.39 J	61.44 U	33.23 U	35.89 U	32.64	27.15 U
C(	COMP WR-2	5	3	17.16	23.89 J	39.63 U	21.45 U	23.14 U	7.98 J	17.48 U
C(	COMP PS-1	1	2	16.94	66.41	62.99 U	34.12 U	36.78 U	34.71	27.86 U
C(	COMP PS-1	2	2	18.16	56.39 J	59.58 U	32.21 U	34.80 U	28.30	26.32 U
C(	COMP PS-1	3	3	17.83	18.06 J	39.71 U	21.48 U	3.14 J	8.47 J	1.40 J
C(	COMP PS-1	4	1	16.03	40.11 J	51.47 U	27.89 U	6.24 J	17.22 J	22.77 U
C(	COMP PS-1	5	3	17.51	28.44 J	58.77 U	31.81 U	2.74 J	10.17 J	25.99 U
C(	COMP PS-2	1	1	16.58	22.56 J	33.17 U	17.97 U	5.37 J	13.93 J	14.66 U
C(	COMP PS-2	2	3	17.87	25.46	23.89 U	12.93 U	2.01 J	8.23 J	10.58 U
C(	COMP PS-2	3	1	16.48	33.43 J	48.85 U	26.46 U	6.43 J	17.35 J	21.60 U
C(	COMP PS-2	4	4	17.53	14.83 J	27.84 U	15.06 U	2.05 J	8.96 J	12.32 U
C(	COMP PS-2	5	4	17.44	14.97 J	35.67 U	19.32 U	3.78 J	8.20 J	15.77 U
C(	COMP PS-3	1	1	17.89	35.66	37.84 U	20.46 U	5.37 J	16.21 J	16.71 U
C(	COMP PS-3	2	3	16.52	30.08 J	50.73 U	27.42 U	3.93 J	9.56 J	1.57 J
C(	COMP PS-3	3	2	18.11	35.62 J	43.57 U	23.58 U	25.40 U	17.95 J	19.22 U
C(	COMP PS-3	4	2	18.42	38.55 J	39.79 U	21.55 U	23.24 U	25.03	17.59 U
C(	COMP PS-3	5	2	18.04	38.08 J	51.39 U	27.77 U	29.99 U	17.24 J	22.67 U
C(	COMP PS-4	1	1	16.15	33.75 J	39.44 U	21.36 U	6.87 J	23.84	17.40 U
C	COMP PS-4	2	1	16.76	20.11 J	26.97 U	14.62 U	2.86 J	12.35	11.93 U
C	COMP PS-4	3	4	16.47	19.79 J	40.98 U	22.16 U	4.13 J	8.86 J	18.09 U
C	COMP PS-4	4	4	16.54	18.62 J	28.05 U	3.26 J	2.90 J	8.83 J	0.79 J
C	COMP PS-4	5	2	17.24	45.88	41.13 U	22.27 U	3.13 J	25.17	18.16 U
C	COMP CS-1	1	3	16.02	20.97 J	45.32 U	24.53 U	3.93 J	10.61 J	1.25 J
C	COMP CS-1	2	1	17.13	30.01 J	40.34 U	21.83 U	5.37 J	17.34 J	17.81 U
C	COMP CS-1	3	4	17.36	20.33 J	39.69 U	21.49 U	3.86 J	11.00 J	17.51 U
C	COMP CS-1	4	4	18.12	20.81 J	36.64 U	19.81 U	3.20 J	9.16 J	0.83 J
C	COMP CS-1	5	2	17.96	53.01 J	52.39 U	28.34 U	30.57 U	26.95	23.16 U
R	R-BF	1	2	18.14	54.52	45.53 U	24.64 U	26.57 U	27.34	20.12 U
R	R-BF	2	2	18.41	36.61 J	46.55 U	25.20 U	27.21 U	20.75 J	20.59 U
R	R-BF	3	4	16.67	18.42 J	40.07 U	21.66 U	1.86 J	7.32 J	2.28 J
R	R-BF	4	2	18.04	36.81 J	37.47 U	20.29 U	21.90 U	23.45	16.57 U
R	R-BF	5	4	17.36	20.05 J	52.02 U	28.17 U	30.36 U	9.22 J	3.11 J
R	R-OS	1	4	17.06	19.28 J	36.75 U	19.87 U	2.58 J	7.39 J	16.24 U
R	R-OS	2	1	14.40	32.22 J	43.89 U	23.75 U	5.35 J	15.21 J	19.38 U
R	R-OS	3	1	16.71	25.61 J	3.23 J	5.63 J	5.15 J	20.05	2.81 J
R	R-OS	4	3	18.54	32.20 J	52.80 U	28.59 U	30.85 U	8.09 J	23.35 U
R	R-OS	5	1	16.76	30.37	26.19 U	14.20 U	3.64 J	11.16 J	11.58 U

TABLE J.5. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* LPAH (µg/kg dry weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
C-SB	1	4	18.39	14.63 J	25.61 U	2.56 J	2.34 J	4.57 J	1.03 J
C-SB	2	3	18.13	58.08 J	110.04 U	59.57 U	64.26 U	16.77 J	3.53 J
C-SB	3	2	18.17	16.46 J	24.60 U	13.32 U	14.36 U	10.84 J	10.90 U
C-SB	4	1	18.07	30.27 J	36.25 U	19.65 U	3.76 J	12.51 J	16.05 U
C-SB	5	1	16.14	39.34 J	47.34 U	25.59 U	5.58 J	16.17 J	20.94 U
C-NE	1	4	18.64	11.64 J	22.69 U	12.29 U	2.20 J	8.26 J	0.80 J
C-NE	2	1	17.28	34.90 J	5.09 J	8.62 J	11.92 J	21.47 J	7.64 J
C-NE	3 Rep 1	2	17.88	118.29 J	145.30 U	78.64 U	84.84 U	73.38	64.21 U
C-NE	3 Rep 2	2	17.88	295.53	168.57 U	91.22 U	98.43 U	103.36	74.50 U
C-NE	3 Rep 3	2	17.88	112.42	92.28 U	49.94 U	53.86 U	52.24	40.77 U
C-NE	4	3	18.01	11.16 J	20.88 U	11.27 U	2.44 J	9.66	0.83 J
C-NE	5 Rep 1	3	16.53	58.68 J	104.23 U	56.44 U	5.99 J	15.49 J	2.00 J
C-NE	5 Rep 2	3	16.53	54.93 J	116.58 U	63.10 U	4.90 J	16.45 J	3.81 J
C-NE	5 Rep 3	3	16.53	38.90 J	69.21 U	37.45 U	4.23 J	11.62 J	1.33 J
Background	1 Rep 1	1	12.49	61.01 J	78.30 U	42.35 U	11.29 J	30.50 J	34.59 U
Background	1 Rep 2	1	12.49	66.37 J	103.68 U	56.12 U	60.61 U	36.11 J	45.80 U
Background	1 Rep 3	1	12.49	99.20 J	104.56 U	56.53 U	13.61 J	38.35 J	46.20 U
Background	2	4	14.62	40.49 J	91.04 U	49.25 U	8.55 J	20.18 J	40.22 U
Background	3	4	12.38	18.50 J	37.64 U	20.36 U	6.79 J	21.24	16.64 U
Background	4	4	13.97	19.97 J	27.06 U	3.72 J	7.02 J	17.75	1.36 J
Background	5 Rep 1	4	16.22	26.57 J	67.57 U	3.64 J	6.47 J	16.46 J	1.60 J
Background	5 Rep 2	4	16.22	38.66 J	68.19 U	5.24 J	5.67 J	22.07 J	1.91 J
Background	5 Rep 3	4	16.22	20.53 J	36.62 U	3.58 J	4.62 J	14.67 J	1.29 J

(a) U Analyte was not present above the level of associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE J.6. High Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAH), Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* HPAH (µg/kg dry weight)									
				Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
COMP WR-1	1	3	17.55	4.62 J[a]	7.35 J	28.83 U[b]	2.79 J	29.40 U	24.50 U	25.58 U	30.71 U	20.91 U	41.65 U
COMP WR-1	2	1	14.22	7.88 J	10.13 J	2.74 J	5.27 J	5.98 J	4.36 J	24.33 U	4.08 J	2.46 J	4.36 J
COMP WR-1	3	3	17.25	4.70 J	7.19 J	4.46 J	3.36 J	27.01 U	22.55 U	23.48 U	28.23 U	19.19 U	38.26 U
COMP WR-1	4	3	17.28	2.55 J	5.21 J	21.93 U	1.74 J	22.40 U	18.69 U	19.44 U	23.38 U	15.91 U	31.71 U
COMP WR-1	5	2	14.96	5.95 J	9.56 J	32.49 U	5.15 J	33.16 U	27.61 U	28.81 U	34.63 U	23.53 U	46.93 U
COMP WR-2	1	2	16.78	10.01 J	9.89 J	103.81 U	72.71 U	106.02 U	88.38 U	92.13 U	110.67 U	75.27 U	150.00 U
COMP WR-2	2	2	17.67	3.90 J	3.85 J	36.39 U	25.47 U	37.18 U	31.01 U	32.31 U	38.82 U	26.37 U	52.63 U
COMP WR-2	3	3	18.32	3.00 J	3.00 J	26.53 U	1.47 J	27.07 U	22.60 U	23.53 U	28.28 U	19.27 U	38.37 U
COMP WR-2	4	2	18.75	5.71 J	4.69 J	45.44 U	31.79 U	46.40 U	38.67 U	40.32 U	48.43 U	32.96 U	65.65 U
COMP WR-2	5	3	17.16	3.50 J	3.61 J	3.38 J	1.75 J	29.90 U	24.94 U	25.99 U	31.24 U	21.27 U	42.31 U
COMP PS-1	1	2	16.94	3.96 J	4.37 J	46.58 U	32.64 U	47.58 U	39.67 U	41.32 U	49.65 U	33.77 U	67.30 U
COMP PS-1	2	2	18.16	3.58 J	3.58 J	44.05 U	30.84 U	44.99 U	37.50 U	39.10 U	46.97 U	31.94 U	63.66 U
COMP PS-1	3	3	17.83	6.11 J	6.06 J	5.55 J	4.43 J	3.65 J	2.02 J	26.08 U	31.30 U	21.31 U	20.08 J
COMP PS-1	4	1	16.03	5.30 J	5.99 J	38.05 U	3.12 J	38.86 U	32.38 U	33.75 U	40.55 U	27.64 U	55.02 U
COMP PS-1	5	3	17.51	3.94 J	3.14 J	4.17 J	2.00 J	44.37 U	37.01 U	38.55 U	46.32 U	31.52 U	62.82 U
COMP PS-2	1	1	16.58	7.24 J	19.72	24.55 U	5.97 J	2.35 J	1.93 J	21.77 U	26.12 U	17.79 U	2.65 J
COMP PS-2	2	3	17.87	3.75 J	8.28 J	17.68 U	2.85 J	18.02 U	15.05 U	15.67 U	18.80 U	12.81 U	25.52 U
COMP PS-2	3	1	16.48	6.80 J	16.93 J	36.17 U	4.07 J	36.89 U	30.76 U	32.04 U	38.53 U	26.21 U	52.25 U
COMP PS-2	4	4	17.53	6.67 J	15.29	2.62 J	5.42 J	1.54 J	0.68 J	18.25 U	21.96 U	14.95 U	29.78 U
COMP PS-2	5	4	17.44	6.02 J	14.16 J	3.44 J	4.36 J	26.95 U	22.48 U	23.39 U	28.10 U	19.15 U	38.13 U
COMP PS-3	1	1	17.89	6.65 J	10.96 J	2.12 J	4.58 J	28.56 U	23.81 U	24.82 U	29.79 U	20.29 U	40.41 U
COMP PS-3	2	3	16.52	5.75 J	8.23 J	5.33 J	4.66 J	3.03 J	1.82 J	33.29 U	39.95 U	27.18 U	54.18 U
COMP PS-3	3	2	18.11	4.97 J	7.40 J	32.19 U	22.53 U	32.85 U	27.39 U	28.55 U	34.29 U	23.36 U	46.55 U
COMP PS-3	4	2	18.42	5.05 J	6.79 J	29.42 U	3.09 J	30.02 U	25.03 U	26.11 U	31.38 U	21.34 U	42.51 U
COMP PS-3	5	2	18.04	3.88 J	5.54 J	37.97 U	26.61 U	38.80 U	32.32 U	33.70 U	40.47 U	27.55 U	54.88 U
COMP PS-4	1	1	16.15	9.72 J	19.81 J	29.16 U	5.20 J	29.78 U	24.83 U	25.88 U	31.08 U	21.11 U	42.11 U
COMP PS-4	2	1	16.76	6.68 J	16.17	19.93 U	3.82 J	20.35 U	17.00 U	17.72 U	21.24 U	14.44 U	28.82 U
COMP PS-4	3	4	16.47	7.41 J	17.18 J	3.16 J	4.92 J	30.97 U	25.80 U	26.90 U	32.30 U	21.98 U	43.84 U
COMP PS-4	4	4	16.54	5.08 J	12.33 J	1.57 J	4.17 J	21.16 U	17.65 U	18.38 U	22.13 U	15.05 U	29.99 U
COMP PS-4	5	2	17.24	7.66 J	15.49 J	30.39 U	5.16 J	31.03 U	25.87 U	26.97 U	32.42 U	22.04 U	43.91 U

TABLE J.6. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* HPAH (µg/kg dry weight) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h]anthracene	Benzo[g,h,i]perylene
COMP CS-1	1	3	16.02	6.43 J	15.67 J	1.06 J	3.75 J	34.21 U	28.53 U	29.71 U	35.71 U	24.28 U	48.44 U
COMP CS-1	2	1	17.13	7.82 J	19.73 J	29.83 U	3.97 J	30.47 U	25.39 U	26.44 U	31.82 U	21.66 U	43.14 U
COMP CS-1	3	4	17.36	5.41 J	14.23 J	3.23 J	2.82 J	29.95 U	25.00 U	26.04 U	31.28 U	21.26 U	42.40 U
COMP CS-1	4	4	18.12	5.63 J	10.82 J	2.76 J	2.43 J	27.70 U	23.07 U	24.06 U	28.92 U	19.65 U	39.18 U
COMP CS-1	5	2	17.96	6.79 J	16.59 J	38.75 U	5.01 J	39.53 U	32.96 U	34.35 U	41.31 U	28.06 U	55.96 U
R-BF	1	2	18.14	16.15 J	43.77	33.68 U	14.00 J	34.34 U	28.67 U	29.88 U	35.89 U	24.42 U	48.62 U
R-BF	2	2	18.41	13.74 J	34.06	34.44 U	10.54 J	35.14 U	29.28 U	30.53 U	36.66 U	24.99 U	49.76 U
R-BF	3	4	16.67	12.72 J	32.99	2.76 J	11.88 J	2.34 J	1.20 J	26.27 U	31.55 U	21.48 U	42.83 U
R-BF	4	2	18.04	14.08 J	35.14	27.72 U	10.64 J	28.33 U	23.61 U	24.61 U	29.55 U	20.12 U	40.08 U
R-BF	5	4	17.36	14.63 J	35.71	3.17 J	11.64 J	39.29 U	32.72 U	34.10 U	41.01 U	27.88 U	55.59 U
R-OS	1	4	17.06	2.93 J	3.75 J	2.64 J	1.99 J	27.73 U	23.15 U	24.09 U	28.96 U	19.70 U	39.27 U
R-OS	2	1	14.40	5.07 J	4.93 J	32.43 U	2.43 J	33.12 U	27.64 U	28.82 U	34.58 U	23.54 U	46.88 U
R-OS	3	1	16.71	5.21 J	5.57 J	3.29 J	3.59 J	3.05 J	2.45 J	17.47 U	2.57 J	2.75 J	3.77 J
R-OS	4	3	18.54	4.37 J	4.96 J	2.43 J	3.83 J	39.86 U	33.23 U	34.63 U	41.64 U	28.32 U	56.42 U
R-OS	5	1	16.76	4.18 J	4.00 J	19.39 U	1.67 J	19.81 U	16.47 U	17.18 U	20.64 U	14.02 U	27.98 U
C-SB	1	4	18.39	8.86 J	9.52 J	2.39 J	4.57 J	19.36 U	16.15 U	16.80 U	20.17 U	13.76 U	27.41 U
C-SB	2	3	18.13	13.57 J	13.13 J	10.04 J	8.94 J	4.25 J	2.87 J	72.20 U	86.71 U	59.02 U	117.60 U
C-SB	3	2	18.17	6.71 J	9.85 J	18.22 U	4.79 J	18.60 U	15.52 U	16.18 U	19.43 U	13.21 U	26.31 U
C-SB	4	1	18.07	7.30 J	9.57 J	26.84 U	4.54 J	27.39 U	22.80 U	23.80 U	28.56 U	19.42 U	38.74 U
C-SB	5	1	16.14	8.30 J	13.38 J	35.01 U	6.44 J	35.75 U	29.80 U	31.04 U	37.30 U	25.34 U	50.56 U
C-NE	1	4	18.64	3.59 J	4.35 J	1.56 J	2.36 J	17.17 U	14.27 U	14.91 U	17.92 U	12.18 U	24.25 U
C-NE	2	1	17.28	11.00 J	12.21 J	6.71 J	8.45 J	7.00 J	6.48 J	5.09 J	6.08 J	5.67 J	6.13 J
C-NE	3 Rep 1	2	17.88	12.36 J	17.67 J	107.49 U	75.22 U	109.73 U	91.44 U	95.36 U	114.54 U	77.91 U	155.31 U
C-NE	3 Rep 2	2	17.88	72.60 U	88.87 U	124.66 U	87.25 U	127.29 U	106.10 U	110.57 U	132.89 U	90.38 U	180.15 U
C-NE	3 Rep 3	2	17.88	7.49 J	8.50 J	68.23 U	47.76 U	69.63 U	58.05 U	60.51 U	72.71 U	49.44 U	98.60 U
C-NE	4	3	18.01	3.89 J	4.39 J	1.11 J	2.61 J	1.11 J	0.61 J	13.71 U	16.44 U	11.22 U	22.32 U
C-NE	5 Rep 1	3	16.53	7.99 J	7.99 J	8.89 J	4.72 J	78.71 U	65.64 U	68.42 U	82.15 U	55.90 U	111.37 U
C-NE	5 Rep 2	3	16.53	11.68 J	10.04 J	10.95 J	7.56 J	88.02 U	73.38 U	76.47 U	91.89 U	62.49 U	124.56 U
C-NE	5 Rep 3	3	16.53	5.44 J	6.72 J	5.32 J	3.75 J	52.21 U	43.56 U	45.37 U	54.51 U	37.08 U	73.93 U

TABLE J.6. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* HPAH (µg/kg dry weight)										
				Fluoranthene	Pyrene	Benzo[a]-anthracene	Chrysene	Benzo[b]-fluoranthene	Benzo[k]-fluoranthene	Benzo[a]-pyrene	Indeno-[1,2,3-c,d]-pyrene	Dibenzo-[a,h]-anthracene	Benzo-[g,h,i]-perylene
Background	1 Rep 1	1	12.49	8.97 J	11.45 J	57.89 U	3.68 J	59.09 U	49.32 U	51.40 U	61.73 U	41.95 U	83.67 U
Background	1 Rep 2	1	12.49	11.61 J	10.65 J	76.70 U	4.40 J	78.30 U	65.25 U	68.05 U	81.75 U	55.64 U	110.81 U
Background	1 Rep 3	1	12.49	12.81 J	13.69 J	77.34 U	5.84 J	78.94 U	65.81 U	68.53 U	82.39 U	56.04 U	111.69 U
Background	2	4	14.62	23.26 J	36.11 J	7.87 J	3.83 J	14.50 J	57.32 U	59.71 U	71.75 U	48.84 U	97.26 U
Background	3	4	12.38	10.18 J	13.25 J	4.36 J	6.62 J	28.43 U	23.67 U	24.72 U	29.64 U	20.19 U	40.23 U
Background	4	4	13.97	9.38 J	8.45 J	2.29 J	3.22 J	0.86 J	0.72 J	17.75 U	21.33 U	14.53 U	28.92 U
Background	5 Rep 1	4	16.22	9.25 J	9.31 J	5.73 J	4.93 J	51.05 U	42.54 U	44.33 U	53.27 U	36.25 U	72.19 U
Background	5 Rep 2	4	16.22	9.37 J	9.74 J	6.78 J	4.32 J	51.48 U	42.91 U	44.70 U	53.70 U	36.56 U	72.81 U
Background	5 Rep 3	4	16.22	7.40 J	6.10 J	2.65 J	2.40 J	27.68 U	23.06 U	24.04 U	28.85 U	19.67 U	39.15 U

(a) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(b) U Analyte was not present above the level of associated value.

TABLE J.7. Quality Control Data for Low Weight Polynuclear Aromatic Hydrocarbons (LPAH), in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Method Blanks								
Blank 1		1	2.46 J[a]	6.67 U[b]	3.61 U	3.89 U	1.05 J	2.95 U
Blank 2		2	8.42 J	9.27 U	5.01 U	5.41 U	5.08	4.09 U
Blank 3		3	3.64 J	7.45 U	4.03 U	4.35 U	0.66 J	3.29 U
Blank 4		4	2.56 J	6.08 U	3.29 U	3.55 U	0.56 J	2.69 U
Matrix Spikes								
C-NE	2	1	6.03 J	0.88 J	1.49 J	2.06 J	3.71 J	1.32 J
C-NE MS	2	1	1377.93	1420.78	1384.93	1421.56	1396.34	1379.67
Concentration Recovered			1371.90	1419.90	1383.44	1419.50	1392.63	1378.35
Amount Spiked			1419.92	1419.92	1419.92	1419.92	1419.92	1419.92
Percent Recovery			97%	100%	97%	100%	98%	97%
C-NE	2	1	6.03 J	0.88 J	1.49 J	2.06 J	3.71 J	1.32 J
C-NE MSD	2	1	1462.77	1504.13	1470.84	1500.24	1468.82	1442.49
Concentration Recovered			1456.74	1503.25	1469.35	1498.18	1465.11	1441.17
Amount Spiked			1488.69	1488.69	1488.69	1488.69	1488.69	1488.69
Percent Recovery			98%	101%	99%	101%	98%	97%
RPD			1%	1%	2%	1%	0%	0%
I-STAT			0.01	0.01	0.01	0.01	0.00	0.00
COMP WR-2	1	2	22.46 J	23.56 U	12.75 U	13.76 U	10.36 J	10.41 U
COMP WR-2 MS	1	2	2527.28	2882.67	2772.93	2804.98	2637.07	2709.52
Concentration Recovered			2504.82	2882.67	2772.93	2804.98	2626.71	2709.52
Amount Spiked			2393.11	2393.11	2393.11	2393.11	2393.11	2393.11
Percent Recovery			105%	120%	116%	117%	110%	113%
COMP WR-2	1	2	22.46 J	23.56 U	12.75 U	13.76 U	10.36 J	10.41 U
COMP WR-2 MSD	1	2	2307.54	2625.59	2488.34	2535.72	2427.10	2494.39
Concentration Recovered			2285.08	2625.59	2488.34	2535.72	2416.74	2494.39
Amount Spiked			2194.27	2194.27	2194.27	2194.27	2194.27	2194.27
Percent Recovery			104%	120%	113%	116%	110%	114%
RPD			1%	0%	3%	1%	0%	1%
I-STAT			0.00	0.00	0.01	0.01	0.00	0.00
C-SB	2	3	10.53 J	19.95 U	10.80 U	11.65 U	3.04 J	0.64 J
C-SB MS	2	3	942.60	959.67	913.33	915.29	970.48	936.95
Concentration Recovered			932.07	959.67	913.33	915.29	967.44	936.31
Amount Spiked			938.67	938.67	938.67	938.67	938.67	938.67
Percent Recovery			99%	102%	97%	98%	103%	100%
C-SB	2	3	10.53 J	19.95 U	10.80 U	11.65 U	3.04 J	0.64 J
C-SB MSD	2	3	615.91	615.00	598.81	602.13	653.12	640.67
Concentration Recovered			605.38	615.00	598.81	602.13	650.08	640.03
Amount Spiked			619.32	619.32	619.32	619.32	619.32	619.32
Percent Recovery			98%	99%	97%	97%	105%	103%
RPD			1%	3%	0%	1%	2%	3%
I-STAT			0.01	0.01	0.00	0.01	0.01	0.02

TABLE J.7. (contd)

N. crassidens LPAH (µg/kg wet weight)

Sediment Treatment	Replicate	Batch	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Background	2	4	5.92 J	13.31 U	7.20 U	1.25 J	2.95 J	5.88 U
Background MS	2	4	463.36	528.52	464.05	474.36	497.89	493.06
Concentration Recovered			457.44	526.52	464.05	473.11	494.94	493.06
Amount Spiked			491.16	491.16	491.16	491.16	491.16	491.16
Percent Recovery			93%	107%	94%	96%	101%	100%
Background	2	4	5.92 J	13.31 U	7.20 U	1.25 J	2.95 J	5.88 U
Background MSD	2	4	357.64	410.08	353.88	360.88	380.10	344.89
Concentration Recovered			351.72	410.08	353.88	359.63	377.15	344.89
Amount Spiked			372.67	372.67	372.67	372.67	372.67	372.67
Percent Recovery			94%	110%	95%	97%	101%	92%
RPD			1%	3%	1%	1%	0%	8%
I-STAT			0.01	0.01	0.00	0.01	0.00	0.04
Blank Spikes								
Blank Spike 1		3	1457.33	1472.79	1431.66	1454.17	1590.47	1554.2
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			97%	98%	95%	97%	106%	104%
Blank Spike 2		4	1418.48	1466.95	1422.63	1457.98	1608.44	1593.67
Amount Spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			95%	98%	95%	97%	107%	106%
Standard Reference Material								
Certified Value			NC[c]	NC	NC	NC	5.6 ±1.44	0.75 ±0.21
SRM NIST1974		1	NA[d]	NA	NA	NA	5.32	2.34[e]
SRM NIST1974		2	NA	NA	NA	NA	6.36	1.05 J[e]
SRM NIST1974		3	NA	NA	NA	NA	5.19	1.81[e]
SRM NIST1974		4	NA	NA	NA	NA	5.43	1.34 J[e]
Analytical Replicates								
C-NE	3 Rep 1	2	21.15 J	25.98 U	14.06 U	15.17 U	13.12	11.48 U
C-NE	3 Rep 2	2	52.84	30.14 U	16.31 U	17.60 U	18.48	13.32 U
C-NE	3 Rep 3	2	20.10	16.50 U	8.93 U	9.63 U	9.34	7.29 U
RSD			59%[f]	NA	NA	NA	34%[f]	NA
C-NE	5 Rep 1	3	9.70 J	17.23 U	9.33 U	0.99 J	2.56 J	0.33 J
C-NE	5 Rep 2	3	9.08 J	19.27 U	10.43 U	0.81 J	2.72 J	0.63 J
C-NE	5 Rep 3	3	6.43 J	11.44 U	6.19 U	0.70 J	1.92 J	0.22 J
RSD			21%	NA	NA	18%	18%	54%[f]
Background	1 Rep 1	1	7.62 J	9.78 U	5.29 U	1.41 J	3.81 J	4.32 U
Background	1 Rep 2	1	8.29 J	12.95 U	7.01 U	7.57 U	4.51 J	5.72 U
Background	1 Rep 3	1	12.39 J	13.06 U	7.06 U	1.70 J	4.79 J	5.77 U
RSD			27%	NA	NA	NA	12%	NA

TABLE J.7. (contd)

Sediment treatment	Replicate	Batch	*N. caecoides* LPAH (µg/kg wet weight) Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene
Background	5 Rep 1	4	4.31 J	10.98 U	0.59 J	1.05 J	2.67 J	0.26 J
Background	5 Rep 2	4	6.27 J	11.06 U	0.85 J	0.92 J	3.58 J	0.31 J
Background	5 Rep 3	4	3.33 J	5.94 U	0.58 J	0.75 J	2.38 J	0.21 J
RSF			32%(f)	NA	23%	17%	22%	19%

(a) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(b) U Analyte was not present above the level of associated value.
(c) NC Not certified.
(d) NA Not applicable
(e) Value varies ≥30% from certified value.
(f) Value exceeds relative precision goal of ≤30%.

