ABSTRACT

Title of Document: THE BIOAVAILABILITY OF BROMINATED DIPHENYL ETHERS FROM URBAN ESTUARINE SEDIMENTS TO DEPOSIT-FEEDING INVERTEBRATES

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Brominated diphenyl ethers (BDEs) are organic chemicals used as flame retardants that have become ubiquitous in the environment. Sediment exposure assessments have not been conducted for BDEs and are necessary for understanding their potential impacts in coastal environments. Field studies and laboratory experiments were conducted to determine the bioavailability of BDEs from sediments to deposit-feeding invertebrates in order to investigate potential transfer to higher trophic levels in estuarine environments. In field studies, accumulation of congeners in the Penta-BDE mixture was similar to PCBs with similar K_{ow}. BDE 209, the dominant congener in sediments, was not detected in invertebrates despite sediment concentrations up to 4000 ng/g dry weight. In 28 and 56 day exposures to Baltimore Harbor sediments, PCBs, PAHs, butyltins and metals were bioavailable to the polychaete worm *Nereis virens* and the amphipod

Leptocheirus plumulosus. However, BDE accumulation was low and BDE 209 was not detected in either species despite sediment concentrations up to 300 ng/g dry weight.

To elucidate the mechanism(s) limiting the bioavailability of BDE 209 and determine the relative bioavailability of congeners in the Penta-BDE and Deca-BDE (>97% BDE 209) commercial mixtures, 28 day bioaccumulation experiments were conducted in which *N. virens* were exposed to spiked sediments, spiked food or field sediments. Selective accumulation of congeners in the Penta-BDE mixture over BDE 209 and other components of the Deca-BDE mixture from spiked sediments support the prevalence of the Penta-BDE congeners reported in higher trophic level species. Bioaccumulation from the spiked substrates demonstrated that BDE 209 is capable of crossing the gut wall. Bioavailability was highly dependent on the exposure conditions however since accumulation of BDE 209 from field sediments did not occur in 28 days (<0.3 ng/g wet weight). When exposed to Deca-BDE in spiked sediments also containing the Penta-BDE commercial mixture and PCB 209, bioaccumulation of BDE 209 was reduced compared to exposure to Deca-BDE alone. The mechanism responsible for limiting accumulation of BDE 209 remains unclear but appears to involve characteristics of the sediment matrix and low transfer efficiency in the digestive fluid and across the gut wall.

THE BIOAVAILABILITY OF BROMINATED DIPHENYL ETHERS FROM URBAN ESTUARINE SEDIMENTS TO DEPOSIT-FEEDING INVERTEBRATES

By

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Chapter 1

Executive Summary

1.1 Introduction

Brominated diphenyl ethers (BDEs) are hydrophobic organic chemicals (HOCs) used as flame retardants and are incorporated into a wide variety of consumer products to comply with fire safety regulations. BDEs are additive flame retardants, meaning that they are only incorporated into the product, not chemically bound to it. Because they are dissolved into the products, BDEs are more likely to volatilize or leach out of materials and be released into the environment. Initial studies reporting high concentrations of BDEs in fish in Sweden (Anderson and Blomkvist 1981) triggered a series of assessments of additional BDE contamination in others areas of the world, which revealed that these compounds were accumulating at an unprecedented rate in the environment. BDEs have become ubiquitous environmental contaminants, as indicated by their high frequency of detection in biotic (Hites 2004) and abiotic matrices (Hale et al. 2006).

BDEs are produced commercially for specific applications as Penta-, Octa-, or Deca-BDE mixtures, each named for their primary constituent congeners. The Penta-BDE mixture is used primarily in the polyurethane foam used in furniture, but was also used in circuit boards until the mid-1990s (Hale et al. 2003). Octa-BDE is primarily used in thermoplastics. In addition to being potential neurotoxicants (Eriksson et al. 2001) and endocrine disruptors (Stoker et al. 2005), the tetra- through hepta- BDE congeners that constitute these mixtures are the BDEs that are the most frequently detected in organisms, including humans (Hites 2004). Due to human and environmental health concerns, the Penta- and Octa-BDE commercial mixtures have been phased out of production and use in new products.

In contrast to the Penta- and Octa-BDE mixtures, the use of Deca-BDE continues unrestricted. BDE 209 (decabromodiphenyl ether) typically constitutes >97% of the Deca-BDE commercial mixture, which is used primarily in thermoplastics (e.g., television and computer casings) and electrical equipment. Concerns with BDE 209 include its potential developmental neurotoxicity (Viberg et al. 2003) and the potential for its degradation into the more toxic and bioaccumulative components of the banned Penta- and Octa-BDE formulations via photolysis, biotransformation, and microbial processes (e.g., Soderstrom et al. 2004; Stapleton et al. 2004; Gerecke et al. 2005). Because BDE 209 is extremely hydrophobic and has a very low water solubility (< 0.1 μg/L), low volatility, and large molecular weight (959 g/mol), it forms strong associations with particles and concentrates in dust, sewage sludge, and aquatic sediments (Hale et al. 2006; EU risk assessment 2002). Despite its expected persistence in these phases, a growing number of studies are reporting accumulation of BDE 209 in biota, including human breast milk (Schecter et al. 2003), mammals (e.g. Christensen et al. 2005), predatory birds (e.g. Lindberg et al. 2004) and fish (e.g. Johnson-Restrepo et al. 2005). Detection of BDE 209 in biota is generally inconsistent and sporadic however, leading to questions regarding routes of exposure to these species.

An assessment of BDE accumulation in Chesapeake Bay recreational fish revealed that the highest concentrations of accumulation were in fish collected near wastewater treatment and municipal waste processing facilities in Baltimore Harbor

(Klosterhaus and Baker, unpublished). Other studies have reported high concentrations of BDEs in sediments and fish worldwide (Hites 2004; Hale et al. 2006), yet few studies have investigated factors controlling the bioaccumulation of BDEs in aquatic food chains. Research on the dynamics of BDE bioavailability from sediments will aid in the elucidation of potential exposure routes to higher trophic levels and is therefore the focus of this dissertation.

1.2 Rationale

Estuarine sediments near urban and industrialized areas commonly contain high concentrations of organic contaminants. Ecosystem managers are responsible for establishing chemical concentration guidelines that are protective of estuarine species and thus must be able to estimate the extent of accumulation in the organisms exposed to these sediments. Knowledge of a chemical's bioavailability from sediments is the first step in predicting not only its potential to cause toxicity to organisms in direct contact with the sediments, but also the extent of its transfer into aquatic food webs. Deposit-feeding invertebrates transfer sediment-bound HOCs such as polychlorinated biphenyls (PCBs) from sediments to aquatic food webs (Pruell et al. 2000), where they may undergo biomagnification in higher trophic level species (Zaranko et al. 1997). Sediment exposure assessments have not been conducted for BDEs and are necessary for understanding routes of exposure to higher trophic levels and their potential impacts in coastal environments.

1.3 Objectives

The overall objective of this research was to establish the relationship between BDE exposure and accumulation by deposit-feeding invertebrates in estuarine sediments. My specific research objectives were:

(1) To determine the steady-state partitioning of BDEs between deposit-feeding invertebrates and sediments in estuaries;

(2) To determine BDE bioaccumulation kinetic parameters for deposit-feeding invertebrates exposed to contaminated sediments;

(3) To determine if Deca-BDE is bioavailable to deposit-feeding invertebrates; and,

(4) To compare the bioavailability of BDEs with other hydrophobic organic contaminant classes.

1.4 Summary of Chapter 2

To investigate the steady-state partitioning of BDEs in the field, paired sediment and invertebrate samples were collected during two field studies from the Back River and Hart-Miller Island area (Baltimore, MD) in 2003 and 2005. Fish in Back River contained high concentrations of BDEs in the previous analysis of Chesapeake Bay fish and therefore Back River was selected as the field site. In addition to BDEs, PCBs and polycyclic aromatic hydrocarbons (PAHs) were also quantified in the invertebrates and sediment to compare the relative bioavailability of these chemical classes. Paired sediment and invertebrate samples from four other field collections in the Chesapeake Bay and the Delaware River estuary were also included in this analysis. Biota-sediment accumulation factors (BSAFs), a common metric used to assess relative bioavailability and a tool used to estimate bioaccumulation potential, were calculated and analyzed to investigate the variation in organic contaminant accumulation among species, taxa, and sites.

PCB and PAH BSAFs for all species were highly variable and each spanned three orders of magnitude. The median BSAF for PCBs was two orders of magnitude higher than the median BSAF for PAHs when all BSAF values were pooled. The median PAH BSAF was nearly an order of magnitude lower than most BSAF values reported in other studies and is likely due to strong sorptive interactions with the sediment matrix (i.e. black carbon). Median PAH BSAFs were similar among taxa, however for PCBs the median BSAF was lower in polychaete worms compared to amphipods and clams, perhaps due to metabolism. The species-specific median BSAFs for both PCBs and PAHs varied six-fold. High variation in PCB and PAH BSAFs among species within a taxonomic group resulted in variation among taxonomic groups that was much less substantial. BDE BSAFs were generally highest for the Penta-BDE congeners, but variability was high among species and sites. BSAFs for the Penta-BDE mixture congeners were comparable to BSAFs for PCBs with similar log K_{ow}. BDE 209 was not detected in invertebrates despite concentrations in the sediment that were as high as ~4000 ng/g dry weight.

Though variation in BSAFs was high, most values were within the expected two- to three-fold variation expected for the BSAF model (DiToro et al. 1991). For a given chemical class, the similarity in median BSAFs among most species and taxa indicates that the BSAF model is a good first-order, screening tool for assessing bioaccumulation potential from sediments.

1.5 Summary of Chapter 3

Using 28 and 56 day uptake experiments, the bioaccumulation potential of sediment-associated organic chemicals (PCBs, PAHs, and BDEs), metals, and butyltins was assessed from five impaired areas of Baltimore Harbor and a control site using deposit-feeding invertebrates. The marine polychaete worm *Neries virens*, an omnivorous primarily sediment-ingesting deposit feeder, and the estuarine amphipod *Leptocheirus plumulosus*, a suspension/surface deposit feeder, were used to assess accumulation in species with different feeding strategies. These experiments were part of a larger study in which whole sediment toxicity identification and evaluation methods were applied to sediments from the same sites, in anticipation that the body burden data would provide insight into the contaminants responsible for any observed toxicity. Since BDE 209 was not detected in any of the invertebrates from the field collections (Chapter 2), this project was an opportunity to reassess the bioavailability of BDE 209 using different sediments and refined BDE analytical methods. Furthermore, by conducting an uptake and depuration time series analysis using sediment from one of the Harbor sites, uptake and depuration rate constants for the various chemicals of interest could be determined.

PCBs, PAHs, butyltins, and some metals in Baltimore Harbor sediments were bioavailable to the polychaete worm *Nereis virens* and the amphipod *Leptocheirus plumulosus*. *N. virens* efficiently metabolized PAHs and likely tributyltin. BDE accumulation in both species was low and the dominant congener in sediments, BDE 209, was not detected in either species despite high sediment concentrations. Copper in *N. virens* and copper and zinc in *L. plumulosus* were the only metals quantified that showed substantial accumulation. Differences in energetic endpoints did not appear to be linked to the observed site-specific differences in PCB and PAH BSAFs. Site-specific differences in sediment characteristics (e.g. black carbon) may account for variation in bioavailability. The 28 day bioaccumulation test with *N. virens* is useful for predicting in situ steady-state body burdens for PAHs since steady-state was reached by day 28. However, the 28 day test may not be useful for PAHs if it is used for extrapolating accumulation to other species since *N. virens* efficiently metabolizes PAHs and thus may underestimate steady-state concentrations in other species with lower metabolic capabilities. Due to slow uptake kinetics, the 28 day bioaccumulation test underestimates the steady-state PCB concentrations in *N. virens*. While standard 28 day bioaccumulation tests indicate the bioavailability of PCBs from sediments, they may under predict bioaccumulation of PCBs into benthic organisms.

These experiments were conducted at the Wye Research and Education Center under the guidance of Dan Fisher and Greg Ziegler. Metals analysis was conducted by Frontier Geosciences (Seattle, WA, USA) and Andrew Heyes at the Chesapeake Biological Laboratory (University of Maryland Center for Environmental Sciences, Solomons, MD, USA). Butyltin analysis was conducted by Michael Unger at the Virginia Institute of Marine Science (Gloucester Point, VA, USA).

1.6 Summary of Chapter 4

Since the Penta-BDE congeners were not detected in the Baltimore Harbor sediments used for the previous accumulation experiment with *Nereis virens* (Chapter 3), an additional experiment was conducted to characterize the relative bioavailability of

BDE congeners in the Penta-BDE and Deca-BDE commercial mixtures from sediments. A 28 day bioaccumulation experiment was conducted in which worms were exposed to either spiked sediments or contaminated field sediments to compare the relative bioavailability of BDEs from each matrix. This experiment was conducted as part of a larger study (Chapter 5) investigating the mechanisms responsible for the lack of BDE 209 accumulation in *N. virens* (Chapters 2 and 3). Biota-sediment accumulation factors (BSAFs) for *N. virens* were compared to BSAFs obtained for field-collected *Nereis succinea* from a previous study (Chapter 2) to determine the relationship between accumulation over 28 days and field-collected values. Additionally, BDE uptake rates were compared among congeners to determine if hydrophobicity can be used to predict the relative bioavailability of BDEs, as it is for other HOC classes.

The bioavailability of BDEs to *N. virens* in this experiment indicated that these chemicals can be remobilized from sediments and transferred to aquatic food webs. Selective accumulation of congeners in the Penta-BDE commercial mixture over BDE 209 and other components of the Deca-BDE mixture support the prevalence of the Penta-BDE congeners in higher trophic level species. Chemical hydrophobicity (K_{ow}) was not a good predictor of bioavailability for congeners in the Penta-BDE commercial mixture. However, the large difference in hydrophobicity between congeners in the Penta- and Deca-BDE mixtures, which is a result of differences in physical properties of the congeners, likely controlled the differences in bioavailability observed. Comparison of BDE bioavailability from the spiked and field sediments after 28 days was confounded by the low concentration of the Penta-BDE congeners in the field sediment and the worms exposed to it. However, the BSAF for *N. virens* after 28 days of exposure to the field sediment was still lower than the BSAF for field-collected *Nereis succinea* indicating that 28 day bioaccumulation tests using *N. virens* may underestimate the actual, in situ concentration of BDEs in deposit-feeding species. BDE 209 was not bioavailable to *N. virens* from the highly contaminated field sediment after 28 days of exposure and was only minimally detected in worms exposed to spiked sediments in which bioavailability was maximized. Erin Dreis, an undergraduate intern, assisted with all aspects of this project including experimental setup and execution, as well as the sample processing and chemical analysis.

1.7 Summary of Chapter 5

The purpose of this study was to elucidate the mechanism(s) limiting bioavailability of BDE 209 to *N. virens.* The specific objectives were to test the hypothesis that BDE 209 does not accumulate because it is too large to cross the gut wall and to determine if the bioavailability of BDE 209 is influenced by the presence of other BDEs in the sediments. A 28 day bioaccumulation experiment was conducted in which bioavailability was maximized by introducing BDE 209 to *N. virens* in minimally aged spiked sediments (< 48 hrs) and a sediment-free treatment in which worms were exposed to BDE 209 via spiked food. In addition to exposure to Deca-BDE alone in spiked sediments, worms were exposed to Deca-BDE in spiked sediments also containing a Penta-BDE commercial mixture and PCB 209 to investigate whether the presence of other HOCs influenced the accumulation of BDE 209.

Accumulation from spiked sediments and food demonstrated that BDE 209 is capable of crossing the gut wall and accumulating in *N. virens*. However this study also demonstrated that availability is highly dependent on the exposure conditions. Accumulation of BDE 209 from field sediments did not occur in 28 days; although a longer exposure may have resulted in low accumulation. *N. virens* did however accumulate BDEs 207 and 208, known degradation products of BDE 209, by day 28. The mechanism responsible for limiting accumulation of BDE 209 from field sediments remains unclear but appears to involve characteristics of the sediment matrix. Low transfer efficiency in the digestive fluid and across the gut wall may also contribute, since even when presented to the worms in a form expected to greatly enhance bioavailability (i.e. dissolved in oil and without the presence of sediment), accumulation of BDE 209 was very low. The presence of other HOCs in the spiked sediments decreased the availability of BDE 209 to *N. virens*. If applicable to field sediments, this has strong implications for predicting the bioavailability of HOCs to deposit feeders since sediments usually contain complex mixtures of chemicals and sediment bioaccumulation models do not account for such interactions.

1.8 Overall Findings and Implications

The primary findings and implications of this research were:

(1) BDE congeners consistently detected in Chesapeake Bay fish (Klosterhaus and Baker, unpublished) were also consistently accumulated in deposit-feeding invertebrates. BDE 209 was not detected in the Chesapeake Bay fish or several deposit-feeding invertebrates in repeated exposures to highly contaminated field sediments. These results suggest that the bioavailability of BDEs to deposit-feeding invertebrates controls exposure to higher trophic levels in aquatic food

chains. Additionally, when exposed to high concentrations of both BDE mixtures (Penta- and Deca-BDE), polychaete worms selectively accumulated congeners in the Penta-BDE mixture over Deca-BDE, further supporting the prevalence of Penta-BDE congeners in fish. Ingestion of fish therefore does not appear to be a significant BDE 209 exposure pathway in humans. These results are in agreement with the growing consensus that BDE 209 primarily accumulates in terrestrial food webs (Chen et al. 2006; EU Risk Assessment 2002).

(2) The lack of BDE 209 accumulation in deposit-feeders, even under very high exposure conditions, indicates that there is an upper limit on the bioavailability of hydrophobic organic contaminants (HOCs) from sediments. The bioavailability of most high molecular weight HOCs (e.g. PCB congeners with log $K_{ow} > 7$) is low, but they are still bioavailable. BDE 209 was not bioavailable from field sediments after 28 days and was only minimally bioavailable under circumstances where the bioavailability of BDE 209 was maximized (i.e. feeding with no sediment interaction). The physical properties of BDE 209 limit its solubilization from the sediment matrix and/or absorption in organisms.

(3) Several studies in which accumulation of BDE 209 was not observed concluded that the large molecular size of BDE 209 prevents it from crossing biological membranes and therefore accumulating in organisms. Accumulation of BDE 209 from spiked sediment and food in my research demonstrated that BDE 209 can cross biological membranes and be absorbed in organisms. The physical

properties of BDE 209 likely limit the efficiency of its transport across biological membranes, but the physical properties also result in strong interactions with sediment particles and/or decreased efficiency of transport in the gut that contribute to the low efficiency of absorption.

(4) Interactions among HOCs during assimilation decreased the bioavailability of BDE 209 to the polychaete worm *Nereis virens*. This finding has not been reported previously for any HOC, likely since assessments of bioavailability are typically conducted with individual chemicals or with chemicals within a narrower K_{ow} range, and solubilization interactions in the gut are not well studied. If these interactions that were observed using spiked sediments occur in the field, bioaccumulation models may overestimate the bioavailability of very hydrophobic chemicals since sediments usually contain complex chemical mixtures. Bioaccumulation models which incorporate the effects of solubilization interactions during the digestion of contaminated sediments may account for some of the variability in bioaccumulation observed in the environment.

Chapter 2

Organic contaminant biota-sediment accumulation factors (BSAFs) for invertebrates living in estuarine sediments

2.1 Introduction

Estuarine sediments near urban and industrialized areas commonly contain high concentrations of hydrophobic organic contaminants (HOCs). Ecosystem managers are responsible for establishing chemical concentration guidelines that protect estuarine species and thus must be able to estimate the extent of accumulation in the organisms exposed to these sediments. Knowledge of a chemical's bioavailability from sediments is the first step in predicting not only its potential to cause toxicity to organisms in direct contact with the sediments, but also the extent of its transfer into aquatic food webs. Estimates of HOC bioavailability from sediments are necessary for understanding their potential impacts in coastal environments.

The most common model to predict HOC bioaccumulation from sediments is the equilibrium partitioning model, also known as the biota-sediment accumulation factor or BSAF (Lake et al. 1990; Lee 1992). The model assumes that a chemical is at a thermodynamic equilibrium among organism lipid, sediment carbon, and pore water and is used to predict the steady-state chemical concentration in an organism. The BSAF for a given chemical can be derived from field or laboratory studies and is calculated by dividing the lipid-normalized chemical concentration in an organism by the carbon-normalized concentration in the exposure sediments. In theory, BSAFs do not vary among species and sediment types if the partitioning of the chemical does not vary with the lipid or carbon composition. BSAFs should also not vary among chemicals and approximate one if partitioning is the only mechanism determining uptake (DiToro et al. 1991). In practice, the BSAF is used to evaluate the relative bioavailability of HOCs from sediments and can be used by ecosystem managers as a first-order prediction of the in situ chemical concentration in an organism if the carbon-normalized chemical concentration in the sediment and the lipid content of the organism are known.

BSAFs determined from organisms and sediment collected directly from the field are ideal since field assessments typically represent a steady-state condition and are realistic. However, field studies are often not practical or the organisms of interest may not be available at a given site. The alternatives to field studies are laboratory studies which generate BSAF values by exposing uncontaminated organisms to spiked sediments or sediments collected from the field. In spiked sediment exposures, ensuring that the chemical has reached sorptive equilibrium in the sediment is essential, otherwise bioavailability may be overestimated (Landrum 1989). Conversely, using either spiked or field sediments, bioavailability has the potential to be underestimated if the organisms have not reached steady-state by the end of the laboratory exposure. This is primarily a concern for the higher molecular weight HOCs, such as PCBs, which may take longer to reach steady-state in some species (Pruell et al. 1993; ASTM 1998). Additionally, physiological changes or changes in organism behavior (e.g., lipid content, ingestion rate, etc.) during the laboratory exposure may influence accumulation. Thus various approaches for determining BSAFs may be used, but their effectiveness for accurately predicting in situ bioaccumulation is limited by whether or not equilibrium conditions were met during the exposure and if the physiology and ecology of the organisms in the laboratory exposure mimics what occurs in the field.

Numerous studies have determined chemical-specific BSAFs for different HOC classes using a wide variety of species and for several different sites. Typically, only a few selected chemicals are analyzed and a limited number of species are used in each study, often limiting the number of BSAF values available for use in impact assessments. Large variation in BSAFs among species and sites within a chemical class is not unusual (e.g., Tracey and Hansen 1996; Maruya et al. 1997; Wong et al. 2001; Magnusson et al. 2006) and may be due to both organism-driven differences, such as feeding behavior, metabolism, or lipid quality, and/or sediment-driven differences, such as chemical concentration or carbon composition (e.g. black carbon) (DiToro et al. 1991; Lee 1992; Koelmans et al. 2006). Variation in BSAFs may also be due to differences in sampling procedures and analytical methods, specifically lipid analysis (Randall et al. 1991), among studies. In an analysis of several laboratory and field BSAF studies, Tracey and Hansen (1996) concluded that BSAFs for a specific HOC class do not differ among species in different habitat groups (i.e. infaunal deposit feeders, epibenthic filter feeders, etc.). Wong et al. (2001) determined BSAFs for chlorinated HOCs in several species collected from 485 river sites in the U.S. and concluded that although there were some species- and chemical-specific differences, median BSAFs values for fish and bivalves were similar. Relatively few studies are readily available which have reported field-derived BSAFs for benthos in estuarine or marine sediments and these are limited to a small number of chemicals, species, and sites (Foster and Wright 1988, Lake et al. 1990, Maruya et al. 1997, Ferguson and Chandler 1998, Kannan 1999, Klosterhaus et al. 2002, Magnusson et al. 2006). Additional BSAFs will improve the accuracy and confidence in predicting the bioavailability of HOCs in estuaries and further address variation among taxa, chemicals, and sites.

In this study, BSAFs from six separate field collections (40 composite samples) were used to investigate the variation in organic contaminant accumulation among three benthic invertebrate taxa from estuarine sediments. Three clam species (*Rangia cuneata*, *Mya arenaria*, and *Macoma balthica*), two polychaete worm species (*Nereis succinea*, *Marenzelleria viridis*), and the amphipod *Leptocheirus plumulosus* were collected from two regions of the Chesapeake Bay and analyzed for polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs). Brominated diphenyl ethers (BDEs), chemicals used as flame retardants that have become ubiquitous contaminants, were quantified in three of the studies. Also included in this analysis were PCB BSAFs for *Gammarus* amphipods collected from the Delaware River Estuary, which is located ~50 km north of the Chesapeake Bay. Specific objectives of this study were to examine differences in BSAFs among species, taxa and chemical classes, as well as to investigate the dependence of BSAFs on the octanol-water partition coefficient (K_{ow}). This analysis of BSAFs, which includes the analysis of over 180 individual HOCs in each sample, will aid in management decisions for estimating the bioavailability of organic contaminants from Chesapeake Bay sediments as well as other estuarine environments.

2.2 Methods

2.2.1 Field Studies

Figure 2-1 shows the location of each field study and Table 2-1 lists the species collected and the number of sites sampled in each. Three of the Chesapeake Bay field collections were conducted in the Back River/Hart-Miller Island area (39° 15’ N, 76° 26’ W), which is located just north of the heavily contaminated and industrialized Baltimore Harbor/Patapsco River system. Back River is a tributary which receives effluent from a major wastewater treatment facility serving the city of Baltimore and contains high sediment concentrations of organic contaminants and metals. Hart-Miller Island is a confined sediment disposal facility located at the mouth of Back River and its surrounding sediments are typically less contaminated compared to the Back River sites. Poplar Island (38° 45’N, 76° 22.5 W) is the site of an ongoing restoration project in which uncontaminated dredge material from the Port of Baltimore is being used to restore the island’s land mass which has been undergoing gradual erosion over the last century. Biota and sediment were monitored for baseline contamination prior to the dredged material placement and data from one of those field collections was included in this study. A previous assessment has reported that the sediment contamination at Poplar Island is equal to or lower than sites around Hart-Miller Island (Dalal et al. 1999) and therefore allows comparison of bioavailability from both a highly contaminated and low impacted site. PCB BSAF data for amphipods collected during a foodweb contamination study in the Delaware River Estuary (Toaspern 2003) was also included for comparison. Methods for collection, chemical extraction and analysis, organism lipid content, and sediment carbon analyses were the same for all the field studies in this analysis and were conducted in the same laboratory.

2.2.2 Invertebrate and sediment collections

Bulk surficial sediment was collected using a Ponar grab sampler and the top 2 cm of each grab sample were scraped into a glass bowl. Bulk sediment for organic contaminant analysis was homogenized with a stainless steel spoon, transferred to a glass jar, and frozen until analysis. Bulk sediment for invertebrate collection was gently sieved and the organisms were placed in jars containing site water only (clams) or site water and sediment (amphipods and worms) for transport back to the laboratory where an air supply was added and the organisms were left overnight. The following day the clams were shucked, rinsed of debris with deionized water, and composited by site in glass jars. Amphipods and worms were again separated from site sediments and transferred to uncontaminated seawater to allow for the purging of gut contents for 8 (amphipods) or 24 (worms) hours. Amphipods were placed on a stainless-steel sieve that was submerged in a glass dish containing seawater, allowing fecal matter to fall through the sieve while retaining the amphipods. Fecal matter was periodically removed from the worm purging containers to prevent re-ingestion. When sediment was no longer visible in the guts, invertebrates were rinsed with deionized water, blotted with clean laboratory tissue, and composited by site in glass jars or vials. Glass jars containing invertebrate samples were kept frozen (-20 °C) until analysis.

2.2.3 Chemical extraction and analyses

Biota and sediments were ground with sodium sulfate using a ceramic mortar and pestle and extracted via Soxhlet apparatus for 24 hrs (sediment, clams, and *Gammarus* amphipods), sonication (worms and amphipods from 2003), or accelerated solvent extraction (ASE 200) in dichloromethane. Prior to extraction, surrogate recovery standards (d_8-napthalene, d_{10}-fluorene, d_{10}-fluoranthene, d_{12}-perylene, PCB 14 (3,5-dichlorobiphenyl), PCB 65 (2,3,5,6-tetrachlorobiphenyl), PCB 166 (2,3,4,4',5,6-hexachlorobiphenyl), ^{13}C-BDE 15 (4,4'-dibromodiphenyl ether) and ^{13}C-BDE 118 (2,3',4,4',5-pentabromodiphenyl ether)) were added. Samples were concentrated using a rotary evaporator and the total lipids in the biota were quantified gravimetrically using a portion of the extract. Lipids were removed from the clam and *Gammarus* amphipod sample extracts using gel permeation chromatography. Following Soxhlet extraction of sediments, activated copper shavings were added to the extracts to remove sulphur and kept at -20 °C overnight. All sample extracts were reduced and exchanged into hexane. Polar interferences were removed from the biota (except for *Gammarus* amphipods) and sediment extracts using deactivated alumina. Following PAH analysis, nonpolar interferences were removed from the extracts using deactivated Florisil® column chromatography, exchanged into hexane, and then analyzed for PCBs and BDEs.

PAHs (39 total) were identified and quantified using a 30 m DB-5MS column (0.25 mm inner diameter, 0.25 μm film thickness; J&W Scientific, Folsom, CA, USA) with a Hewlett Packard (Palo Alto, CA, USA) 5890/5972A gas chromatograph coupled to a mass selective detector (GC/MSD) operated in selected ion monitoring mode. The oven temperature program consisted of an initial hold for 0.6 minutes at 40°C and a 10°C/min ramp to 280°C that was held for 22 minutes. Samples were run using the splitless injection mode and the injector and detector temperatures were 250 °C and 280 °C, respectively. The PAHs d_{10}-phenanthrene, d_{12}-anthracene, d_{12}-benz[a]anthracene, and d_{12}-benzo[g,h,i]perylene were used as internal standards and added to all samples and calibration standards just prior to instrumental analysis.

PCB congeners (~110 congeners total) in the biota and sediment were quantified using a Hewlett Packard (Palo Alto, CA, USA) 5890 gas chromatograph equipped with a ^{63}Ni electron capture detector. A 60 m DB-5 column (0.32 mm inner diameter, 0.25 µm film thickness; J&W Scientific, Folsom, CA, USA) was used for all samples. The oven temperature program consisted of an initial hold for 2 minutes at 100°C, a 4°C/min ramp to 170°C, and a 3°C/min ramp to 280°C that was held for 10 minutes. Samples were run using the splitless injection mode and the injector and detector temperatures were 250°C and 320°C, respectively. PCB 30 (2,3,6-trichlorobiphenyl) and PCB 204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl) were used as internal standards and were added to samples and calibration standards just prior to instrumental analysis. PCB congeners were identified and quantified following methods routinely used in our laboratory (Ashley and Baker 1999).

BDEs (34 congeners total) were quantified using programmed temperature vaporization (PTV) injection (5 µl injections in pulsed splitless mode) on an Agilent 6890N gas chromatograph coupled to an Agilent 5973N mass selective detector operated in negative chemical ionization mode. A 15 m DB-5MS column (J&W Scientific, Folsom, CA, USA) with an inner diameter of 0.25 mm and 0.1 µm film thickness was used. The oven temperature program consisted of an initial hold at 40°C for 1 min, a 20 °C/min ramp to 250 °C with no hold, a 1.5 °C/min ramp to 260 °C and held for 1 min, and a 25 °C/min ramp to 320 °C and held for 20 min. The injector and detector temperatures were 45 °C and 320 °C, respectively. Inlet and column flow were 100 ml/min and 1.5 ml/min, respectively. Prior to instrumental analysis, ^{13}C-CDE 86 (2,2',3,4,5-pentachlorodiphenyl ether) and ^{13}C-BDE 209 (decabromodiphenyl ether) were added as internal standards to all samples and calibration standards. The mass fragments *m/z* -79 and -81 were monitored for di- to octa-BDEs, -487 and -409 for the nona-BDEs and BDE 209, -318 and -316 for ^{13}C-CDE 86, and -495 and -415 for ^{13}C BDE 209 for quantitative and qualitative ions, respectively.

2.2.4 Sediment carbon and lipid analysis

Total carbon in the sediment was quantified using an Exeter Analytical CE440 Elemental Analyzer. The mean percentage (and range) of sediment carbon at each of the study sites was: 3.4 (2.5-4.8) for Back River/Hart-Miller Island 2003, 3.2 (0.5-4.7) for Back River/Hart-Miller Island 2005, 2.8 (1.3-3.7) for Hart-Miller Island 2003, 1.7 (0.5-4.1) for Poplar Island, 3.23 (0.7-6.3) for Delaware River Fall 2001, and 3.52 (1.5-7.4) for Delaware River Spring 2002. The percentage of total lipid for each species is listed in Table 2-2.

2.2.5 Data Analysis

Biota-sediment accumulation factors (BSAFs) were calculated by dividing the lipid-normalized chemical concentration in the organism (ng chemical/g lipid) by the carbon-normalized chemical concentration in the organism's surrounding sediment (ng chemical/g carbon). All congener/compound-specific BSAFs determined in the field studies listed in Table 2-1 were used in the analysis. For clams from the Poplar Island study, BSAFs were calculated for each replicate composite using the mean sediment concentration at each site and the mean BSAF for each site was used in the analysis. To examine the relationship between BSAF and the octanol-water partition coefficient (K_{ow}), PAH and PCB BSAFs were aggregated into 0.5 log K_{ow} increments. The log K_{ow} values used for this study are from Mackay et al. (1992) or if not available were calculated using EPIWIN modeling software (U.S. EPA). Box plots (Sigma Plot 9.0, Systat Software, Inc., San Jose, CA, USA) summarizing the pooled BSAFs for each log K_{ow} increment indicate the median (horizontal line within the box), 25th and 75th percentile (upper and lower edges of box), the 10th and 90th percentile (error bars), and outliers (black circles). Minitab (State College, PA) was used to conduct a one-way randomized re-sampling ANOVA statistic (Butler 2001) to test for differences in mean BSAFs among taxa. This technique does not assume a normal distribution or equal variances in the data. All compound-specific BSAFs were included in the analysis (i.e. no outliers were removed).

2.3 Results and Discussion

2.3.1 PCB vs. PAH BSAFs

The PCB and PAH BSAFs for all species and sites each spanned three orders of magnitude (Figure 2-2; Table 2-3; Appendix A). The median PCB BSAF (3.61) was 2 orders of magnitude higher than the median PAH BSAF (0.06). Even though the median PCB BSAF was ~-2-3 times higher than the equilibrium partitioning predicted value, the BSAFs were within a similar range as those reported for many other benthic deposit- and filter-feeders (e.g. Lake et al. 1990, Lee 1992, Tracey and Hansen 1996, Wong et al.2001; Magnusson et al. 2006), demonstrating the high bioavailability of most PCB congeners from sediments.

PAH BSAF values less than predicted by equilibrium partitioning, as seen in this study and often observed in others (Tracey and Hansen 1996; Maruya et al. 1997; Lee 1992), are generally attributed to the widespread capability of many aquatic taxa to metabolize these compounds (Rust et al. 2004; Livingstone 1998). However, the median PAH BSAF in this study (0.06) was nearly an order of magnitude lower than the median BSAF value (0.29) in the review by Tracey and Hansen (1996). Most PAH BSAFs in this study were also lower than those commonly observed in other studies (~0.1-1), including a study investigating PAH bioaccumulation in polychaete worms and clams from the Chesapeake Bay (Foster and Wright 1988). Similarly low PAH BSAF values have been reported in other studies, which attributed the lower than predicted accumulation to the presence of black carbon in the sediment (Thorsen et al. 2004; Sundelin et al 2004; Moermond et al. 2005). Black carbon particles (nm-μm size range) are produced from the incomplete combustion of fossil fuels and vegetation and are deposited in aquatic environments via atmospheric deposition and surface runoff (Koelmans et al. 2006). The high surface area, porosity, and aromatic structure of black carbon particles effectively make black carbon a 'supersorbent' for organic chemicals in the environment. Strong sorptive interactions with black carbon may reduce the bioavailability of several classes of HOCs from sediments by up to two orders of magnitude (Koelmans et al. 2006; Cornelissen et al. 2005) and it has been demonstrated that large variations in sediment black carbon content may account for the large variation in BSAF values observed (Cornelissen and Gustafsson 2005). Black carbon also has been shown to influence the accumulation of PCBs (Jonker et al. 2004); though because PAHs bind more strongly to black carbon than PCBs (Bucheli and Gustafsson 2003), black carbon influences the bioavailability of PAHs more so than PCBs (Sundelin et al 2004). This discrepancy in sorption likely contributes to the large difference in PCB and PAH BSAFs that are often observed in field sediments (Cornelissen et al. 2005). Thus in addition to metabolism, strong association with black carbon may be responsible for the much lower than predicted PAH BSAFs in this study. The black carbon content of the sediment was not measured in this study; however, the Back River/Hart-Miller Island study sites are located near a highly urbanized and heavily industrialized area where black carbon may be expected to accumulate as a result of atmospheric deposition and surface runoff. Black carbon generally comprises ~9% of total organic carbon (TOC) in aquatic sediments and was as high as 40% of the TOC in sediment at some sites (Koelmans et al. 2006 and references therein).

2.3.2 Differences in PCB and PAH BSAFs among sites, species, and taxa

For PCBs, the range in median BSAFs among species was similar for Back River/Hart-Miller Island (~2-5) and the Delaware River (~3-6) (Table 2-4). At Poplar Island, the median BSAFs for all species were uniformly lower (~1-2) and were up to six-fold lower than the median BSAFs for species at the other sites. PCB BSAFs were also the most variable at Poplar Island. It is not possible to determine if site-specific factors or taxonomic differences in exposure are responsible for this difference, because only clams were collected at Poplar Island. For PAHs, the range in median BSAFs and the variation among species was relatively similar for both Back River/Hart-Miller Island and the Delaware River. Despite the lower PCB BSAFs for Poplar Island, the BSAF data were aggregated for analysis of differences among species and taxa.

PCB and PAH BSAFs were grouped by taxa and their relationships with chemical hydrophobicity (log K_{ow}) are shown in Figures 2-3, 2-4, and 2-5. The dotted line in each figure denotes the median compound-specific BSAF for all species within the taxa; compound-specific BSAFs from all species and sites were pooled. The median PCB BSAF among taxa was similar, though the median BSAFs for amphipods and clams (3.9 and 3.7, respectively) were higher than the median BSAF for the polychaete worms (3.0). Statistical analysis of differences in the mean (± 1 SD) PCB BSAF among taxa indicated that amphipod BSAFs (6.26 ± 6.93) were higher than clam BSAFs (4.80 ± 4.53), which were higher than the polychaete worm BSAFs (3.99 ± 3.41). A similar taxonomic trend was observed for the median PAH BSAFs (Figures 2-3, 2-4, and 2-5), though BSAF values were much lower. Statistical analysis of differences in the mean (± 1 SD) PAH BSAF among taxa indicated that clam BSAFs (0.186 ± 0.280) were higher than both amphipod (0.110 ± 0.118) and polychaete worm BSAFs (0.066 ± 0.039). Within each taxa however, the species-specific variation in median BSAF was relatively high (Table 2-4). For PCBs, median BSAFs among species varied up to two-, three-, and five-fold for polychaete worms, amphipods, and clams, respectively. For PAHs, median BSAFs varied two-fold for the polychaete worms and up to four-fold for both the amphipods and clams. Thus, because differences in BSAFs among species within a taxonomic group were high, differences among taxonomic groups were less obvious for both PCBs and PAHs.

Variation in HOC bioavailability among species is often attributed to organism-driven differences in metabolic efficiency, feeding behavior, and/or lipid composition. PAH BSAFs for the polychaete worms and amphipods were among the lowest observed in this study and were likely the result of a more efficient elimination mechanism compared to other species and taxa. *Nereis succinea* and other polychaete worms are very efficient at metabolizing PAHs (Rust et al. 2004) and may also selectively metabolize PCBs (Pruell et al 1993). Amphipods and bivalves metabolize PAHs less efficiently (Rust et al. 2004; Kane Driscoll et al. 1997; Fay et al. 2000; Varanasi et al. 1985) and no studies have reported PCB biotransformation in amphipods or bivalves. Lower PAH and PCB BSAFs for polychaete worms compared to bivalves have been observed in other studies in which organisms were collected directly from field sediments (Maruya et al. 1997) or exposed to field sediments in the laboratory (Pruell et al. 1993; Foster and Wright 1988).

Compositional differences in lipid among and within species may also contribute to differences in HOC accumulation. HOCs may partition into different lipid classes with varying affinities; thus differing amounts of these classes among species may result in species-specific differences in contaminant bioavailability (Landrum and Fisher 1999). In this study, all three taxa had relatively similar total lipid content (Table 2-2) but species-specific differences in lipid class composition may have existed which could have influenced bioaccumulation.

Differences in feeding strategy may have also led to differences in exposure and thus HOC accumulation among species. Deposit-feeding species may receive a higher exposure to HOCs, and thus have higher BSAFs, due to more direct contact with contaminated sediments compared to filter-feeding species. In support of this, Lake et al. (1990) observed lower PCB accumulation factors for *Mercenaria mercenaria*, the filter-feeding hard clam, compared to the deposit-feeding polychaete worm *Nephtys incisa* living in contaminated sediments. However, suspended particles can have higher HOC concentrations compared to surficial sediment (Ko and Baker 1995), which may result in a higher exposure to filter- and suspension-feeding organisms compared to deposit feeders which ingest primarily surface or buried sediment. In this study, variation in BSAFs among species did not appear to be associated with organism feeding strategy, corroborating what others have reported (Tracey and Hansen 1996; Magnusson et al. 2006). Lastly, for amphipods and clams, differences in site-specific characteristics (e.g. black carbon content, organic carbon quality, contaminant concentration) and season may have also contributed to the perceived species-specific variation since species within these taxa were collected from different sites and at different times of the year.

2.3.3 BSAF dependence on K_{ow}

The relationship between BSAF and chemical hydrophobicity (K_{ow}) for each taxon and their respective regression analyses are shown in Figures 2-3, 2-4, and 2-5 and Figures 2-6, 2-7, and 2-8, respectively. BSAFs for PCBs were higher than the BSAFs for PAHs with similar log K_{ow} in all taxonomic groups. For PCBs, BSAFs were not significantly correlated with log K_{ow} for any taxonomic group ($p > 0.05$). The range of BSAFs remained relatively constant across the K_{ow} range with the exception of the lowest molecular weight PCBs (log K_{ow} 5-5.5) in the worms and clams and the highest molecular weight PCBs (log Kow > 7.5) in the amphipods. PCB congeners with log K_{ow} 5-5.5 had a median value that was higher in the worms and lower in the clams compared to the overall median BSAF value for their taxa. For the amphipods, the highest molecular weight PCBs (log K_{ow} >7.5) had a lower median value than the overall median

BSAF for the taxon. A negative correlation of PCB BSAFs with log K_{ow} was nearly significant for the amphipods ($p = 0.054$). Many studies investigating the bioavailability of PCBs to polychaete worms, amphipods, and clams exposed to field-contaminated sediments have observed a negative relationship with K_{ow} (Pruell et al 1993; Kannan 1999; Lake et al. 1990; Magnusson et al. 2006). Decreased bioavailability with increasing K_{ow} occurs as a chemical becomes more tightly associated with sediment particles and less efficiently transported through pore water, gut fluid and across biological barriers. However, parabolic BSAF relationships with maximum availability at log K_{ow}'s of ~6-7 (Pruell et al. 1993; Lamoreaux and Brownawell 1999; Landrum et al. 2001; Tracey and Hansen 1996) and BSAFs independent of K_{ow} have also been reported (Magnusson et al. 2006). Lower BSAFs for the lower molecular weight PCBs that are often observed are likely due to the more efficient elimination of these lower molecular weight congeners (Pruell et al. 1993; Landrum et al. 2001). The lack of a significant trend of PCBs with chemical hydrophobicity in this study suggests that the median BSAF may be a reasonably good predictor of PCB congener bioavailability for these taxonomic groups.

PAH BSAFs were negatively correlated with log K_{ow} for the polychaete worms ($p = 0.002$) and the amphipods ($p = 0.007$), but were not significantly correlated for the clams ($p = 0.35$). This trend of decreasing PAH bioavailability with increasing log K_{ow} is consistent with other studies which utilized species from the same taxon (Meador et al. 1995; Maruya et al. 1997; Ferguson and Chandler 1998; Thorsen et al. 2004). In contrast, PAH BSAFs did not vary substantially with log K_{ow} in the BSAF review by Tracey and Hansen (1996). The BSAFs in this study also showed a similar trend to mussels in a study by Sundelin et al (2004), in which the BSAFs for PAHs decreased with increasing K_{ow} but BSAFs for the PCBs did not. The authors suggested that this was due to the stronger sorptive interactions of the high molecular weight PAHs to black carbon on the sediment particles compared to PCBs with similar K_{ow}, and is consistent with the much higher BSAFs for PCBs in all taxa compared to PAHs in this study. This study shows that log K_{ow} is a useful tool for predicting PAH accumulation in a variety of benthic invertebrate species. An increasing number of studies are indicating however that the black carbon content of the sediment is also an important indicator of bioavailability that should be included in PAH bioavailability assessments (Cornelissen et al. 2005; Koelmans et al. 2006).

2.3.4 Brominated diphenyl ether BSAFs

Brominated diphenyl ether (BDE) BSAFs for the polychaete worms, amphipods, and clams collected from the Back River/Hart-Miller Island study are listed in Table 2-5. BDEs were not consistently detected among sites, which may in part be due to the low amount of tissue sample available at some sites. BDEs 47 (2,2’,4,4’-tetrabromodiphenyl ether), 99 (2,2’,4,4’,5-pentabromodiphenyl ether), 100 (2,2’,4,4’,6-pentabromodiphenyl ether), 153 (2,2’,4,4’,5,5’-hexabromodiphenyl ether), and 154 (2,2’,4,4’,5,6’-hexabromodiphenyl ether), the primary components of the Penta-BDE mixture, were detected in many of the samples and are the congeners most frequently detected in biota (Hites 2004). BDE 154 was detected with the most frequency and in all four species analyzed. BDEs 17 (2,2’,4-tribromodiphenyl ether), 28/33 (2,4,4’-tribromodiphenyl ether/2’,3,4-tribromodiphenyl ether), 75 (2,4,4’,6-tetrabromodiphenyl ether), and 85/155

(2,2’,3,4,4’-pentabromodiphenyl ether/ 2,2’,4,4’,6,6’-hexabromodiphenyl ether) were also detected often and are minor components of the Penta-BDE commercial products (LaGuardia et al. 2006). BDE 183 (2,2’,3,4,4’,5’,6-heptabromodiphenyl ether), the major component of the Octa-BDE commercial mixture, was detected in only a few clam samples. Components of the Deca-BDE commercial product, BDEs 206 (2,2’,3,3’,4,4’,5,5’,6-nonabromodiphenyl ether), 207 (2,2’,3,3’,4,4’,5,6,6’-nonabromodiphenyl ether), 208 (2,2’,3,3’,4,5,5’,6,6’-nonabromodiphenyl ether) and BDE 209 (decabromodiphenyl ether), were only detected in the clams. BDE 209 was detected in the clams at two out of the nine sites. BDE concentrations in the clams, especially the Deca-BDE congeners which were detected at high concentrations in the sediments, may have been influenced by incomplete gut clearance since the guts of the clams were not thoroughly purged prior to analysis. Lack of detection of BDE 209 in most invertebrates was surprising since it comprised 85-95% of the total BDEs in the sediment at these sites. However, method detection limits for BDE 209 in the biota were relatively high (20-120 ng/g wet weight); thus low accumulation may have occurred. It is possible that these invertebrate species are capable of BDE 209 metabolism, though metabolic capability could not be determined using this study design.

BDE BSAFs ranged from 0.008 – 7.5 with most ~1-5. BSAFs were generally highest for the Penta-BDE congeners, but variability was high among species and sites. BSAFs were usually lowest in the clams, suggesting that filter feeders receive a lower exposure to BDEs than the deposit-feeding species. BDEs with log K_{ow}’s between 7.3-7.8 (BDEs 99, 100, 153, 154) had the highest bioavailability (most mean BSAFs 3-4), but a consistent trend with chemical hydrophobicity was not apparent. BSAFs for the Penta-BDE mixture congeners were comparable to BSAFs for PCBs with similar log K_{ow}.

Lack of accumulation of BDE 209 by most invertebrates in this study, despite very high sediment concentrations, suggests that the bioavailability of BDE 209 to aquatic food webs is low. In addition to BDE 209 being a potential neurotoxin (Viberg et al. 2003), studies have demonstrated that BDE 209 is capable of undergoing debromination via photolysis (Soderstrom et al. 2004), biotransformation in fish (Stapleton et al. 2004), and microbes under anaerobic conditions (Gerecke et al. 2005) to form lower brominated, more bioaccumulative congeners. Many of these lower brominated byproducts are components of Penta-BDE, a mixture now phased out of production and use in new products, are potential neurotoxicants (Eriksson et al. 2001), and interfere with endocrine function (Stoker et al. 2005). Because of the unrestricted and continued use of Deca-BDE in large volumes, the risk of toxicity, and limited availability of BDE 209 fate data, studies elucidating the availability of BDE 209 from sediments to higher trophic levels are needed.

2.4 Summary and implications

PCB and PAH BSAFs for all species and sites each spanned three orders of magnitude. When all BSAF data were pooled, the median BSAF for PCBs (3.61) was two orders of magnitude higher than the median BSAF for PAHs (0.06). The median PAH BSAF was nearly an order of magnitude lower than most BSAF values reported in other studies and is likely due to efficient biotransformation and/or strong sorptive interactions with the sediment matrix (i.e. black carbon). For PCBs, the median BSAF was lower in polychaete worms (3.0) compared to amphipods and clams (3.7-3.9) and the median PAH BSAFs were similar among taxa (0.05-0.08). For PCBs, the mean amphipod BSAF (6.26 ± 6.93) was significantly higher than the mean clam BSAF (4.80 ± 4.53), which was significantly higher than the mean polychaete worm BSAF (3.99 ± 3.41). For PAHs, the mean clam BSAF (0.186 ± 0.280) was higher than both the mean amphipod (0.110 ± 0.118) and polychaete worm BSAF (0.066 ± 0.039). Within taxa, the species-specific median PCB BSAFs varied two- to five-fold. For PAHs, median BSAFs varied two-fold for the polychaete worms and up to four-fold for both the amphipods and clams. High variation in PCB and PAH BSAFs among species within a taxonomic group resulted in variation among taxonomic groups that was much less substantial. BSAFs for PCBs were higher than the BSAFs for PAHs with similar log K_{ow} in all taxonomic groups. For PCBs, BSAFs were not significantly correlated with log K_{ow} for any taxonomic group and thus the median value may be a reasonably good predictor of PCB congener bioavailability. PAH BSAFs were negatively correlated with log K_{ow} for the polychaete worms and the amphipods but not the clams. This indicates that log K_{ow} is a better tool for predicting PAH accumulation in deposit feeders than in filter feeders. BDE BSAFs were generally highest for the Penta-BDE congeners, but variability was high among species and sites. BSAFs for the Penta-BDE mixture congeners were comparable to BSAFs for PCBs with similar log K_{ow}.

Though variation in BSAFs was high, most values were within the expected two- to three-fold variation expected for the BSAF model (DiToro et al. 1991). For a given chemical class, the similarity in median BSAFs among most species and taxa indicates that the BSAF model is a good first-order, screening tool for assessing bioaccumulation potential from sediments.

Table 2-1. Details of field collections used for BSAF comparisons in this study

Study Sites and Species Collected	Organism Type	Feeding Type	# Sites	Chemical Analysis	Guts Purged?
<u>Chesapeake Bay</u>					
Back River/Hart-Miller Island (Summer 2003):				PAH, PCB, BDE	Yes
Nereis succinea	Polychaete worm	Deposit feeder	5[A]		
Marenzelleria viridis	Polychaete worm	Deposit feeder	3[A]		
Leptocheirus plumulosus	Amphipod	Suspension/Deposit feeder	3[A]		
Back River/Hart-Miller Island (Spring 2005):				PAH, PCB	Yes
Leptocheirus plumulosus	Amphipod	Suspension/Deposit feeder	3[A]		
Hart-Miller Island (Spring 2003):				PAH, PCB, BDE	No
Rangia cuneata	Clam	Filer feeder	9[A]		
Poplar Island (Summer 2000):				PAH, PCB	No
Macoma balthica	Clam	Deposit feeder	2[B]		
Mya arenaria	Clam	Filter feeder	4[B]		
Rangia cuneata	Clam	Filter feeder	1[B]		
<u>Delaware River Estuary</u>				PCB	Yes
Gammarus sp. (Fall 2001)	Amphipod	Deposit feeder	5[A]		
Gammarus sp. (Spring 2002)	Amphipod	Deposit feeder	5[A]		

[A] = One composite of 3-100 individuals at each site.

[B] = Four or five composites of ~10-20 individuals (used as replicates) at each site.

Table 2-2. Percent total lipid of invertebrate species in each sample composite

Study Sites and Species Collected	Organism Type	Mean % lipid and range
Chesapeake Bay		
Back River/Hart-Miller (Summer 2003):		
Nereis succinea	Polychaete worm	2.1 (1.7-2.8)
Marenzelleria viridis	Polychaete worm	1.1 (1.0-1.2)
Leptocheirus plumulosus	Amphipod	1.3 (1.1-1.5)
Back River/Hart-Miller (Spring 2005):		
Leptocheirus plumulosus	Amphipod	1.3[A]
Hart-Miller Island (Spring 2003):		
Rangia cuneata	Clam	1.0 (0.4-1.3)
Poplar Island (Summer 2000):		
Macoma balthica	Clam	2.4 (1.6-3.2)
Mya arenaria	Clam	1.7 (1.1-2.2)
Rangia cuneata	Clam	0.9 (0.6-1.0)
Delaware River Estuary		
Gammarus sp. (Fall 2001)	Amphipod	0.6 (0.4-0.8)
Gammarus sp. (Spring 2002)	Amphipod	1.3 (1.0-1.7)

[A] = Mean lipid from the 2003 study used since not enough sample to do lipid analysis.

	BSAF	
Probability Percentile	PAHs	PCBs
50	0.06	3.61
75	0.13	6.49
90	0.29	11.70
95	0.48	15.70
99	1.12	28.17

Table 2-3. Probability percentiles for all PAH and PCB biota-sediment accumulation factors.

Table 2-4. Summary of species- and site-specific PCB and PAH BSAFs used in this study

Study Sites and Species Collected	Organism Type	# Sites	PCB BSAFs Median	Mean	CV	Range	N	PAH BSAFs Median	Mean	CV	Range	N
Chesapeake Bay												
Back River/Hart-Miller Island (Summer 2003):												
Nereis succinea	Polychaete worm	5^A	3.84	4.82	0.77	0.08-29	273	0.03	0.04	0.91	0.001-0.19	94
Marenzelleria viridis	Polychaete worm	3^A	2.11	2.20	0.71	0.30-14	125	0.07	0.07	0.39	0.007-0.13	78
Leptocheirus plumulosus	Amphipod	3^A	2.27	2.80	0.73	0.14-12	154	0.04	0.06	1.08	0.002-0.33	64
Back River/Hart-Miller Island (Summer 2005):												
Leptocheirus plumulosus	Amphipod	3^A	4.10	4.06	0.50	0.44-14	133	0.17	0.17	0.80	0.024-0.82	50
Hart-Miller Island (Spring 2003):												
Rangia cuneata	Clam	9^A	5.20	6.21	0.71	0.09-30	400	0.05	0.06	0.74	0.004-0.23	98
Poplar Island (Summer 2000):												
Macoma balthica	Clam	2^B	1.74	3.08	1.53	0.09-40	99	0.12	0.21	0.97	0.009-0.80	48
Mya arenaria	Clam	4^B	1.65	2.76	1.10	0.07-15	165	0.18	0.31	0.46	0.004-2.2	103
Rangia cuneata	Clam	1^B	1.07	2.47	1.55	0.07-23	48	0.07	0.11	0.95	0.013-0.37	21
Delaware River Estuary												
Gammarus sp. (Fall 2001)	Amphipod	5^A	6.10	8.75	0.86	0.19-44	246	-	-	-	-	-
Gammarus sp. (Spring 2002)	Amphipod	5^A	3.21	7.01	1.20	0.02-45	280	-	-	-	-	-
		Median of all PCB:	3.61			Median of all PAH:		0.06				

CV = coefficient of variation; N = number of observations (i.e. total number of congener-specific BSAFs; sites were pooled).

^{A} = One composite of ~3-100 individuals at each site. ^{B} = Four or five composites of ~10-20 individuals at each site (used as replicates). BSAFs for the PAHs 9-methylanthracene and 2-methylanthracene were not included in the summary statistics since values were an order of magnitude higher than the other BSAFs

Table 2-5. Mean (range) and frequency of detection of BDE BSAFs for each species collected from Back River/Hart-Miller Island, Maryland.

Congener	log *K*ow	*N. succinea* (worm) n = 5	*M. viridis* (worm) n = 3	*L. plumulosus* (amphipod) n = 3	*R. cuneata* (clam) n = 9
BDE 17	5.74	1.4 (0.7-2.2) 5/5	0.5 (0.3-0.6) 2/3	1.0 (0.8-1.3) 3/3	0.6 (0.4-0.7) 6/9
BDE 28,33	5.94	1.7 (0.9-2.7) 3/5	-	2.2 (1.9-2.5) 3/3	0.4 (0.1-0.9) 7/9
BDE 47	6.81	2.8 (2.0-3.2) 3/5	-	-	1.1
BDE 75		2.6 (2.0-3.3) 2/5	2.0	-	1.0 (0.8-1.1) 3/9
BDE 85,155	7.37	-	1.9	-	1.2 (0.6-1.8) 2/9
BDE 99	7.32	3.7 (2.2-5.2) 2/5	3.8 (3.6-4.0) 2/3	4.2	-
BDE 100	7.24	4.5 (2.7-6.4) 2/5	3.2	4.3	1.7 (0.6-2.7) 2/9
BDE 119	7.66	-	-	-	1.7
BDE 153	7.9	5.3 1/5	-	-	2.3 (1.9-2.7) 2/9
BDE 154	7.82	4.4 (0.4-7.5) 5/5	2.6 (2.5-2.7) 2/3	1.0 (0.5-1.6) 3/3	2.4 (1.4-3.9) 5/9

Table 2.5 continued

Congener	log *K*ow	*N. succinea* (worm) n = 5	*M. viridis* (worm) n = 3	*L. plumulosus* (amphipod) n = 3	*R. cuneata* (clam) n = 9
BDE 183	8.27	-	-	-	0.8 (0.5-1.0) 3/9
BDE 197		-	-	0.1	
BDE 206					0.02
BDE 207			-	-	0.04 (0.01-0.07) 8/9
BDE 208		-	-	-	0.1 (0.02-0.2) 8/9
BDE 209	10	-	-	-	0.01 (0.008-0.02) 2/9

BDEs 25, 30, 49/71, 66, 116, 138, 156, 181, 190, 191, 196, 198/203, 204, and 205 were also analyzed but not detected in either biota or sediment, therefore BSAFs could not be calculated for these congeners.