TABLE J.8. Quality Control Data for High Molecular Polynuclear Aromatic Hydrocarbons (HPAH), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* HPAH (wet weight µg/kg) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h,]anthracene	Benzo[g,h,i]perylene
Method blanks												
Blank 1		1	2.87 U[a]	3.51 U	4.93 U	3.45 U	5.03 U	4.20 U	4.37 U	5.25 U	3.57 U	7.12 U
Blank 2		2	1.23 J[b]	2.86 J	6.85 U	4.80 U	7.00 U	5.83 U	6.08 U	7.30 U	4.97 U	9.90 U
Blank 3		3	0.27 J	0.30 J	5.51 U	3.86 U	5.62 U	4.69 U	4.89 U	5.87 U	3.99 U	7.96 U
Blank 4		4	2.62 U	0.72 J	0.55 J	0.49 J	4.59 U	3.83 U	3.99 U	4.79 U	3.26 U	6.49 U
Matrix spikes												
C-NE	2	1	1.90 J	2.11 J	1.16 J	1.46 J	1.21 J	1.12 J	0.88 J	1.05 J	0.98 J	1.06 J
C-NE MS	2	1	1384.84	1373.15	NA[c]	1409.80	1433.21	1477.25	1354.13	1431.95	1500.22	1322.86
Concentration Recovered			1382.94	1371.04	NA	1408.34	1432.00	1476.13	1353.25	1430.90	1499.24	1321.80
Amount Spiked			1419.92	1419.92	NS[d]	1419.92	1419.92	1419.92	1419.92	1419.92	1419.92	1419.92
Percent Recovery			97%	97%	NA	99%	101%	104%	95%	101%	106%	93%
C-NE	2	1	1.90 J	2.11 J	1.16 J	1.46 J	1.21 J	1.12 J	0.88 J	1.05 J	0.98 J	1.06 J
C-NE MSD	2	1	1457.59	1433.94	NA	1480.66	1568.87	1513.80	1431.78	1509.05	1571.66	1407.53
Concentration Recovered			1455.69	1431.83	NA	1479.20	1567.66	1512.68	1430.90	1508.00	1570.68	1406.47
Amount Spiked			1488.69	1488.69	NS	1488.69	1488.69	1488.69	1488.69	1488.69	1488.69	1488.69
Percent Recovery			98%	96%	NA	99%	105%	102%	96%	101%	106%	94%
RPD			0%	0%	NA	0%	4%	2%	1%	1%	0%	1%
I-STAT			0.00	0.00	NA	0.00	0.02	0.01	0.00	0.00	0.00	0.01
COMP WR-2	1	2	1.68 J	1.66 J	17.42 U	12.20 U	17.79 U	14.83 U	15.46 U	18.57 U	12.63 U	25.17 U
COMP WR-2 MS	1	2	2549.90	2525.55	NA	2392.42	3182.30	3060.19	2846.66	3134.35	3332.44	2820.52
Concentration Recovered			2548.22	2523.89	NA	2392.42	3182.30	3060.19	2846.66	3134.35	3332.44	2820.52
Amount Spiked			2393.11	2393.11	NS	2393.11	2393.11	2393.11	2393.11	2393.11	2393.11	2393.11
Percent Recovery			106%	105%	NA	100%	133%[e]	128%[e]	119%	131%[e]	139%[e]	118%
COMP WR-2	1	2	1.68 J	1.66 J	17.42 U	12.20 U	17.79 U	14.83 U	15.46 U	18.57 U	12.63 U	25.17 U
COMP WR-2 MSD	1	2	2317.72	2290.30	NA	2166.28	3176.02	3019.44	2863.35	2768.64	2840.14	2810.20
Concentration Recovered			2316.04	2288.64	NA	2166.28	3176.02	3019.44	2863.35	2768.64	2840.14	2810.20
Amount Spiked			2194.27	2194.27	NS	2194.27	2194.27	2194.27	2194.27	2194.27	2194.27	2194.27
Percent Recovery			106%	104%	NA	99%	145%[e]	138%[e]	130%[e]	126%[e]	129%[e]	128%[e]
RPD			1%	1%	NA	1%	8%	7%	9%	4%	7%	8%
I-STAT			0.00	0.01	NA	0.01	0.04	0.04	0.05	0.02	0.04	0.04

TABLE J.8 . (contd)

N. caecoides HPAH (wet weight µg/kg)

Sediment Treatment	Replicate	Batch	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h,]anthracene	Benzo[g,h,i]perylene
C-SB	2	3	2.46 J	2.38 J	1.82 J	1.62 J	0.77 J	0.52 J	13.09 U	15.72 U	10.70 U	21.32 U
C-SB MS	2	3	976.00	972.49	1030.43	1019.14	1064.17	1160.16	1063.02	1154.56	1230.34	954.97
Concentration Recovered			973.54	970.11	1028.61	1017.52	1063.4	1159.64	1063.02	1154.56	1230.34	954.97
Amount Spiked			938.67	938.67	938.67	938.67	938.67	938.67	938.67	938.67	938.67	938.67
Percent Recovery			104%	103%	110%	108%	113%	124%(e)	113%	123%(e)	131%(e)	102%
C-SB	2	3	2.46 J	2.38 J	1.82 J	1.62 J	0.77 J	0.52 J	13.09 U	15.72 U	10.70 U	21.32 U
C-SB MSD	2	3	679.01	676.47	728.84	716.03	755.02	816.79	756.52	761.84	834.21	683.98
Concentration Recovered			676.55	674.09	727.02	714.41	754.25	816.27	756.52	761.84	834.21	683.98
Amount Spiked			619.32	619.32	619.32	619.32	619.32	619.32	619.32	619.32	619.32	619.32
Percent Recovery			109%	109%	117%	115%	122%(e)	132%(e)	122%(e)	123%(e)	135%(e)	110%
RPD			5%	5%	7%	6%	7%	6%	8%	0%	3%	8%
I-STAT			0.03	0.03	0.03	0.03	0.04	0.03	0.04	0.00	0.01	0.04
Background	2	4	3.40 J	5.28 J	1.15 J	0.56 J	2.12 J	8.38 U	8.73 U	10.49 U	7.14 U	14.22 U
Background MS	2	4	490.71	487.29	548.35	482.75	612.67	497.31	508.88	498.33	575.46	529.31
Concentration Recovered			487.31	482.01	547.20	482.19	610.55	497.31	508.88	498.33	575.46	529.31
Amount Spiked			491.16	491.16	491.16	491.16	491.16	491.16	491.16	491.16	491.16	491.16
Percent Recovery			99%	98%	111%	98%	124%(e)	101%	104%	101%	117%	108%
Background	2	4	3.40 J	5.28 J	1.15 J	0.56 J	2.12 J	8.38 U	8.73 U	10.49 U	7.14 U	14.22 U
Background MSD	2	4	376.45	361.42	417.13	377.80	453.15	386.49	309.01	379.94	436.89	394.91
Concentration Recovered			373.05	356.14	415.98	377.24	451.03	386.49	309.01	379.94	436.89	394.91
Amount Spiked			372.67	372.67	372.67	372.67	372.67	372.67	372.67	372.67	372.67	372.67
Percent Recovery			100%	96%	112%	101%	121%(e)	104%	83%	102%	117%	106%
RPD			1%	3%	0%	3%	3%	2%	22%	0%	0%	2%
I-STAT			0.00	0.01	0.00	0.02	0.01	0.01	0.11	0.00	0.00	0.01
Blank Spikes												
Blank Spike 1		3	1676.41	1663.81	1764.47	1755.29	1740.55	1916.46	1656.09	1607.36	1646.23	1491.18
Amount spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			112%	111%	118%	117%	116%	128%	110%	107%	110%	99%
Blank Spike 2		4	1686.22	1678.28	1852.33	1655.42	1774.7	1753.52	1550.03	1138.89	1314.8	1485.87
Amount spiked			1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00	1500.00
Percent Recovery			112%	112%	123%	110%	118%	117%	103%	76%	88%	99%

TABLE J.8 . (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* HPAH (wet weight µg/kg) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h,]anthracene	Benzo[g,h,i]perylene
Standard Reference Material												
Certified Value			33.6 ±5.8	34.1 ±3.7	NC(f)	NC	6.5 ±1.2	NC	2.29(g) ±0.47	1.80(g) ±0.33	NC	2.47 ±0.28
SRM NIST1974		1	32.21	31.87	NA	NA	7.36	NA	2.42 J	2.29 J	NA	7.67(h)
SRM NIST1974		2	35.70	35.78	NA	NA	7.64	NA	1.61 J	2.96 U	NA	3.25J(h)
SRM NIST1974		3	33.02	34.00	NA	NA	6.20	NA	1.98 J	1.82 J	NA	2.20 J
SRM NIST1974		4	35.73	34.73	NA	NA	6.32	NA	2.37 U	2.96 U	NA	2.25 J
Analytical Replicates												
Background	2 Rep 1	1	1.12 J	1.43 J	7.23 U	0.46 J	7.38 U	6.16 U	6.42 U	7.71 U	5.24 U	10.45 U
Background	2 Rep 2	1	1.45 J	1.33 J	9.58 U	0.55 J	9.78 U	8.15 U	8.50 U	10.21 U	6.95 U	13.84 U
Background	2 Rep 3	1	1.60 J	1.71 J	9.66 U	0.73 J	9.86 U	8.22 U	8.56 U	10.29 U	7.00 U	13.95 U
RSD			18%	13%	NA	24%	NA	NA	NA	NA	NA	NA
C-NE	3 Rep 1	2	2.21 J	3.16 J	19.22 U	13.45 U	19.62 U	16.35 U	17.05 U	20.48 U	13.93 U	27.77 U
C-NE	3 Rep 2	2	12.98 U	15.89 U	22.29 U	15.60 U	22.76 U	18.97 U	19.77 U	23.76 U	16.16 U	32.21 U
C-NE	3 Rep 3	2	1.34 J	1.52 J	12.20 U	8.54 U	12.45 U	10.38 U	10.82 U	13.00 U	8.84 U	17.63 U
RSD			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C-NE	5 Rep 1	3	1.32 J	1.32 J	1.47 J	0.78 J	13.01 U	10.85 U	11.31 U	13.58 U	9.24 U	18.41 U
C-NE	5 Rep 2	3	1.93 J	1.66 J	1.81 J	1.25 J	14.55 U	12.13 U	12.64 U	15.19 U	10.33 U	20.59 U
C-NE	5 Rep 3	3	0.90 J	1.11 J	0.88 J	0.62 J	8.63 U	7.20 U	7.50 U	9.01 U	6.13 U	12.22 U
RSD			37%(i)	20%	34%(i)	37%(i)	NA	NA	NA	NA	NA	NA

TABLE J.8 . (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* HPAH (wet weight µg/kg) Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenzo[a,h,]anthracene	Benzo[g,h,i]perylene
Background	2 Rep 1	4	1.50 J	1.51 J	0.93 J	0.80 J	8.28 U	6.90 U	7.19 U	8.64 U	5.88 U	11.71 U
Background	2 Rep 2	4	1.52 J	1.58 J	1.10 J	0.70 J	8.35 U	6.96 U	7.25 U	8.71 U	5.93 U	11.81 U
Background	2 Rep 3	4	1.20 J	0.99 J	0.43 J	0.39 J	4.49 U	3.74 U	3.90 U	4.68 U	3.19 U	6.35 U
RSD			13%	24%	42%(i)	34%(i)	NA	NA	NA	NA	NA	NA

(a) U Analyte was not present above the level of associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) NA Not applicable.
(d) NS Not spiked.
(e) Value outside of quality control range of 40%-120%.
(f) NC Not certified.
(g) Certified value below established MDL.
(h) Value varies ≥30% from certified value.
(i) Value exceeds relative precision goal of ≤30%.

TABLE J.9. Surrogate Percent Recoveries for Polynuclear Aromatic Hydrocarbons (PAH) in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries		
			Naphtha-lene d8	Acenaph-thene d10	Benzo[a]-pyrene d12
COMP WR-1	1	3	77	63	72
COMP WR-1	2	1	66	65	64
COMP WR-1	3	3	65	58	67
COMP WR-1	4	3	72	65	71
COMP WR-1	5	2	67	69	50
COMP WR-2	1	2	71	75	57
COMP WR-2	2	2	70	78	57
COMP WR-2	3	3	82	66	75
COMP WR-2	4	2	72	68	59
COMP WR-2	5	3	70	61	67
COMP PS-1	1	2	67	72	49
COMP PS-1	2	2	71	77	54
COMP PS-1	3	3	70	62	71
COMP PS-1	4	1	65	64	61
COMP PS-1	5	3	75	68	71
COMP PS-2	1	1	65	65	64
COMP PS-2	2	3	67	57	63
COMP PS-2	3	1	67	66	64
COMP PS-2	4	4	72	71	80
COMP PS-2	5	4	71	66	70
COMP PS-3	1	1	72	68	59
COMP PS-3	2	3	71	63	71
COMP PS-3	3	2	70	69	65
COMP PS-3	4	2	69	67	58
COMP PS-3	5	2	64	69	44
COMP PS-4	1	1	66	66	63
COMP PS-4	2	1	66	63	62
COMP PS-4	3	4	73	68	73
COMP PS-4	4	4	78	72	76
COMP PS-4	5	2	67	72	52
COMP CS-1	1	3	80	63	76
COMP CS-1	2	1	63	62	59
COMP CS-1	3	4	75	71	77
COMP CS-1	4	4	75	69	78
COMP CS-1	5	2	72	72	57

TABLE J.9. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries: Naphthalene d8	Acenaphthene d10	Benzo[a]pyrene d12
R-BF	1	2	69	66	58
R-BF	2	2	69	67	59
R-BF	3	4	80	74	76
R-BF	4	2	66	66	56
R-BF	5	4	80	76	80
R-OS	1	4	72	68	70
R-OS	2	1	79	78	74
R-OS	3	1	75	73	71
R-OS	4	3	70	63	69
R-OS	5	1	64	67	69
C-SB	1	4	78	72	76
C-SB	2	3	71	65	74
C-SB	3	2	71	73	45
C-SB	4	1	75	76	70
C-SB	5	1	71	70	67
C-NE	1	4	75	70	74
C-NE	2	1	74	77	71
C-NE	3 Rep 1	2	60	61	42
C-NE	3 Rep 2	2	30[a]	31[a]	18[a]
C-NE	3 Rep 3	2	64	67	46
C-NE	4	3	77	66	72
C-NE	5 Rep 1	3	68	60	65
C-NE	5 Rep 2	3	72	62	71
C-NE	5 Rep 3	3	79	66	73
Background	1 Rep 1	1	76	77	76
Background	1 Rep 2	1	75	75	73
Background	1 Rep 3	1	73	74	73
Background	2	4	76	70	71
Background	3	4	69	68	72
Background	4	4	67	68	77
Background	5 Rep 1	4	80	73	75
Background	5 Rep 2	4	80	73	75
Background	5 Rep 3	4	76	70	73
Quality Control Samples					
Method Blanks					
Blank 1		1	75	77	77
Blank 2		2	69	69	49
Blank 3		3	71	65	60
Blank 4		4	78	68	79

TABLE J.9. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries: Naphthalene d8	Acenaphthene d10	Benzo[a]pyrene d12
Matrix Spikes					
C-NE	2	1	74	77	71
C-NE MS	2	1	80	85	80
C-NE MSD	2	1	78	82	78
COMP WR-2	1	2	71	75	57
COMP WR-2 MS	1	2	75	78	78
COMP WR-2 MSD	1	2	57	58	56
C-SB	2	3	71	65	74
C-SB MS	2	3	71	64	75
C-SB MSD	2	3	74	65	79
Background	2	4	76	70	71
Background MS	2	4	84	76	88
Background MSD	2	4	83	77	66
Blank Spikes					
Blank Spike 1		3	72	63	71
Blank Spike 2		4	78	67	85
Standard Reference Material					
Certified Value			NA[b]	NA	NA
SRM NIST1974		1	74	79	71
SRM NIST1974		2	70	79	56
SRM NIST1974		3	71	65	64
SRM NIST1974		4	78	74	20
Analytical Replicates					
C-NE	3 Rep 1	2	60	61	42
C-NE	3 Rep 2	2	30[a]	31[a]	18[a]
C-NE	3 Rep 3	2	64	67	46
C-NE	5 Rep 1	3	68	60	65
C-NE	5 Rep 2	3	72	62	71
C-NE	5 Rep 3	3	79	66	73
Background	1 Rep 1	1	76	77	76
Background	1 Rep 2	1	75	75	73
Background	1 Rep 3	1	73	74	73

TABLE J.9. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recoveries: Naphthalene d8	Acenaphthene d10	Benzo[a]pyrene d12
Background	5 Rep 1	4	80	73	75
Background	5 Rep 2	4	80	73	75
Background	5 Rep 3	4	76	70	73

(a) Surrogate recovery outside of quality control range (40% - 120%).
(b) NA Not applicable.

TABLE J.10. Chlorinated Pesticides, (alphabetical, Aldrin - 4,4'-DDT), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Target DL[a]			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Achieved DL High			1.819	1.862	1.862	1.862	0.947	5.334	1.256	2.539	3.915
Achieved DL Low			0.227	0.232	0.232	0.232	0.118	0.665	0.157	0.317	0.488
COMP WR-1	1	3	0.413 U[b]	0.422 U	0.422 U	0.422 U	2.130	1.210 U	0.286 U	2.026	0.888 U
COMP WR-1	2	1	0.319 U	0.326 U	0.471	1.204	1.281	0.552	0.779	0.688	0.686 U
COMP WR-1	3	3	0.373 U	0.381 U	0.381 U	0.381 U	1.727	1.093 U	0.257 U	1.810	0.802 U
COMP WR-1	4	3	0.309 U	0.317 U	0.317 U	0.317 U	1.688	0.907 U	0.214 U	1.619	0.666 U
COMP WR-1	5	2	0.396 U	0.406 U	0.406 U	0.406 U	1.449	1.162 U	0.274 U	0.878	0.853 U
COMP WR-2	1	2	1.422 U	1.455 U	1.455 U	1.455 U	0.740 U	4.169 U	0.982 U	1.985 U	3.060 U
COMP WR-2	2	2	0.525 U	0.537 U	1.209	0.537 U	0.273 U	1.540 U	0.363 U	1.903	1.130 U
COMP WR-2	3	3	0.397 U	0.406 U	2.058	0.406 U	2.092	1.164 U	0.274 U	1.728	0.854 U
COMP WR-2	4	2	0.695 U	0.711 U	0.711 U	0.711 U	0.362 U	2.038 U	0.480 U	0.970 U	1.496 U
COMP WR-2	5	3	0.410 U	0.420 U	3.786	0.420 U	2.107	1.203 U	0.283 U	1.769	0.883 U
COMP PS-1	1	2	0.644 U	0.659 U	0.659 U	0.659 U	0.335 U	1.889 U	0.445 U	0.899 U	1.386 U
COMP PS-1	2	2	0.653 U	0.668 U	0.668 U	0.668 U	0.340 U	1.914 U	0.451 U	0.911 U	1.405 U
COMP PS-1	3	3	0.427 U	0.437 U	2.386	0.437 U	2.340	1.075 J[c]	0.295 U	1.946	0.920 U
COMP PS-1	4	1	0.498 U	0.510 U	0.510 U	1.964	2.020	1.461 U	0.344 U	0.542 J	1.072 U
COMP PS-1	5	3	0.621 U	0.636 U	2.702	0.636 U	3.020	1.821 U	0.429 U	2.687	1.337 U
COMP PS-2	1	1	0.332 U	0.340 U	0.546	1.294	2.096	0.652	2.288	1.937	0.714 U
COMP PS-2	2	3	0.257 U	0.264 U	1.654	0.264 U	1.543	0.755 U	0.691	1.722	0.554 U
COMP PS-2	3	1	0.486 U	0.497 U	1.158	1.872	2.381	0.872	2.473	1.856	1.046 U
COMP PS-2	4	4	0.295 U	2.058	0.302 U	0.302 U	1.909	0.904	1.103	2.034	0.634 U
COMP PS-2	5	4	0.375 U	0.384 U	1.339	0.384 U	2.018	1.090 J	0.970	2.263	0.808 U
COMP PS-3	1	1	0.408 U	0.418 U	0.837	1.657	1.902	0.988	1.299	1.320	0.879 U
COMP PS-3	2	3	0.506 U	0.517 U	9.137	0.517 U	0.263 U	1.483 U	0.349 U	2.623	1.088 U
COMP PS-3	3	2	0.476 U	0.487 U	0.487 U	0.487 U	2.031	1.395 U	1.541	1.376	1.024 U
COMP PS-3	4	2	0.442 U	0.453 U	0.453 U	0.453 U	1.642	1.297 U	0.305 U	1.168	0.952 U
COMP PS-3	5	2	0.559 U	0.572 U	0.572 U	0.572 U	1.939	1.640 U	0.386 U	1.397	1.203 U
COMP PS-4	1	1	0.384 U	0.393 U	0.821	1.516	1.941	0.742	2.537	1.888	0.827 U
COMP PS-4	2	1	0.273 U	0.279 U	1.063	1.116	1.465	0.487	1.747	1.245	0.587 U
COMP PS-4	3	4	0.408 U	2.892	0.417 U	0.417 U	2.441	1.195 U	1.148	2.484	0.877 U
COMP PS-4	4	4	0.280 U	1.908	1.136	0.287 U	2.106	0.872	1.360	2.188	0.603 U
COMP PS-4	5	2	0.428 U	0.438 U	1.692	0.438 U	0.223 U	1.254 U	1.484	2.593	0.921 U

TABLE J.10. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
COMP CS-1	1	3	0.438 U	0.448 U	2.694	0.448 U	2.494	1.284 U	0.302 U	0.611 U	0.943 U
COMP CS-1	2	1	0.417 U	0.427 U	1.221	1.561	1.761	0.773	0.976	0.942	0.898 U
COMP CS-1	3	4	0.416 U	0.425 U	3.281	0.425 U	3.334	1.219 U	0.287 U	2.132	0.895 U
COMP CS-1	4	4	0.401 U	2.708	2.788	0.410 U	1.711	1.176 U	0.277 U	1.800	0.863 U
COMP CS-1	5	2	0.568 U	0.581 U	0.581 U	0.581 U	1.766	1.665 U	0.392 U	0.956	1.222 U
R-BF	1	2	0.498 U	0.510 U	0.510 U	0.510 U	1.558	1.461 U	1.695	2.024	1.072 U
R-BF	2	2	0.517 U	0.529 U	0.529 U	0.529 U	1.855	1.517 U	0.357 U	1.886	1.113 U
R-BF	3	4	0.403 U	0.412 U	1.201	0.412 U	1.825	1.224	0.259 J	2.413	0.867 U
R-BF	4	2	0.408 U	0.418 U	0.418 U	0.418 U	0.212 U	1.197 U	0.282 U	1.794	0.878 U
R-BF	5	4	0.545 U	0.558 U	0.558 U	0.558 U	3.017	1.556 J	0.230 J	3.079	1.173 U
R-OS	1	4	0.378 U	0.387 U	0.387 U	0.387 U	1.886	1.110 U	0.261 U	2.252	0.814 U
R-OS	2	1	0.381 U	0.390 U	1.218	1.526	0.199 U	1.119 U	0.263 U	0.847	0.821 U
R-OS	3	1	0.268 U	0.275 U	0.668	1.080	0.140 U	0.441	0.639	0.758	0.577 U
R-OS	4	3	0.591 U	0.605 U	3.416	0.605 U	2.870	1.733 U	0.408 U	2.774	1.272 U
R-OS	5	1	0.265 U	0.271 U	1.846	1.038	1.301	0.777 U	0.183 U	0.953	0.570 U
C-SB	1	4	0.284 U	0.291 U	0.291 U	0.291 U	0.148 U	0.812 J	0.196 U	1.400	0.612 U
C-SB	2	3	1.204 U	1.232 U	17.624	1.232 U	4.913	3.531 U	0.831 U	4.821	2.591 U
C-SB	3	2	0.270 U	0.276 U	0.276 U	0.276 U	0.141 U	0.792 U	0.186 U	1.228	0.581 U
C-SB	4	1	0.395 U	0.405 U	0.779	1.999	0.206 U	0.744	0.273 U	0.632	0.851 U
C-SB	5	1	0.461 U	0.472 U	0.472 U	1.791	1.207	1.352 U	0.318 U	0.718	0.992 U
C-NE	1	4	0.255 U	2.262	1.333	0.262 U	1.286	0.749 U	0.176 U	1.265	0.550 U
C-NE	2	1	0.535 U	0.547 U	0.547 U	2.298	1.541	1.004	0.369 U	0.883	1.151 U
C-NE	3 Rep 1	2	1.568 U	1.605 U	1.605 U	1.605 U	3.786	4.598 U	1.083 U	1.888 J	3.375 U
C-NE	3 Rep 2	2	1.819 U	1.862 U	1.862 U	1.862 U	4.330	5.334 U	1.256 U	1.976 J	3.915 U
C-NE	3 Rep 3	2	0.995 U	1.019 U	1.019 U	1.019 U	2.662	2.919 U	0.688 U	1.283 J	2.143 U
C-NE	4	3	0.227 U	0.232 U	0.232 U	0.232 U	1.302	0.665 U	0.157 U	0.317 U	0.488 U
C-NE	5 Rep 1	3	1.040 U	1.064 U	4.451	1.064 U	4.288	3.050 U	0.718 U	4.244	2.238 U
C-NE	5 Rep 2	3	1.163 U	1.190 U	4.272	1.190 U	5.243	3.410 U	0.803 U	4.702	2.503 U
C-NE	5 Rep 3	3	0.690 U	0.706 U	3.103	0.706 U	2.912	2.024 U	0.477 U	2.966	1.485 U