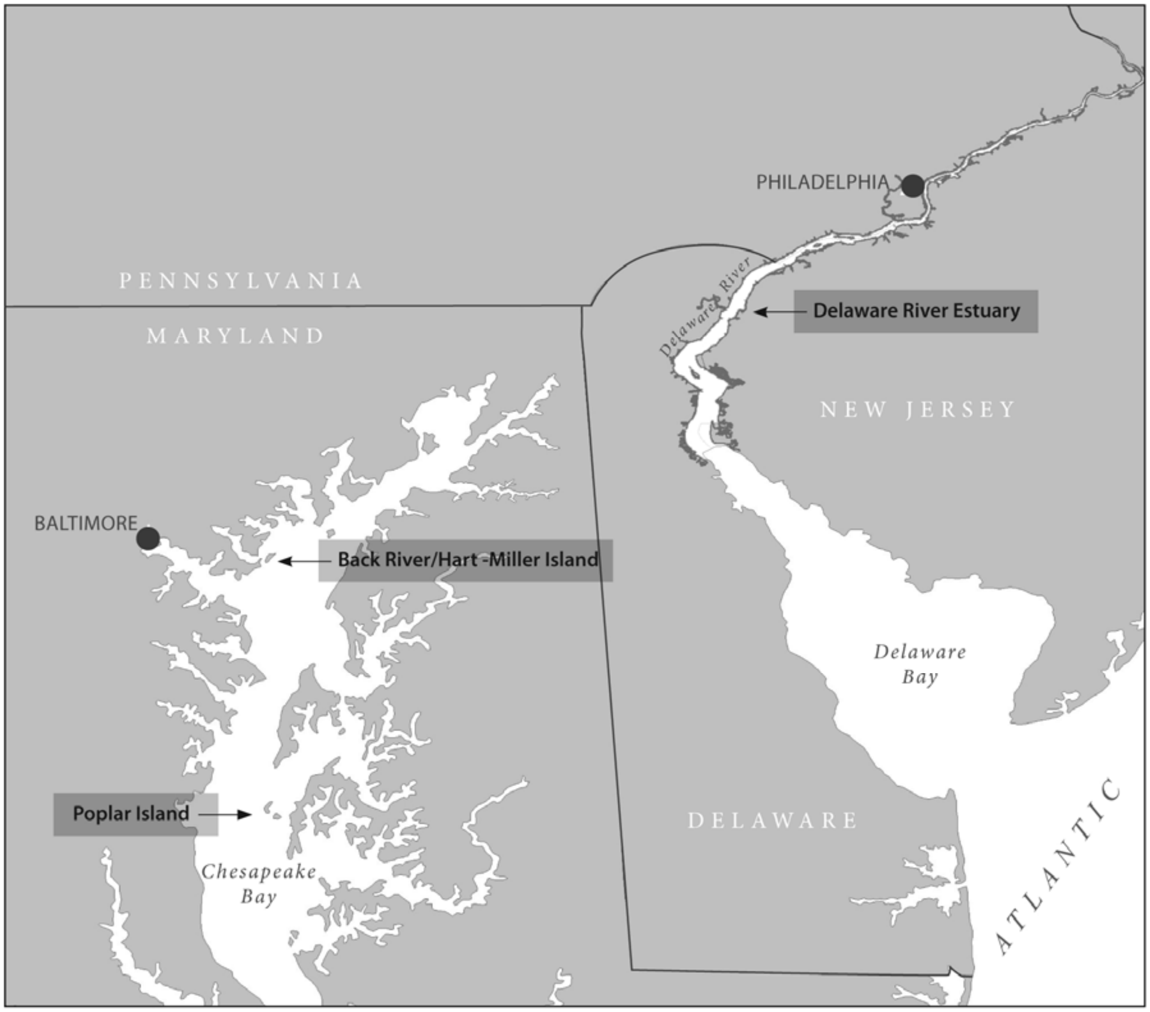


Figure 2-1. Map of Chesapeake Bay and Delaware River Estuary field sites.

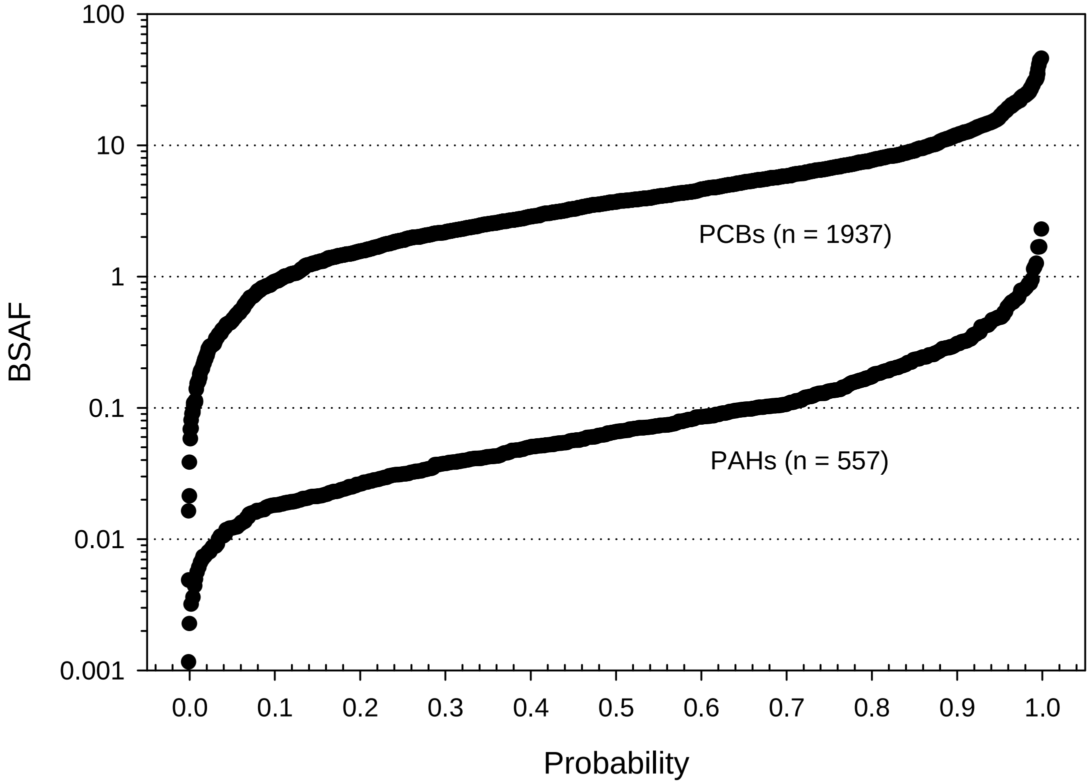


Figure 2-2. Probability distributions for all PCB and PAH biota-sediment accumulation Factors (BSAFs) determined in this study.

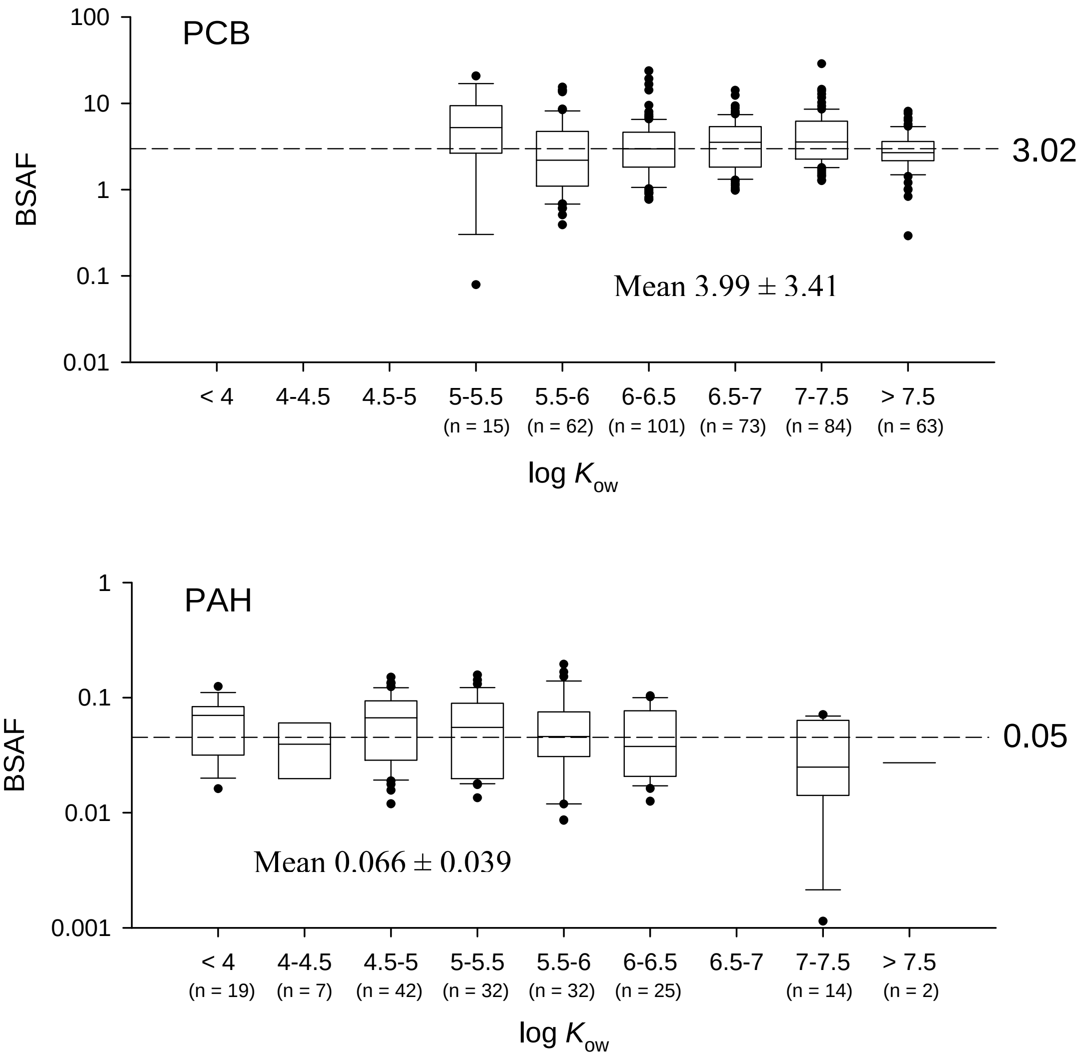


Figure 2-3. Polychaete worm PCB and PAH BSAFs sorted by log octanol-water partition coefficient (K_{ow}). BSAFs from both worm species were pooled. The dashed line indicates the median value of all worm BSAFs for each chemical class. BSAFs for the PAHs 9-methylanthracene and 2-methylanthracene ranged from 1.2-5.5 (5 total) and 0.4-0.5 (3 total), respectively, and were not included in the analysis. n = the number of BSAFs in each K_{ow} group. The mean (± 1 standard deviation) is also shown.

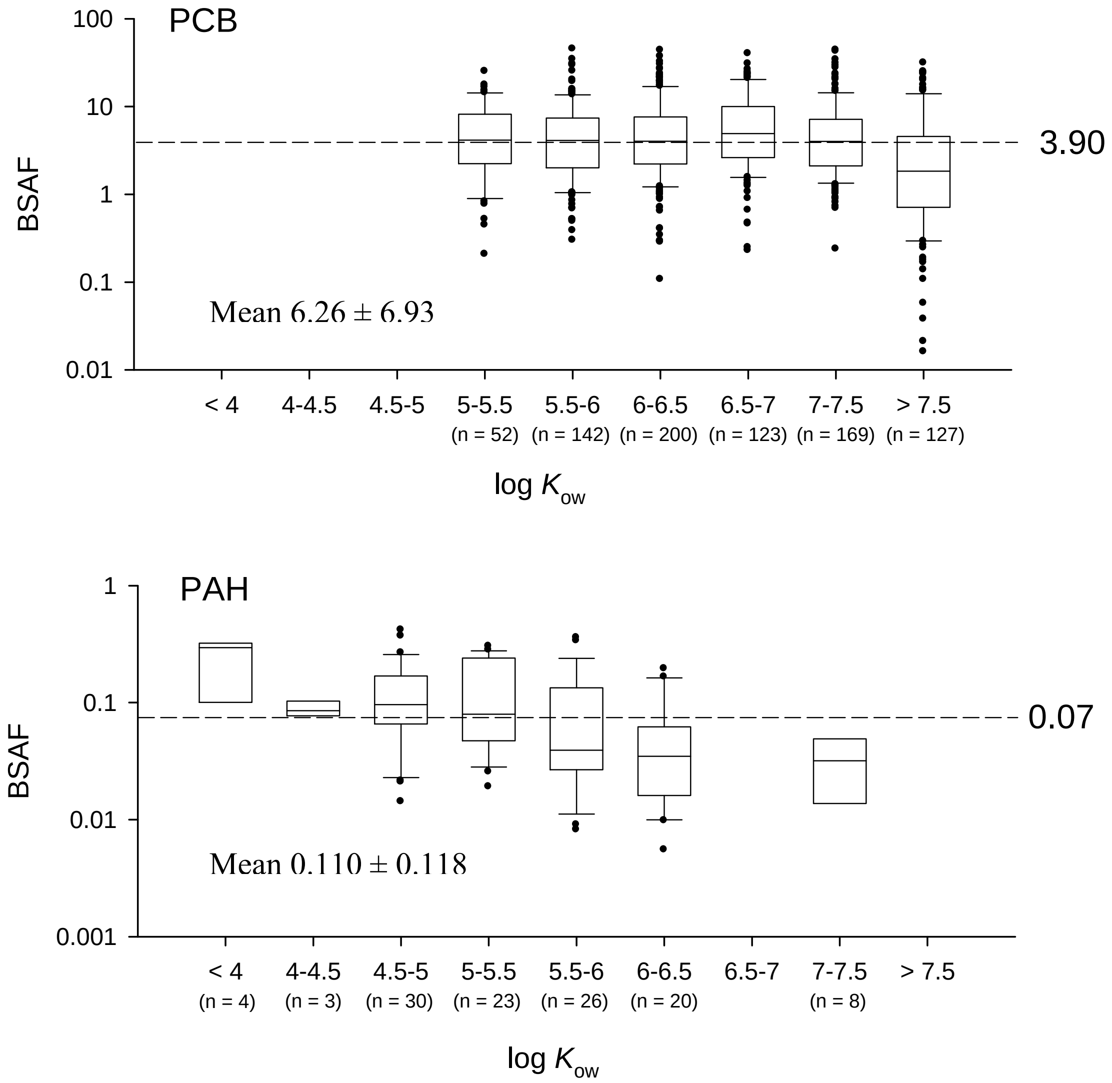


Figure 2-4. Amphipod PCB and PAH BSAFs sorted by log octanol-water partition coefficient (K_{ow}). BSAFs from both amphipod species and all sites were pooled. The dashed line indicates the median value of all amphipod BSAFs for each chemical class. n = the number of BSAFs in each K_{ow} group. The mean (± 1 standard deviation) is also shown.

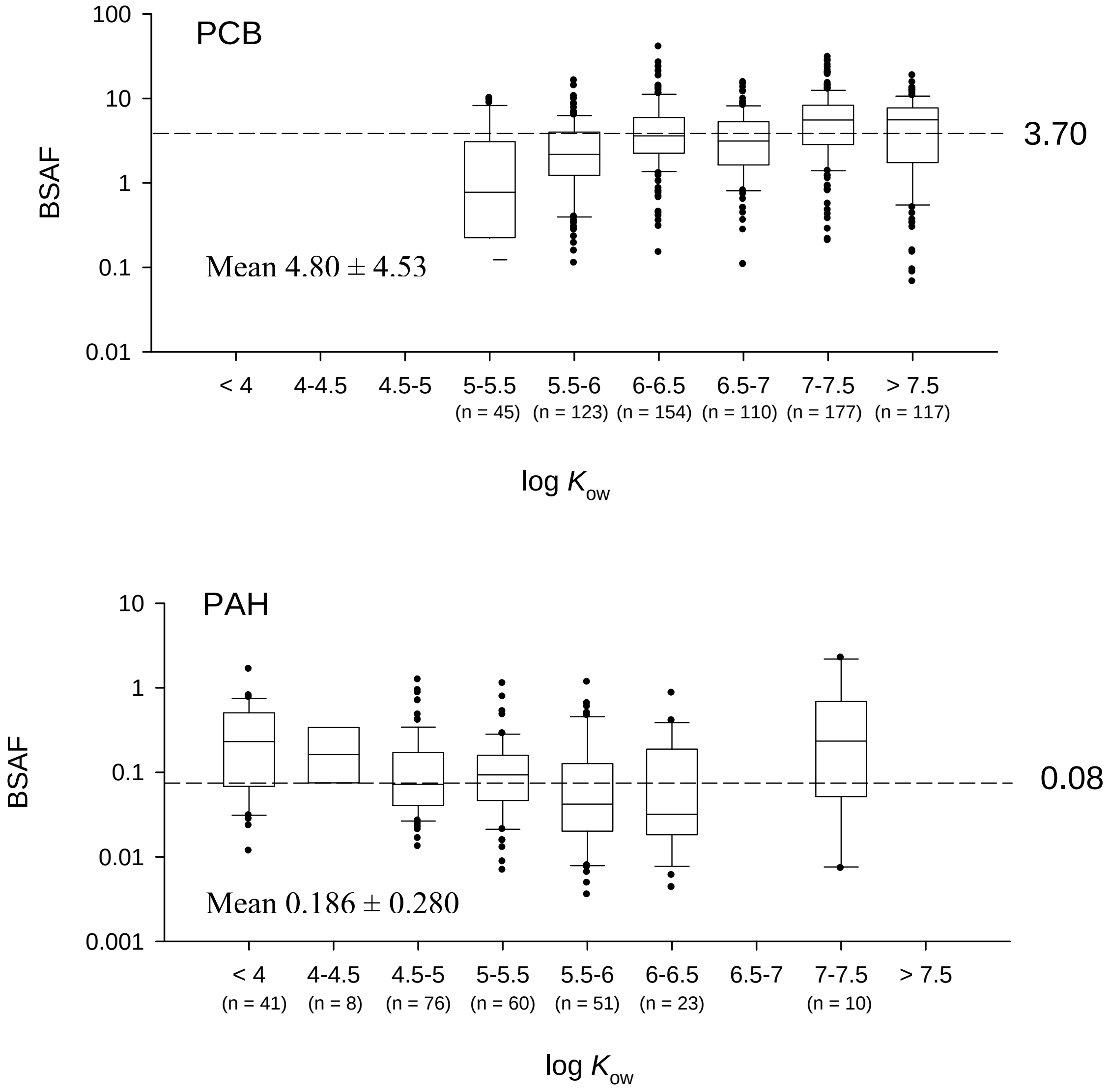
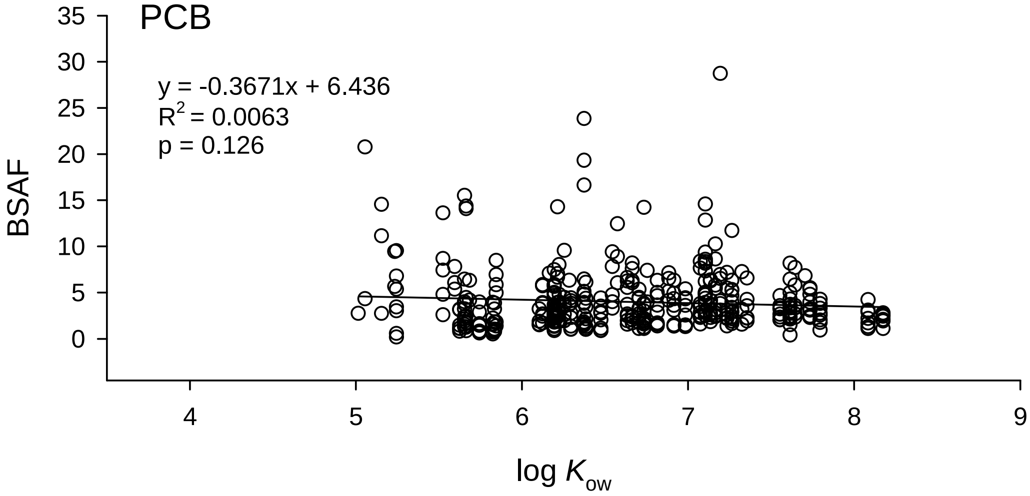


Figure 2-5. Clam PCB and PAH BSAFs sorted by log octanol-water partition coefficient (K_{ow}). BSAFs from all clam species and all sites were pooled. The dashed line indicates the median value of all clam BSAFs for each chemical class. n = the number of BSAFs in each K_{ow} group. The mean (± 1 standard deviation) is also shown.



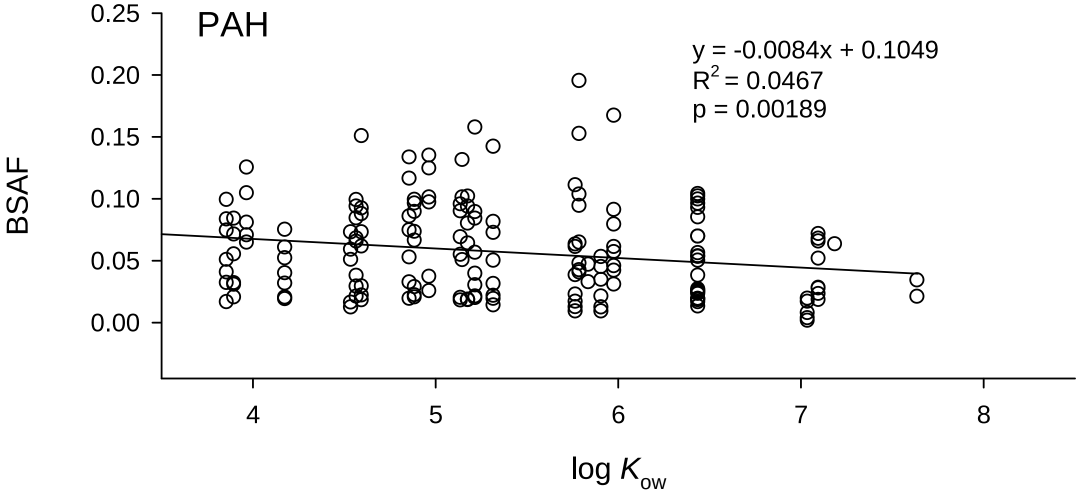
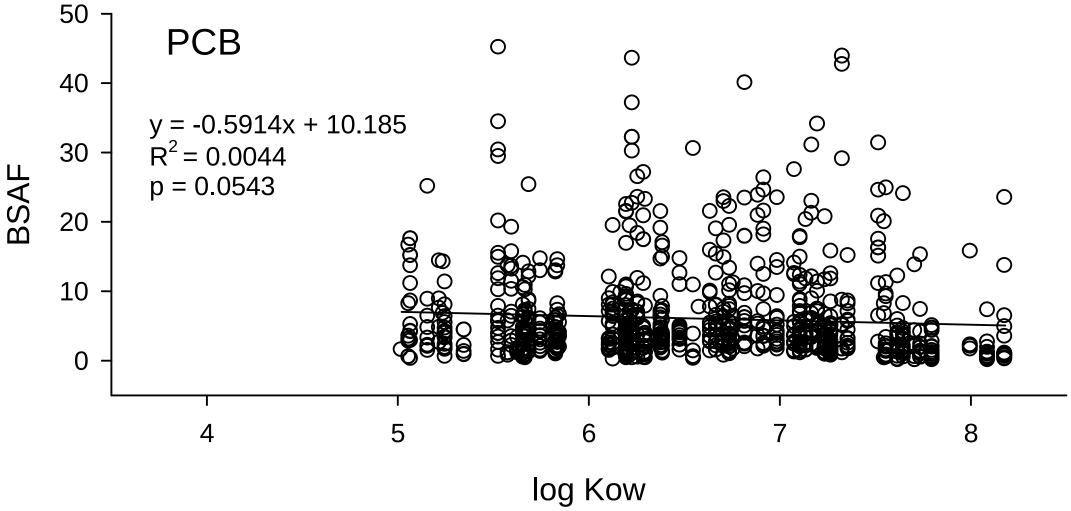


Figure 2-6. Regressions of log K_{ow} vs polychaete worm PCB and PAH biota-sediment accumulation factors (BSAFs).



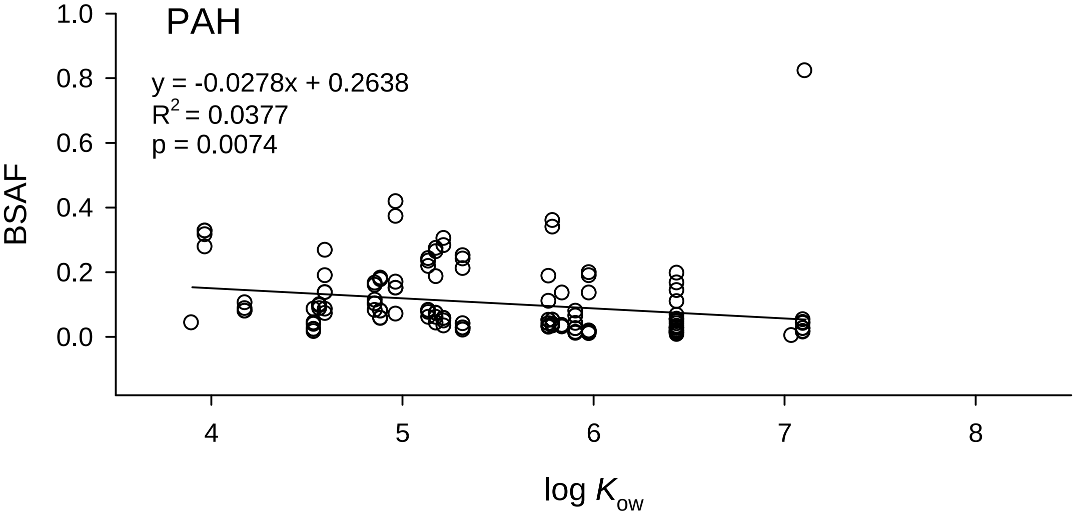
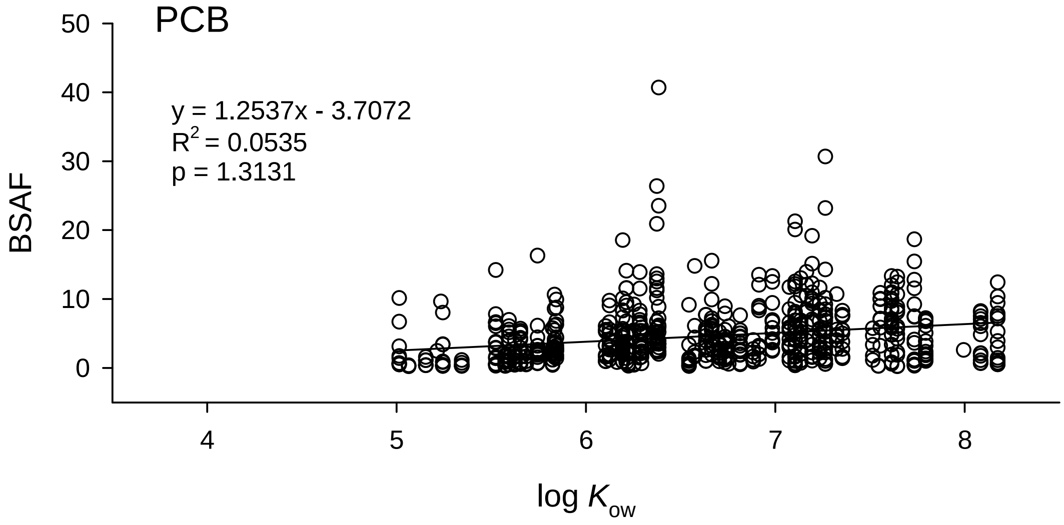


Figure 2-7. Regressions of log K_{ow} vs amphipod PCB and PAH biota-sediment accumulation factors (BSAFs).



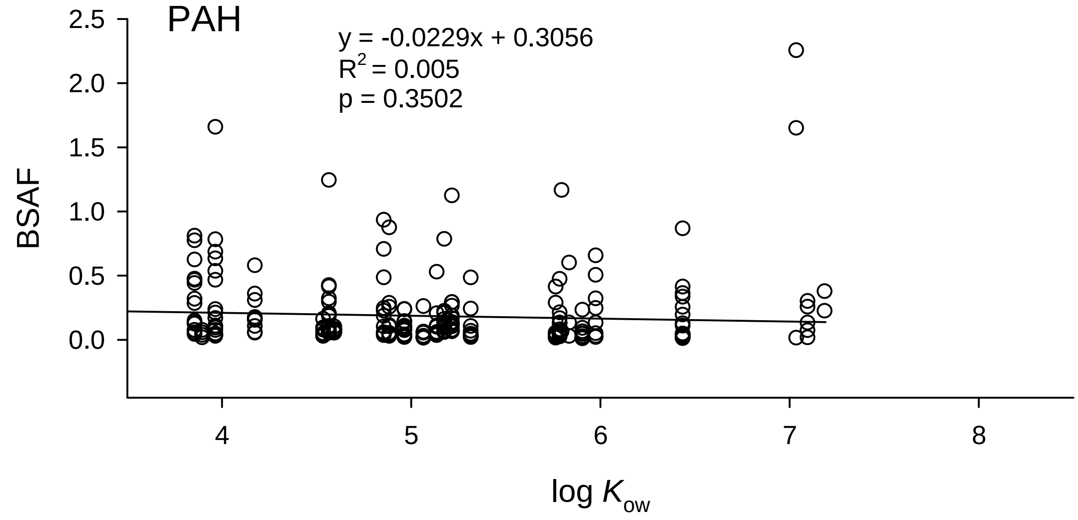


Figure 2-8. Regressions of log K_{ow} vs clam PCB and PAH biota-sediment accumulation factors (BSAFs).

Chapter 3

Bioaccumulation of organic contaminants, butyltins, and metals in deposit feeders exposed to Baltimore Harbor sediments

3.1 Introduction

The Baltimore Harbor/Patapsco River system is a heavily urbanized sub-estuary of the Chesapeake Bay containing several areas designated as ‘impaired’ by the Maryland Department of the Environment for not meeting water quality standards. Baltimore Harbor sediments are highly contaminated with hydrophobic organic chemicals (HOCs) and metals (Ashley and Baker 1999; McGee et al. 1999; Baker et al. 1997) and benthic invertebrate communities are severely degraded or nonexistent. Acute and chronic whole sediment toxicity tests using the benthic amphipods *Leptocheirus plumulosus* and *Ampelisca abdita* have demonstrated that toxicity of Harbor sediments is extensive (Hansen et al. 1996; McGee et al. 1999; McGee et al. 2004; Fisher et al. 2004; Manyin and Rowe 2006). Using sediment and pore water concentration-based metrics, the authors offered conflicting conclusions as to which chemical class is likely responsible for the observed toxicity. Positive identification of the contaminant class or specific chemical causing toxicity in sediments containing complex mixtures of chemicals is a complicated undertaking since contaminant bioavailability may be controlled by a multitude of factors, including feeding strategy (i.e. exposure) and reactive sites in the sediment matrix that bind contaminants. Baltimore Harbor sediments contain very high concentrations of metal-binding sulfides (Klosterhaus et al. 2006) and may contain high concentrations of organic chemical geosorbents typical of urbanized environments (i.e. black carbon), which may limit uptake by organisms (Cornelissen et al. 2005). Using bioaccumulation studies to determine contaminant uptake in conjunction with sediment and pore water-based metrics may assist in deducing the toxic component(s) of contaminated sediments.

Using 28 day uptake experiments, the objective of this study was to characterize the bioaccumulation potential of sediment-associated organic chemicals, metals, and butyltins from impaired areas of Baltimore Harbor to deposit-feeding invertebrates. These experiments were part of a larger study in which whole sediment toxicity identification and evaluation (TIE) methods were applied to sediments from the same sites, in anticipation that the body burden data would provide insight into the contaminants responsible for the observed toxicity. The marine polychaete worm *Neries virens*, an omnivorous primarily sediment-ingesting deposit feeder, and the estuarine amphipod *Leptocheirus plumulosus*, a suspension/surface deposit feeder, were used to assess accumulation in species with different feeding strategies. Additional objectives were to estimate the bioaccumulation potential of contaminants from Harbor sediments to organisms near the base of the food web and to determine the utility of 28 day tests for predicting steady-state body burdens. In addition to day 28 body burden measurements, an uptake and depuration time series analysis was conducted at one Harbor site to determine uptake and depuration rate constants for the various chemicals of interest.

3.2 Methods

3.2.1 Sediment collection and carbon analysis

Bulk surficial sediment samples were collected from five sites in Baltimore Harbor (Baltimore Sediment Mapping sites 33, 38, 45, 54, 68; Ashley and Baker 1999) and a reference control site (Bigwood Cove, Wye River, MD) on August 25-27, 2004 using a Ponar grab sampler (Figure 3-1). The control site was selected because it contains very low concentrations of contaminants and is not toxic to the amphipod *Leptocheirus plumulosus* (Dan Fisher, personal communication). The top 2 cm of each grab sample were scraped into a glass bowl with a plastic spatula, transferred to a 50 gallon plastic drum, and homogenized with a stainless steel paddle. Bulk sediment for solid-phase metals, organic contaminants, and butyltin analysis was transferred to glass jars, transported in coolers, and frozen upon return to the laboratory. Total carbon in the sediment was quantified using an Exeter Analytical CE440 Elemental Analyzer. The percentage of sediment carbon at each Baltimore Harbor site was 6.0, 4.3, 5.3, 3.9, 5.7, and 1.5 for BSM 33, 38, 45, 54, 68, and the control site, respectively.

3.2.2 Bioaccumulation experiments

Table 3-1 lists the test methods, which were consistent with procedures recommended by the American Society for Testing and Materials (ASTM 1998). The amphipods (*Leptocheirus plumulosus*) were cultured at the Wye Research and Education Center (Queenstown, MD, USA) and the polychaete worms (*Nereis virens*) were purchased from Aquatic Research Organisms (Hampton, NH). The polychaete experiment was conducted using unsieved sediment while the amphipod experiment used sieved sediments (< 500 μm) to remove native amphipods that may be present in the Harbor sediments. The time series uptake and depuration experiment was conducted using sediments from BSM 45 and only worms were used due to limitations in the number of amphipods available in the laboratory cultures. After 28 days of exposure to

BSM 45 sediment, worms were transferred to new aquaria containing reference sediment from the control site for the depuration phase of the experiment. Additional worms were exposed to BSM 45 sediments for an additional 28 days (for a total exposure of 56 days) to determine if a longer time period was necessary to reach steady-state. These worms were transferred to aquaria with new BSM 45 sediment after 28 days. On each sampling day, worms and amphipods were transferred to aquaria (worms) or glass dishes (amphipods) containing only artificial, aerated seawater and allowed to purge their gut contents for 24 hours. Fecal matter was periodically removed from the worm aquaria to prevent re-ingestion. Worms were then weighed individually, composited by aquaria, and transferred to glass jars. For gut purging, amphipods were placed on a stainless-steel sieve that was submerged in the glass dish containing seawater, allowing fecal matter to fall through the sieve while retaining the amphipods. After the gut purge, amphipods from all replicates were composited by site, weighed, and transferred to glass jars. Glass jars containing worms and amphipod samples were kept frozen (-20 °C) until analysis. Dissolved oxygen and pH were measured three times per week and were within acceptable quality control limits (ASTM 1998).

3.2.3 Organic chemical analysis

Polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and polybrominated diphenyl ethers (BDEs) were quantified in worms, amphipods, and sediment samples. Composite worm samples were homogenized using a mini food processor with a stainless steel blade and subdivided into glass jars for organics, metals, and butyltin analyses. For organic chemical analyses, worm homogenates, amphipods, and wet sediments were ground with sodium sulfate using a ceramic mortar and pestle, surrogate standards (d_8-napthalene, d_{10}-fluorene, d_{10}-fluoranthene, d_{12}-perylene, PCB 14 (3,5-dichlorobiphenyl), PCB 65 (2,3,5,6-tetrachlorobiphenyl), PCB 166 (2,3,4,4',5,6-hexachlorobiphenyl), ^{13}C-BDE 15 (4,4'-dibromodiphenyl ether) and ^{13}C-BDE 118 (2,3',4,4',5-pentabromodiphenyl ether)) were added and extracted via Soxhlet apparatus in dichloromethane for 24 hrs. Following concentration of the sample under nitrogen, total lipids in the worms and amphipods were quantified gravimetrically using a portion of the extract. Lipids were then removed from the extracts using gel permeation chromatography. Following Soxhlet extraction of sediments, activated copper shavings were added to the extracts to remove sulfur and kept at -20 °C overnight. All sample extracts were reduced and exchanged into hexane. Polar interferences were removed from the biota and sediment extracts using deactivated alumina. Following PAH analysis, nonpolar interferences were removed from the extracts using deactivated Florisil® column chromatography, exchanged into hexane, and analyzed for PCBs and BDEs.

PAHs (39 total) were identified and quantified using a 30 m DB-5MS column (0.25 mm inner diameter, 0.25 μm film thickness; J&W Scientific, Folsom, CA, USA) with a Hewlett Packard (Palo Alto, CA, USA) 5890/5972A gas chromatograph coupled to a mass selective detector (GC/MSD) operated in selected ion monitoring mode. The oven temperature program consisted of an initial hold for 0.6 minutes at 40°C and a 10°C/min ramp to 280°C that was held for 22 minutes. Samples were run using the splitless injection mode and the injector and detector temperatures were 250 °C and 280 °C, respectively. The PAHs d_{10}-phenanthrene, d_{12}-anthracene, d_{12}-benz[a]anthracene, and d_{12}-benzo[g,h,i]perylene were used as internal standards and added to all samples and calibration standards just prior to instrumental analysis.

PCB congeners (~110 congeners total) in the biota and sediment were quantified using a Hewlett Packard (Palo Alto, CA, USA) 5890 gas chromatograph equipped with a ^{63}Ni electron capture detector. A 60 m DB-5 column (0.32 mm inner diameter, 0.25 µm film thickness; J&W Scientific, Folsom, CA, USA) was used for all samples. The oven temperature program consisted of an initial hold for 2 minutes at 100°C, a 4°C/min ramp to 170°C, and a 3°C/min ramp to 280°C that was held for 10 minutes. Samples were run using the splitless injection mode and the injector and detector temperatures were 250°C and 320°C, respectively. PCB 30 (2,3,6-trichlorobiphenyl) and PCB 204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl) were used as internal standards and were added to samples and calibration standards just prior to instrumental analysis. PCB congeners were identified and quantified following methods routinely used in our laboratory (Ashley and Baker 1999).

BDEs (34 congeners total) were quantified using on-column injection on an Agilent 6890N gas chromatograph coupled to an Agilent 5973N mass selective detector operated in negative chemical ionization mode. A 15 m DB-5MS column (J&W Scientific, Folsom, CA, USA) with an inner diameter of 0.25 mm and 0.1 µm film thickness was used. The oven temperature program consisted of an initial hold at 80°C for 2 min, a 12 °C/min ramp to 140 °C and held for 5 min, and a 5 °C/min ramp to 280 °C and held for 35 min. The injector and detector temperatures were 50 °C and 280 °C, respectively. Inlet and column flow were 67 ml/min and 1.3 ml/min, respectively. Prior to instrumental analysis, ^{13}C-CDE 86 (2,2',3,4,5-pentachlorodiphenyl ether) and ^{13}C-

BDE 209 (decabromodiphenyl ether) were added as internal standards to all samples and calibration standards.

For all organic contaminant analyses, laboratory blanks were processed with each set of samples to determine the extent of contamination in samples due to laboratory air and sample processing. Matrix blanks (surrogate recovery and analyte standards spiked into sodium sulfate) and sample matrix spikes (surrogate recovery standards and analyte standards spiked into a sample containing sodium sulfate) were also extracted to determine extraction efficiency. Samples were kept covered with aluminum foil throughout the extraction procedure to minimize dust contamination of samples.

Method detection limits for all organic analytes were defined as three times the mean analyte mass in laboratory blanks divided by the mass extracted in each sample. Mean recoveries of the PAH surrogate standards d_8-naphthalene, d_{10}-fluorene, d_{10}-fluoranthene, and d_{12}-perylene were 38 ± 9, 57 ± 6%, 92 ± 8%, and 126 ± 20% in worm samples , 40 ± 4, 64 ± 8%, 79 ± 5%, and 91 ± 11% in amphipod samples, and 23 ± 9, 44 ± 11%, 63 ± 13%, and 68 ± 15% in sediment samples, respectively. Mean recoveries of the PCB surrogate standards PCB 14, PCB 65, and PCB 166 were 111 ± 27, 57 ± 7, and 78 ± 11% in worm samples, 65 ± 20, 56 ± 10, and 76 ± 21% in amphipod samples, and 76 ± 23, 54 ± 11, and 59 ± 15% in sediment samples, respectively. Mean recoveries of the BDE surrogate standards BDE 15 and BDE 118 were 57 ± 10% and 76 ± 9% in worms, 79 ± 15% and 84 ± 10% in amphipods, and 69 ± 20% and 69 ± 11% in sediment, respectively. Sample values were not corrected for surrogate recoveries in any analysis.

3.2.4 Butyltins analysis

The analytical method for tributyltin (TBT) in environmental water samples has been published previously (Unger 1986, 1996) and the method for quantification in biota and sediments is a modification of this technique. Tripentyltin surrogate standard was added to a weighed aliquot of the sediment sample and then digested with concentrated HCl. Extraction with hexane was followed by separation using a centrifuge. Hexylmagnesium bromide was then added to derivatize the tripentyltin (TPT), tributyltin (TBT), dibutyltin (DBT), and monobutyltin (MBT) ions. The extract was then passed through a column of Florisil® and sodium sulfate, followed by addition of the internal standard, tetrabutyltin (TTBT). The samples were injected into a Varian® 3300 gas chromatograph equipped with a dual-flame flame photometric detector (FPD). The GC was setup according to established methods (Unger, 1996).

3.2.5 Metals analysis

With the exception of amphipods from site BSM 33, metals analyses (Cr, Cu, Zn, Cd, Pb, Ni, Ag, Hg) were only performed on worm samples since a limited amount of amphipod tissue was recovered at the end of the bioaccumulation experiments. Available amphipod tissue was used for organics analyses at most sites because worms did not appear to accumulate substantial concentrations of metals in the experiments. However, because the sediment concentration of chromium at BSM 33 was among the highest, and chromium has been noted as a metal of concern in the Harbor, chromium rather than organic chemicals were quantified in amphipods from BSM 33. Worm and amphipod samples were digested by a microwave digestion technique (Sheppard et al. 1994).

Approximately 1 gram of worm tissue was placed in a quartz digestion cell with 2 mL of concentrated ultra pure nitric acid. The quartz vessels were sealed and digested at 140 °C at 580 kPa. The samples were then diluted to approximately 15 mL with ultra pure water. For all metals except Hg, samples where further diluted and analyzed by inductively coupled plasma mass spectrometry (ICP-MS). For Hg, a 1 mL aliquot of the digestate was diluted to 10 mLs with distilled-deionized water. Prior to analysis, the samples were further oxidized for 30 minutes with 2 mLs of bromine monochloride solution. The excess oxidant was neutralized with 10% hydroxylamine solution and the concentration of mercury in an aliquot of the solution was determined by tin chloride reduction cold vapor atomic fluorescence detection after gold amalgamation in accordance with protocols outlined in USEPA Method 1631 (McAloon and Mason 2003).

Chromium (Cr), copper (Cu), zinc (Zn), silver (Ag), cadmium (Cd), lead (Pb), and arsenic (As) were quantified in sediment. Sediment for Cr, Cu, Zn, Ag, Cd, and Pb analysis was prepared using hydrofluoric acid/nitric acid microwave bomb digestion with post oven boil down. Sediment for As analysis was prepared using aqua regia oven bomb digestion. Cr, Cu, Zn, Ag, Cd, and Pb were quantified using a Perkin-Elmer ELAN 6000 inductively coupled plasma-mass spectrometer (ICP-MS) with ^{45}Sc, ^{74}Ge, ^{115}In, and ^{195}Pt as internal standards. Arsenic was quantified using hydride generation atomic fluorescence spectrometry (HG-AFS). Method blanks and matrix spikes were processed to account for laboratory contamination of the samples and extraction efficiency, respectively. All quality control parameters were within the established control limits.

3.2.6 Data analysis

The worm organic chemical bioaccumulation data from the time series experiment were analyzed to determine uptake and depuration rate constants. Biota-sediment accumulation factors (BSAFs) for the organic chemicals were calculated from the day 28 data for both worms and amphipods. Sediment chemistry data were normalized to organic carbon and tissue data were normalized to lipids prior to analysis. A two-compartment first-order kinetic model was used to describe the movement of contaminants into and out of the worm. For this model, changes in the concentration of contaminants in the worm are described by the differential equation:

$$dC_w/dt = k_1C_s - k_2C_w \tag{1}$$

where: C_w = concentration of contaminant in the worm (ng/g lipid); C_s = concentration of contaminant in the sediment (ng/g carbon); k_1 = uptake rate constant (g carbon g lipid^{-1} hr^{-1}); k_2 = depuration rate constant (hr^{-1}); and t = time (hr). With initial conditions of t = 0, C_w = 0, and C_s = constant, this equation has the simple solution of (Newman and Unger, 2003):

$$C_w = C_s\,(k_1/\,k_2)\,(1 - e^{-k2t}) \tag{2}$$

At steady-state:

$$C_w/C_s = k_1/\,k_2 = \text{Biota-sediment accumulation factor (BSAF)} \tag{3}$$

Therefore, if one can determine the uptake and depuration rate constants, a BSAF can be calculated even if steady-state is not reached. In this study, uptake (k_1) and depuration (k_2) rate constants were calculated by fitting the first-order model above (Equation 2) to measured organism contaminant residues by using an iterative, nonlinear, least squares curve-fitting technique (SigmaPlot®, Jandel Scientific, San Rafael, CA, USA). When the uptake data did not fit the nonlinear model (i.e., when the concentration in the worm did not stabilize or appear to begin to stabilize by day 28), the uptake rate constant was determined from linear regression of the lipid-normalized worm concentrations on days 0, 2, and 4 of uptake (when elimination processes were assumed to be negligible) normalized to the mean day 0 sediment concentration, versus time. In addition to the depuration rate constants calculated as part of the nonlinear curve fit, depuration rate constants were also determined from linear regression of the natural log of $C_w/C_{w,\ day\ 28}$ versus time. BSAFs were calculated using day 28 worm concentrations and day 0 sediment concentrations in the bioaccumulation experiments and have units of g carbon/g lipid. Where possible, BSAFs were also calculated using the rate constant estimates (k_1 and k_2). The log K_{ow} values used for this study are from Mackay et al. (1992) or if not available were calculated using EPIWIN modeling software (U.S. EPA). Linear regressions (Excel) were used to determine relationships between BSAF vs. log K_{ow} and uptake and depuration rates vs. log K_{ow}.

3.3 Results and Discussion

3.3.1 Survival and growth

Nereis virens survival averaged 95% in the control sediment during the 28 day bioaccumulation experiment (Figure 3-2). Worms in the sediments from BSM 33 had the poorest survival (average 40%). Survival of the worms in the other sites was relatively good, with the highest survival at BSM 68 (average 95%). After 28 days of exposure, the average wet weight of *N. virens* had decreased by about 36% (Figure 3-2). Worm weights did not appear to be correlated to toxicity during the uptake phase. The worms were not fed during the bioaccumulation experiment as per ASTM (1998) method protocols. Average *N. virens* wet weights at the end of the 28 day uptake experiment were similar across sites, but by day 56 of the uptake phase (BSM 45 only) the average worm weight had decreased ~15%. Average *N. virens* lipid content at the end of the 28 day uptake experiment was similar across sites and remained relatively consistent during the time series exposure and depuration experiment (Figure 3-3). Since only two replicates were used for the worm bioaccumulation tests and the amphipod replicates were pooled, statistical analyses to determine differences between sites for survival, weight, and lipid content could not be conducted.

Survival of *L. plumulosus* in the control sediment was 78% during the 28 day exposure (Figure 3-4). Survival was reduced at BSM 33, 38 and 68 after 28 days of exposure. Wet weights were measured on the composited mass of amphipods from each site (Figure 3-4). The lowest weight of amphipods was found at BSM 33 and BSM 68, the two sites used in the bioaccumulation experiment that were acutely toxic in the 7 day whole sediment TIE bioassay (Klosterhaus et al. 2006). Average *L. plumulosus* lipid content at the end of the 28 day uptake experiment was relatively consistent among sites and remained similar to lipid content on day 0 (Figure 3-3).

3.3.2 Polychlorinated biphenyls (PCBs)

Nereis virens and *Leptocheirus plumulosus* accumulated substantial body burdens of PCBs after 28 days in Baltimore Harbor sediments (Figure 3-5). Total PCB concentrations in *N. virens* ranged from 1000-2500 ng/g lipid and concentrations were similar between replicate tanks. Total PCB concentrations in *L. plumulosus* ranged from 5000-17,000 ng/g lipid on day 28 and were 5-8 times higher than the PCB concentrations in *N. virens* exposed to sediments from BSM sites 38, 45, and 68. Conversely, PCB uptake from BSM 54 sediment was similar between the two species. Differences in uptake of PCBs by both species among sites generally reflected the differences in sediment concentrations among the sites. Accumulation of PCBs in *N. virens* from BSM 54 sediment however, was higher compared to accumulation at the other sites despite BSM 54 having the lowest sediment PCB concentration. Uptake rate constants (k_1) for PCBs from sediment into *N. virens* significantly declined with increasing congener K_{ow} ($p = 0.0007$; Figure 3-6), a trend associated with slower diffusion of larger molecules through aqueous media and across membranes. Depuration rate constants (k_2) for *N. virens* showed a similar significant relationship to K_{ow} ($p = 0.002$) and were similar in magnitude to the uptake rate constants.

N. virens continued to accumulate PCBs with an extended exposure to 56 days in BSM 45 sediment (Figure 3-7). Concentrations of PCBs with six or more Cl (hexa-, hepta-, octa- , nona- and deca-PCBs) were generally higher on day 56 compared to day 28, indicating that for these PCB congeners steady-state concentrations were not reached in *N. virens* after 28 days in these sediments. This is consistent with a similar bioaccumulation study, in which it took 70-120 days of exposure to field sediments for *N. virens* to attain steady-state (Pruell et al. 1993). In contrast, concentrations of the tri-PCBs, and perhaps the tetra- and penta-PCBs, appeared to reach steady-state by day 28. Following transfer to control sediments after a 28 day exposure to BSM 45 sediment, most PCBs did not depurate in 21 days (Figure 3-7), suggesting that metabolism and elimination of the PCBs is limited in *N. virens*. Other studies have suggested that *N. virens* may have the ability to selectively biotransform PCB congeners (Pruell et al. 1993). Congener-specific PCB concentrations in *N. virens*, *L. plumulosus*, and sediment are listed in Appendix B.

The 28 day bioaccumulation experiment is a common, standardized tool used in risk assessments to assess the potential for uptake of toxic chemicals from contaminated sediments (ASTM 1998). The 28 day test duration is recommended because it has been established that 28 days of exposure to contaminated sediments is of sufficient duration for most chemicals to reach at least 80% of the steady-state concentration in an organism (ASTM 1998). Using the sediment concentration and the concentration in the organism achieved by day 28, chemical-specific biota-sediment accumulation factors (BSAFs) are often calculated to determine the relative bioavailability of chemicals from the sediment. The BSAF is an equilibrium partitioning model developed to estimate chemical body burdens in organisms exposed to contaminated sediments and the major assumption of the model is that the chemical has reached steady-state in the organism (Lake et al. 1990; DiToro et al. 1991). The 28 day BSAF values ($BSAF_{28}$) generated from bioaccumulation experiments are often used to represent the steady-state condition; however, in some species it takes chemicals much longer to reach steady-state, particularly *Nereis virens*

(ASTM 1998). If a time series uptake experiment is not conducted, it is not possible to determine if the chemicals reached steady-state by day 28 and thus the steady-state concentration may be underestimated. In this study, only 35% of the PCB congeners (36 out of 102 congeners analyzed) reached steady-state after 28 days. Assuming a BSAF equal to one represents steady-state, most of the PCB congeners attained only ~20-50% of the steady-state tissue concentration by day 28 in this study. If the median PCB BSAF (~3-4) previously determined for organisms collected from the field (Chapter 2) is assumed to represent steady-state, most of the PCB congeners attained an even lower percentage of the steady-state tissue concentration by day 28. Thus the BSAFs_{28} for the congeners that had not reached steady-state by day 28 are underestimates of the steady state concentration in the worms and cannot be directly compared to other reported values in which a steady-state condition was attained (i.e. primarily field-derived BSAFs). However, the BSAF_{28} values calculated in this study provide estimates of the relative bioavailability of each chemical from Baltimore Harbor sediments to each species and can be used to assess the utility of using 28 day bioaccumulation experiments to predict in situ body burdens by comparing the BSAF_{28} to the field-derived BSAF for similar species.

Most BSAFs_{28} for individual PCB congeners ranged from 0.1 – 0.6 for *N. virens* (mean 0.4 ± 0.4) on day 28 of exposure to Baltimore Harbor sediments (Figure 3-8). Most BSAFs_{28} were ≤ 1 at all of the Harbor sites except BSM 54, where BSAFs_{28} for many of the congeners ranged from 1-3. Though PCB concentrations in *N. virens* exposed to control site sediments were low, PCB BSAFs_{28} from the control site were among the highest, with some congeners having BSAFs_{28} as high as 8. It is possible that the high $BSAFs_{28}$ for organic contaminants in reference or control sediments were due to the lack of black carbon or chemical concentration related changes in partitioning in bulk sediment (i.e. more easily desorbed from the sediment in the gut and/or pore water) and/or physiological differences in organisms living in a contaminated/stressed environment versus a relatively uncontaminated control site (e.g. increased stress associated with decreased feeding and/or changes in respiration rate resulting in lower body burdens compared to a control site). However, high PCB $BSAFs_{28}$ were not consistently associated with high *N. virens* survival, wet weights, or lipid content in our experiments, suggesting that bioaccumulation from these sediments may be influenced by site-specific differences in sediment chemistry more so than changes in the energetics of *N. virens* exposed to these sediments. High BSAFs for chemicals in the control sediment were most often associated with sediment and tissue concentrations that were 1 to 2 orders of magnitude lower than the concentrations at other sites. The propagation of error due to the analytical uncertainty associated with these small values was likely manifested as large differences in BSAFs for the control site compared to the contaminated sites and may therefore be less reliable estimates of bioaccumulation. A primary concern in risk assessment is to understand the mechanism(s) driving the variability in bioaccumulation among contaminated sites; thus comparisons of contaminated site BSAFs to BSAFs from the relatively uncontaminated control site may not be meaningful.

Most $BSAFs_{28}$ for individual PCB congeners ranged from 0.1 – 5 (mean 2.0 ± 1.6) for *L. plumulosus* on day 28 of exposure to Baltimore Harbor sediments (Figure 3-8). Since a time series experiment was not conducted using the amphipods, it was not possible to determine if $BSAFs_{28}$ represented steady-state conditions. However, $BSAFs_{28}$

for *L. plumulosus* were generally at least twice as high as the BSAFs_{28} for *N. virens*, suggesting higher PCB bioavailability to the amphipods. In contrast to *N. virens*, BSAFs_{28} for *L. plumulosus* did not vary among the sites.

The PCB BSAFs_{28} for *N. virens* were independent of congener K_{ow} ($p = 0.73$); however for *L. plumulosus*, BSAFs_{28} decreased significantly with log K_{ow} ($p = 0.011$). PCB congeners having the highest bioavailability in other sediment bioaccumulation studies with infaunal deposit feeders were generally within the log K_{ow} range of 6 – 7 (Tracey and Hansen 1996) and represent the congeners which are very lipophilic, yet compared to the higher K_{ow} congeners are more easily desorbed from sediment particles and small enough for efficient absorption in organisms. Non-equilibrium conditions (i.e. not yet reached steady-state) in *N. virens* may be responsible for the lack of a decreasing trend for BSAFs_{28} with log K_{ow} that is observed in many other species.