TABLE J.10. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Background	1 Rep 1	1	0.590 U	0.604 U	0.604 U	0.604 U	1.993	1.731 U	0.408 U	0.970	1.270 U
Background	1 Rep 2	1	0.782 U	0.800 U	0.800 U	0.800 U	2.453	2.293 U	0.540 U	1.260	1.683 U
Background	1 Rep 3	1	0.788 U	0.806 U	0.806 U	0.806 U	3.390	2.310 U	0.544 U	1.040 J	1.696 U
Background	2	4	0.803 U	0.822 U	0.822 U	0.822 U	0.418 U	2.356 U	0.555 U	1.121 U	1.729 U
Background	3	4	0.281 U	1.902	0.288 U	1.714	1.910	0.745 J	0.194 U	1.555	0.605 U
Background	4	4	0.228 U	0.234 U	0.234 U	0.234 U	1.952	0.667 J	0.158 U	1.325	0.491 U
Background	5 Rep 1	4	0.661 U	4.396	0.677 U	0.677 U	3.138	1.679 J	0.457 U	2.906	1.424 U
Background	5 Rep 2	4	0.667 U	4.435	0.683 U	0.683 U	3.187	1.756 J	0.461 U	3.059	1.436 U
Background	5 Rep 3	4	0.359 U	2.393	0.367 U	0.367 U	2.018	0.928 J	0.248 U	1.798	0.772 U

(a) DL Detection limit.
(b) U Analyte was not present above the associated value.
(c) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE J.11. Chlorinated Pesticides (alphabetical, Dieldrin - Toxaphene), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight)									
			Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor epoxide	Lindane	Toxaphene
Target DL[a]			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	30
Achieved DL High			19.422	5.334	5.334	5.334	18.313	5.334	3.803	2.086	1.862	53.343
Achieved DL Low			2.423	0.665	0.665	0.665	2.284	0.665	0.474	0.260	0.232	6.654
COMP WR-1	1	3	1.394 J[b]	1.210 U[c]	1.210 U	1.210 U	4.154 U	1.210 U	0.863 U	0.473 U	0.422 U	12.100 U
COMP WR-1	2	1	0.336 J	0.935 U	0.935 U	0.935 U	3.208 U	0.935 U	0.666 U	0.365 U	1.291	9.346 U
COMP WR-1	3	3	3.980 U	1.093 U	1.093 U	1.093 U	3.752 U	1.093 U	0.779 U	0.427 U	0.381 U	10.930 U
COMP WR-1	4	3	3.302 U	0.907 U	0.907 U	0.907 U	3.113 U	0.907 U	0.647 U	0.355 U	0.317 U	9.069 U
COMP WR-1	5	2	4.231 U	1.162 U	1.162 U	1.162 U	3.989 U	1.162 U	0.828 U	0.454 U	0.406 U	11.620 U
COMP WR-2	1	2	15.180 U	4.169 U	4.169 U	4.169 U	14.312 U	4.169 U	2.972 U	1.630 U	1.455 U	41.691 U
COMP WR-2	2	2	1.547 J	1.540 U	1.540 U	1.540 U	5.286 U	1.540 U	1.098 U	0.602 U	0.537 U	15.398 U
COMP WR-2	3	3	4.236 U	1.164 U	1.164 U	1.164 U	3.994 U	1.164 U	0.830 U	0.455 U	0.406 U	11.636 U
COMP WR-2	4	2	7.422 U	2.038 U	2.038 U	2.038 U	6.998 U	2.038 U	1.453 U	0.797 U	0.711 U	20.385 U
COMP WR-2	5	3	1.427 J	1.203 U	1.203 U	1.203 U	4.130 U	1.203 U	0.858 U	0.470 U	2.330	12.032 U
COMP PS-1	1	2	6.877 U	1.889 U	1.889 U	1.889 U	6.484 U	1.889 U	1.347 U	0.738 U	0.659 U	18.888 U
COMP PS-1	2	2	2.363 J	1.914 U	1.914 U	1.914 U	6.572 U	1.914 U	1.365 U	0.748 U	0.668 U	19.143 U
COMP PS-1	3	3	4.562 U	1.253 U	1.253 U	1.253 U	4.302 U	1.253 U	0.893 U	0.490 U	0.437 U	12.531 U
COMP PS-1	4	1	5.318 U	1.461 U	1.461 U	1.461 U	5.014 U	1.461 U	1.041 U	0.571 U	0.510 U	14.606 U
COMP PS-1	5	3	2.090 J	1.821 U	1.821 U	1.821 U	6.253 U	1.821 U	1.299 U	0.712 U	0.636 U	18.214 U
COMP PS-2	1	1	0.420 J	0.973 U	0.973 U	0.973 U	3.341 U	0.973 U	0.694 U	0.381 U	1.420	9.733 U
COMP PS-2	2	3	2.749 U	0.755 U	0.755 U	0.755 U	2.592 U	0.755 U	0.538 U	0.295 U	0.264 U	7.550 U
COMP PS-2	3	1	0.557 J	1.425 U	1.425 U	1.425 U	4.893 U	1.425 U	1.016 U	0.557 U	1.880	14.254 U
COMP PS-2	4	4	1.019 J	0.864 U	0.946	0.864 U	2.967 U	0.864 U	0.616 U	0.338 U	1.796	8.644 U
COMP PS-2	5	4	1.288 J	1.101 U	1.101 U	1.101 U	3.780 U	1.101 U	0.785 U	0.430 U	0.384 U	11.009 U
COMP PS-3	1	1	0.463 J	1.198 U	1.198 U	1.198 U	4.111 U	1.198 U	0.854 U	0.468 U	0.418 U	11.975 U
COMP PS-3	2	3	1.729 J	1.483 U	1.483 U	1.483 U	5.090 U	1.483 U	1.057 U	0.580 U	2.873	14.826 U
COMP PS-3	3	2	5.081 U	1.395 U	1.395 U	1.395 U	4.790 U	1.395 U	0.995 U	0.546 U	0.487 U	13.954 U
COMP PS-3	4	2	0.551 J	1.297 U	1.297 U	1.297 U	4.453 U	1.297 U	0.925 U	0.507 U	0.453 U	12.973 U
COMP PS-3	5	2	5.970 U	1.640 U	1.640 U	1.640 U	5.629 U	1.640 U	1.169 U	0.641 U	0.572 U	16.397 U
COMP PS-4	1	1	0.431 J	1.127 U	1.127 U	1.127 U	3.869 U	1.127 U	0.803 U	0.441 U	0.393 U	11.270 U
COMP PS-4	2	1	0.352 J	0.800 U	0.800 U	0.800 U	2.747 U	0.800 U	0.570 U	0.313 U	1.160	8.001 U
COMP PS-4	3	4	1.411 J	1.195 U	1.195 U	1.195 U	4.103 U	1.195 U	0.852 U	0.467 U	2.359	11.953 U
COMP PS-4	4	4	0.985 J	0.821 U	0.821 U	0.821 U	2.818 U	0.821 U	0.585 U	0.321 U	1.664	8.210 U
COMP PS-4	5	2	1.518 J	1.254 U	1.254 U	1.254 U	4.306 U	1.254 U	0.894 U	0.490 U	0.438 U	12.544 U

TABLE J.11. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight)									
			Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor epoxide	Lindane	Toxaphene
COMP CS-1	1	3	4.676 U	1.284 U	1.284 U	1.284 U	4.409 U	1.284 U	0.916 U	0.502 U	0.448 U	12.844 U
COMP CS-1	2	1	0.465 J	1.223 U	1.223 U	1.223 U	4.199 U	1.223 U	0.872 U	0.545	0.427 U	12.231 U
COMP CS-1	3	4	1.435 J	1.219 U	1.219 U	1.219 U	4.185 U	1.219 U	0.869 U	0.477 U	2.484	12.191 U
COMP CS-1	4	4	1.368 J	1.176 U	1.176 U	1.176 U	4.036 U	1.176 U	0.838 U	0.460 U	0.410 U	11.757 U
COMP CS-1	5	2	0.667 J	1.665 U	1.665 U	1.665 U	5.716 U	1.665 U	1.187 U	0.651 U	0.581 U	16.651 U
R-BF	1	2	0.775 J	1.461 U	1.461 U	1.461 U	5.016 U	1.461 U	1.042 U	0.571 U	0.510 U	14.612 U
R-BF	2	2	0.760 J	1.517 U	1.517 U	1.517 U	5.207 U	1.517 U	1.081 U	0.593 U	0.529 U	15.168 U
R-BF	3	4	1.543 J	1.182 U	1.182 U	1.182 U	4.057 U	1.182 U	0.843 U	0.462 U	2.333	11.818 U
R-BF	4	2	0.655 J	1.197 U	1.197 U	1.197 U	4.108 U	1.197 U	0.853 U	0.468 U	0.418 U	11.967 U
R-BF	5	4	2.384 J	1.598 U	1.598 U	1.598 U	5.486 U	1.598 U	1.139 U	0.625 U	3.076	15.980 U
R-OS	1	4	1.462 J	1.110 U	1.110 U	1.110 U	3.810 U	1.110 U	0.791 U	0.434 U	2.262	11.097 U
R-OS	2	1	4.073 U	1.119 U	1.119 U	1.119 U	3.840 U	1.119 U	0.798 U	0.437 U	0.390 U	11.186 U
R-OS	3	1	0.284 J	0.787 U	0.787 U	0.787 U	2.701 U	0.787 U	0.561 U	0.308 U	1.087	7.868 U
R-OS	4	3	1.996 J	1.733 U	1.733 U	1.733 U	5.948 U	1.733 U	1.235 U	0.677 U	0.605 U	17.326 U
R-OS	5	1	2.830 U	0.777 U	0.777 U	0.777 U	2.668 U	0.777 U	0.554 U	0.304 U	1.116	7.772 U
C-SB	1	4	0.971 J	0.834 U	0.834 U	0.685 J	2.863 U	0.834 U	0.595 U	0.326 U	0.291 U	8.339 U
C-SB	2	3	12.855 U	3.531 U	3.531 U	3.531 U	12.120 U	3.531 U	2.517 U	1.380 U	1.232 U	35.306 U
C-SB	3	2	2.883 U	0.792 U	0.792 U	0.792 U	2.718 U	0.792 U	0.565 U	0.310 U	0.276 U	7.918 U
C-SB	4	1	0.441 J	1.160 U	1.160 U	1.160 U	3.981 U	1.160 U	0.827 U	0.453 U	0.405 U	11.596 U
C-SB	5	1	0.519 J	1.352 U	1.352 U	1.352 U	4.640 U	1.352 U	0.964 U	0.528 U	1.883	13.516 U
C-NE	1	4	0.966 J	0.749 U	0.749 U	0.749 U	2.572 U	0.749 U	0.534 U	0.293 U	0.262 U	7.493 U
C-NE	2	1	0.657 J	1.568 U	1.568 U	1.568 U	5.382 U	1.568 U	1.118 U	0.613 U	0.547 U	15.677 U
C-NE	3 Rep 1	2	1.694 J	4.598 U	4.598 U	4.598 U	15.786 U	4.598 U	3.278 U	1.798 U	1.605 U	45.984 U
C-NE	3 Rep 2	2	2.052 J	5.334 U	5.334 U	5.334 U	18.313 U	5.334 U	3.803 U	2.086 U	1.862 U	53.343 U
C-NE	3 Rep 3	2	10.630 U	2.919 U	2.919 U	2.919 U	10.022 U	2.919 U	2.081 U	1.141 U	1.019 U	29.194 U
C-NE	4	3	2.423 U	0.665 U	0.665 U	0.665 U	2.284 U	0.665 U	0.474 U	0.260 U	0.232 U	6.654 U
C-NE	5 Rep 1	3	3.437 J	3.050 U	3.050 U	3.050 U	10.470 U	3.050 U	2.174 U	1.192 U	1.064 U	30.498 U
C-NE	5 Rep 2	3	3.893 J	3.410 U	3.410 U	3.410 U	11.707 U	3.410 U	2.431 U	1.333 U	1.190 U	34.102 U
C-NE	5 Rep 3	3	2.736 J	2.024 U	2.024 U	2.024 U	6.948 U	2.024 U	1.443 U	0.791 U	0.706 U	20.239 U

TABLE J.11. (contd)

Sediment Treatment	Replicate	Batch	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin Aldehyde	Heptachlor	Heptachlor epoxide	Lindane	Toxaphene
Background	1 Rep 1	1	0.627 J	1.731 U	1.731 U	1.731 U	5.942 U	1.731 U	1.234 U	0.677 U	0.894 U	17.388 U
Background	1 Rep 2	1	0.859 J	2.293 U	2.293 U	2.293 U	7.870 U	2.293 U	1.634 U	0.896 U	0.890 U	22.925 U
Background	1 Rep 3	1	0.813 J	2.310 U	2.310 U	2.310 U	7.932 U	2.310 U	1.647 U	0.903 U	0.896 U	23.104 U
Background	2	4	2.692 J	2.356 U	2.356 U	2.356 U	8.087 U	2.355 U	1.679 U	0.921 U	0.822 U	23.557 U
Background	3	4	0.959 J	0.824 U	1.[illegible]	0.824 U	6.870 J	0.824 U	0.588 U	0.322 U	1.654	8.241 U
Background	4	4	0.817 J	0.670 U	0.670 U	0.670 U	2.259 U	0.670 U	0.477 U	0.262 U	1.397	6.696 U
Background	5 Rep 1	4	2.206 J	1.940 U	1.896 J	1.940 U	6.660 U	1.940 U	1.383 U	2.314	3.928	19.388 U
Background	5 Rep 2	4	2.376 J	1.956 U	1.937 J	1.956 U	6.716 U	1.956 U	1.395 U	2.216	3.883	19.585 U
Background	5 Rep 3	4	1.220 J	1.052 U	1.042 J	1.052 U	3.610 U	1.052 U	0.750 U	1.297	2.138	10.517 U

(a) DL Detection limit.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) U Analyte was not present above the associated value.

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TABLE J.12. Chlorinated Pesticides (alphabetical, Aldrin - 4,4'-DDT), Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* Pesticides (µg/kg dry weight)								
				Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
COMP WR-1	1	3	17.55	2.35 U[a]	2.40 U	2.40 U	2.40 U	12.14	6.89 U	1.63 U	11.54	5.06 U
COMP WR-1	2	1	14.22	2.24 U	2.29 U	3.31	8.47	9.01	3.88	5.48	4.84	4.82 U
COMP WR-1	3	3	17.25	2.16 U	2.21 U	2.21 U	2.21 U	10.01	6.34 U	1.49 U	10.49	4.65 U
COMP WR-1	4	3	17.28	1.79 U	1.83 U	1.83 U	1.83 U	9.77	5.25 U	1.24 U	9.37	3.85 U
COMP WR-1	5	2	14.96	2.65 U	2.71 U	2.71 U	2.71 U	9.69	7.77 U	1.83 U	5.87	5.70 U
COMP WR-2	1	2	16.78	8.47 U	8.67 U	8.67 U	8.67 U	4.41 U	24.85 U	5.85 U	11.83 U	18.24 U
COMP WR-2	2	2	17.67	2.97 U	3.04 U	6.84	3.04 U	1.54 U	8.72 U	2.05 U	10.77	6.40 U
COMP WR-2	3	3	18.32	2.17 U	2.22 U	11.23	2.22 U	11.42	6.35 U	1.50 U	9.43	4.66 U
COMP WR-2	4	2	18.75	3.71 U	3.79 U	3.79 U	3.79 U	1.93 U	10.87 U	2.56 U	5.17 U	7.98 U
COMP WR-2	5	3	17.16	2.39 U	2.45 U	22.06	2.45 U	12.28	7.01 U	1.65 U	10.31	5.15 U
COMP PS-1	1	2	16.94	3.80 U	3.89 U	3.89 U	3.89 U	1.98 U	11.15 U	2.63 U	5.31 U	8.18 U
COMP PS-1	2	2	18.16	3.60 U	3.68 U	3.68 U	3.68 U	1.87 U	10.54 U	2.48 U	5.02 U	7.74 U
COMP PS-1	3	3	17.83	2.39 U	2.45 U	13.38	2.45 U	13.12	6.03 J[b]	1.65 U	10.91	5.16 U
COMP PS-1	4	1	16.03	3.11 U	3.18 U	3.18 U	12.25	12.60	9.11 U	2.15 U	3.38 J	6.69 U
COMP PS-1	5	3	17.51	3.55 U	3.63 U	15.43	3.63 U	17.25	10.40 U	2.45 U	15.35	7.64 U
COMP PS-2	1	1	16.58	2.00 U	2.05 U	3.29	7.80	12.64	3.93	13.80	11.68	4.31 U
COMP PS-2	2	3	17.87	1.44 U	1.48 U	9.26	1.48 U	8.63	4.22 U	3.87	9.64	3.10 U
COMP PS-2	3	1	16.48	2.95 U	3.02 U	7.03	11.36	14.45	5.29	15.01	11.26	6.35 U
COMP PS-2	4	4	17.53	1.68 U	11.74	1.72 U	1.72 U	10.89	5.16	6.29	11.60	3.62 U
COMP PS-2	5	4	17.44	2.15 U	2.20 U	7.68	2.20 U	11.57	6.25 J	5.56	12.98	4.63 U
COMP PS-3	1	1	17.89	2.28 U	2.34 U	4.68	9.26	10.63	5.52	7.26	7.38	4.91 U
COMP PS-3	2	3	16.52	3.06 U	3.13 U	55.31	3.13 U	1.59 U	8.98 U	2.11 U	15.88	6.59 U
COMP PS-3	3	2	18.11	2.63 U	2.69 U	2.69 U	2.69 U	11.21	7.70 U	8.51	7.60	5.65 U
COMP PS-3	4	2	18.42	2.40 U	2.46 U	2.46 U	2.46 U	8.91	7.04 U	1.66 U	6.34	5.17 U
COMP PS-3	5	2	18.04	3.10 U	3.17 U	3.17 U	3.17 U	10.75	9.09 U	2.14 U	7.74	6.67 U
COMP PS-4	1	1	16.15	2.38 U	2.43 U	5.08	9.39	12.02	4.59	15.71	11.69	5.12 U
COMP PS-4	2	1	16.76	1.63 U	1.66 U	6.34	6.66	8.74	2.91	10.42	7.43	3.50 U
COMP PS-4	3	4	16.47	2.48 U	17.56	2.53 U	2.53 U	14.82	7.26 U	6.97	15.08	5.32 U
COMP PS-4	4	4	16.54	1.69 U	11.54	6.87	1.74 U	12.73	5.27	8.22	13.23	3.65 U
COMP PS-4	5	2	17.24	2.48 U	2.54 U	9.81	2.54 U	1.29 U	7.27 U	8.61	15.04	5.34 U

TABLE J.12. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* Pesticides (µg/kg dry weight)								
				Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
COMP CS-1	1	3	16.02	2.73 U	2.80 U	16.82	2.80 U	15.57	8.01 U	1.89 U	3.81 U	5.89 U
COMP CS-1	2	1	17.13	2.43 U	2.49 U	7.13	9.11	10.28	4.51	5.70	5.50	5.24 U
COMP CS-1	3	4	17.36	2.40 U	2.45 U	18.90	2.45 U	19.21	7.02 U	1.65 U	12.28	5.16 U
COMP CS-1	4	4	18.12	2.21 U	14.94	15.39	2.26 U	9.44	6.49 U	1.53 U	9.93	4.76 U
COMP CS-1	5	2	17.96	3.16 U	3.23 U	3.23 U	3.23 U	9.83	9.27 U	2.18 U	5.32	6.80 U
R-BF	1	2	18.14	2.75 U	2.81 U	2.81 U	2.81 U	8.59	8.05 U	9.34	11.16	5.91 U
R-BF	2	2	18.41	2.81 U	2.87 U	2.87 U	2.87 U	10.08	8.24 U	1.94 U	10.24	6.05 U
R-BF	3	4	16.67	2.42 U	2.47 U	7.20	2.47 U	10.95	7.34	1.55 J	14.48	5.20 U
R-BF	4	2	18.04	2.26 U	2.32 U	2.32 U	2.32 U	1.18 U	6.64 U	1.56 U	9.94	4.87 U
R-BF	5	4	17.36	3.14 U	3.21 U	3.21 U	3.21 U	17.38	8.96 J	1.32 J	17.74	6.76 U
R-OS	1	4	17.06	2.22 U	2.27 U	2.27 U	2.27 U	11.06	6.51 U	1.53 U	13.20	4.77 U
R-OS	2	1	14.40	2.55 U	2.71 U	8.46	10.60	1.38 U	7.77 U	1.83 U	5.88	5.70 U
R-OS	3	1	16.71	1.60 U	1.65 U	4.00	6.46	0.84 U	2.64	3.82	4.54	3.45 U
R-OS	4	3	18.54	3.19 U	3.26 U	18.43	3.26 U	15.48	9.35 U	2.20 U	14.96	6.86 U
R-OS	5	1	16.76	1.58 U	1.62 U	11.01	6.19	7.76	4.64 U	1.09 U	5.69	3.40 U
C-SB	1	4	18.39	1.54 U	1.58 U	1.58 U	1.58 U	0.80 U	4.42 J	1.07 U	7.61	3.33 U
C-SB	2	3	18.13	6.64 U	6.80 U	97.21	6.80 U	27.10	19.48 U	4.58 U	26.59	14.29 U
C-SB	3	2	18.17	1.49 U	1.52 U	1.52 U	1.52 U	0.78 U	4.36 U	1.02 U	6.76	3.20 U
C-SB	4	1	18.07	2.19 U	2.24 U	4.31	11.06	1.14 U	4.12	1.51 U	3.50	4.71 U
C-SB	5	1	16.14	2.86 U	2.92 U	2.92 U	11.10	7.48	8.38 U	1.97 U	4.45	6.15 U
C-NE	1	4	18.64	1.37 U	12.14	7.15	1.41 U	6.90	4.02 U	0.94 U	6.79	2.95 U
C-NE	2	1	17.28	3.10 U	3.17 U	3.17 U	13.30	8.92	5.81	2.14 U	5.11	6.66 U
C-NE	3 Rep 1	2	17.88	8.77 U	8.98 U	8.98 U	8.98 U	21.17	25.72 U	6.06 U	10.56 J	18.88 U
C-NE	3 Rep 2	2	17.88	10.17 U	10.41 U	10.41 U	10.41 U	24.22	29.83 U	7.02 U	11.05 J	21.90 U
C-NE	3 Rep 3	2	17.88	5.56 U	5.70 U	5.70 U	5.70 U	14.89	16.33 U	3.85 U	7.18 J	11.99 U
C-NE	4	3	18.01	1.26 U	1.29 U	1.29 U	1.29 U	7.23	3.69 U	0.87 U	1.76 U	2.71 U
C-NE	5 Rep 1	3	16.53	6.29 U	6.44 U	26.93	6.44 U	25.94	18.45 U	4.34 U	25.67	13.54 U
C-NE	5 Rep 2	3	16.53	7.04 U	7.20 U	25.84	7.20 U	31.72	20.63 U	4.86 U	28.45	15.14 U
C-NE	5 Rep 3	3	16.53	4.17 U	4.27 U	18.77	4.27 U	17.62	12.24 U	2.89 U	17.94	8.98 U

TABLE J.12. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* Pesticides (µg/kg dry weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Background	1 Rep 1	1	12.49	4.72 U	4.84 U	4.84 U	4.84 U	15.96	13.86 U	3.27 U	7.77	10.17 U
Background	1 Rep 2	1	12.49	6.26 U	6.41 U	6.41 U	6.41 U	19.64	18.36 U	4.32 U	10.09	13.47 U
Background	1 Rep 3	1	12.49	6.31 U	6.45 U	6.45 U	6.45 U	27.14	18.49 U	4.36 U	8.33 J	13.58 U
Background	2	4	14.62	5.49 U	5.62 U	5.62 U	5.62 U	2.86 U	16.11 U	3.80 U	7.67 U	11.83 U
Background	3	4	12.38	2.27 U	15.36	2.33 U	13.84	15.43	6.02 J	1.57 U	12.56	4.89 U
Background	4	4	13.97	1.63 U	1.68 U	1.68 U	1.68 U	13.97	4.77 J	1.13 U	9.48	3.51 U
Background	5 Rep 1	4	16.22	4.08 U	27.10	4.17 U	4.17 U	19.35	10.35 J	2.82 U	17.92	8.78 U
Background	5 Rep 2	4	16.22	4.11 U	27.34	4.21 U	4.21 U	19.65	10.83 J	2.84 U	18.86	8.85 U
Background	5 Rep 3	4	16.22	2.21 U	14.75	2.26 U	2.26 U	12.44	5.72 J	1.53 U	11.09	4.76 U