BSAFs_{28} for *N. virens* (mean 0.4 ± 0.4) were an order of magnitude lower than the BSAFs calculated in a previous study for the closely related species *Nereis succinea* (mean 4.8 ± 3.7) living in Back River, a highly contaminated tributary of the Chesapeake Bay adjacent to the Baltimore Harbor/Patapsco River system (Figure 3-9 and Chapter 2). Together with the observations that PCB concentrations in *N. virens* doubled between day 28 and 56 of exposure in BSM 45 sediment and metabolism was not apparent, BSAFs_{28} much lower than field-derived BSAFs lends further support that PCB concentrations in *N. virens* had not reached steady-state by day 28 in our laboratory experiments. For *L. plumulosus*, the BSAFs_{28} (mean 2.0 ± 1.6) for most PCB congeners were below or within the lower end of the range of BSAFs calculated for the same species collected in the Back River field study (4.0 ± 2.1; Figure 3-9), suggesting that most congeners had not yet reached or were approaching steady-state in the amphipods after the 28 day exposure. Thus compared to the worms, the amphipods were much closer to steady-state by day 28 in the laboratory study. Despite these differences in time to reach steady-state, the field-derived BSAFs for the amphipods and worms were similar (Chapter 2) indicating that PCB bioavailability to *L. plumulosus* and *Nereis* sp. was similar. The smaller mass and lower lipid content of the amphipods (Figures 3-2, 3-3, and 3-4) may have resulted in faster rates of PCB uptake and/or elimination, which subsequently resulted in a faster time to steady-state compared to the worms. In a study with freshwater amphipods, Landrum (1988) observed that PAH and PCB uptake and depuration rates were inversely related to the mass of the organism and that depuration rate was inversely related to organism lipid content, the latter which has also been observed for *N. virens* (Goerke 1984). Smaller biomass and lower lipid was also suggested to explain the 7-12 times faster time to steady-state for clams compared to *N. virens* in Passaic River (NJ, USA) sediments (Pruell et al 1993). Thus physiological differences between the two species in our study likely influenced the time required to achieve steady-state but the bioavailability of PCBs to the worms and amphipods from Baltimore Harbor sediments was most likely similar. Our results also suggest that BSAFs_{28} for *N. virens* and *L. plumulosus* would underestimate the actual, in situ concentration of most PCB congeners in Baltimore Harbor benthos.

3.3.3 Polycyclic aromatic hydrocarbons (PAHs)

Nereis virens and *Leptocheirus plumulosus* accumulated substantial body burdens of PAHs after 28 days in Baltimore Harbor sediments (Figure 3-10). Total PAH concentrations in *N. virens* ranged from 1500-3000 ng/g lipid. *N. virens* concentrations in replicate tanks were similar with the exception of BSM 45, where the body burdens between tanks varied two-fold. Total PAH concentrations in *L. plumulosus* ranged from 40,000-100,000 ng/g lipid and were ~15-45 times higher than the PAH concentrations in *N. virens*. Differences in uptake of PAHs by both species among sites generally reflected the differences in sediment concentrations among sites. PAH concentrations in *N. virens* exposed to BSM 33 sediment were higher compared to the other sites, despite BSM 33 having the lowest sediment PAH concentration. *N. virens* rapidly accumulated PAHs by day two of the time series exposure and most PAHs appeared to reach steady-state by day 8 (Figure 3-7). Following transfer to control sediments after a 28 day exposure, PAH concentrations in *N. virens* rapidly decreased, consistent with studies showing that this species efficiently metabolizes PAHs (Rust et al. 2004, Jorgensen et al. 2005). Compound-specific PAH concentrations in *N. virens*, *L. plumulosus*, and sediments are listed in Appendix B.

Like PCBs, uptake rates for PAHs from sediment into *N. virens* significantly decreased with increasing congener K_{ow} ($p = 0.048$; Figure 3-6). PCBs accumulated faster than PAHs with similar K_{ow}, likely due to the efficient metabolism of PAHs by *N. virens* and a stronger association of PAHs to sediment particles compared to PCBs if black carbon is present (Cornelissen and Gustafsson 2005). Of the few PAHs detected in the depuration phase that fit the kinetic uptake model, depuration rates also declined with increasing $K_{\mathrm{ow},}$ though the relationship was not significant (Figure 3-6). Without the depuration rate for 4,5-methylenephenanthrene, which was unusually low compared to the other PAHs, the relationship would likely have been significant. Depuration rates were faster for PAHs compared to PCBs with similar K_{ow}, which would be expected for compounds that are susceptible to metabolism.

Most PAH BSAFs$_{28}$ ranged from ~0.001-0.04 for *N. virens* (mean 0.02 ± 0.06; Figure 3-11). BSAFs$_{28}$ for *N. virens* exposed to BSM 33 sediment were generally twice as high as BSAFs$_{28}$ for the other sites. The higher PAH BSAFs$_{28}$ for *N. virens* exposed to BSM 33 sediments were associated with the lowest *N. virens* survival among Baltimore Harbor sites (Figure 3-2). BSAFs$_{28}$ for *N. virens* significantly decreased with K_{ow}, a trend frequently observed in other PAH bioaccumulation studies (Meador et al. 1995; Maruya et al. 1997).

Most PAH BSAFs$_{28}$ ranged from ~0.02 – 0.6 for *L. plumulosus* (mean 0.28 ± 0.32; Figure 3-11). The order of magnitude higher BSAFs$_{28}$ compared to the worms likely represents the less efficient PAH metabolic pathway in *L. plumulosus* compared to *N. virens* (Rust et al. 2004). Clear differences in BSAFs$_{28}$ among sites for *L. plumulosus* were not apparent, although BSAFs$_{28}$ for amphipods exposed to the control site were among the highest. As stated above for PCBs, the increased bioavailability of PAHs from certain sites may be the result of differences in sediment chemistry among sites and/or physiological differences in the organisms exposed to different chemical environments. The BSAFs$_{28}$ for *L. plumulosus* were independent of K_{ow} ($p = 0.44$).

The BSAFs$_{28}$ for *Nereis virens* (mean 0.02 ± 0.06) and *L. plumulosus* (mean 0.28 ± 0.32) in this study were similar to the BSAFs calculated for *Nereis succinea* (mean 0.04 ± 0.04) and *L. plumulosus* (mean 0.17 ± 0.14) respectively, collected from Back River in a previous study (Figure 3-12 and Chapter 2). This similarity indicates that in contrast to PCBs, PAHs had reached steady-state in the amphipods and worms in our 28 day laboratory experiment. This also suggests that the physiological differences in the species (i.e. size and lipid content) that may have influenced differences in PCB accumulation rates may not be important when the species have the ability to metabolize the chemicals. The similarity in lab- and field-generated BSAFs also indicates that the standard 28 day bioaccumulation test may be a useful tool for predicting in situ PAH body burdens for these species and perhaps other benthos in the field; however since *N. virens* efficiently metabolize PAHs, caution should be taken when extrapolating the results to other species which may have less efficient PAH biotransformation pathways, and subsequently higher BSAFs.

3.3.4. Brominated diphenyl ethers (BDEs)

Concentrations of BDEs in *Nereis virens* were very low after 28 days of exposure to Baltimore Harbor sediments (total BDE 3-15 ng/g lipid; Figure 3-13). Of the 34 congeners analyzed, 11 were detected in the sediments. BDE 209 was by far the dominant congener in sediments, ranging from 86-96% of the total BDE concentration. Other congeners detected in the sediments were BDEs 206, 207 > 208 > 17, 28/33,153, 154, 183, 196, 197. BDEs 28/33, 66, 153, and 154 were the only congeners detected in *N. virens*. BDEs 28/33 (two chromatographically unresolved congeners) typically dominated. BDE 66 may be a biotransformation product since it was not detected in the sediments; however it was detected in worms from only two sites. Concentrations of BDEs 66, 153, and 154 after 56 days of exposure to BSM 45 sediment were slightly higher than day 0 concentrations, with no elimination of these congeners occurring over the 21 day depuration phase (Figure 3-14). BDEs 28/33 were the only congeners to increase in concentration over time, with concentrations eight times higher on day 56 of exposure compared to day 0. Additionally, BDEs 28/33 continued to increase in *N. virens* following transfer to control sediment for the depuration phase of the experiment. Since BDEs 28/33 were below detection in the control sediment, increases in BDEs 28/33 during the exposure to clean sediment in *N. virens* may be the result of biotransformation of higher brominated congeners in the worms. BDEs 28/33 were detected in *N. virens* from the other sites as well (BSM 38, 45, 54, and 68), although it was only detected in sediment at BSM 45. BDEs 206, 208, and 209 were inconsistently detected in *N. virens* in the time series exposure on day 56 of uptake and day 7 of depuration (Appendix B). Because these congeners were not detected prior to day 56 and were detected in only one replicate at each of these time points, it is suspected that their detection may be the result of incomplete gut clearance.

With the exception of BDE 209 and the nona-BDE congeners (BDEs 206, 207, 208), low accumulation of BDEs in *N. virens* was consistent with their low concentrations in the sediments. BDE 209, the predominant congener in sediments, was not detected in *N. virens* from any site (< 4 ng/g wet weight). Lack of accumulation of BDE 209 in the worms despite such high exposure concentrations was consistent with the Back River field study (Chapter 2) in which BDE 209 was not detected in any biota sample even though concentrations of BDE 209 in the sediment were up to an order of magnitude higher than the Baltimore Harbor sites in this study. BDE 47, the most prevalent congener detected in biota (Hites 2004), was not detected in *N. virens* at any site; however this was not unexpected since BDE 47 was below detection in sediments from the Harbor sites (< 0.1 ng/g dry weight). BDEs 99 and 100, which together with

BDE 47 represent the BDE congeners most commonly detected in biota, were only detected in *N. virens* prior to any sediment exposure (day 0) and the control site after 28 days. Congeners detected in only the supposedly uncontaminated worms may have been the result of a higher tissue mass available for extraction compared to the other samples, which enabled detection above laboratory analytical blanks for these frequently detected congeners.

The uptake rate constants for BDEs 28/33, 154, and 153 were 0.007, 0.008, and 0.04 g carbon g lipid^{-1} hr^{-1}, respectively, in *N. virens* exposed to BSM 45 sediment (Appendix B). These rate constants were at least an order of magnitude higher than the uptake rate constants for PCBs with similar K_{ow} (Figure 3-6). Depuration rate constants could not be estimated reliably since BDE concentrations did not decrease over the time course of the depuration phase of the experiment.

Concentrations of BDEs in *L. plumulosus* after 28 days in Baltimore Harbor sediments ranged from 400 – 800 ng/g lipid (Figure 3-13). The concentrations of BDEs 47, 99 were greater than BDE 100, which was greater than BDEs 17, 25, 28/33, 30, 66, 75, 85/155, 153, and 154. However, BDE concentrations in *L. plumulosus* on day 0 were more than twice as high as the concentrations after 28 days of exposure to sediment from all sites except BSM 68, which was still lower than the day 0 *N. virens* concentration. Prior exposure to the Penta BDEs (BDEs 47, 99, 100, 153, 154) in fish flakes fed to the laboratory cultures may have led to the higher concentrations of BDEs in the amphipods on day 0; however BDE concentrations were not determined in the fish flakes. Congener-specific concentrations of BDEs in *N. virens*, *L. plumulosus*, and sediments are listed in Appendix B.

$BSAFs_{28}$ for BDEs 28/33, 66, 153, and 154 in *N. virens* ranged from 2.8-5.1, 0.9-1, 0.1-1, and 0.1-1, respectively (Appendix B). BSAFs for *Nereis succinea* living in Back River (Chapter 2) were ten times higher than the $BSAFs_{28}$ for *N. virens* in this study for BDEs 153 and 154, suggesting that *N. virens* had not reached steady-state in the 28 day lab exposures. In contrast, the BDE 28 BSAFs for *N. succinea* in Back River were ~1.5, at least 50% lower than the $BSAFs_{28}$ for *N. virens* at BSM 45 in this study. However, BDEs from BSM 45 in particular may be more bioavailable since the $BSAFs_{28}$ for BDEs 153 and 154 were the highest at this site. Because *L. plumulosus* did not accumulate BDEs from the sediments, BSAFs were not calculated for this species.

3.3.5 Butyltins

The relative concentrations of butyltins in *N. virens* exposed to sediments from all sites were dibutyltin (DBT)> monobutyltin (MBT) > tributyltin (TBT), despite being exposed to TBT sediment concentrations that were 3 to 60 times higher than DBT at the Harbor sites (Appendix B). After 28 days, concentrations of TBT ranged from 0.4-4 ng/g wet weight (30-215 ng/g lipid) in worms exposed to sediment from BSM 45, 54, and 68. TBT was not detected in *N. virens* in the control sediment. *N. virens* DBT and MBT concentrations ranged from 12-24 and 3-15 ng/g wet weight at the BSM sites and 6-11 and 2-3 ng/g wet weight in control sediments, respectively. DBT rapidly accumulated by day 2 of the time series exposure, with concentrations 18 times higher than day 0 values by day 28 (Figure 3-15). Uptake of MBT was slower than DBT, with MBT concentrations that were six times higher than day 0 values by day 28. The predominance of the metabolites DBT and MBT over TBT in *N. virens* despite sediment

TBT concentrations that were much higher than DBT and MBT indicates that this species biotransforms TBT, which has also been observed by others (Lee 1996). Butyltins were not quantifiable in *N. virens* from the BSM 33 and BSM 38 exposures, or from the Day 56 uptake or the depuration time points in the time series experiment due to an insufficient tissue mass available for the analysis. As such, it was not possible to estimate if butyltins had reached steady-state in *N. virens* by day 28 of the experiment. Butyltins were not quantified in *L. plumulosus* due to insufficient sample mass for analysis.

The TBT uptake rate constant for *N. virens* exposed to BSM 45 sediment was 0.0002 g carbon g lipid^{-1} hr^{-1}. This low uptake rate is compatible with high metabolic capability in this species. Uptake rates could not be determined for MBT and DBT since they were below detection in sediments. Depuration rate constants were not determined for butyltins since they could not be quantified in worms from the depuration phase of the experiment.

BSAFs$_{28}$ for TBT and DBT ranged from 0.03-0.09 and 1.6-35, respectively (Appendix B). Since MBT was below detection in sediments, MBT BSAFs$_{28}$ could not be calculated. As stated above, efficient TBT metabolic capability is likely responsible for the low accumulation of TBT and high accumulation of DBT in *N. virens*. To our knowledge, TBT BSAFs that have been normalized to biota lipid and sediment carbon have not been previously determined for polychaetes exposed to field-collected sediments. However, non-normalized accumulation factors were higher (1-4) for polychaete worms collected near the St. Lawrence Estuary, Canada. Studies have reported no substantial TBT biomagnification in estuarine food chains, likely due to the biotransformation capability for TBT in many species (Veltman et al. 2006; Viglino et al. 2006).

3.3.6 Metals

Chromium (Cr), copper (Cu), zinc (Zn), cadmium (Cd), lead (Pb), arsenic (As), and silver (Ag) were all detected in Baltimore Harbor sediments (Figure 3-16). Cu was the only metal quantified that showed consistent and substantial accumulation in *N. virens* among all Harbor sediments, with concentrations ~ 40-130 % higher compared to day 0 worm concentrations (Figure 3-17). Cu concentrations appeared to have reached steady-state by day 28 in *N. virens* at BSM 45 since concentrations on day 56 of exposure approximated those for day 28 (Figure 3-18). Sediment Cu concentrations were relatively high at all Harbor sites compared to the control site (Figure 3-16). However, pore water Cu concentrations were elevated in all sediments, including the control site (Klosterhaus et al. 2006). Because *N. virens* accumulated Cu from all the Harbor sites as well as the control site sediment, pore water may have been the primary route of Cu exposure to the worms in this study. Substantial amounts of Cu accumulated in *L. plumulosus* from both the control and BSM 33 sediments, with concentrations that were twice as high as day 0 concentrations (Figure 3-19). The *N. virens* day 28 bioaccumulation factors (BAFs; ng/g worm wet weight divided by ng/g sediment dry weight) for Cu at all sites and the uptake rate from BSM 45 sediments are listed in Appendix B.

Despite high concentrations of Cr and Zn in Harbor sediments, these metals did not accumulate in *N. virens* (Figure 3-17). Cr also did not accumulate in *L. plumulosus* from BSM 33, though Zn concentrations doubled after 28 days (Figure 3-19). Limited absorption of Cr in our study is consistent with other studies which have reported very low Cr assimilation efficiencies in aquatic invertebrates (Wang and Fisher 1999; Weston and Maruya 2002). Some accumulation of Cd occurred in *N. virens* at BSM sites 33 and 38, though increases were not consistent or substantial compared to day 0 concentrations. Despite high concentrations of Pb in all Harbor sediments, only *N. virens* exposed to BSM 68 sediment consistently accumulated this metal, with concentrations ~50% higher than day 0 concentrations. Nickel (Ni) accumulated in *N. virens* exposed to all Harbor sediments, with increases of ~25 to more than 100% among sites. The concentration of Ni was three and five times higher in *L. plumulosus* after 28 days in BSM 33 and control sediments, respectively. With the exception of BSM 68, Ag did not accumulate consistently between replicate tanks. Ag concentrations in *N. virens* after 28 days of exposure to BSM 68 sediment were more than twice as high as day 0 concentrations, though concentrations remained relatively low. Concentrations of Ag in *L. plumulosus* increased in both the control and BSM 33 sediments after 28 days. Except for BSM 38, mercury accumulated in *N. virens* exposed to all sediments, including the control site, however concentrations were very low. Selenium was below detection in day 0 *L. plumulosus* but increased to 150 and 350 ng/g wet weight after 28 days of exposure to the control and BSM 33 sediments, respectively. Arsenic was below detection in *L. plumulosus* on day 0 and after exposure to BSM 33 sediments.

3.4 Summary

PCBs, PAHs, butyltins, and some metals in Baltimore Harbor sediments were bioavailable to the polychaete worm *Nereis virens* and the amphipod *Leptocheirus plumulosus*. Uptake rates for PCBs and PAHs from sediment into *N. virens* significantly decreased with increasing congener K_{ow}. PCBs accumulated faster than PAHs with similar K_{ow}. *N. virens* efficiently metabolized PAHs and probably TBT. BDE accumulation in both species was low and the dominant congener in sediments, BDE 209, was not detected in either species despite high sediment concentrations. Copper in *N. virens* and copper and zinc in *L. plumulosus* were the only metals quantified that showed substantial accumulation. Differences in energetic endpoints did not appear to be linked to the observed site-specific differences in PCB and PAH BSAFs. Site-specific differences in sediment characteristics (e.g. black carbon) may account for variation in bioavailability. The 28 day bioaccumulation test with *N. virens* is useful for predicting in situ steady-state body burdens for PAHs since steady-state was reached by day 28. However, the 28 day test may not be useful for PAHs if it is used for extrapolating accumulation to other species since *N. virens* efficiently metabolize PAHs and thus may underestimate steady-state concentrations in other species with lower metabolic capabilities. Due to slow uptake kinetics, the 28 day bioaccumulation test underestimates the steady-state PCB concentrations in *N. virens*. While standard 28 day bioaccumulation tests indicate the bioavailability of PCBs from sediments, they may under predict bioaccumulation of PCBs into benthic organisms.

Table 3-1. Bioaccumulation Test Method Summary

1. Species	Amphipod (*Leptocheirus plumulosus*) Polychaete (*Nereis virens*)
2. Life stage	Amphipod: adult (710 - 1,000 µm); Polychaete: adult
3. Dilution water	Static renewal; Amphipod: 5 ppt; Polychaete: 20 ppt; Filtered Wye River water adjusted as necessary with deep well water or Crystal Sea Bioassay Formula
4. Test chamber	Amphipod: 1-L beaker; Polychaete: 20-L aquarium
5. Sediment amount	Amphipod: 300 mL; Polychaete: 1.7 L
6 Overlying water volume	Amphipod: 500 mL; Polychaete: 15 L
7. Organisms/replicate	Amphipod: 150; Polychaete: 10
8. Number of replicates	Amphipod: 15; Polychaete: 2
9. Feeding	Amphipod: 3X per test, 250 µm TetraMin; Polychaete: not fed
10. Temperature	Amphipod: 25 ºC; Polychaete: 20 ºC
11. Photoperiod	16 light :8 dark (ambient laboratory light, 100 to 1000 lux)
12. Aeration	Gentle; 1-2 bubbles/sec with pipette
13. Test duration	Amphipods: 28 days for BSM 33, 38, 45, 54 and 68 Polychaetes: 28 days for BSM 33, 38, 54 and 68; Polychaete Time Series (BSM 45): 56 days of uptake and 21 days of depuration
14. Sampling	Amphipods: days 0 and 28 (all 5 Harbor sites, plus control) Polychaetes: days 0 and 28 (all 5 Harbor sites, plus control) Polychaete Time Series: days 2, 4, 8, 16, 28 and 56 of uptake phase and days 7, 14 and 21 of depuration phase (BSM 45 only) Sediment: day 0
15. Analysis	Amphipods: major contaminant at each site (limited sample size) Polychaetes: organic contaminants, metals, butyltins Sediment: organic contaminants, metals, butyltins

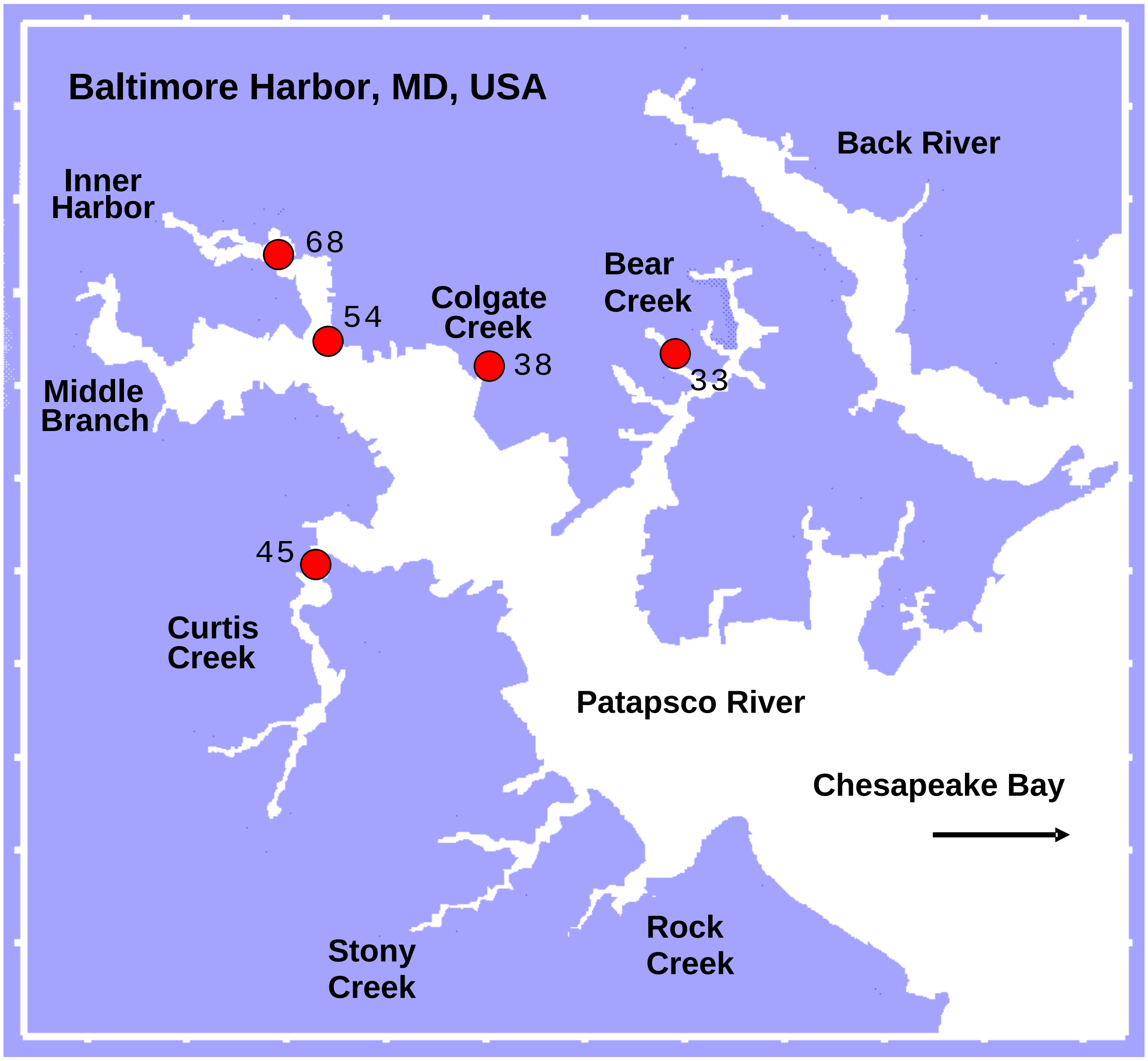


Figure 3-1. Sites in the Baltimore Harbor/Patapsco River system where sediment was collected for *Nereis virens* and *Leptocheirus plumulosus* bioaccumulation studies. Site numbers refer to sites from the Baltimore Sediment Mapping study (Ashley and Baker 1999).

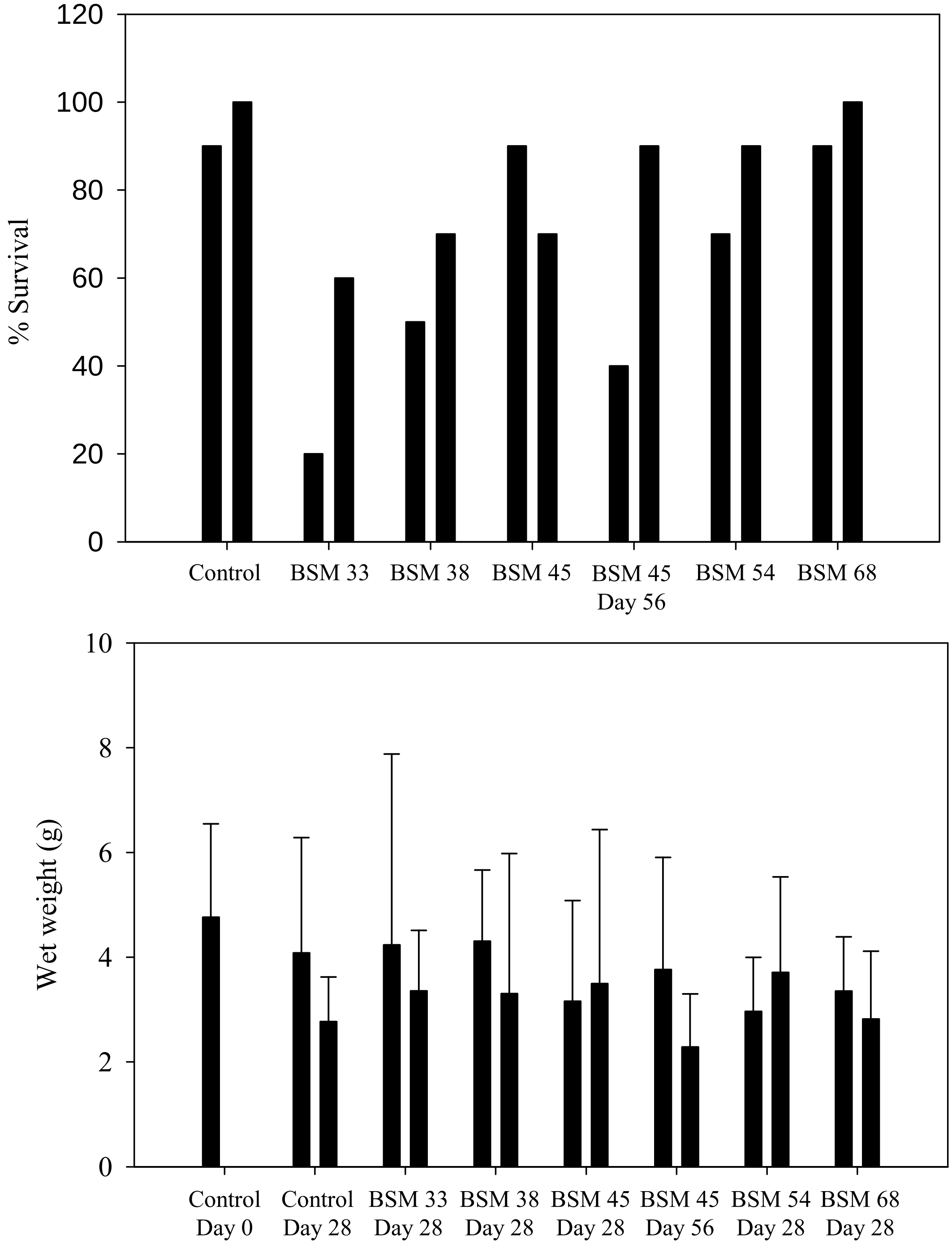


Figure 3-2. Survival and wet weight of *Nereis virens* from each Baltimore Harbor site in the 28 day bioaccumulation experiment. Bars represent the mean (± 1 SD) in replicate tanks.