(a) U Analyte was not present above the level of associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE J.13. Chlorinated Pesticides (alphabetical, Dieldrin - Toxaphene), Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* Pesticides (µg/kg dry weight)									
				Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-Aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
COMP WR-1	1	3	17.55	7.94 J[a]	6.89 U[b]	6.89 U	6.89 U	23.67 U	6.89 U	4.92 U	2.70 U	2.40 U	68.95 U
COMP WR-1	2	1	14.22	2.36 J	6.58 U	6.58 U	6.58 U	22.56 U	6.58 U	4.68 U	2.57 U	9.08	65.72 U
COMP WR-1	3	3	17.25	23.07 U	6.34 U	6.34 U	6.34 U	21.75 U	6.34 U	4.52 U	2.48 U	2.21 U	63.36 U
COMP WR-1	4	3	17.28	19.11 U	5.25 U	5.25 U	5.25 U	18.02 U	5.25 U	3.74 U	2.05 U	1.83 U	52.48 U
COMP WR-1	5	2	14.96	28.28 U	7.77 U	7.77 U	7.77 U	26.66 U	7.77 U	5.53 U	3.03 U	2.71 U	77.67 U
COMP WR-2	1	2	16.78	90.46 U	24.85 U	24.85 U	24.85 U	85.29 U	24.85 U	17.71 U	9.71 U	8.67 U	248.46 U
COMP WR-2	2	2	17.67	8.75 J	8.72 U	8.72 U	8.72 U	29.92 U	8.72 U	6.21 U	3.41 U	3.04 U	87.14 U
COMP WR-2	3	3	18.32	23.12 U	6.35 U	6.35 U	6.35 U	21.80 U	6.35 U	4.53 U	2.48 U	2.22 U	63.52 U
COMP WR-2	4	2	18.75	39.58 U	10.87 U	10.87 U	10.87 U	37.32 U	10.87 U	7.75 U	4.25 U	3.79 U	108.72 U
COMP WR-2	5	3	17.16	8.32 J	7.01 U	7.01 U	7.01 U	24.07 U	7.01 U	5.00 U	2.74 U	13.58	70.12 U
COMP PS-1	1	2	16.94	40.60 U	11.15 U	11.15 U	11.15 U	38.28 U	11.15 U	7.95 U	4.36 U	3.89 U	111.50 U
COMP PS-1	2	2	18.16	13.01 J	10.54 U	10.54 U	10.54 U	36.19 U	10.54 U	7.52 U	4.12 U	3.68 U	105.41 U
COMP PS-1	3	3	17.83	25.59 U	7.03 U	7.03 U	7.03 U	24.13 U	7.03 U	5.01 U	2.75 U	2.45 U	70.28 U
COMP PS-1	4	1	16.03	33.18 U	9.11 U	9.11 U	9.11 U	31.28 U	9.11 U	6.49 U	3.56 U	3.18 U	91.12 U
COMP PS-1	5	3	17.51	11.94 J	10.40 U	10.40 U	10.40 U	35.71 U	10.40 U	7.42 U	4.07 U	3.63 U	104.02 U
COMP PS-2	1	1	16.58	2.53 J	5.87 U	5.87 U	5.87 U	20.15 U	5.87 U	4.19 U	2.30 U	8.56	58.70 U
COMP PS-2	2	3	17.87	15.38 U	4.22 U	4.22 U	4.22 U	14.50 U	4.22 U	3.01 U	1.65 U	1.48 U	42.25 U
COMP PS-2	3	1	16.48	3.38 J	8.65 U	8.65 U	8.65 U	29.69 U	8.65 U	6.17 U	3.38 U	11.41	86.49 U
COMP PS-2	4	4	17.53	5.81 J	4.93 U	5.40	4.93 U	16.93 U	4.93 U	3.51 U	1.93 U	10.25	49.31 U
COMP PS-2	5	4	17.44	7.39 J	6.31 U	6.31 U	6.31 U	21.67 U	6.31 U	4.50 U	2.47 U	2.20 U	63.13 U
COMP PS-3	1	1	17.89	2.59 J	6.70 U	6.70 U	6.70 U	22.98 U	6.70 U	4.77 U	2.62 U	2.34 U	66.94 U
COMP PS-3	2	3	16.52	10.47 J	8.98 U	8.98 U	8.98 U	30.81 U	8.98 U	6.40 U	3.51 U	17.39	89.75 U
COMP PS-3	3	2	18.11	28.06 U	7.70 U	7.70 U	7.70 U	26.45 U	7.70 U	5.49 U	3.01 U	2.69 U	77.05 U
COMP PS-3	4	2	18.42	2.99 J	7.04 U	7.04 U	7.04 U	24.17 U	7.04 U	5.02 U	2.75 U	2.46 U	70.43 U
COMP PS-3	5	2	18.04	33.09 U	9.09 U	9.09 U	9.09 U	31.20 U	9.09 U	6.48 U	3.55 U	3.17 U	90.89 U
COMP PS-4	1	1	16.15	2.67 J	6.98 U	6.98 U	6.98 U	23.96 U	6.98 U	4.97 U	2.73 U	2.43 U	69.78 U
COMP PS-4	2	1	16.76	2.10 J	4.77 U	4.77 U	4.77 U	16.39 U	4.77 U	3.40 U	1.87 U	6.92	47.74 U
COMP PS-4	3	4	16.47	8.57 J	7.26 U	7.26 U	7.26 U	24.91 U	7.26 U	5.17 U	2.84 U	14.32	72.57 U
COMP PS-4	4	4	16.54	5.96 J	4.96 U	4.96 U	4.96 U	17.04 U	4.96 U	3.54 U	1.94 U	10.06	49.64 U
COMP PS-4	5	2	17.24	8.81 J	7.27 U	7.27 U	7.27 U	24.98 U	7.27 U	5.19 U	2.84 U	2.54 U	72.76 U

TABLE J.13. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* Pesticides (µg/kg dry weight)									
				Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-Aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
COMP CS-1	1	3	16.02	29.19 U	8.01 U	8.01 U	8.01 U	27.52 U	8.01 U	5.72 U	3.13 U	2.80 U	80.17 U
COMP CS-1	2	1	17.13	2.71 J	7.14 U	7.14 U	7.14 U	24.51 U	7.14 U	5.09 U	3.18	2.49 U	71.40 U
COMP CS-1	3	4	17.36	8.27 J	7.02 U	7.02 U	7.02 U	24.11 U	7.02 U	5.01 U	2.75 U	14.31	70.22 U
COMP CS-1	4	4	18.12	7.55 J	6.49 U	6.49 U	6.49 U	22.27 U	6.49 U	4.62 U	2.54 U	2.26 U	64.88 U
COMP CS-1	5	2	17.96	3.71 J	9.27 U	9.27 U	9.27 U	31.83 U	9.27 U	6.61 U	3.62 U	3.23 U	92.71 U
R-BF	1	2	18.14	4.27 J	8.05 U	8.05 U	8.05 U	27.65 U	8.05 U	5.74 U	3.15 U	2.81 U	80.55 U
R-BF	2	2	18.41	4.13 J	8.24 U	8.24 U	8.24 U	28.28 U	8.24 U	5.87 U	3.22 U	2.87 U	82.39 U
R-BF	3	4	16.67	9.26 J	7.09 U	7.09 U	7.09 U	24.34 U	7.09 U	5.06 U	2.77 U	14.00	70.89 U
R-BF	4	2	18.04	3.63 J	6.64 U	6.64 U	6.64 U	22.77 U	6.64 U	4.73 U	2.59 U	2.32 U	66.34 U
R-BF	5	4	17.36	13.73 J	9.21 U	9.21 U	9.21 U	31.60 U	9.21 U	6.56 U	3.60 U	17.72	92.05 U
R-OS	1	4	17.06	8.57 J	6.51 U	6.51 U	6.51 U	22.33 U	6.51 U	4.64 U	2.54 U	13.26	65.05 U
R-OS	2	1	14.40	28.28 U	7.77 U	7.77 U	7.77 U	26.67 U	7.77 U	5.54 U	3.03 U	2.71 U	77.68 U
R-OS	3	1	16.71	1.70 J	4.71 U	4.71 U	4.71 U	16.16 U	4.71 U	3.36 U	1.84 U	6.51	47.09 U
R-OS	4	3	18.54	10.77 J	9.35 U	9.35 U	9.35 U	32.08 U	9.35 U	6.66 U	3.65 U	3.26 U	93.45 U
R-OS	5	1	16.76	16.89 U	4.64 U	4.64 U	4.64 U	15.92 U	4.64 U	3.31 U	1.81 U	6.66	46.37 U
C-SB	1	4	18.39	5.28 J	4.54 U	4.54 U	3.72 J	15.57 U	4.54 U	3.24 U	1.77 U	1.58 U	45.35 U
C-SB	2	3	18.13	70.90 U	19.48 U	19.48 U	19.48 U	66.85 U	19.48 U	13.88 U	7.61 U	6.80 U	194.74 U
C-SB	3	2	18.17	15.87 U	4.36 U	4.36 U	4.36 U	14.96 U	4.36 U	3.11 U	1.71 U	1.52 U	43.58 U
C-SB	4	1	18.07	2.44 J	6.42 U	6.42 U	6.42 U	22.03 U	6.42 U	4.58 U	2.51 U	2.24 U	64.17 U
C-SB	5	1	16.14	3.22 J	8.38 U	8.38 U	8.38 U	28.75 U	8.38 U	5.97 U	3.27 U	11.67	83.74 U
C-NE	1	4	18.64	5.18 J	4.02 U	4.02 U	4.02 U	13.80 U	4.02 U	2.86 U	1.57 U	1.41 U	40.20 U
C-NE	2	1	17.28	3.80 J	9.07 U	9.07 U	9.07 U	31.15 U	9.07 U	6.47 U	3.55 U	3.17 U	90.72 U
C-NE	3 Rep 1	2	17.88	9.47 J	25.72 U	25.72 U	25.72 U	88.29 U	25.72 U	18.33 U	10.06 U	8.98 U	257.18 U
C-NE	3 Rep 2	2	17.88	11.48 J	29.83 U	29.83 U	29.83 U	102.42 U	29.83 U	21.27 U	11.67 U	10.41 U	298.34 U
C-NE	3 Rep 3	2	17.88	59.45 U	16.33 U	16.33 U	16.33 U	56.05 U	16.33 U	11.64 U	6.38 U	5.70 U	163.28 U
C-NE	4	3	18.01	13.45 U	3.69 U	3.69 U	3.69 U	12.68 U	3.69 U	2.63 U	1.44 U	1.29 U	36.95 U
C-NE	5 Rep 1	3	16.53	20.79 J	18.45 U	18.45 U	18.45 U	63.34 U	18.45 U	13.15 U	7.21 U	6.44 U	184.50 U
C-NE	5 Rep 2	3	16.53	23.55 J	20.63 U	20.63 U	20.63 U	70.82 U	20.63 U	14.71 U	8.06 U	7.20 U	206.30 U
C-NE	5 Rep 3	3	16.53	16.55 J	12.24 U	12.24 U	12.24 U	42.03 U	12.24 U	8.73 U	4.79 U	4.27 U	122.44 U

TABLE J.13. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* Pesticides (µg/kg dry weight) Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-Aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
Background	1 Rep 1	1	12.49	5.02 J	13.86 U	13.86 U	13.86 U	47.57 U	13.86 U	9.88 U	5.42 U	4.84 U	138.58 U
Background	1 Rep 2	1	12.49	6.88 J	18.36 U	18.36 U	18.36 U	63.01 U	18.36 U	13.08 U	7.17 U	6.41 U	183.55 U
Background	1 Rep 3	1	12.49	6.51 J	18.49 U	18.49 U	18.49 U	63.51 U	18.49 U	13.19 U	7.23 U	6.45 U	184.98 U
Background	2	4	14.62	18.41 J	16.11 U	16.11 U	16.11 U	55.31 U	16.11 U	11.48 U	6.30 U	5.62 U	161.13 U
Background	3	4	12.38	7.75 J	6.66 U	8.15	6.66 U	7.03 J	6.66 U	4.75 U	2.60 U	13.36	66.57 U
Background	4	4	13.97	5.85 J	4.80 U	4.80 U	4.80 U	16.46 U	4.80 U	3.41 U	1.88 U	10.00	47.93 U
Background	5 Rep 1	4	16.22	13.60 J	11.96 U	11.69 J	11.96 U	41.06 U	11.96 U	8.53 U	14.27	24.22	119.60 U
Background	5 Rep 2	4	16.22	14.65 J	12.06 U	11.94 J	12.06 U	41.41 U	12.06 U	8.60 U	13.66	23.45	120.62 U
Background	5 Rep 3	4	16.22	7.52 J	6.49 U	6.42 J	6.49 U	22.26 U	6.49 U	4.62 U	8.00	13.13	64.84 U

(a) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(b) U Analyte was not present above the level associated value.

TABLE J.14. Quality Control Data for Chlorinated Pesticides (alphabetical, Aldrin - 4,4'-DDT), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Method Blanks											
Blank 1		1	0.402 U[a]	0.412 U	0.412 U	0.412 U	0.209 U	1.180 U	0.278 U	0.562 U	0.866 U
Blank 2		2	0.559 U	0.572 U	0.572 U	0.572 U	0.291 U	1.640 U	0.386 U	0.781 U	1.203 U
Blank 3		3	0.449 U	0.460 U	0.460 U	0.460 U	0.234 U	1.318 U	0.310 U	0.628 U	0.968 U
Blank 4		4	0.367 U	0.375 U	0.375 U	0.375 U	0.191 U	1.076 U	0.253 U	0.512 U	0.789 U
Matrix Spikes											
C-NE	2	1	0.535 U	0.547 U	0.547 U	2.298	1.541[b]	1.004	0.369 U	0.883	1.151 U
C-NE MS	2	1	66.874	74.460	75.195	90.886	NA	64.591	59.103	62.321	68.384
Concentration Recovered			66.874	74.460	75.195	88.588	NA	63.587	59.103	61.438	68.384
Amount Spiked			56.797	56.797	56.797	56.797	NS[c]	59.977	56.827	56.770	56.770
Percent Recovery			118%	131%[d]	132%[d]	156%[d]	NA	106%	104%	108%	120%
C-NE	2	1	0.535 U	0.547 U	0.547 U	2.298	1.541	1.004	0.369 U	0.883	1.151 U
C-NE MSD	2	1	69.184	81.619	85.042	99.679	NA	66.214	66.663	65.690	72.537
Concentration Recovered			69.184	81.619	85.042	97.379	NA	65.210	66.663	64.807	72.537
Amount Spiked			59.547	59.547	59.547	59.547	NS	62.882	59.579	59.520	59.520
Percent Recovery			116%	137%[d]	143%[d]	164%[d]	NA	104%	112%	109%	122%[d]
RPD			1%	4%	8%	5%	NA	2%	7%	1%	1%
I-STAT			0.01	0.02	0.04	0.02	NA	0.01	0.04	0.00	0.01
COMP WR-2	1	2	1.422 U	1.455 U	1.455 U	1.455 U	0.740 U	4.169 U	0.982 U	1.985 U	3.060 U
COMP WR-2 MS	1	2	107.537	100.341	104.450	131.456	NA	102.618	101.108	114.563	116.416
Concentration Recovered			107.537	100.341	104.450	131.456	NA	102.618	101.108	114.563	116.416
Amount Spiked			95.724	95.724	95.724	95.724	NS	101.085	95.724	95.680	95.680
Percent Recovery			112%	105%	109%	137%[d]	NA	102%	106%	120%	122%[d]
COMP WR-2	1	2	1.422 U	1.455 U	1.455 U	1.455 U	0.740 U	4.169 U	0.982 U	1.985 U	3.060 U
COMP WR-2 MSD	1	2	92.596	73.154	93.769	110.672	NA	76.889	91.343	94.804	95.156
Concentration Recovered			92.596	73.154	93.769	110.672	NA	76.889	91.343	94.804	95.156
Amount Spiked			87.771	87.771	87.771	87.771	NS	92.686	87.817	87.730	87.730
Percent Recovery			105%	83%	107%	126%[d]	NA	83%	104%	108%	108%
RPD			6%	23%	2%	9%	NA	20%	2%	10%	11%
I-STAT			0.03	0.11	0.01	0.04	NA	0.10	0.01	0.05	0.06

TABLE J.14. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
C-SB	2	3	1.204 U	1.232 U	17.624	1.232 U	4.913	3.531 U	0.831 U	4.821	2.591 U
C-SB MS	2	3	98.130	110.249	125.148	129.899	NA	89.186	127.111	125.507	128.894
Concentration Recovered			98.130	110.249	107.524	129.899	NA	89.186	127.111	120.686	128.894
Amount Spiked			93.867	98.798	93.867	93.867	NS	99.124	93.867	93.867	93.917
Percent Recovery			105%	112%	115%	138%(d)	NA	90%	135%(d)	129%(d)	137%(d)
C-SB	2	3	1.204 U	1.232 U	17.624	1.232 U	4.913	3.531 U	0.831 U	4.821	2.591 U
C-SB MSD	2	3	67.208	68.138	81.665	83.875	NA	59.491	88.333	85.960	88.942
Concentration Recovered			67.208	68.138	64.041	83.875	NA	59.491	88.333	81.139	88.942
Amount Spiked			61.932	65.186	61.932	61.932	NS	65.400	61.932	61.932	61.965
Percent Recovery			109%	105%	103%	135%(d)	NA	91%	143%(d)	131%(d)	144%(d)
RPD			4%	7%	10%	2%	NA	1%	5%	2%	4%
I-STAT			0.02	0.03	0.05	0.01	NA	0.01	0.03	0.01	0.02
Background	2	4	0.803 U	0.822 U	0.822 U	0.822 U	0.418 U	2.356 U	0.555 U	1.121 U	1.729 U
Background MS	2	4	59.890	54.869	58.242	69.379	NA	51.623	84.116	65.657	69.816
Concentration Recovered			59.890	54.869	58.242	69.379	NA	51.623	84.116	65.657	69.816
Amount Spiked			49.116	51.696	49.116	49.116	NS	51.866	49.116	49.116	49.142
Percent Recovery			122%(d)	106%	119%	141%(d)	NA	100%	171%(d)	134%(d)	142%(d)
Background	2	4	0.803 U	0.822 U	0.822 U	0.822 U	0.418 U	2.356 U	0.555 U	1.121 U	1.729 U
Background MSD	2	4	42.257	44.867	43.520	53.441	NA	39.383	48.835	48.253	47.060
Concentration Recovered			42.257	44.867	43.520	53.441	NA	39.383	48.835	48.253	47.060
Amount Spiked			37.267	39.225	37.267	37.267	NS	39.354	37.267	37.267	37.287
Percent Recovery			113%	114%	117%	143%(d)	NA	100%	131%(d)	129%(d)	126%(d)
RPD			7%	7%	2%	2%	NA	0%	27%	3%	12%
I-STAT			0.04	0.04	0.01	0.01	NA	0.00	0.13	0.02	0.06
Analytical Triplicates											
C-NE	3 Rep 1	2	1.568 U	1.605 U	1.605 U	1.605 U	3.78[illegible]	4.598 U	1.083 U	1.888 J	3.375 U
C-NE	3 Rep 2	2	1.819 U	1.862 U	1.862 U	1.862 U	4.330	5.334 U	1.256 U	1.976 J	3.915 U
C-NE	3 Rep 3	2	0.995 U	1.019 U	1.019 U	1.019 U	2.662	2.919 U	0.688 U	1.283 J	2.143 U
RSD			NA	NA	NA	NA	24%	NA	NA	22%	NA
C-NE	5 Rep 1	3	1.040 U	1.064 U	4.451	1.064 U	4.288	3.050 U	0.718 U	4.244	2.238 U
C-NE	5 Rep 2	3	1.163 U	1.190 U	4.272	1.190 U	5.243	3.410 U	0.803 U	4.702	2.503 U
C-NE	5 Rep 3	3	0.690 U	0.706 U	3.103	0.706 U	2.912	2.024 U	0.477 U	2.966	1.485 U
RSD			NA	NA	19%	NA	28%	NA	NA	23%	NA

TABLE J.14 (contd)

TABLE J.14. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Aldrin	Alpha-BHC	Beta-BHC	Delta-BHC	Cis-Chlordane	Trans-(gamma) Chlordane	4,4'-DDD	4,4'-DDE	4,4'-DDT
Background	1 Rep 1	1	0.590 U	0.604 U	0.604 U	0.604 U	1.993	1.731 U	0.408 U	0.970	1.270 U
Background	1 Rep 2	1	0.782 U	0.800 U	0.800 U	0.800 U	2.453	2.293 U	0.540 U	1.260	1.683 U
Background	1 Rep 3	1	0.788 U	0.806 U	0.806 U	0.806 U	3.390	2.310 U	0.544 U	1.040 J	1.696 U
RSD			NA	NA	NA	NA	27%	NA	NA	14%	NA
Background	5 Rep 1	4	0.661 U	4.396	0.677 U	0.677 U	3.138	1.679 J	0.457 U	2.906	1.424 U
Background	5 Rep 2	4	0.667 U	4.435	0.683 U	0.683 U	3.187	1.756 J	0.461 U	3.059	1.436 U
Background	5 Rep 3	4	0.359 U	2.393	0.367 U	0.367 U	2.018	0.928 J	0.248 U	1.798	0.772 U
RSD			NA	31%(e)	NA	NA	24%	31%(e)	NA	27%	NA

(a) U Analyte was not present above the level of associated value.
(b) NA Not applicable.
(c) NS Not spiked.
(d) Value outside of quality control range of 40%-120%.
(e) Value exceeds relative precision goal of ≤30%.

TABLE J.15. Quality Control Data for Chlorinated Pesticides (alphabetical, Dieldrin - Toxaphene), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
Method Blanks												
Blank 1		1	4.295 U[a]	1.180 U	1.180 U	1.180 U	4.050 U	1.180 U	0.841 U	0.461 U	0.412 U	11.796 U
Blank 2		2	5.970 U	1.640 U	1.640 U	1.640 U	5.629 U	1.640 U	1.169 U	0.641 U	0.572 U	16.397 U
Blank 3		3	4.800 U	1.318 U	1.318 U	1.318 U	4.525 U	1.318 U	0.940 U	0.515 U	0.460 U	13.182 U
Blank 4		4	3.916 U	1.076 U	1.076 U	1.076 U	3.692 U	1.076 U	0.767 U	0.421 U	0.375 U	10.756 U
Matrix Spikes												
C-NE	2	1	0.657 J[b]	1.568 U	1.568 U	1.568 U	5.382 U	1.568 U	1.118 U	0.613 U	0.547 U	15.677 U[c]
C-NE MS	2	1	57.873	70.711	64.265	70.498	69.595	25.170	74.229	50.082	75.936	NA
Concentration Recovered			57.216	70.711	64.265	70.498	69.595	25.170	74.229	50.082	75.936	NA[d]
Amount Spiked			56.797	56.797	56.797	56.797	58.190	56.797	56.770	56.797	56.797	NS
Percent Recovery			101%	124%[e]	113%	124%[e]	120%	44%	131%[e]	88%	134%[e]	NA
C-NE	2	1	0.657 J	1.568 U	1.568 U	1.568 U	5.382 U	1.568 U	1.118 U	0.613 U	0.547 U	15.677 U
C-NE MSD	2	1	57.040	69.840	65.769	68.385	69.330	25.155	80.861	53.401	83.633	NA
Concentration Recovered			56.383	69.840	65.769	68.385	69.330	25.155	80.861	53.401	83.633	NA
Amount Spiked			59.547	59.547	59.547	59.547	61.008	59.547	59.520	59.547	59.547	NS
Percent Recovery			95%	117%	110%	115%	114%	42%	136%[e]	90%	140%[e]	NA
RPD			6%	6%	2%	8%	5%	5%	4%	2%	5%	NA
I-STAT			0.03	0.03	0.01	0.04	0.03	0.02	0.02	0.01	0.02	NA
COMP WR-2	1	2	15.180 U	4.169 U	4.169 U	4.169 U	14.312 U	4.169 U	2.972 U	1.630 U	1.455 U	41.691 U
COMP WR-2 MS	1	2	97.512	114.451	103.346	96.767	114.824	15.255	127.403	86.588	117.100	NA
Concentration Recovered			97.512	114.451	103.346	96.767	114.824	15.255	127.403	86.588	117.100	NA
Amount Spiked			95.724	95.724	95.724	95.724	98.073	95.724	95.680	95.724	95.724	NS
Percent Recovery			102%	120%	108%	101%	117%	16%[e]	133%[e]	90%	122%[e]	NA
COMP WR-2	1	2	15.180 U	4.169 U	4.169 U	4.169 U	14.312 U	4.169 U	2.972 U	1.630 U	1.455 U	41.691 U
COMP WR-2 MSD	1	2	76.881	83.023	78.571	69.938	97.604	9.934	112.249	65.317	90.215	NA
Concentration Recovered			76.881	83.023	78.571	69.938	97.604	9.934	112.249	65.317	90.215	NA
Amount Spiked			87.771	87.771	87.771	87.771	89.924	87.771	87.730	87.771	87.771	NS
Percent Recovery			88%	95%	90%	80%	109%	11%[e]	128%[e]	74%	103%	NA
RPD			15%	23%	19%	24%	8%	37%[f]	4%	19%	17%	NA
I-STAT			0.08	0.12	0.09	0.12	0.04	0.19	0.02	0.10	0.09	NA

TABLE J.15. (contd)

TABLE J.15. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Heptachlor	Heptachlor epoxide	Lindane	Toxaphene
C-SB	2	3	12.855 U	3.531 U	3.531 U	3.531 U	12.120 U	3.531 U	2.517 U	1.380 U	1.232 U	35.306 U
C-SB MS	2	3	130.572	115.574	119.492	124.733	119.707	50.764	107.348	78.829	116.534	NA
Concentration Recovered			130.572	115.574	119.492	124.733	119.707	50.764	107.348	78.829	116.534	NA
Amount Spiked			93.867	93.867	93.867	93.867	96.076	93.824	93.867	93.917	93.867	NS
Percent Recovery			139%(e)	123%(e)	127%(e)	133%(e)	125%(e)	54%	114%	84%	124%(e)	NA
C-SB	2	3	12.855 U	3.531 U	3.531 U	3.531 U	12.120 U	3.531 U	2.517 U	1.380 U	1.232 U	35.306 U
C-SB MSD	2	3	88.566	80.983	77.494	80.306	82.852	26.242	67.680	50.826	73.854	NA
Concentration Recovered			88.566	80.983	77.494	80.306	82.852	26.242	67.680	50.826	73.854	NA
Amount Spiked			61.932	61.932	61.932	61.932	63.390	61.903	61.932	61.965	61.932	NS
Percent Recovery			143%(e)	131%(e)	125%(e)	130%(e)	131%(e)	42%	109%	82%	119%	NA
RPD			3%	6%	2%	2%	5%	24%	5%	2%	4%	NA
I-STAT			0.01	0.03	0.01	0.01	0.02	0.12	0.02	0.01	0.02	NA
Background	2	4	2.692 J	2.356 U	2.356 U	2.356 U	8.087 U	2.356 U	1.679 U	0.921 U	0.822 U	23.557 U
Background MS	2	4	60.349	61.219	63.360	57.835	56.542	48.618	60.632	45.950	60.097	NA
Concentration Recovered			57.657	61.219	63.360	57.835	56.542	48.618	60.632	45.950	60.097	NA
Amount Spiked			49.116	49.116	49.116	49.116	50.272	49.093	49.116	49.142	49.116	NS
Percent Recovery			117%	125%(e)	129%(e)	118%	112%	99%	123%(e)	94%	122%(e)	NA
Background	2	4	2.692 J	2.356 U	2.356 U	2.356 U	8.087 U	2.356 U	1.679 U	0.921 U	0.822 U	23.557 U
Background MSD	2	4	45.750	43.896	44.774	43.003	46.414	36.478	44.491	32.592	45.560	NA
Concentration Recovered			43.058	43.896	44.774	43.003	46.414	36.478	44.491	32.592	45.560	NA
Amount Spiked			37.267	37.267	37.267	37.267	38.144	37.250	37.267	37.287	37.267	NS
Percent Recovery			116%	118%	120%	115%	122%(e)	98%	119%	87%	122%(e)	NA
RPD			2%	6%	7%	2%	8%	1%	3%	7%	0%	NA
I-STAT			0.01	0.03	0.04	0.01	0.04	0.01	0.02	0.03	0.00	NA
Analytical Triplicates												
C-NE	3 Rep 1	2	1.694 J	4.598 U	4.598 U	4.598 U	15.786 U	4.598 U	3.278 U	1.798 U	1.605 U	45.984 U
C-NE	3 Rep 2	2	2.052 J	5.334 U	5.334 U	5.334 U	18.313 U	5.334 U	3.803 U	2.086 U	1.862 U	53.343 U
C-NE	3 Rep 3	2	10.630 U	2.919 U	2.919 U	2.919 U	10.022 U	2.919 U	2.081 U	1.141 U	1.019 U	29.194 U
RSD			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C-NE	5 Rep 1	3	3.437 J	3.050 U	3.050 U	3.050 U	10.470 U	3.050 U	2.174 U	1.192 U	1.064 U	30.498 U
C-NE	5 Rep 2	3	3.893 J	3.410 U	3.410 U	3.410 U	11.707 U	3.410 U	2.431 U	1.333 U	1.190 U	34.102 U
C-NE	5 Rep 3	3	2.736 J	2.024 U	2.024 U	2.024 U	6.948 U	2.024 U	1.443 U	0.791 U	0.706 U	20.239 U
RSD			17%	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE J.15. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Pesticides (µg/kg wet weight) Dieldrin	Endosulfan I	Endosulfan II	Endosulfan-sulfate	Endrin	Endrin-aldehyde	Heptachlor	Heptachlor-epoxide	Lindane	Toxaphene
Background	1 Rep 1	1	0.627 J	1.731 U	1.731 U	1.731 U	5.942 U	1.731 U	1.234 U	0.677 U	0.604 U	17.309 U
Background	1 Rep 2	1	0.859 J	2.293 U	2.293 U	2.293 U	7.870 U	2.293 U	1.634 U	0.896 U	0.800 U	22.925 U
Background	1 Rep 3	1	0.813 J	2.310 U	2.310 U	2.310 U	7.932 U	2.310 U	1.647 U	0.903 U	0.806 U	23.104 U
RSD			16%	NA	NA	NA	NA	NA	NA	NA	NA	NA
Background	5 Rep 1	4	2.206 J	1.940 U	1.896 J	1.940 U	6.660 U	1.940 U	1.383 U	2.314	3.980	19.399 U
Background	5 Rep 2	4	2.376 J	1.956 U	1.937 J	1.956 U	6.716 U	1.956 U	1.395 U	2.216	3.803	19.565 U
Background	5 Rep 3	4	1.220 J	1.052 U	1.042 J	1.052 U	3.610 U	1.052 U	0.750 U	1.297	2.130	10.517 U
RSD			32%(f)	NA	31%(f)	NA	NA	NA	NA	29%	31%(f)	NA

(a) U Analyte was not present above the level of associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) NA Not applicable.
(d) NS Not spiked.
(e) Value outside of quality control range of 40% - 120%.
(f) Value exceeds relative precision goal of ≤30%.

TABLE J.16. Polychlorinated Biphenyls (PCB), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* PCB (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
Target DL[a]			20	20	20	20
Achieved DL High			53.343	53.343	53.343	53.343
Achieved DL Low			6.654	6.654	6.654	6.654
COMP WR-1	1	3	12.100 U[b]	12.100 U	7.380 J[c]	12.100 U
COMP WR-1	2	1	9.346 U	9.346 U	6.689	9.346 U
COMP WR-1	3	3	10.930 U	10.930 U	10.930 U	10.930 U
COMP WR-1	4	3	9.069 U	9.069 U	5.959 J	9.069 U
COMP WR-1	5	2	11.620 U	11.620 U	11.620 U	11.620 U
COMP WR-2	1	2	41.691 U	41.691 U	41.691 U	41.691 U
COMP WR-2	2	2	15.398 U	12.049	15.398 U	15.398 U
COMP WR-2	3	3	11.636 U	11.630 J	11.636 U	11.636 U
COMP WR-2	4	2	20.385 U	20.385 U	20.385 U	20.385 U
COMP WR-2	5	3	12.032 U	12.032 U	12.032 U	12.032 U
COMP PS-1	1	2	18.888 U	18.888 U	18.888 U	18.888 U
COMP PS-1	2	2	19.143 U	19.143 U	19.143 U	19.143 U
COMP PS-1	3	3	12.531 U	12.531 U	8.218 J	12.531 U
COMP PS-1	4	1	14.606 U	14.606 U	14.606 U	14.606 U
COMP PS-1	5	3	18.214 U	18.214 U	18.214 U	18.214 U
COMP PS-2	1	1	9.733 U	9.733 U	12.539	9.733 U
COMP PS-2	2	3	7.550 U	7.550 U	7.004 J	7.550 U
COMP PS-2	3	1	14.254 U	14.254 U	10.231	14.254 U
COMP PS-2	4	4	8.644 U	8.644 U	7.114 J	8.644 U
COMP PS-2	5	4	11.009 U	11.009 U	7.998 J	11.009 U
COMP PS-3	1	1	11.975 U	11.975 U	19.479	11.975 U
COMP PS-3	2	3	14.826 U	14.826 U	14.826 U	14.826 U
COMP PS-3	3	2	13.954 U	13.954 U	13.954 U	13.954 U
COMP PS-3	4	2	12.973 U	12.973 U	9.968	12.973 U
COMP PS-3	5	2	16.397 U	16.397 U	10.386	16.397 U
COMP PS-4	1	1	11.270 U	11.270 U	15.664	11.270 U
COMP PS-4	2	1	8.001 U	8.001 U	12.005	8.001 U
COMP PS-4	3	4	11.953 U	11.953 U	9.799 J	11.953 U
COMP PS-4	4	4	8.210 U	8.210 U	9.186	8.210 U
COMP PS-4	5	2	12.544 U	12.544 U	13.733	12.544 U
COMP CS-1	1	3	12.844 U	12.844 U	12.844 U	12.844 U
COMP CS-1	2	1	12.231 U	12.231 U	12.231 U	12.231 U
COMP CS-1	3	4	12.191 U	12.191 U	12.191 U	12.191 U
COMP CS-1	4	4	11.757 U	11.757 U	11.757 U	11.757 U
COMP CS-1	5	2	16.651 U	16.651 U	16.651 U	16.651 U
R-BF	1	2	14.612 U	14.612 U	21.040	14.612 U
R-BF	2	2	15.168 U	15.168 U	25.315	15.168 U
R-BF	3	4	11.818 U	11.818 U	21.357	11.818 U
R-BF	4	2	11.967 U	11.967 U	28.781	11.967 U
R-BF	5	4	15.980 U	15.980 U	26.342	15.980 U
R-OS	1	4	11.097 U	11.097 U	11.097 U	11.097 U
R-OS	2	1	11.186 U	11.186 U	11.186 U	11.186 U
R-OS	3	1	7.868 U	7.868 U	7.868 U	7.868 U
R-OS	4	3	17.326 U	17.326 U	17.326 U	17.326 U
R-OS	5	1	7.772 U	7.772 U	5.344	7.772 U

TABLE J.16. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* PCB (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
C-SB	1	4	8.339 U	8.339 U	8.339 U	8.339 U
C-SB	2	3	35.306 U	35.306 U	35.306 U	35.306 U
C-SB	3	2	7.918 U	12.374	7.918 U	7.918 U
C-SB	4	1	11.596 U	11.596 U	11.596 U	11.596 U
C-SB	5	1	13.516 U	13.516 U	8.985	13.516 U
C-NE	1	4	7.493 U	7.493 U	7.493 U	7.493 U
C-NE	2	1	15.677 U	15.677 U	15.677 U	15.677 U
C-NE	3 Rep 1	2	45.984 U	45.984 U	45.984 U	45.984 U
C-NE	3 Rep 2	2	53.343 U	53.343 U	53.343 U	53.343 U
C-NE	3 Rep 3	2	29.194 U	29.194 U	29.194 U	29.194 U
C-NE	4	3	6.654 U	6.654 U	6.654 U	6.654 U
C-NE	5 Rep 1	3	30.498 U	30.498 U	30.498 U	30.498 U
C-NE	5 Rep 2	3	34.102 U	34.102 U	34.102 U	34.102 U
C-NE	5 Rep 3	3	20.239 U	20.239 U	20.239 U	20.239 U
Background	1 Rep 1	1	17.309 U	17.309 U	17.309 U	17.309 U
Background	1 Rep 2	1	22.925 U	22.925 U	22.925 U	22.925
Background	1 Rep 3	1	23.104 U	23.104 U	23.104 U	23.104
Background	2	4	23.557 U	23.557 U	23.557 U	23.557 U
Background	3	4	8.241 U	8.241 U	8.241 U	8.241 U
Background	4	4	6.696 U	6.696 U	6.696 U	6.696 U
Background	5 Rep 1	4	19.399 U	19.399 U	19.399 U	19.399 U
Background	5 Rep 2	4	19.565 U	19.565 U	19.565 U	19.565 U
Background	5 Rep 3	4	10.517 U	10.517 U	10.517 U	10.517 U

(a) DL Detection limit.
(b) U Analyte was not present above the level of associated value.
(c) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE J.17. Polychlorinated Biphenyls (PCB), Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* PCB (µg/kg dry weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
COMP WR-1	1	3	17.55	68.95 U[a]	68.95 U	42.05 J[b]	68.95 U
COMP WR-1	2	1	14.22	65.72 U	65.72 U	47.04	65.72 U
COMP WR-1	3	3	17.25	63.36 U	63.36 U	63.36 U	63.36 U
COMP WR-1	4	3	17.28	52.48 U	52.48 U	34.48 J	52.48 U
COMP WR-1	5	2	14.96	77.67 U	77.67 U	77.67 U	77.67 U
COMP WR-2	1	2	16.78	248.46 U	248.46 U	248.46 U	248.46 U
COMP WR-2	2	2	17.67	87.14 U	68.19	87.14 U	87.14 U
COMP WR-2	3	3	18.32	63.52 U	63.48 J	63.52 U	63.52 U
COMP WR-2	4	2	18.75	108.72 U	108.72 U	108.72 U	108.72 U
COMP WR-2	5	3	17.16	70.12 U	70.12 U	70.12 U	70.12 U
COMP PS-1	1	2	16.94	111.50 U	111.50 U	111.50 U	111.50 U
COMP PS-1	2	2	18.16	105.41 U	105.41 U	105.41 U	105.41 U
COMP PS-1	3	3	17.83	70.28 U	70.28 U	46.09 J	70.28 U
COMP PS-1	4	1	16.03	91.12 U	91.12 U	91.12 U	91.12 U
COMP PS-1	5	3	17.51	104.02 U	104.02 U	104.02 U	104.02 U
COMP PS-2	1	1	16.58	58.70 U	58.70 U	75.63	58.70 U
COMP PS-2	2	3	17.87	42.25 U	42.25 U	39.19 J	42.25 U
COMP PS-2	3	1	16.48	86.49 U	86.49 U	62.08	86.49 U
COMP PS-2	4	4	17.53	49.31 U	49.31 U	40.58 J	49.31 U
COMP PS-2	5	4	17.44	63.13 U	63.13 U	45.86 J	63.13 U
COMP PS-3	1	1	17.89	66.94 U	66.94 U	108.88	66.94 U
COMP PS-3	2	3	16.52	89.75 U	89.75 U	89.75 U	89.75 U
COMP PS-3	3	2	18.11	77.05 U	77.05 U	77.05 U	77.05 U
COMP PS-3	4	2	18.42	70.43 U	70.43 U	54.12	70.43 U
COMP PS-3	5	2	18.04	90.89 U	90.89 U	57.57	90.89 U
COMP PS-4	1	1	16.15	69.78 U	69.78 U	96.99	69.78 U
COMP PS-4	2	1	16.76	47.74 U	47.74 U	71.63	47.74 U
COMP PS-4	3	4	16.47	72.57 U	72.57 U	59.50 J	72.57 U
COMP PS-4	4	4	16.54	49.64 U	49.64 U	55.54	49.64 U
COMP PS-4	5	2	17.24	72.76 U	72.76 U	79.66	72.76 U
COMP CS-1	1	3	16.02	80.17 U	80.17 U	80.17 U	80.17 U
COMP CS-1	2	1	17.13	71.40 U	71.40 U	71.40 U	71.40 U
COMP CS-1	3	4	17.36	70.22 U	70.22 U	70.22 U	70.22 U
COMP CS-1	4	4	18.12	64.88 U	64.88 U	64.88 U	64.88 U
COMP CS-1	5	2	17.96	92.71 U	92.71 U	92.71 U	92.71 U
R-BF	1	2	18.14	80.55 U	80.55 U	115.99	80.55 U
R-BF	2	2	18.41	82.39 U	82.39 U	137.51	82.39 U
R-BF	3	4	16.67	70.89 U	70.89 U	128.12	70.89 U
R-BF	4	2	18.04	66.34 U	66.34 U	159.54	66.34 U
R-BF	5	4	17.36	92.05 U	92.05 U	151.74	92.05 U
R-OS	1	4	17.06	65.05 U	65.05 U	65.05 U	65.05 U
R-OS	2	1	14.40	77.68 U	77.68 U	77.68 U	77.68 U
R-OS	3	1	16.71	47.09 U	47.09 U	47.09 U	47.09 U
R-OS	4	3	18.54	93.45 U	93.45 U	93.45 U	93.45 U
R-OS	5	1	16.76	46.37 U	46.37 U	31.89	46.37 U

TABLE J.17. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* PCB (µg/kg dry weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
C-SB	1	4	18.39	45.35 U	45.35 U	45.35 U	45.35 U
C-SB	2	3	18.13	194.74 U	194.74 U	194.74 U	194.74 U
C-SB	3	2	18.17	43.58 U	68.10	43.58 U	43.58 U
C-SB	4	1	18.07	64.17 U	64.17 U	64.17 U	64.17 U
C-SB	5	1	16.14	83.74 U	83.74 U	55.67	83.74 U
C-NE	1	4	18.64	40.20 U	40.20 U	40.20 U	40.20 U
C-NE	2	1	17.28	90.72 U	90.72 U	90.72 U	90.72 U
C-NE	3 Rep 1	2	17.88	257.18 U	257.18 U	257.18 U	257.18 U
C-NE	3 Rep 2	2	17.88	298.34 U	298.34 U	298.34 U	298.34 U
C-NE	3 Rep 3	2	17.88	163.28 U	163.28 U	163.28 U	163.28 U
C-NE	4	3	18.01	36.95 U	36.95 U	36.95 U	36.95 U
C-NE	5 Rep 1	3	16.53	184.50 U	184.50 U	184.50 U	184.50 U
C-NE	5 Rep 2	3	16.53	206.30 U	206.30 U	206.30 U	206.30 U
C-NE	5 Rep 3	3	16.53	122.44 U	122.44 U	122.44 U	122.44 U
Background	1 Rep 1	1	12.49	138.58 U	138.58 U	138.58 U	138.58 U
Background	1 Rep 2	1	12.49	183.55 U	183.55 U	183.55 U	183.55
Background	1 Rep 3	1	12.49	184.98 U	184.98 U	184.98 U	184.98
Background	2	4	14.62	161.13 U	161.13 U	161.13 U	161.13 U
Background	3	4	12.38	66.57 U	66.57 U	66.57 U	66.57 U
Background	4	4	13.97	47.93 U	47.93 U	47.93 U	47.93 U
Background	5 Rep 1	4	16.22	119.60 U	119.60 U	119.60 U	119.60 U
Background	5 Rep 2	4	16.22	120.62 U	120.62 U	120.62 U	120.62 U
Background	5 Rep 3	4	16.22	64.84 U	64.84 U	64.84 U	64.84 U

(a) U Analyte was not present above the level of associated value.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).

TABLE J.18. Quality Control Data for Polyclorinated Biphenyls (PCB), Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* PCB (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
Method Blanks						
Blank 1		1	11.796 U[a]	11.796 U	11.796 U	11.796 U
Blank 2		2	16.397 U	16.397 U	16.397 U	16.397 U
Blank 3		3	13.182 U	13.182 U	13.182 U	13.182 U
Blank 4		4	10.756 U	10.756 U	10.756 U	10.756 U
Matrix Spikes						
C-NE	2	1	15.677 U	15.677 U	15.677 U	15.677 U
C-NE MS	2	1	NA[b]	NA	946.195	NA
Concentration Recovered			NA	NA	946.195	NA
Amount Spiked			NS[c]	NS	709.958	NS
Percent Recovery			NA	NA	133%[d]	NA
C-NE	2	1	15.677 U	15.677 U	15.677 U	15.677 U
C-NE MSD	2	1	NA	NA	1040.101	NA
Concentration Recovered			NA	NA	1040.101	NA
Amount Spiked			NS	NS	744.343	NS
Percent Recovery			NA	NA	140%[d]	NA
RPD			NA	NA	5%	NA
I-STAT			NA	NA	0.02	NA
COMP WR-2	1	2	41.691 U	41.691 U	41.691 U	41.691 U
COMP WR-2 MS	1	2	NA	NA	1786.299	NA
Concentration Recovered			NA	NA	1786.299	NA
Amount Spiked			NS	NS	1196.554	NS
Percent Recovery			NA	NA	149%[d]	NA
COMP WR-2	1	2	41.691 U	41.691 U	41.691 U	41.691 U
COMP WR-2 MSD	1	2	NA	NA	1552.707	NA
Concentration Recovered			NA	NA	1552.707	NA
Amount Spiked			NS	NS	1097.133	NS
Percent Recovery			NA	NA	142%[d]	NA
RPD			NA	NA	5%	NA
I-STAT			NA	NA	0.03	NA
C-SB	2	3	35.306 U	35.306 U	35.306 U	35.306 U
C-SB MS	2	3	NA	NA	1110.011	NA
Concentration Recovered			NA	NA	1110.011	NA
Amount Spiked			NS	NS	1368.917	NS
Percent Recovery			NA	NA	81%	NA
C-SB	2	3	35.306 U	35.306 U	35.306 U	35.306 U
C-SB MSD	2	3	NA	NA	863.012	NA
Concentration Recovered			NA	NA	863.012	NA
Amount Spiked			NS	NS	903.192	NS
Percent Recovery			NA	NA	96%	NA
RPD			NA	NA	16%	NA
I-STAT			NA	NA	0.08	NA

TABLE J.18. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* PCB (µg/kg wet weight) Aroclor-1242	Aroclor-1248	Aroclor-1254	Aroclor-1260
Background	2	4	23.557 U	23.557 U	23.557 U	23.557 U
Background MS	2	4	NA	NA	614.069	NA
Concentration Recovered			NA	NA	614.069	NA
Amount Spiked			NS	NS	716.284	NS
Percent Recovery			NA	NA	86%	NA
Background	2	4	23.557 U	23.557 U	23.557 U	23.557 U
Background MSD	2	4	NA	NA	498.481	NA
Concentration Recovered			NA	NA	498.481	NA
Amount Spiked			NS	NS	543.486	NS
Percent Recovery			NA	NA	92%	NA
RPD			NA	NA	7%	NA
I-STAT			NA	NA	0.03	NA
Analytical Triplicates						
C-NE	3 Rep 1	2	45.984 U	45.984 U	45.984 U	45.984 U
C-NE	3 Rep 2	2	53.343 U	53.343 U	53.343 U	53.343 U
C-NE	3 Rep 3	2	29.194 U	29.194 U	29.194 U	29.194 U
RSD			NA	NA	NA	NA
C-NE	5 Rep 1	3	30.498 U	30.498 U	30.498 U	30.498 U
C-NE	5 Rep 2	3	34.102 U	34.102 U	34.102 U	34.102 U
C-NE	5 Rep 3	3	20.239 U	20.239 U	20.239 U	20.239 U
RSD			NA	NA	NA	NA
Background	1 Rep 1	1	17.309 U	17.309 U	17.309 U	17.309 U
Background	1 Rep 2	1	22.925 U	22.925 U	22.925 U	22.925
Background	1 Rep 3	1	23.104 U	23.104 U	23.104 U	23.104
RSD			NA	NA	NA	NA
Background	5 Rep 1	4	19.399 U	19.399 U	19.399 U	19.399 U
Background	5 Rep 2	4	19.565 U	19.565 U	19.565 U	19.565 U
Background	5 Rep 3	4	10.517 U	10.517 U	10.517 U	10.517 U
RSD			NA	NA	NA	NA

(a) U Analyte was not present above the level of associated value.
(b) NA Not applicable.
(c) NS Not spiked.
(d) Value outside of quality control range 40%-120%.

TABLE J.19. Surrogate Percent Recoveries for Chlorinated Pesticides and Polychlorinated Biphenyls (PCB) in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

S/T	Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery Dibromooctofluorobiphenyl	CL5(112)
C	COMP WR-1	1	3	72	76
C	COMP WR-1	2	1	76	98
C	COMP WR-1	3	3	63	74
C	COMP WR-1	4	3	75	77
C	COMP WR-1	5	2	81	108
C	COMP WR-2	1	2	82	82
C	COMP WR-2	2	2	78	73
C	COMP WR-2	3	3	72	80
C	COMP WR-2	4	2	86	101
C	COMP WR-2	5	3	66	76
C	COMP PS-1	1	2	65	69
C	COMP PS-1	2	2	72	72
C	COMP PS-1	3	3	70	71
C	COMP PS-1	4	1	69	97
C	COMP PS-1	5	3	73	78
C	COMP PS-2	1	1	74	103
C	COMP PS-2	2	3	64	72
C	COMP PS-2	3	1	88	101
C	COMP PS-2	4	4	81	94
C	COMP PS-2	5	4	79	90
C	COMP PS-3	1	1	88	113
C	COMP PS-3	2	3	75	78
C	COMP PS-3	3	2	83	112
C	COMP PS-3	4	2	90	106
C	COMP PS-3	5	2	82	97
C	COMP PS-4	1	1	80	102
C	COMP PS-4	2	1	75	100
C	COMP PS-4	3	4	74	76
C	COMP PS-4	4	4	82	87
C	COMP PS-4	5	2	73	79
C	COMP CS-1	1	3	67	76
C	COMP CS-1	2	1	67	95
C	COMP CS-1	3	4	84	83
C	COMP CS-1	4	4	78	77
C	COMP CS-1	5	2	83	103

TABLE J.19. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery Dibromoocto-fluorobiphenyl	CL5(112)
R-BF	1	2	133[a]	100
R-BF	2	2	81	104
R-BF	3	4	87	94
R-BF	4	2	86	99
R-BF	5	4	85	90
R-OS	1	4	68	76
R-OS	2	1	99	115
R-OS	3	1	79	107
R-OS	4	3	72	75
R-OS	5	1	83	110
C-SB	1	4	82	95
C-SB	2	3	72	80
C-SB	3	2	78	88
C-SB	4	1	95	115
C-SB	5	1	89	108
C-NE	1	4	78	84
C-NE	2	1	88	105
C-NE	3 Rep 1	2	68	84
C-NE	3 Rep 2	2	28[a]	43
C-NE	3 Rep 3	2	68	96
C-NE	4	3	82	83
C-NE	5 Rep 1	3	67	69
C-NE	5 Rep 2	3	71	79
C-NE	5 Rep 3	3	83	79
Background	1 Rep 1	1	80	107
Background	1 Rep 2	1	76	106
Background	1 Rep 3	1	94	254[a]
Background	2	4	76	93
Background	3	4	79	70
Background	4	4	81	86
Background	5 Rep 1	4	88	95
Background	5 Rep 2	4	78	82
Background	5 Rep 3	4	80	76
Quality Control Data				
Method Blanks				
Blank 1		1	72	92
Blank 2		2	78	88
Blank 3		3	66	75
Blank 4		4	78	127[a]

TABLE J.19. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery Dibromooctofluorobiphenyl	CL5(112)
Matrix Spikes				
COMP WR-2	1	2	82	82
COMP WR-2 MS	1	2	81	112
COMP WR-2 MSD	1	2	63	88
C-SB	2	3	72	80
C-SB MS	2	3	72	80
C-SB MSD	2	3	78	85
C-NE	2	1	88	105
C-NE MS	2	1	89	116
C-NE MSD	2	1	82	110
Background	2	4	76	93
Background MS	2	4	88	96
Background MSD	2	4	86	91
Analytical Triplicates				
C-NE	3 Rep 1	2	68	84
C-NE	3 Rep 2	2	28[a]	43
C-NE	3 Rep 3	2	68	96
C-NE	5 Rep 1	3	67	69
C-NE	5 Rep 2	3	71	79
C-NE	5 Rep 3	3	83	79
Background	1 Rep 1	1	80	107
Background	1 Rep 2	1	76	106
Background	1 Rep 3	1	94	254[a]
Background	5 Rep 1	4	88	95
Background	5 Rep 2	4	78	82
Background	5 Rep 3	4	80	76

(a) Surrogate percent recovery outside of quality control range of 40%-120%.