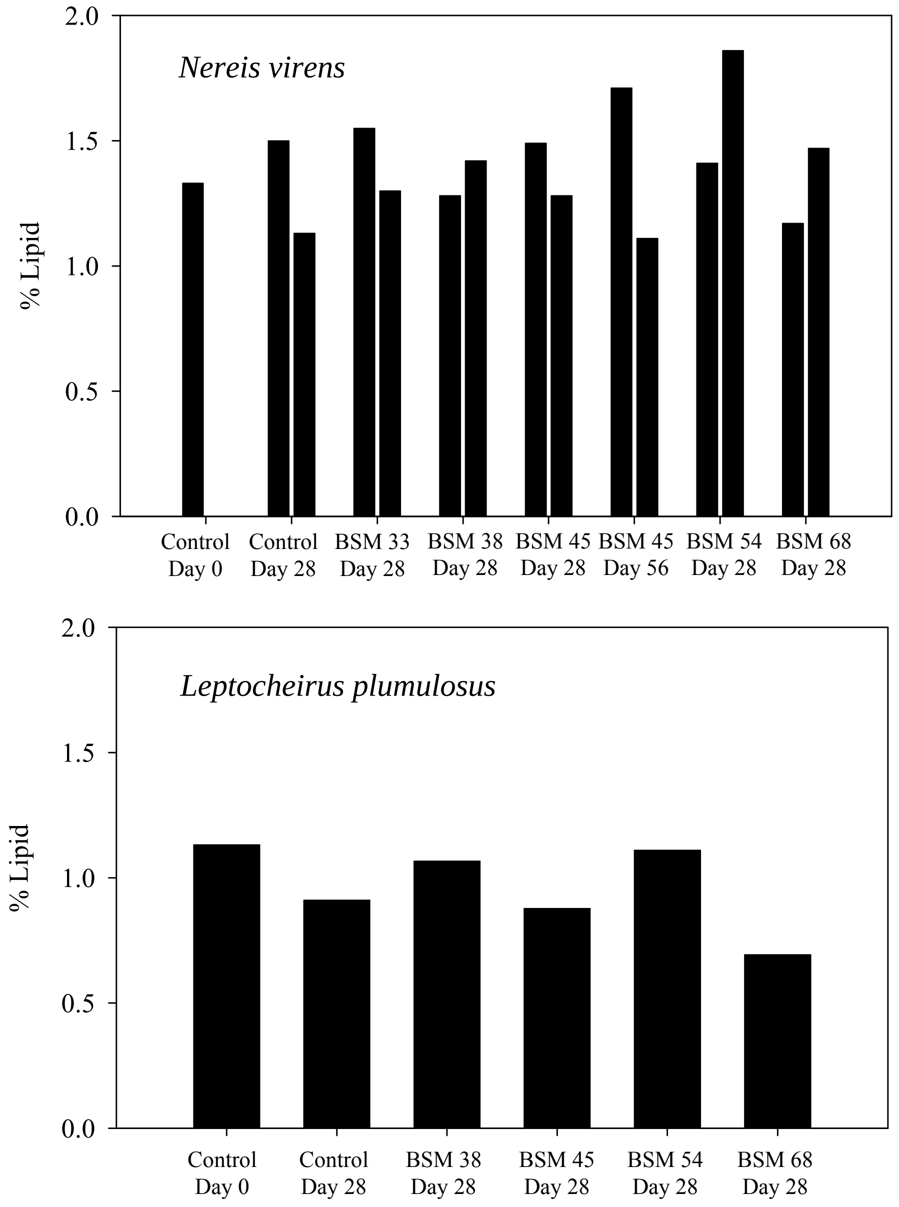
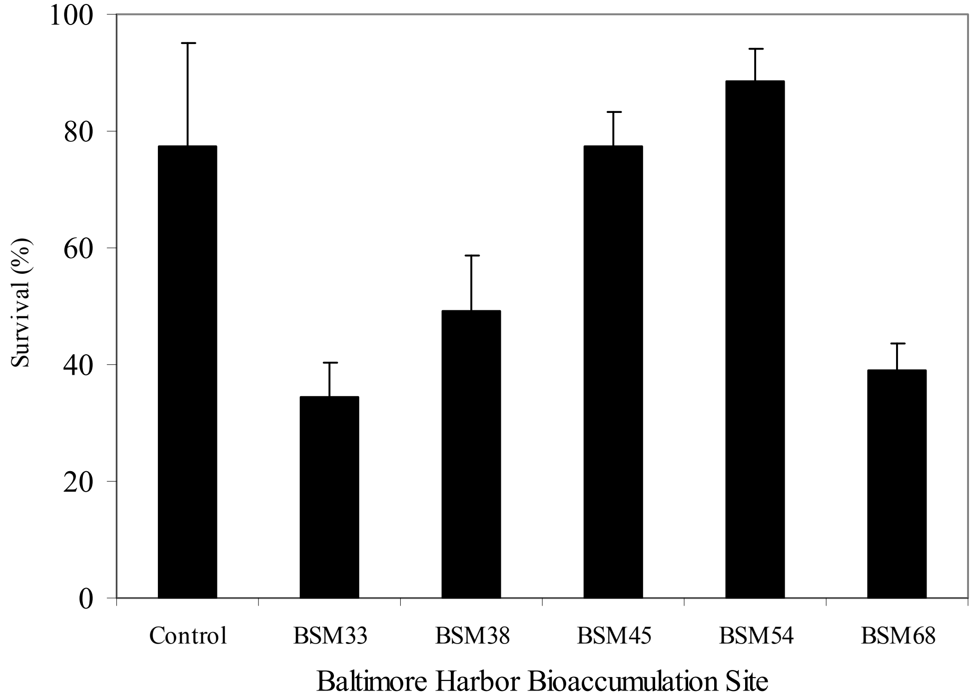


Figure 3-3. Percentage of total lipid (wet weight basis) in *Nereis virens* and *Leptocheirus plumulosus* in the bioaccumulation experiments. Lipid was quantified on the composite of individuals from each replicate tank (*N. virens*) or the composite of all replicates (*L. plumulosus*).



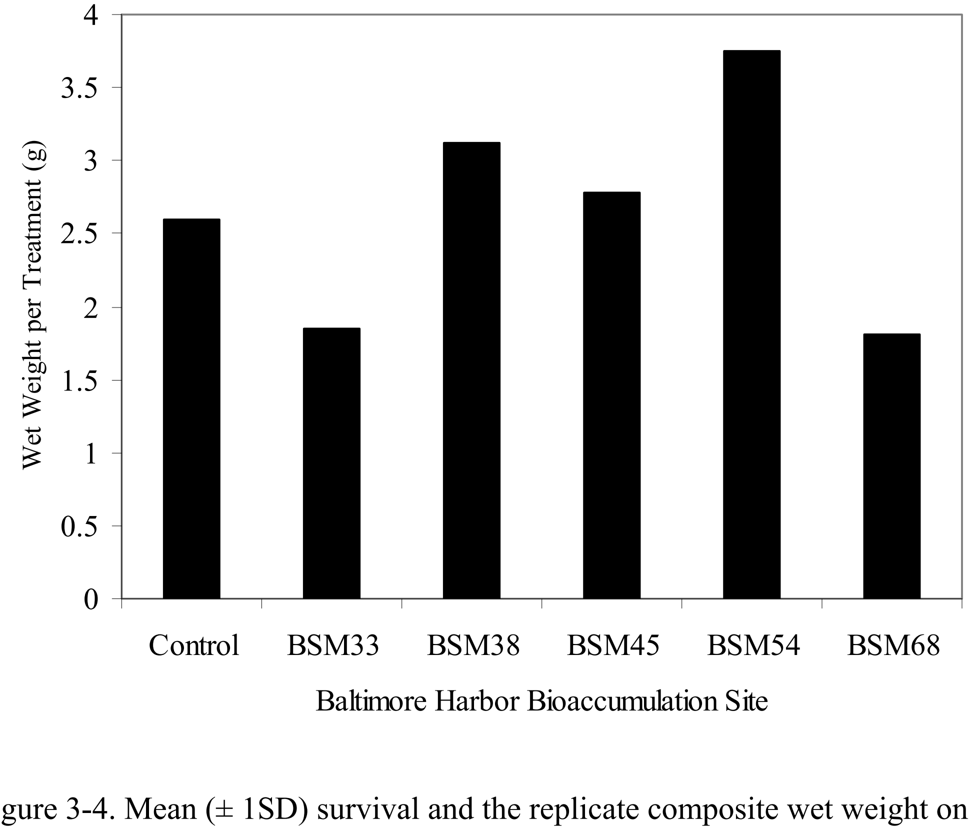


Figure 3-4. Mean (± 1SD) survival and the replicate composite wet weight on day 28 for *Leptocheirus plumulosus* in each Baltimore Harbor site in the 28 day bioaccumulation experiment.

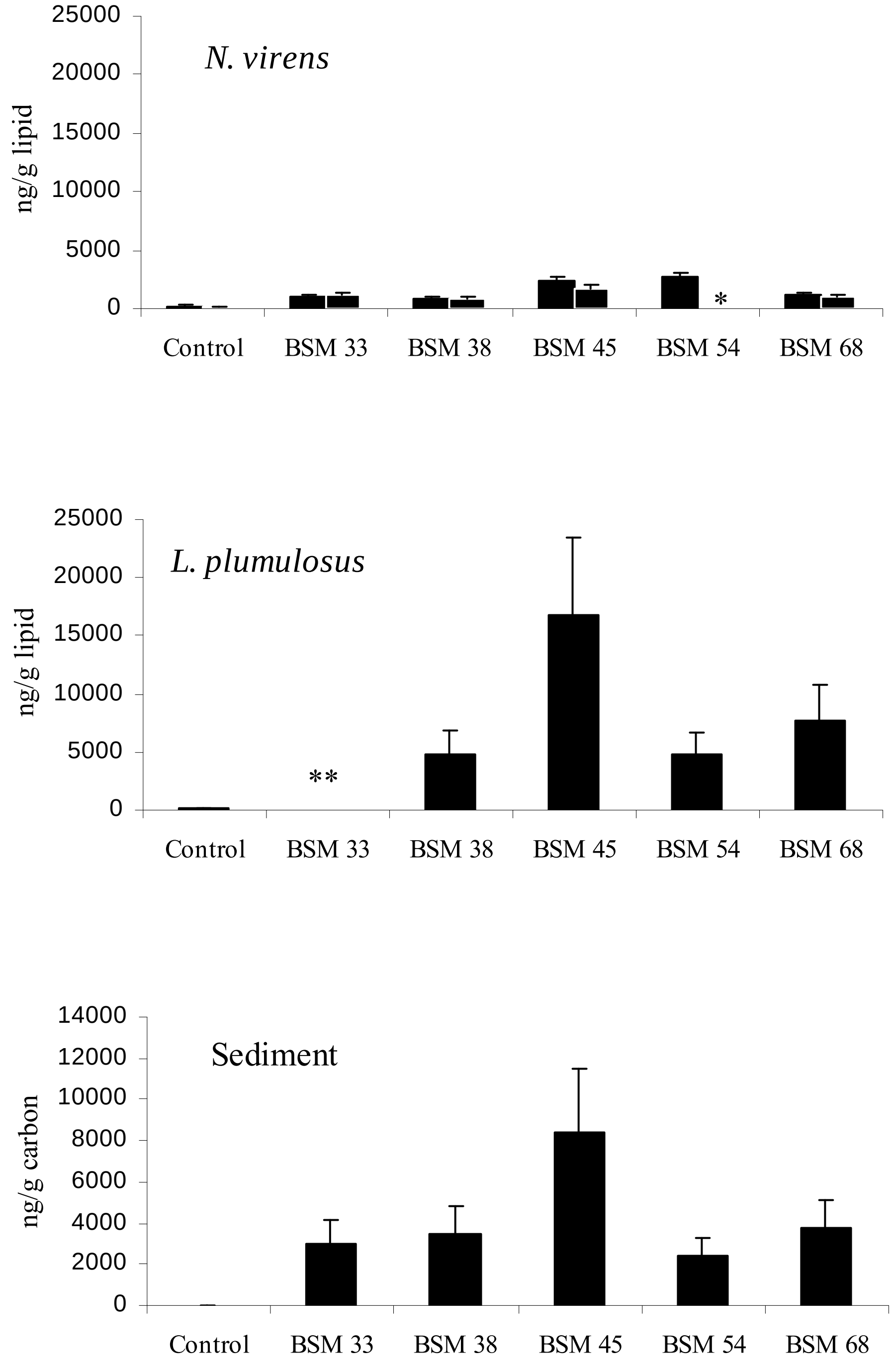
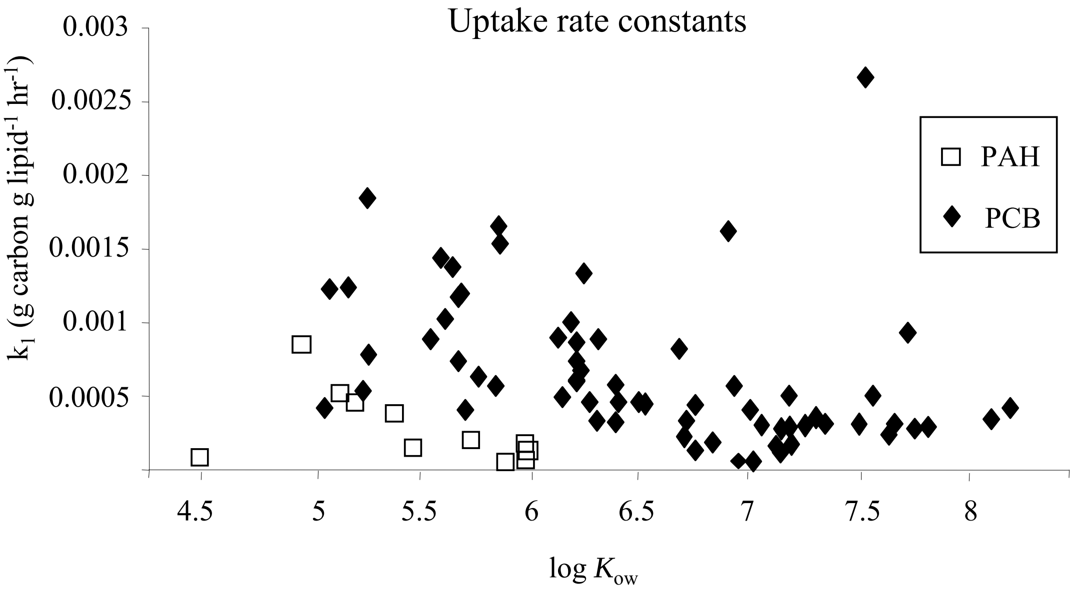


Figure 3-5. Total PCBs in *Nereis virens* and *Leptocheirus plumulosus* after 28 days of exposure to Baltimore Harbor sediments. *N. virens* bars represent replicate tanks. *L. plumulosus* bars represent the composite of replicates. Error bars indicate the error due to analytical uncertainty. * BSM 54 *N. virens* sample was lost. ** Not enough tissue for analysis.



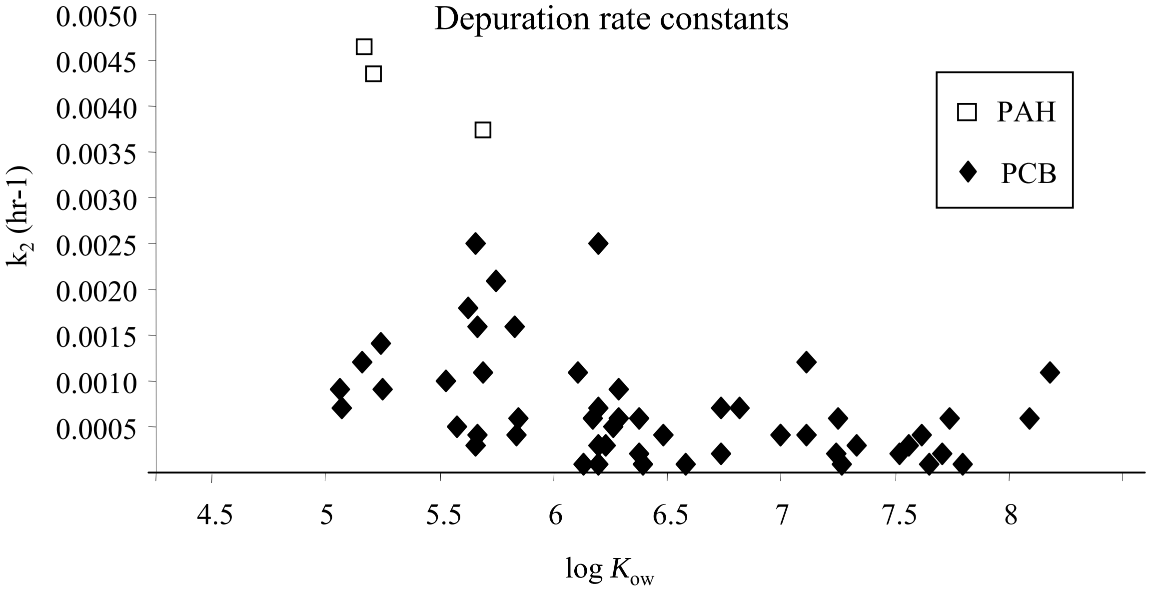
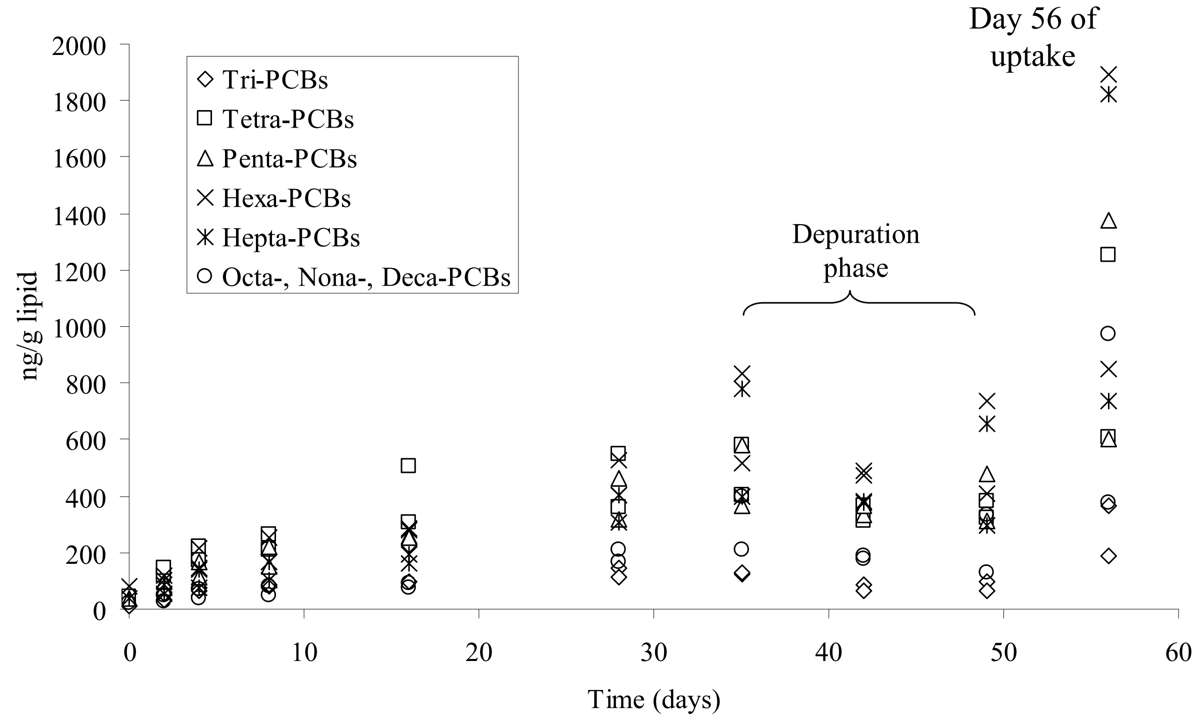


Figure 3-6. PAH and PCB uptake and depuration rate constants for *Nereis virens* in BSM 45 sediment. Uptake rate constants for PCB 25 (0.025) and PCB 81/87 (0.01) are not shown and were not included in regression analyses. For PAH uptake rates: $y = -0.0002x + 0.0015$, $R^2 = 0.37$, $p = 0.048$. For PCB uptake rates: $y = -0.0003x + 0.0024$, $R^2 = 0.17$, $p = 0.0007$. For PCB depuration rates: $y = -0.0003x + 0.0026$, R2 = 0.18, $p = 0.002$. Compound-specific rate constants are provided in Appendix B.



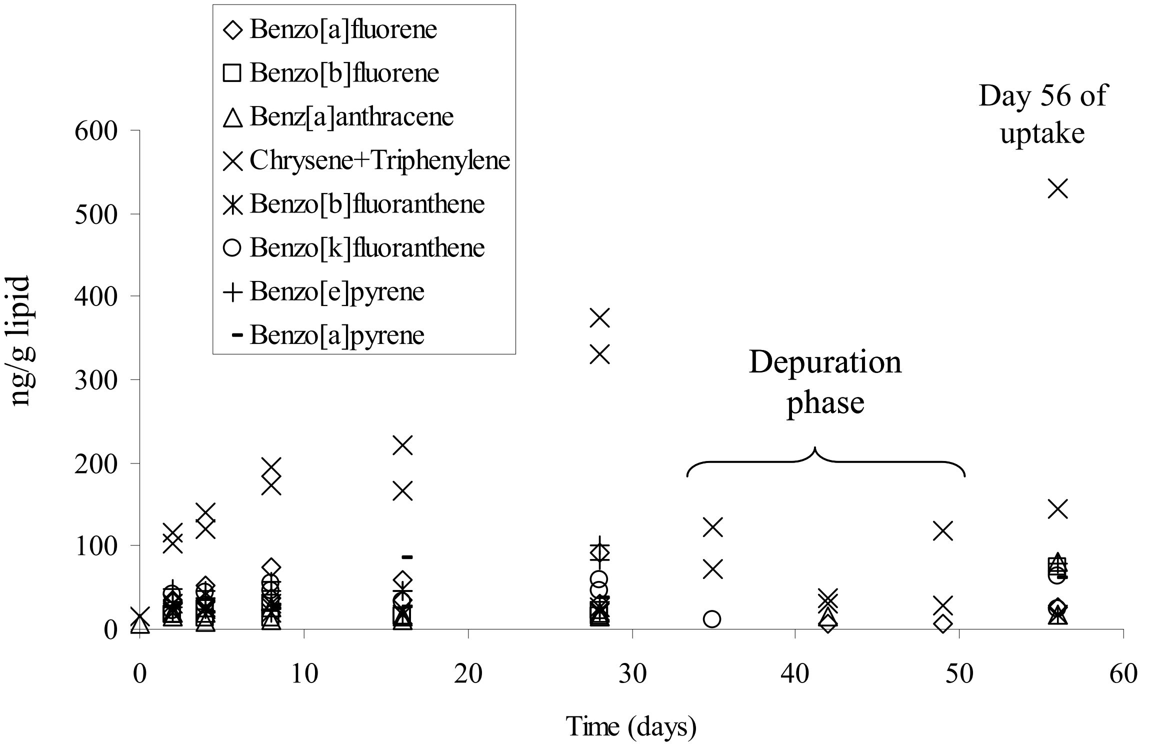
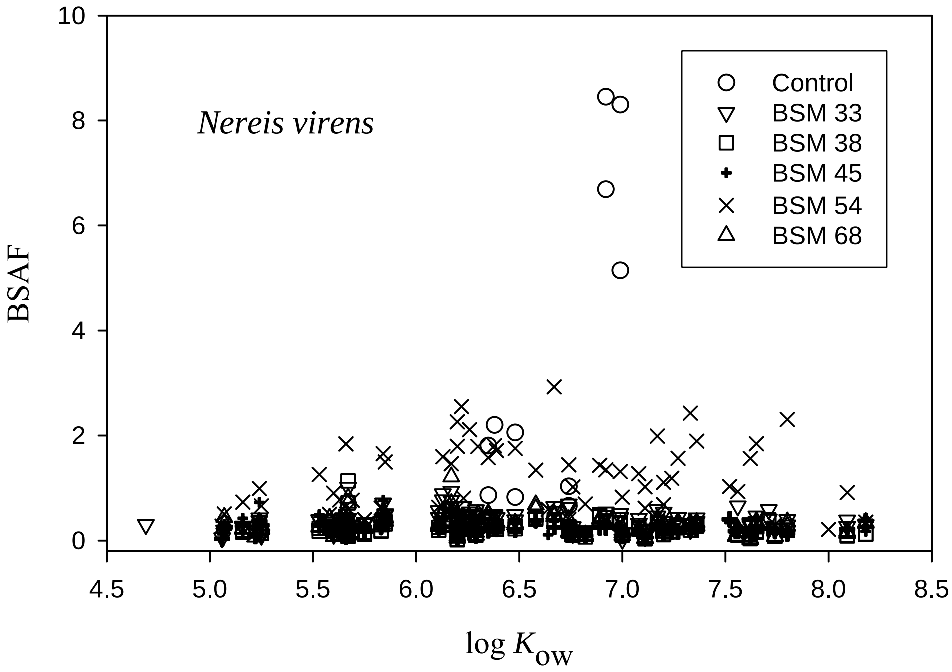


Figure 3-7. Uptake and depuration of PCBs and PAHs in *Nereis virens* over time in BSM 45 sediments. Note the day 56 time point represents uptake under continuous exposure. Only PAHs that were consistently accumulated are shown. All PAH data is in Appendix B.



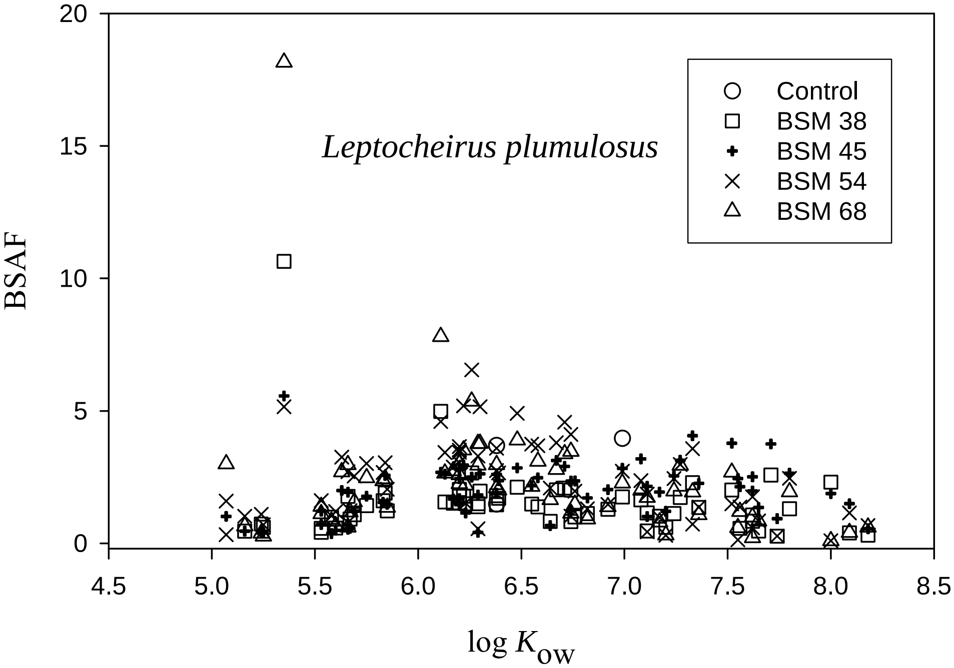
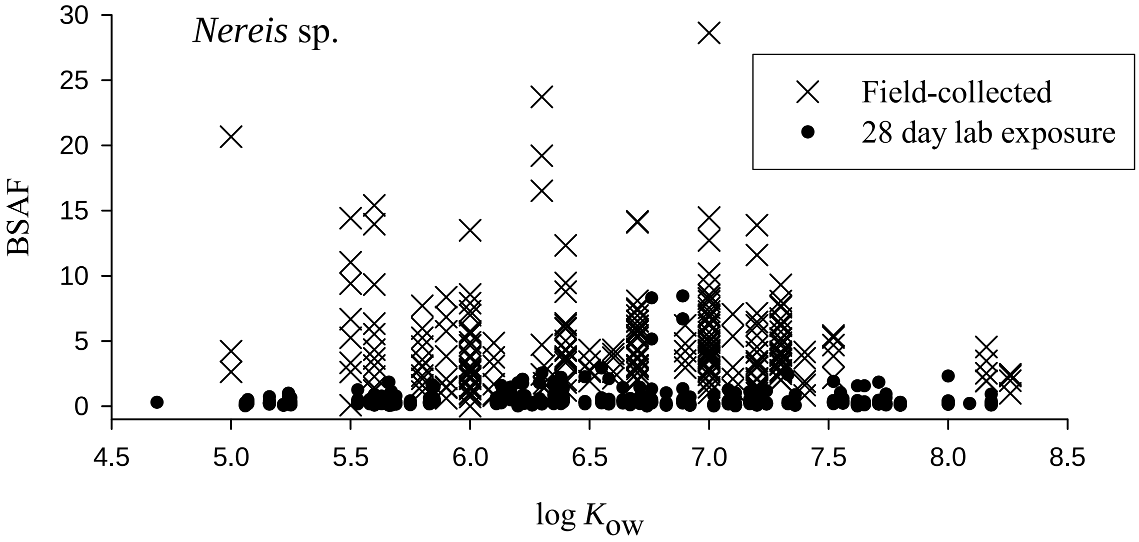


Figure 3-8. PCB biota-sediment accumulation factors (BSAFs) for *Nereis virens* and *Leptocheirus plumulosus* after 28 days of exposure to Baltimore Harbor sediments. PCBs could not be quantified in amphipods at BSM 33 due to an insufficient amount of tissue available for analysis. For *N. virens*: p = 0.729, y = 0.0129x + 0.335, R^2 = 0.0002. For *L. plumulosus*: p = 0.011, y = -0.322x + 4.13, R^2 = 0.0237.