TABLE J.20. Metals, Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* Metals (mg/kg wet weight)									
				Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP WR-1	1	3	17.55	0.008	4.5	0.146	0.16	2.6	0.011	0.46	0.121	0.21	37
COMP WR-1	2	1	14.22	0.012	4.4	0.168	0.16	2.6	0.010	0.56	0.129	0.19	27
COMP WR-1	3 Rep 1	2	17.25	0.005	5.8	0.224	0.13	1.7	0.012	0.42	0.145	0.13	38
COMP WR-1	3 Rep 2	2	17.25	0.008	ND[a]	0.218	0.13	ND	ND	0.46	0.142	ND	ND
COMP WR-1	3 Rep 3	2	17.25	0.007	ND	0.214	0.14	ND	ND	0.46	0.135	ND	ND
COMP WR-1	4	3	17.28	0.013	4.3	0.199	0.20	2.0	0.012	0.51	0.135	0.24	39
COMP WR-1	5	2	14.96	0.011	3.6	0.115	0.21	2.1	0.012	0.48	0.357	0.20	31
COMP WR-2	1	2	16.78	0.009	4.5	0.157	0.12	2.7	0.010	0.44	0.112	0.14	33
COMP WR-2	2	2	17.67	0.014	4.1	0.159	0.13	2.1	0.016	0.46	0.117	0.17	35
COMP WR-2	3	2	18.32	0.006	4.2	0.208	0.14	3.0	0.010	0.46	0.122	0.25	33
COMP WR-2	4	2	18.75	0.014	4.6	0.237	0.18	2.9	0.013	0.59	0.132	0.27	38
COMP WR-2	5	2	17.16	0.007	3.8	0.197	0.16	3.0	0.011	0.50	0.135	0.18	29
COMP PS-1	1	2	16.94	0.011	4.0	0.139	0.12	3.2	0.011	0.45	0.110	0.31	30
COMP PS-1	2	2	18.16	0.012	4.4	0.203	0.17	3.0	0.010	0.46	0.104	0.25	33
COMP PS-1	3	2	17.83	0.014	4.7	0.136	0.15	2.4	0.016	0.67	0.142	0.35	36
COMP PS-1	4	1	16.03	0.006	3.8	0.117	0.48	2.7	0.011	0.84	0.143	0.27	28
COMP PS-1	5	3	17.51	0.008	4.7	0.184	0.14	1.9	0.013	0.61	0.133	0.24	38
COMP PS-2	1	1	16.58	0.007	4.6	0.148	0.20	2.1	0.014	0.65	0.109	0.37	30
COMP PS-2	2	3	17.87	0.007	5.1	0.177	0.16	1.8	0.013	0.57	0.129	0.23	38
COMP PS-2	3	1	16.48	0.005	4.7	0.146	0.21	2.7	0.012	0.63	0.255	0.29	29
COMP PS-2	4	3	17.53	0.011	4.9	0.147	0.16	2.1	0.013	0.54	0.122	0.38	36
COMP PS-2	5	3	17.44	0.020	4.8	0.127	0.18	2.0	0.012	0.54	0.107	0.13	32
COMP PS-3	1	1	17.89	0.014	4.9	0.152	0.14	2.6	0.011	0.47	0.086	0.33	34
COMP PS-3	2	2	16.52	0.011	3.5	0.145	0.13	2.9	0.011	0.47	0.136	0.23	32
COMP PS-3	3 Rep 1	1	18.11	0.012	4.5	0.214	0.27	3.4	0.013	0.76	0.122	0.29	35
COMP PS-3	3 Rep 2	1	18.11	0.011	ND	0.216	0.22	ND	ND	0.77	0.112	ND	ND
COMP PS-3	3 Rep 3	1	18.11	0.018	ND	0.185	0.18	ND	ND	0.64	0.121	ND	ND
COMP PS-3	4	2	18.42	0.012	4.4	0.178	0.16	2.6	0.013	0.54	0.185	0.34	34
COMP PS-3	5	2	18.04	0.305	4.5	0.796	0.23	3.5	0.012	0.46	0.075	0.27	33
COMP PS-4	1	1	16.15	0.013	5.3	0.176	0.17	2.3	0.010	0.49	0.112	0.22	32
COMP PS-4	2	1	16.76	0.012	5.6	0.180	0.19	2.8	0.018	0.63	0.268	0.49	33
COMP PS-4	3	3	16.47	0.013	4.2	0.193	0.16	1.7	0.012	0.49	0.115	0.26	35
COMP PS-4	4	3	16.54	0.012	4.8	0.156	0.14	2.3	0.011	0.39	0.107	0.24	32
COMP PS-4	5	2	17.24	0.012	5.6	0.130	0.13	2.7	0.012	0.47	0.112	0.30	31

TABLE J.20. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* Metals (mg/kg wet weight)									
				Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP CS-1	1	2	16.02	0.017	5.6	0.182	0.14	2.5	0.012	0.48	0.108	0.29	34
COMP CS-1	2	1	17.13	0.011	4.9	0.186	0.22	2.0	0.014	0.61	0.139	0.32	39
COMP CS-1	3	3	17.36	0.014	5.3	0.141	0.17	2.5	0.011	0.44	0.107	0.24	35
COMP CS-1	4	3	18.12	0.012	5.3	0.191	0.46	2.4	0.013	0.65	0.142	0.35	36
COMP CS-1	5	2	17.96	0.009	5.4	0.177	0.19	2.9	0.013	0.48	0.233	0.45	38
R-BF	1	2	18.14	0.015	6.1	0.190	0.19	3.0	0.015	0.47	0.299	0.37	40
R-BF	2	2	18.41	0.012	5.4	0.196	0.18	3.2	0.013	0.73	0.099	0.35	35
R-BF	3	3	16.67	0.007	4.7	0.148	0.14	1.9	0.013	0.39	0.163	0.18	34
R-BF	4	1	18.04	0.017	5.4	0.192	0.20	3.2	0.014	0.52	0.202	0.27	37
R-BF	5	3	17.36	0.012	4.9	0.151	0.16	2.7	0.012	0.42	0.150	0.22	34
R-OS	1	3	17.06	0.015	5.7	0.142	0.16	2.7	0.012	0.47	0.087	0.21	34
R-OS	2	1	14.40	0.016	3.8	0.162	0.17	2.6	0.015	0.51	0.206	0.34	30
R-OS	3	1	16.71	0.019	4.3	0.166	0.33	3.6	0.014	0.91	0.135	0.33	30
R-OS	4	2	18.54	0.015	4.4	0.201	0.14	2.7	0.013	0.58	0.127	0.24	36
R-OS	5	1	16.76	0.022	4.2	0.166	0.19	2.7	0.013	0.69	0.176	0.28	31
C-SB	1 Rep 1	3	18.39	0.012	4.6	0.159	0.21	2.0	0.009	0.54	0.112	0.18	39
C-SB	1 Rep 2	3	18.39	0.016	ND	0.168	0.19	ND	ND	0.57	0.119	ND	ND
C-SB	1 Rep 3	3	18.39	0.018	ND	0.146	0.17	ND	ND	0.59	0.113	ND	ND
C-SB	2	2	18.13	0.012	5.1	0.207	0.15	2.4	0.012	0.45	0.201	0.18	37
C-SB	3	2	18.17	0.009	5.3	0.130	0.13	3.4	0.013	0.41	0.084	0.21	34
C-SB	4	1	18.07	0.010	4.8	0.208	0.55	3.5	0.012	2.58	0.104	0.20	36
C-SB	5	1	16.14	0.013	3.8	0.180	0.14	2.4	0.008	0.46	0.087	0.28	27
C-NE	1	3	18.64	0.021	5.2	0.200	0.18	3.7	0.015	0.42	0.090	0.32	37
C-NE	2	1	17.28	0.010	4.1	0.102	0.15	2.4	0.023	0.48	0.266	0.39	36
C-NE	3	2	17.88	0.010	4.4	0.259	0.16	2.7	0.015	0.55	0.121	0.22	34
C-NE	4	2	18.01	0.010	4.0	0.174	0.12	2.6	0.013	0.49	0.093	0.26	34
C-NE	5	2	16.53	0.011	3.5	0.128	0.21	1.8	0.017	0.73	0.334	0.34	33
Background	1	4	12.49	0.011	2.5	0.109	0.14	1.7	0.007	0.27	0.055	0.10	19
Background	2 Rep 1	4	14.62	0.007	3.2	0.123	0.15	2.2	0.009	0.36	0.072	0.11	24
Background	2 Rep 2	4	14.62	ND	ND	ND	ND	ND	0.009	ND	ND	ND	ND
Background	2 Rep 3	4	14.62	ND	ND	ND	ND	ND	0.007	ND	ND	ND	ND
Background	3 Rep 1	4	12.38	0.008	2.6	0.115	0.13	1.8	0.008	0.32	0.064	0.10	20
Background	3 Rep 2	4	12.38	ND	0.0	0.000	ND	ND	0.008	ND	ND	ND	ND
Background	3 Rep 3	4	12.38	ND	0.0	0.000	ND	ND	0.008	ND	ND	ND	ND
Background	4	4	13.97	0.007	3.4	0.129	0.15	1.7	0.010	0.34	0.065	0.22	25

TABLE J.20. (contd)

Sediment Treatment	Replicate	Batch	Percent Dry Weight	*N. caecoides* metals (mg/kg wet weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Background	5 Rep 1	4	16.22	0.012	4.0	0.160	0.25	2.3	0.012	0.46	0.086	0.12	29
Background	5 Rep 2	4	16.22	0.009	ND	0.164	0.22	ND	0.012	0.41	0.084	ND	ND
Background	5 Rep 3	4	16.22	0.013	ND	0.163	0.20	ND	0.011	0.40	0.105	ND	ND

(a) ND No data; sample not replicated for analyte.

TABLE J.21. Metals, Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

TABLE J.21. Metals, Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* Metals (mg/kg dry weight)									
			Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Target DL[a]			0.10	2.0	0.1	1.0	4.3	0.01	1.0	1.0	1.0	35
Achieved DL			0.001	1.1	0.015	0.05	2.1	0.001	0.03	0.002	0.5	25
COMP WR-1	1	3	0.048	25.9	0.833	0.93	15.0	0.065	2.61	0.691	1.21	208
COMP WR-1	2	1	0.081	30.9	1.182	1.10	18.4	0.072	3.96	0.906	1.33	187
COMP WR-1	3 Rep 1	2	0.031	33.8[b]	1.299	0.75	9.7	0.070	2.42	0.839	0.76	219
COMP WR-1	3 Rep 2	2	0.047	ND[b]	1.264	0.78	ND	ND	2.68	0.823	ND	ND
COMP WR-1	3 Rep 3	2	0.039	ND	1.240	0.84	ND	ND	2.64	0.785	ND	ND
COMP WR-1	4	3	0.073	25.0	1.149	1.13	11.4	0.067	2.94	0.779	1.37	224
COMP WR-1	5	2	0.074	23.8	0.766	1.43	14.3	0.079	3.21	2.384	1.32	207
COMP WR-2	1	2	0.056	26.9	0.936	0.72	16.3	0.058	2.64	0.668	0.83	196
COMP WR-2	2	2	0.080	23.4	0.902	0.71	11.7	0.089	2.61	0.664	0.95	200
COMP WR-2	3	2	0.031	22.9	1.136	0.77	16.6	0.057	2.51	0.667	1.35	182
COMP WR-2	4	2	0.072	24.3	1.264	0.94	15.4	0.069	3.16	0.705	1.42	201
COMP WR-2	5	2	0.040	21.9	1.147	0.93	17.5	0.062	2.92	0.787	1.03	168
COMP PS-1	1	2	0.064	25.6	0.820	0.73	18.6	0.065	2.66	0.647	1.82	179
COMP PS-1	2	2	0.065	24.4	1.117	0.91	16.5	0.056	2.56	0.575	1.37	184
COMP PS-1	3	2	0.080	26.6	0.762	0.85	13.7	0.088	3.77	0.794	1.94	203
COMP PS-1	4	1	0.040	23.7	0.731	2.99	17.0	0.070	5.27	0.889	1.71	173
COMP PS-1	5	3	0.048	26.7	1.051	0.79	10.8	0.077	3.48	0.760	1.36	215
COMP PS-2	1	1	0.040	27.6	0.895	1.20	12.4	0.083	3.91	0.656	2.22	181
COMP PS-2	2	3	0.040	28.4	0.989	0.91	9.8	0.072	3.21	0.724	1.28	214
COMP PS-2	3	1	0.031	28.5	0.886	1.26	16.6	0.073	3.82	1.549	1.79	178
COMP PS-2	4	3	0.064	28.1	0.838	0.89	11.8	0.072	3.10	0.695	2.15	208
COMP PS-2	5	3	0.112	27.8	0.729	1.03	11.8	0.066	3.08	0.612	0.72	185
COMP PS-3	1	1	0.081	27.3	0.851	0.76	14.5	0.060	2.64	0.480	1.82	191
COMP PS-3	2	2	0.064	21.3	0.880	0.76	17.5	0.066	2.83	0.826	1.37	194
COMP PS-3	3 Rep 1	1	0.067	24.8	1.182	1.48	18.6	0.073	4.17	0.673	1.60	193
COMP PS-3	3 Rep 2	1	0.058	ND	1.193	1.19	ND	ND	4.24	0.621	ND	ND
COMP PS-3	3 Rep 3	1	0.097	ND	1.019	0.98	ND	ND	3.53	0.670	ND	ND
COMP PS-3	4	2	0.065	23.9	0.969	0.88	14.0	0.073	2.93	1.007	1.83	187
COMP PS-3	5	2	1.690	25.0	4.411	1.29	19.5	0.067	2.54	0.416	1.52	183

TABLE J.21. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP PS-4	1	1	0.079	32.7	1.088	1.03	14.2	0.064	3.02	0.695	1.34	200
COMP PS-4	2	1	0.071	33.2	1.073	1.12	17.0	0.110	3.73	1.597	2.93	199
COMP PS-4	3	3	0.081	25.3	1.170	0.97	10.3	0.072	3.00	0.696	1.57	213
COMP PS-4	4	3	0.073	28.9	0.945	0.82	13.8	0.068	2.34	0.645	1.48	196
COMP PS-4	5	2	0.072	32.2	0.755	0.75	15.6	0.068	2.70	0.649	1.74	177
COMP CS-1	1	2	0.105	34.9	1.133	0.90	15.7	0.074	3.02	0.675	1.83	212
COMP CS-1	2	1	0.064	28.6	1.086	1.26	11.9	0.083	3.55	0.814	1.89	226
COMP CS-1	3	3	0.082	30.4	0.814	0.96	14.2	0.064	2.56	0.617	1.38	202
COMP CS-1	4	3	0.064	29.0	1.054	2.56	13.3	0.071	3.56	0.782	1.91	196
COMP CS-1	5	2	0.048	30.2	0.985	1.04	16.2	0.072	2.69	1.295	2.48	211
R-BF	1	2	0.081	33.4	1.048	1.04	16.4	0.082	2.61	1.646	2.02	220
R-BF	2	2	0.064	29.3	1.065	1.00	17.2	0.070	3.99	0.537	1.91	191
R-BF	3	3	0.040	28.4	0.887	0.82	11.5	0.076	2.32	0.980	1.10	206
R-BF	4	1	0.096	29.7	1.066	1.10	17.7	0.079	2.90	1.117	1.48	207
R-BF	5	3	0.072	28.5	0.867	0.91	15.7	0.068	2.43	0.863	1.28	195
R-OS	1	3	0.089	33.4	0.831	0.93	15.7	0.070	2.74	0.509	1.22	202
R-OS	2	1	0.110	26.5	1.127	1.15	17.9	0.107	3.55	1.428	2.38	210
R-OS	3	1	0.111	25.7	0.992	2.29	21.5	0.081	5.45	0.809	1.98	178
R-OS	4	2	0.081	23.9	1.086	0.78	14.3	0.072	3.12	0.686	1.28	194
R-OS	5	1	0.129	24.9	0.992	1.16	15.9	0.076	4.13	1.051	1.68	187
C-SB	1 Rep 1	3	0.067	25.1	0.866	1.14	10.8	0.048	2.91	0.607	0.98	211
C-SB	1 Rep 2	3	0.086	ND	0.914	1.04	ND	ND	3.11	0.649	ND	ND
C-SB	1 Rep 3	3	0.096	ND	0.792	0.91	ND	ND	3.23	0.616	ND	ND
C-SB	2	2	0.064	28.3	1.141	0.80	13.1	0.065	2.47	1.107	0.97	205
C-SB	3	2	0.048	29.3	0.713	0.73	18.5	0.073	2.26	0.461	1.18	188
C-SB	4	1	0.055	26.8	1.151	3.04	19.3	0.066	14.30	0.577	1.10	199
C-SB	5	1	0.079	23.5	1.114	0.89	14.9	0.049	2.84	0.538	1.71	167
C-NE	1	3	0.114	27.9	1.073	0.98	19.6	0.081	2.28	0.482	1.71	201
C-NE	2	1	0.055	23.9	0.591	0.85	13.6	0.134	2.75	1.537	2.24	206
C-NE	3	2	0.057	24.7	1.451	0.88	15.1	0.085	3.07	0.679	1.25	189
C-NE	4	2	0.055	22.4	0.964	0.69	14.2	0.074	2.73	0.514	1.44	188
C-NE	5	2	0.064	21.4	0.772	1.26	10.7	0.101	4.44	2.021	2.04	199
Background	1	4	0.089	20.2	0.872	1.15	13.7	0.060	2.14	0.442	0.79	155
Background	2 Rep 1	4	0.048	21.7	0.842	1.01	14.9	0.063	2.48	0.491	0.73	165
Background	2 Rep 2	4	ND	ND	ND	ND	ND	0.064	ND	ND	ND	ND
Background	2 Rep 3	4	ND	ND	ND	ND	ND	0.049	ND	ND	ND	ND
Background	3 Rep 1	4	0.065	21.0	0.928	1.02	14.6	0.064	2.57	0.515	0.79	162

TABLE J.21. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Metals (mg/kg dry weight)									
			Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Background	3 Rep 2	4	ND	ND	ND	ND	ND	0.063	ND	ND	ND	ND
Background	3 Rep 3	4	ND	ND	ND	ND	ND	0.066	ND	ND	ND	ND
Background	4	4	0.049	24.2	0.923	1.08	12.5	0.071	2.43	0.463	1.60	176
Background	5 Rep 1	4	0.073	24.9	0.984	1.54	14.2	0.071	2.81	0.530	0.74	181
Background	5 Rep 2	4	0.056	ND	1.011	1.37	ND	0.071	2.51	0.519	ND	ND
Background	5 Rep 3	4	0.080	ND	1.007	1.24	ND	0.070	2.49	0.649	ND	ND

(a) DL Detection limit.
(b) ND No data; sample not replicated for analyte.

TABLE J.22. Quality Control Data for Metals, Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	*N. caecoides* Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
Method Blanks												
Blank		1	0.001	NA[a]	0.002	0.22	NA	<0.001	0.02	0.002	NA	NA
Blank		2	0.001	NA	0.003	0.21	NA	<0.001	0.04	0.002	NA	NA
Blank		2	0.002	NA	0.002	0.18	NA	ND	0.05	0.003	NA	NA
Blank		2	0.001 U[b]	NA	ND[c]	0.18	NA	ND	0.03	0.002	NA	NA
Blank		3	0.001 U	NA	ND	0.18	NA	<0.001	0.04	0.002	NA	NA
Blank		3	0.001	NA	0.011	0.19	NA	ND	0.02	0.002	NA	NA
Blank		4	0.001	NA	0.013	0.20	NA	<0.001	0.05	0.002	NA	NA
Matrix Spikes												
R-BF	4	1	0.096	29.7	1.066	1.10	17.7	0.079	2.90	1.117	1.48	207
R-BF MS		1	1.130	NA	3.604	6.96	NA	NA	8.67	7.091	NA	NA
Concentration Recovered			1.034	NA[d]	2.538	5.86	NA	NA	5.77	5.974	NA	NA
Amount Spiked			1.0	NS	2.5	5.0	NS	NS	5.0	5.0	NS	NS
Percent Recovery			103%	NA	102%	117%	NA	NA	115%	119%	NA	NA
COMP WR-2	2	2	0.080	23.4	0.902	0.71	11.7	0.089	2.61	0.664	0.95	200
COMP WR-2 MS		2	1.000	NA	3.557	5.63	NA	NA	7.12	6.365	NA	NA
Concentration Recovered			0.920	NA	2.655	4.92	NA	NA	4.51	5.701	NA	NA
Amount Spiked			1.0	NS	2.5	5.0	NS	NS	5.0	5.0	NS	NS
Percent Recovery			92%	NA	106%	98%	NA	NA	90%	114%	NA	NA
COMP PS-1	3	2	0.080	26.6	0.762	0.85	13.7	0.088	3.77	0.794	1.94	203
COMP PS-1 MS		2	0.915	NA	3.019	5.13	NA	NA	7.89	6.679	NA	NA
Concentration Recovered			0.835	NA	2.257	4.28	NA	NA	4.12	5.885	NA	NA
Amount Spiked			1.0	NS	2.5	5.0	NS	NS	5.0	5.0	NS	NS
Percent Recovery			84%	NA	90%	86%	NA	NA	82%	118%	NA	NA
R-BF	5	3	0.072	28.5	0.867	0.91	15.7	0.068	2.43	0.863	1.28	195
R-BF MS		3	NA	NA	NA	NA	NA	0.584	NA	NA	NA	NA
Concentration Recovered			NA	NA	NA	NA	NA	0.516	NA	NA	NA	NA
Amount Spiked			NS	NS	NS	NS	NS	0.5	NS	NS	NS	NS
Percent Recovery			NA	NA	NA	NA	NA	103%	NA	NA	NA	NA

TABLE J.22. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
COMP PS-2	4	3	0.064	28.1	0.838	0.89	11.8	0.072	3.10	0.695	2.15	208
COMP PS-2 MS		3	0.907	NA	3.194	5.35	NA	NA	7.78	6.401	NA	NA
Concentration Recovered			0.843	NA	2.356	4.46	NA	NA	4.68	5.706	NA	NA
Amount Spiked			1.0	NS	2.5	5.0	NS	NS	5.0	5.0	NS	NS
Percent Recovery			84%	NA	94%	89%	NA	NA	94%	114%	NA	NA
Background	1	4	0.089	20.2	0.872	1.15	13.7	0.060	2.14	0.442	0.79	155
Background MS		4	NA	NA	NA	NA	NA	0.525	NA	NA	NA	NA
Concentration Recovered			NA	NA	NA	NA	NA	0.465	NA	NA	NA	NA
Amount Spiked			NS	NS	NS	NS	NS	0.5	NS	NS	NS	NS
Percent Recovery			NA	NA	NA	NA	NA	93%	NA	NA	NA	NA
Background	2	4	0.049	24.2	0.923	1.08	12.5	0.071	2.43	0.463	1.60	176
Background MS		4	NA	NA	NA	NA	NA	0.566	NA	NA	NA	NA
Concentration Recovered			NA	NA	NA	NA	NA	0.495	NA	NA	NA	NA
Amount Spiked			NS	NS	NS	NS	NS	0.5	NS	NS	NS	NS
Percent Recovery			NA	NA	NA	NA	NA	99%	NA	NA	NA	NA
Standard Reference Material												
Certified Values			1.68 ±0.15	14.0 ±1.2	4.15 ±0.38	1.43 ±0.46	66.3 ±4.3	0.064 ±0.007	2.25 ±0.44	0.371 ±0.014	2.21 ±0.24	830 ±57
SRM1566A		1	1.680	14.3	4.050	1.76	64.8	0.067	2.16	0.367	2.41	849
SRM1566A		2	1.600	15.1	4.259	1.40	66.0	0.063	1.88	0.370	2.51	866
SRM1566A		3	1.530	14.9	4.271	1.24	64.4	0.062	1.57(e)	0.379	2.12	858
SRM1566A		4	1.520	14.6	4.189	1.19	64.9	0.065	2.14	0.378	2.38	849
Analytical Triplicates												
COMP WR-1	3 Rep 1	2	0.031	33.8	1.299	0.75	9.7	0.070	2.42	0.839	0.76	219
COMP WR-1	3 Rep 2	2	0.047	ND	1.264	0.78	ND	ND	2.68	0.823	ND	ND
COMP WR-1	3 Rep 3	2	0.039	ND	1.240	0.84	ND	ND	2.64	0.785	ND	ND
RSD			21%(f)	NA	2%	6%	NA	NA	5%	3%	NA	NA
COMP PS-3	3 Rep 1	1	0.067	24.8	1.182	1.48	18.6	0.073	4.17	0.673	1.60	193
COMP PS-3	3 Rep 2	1	0.058	ND	1.193	1.19	ND	ND	4.24	0.621	ND	ND
COMP PS-3	3 Rep 3	1	0.097	ND	1.019	0.98	ND	ND	3.53	0.670	ND	ND
RSD			28%(f)	NA	9%	21%(f)	NA	NA	10%	4%	NA	NA

TABLE J.22. (contd)

Sediment Treatment	Replicate	Batch	*N. caecoides* Metals (mg/kg dry weight) Ag	As	Cd	Cr	Cu	Hg	Ni	Pb	Se	Zn
C-SB	1 Rep 1	3	0.067	25.1	0.866	1.14	10.8	0.048	2.91	0.607	0.98	211
C-SB	1 Rep 2	3	0.086	ND	0.914	1.04	ND	ND	3.11	0.649	ND	ND
C-SB	1 Rep 3	3	0.096	ND	0.792	0.91	ND	ND	3.23	0.616	ND	ND
RSD			18%	NA	7%	11%	NA	NA	5%	4%	NA	NA
Background	1 Rep 1	4	0.048	21.7	0.842	1.01	14.9	0.063	2.48	0.491	0.73	165
Background	1 Rep 2	4	ND	ND	ND	ND	ND	0.064	ND	ND	ND	ND
Background	1 Rep 3	4	ND	ND	ND	ND	ND	0.049	ND	ND	ND	ND
RSD			NA	NA	NA	NA	NA	14%	NA	NA	NA	NA
Background	2 Rep 1	4	0.065	21.0	0.928	1.02	14.6	0.064	2.57	0.515	0.79	162
Background	2 Rep 2	4	ND	ND	ND	ND	ND	0.063	ND	ND	ND	ND
Background	2 Rep 3	4	ND	ND	ND	ND	ND	0.066	ND	ND	ND	ND
RSD			NA	NA	NA	NA	NA	2%	NA	NA	NA	NA
Background	3 Rep 1	4	0.073	24.9	0.984	1.54	14.2	0.071	2.81	0.530	0.74	181
Background	3 Rep 2	4	0.056	ND	1.011	1.37	ND	0.071	2.51	0.519	ND	ND
Background	3 Rep 3	4	0.080	ND	1.007	1.24	ND	0.070	2.49	0.649	ND	ND
RSD			18%	NA	1%	11%	NA	1%	7%	13%	NA	NA

(a) NA Not applicable.
(b) U Analyte was not present above the level of associated value.
(c) ND No data.
(d) NS Not spiked.
(e) Value varies ≥30% from certified value.
(f) Value exceeds relative precision goal of ≤20%.

TABLE J.23. Butyltin Results, Wet and Dry Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery Tri-pentyltin	*N. caecoides* Butyltins (µg/kg wet weight) Tri-butyltin	Di-butyltin	Mono-butyltin	Percent Dry Weight	*N. caecoides* Butyltins (µg/kg dry weight) Tri-butyltin	Di-butyltin	Mono-butyltin
Target DL[a]				5	5	5	NA	NA	NA	NA
Achieved DL High				76.69	36.11	32.87	NA	NA	NA	NA
Achieved DL Low				8.43	3.97	3.61	NA	NA	NA	NA
COMP WR-1	1	1	89	30.29 J[b]	31.55 U[c]	28.72 U	17.55	172.59 J	179.77 U	163.65 U
COMP WR-1	2	1	125[d]	22.68 J	26.87 U	24.46 U	14.22	159.49 J	188.96 U	172.01 U
COMP WR-1	3	1	104	43.95 J	27.91 U	25.40 U	17.25	254.78 J	161.80 U	147.25 U
COMP WR-1	4	1	116	40.24 J	22.63 U	20.60 U	17.28	232.87 J	130.96 U	119.21 U
COMP WR-1	5	1	62	59.52	19.85 U	18.07 U	14.96	397.86	132.69 U	120.79 U
COMP WR-2	1	3	15[d]	162.57	23.49 U	37.00	16.78	968.83	139.99 U	220.50
COMP WR-2	2	3	58	43.20 J	21.35 U	19.44 U	17.67	244.48 J	120.83 U	110.02 U
COMP WR-2	3	4	59	42.60 J	25.04 U	22.79 U	18.32	232.53 J	136.68 U	124.40 U
COMP WR-2	4	3	53	36.58 J	18.50 U	16.84 U	18.75	195.09 J	98.67 U	89.81 U
COMP WR-2	5	3	60	60.35	23.65 U	21.53 U	17.16	351.69	137.82 U	125.47 U
COMP PS-1	1	1	95	18.40 J	17.74 U	16.15 U	16.94	108.62 J	104.72 U	95.34 U
COMP PS-1	2	1	106	27.29 J	33.35 U	30.36 U	18.16	150.28 J	183.65 U	167.18 U
COMP PS-1	3	3	23[d]	173.89	29.12 U	26.51 U	17.83	975.27	163.32 U	148.68 U
COMP PS-1	4	5[e]	58	30.74	7.46 U	6.79 U	16.03	191.77	46.54 U	42.36 U
COMP PS-1	5	4	57	57.84 J	27.74 U	25.25 U	17.51	330.33 J	158.42 U	144.20 U
COMP PS-2	1	5[e]	62	16.41	4.97 U	4.52 U	16.58	98.97	29.98 U	27.26 U
COMP PS-2	2	4	50	67.66	27.93 U	25.42 U	17.87	378.62	156.30 U	142.25 U
COMP PS-2	3	5[e]	52	25.71	7.28 U	6.63 U	16.48	156.01	44.17 U	40.23 U
COMP PS-2	4	4	80	48.55 J	34.17 U	31.10 U	17.53	276.95 J	194.92 U	177.41 U
COMP PS-2	5	4	55	57.89 J	33.44 U	30.44 U	17.44	331.94 J	191.74 U	174.54 U
COMP PS-3	1	2	73	44.90 J	28.23 U	25.70 U	17.89	250.98 J	157.80 U	143.66 U
COMP PS-3	2	2	77	61.15 J	29.21 U	3.62 J	16.52	370.16 J	176.82 U	21.91 J
COMP PS-3	3	3	72	63.93	26.99 U	24.57 U	18.11	353.01	149.03 U	135.67 U
COMP PS-3	4	1	80	68.70	29.02 U	26.42 U	18.42	372.96	157.55 U	143.43 U
COMP PS-3	5	2	67	62.88 J	34.17 U	31.10 U	18.04	348.56 J	189.41 U	172.39 U
COMP PS-4	1	5[e]	70	15.90	5.75 U	5.24 U	16.15	98.45	35.60 U	32.45 U
COMP PS-4	2	5[e]	64	11.98	4.09 U	3.72 U	16.76	71.48	24.40 U	22.20 U
COMP PS-4	3	4	21[d]	238.82	32.84 U	29.89 U	16.47	1450.03	199.39 U	181.48 U
COMP PS-4	4	2	66	51.32 J	29.93 U	27.25 U	16.54	310.28 J	180.96 U	164.75 U
COMP PS-4	5	2	81	49.68 J	31.97 U	29.10 U	17.24	288.17 J	185.44 U	168.79 U

TABLE J.23. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery Tri-pentyltin	*N. caecoides* Butyltins (µg/kg wet weight) Tri-butyltin	Di-butyltin	Mono-butyltin	Percent Dry Weight	*N. caecoides* Butyltins (µg/kg dry weight) Tri-butyltin	Di-butyltin	Mono-butyltin
COMP CS-1	1	4	17(d)	284.40	33.96	59.28	16.02	1775.28	211.99	370.04
COMP CS-1	2	5(e)	56	23.67	6.25 U	5.69 U	17.13	138.18	36.49 U	33.22 U
COMP CS-1	3 Rep 1	4	36(d)	178.12	34.79 U	31.67 U	17.36	1026.04	200.40 U	182.43 U
COMP CS-1	3 Rep 2	4	61	83.94	25.87 U	23.56 U	17.36	483.53	149.02 U	135.71 U
COMP CS-1	4	4	70	73.05 J	36.11 U	32.87 U	18.12	403.15 J	199.28 U	181.40 U
COMP CS-1	5 Rep 1	3	18(d)	245.49	33.69 U	67.18	17.96	1366.87	187.58 U	374.05
COMP CS-1	5 Rep 2	3	56	76.69	33.20 U	30.22 U	17.96	427.00	184.86 U	168.26 U
R-BF	1	3	63	57.86 J	27.28 U	24.83 U	18.14	318.96 J	150.39 U	136.88 U
R-BF	2	3	65(f)	52.02	23.40 U	21.30 U	18.41	282.56	127.10 U	115.70 U
R-BF	3	4	61	50.82 J	32.90 U	29.95 U	16.67	304.86 J	197.36 U	179.66 U
R-BF	4	3	66	52.22	24.04 U	21.88 U	18.04	289.47	133.26 U	121.29 U
R-BF	5	4	26	168.48	3.46 J	3.28 J	17.36	970.51	19.93 J	18.89 J
R-OS	1	2	66	27.96 J	29.81 U	27.14 U	17.06	163.89 J	174.74 U	159.09 U
R-OS	2	2	73	28.50 J	21.73 U	19.78 U	14.40	197.92 J	150.90 U	137.36 U
R-OS	3	1	109	62.79 J	35.71 U	32.51 U	16.71	375.76 J	213.70 U	194.55 U
R-OS	4	2	58	90.06	34.66 U	31.55 U	18.54	485.76	186.95 U	170.17 U
R-OS	5	5(e)	60	8.43 U	3.97 U	3.61 U	16.76	50.30 U	23.69 U	21.54 U
C-SB	1	2	75	23.60 J	17.46 U	15.90 U	18.39	128.33 J	94.94 U	86.46 U
C-SB	2	1	106	15.32 J	15.99 U	14.56 U	18.13	84.50 J	88.20 U	80.31 U
C-SB	3	1	83	20.72 J	16.11 U	0.07 J	18.17	114.03 J	88.66 U	0.39 J
C-SB	4 Rep 1	2	81	31.45 J	33.32 U	30.33 U	18.07	174.05 J	184.39 U	167.85 U
C-SB	4 Rep 2	2	71	23.27 J	29.31 U	26.68 U	18.07	128.78 J	162.20 U	147.65 U
C-SB	4 Rep 3	2	75	39.49 J	27.24 U	24.79 U	18.07	218.54 J	150.75 U	137.19 U
C-SB	5	2	83	20.97 J	16.67 U	15.18 U	16.14	129.93 J	103.28 U	94.05 U
C-NE	1	1	111	49.32 J	28.17 U	25.64 U	18.64	264.59 J	151.13 U	137.55 U
C-NE	2	5(e)	57	27.51	8.00 U	7.29 U	17.28	159.20	46.30 U	42.19 U
C-NE	3	3	52	60.39 J	32.40 U	29.49 U	17.88	337.75 J	181.21 U	164.93 U
C-NE	4	1	82	67.49 U	31.77 U	28.92 U	18.01	374.74 U	176.40 U	160.58 U
C-NE	5	1	77	26.51 J	6.75 J	13.87 U	16.53	160.38 J	40.83 J	83.91 U

TABLE J.23. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery Tri-pentyltin	*N. caecoides* Butyltins (µg/kg wet weight) Tri-butyltin	Di-butyltin	Mono-butyltin	Percent Dry Weight	*N. caecoides* Butyltins (µg/kg dry weight) Tri-butyltin	Di-butyltin	Mono-butyltin
Background	1	2	71	33.70 J	33.14 U	30.17 U	12.49	269.82 J	265.33 U	241.55 U
Background	2	2	65	50.91 J	27.89 U	25.39 U	14.62	348.22 J	190.77 U	173.67 U
Background	3 Rep 1	1	94	66.44 J	33.60 U	30.58 U	12.38	536.67 J	271.41 U	247.01 U
Background	3 Rep 2	1	97	31.45 J	30.80 U	28.04 U	12.38	254.04 J	248.79 U	226.49 U
Background	3 Rep 3	1	79	39.39 J	29.62 U	26.96 U	12.38	318.17 J	239.26 U	217.77 U
Background	4	1	84	63.85	28.98 U	26.38 U	13.97	457.05	207.44 U	188.83 U
Background	5	2	83	16.61 J	15.51 U	14.12 U	16.22	102.40 J	95.62 U	87.05 U

(a) DL Detection limit.
(b) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(c) U Analyte was not present above the level of associated value.
(d) Surrogate recovery outside of quality control range of 40% - 120%.
(e) Butyltins analyzed in PAH/PCB extract; limited QC data available.
(f) Pentylbutyltin surrogate used for sample.

TABLE J.24. Quality Control Data for Butyltins, Wet Weight, in Tissue of *N. caecoides*, John F. Baldwin Ship Channel Program

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery Tri-pentyltin	*N. caecoides* Butyltins (ug/kg wet weight) Tri-butyltin	Di-butyltin	Mono-butyltin
Method Blanks						
Blank 1		1	84	51.42 J[a]	24.46 U[b]	22.27 U
Blank 2		2	66	46.90 J	25.78 U	23.47 U
Blank 3		3	40	76.02	25.60 U	23.31 U
Blank 4		4	59	39.20 J	30.36 U	27.64 U
Blank 5		5[c]	79	6.07 J	5.60 U	5.10 U
Matrix Spikes						
COMP WR-1	3	1	104	43.945 J	27.91 U	25.400 U
COMP WR-1 MS	3	1		210.356	137.188	18.105
Concentration Recovered				166.411	137.188	18.105
Amount Spiked				159.110	128.476	125.940
Percent Recovery				105%	107%	14%[d]
COMP WR-1	3	1	104	43.945 J	27.91 U	25.400 U
COMP WR-1 MSD	3	1		334.235	229.606	81.472
Concentration Recovered				290.290	229.606	81.472
Amount Spiked				279.102	225.366	220.917
Percent Recovery				104%	102%	37%[d]
RPD				1%	5%	90%[e]
I-stat				0.00	0.02	0.45
COMP PS-3	5	2	67	62.878 J	34.17 U	31.10
COMP PS-3 MS	5	2		327.683	212.806	21.717
Concentration Recovered				264.805	212.806	21.717
Amount Spiked				251.609	203.166	199.156
Percent Recovery				105%	105%	11%[d]
COMP PS-3	5	2	67	62.878 J	34.17 U	31.10 U
COMP PS-3 MSD	5	2		503.145	399.599	81.801
Concentration Recovered				440.265	399.599	81.801
Amount Spiked				480.403	387.909	380.252
Percent Recovery				92%	103%	22%[d]
RPD				14%	2%	67%[e]
I-stat				0.07	0.01	0.33
C-NE	3	3	52	60.386 J	32.400 U	29.49 U
C-NE MS	3	3		239.786	182.470	7.537
Concentration Recovered				179.400	182.470	7.537
Amount Spiked				220.571	178.103	174.588
Percent Recovery				81%	102%	4%[d]
C-NE	3	3	52	60.386 J	32.400 U	29.49 U
C-NE MSD	3	3		216.601	152.158	13.407
Concentration Recovered				156.215	152.158	13.407
Amount Spiked				171.100	138.158	135.431
Percent Recovery				91%	110%	10%[d]
RPD				12%	7%	86%[e]
I-stat				0.06	0.04	0.43

TABLE J.24. (contd)

Sediment Treatment	Replicate	Batch	Surrogate Percent Recovery Tri-pentyltin	*N. caecoides* Butyltins (µg/kg wet weight) Tri-butyltin	Di-butyltin	Mono-butyltin
COMP PS-1	5	4	57	57.840 J	27.74 U	25.25 U
COMP PS-1 MS	5	4		644.370	403.854	4.442
Concentration Recovered				586.530	403.854	4.442
Amount Spiked				283.809	229.167	224.643
Percent Recovery				207%(d)	176%(d)	2%(d)
COMP PS-1	5	4	57	57.840 J	27.74 U	25.25 U
COMP PS-1 MSD	5	4		420.212	208.949	32.90 U
Concentration Recovered				362.372	208.949	0
Amount Spiked				285.224	230.309	225.763
Percent Recovery				127%(d)	91%	0%(d)
RPD				48%(e)	64%(e)	200%(e)
I-stat				0.24	0.32	1.00
Standard Reference Material						
No data available						
Analytical Duplicates						
COMP CS-1	5 Rep 1	3	18(d)	245.49	33.69 U	67.18
COMP CS-1	5 Rep 2	3	56	76.69	33.20 U	30.22 U
RPD				105%(e)	NA(f)	NA
I-stat				0.52	NA	NA
COMP CS-1	3 Rep 1	4	36(d)	178.12	34.79 U	31.67 U
COMP CS-1	3 Rep 2	4	61	83.94	25.87 U	23.56 U
RPD				72%(e)	NA	NA
I-Stat				0.36	NA	NA
Analytical Triplicates						
Background	3 Rep 1	1	94	66.44 J	33.60 U	30.58 U
Background	3 Rep 2	1	97	31.45 J	30.80 U	28.04 U
Background	3 Rep 3	1	79	39.39 J	29.62 U	26.96 U
RSD				40%(e)	NA	NA
C-SB	4 Rep 1	2	81	31.45 J	33.32 U	30.33 U
C-SB	4 Rep 2	2	71	23.27 J	29.31 U	26.68 U
C-SB	4 Rep 3	2	75	39.49 J	27.24 U	24.79 U
RSD				26%	NA	NA

(a) J Analyte detected below method detection limit (MDL), but above instrument detection limit (IDL).
(b) U Analyte was not present above the level of associated value.
(c) Butyltins analyzed in PAH/PCB extract; limited QC data available.
(d) Value outside of quality control range of 40% - 120%.
(e) Value exceeds relative precision range of ≤30%.
(f) NA Not applicable.

APPENDIX K

POTENTIAL EFFECTS OF DISPOSAL OF JOHN F. BALDWIN SHIP CHANNEL SEDIMENTS AT THE BAY FARM BORROW AREA

APPENDIX K

POTENTIAL EFFECTS OF DISPOSAL OF JOHN F. BALDWIN SHIP CHANNEL SEDIMENTS AT THE BAY FARM BORROW AREA

The main focus of this report is to evaluate the suitability of John F. Baldwin Ship Channel sediments for ocean disposal. Another potential use for the sediments is to cap other material that has been disposed of at in-bay locations, providing disposal criteria are met. An in-bay reference sediment from the Bay Farm Borrow Area was tested as part of the study. This appendix to the report presents the results of statistical comparisons and a Tier III evaluation of John F. Baldwin Ship Channel sediments relative to the Bay Farm reference R-BF. The Tier III ocean disposal testing and evaluation criteria are either similar to or more stringent (by inclusion of multi-species acute toxicity and bioaccumulation testing) than current in-bay disposal guidelines.

All methods and results for sampling, physical descriptions, sediment chemistry, biological testing, and tissue chemistry are contained in Sections 2.0 and 3.0 of this report; supporting data are contained in Appendixes A through J. It must be reiterated that the use of Dunnett's Test for statistical comparisons of non-independent data sets increases the chance of error in all comparisons (Section 2.5), but that these errors should be toward identifying more significant differences instead of fewer.

K.1 SEDIMENT CHARACTERISTICS

The Bay Farm Borrow Area sediment consists almost entirely of silt and clay. By comparison, most of the unconsolidated Younger Bay Mud in or from the John F. Baldwin Ship Channel was generally of coarser grain size than R-BF (Table 3.5). John F. Baldwin Ship Channel sediments were lower in organic carbon, volatile solids, and oil and grease than R-BF. Pinole Shoal and Carquinez Strait sediments consistently exceeded R-BF in arsenic and chromium; otherwise, all John F. Baldwin Ship Channel sediments had metals concentrations comparable to R-BF (Table 3.7). None of the channel sediments exceeded R-BF in PAH, pesticide, or PCB concentrations. The highest concentrations of sediment PAH were found at R-BF; COMP CS-1 had the highest PAHs of any John F. Baldwin Ship Channel sample, but total levels were only half of the R-BF concentrations (Table 3.6). Tributyltin was undetected in R-BF sediment, but was detected in sediment from station P X.5 C (4.1 µg/kg dry weight).

K.2 WATER COLUMN EFFECTS

The evaluation of water column effects does not change with comparisons to different references because the reference sediment itself is not tested for water column toxicity. There was no acute toxicity to *H. sculpta* and *C. stigmaeus*, but the 100% SPP of four composites was acutely toxic to *D. excentricus* larvae (Table K.1). Despite those instances of significant toxicity, no LC50s could be calculated because mortality did not exceed 50% of the population relative to the control. Three Pinole Shoal composites significantly affected the normal development of D. excentricus larvae, a more sensitive endpoint than larvae survival. Compliance with the survival-based 0.1% SPP LPC (or, the lower EC50-based LPCs for COMPs PS-1, PS-2, and PS-4) would have to be determined. Some parameters for modeling the dredged material disposal scenario would change with the in-bay location.

K.3 DEPOSITED SEDIMENT TOXICITY

The solid-phase of John F. Baldwin Ship Channel sediments was not acutely toxic to *R. abronius*, *N. caecoides*, or *M. nasuta* in 10-day exposures. Compared to R-BF there was no statistically significant reduction in survival, and survival was never reduced more than 10% from reference for any of the three species tested (Table K.2) .

K.4 DEPOSITED SEDIMENT BIOACCUMULATION

Complete tissue chemistry and quality control data are presented in Appendixes I and J for *M. nasuta* and *N. caecoides*, respectively. These data are summarized in Section 3.5 of the main body of this report. Food and Drug Administration (FDA) action limits for contaminants in fish and shellfish are established for nine compounds that were measured in organisms exposed to John F. Baldwin Ship Channel sediment; none of the FDA limits were exceeded. Where mean tissue contaminant concentrations in organisms exposed to John F. Baldwin Ship Channel test treatments exceeded concentrations in organisms exposed to R-BF, statistical comparisons were conducted using Dunnett's Test.

Only three compounds (4,4'-DDD, chromium, and tributyltin) were identified by Dunnett's Test as significantly elevated above R-BF in *M. nasuta* and/or *N. caecoides* (Table K.3). Only 4,4'-DDD was significantly elevated in both species when exposed to COMPs PS-2 and PS-4, but the actual concentrations were relatively low. Concentrations of 4,4'-DDD as well as 4,4'-

TABLE K.1. Suspended-Particulate-Phase Toxicity Test Results, John F. Baldwin Ship Channel (bold type indicates mean survival in 100% SPP significantly lower than control in 2-sample T-test, $\alpha = 0.05$)

		Mysid *H. scubita*			Echinoderm Larvae *D. excentricus*			Sanddab *C. stigmaeus*		
		Mean Survival (%)		LC50 as	Mean Survival (%)		LC50 as	Mean Survival (%)		LC50 as
In	Treatment	0% SPP	100% SPP	% SPP	0% SPP	100% SPP	% SPP	0% SPP	100% SPP	% SPP
Cl	COMP WR-1	97.5	97.5	>100	97	93	>100	100	100	>100
Cl	COMP WR-2	92.5	92.5	>100	90	86	>100	97.5	95.0	>100
Cl	COMP PS-1	95.0	95.0	>100	88	**49**	>100	100	100	>100
Cl	COMP PS-2	92.5	95.0	>100	88	**50**	>100	100	100	>100
Cl	COMP PS-3	82.5	95.0	>100	92	**80**	>100	97.5	97.5	>100
Cl	COMP PS-4	77.5	92.5	>100	90	80	>100	100	92.5	>100
Cl	COMP CS-1	87.5	90.0	>100	95	**75**	>100	100	100	>100

TABLE K.2. Comparison of John F. Baldwin Ship Channel Solid-Phase Acute Toxicity to the Bay Farm Reference (no treatments had difference in survival from R-BF that was statistically significant and greater than 10%)

		Mean Percent Survival in 10-day Solid-Phase Test		
I	Treatment	*R. abronius*	*N. caecoides*	*M. nasuta*
F	R-BF	92.0	95.0	99.0
C	COMP WR-1	95.0	94.0	97.0
C	COMP WR-2	97.0	97.0	99.0
C	COMP PS-1	82.0	95.0	90.0
C	COMP PS-2	83.0	95.0	98.0
C	COMP PS-3	96.0	95.0	93.0
C	COMP PS-4	95.0	94.0	97.0
C	COMP CS-1	95.0	96.0	96.0
C	C-WB	99.0	NA	NA
C	C-NE	NA	99.0	94.0
C	C-SB	89.0	96.0	98.0

(a) NA Not applicable.

TABLE K.3. Summary of Acute Toxicity and Bioaccumulation for John F. Baldwin Ship Channel Composites Relative to the Bay Farm Reference R-BF

Sediment Treatment	Acute Toxicity	*M. nasuta* Bioaccumulation					*N. caecoides* Bioaccumulation				
		PAH	PEST[a]	PCB	Metals[b]	Butyltins[c]	PAH	PEST	PCB	Metals	Butyltins
R-BF	NA [d]	NA	DDD, 4.81	NA	Cr, 2.56	TBT, 13.6	NA	DDD, 3.1	NA	NA	NA
COMP WR-1	—[e]	—	—	—	—	—	—	—	—	—	—
COMP WR-2	—	—	—	—	—	—	—	—	—	—	—
COMP PS-1	E[f]	—	—	—	—	—	—	—	—	—	—
COMP PS-2	E	—	DDD, 12.53	—	—	—	—	DDD, 8.9	—	—	—
COMP PS-3	—	—	—	—	—	TBT, 88.7	—	—	—	—	—
COMP PS-4	E	—	DDD, 15.84	—	Cr, 3.55	—	—	DDD, 10.0	—	—	—
COMP CS-1	—	—	—	—	—	—	—	—	—	—	—

(a) Pesticides: DDD = 4,4'-DDD, concentration in µg/kg dry weight.
(b) Metals: Cr = Chromium, concentration in mg/kg dry weight.
(c) Butyltins: TBT = Tributyltin, concentration in µg/kg dry weight.
(d) NA Not applicable.
(e) — No statistically significant acute toxicity or bioaccumulation.
(f) E Significant effect (calculable EC50) on echinoderm larval development in SPP test.