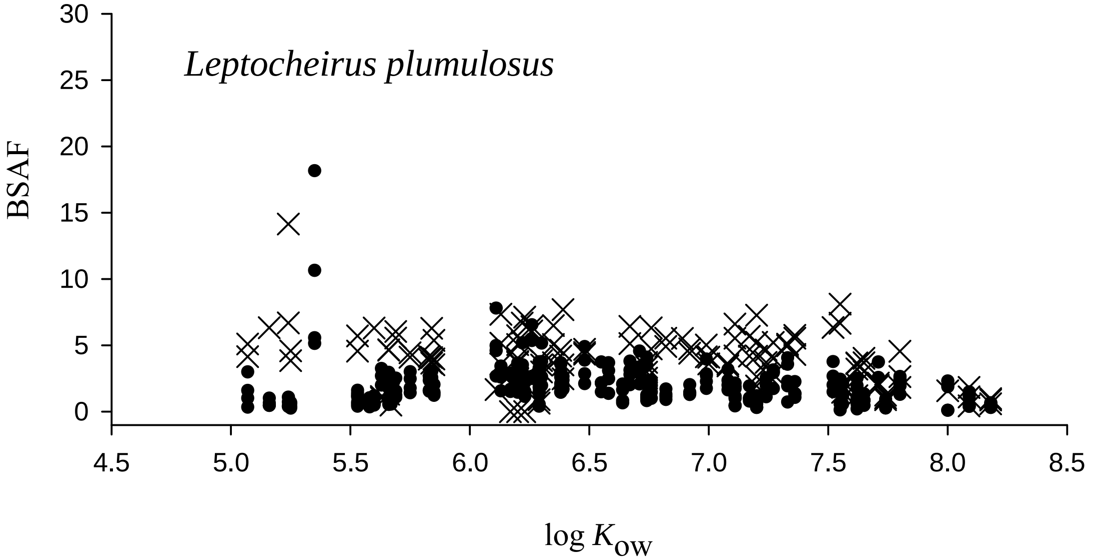


Figure 3-9. PCB biota-sediment accumulation factors (BSAFs) for *Nereis virens* and *Leptocheirus plumulosus* in the 28 day lab exposures vs. *Nereis succinea* and *L. plumulosus* collected from Back River, MD (Chapter 2).

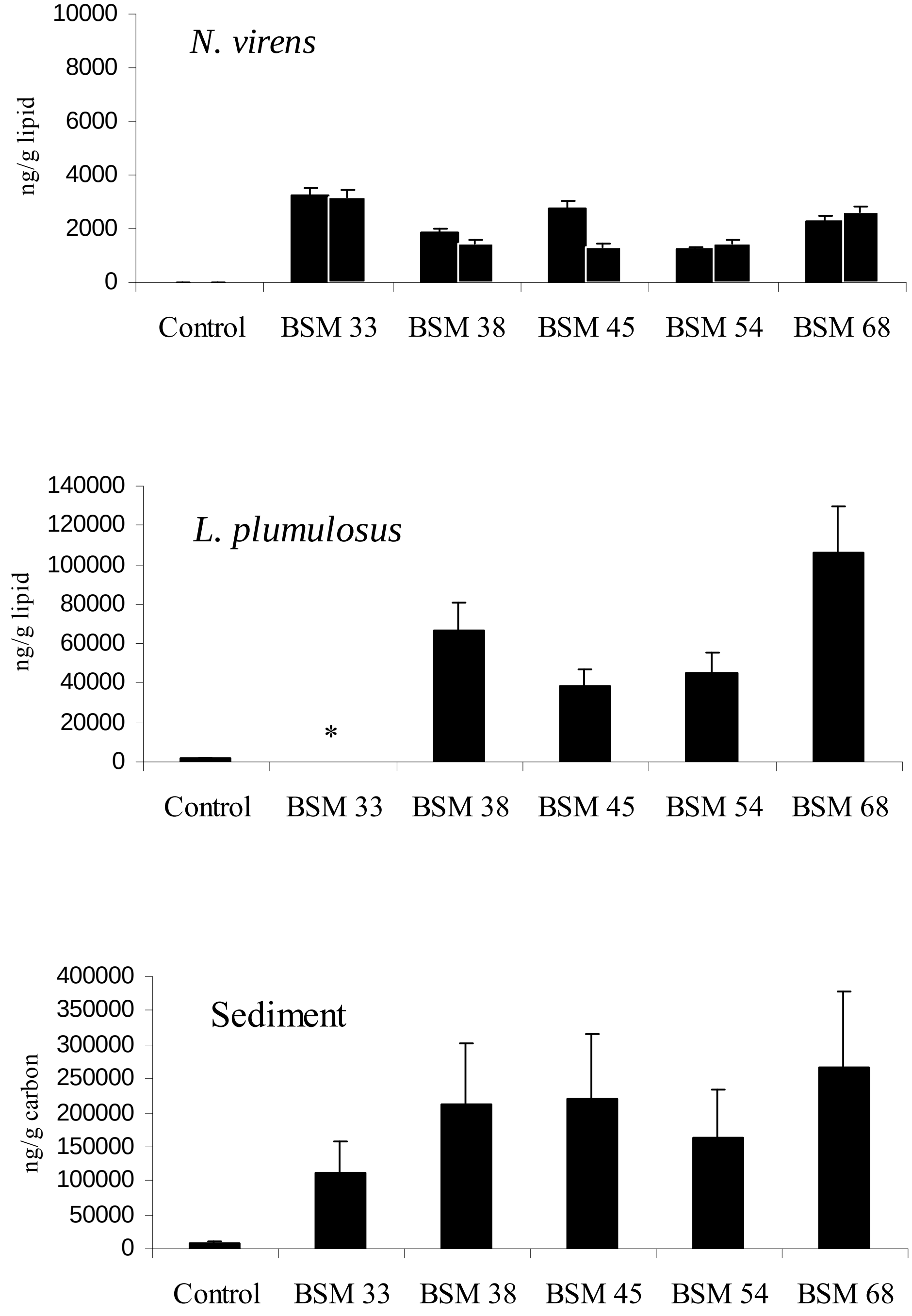


Figure 3-10. Total PAHs in *Nereis virens* and *Leptocheirus plumulosus* after 28 days of exposure to Baltimore Harbor sediments. *N. virens* bars represent replicate tanks. Error bars indicate the error due to analytical uncertainty. * Insufficient tissue mass available for analysis.

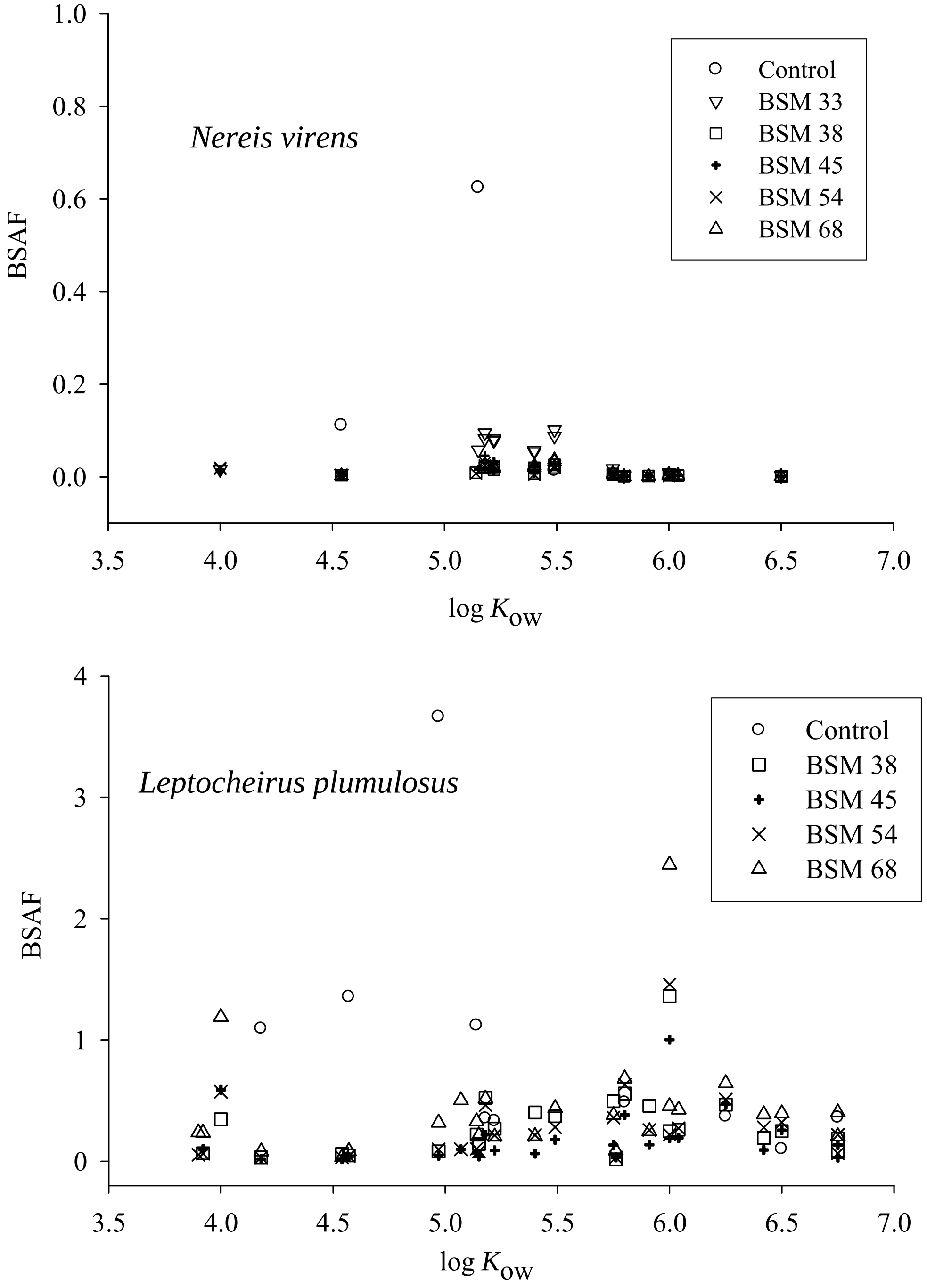


Figure 3-11. PAH biota-sediment accumulation factors (BSAFs) for *Nereis virens* and *Leptocheirus plumulosus* after 28 days of exposure to Baltimore Harbor sediments. PCBs could not be quantified in amphipods at BSM 33 due to an insufficient amount of tissue available for analysis. The BSAF for 2-methyl-anthracene at the control site was 0.6 and is not shown. For *N. virens*: $p = 0.017$, $y = -0.0165x + 0.116$, $R^2 = 0.0437$. For *L. plumulosus*: $p = 0.435$, $y = -0.0314x +0.5357$, $R^2 = 0.0045$.

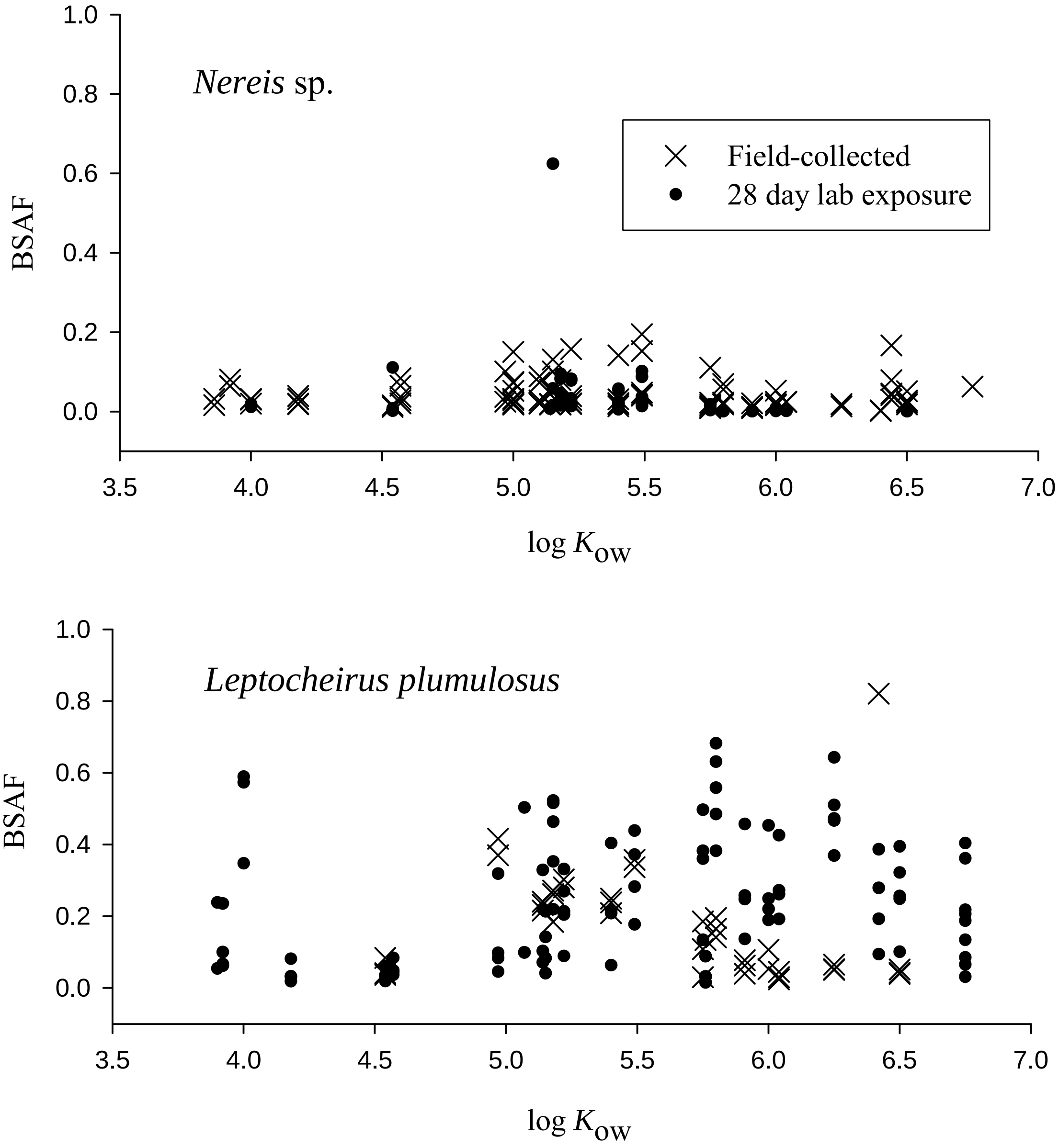


Figure 3-12. PAH biota-sediment accumulation factors (BSAFs) for *Nereis virens* and *Leptocheirus plumulosus* in the 28 day lab exposures vs. *Nereis succinea* and *L. plumulosus* collected from Back River, MD (Chapter 2).

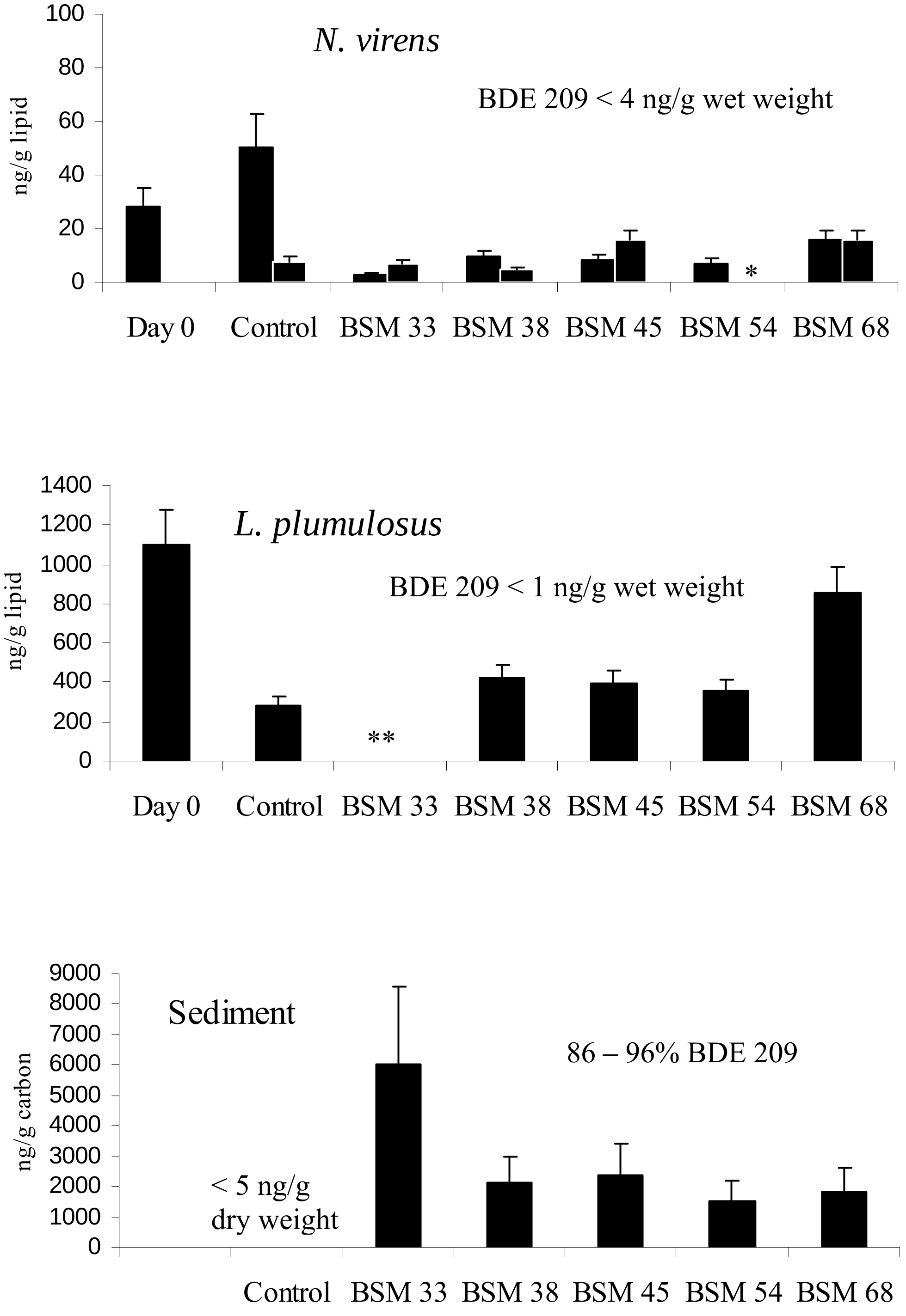


Figure 3-13. Total BDEs in *Leptocheirus plumulosus* and *Nereis virens* after 28 days of exposure to Baltimore Harbor sediments. *N. virens* bars represent replicate tanks. Error bars indicate the error due to analytical uncertainty. *BSM 54 replicate sample was lost.** Not enough tissue available for analysis.

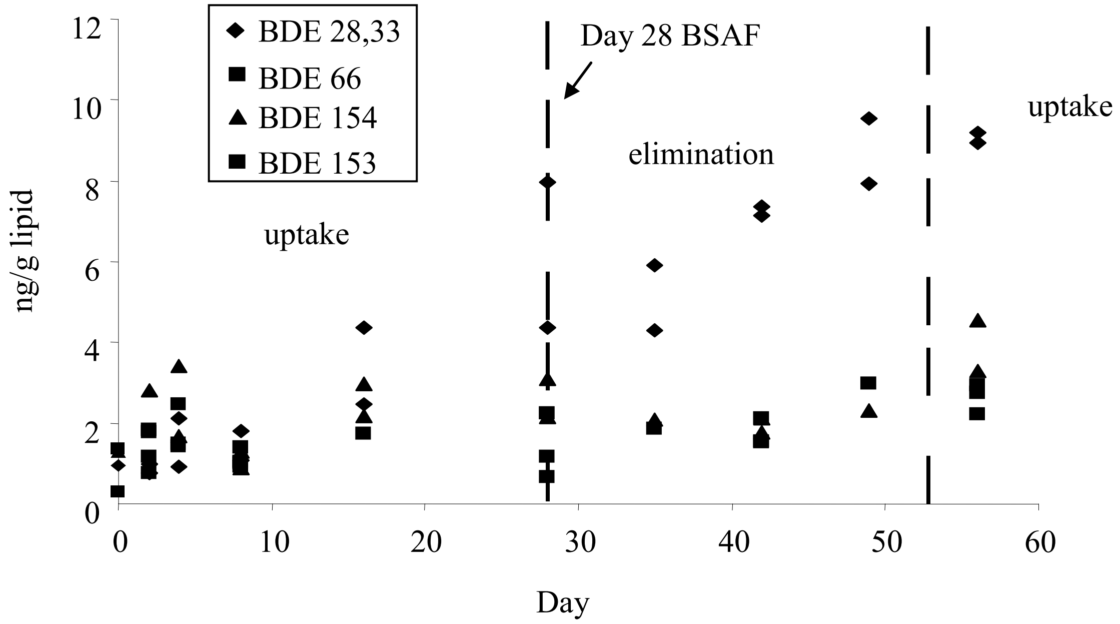


Figure 3-14. Uptake and depuration of the predominant BDE congeners accumulated in *N. virens* exposed to BSM 45 sediment for 56 days. The time series experiment was not conducted with *L. plumulosus*.

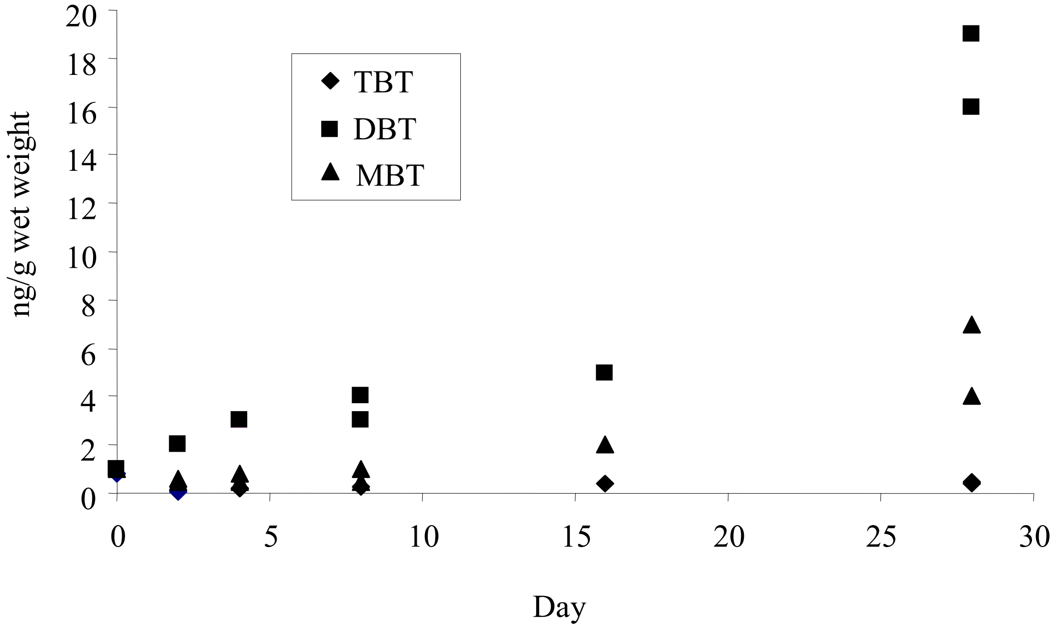


Figure 3-15. Uptake of tributyltin (TBT) and its degradation products dibutyltin (DBT) and monobutyltin (MBT) in *N. virens* exposed to BSM 45 sediment for 28 days. Butyltin analysis was not conducted on *L. plumulosus* due to insufficient sample for analysis.

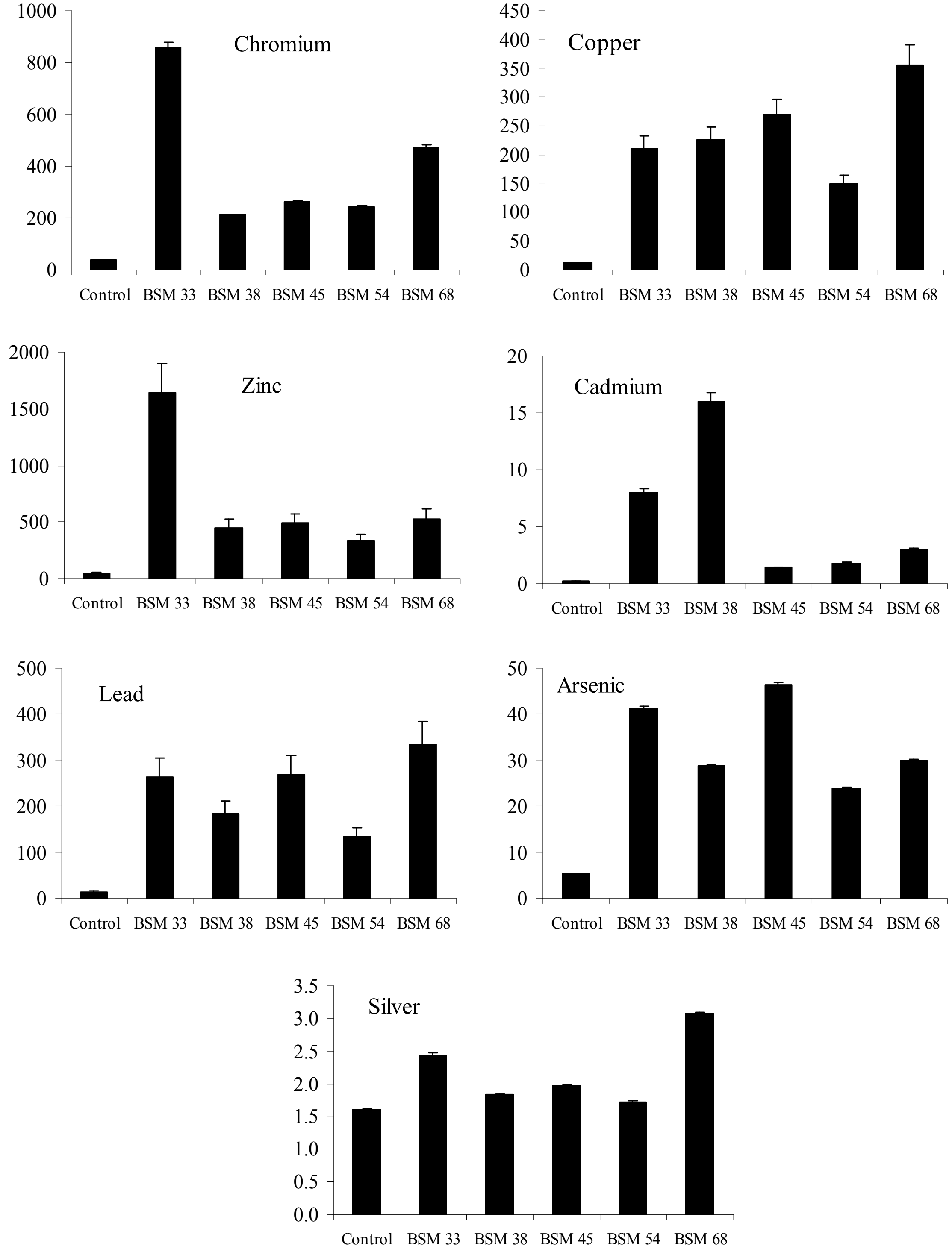


Figure 3-16. Metal concentrations (µg/g dry weight) in Baltimore Harbor sediments. Error bars indicate the error due to analytical uncertainty.