TABLE K.4. Concentrations of 4,4'-DDT and its Breakdown Products 4,4'-DDE and 4,4'-DDD in Tissues of *M. nasuta* and *N. caecoides* Exposed to John F. Baldwin Ship Channel Sediments (bold type indicates value is significantly greater than reference when compared by Dunnett's Test)

		Mean Pesticide Concentration (ug/kg dry weight)					
		M.nasuta			*N.caecoides*		
Se	Sediment Treatment	4,4'-DDT	4,4'-DDE	4,4'-DDD	4,4'-DDT	4,4'-DDE	4,4'-DDD
Ba	Background	1.93 U[a]	1.38	0.62 U	8.02 U	10.88	2.58 U
Cl	COMP WR-1	3.13 U	5.45	6.29	4.82 U	8.42	2.33 U
Cl	COMP WR-2	2.10 U	3.52	1.26	8.48 U	9.50	2.72 U
Cl	COMP PS-1	2.33 U	3.03	4.09	7.08 U	7.99	2.27 U
Cl	COMP PS-2	2.32 U	6.53	**12.53**	4.40 U	11.43	**8.91**
Cl	COMP PS-3	2.01 U	5.23	7.20	5.80 U	8.99	4.34
Cl	COMP PS-4	2.38 U	6.95	**15.84**	4.59 U	12.49	**9.99**
Cl	COMP CS-1	2.46 U	2.63	3.13	5.57	7.37	2.59
Re	R-BF	2.76 U	7.81	4.81	5.76 U	12.71	3.14
Re	R-OS	1.96 U	7.38	2.31	4.84 U	8.85	2.09
Ca	C-SB	1.65 U	3.95	1.64	6.33 U	9.78	2.03 U
Ca	C-NE	2.08 U	3.98	1.30	8.49 U	9.45	2.72 U

(a) Undetected in all replicates; value is mean of dry weight detection limits.

DDT and 4,4'-DDE, another breakdown product of 4,4'-DDT, are compared in Table K.4. Table B.14 shows that in all the test sediments, these compounds were either undetected, or estimated below the method detection limit. Significant accumulation above detection limits and at a magnitude greater than five times reference were observed for tributyltin, a compound for which there is no FDA action limit or other guideline for assessing impact to human health or the environment. The ANOVA data for all comparisons conducted are contained in Table K.5 for *M. nasuta* and K.6 for *N. caecoides*.

K.5 CONCLUSIONS

In addition to summarizing bioaccumulation results for John F. Baldwin Ship Channel sediments relative to the Bay Farm Borrow Area reference R-BF, Figure K.1 shows the number of sediment contaminants elevated above R-BF and acute toxicity relative to R-BF. Figures K.2, K.3, and K.4 also show, in map form, how biological responses to sediments from the West Richmond, Pinole Shoal, and Carquinez Strait reaches, respectively, compare to R-BF. These comparisons are related to ocean disposal criteria for each reach of the channel. This summary is intended to assist USACE, EPA, and other resource agencies in evaluating the potential effects of in-bay disposal of dredged material from the John F. Baldwin Ship Channel.

TABLE K.5. ANOVA Results for Chemical Parameters in Tissues of *M. nasuta* Compared to the Bay Farm Reference R-BF

Parameter	Sum of Squares		Degrees of Freedom		F-ratio	p-value
	Treatment	Residual	Treatment	Residual		
Polynuclear Aromatic Hydrocarbons						
Naphthalene	0.029	4.524	1	7	0.045	0.8382
Acenapthylene	7.780	59.270	6	28	0.613	0.7183
Acenapthene	3.058	21.687	6	28	0.658	0.6837
Fluorene	0.249	2.921	2	12	0.511	0.6125
Phenanthrene	NA[a]	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Indeno(1,2,3)pyrene	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	1.945	21.141	3	16	0.491	0.6937
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA
Chlorinated Pesticides						
Aldrin	NA	NA	NA	NA	NA	NA
Alpha BHC	1.150	18.691	6	28	0.287	0.9382
Beta BHC	0.009	2.348	1	8	0.031	0.8638
Delta BHC	NA	NA	NA	NA	NA	NA
cis-(alpha) Chlordane	4.693	16.559	7	32	1.296	0.2840
trans-(gamma) Chlordane	NA	NA	NA	NA	NA	NA
4,4'-DDD	32.601	18.993	7	32	7.847	0.0001
4,4'-DDE	7.139	4.369	7	32	7.470	0.0001
4,4'-DDT	NA	NA	NA	NA	NA	NA
Dieldrin	0.0001	4.292	1	8	1.845E-4	0.9895
Endosulfan I	NA	NA	NA	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	0.224	1.923	3	16	0.622	0.6109
Endrin	2.447E-5	10.529	1	8	1.859E-5	0.9967
Endrin aldehyde	0.245	5.442	1	8	0.359	0.5654
Heptachlor	0.167	4.469	3	16	0.199	0.8954
Heptachlor epoxide	0.712	6.849	3	16	0.554	0.6527
Lindane	0.796	13.090	4	20	0.304	0.8719
Toxaphene	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls						
Aroclor 1242	NA	NA	NA	NA	NA	NA
Aroclor 1248	1.731	11.603	7	32	0.682	0.6860
Aroclor 1254	3.044	3.460	4	20	4.399	0.0103
Aroclor 1260	NA	NA	NA	NA	NA	NA

TABLE K.5. (contd)

Parameter	Sum of Squares		Degrees of Freedom		F-ratio	p-value
	Treatment	Residual	Treatment	Residual		
Metals						
Silver	0.898	2.883	7	32	1.424	0.2302
Arsenic	0.208	0.919	7	32	1.035	0.4267
Cadmium	0.665	1.467	7	32	2.073	0.0757
Chromium	0.478	1.331	7	32	1.642	0.1594
Copper	0.379	1.031	7	32	1.679	0.1497
Mercury	1.683	1.766	7	32	4.357	0.0017
Nickel	0.430	0.754	7	32	2.606	0.0302
Lead	4.151	4.915	7	32	3.860	0.0038
Selenium	0.409	0.896	7	32	2.088	0.0739
Zinc	0.136	0.689	7	32	0.902	0.5167
Butyltins						
Tributyltin	18.099	2.486	6	27	32.764	0.0001
Dibutyltin	NA	NA	NA	NA	NA	NA
Monobutyltin	0.263	0.637	4	20	2.067	0.1234

(a) NA Not applicable; undetected in all replicates or, if detected, treatment mean ≤ R-BF mean.

TABLE K.6. ANOVA Results for Chemical Parameters in Tissues of *N. caecoides* Compared to the Bay Farm Reference R-BF

Parameter	Sum of Squares		Degrees of Freedom		F-ratio	p-value
	Treatment	Residual	Treatment	Residual		
Polynuclear Aromatic Hydrocarbons						
Naphthalene	1.771	7.260	7	32	1.115	0.3778
Acenapthylene	NA[a]	NA	NA	NA	NA	NA
Acenapthene	NA	NA	NA	NA	NA	NA
Fluorene	1 776	19.297	2	12	0.552	0.5896
Phenanthrene	0.747	9.863	6	28	0.354	0.9017
Anthracene	0.861	23.923	3	16	0.192	0.9003
Fluoranthene	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.982	25.806	3	16	0.410	0.7483
Chrysene	0.602	23.847	3	16	0.135	0.9379
Benzo(b)fluoranthene	0.212	10.755	1	8	0.158	0.7018
Benzo(k)fluoranthene	0.235	14.789	1	8	0.127	0.7308
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Indeno(1,2,3)pyrene	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	0.006	1.106	1	8	0.046	0.8350
Chlorinated Pesticides						
Aldrin	NA	NA	NA	NA	NA	NA
Alpha BHC	0.862	9.472	3	16	0.486	0.6970
Beta BHC	7.716	17.078	7	32	2.065	0.0768
Delta BHC	0.711	11.015	6	28	0.301	0.9311
cis-(alpha) Chlordane	3.902	20.481	7	32	0.871	0.5396
trans-(gamma) Chlordane	1.610	1.773	6	28	4.237	0.0037
4,4'-DDD	11.704	9.293	5	24	6.046	0.0009
4,4'-DDE	2.114	4.631	7	32	2.087	0.0739
4,4'-DDT	NA	NA	NA	NA	NA	NA
Dieldrin	7.867	20.067	5	24	1.882	0.1351
Endosulfan I	NA	NA	NA	NA	NA	NA
Endosulfan II	0.188	0.338	1	8	4.454	0.0678
Endosulfan sulfate	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	1.606E-4	0.143	1	8	0.009	0.9268
Lindane	1.692	19.212	6	28	0.411	0.8654
Toxaphene	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls						
Aroclor 1242	NA	NA	NA	NA	NA	NA
Aroclor 1248	0.110	1.373	1	8	0.641	0.4466
Aroclor 1254	3.488	1.900	5	24	8.813	0.0001
Aroclor 1260	NA	NA	NA	NA	NA	NA

TABLE K.6. (contd)

Parameter	Sum of Squares Treatment	Sum of Squares Residual	Degrees of Freedom Treatment	Degrees of Freedom Residual	F-ratio	p-value
Metals						
Silver	3.252	11.276	7	32	1.318	0.2738
Arsenic	0.358	0.257	7	32	6.362	0.0001
Cadmium	0.541	2.648	7	32	0.933	0.4947
Chromium	0.539	2.895	7	32	0.851	0.5548
Copper	0.319	1.097	7	32	1.328	0.2695
Mercury	0.072	0.579	7	32	0.568	0.7765
Nickel	0.231	1.082	7	32	0.975	0.4658
Lead	0.788	3.859	7	32	0.933	0.4951
Selenium	1.214	2.319	7	32	2.392	0.0436
Zinc	0.064	0.149	7	32	1.975	0.0898
Butyltins						
Tributyltin	3.703	16.930	7	32	1.000	0.4494
Dibutyltin	0.259	5.604	1	8	0.370	0.5597
Monobutyltin	0.877	10.109	3	16	0.463	0.7123

(a) NA Not applicable; undetected in all replicates or, if detected, treatment mean ≤ R-BF mean.

SEDIMENT TREATMENT	Sediment Chemistry: Sediment LPAH > R-BF	Sediment HPAH > R-BF	Sediment Pesticide and PCB > R-BF	Sediment Metals > R-BF	Sediment Butyltins > R-BF	Acute Toxicit: Sediments with Solid-Phase Acute	Sediments Associated with SPP	Significant Bioaccumulation: Numbers of Compounds at Various Magnitudes of Difference from R-BF — Any Significant Bioaccumulation: # of LPAH Compounds (6 possible)	# of HPAH Compounds (10 possible)	# of Pesticide Compounds (19 possible)	# of PCBs (4 possible)	# of Metals (10 possible)	# of Butyltin Compounds (3 possible)	Bioaccumulation > 2 ≤ 5 times R-BF: # of LPAH Compounds (6 possible)	# of HPAH Compounds (10 possible)	# of Pesticide Compounds (19 possible)	# of PCBs (4 possible)	# of Metals (10 possible)	# of Butyltin Compounds (3 possible)	Bioaccumulation > 5 ≤ 10 times R-BF: # of LPAH Compounds (6 possible)	# of HPAH Compounds (10 possible)	# of Pesticide Compounds (19 possible)	# of PCBs (4 possible)	# of Metals (10 possible)	# of Butyltin Compounds (3 possible)	Bioaccumulation > 10 times R-BF: # of LPAH Compounds (6 possible)	# of HPAH Compounds (10 possible)	# of Pesticide Compounds (19 possible)	# of PCBs (4 possible)	# of Metals (10 possible)	# of Butyltin Compounds (3 possible)
COMP WR-1		1		1																									
COMP WR-2				2																									
COMP PS-1				1			E																						
COMP PS-2		1		2			E			1/1						1/1													
COMP PS-3		1		1	1								1											1					
COMP PS-4		1		4			E			1/1		1				1/1													
COMP CS-1				2																									

Number of Compounds Bioaccumulating in *M. nasuta* Tissues (for tissue concentrations of individual compounds, see Tables 3.16 through 3.21)
Number of Compounds Bioaccumulating in *N. caecoides* Tissues (for tissue concentrations of individual compounds, see Tables 3.22 through 3.27)

R Acute Toxicity to *R. abronius* (10-day)
N Acute Toxicity to *N. caecoides* (10-day)
M Acute Toxicity to *M. nasuta* (10-day)

H LC50 < 100% SPP for *H. sculpta* (mysids)
E EC50 <100% SPP for larval *D. excentricus* (echinoderm)

FIGURE K.1. Matrix of Sediment Chemistry, Significant Acute Toxicity, and Bioaccumulation for John F. Baldwin Ship Channel Sediments Relative to the Bay Farm Borrow Area Reference R-BF

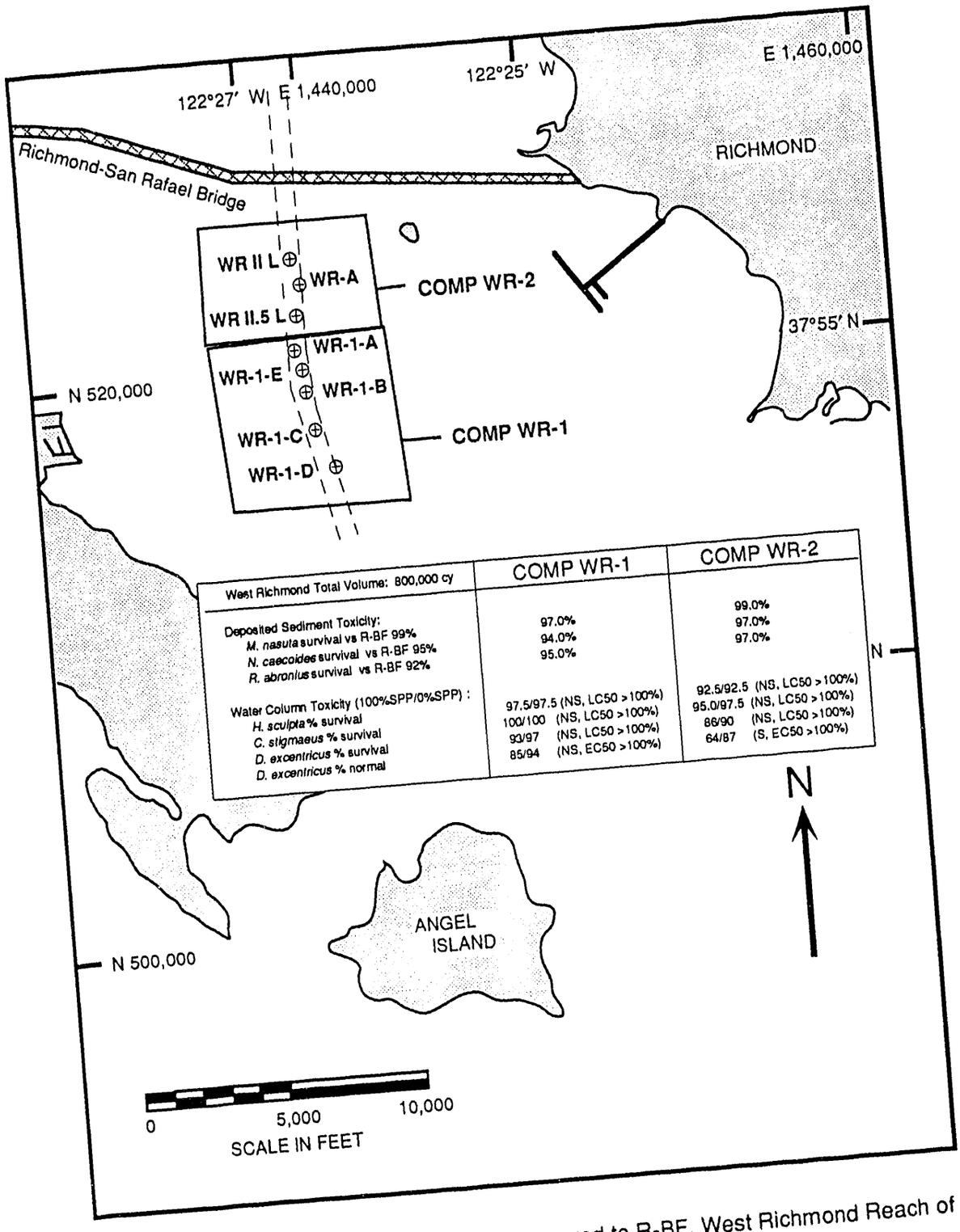
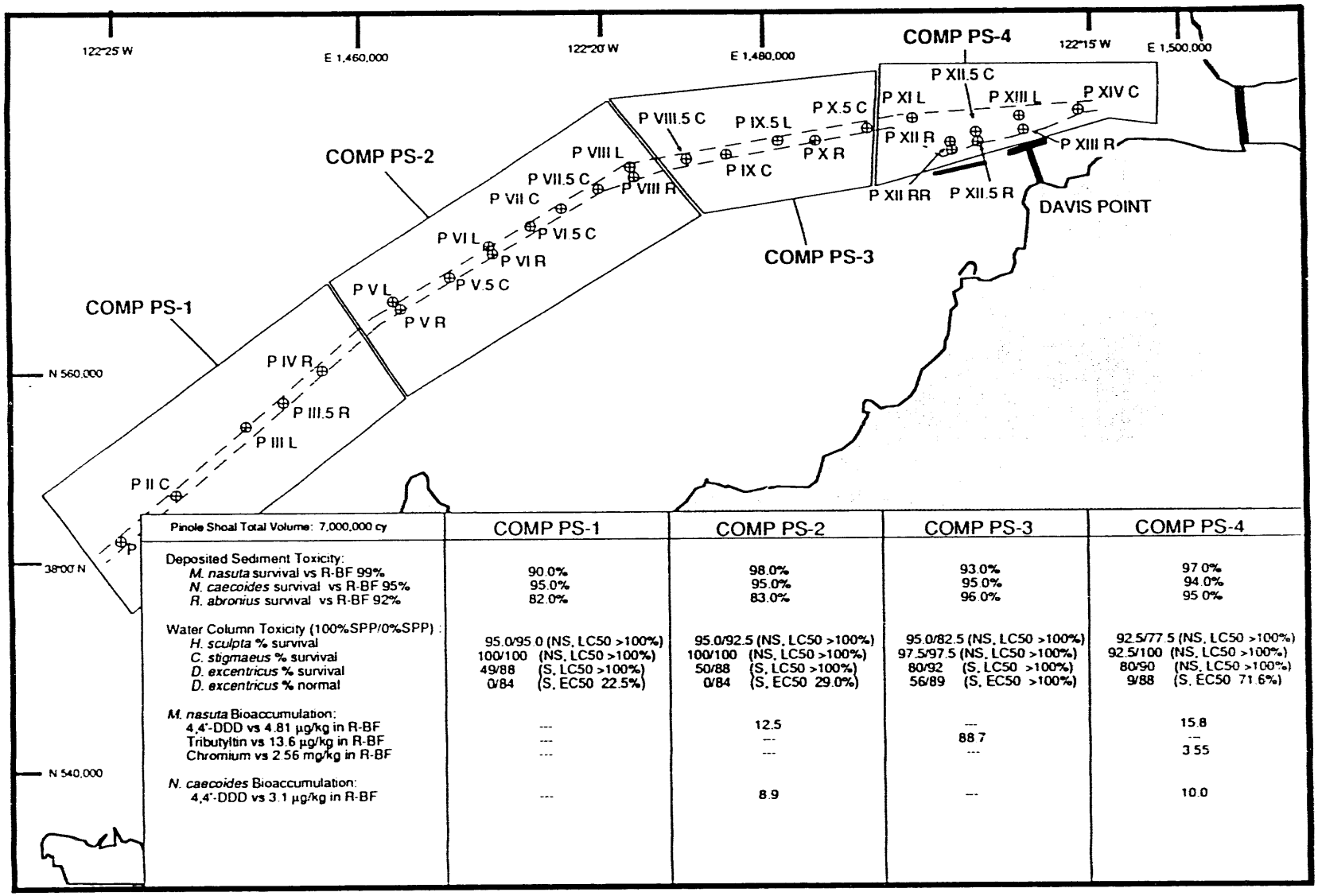


FIGURE K.2. Sediment Evaluation Results Compared to R-BF, West Richmond Reach of the John F. Baldwin Ship Channel



Pinole Shoal Total Volume: 7,000,000 cy	COMP PS-1	COMP PS-2	COMP PS-3	COMP PS-4
Deposited Sediment Toxicity:				
M. nasuta survival vs R-BF 99%	90.0%	98.0%	93.0%	97.0%
N. caecoides survival vs R-BF 95%	95.0%	95.0%	95.0%	94.0%
R. abronius survival vs R-BF 92%	82.0%	83.0%	96.0%	95.0%
Water Column Toxicity (100%SPP/0%SPP):				
H. sculpta % survival	95.0/95.0 (NS, LC50 >100%)	95.0/92.5 (NS, LC50 >100%)	95.0/82.5 (NS, LC50 >100%)	92.5/77.5 (NS, LC50 >100%)
C. stigmaeus % survival	100/100 (NS, LC50 >100%)	100/100 (NS, LC50 >100%)	97.5/97.5 (NS, LC50 >100%)	92.5/100 (NS, LC50 >100%)
D. excentricus % survival	49/88 (S, LC50 >100%)	50/88 (S, LC50 >100%)	80/92 (S, LC50 >100%)	80/90 (NS, LC50 >100%)
D. excentricus % normal	0/84 (S, EC50 22.5%)	0/84 (S, EC50 29.0%)	56/89 (S, EC50 >100%)	9/88 (S, EC50 71.6%)
M. nasuta Bioaccumulation:				
4,4'-DDD vs 4.81 µg/kg in R-BF	---	12.5	---	15.8
Tributyltin vs 13.6 µg/kg in R-BF	---	---	88.7	---
Chromium vs 2.56 mg/kg in R-BF	---	---	---	3.55
N. caecoides Bioaccumulation:				
4,4'-DDD vs 3.1 µg/kg in R-BF	---	8.9	---	10.0

FIGURE K.3. Sediment Evaluation Results Compared to R-BF, Pinole Shoal Reach of the John F. Baldwin Ship Channel

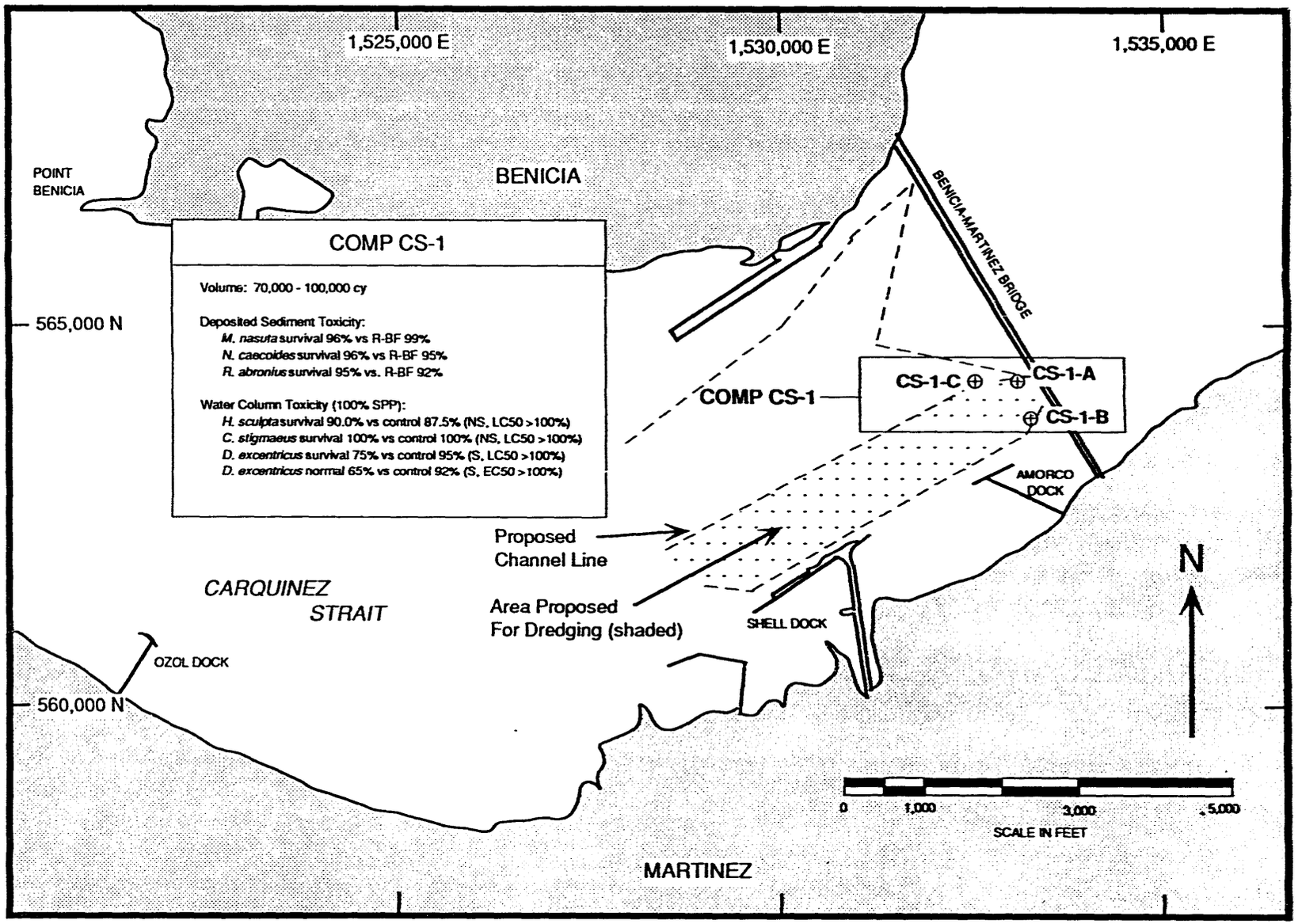


FIGURE K.4. Sediment Evaluation Results Compared to R-BF, Carquinez Strait Reach of the John F. Baldwin Ship Channel

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