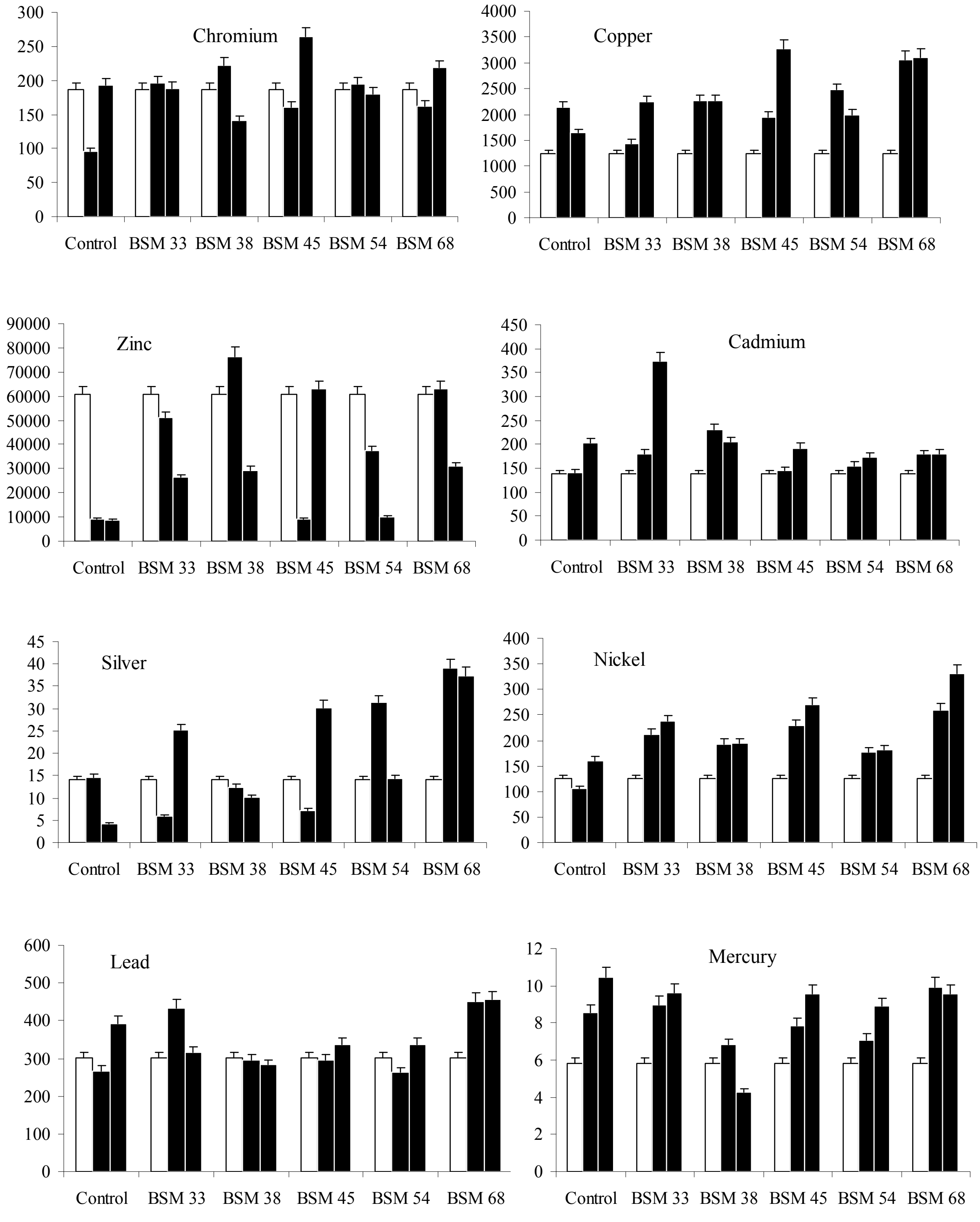


Figure 3-17. Metal concentrations (ng/g wet weight) in *Nereis virens* after 28 days exposure to Baltimore Harbor sediments. Error bars indicate the error due to analytical uncertainty.

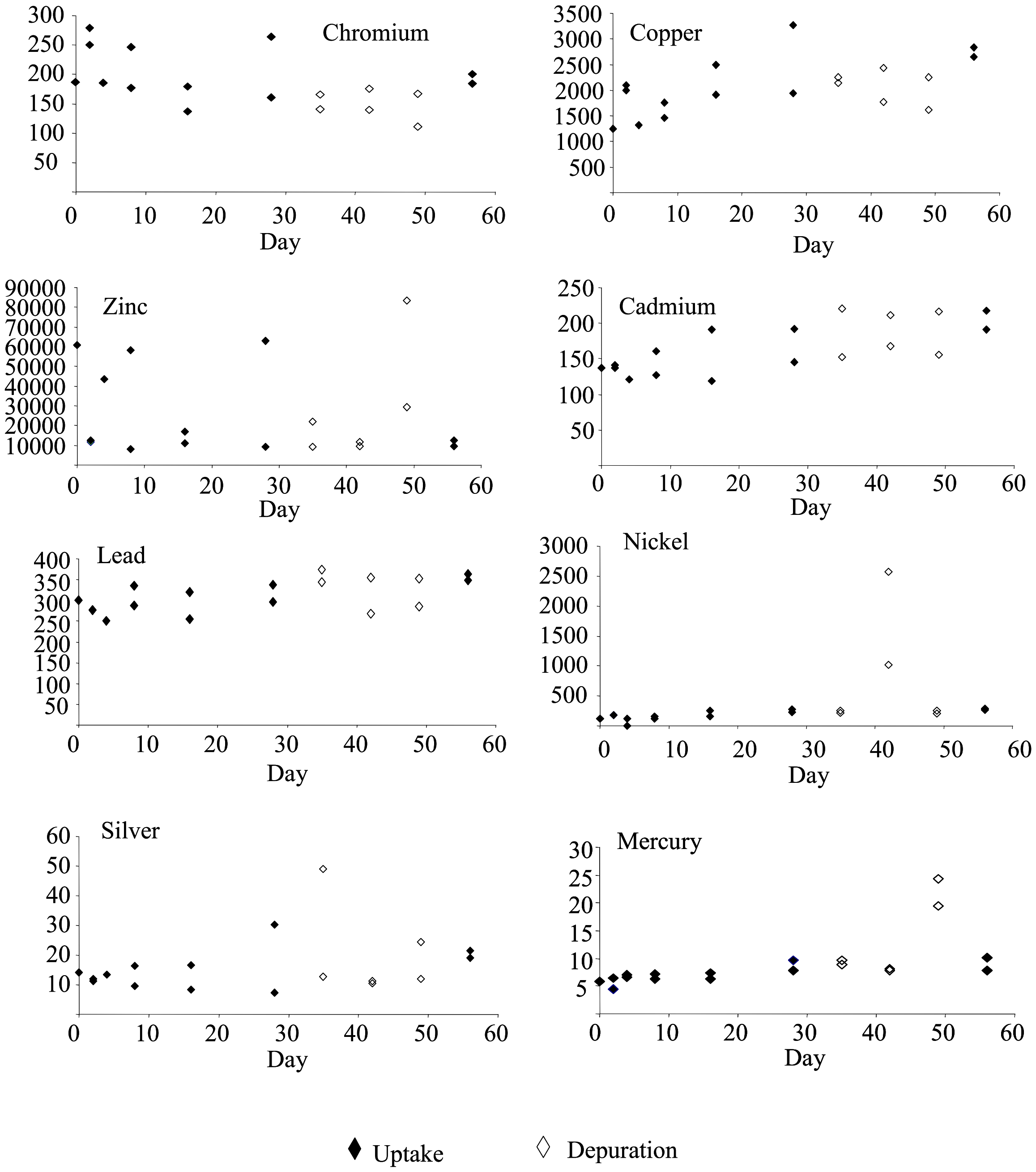


Figure 3-18. Uptake (28 and 56 day) and depuration (21 day) of metals in *Nereis virens* (ng/g wet weight) exposed to BSM 45 sediment. Only one replicate was quantified on day 4 of uptake for all metals except mercury.

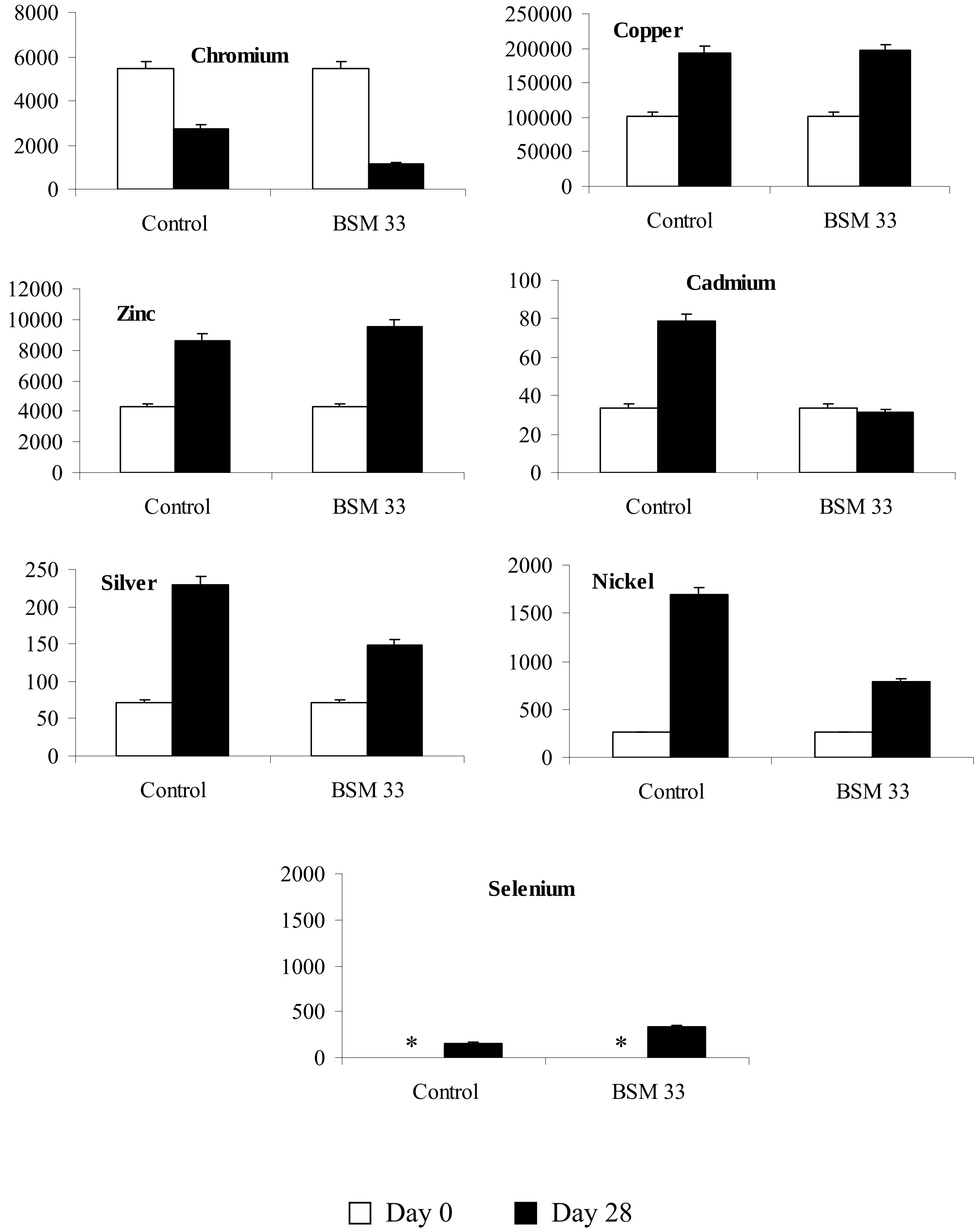


Figure 3-19. Metal concentrations (ng/g wet weight) in *Leptocheirus plumulosus* after 28 days of exposure to Baltimore Harbor sediments. Error bars indicate the error due to analytical uncertainty. * < 80 ng/g wet weight. Arsenic was not detected in any worm sample (< 160 ng/g wet weight).

Chapter 4

Bioaccumulation of brominated diphenyl ethers in the marine polychaete *Nereis virens*

4.1 Introduction

Brominated diphenyl ethers (BDEs) are hydrophobic organic chemicals (HOCs) used as flame retardants and incorporated into a wide variety of consumer products to comply with fire safety regulations. BDEs have become ubiquitous environmental contaminants due to their high frequency of detection in both biotic (Hites 2004) and abiotic matrices (Hale et al. 2006). BDEs are produced commercially for specific applications as Penta-, Octa-, or Deca-BDE mixtures, each named for their primary constituent congeners. However, the Penta- and Octa- mixtures were banned or phased out due to environmental and human health concerns (e.g. Eriksson et al. 2001; Stoker et al. 2005), leaving Deca-BDE as the only BDE product still in use. Concerns with Deca-BDE include its potential developmental neurotoxicity (Viberg et al. 2003) and the potential for its degradation into the more toxic and bioaccumulative components of the banned Penta- and Octa-BDE formulations via photolysis, biotransformation, and microbial processes (e.g. Soderstrom et al. 2004; Stapleton et al. 2004; Gerecke et al. 2005). Because of their past and present use in high volumes, their expected persistence in the environment, and continued health concerns, further studies investigating BDE fate and transport pathways are warranted, especially those elucidating exposure routes to higher trophic levels.

BDEs tend to concentrate in soils, dust, biosolids (i.e. sewage sludge) and aquatic sediments due to their very low water solubility (Hale et al. 2006; EU risk assessment 2002). Other sediment-bound HOCs such as polychlorinated biphenyls (PCBs) are transferred from sediments to aquatic food webs by deposit-feeding invertebrates (e.g., Pruell et al 2000), but few studies have investigated the bioavailability of BDEs to these organisms. The freshwater oligochaete *Lumbriculus variegatus* accumulated congeners in the Penta-BDE mixture from both spiked sediments and composted biosolids in laboratory studies (Leppänen and Kukkonen 2004; Ciparis and Hale 2005) and some of these same congeners were also detected in earthworms living in soils receiving historical loadings of BDE-contaminated sewage sludge and river overflow (Matscheko et al. 2002). Penta-BDE congeners also accumulated in amphipods (*Leptocheirus plumulosus*) and two species of polychaete worms (*Nereis succinea* and *Marenzelleria viridis*) living in a highly contaminated tributary of the Chesapeake Bay receiving high loadings of wastewater effluent (Chapter 2).

In contrast to the high frequency of detection of the Penta-BDE congeners in these and other studies (Hites 2004), detection of the nona- and deca-BDE congeners are less common. BDE 209, which generally comprises >97% of Deca-BDE mixtures, was not detected in the Chesapeake Bay deposit feeders from our studies despite high sediment exposures, and did not accumulate or was minimally detected in *L. variegatus* in a laboratory study by Ciparis and Hale (2005). In contrast, BDE 209 accumulated in field-collected earthworms (Sellström et al. 2005). The lack of BDE 209 accumulation in the deposit feeders from our studies was surprising, particularly for *Nereis*, since polychaete worms typically process large volumes of sediment and because sediment ingestion is the major route of HOC uptake in many deposit-feeding species (Weston et al. 2000).

The goal of this work is to characterize the relative bioavailability of BDE congeners in the Penta-BDE and Deca-BDE commercial mixtures from sediments to the marine polychaete worm *Nereis virens*. A 28 day bioaccumulation experiment was conducted in which worms were exposed to either BDE-contaminated spiked sediments or contaminated field sediments to compare the relative bioavailability of BDEs from each matrix. A time series sampling regime was conducted on worms exposed to the spiked sediment mixture containing both the Penta- and Deca-BDE commercial mixtures so that accumulation rate constants could be determined. PCB 209, a PCB congener known to accumulate in *N. virens* (Chapter 3), was also added to the spiked sediment and used as a positive control to insure that sediment ingestion had occurred. This experiment was conducted as part of a larger study (Chapter 5) investigating the mechanisms responsible for the lack of BDE 209 accumulation in *N. virens* (Chapters 1 and 2). Biota-sediment accumulation factors (BSAFs) for *N. virens* are compared to BSAFs obtained for field-collected *Nereis succinea* from a previous study (Chapter 2) to determine the relationship between accumulation over 28 days and field-collected values, both of which are commonly used metrics to predict accumulation in organisms living in contaminated sediment environments. Additionally, BDE uptake rates are compared among congeners to determine if hydrophobicity can be used to predict the relative bioavailability of BDEs, as it is for other HOC classes.

4.2 Methods

4.2.1 Sediment collection and spiking

Worms were exposed to three sediment treatments: a spiked sediment mixture containing the Deca- and Penta-BDE commercial mixtures and PCB 209, contaminated field sediment, and a solvent control sediment. Control sediment was collected from the Wye River, a tributary of the Chesapeake Bay on the eastern shore of Maryland with undetectable concentrations of BDEs and other contaminants (Klosterhaus et al. 2006; Chapter 3). The field sediment was collected from Back River, a highly BDE-contaminated tributary of the Chesapeake Bay that receives effluent from a major wastewater treatment plant serving the city of Baltimore (Maryland, USA). Sediment from this site contains very high concentrations of BDE 209 (~2000 ng/g dry) and very low concentrations of the Penta-BDE congeners (~1 ng/g dry). Surficial sediment was collected from each site using a Ponar grab. The top 2-3 cm of sediment were placed in plastic buckets using stainless steel spatulas, homogenized, and kept at 4°C until use.

The Deca-BDE technical mixture (FR 300BA, decabromodiphenyl oxide 85.5%, ± 4% purity) and 2,2’,3,3’,4,4’,5,5’,6,6’-decachlorobiphenyl (PCB 209, ± 4% purity) were purchased from Accustandard (New Haven, CT) in neat form and dissolved into toluene and hexane, respectively. Deca-BDE technical mixtures generally contain >97% BDE 209 with a small contribution of nona- and octa-BDEs. The Penta-BDE technical mixture DE-71 was purchased from Great Lakes Chemical (IN, USA) and dissolved into toluene. Our analysis indicated that BDEs 47, 85, 99, 100, 153, and 154 comprised 32, 2, 48, 9, 4, and 4% of the DE-71 technical mixture by weight. The target concentration for Deca-BDE in the spiked sediment (2500 ng/g dry) was selected to approximate the concentration in the field sediment. The target concentration for PCB 209, a congener used as a positive control for accumulation and bioavailability comparison, was also 2500 ng/g dry. The Penta-BDE target concentration in the spiked sediment was 1000 ng/g dry sediment, and though much higher than typical field concentrations, was chosen to be sure accumulation was detectable after a 28 day exposure. For the spiked sediment, the appropriate volume of each chemical standard was added to a small volume of control sediment in a glass beaker using either glass seriological pipets or syringes and homogenized with a stainless steel spatula for several minutes. Since a large volume of solvent was required, and toluene and hexane can be toxic, the spiked sediment was left under a fume hood in the dark overnight, and then exposed to a nitrogen gas stream for several hours the following day to facilitate solvent evaporation. Once most of the solvent had evaporated, the small volume of spiked sediment was transferred to a plastic bucket containing the rest of the control sediment used for each treatment and stirred vigorously with a stainless steel spoon or a shovel. The spiked sediments were then added to the exposure tanks after ~15 min of hand mixing.

4.2.2 Bioaccumulation experiment

Uncontaminated *Nereis virens* (Aquatic Research Organisms, Hampton, NH) were exposed to each sediment treatment in triplicate glass aquaria for 28 days. For the field and control sediments, worms were exposed in 20 L aquaria containing 1.7 L of sediment and 15 L of overlying seawater. For the spiked sediment treatment, worms were exposed in 56 L aquaria containing 4.5 L of sediment and 40 L of overlying seawater to accommodate a larger number of worms for the time series sampling.

Sediments and overlying water were added to each aquaria and allowed to settle overnight prior to worm addition. Ten worms per replicate were added to each aquaria for the field and control sediments and 24 worms per replicate were added to the spiked sediment aquaria. Worms did not receive supplementary food. Ambient Patuxent River seawater (14 ppt) was supplemented with Instant Ocean to maintain 20 ppt overlying seawater in each tank. The experiment was conducted as a static renewal test with 1/3 of the overlying water exchanged 3 times per week. Room temperature was 20 ± 3 °C and a photoperiod of 16 hrs light, 8 hours dark was used. A glass pipette connected to silicone tubing and an air supply was used to gently aerate each tank. Salinity (20.6 ± 0.4 ppt) and dissolved oxygen (5.6 ± 0.9 mg/L) were monitored in each aquaria before each water change.

Sediment was sampled from each tank on day 0 prior to water and worm addition and on day 28 using a stainless steel spatula, placed in a glass jar, and frozen until analysis. Thirty worms were randomly selected on day 0, their individual weights recorded, and then separated into 3 composites of 10 worms each, and kept frozen in a glass jar until analysis. Four worms from each of the spiked sediment replicate tanks were sampled on days 2, 4, 8, and 16 for the time series uptake and on day 28, worms were removed from all treatment tanks. Upon removal from their treatment sediments, worms were transferred to aquaria containing control sediment, where they were allowed to feed for 5 hours to facilitate purging of contaminated sediment from the gut. Worms were then transferred to aquaria containing only seawater and allowed an additional 19 hours for gut clearance. Following gut clearance, worms were placed on aluminum foil, blotted with laboratory tissue to remove any debris and excess water, and their individual weights were recorded. Worms were then composited by replicate, placed in a glass jar, and kept frozen until analysis.

4.2.3 Chemical analysis

Composite worm samples were homogenized using a mini food processor. Worms and wet sediment were ground with sodium sulfate using a ceramic mortar and pestle to remove water. BDEs and PCBs were extracted from the samples using accelerated solvent extraction (ASE 300, Dionex, Sunnyvale, CA, USA) in dichloromethane. Deactivated alumina was added to the ASE extraction cell to remove lipids and other polar interferences from the samples. PCB 14 (3,5-dichlorobiphenyl), PCB 65 (2,3,5,6-tetrachlorobiphenyl), PCB 166 (2,3,4,4',5,6-hexachlorobiphenyl), ^{13}C-BDE 15 (4,4'-dibromodiphenyl ether) and ^{13}C-BDE 118 (2,3',4,4',5-pentabromodiphenyl ether) were used as surrogate standards and added directly to the ASE extraction cells prior to extraction. Following extraction, activated copper shavings were added to the sediment extracts to remove sulfur. Worm and sediment extracts were concentrated down to 1 mL using a rotary evaporator and exchanged into hexane. Nonpolar interferences were removed from the extracts using deactivated Florisil® column chromatography, concentrated with a turbo evaporator to 1mL in hexane. Worm lipids were quantified gravimetrically by running a separate ASE extraction (without alumina added to the cells) of the worm sample. Lipids were only quantified in worms sampled on days 0 and 28 due to a smaller tissue sample available for chemical analysis in the time series sampling; the mean lipid content of day 0 and 28 worms was used for these samples. Sediment carbon was quantified using an Exeter Analytical CE440 Elemental Analyzer.

PCBs in the worms and sediment were quantified using an Agilent 6890N gas chromatograph equipped with a ^{63}Ni electron micro electron capture detector and a 60 m DB-5 column (0.32 mm inner diameter, 0.25 μm film; J&W Scientific, Folsom, CA, USA). The oven temperature program consisted of an initial hold for 2 minutes at 100°C, a 4°C/min ramp to 170°C, and a 3°C/min ramp to 280°C that was held for 10 minutes. Samples were run using the splitless injection mode and the injector and detector temperatures were 250 °C for the GC-μECD. PCB 30 (2,3,6-trichlorobiphenyl) and PCB 204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl) were used as internal standards and were added to samples and calibration standards just prior to instrumental analysis. PCB standards were purchased from Ultra Scientific (North Kingstown, RI, USA) congeners were identified and quantified following methods routinely used in our laboratory (Ashley and Baker 1999).

BDEs (34 congeners total) were quantified using programmed temperature vaporization (PTV) injection (5 μl injections in pulsed splitless mode) on an Agilent 6890N gas chromatograph coupled to an Agilent 5973N mass selective detector operated in negative chemical ionization mode. A 15 m DB-5MS column (J&W Scientific, Folsom, CA, USA) with an inner diameter of 0.25 mm and 0.1 μm film thickness was used. The oven temperature program consisted of an initial hold at 40°C for 1 min, a 20 °C/min ramp to 250 °C with no hold, a 1.5 °C/min ramp to 260 °C and held for 1 min, and a 25 °C/min ramp to 320 °C and held for 20 min. The injector and detector temperatures were 45 °C and 320 °C, respectively. Inlet and column flow were 100 ml/min and 1.5 ml/min, respectively. Prior to instrumental analysis, ^{13}C-CDE 86 (2,2’,3,4,5-pentachlorodiphenyl ether) and ^{13}C-BDE 209 (decabromodiphenyl ether) were added as internal standards to all samples and calibration standards. The mass fragments *m/z* -79 and -81 were monitored for di- to octa-BDEs, -487 and -409 for the nona-BDEs and BDE 209, -318 and -316 for ^{13}C-CDE 86, and -495 and -415 for ^{13}C BDE 209 for quantitative and qualitative ions, respectively. BDE standards were purchased from Cambridge Isotope Laboratories (Andover, MA, USA), Wellington Labs (Guelph, Ontario, Cananda), and Accustandard (New Haven, CT, USA) or received from the U.S. National Institute of Standards and Technology (NIST).

Laboratory blanks were processed with each set of samples to determine the extent of contamination during sample processing. Matrix blanks (surrogate recovery and analyte standards spiked into sodium sulfate) and sample matrix spikes (surrogate recovery standards and analyte standards spiked into a sample containing sodium sulfate) were also extracted to determine extraction efficiency. Method detection limits (MDLs) for all organic analytes were defined as three times the mean analyte mass in laboratory blanks divided by the mass of worm or sediment extracted in each sample. Mean recoveries of the PCB surrogate standards PCB 14, PCB 65, and PCB 166 were 79 ± 31, 60 ± 12, and 72 ± 11% in worms and 38 ± 5, 49 ± 10, and 70 ± 11% in sediment samples, respectively. Mean recoveries of PCB 14 and 65 for the field sediment samples were not quantifiable, likely due to interference(s) from some reactive component of the field sediment matrix. Mean recoveries of the BDE surrogate standards ^{13}C-BDE 15 and ^{13}C-BDE 118 were 55 ± 15% and 100 ± 22% in worms and 47 ± 14% and 88 ± 33% in sediment, respectively. Mean recoveries for the field sediment samples were abnormally high with 133 ± 13% and 143 ± 20% for ^{13}C-BDE 15 and ^{13}C-BDE 118, respectively. Sample values were not corrected for recoveries and thus may be conservative measurements for all samples but the field sediments. PCB 209 matrix spike recoveries (n = 5) were 69 ± 5%. The mean matrix spike recoveries for the BDEs detected in these samples ranged from 52-80%, which approximated the surrogate standard recoveries.

4.2.4 Uptake rates and biota-sediment accumulation factors

The bioaccumulation data were analyzed to determine uptake rate constants and biota-sediment accumulation factors (BSAFs). Sediment chemistry data were normalized to organic carbon and tissue data were normalized to lipids prior to analysis. A two-compartment (sediment and worm) first-order kinetic model was used to describe the movement of contaminants into the worm. For this model, changes in the concentration of contaminants in the worm are described by the differential equation:

$$dC_w/dt = k_1C_s - k_2C_w \qquad (1)$$

where: C_w = concentration of contaminant in the worm (ng/g lipid); C_s = concentration of contaminant in the sediment (ng/g carbon); k_1 = uptake rate constant (g carbon g lipid^{-1} hr^{-1}); and k_2 = depuration rate constant (hr^{-1}); t = time (hr). With initial conditions of t = 0, C_w = 0, and C_s = constant, this equation has the simple solution of:

$$C_w = C_s\ (k_1/\ k_2)\ (1 - e^{-k_2t}) \qquad (2)$$

Normally the uptake rate constant (k_1) is calculated by fitting the first-order model above (Equation 2) to measured organism contaminant residues using an iterative, nonlinear, least squares curve-fitting technique (SigmaPlot®, Jandel Scientific, San Rafael, CA, USA). However, because the uptake data did not fit the nonlinear model (i.e. the concentration in the worm did not stabilize for three time points by day 28), the uptake rate constant was determined from linear regression of the concentration in the worm on days 0, 2, and 4 of uptake (when elimination processes were assumed to be negligible) normalized to the mean day 0 sediment concentration, versus time. Because BDE 209 was not detected in the worms until day 8 of the exposure to spiked sediments, its uptake rate was calculated using the concentration in the worms from all of the time points sampled. Congener-specific biota-sediment accumulation factors (BSAFs) were calculated by normalizing the day 28 concentration in the worm (ng/g lipid) to the mean of the day 0 and 28 concentration in the sediment (ng/g carbon). Values for K_{ow} were obtained from Braekevelt et al. (2003), the EU risk assessment report for Deca-BDE (2002), or if not available were estimated based on similarity in structure to BDEs with known K_{ow} (i.e. same homologue group).

4.2.5 Data analysis

A one sample t-test (Systat v. 11) was used to determine differences in worm weights and total lipids between days 0 and 28. One-way ANOVA with Tukey's studentized range test was used to test for differences in worm wet weights and lipid among treatments on day 28. Minitab was used to perform the polynomial regression on uptake rates vs. log K_{ow}. Differences in sediment concentration between days 0 and 28 for each treatment were determined using a student's two-sided t test. An α of 0.05 was used for all statistical tests.

4.3 Results and Discussion

4.3.1 Worm Health

Worms remained buried in the sediment during the exposure and the sediment surface showed signs of active re-working in all sediment treatments. Survival was calculated by pooling individuals from the replicates in each treatment and was 90%, 83%, and 88% for the control, field, and spiked sediment, respectively. Worm lipid content (~1% wet weight basis) was not significantly different among treatments on day 28 or between days 0 and 28. Worm wet weights in the control sediment (2.2 ± 0.5 g) and field sediment (2.57 ± 0.07 g) on day 28 were significantly lower than the worms on day 0 (3.7 ± 1.6 g). Worms exposed to the control sediment had significantly lower wet weights (2.16 ± 1.0 g) than worms exposed to the spiked sediment (3.30 ± 1.33 g) on day 28. It is possible that the decreased weight of worms exposed to the field and control sediments on day 28 was associated with lower sediment ingestion rates and thus lower accumulation of contaminants compared to the worms in the spiked sediment treatment. Since accumulation of BDEs in these worms was low, these differences likely did not influence our results.

4.3.2 Sediment exposures

Concentrations of BDEs and PCB 209 in the spiked and field sediments on days 0 and 28 are shown in Figure 4-1. BDEs and PCB 209 were not detected in the control sediment (MDLs 0.004 - 4 and 2 ng/g dry, respectively). The organic carbon content of the control, spiked sediment, and field sediment was 1.3 ± 0.1, 1.5 ± 0.4, and 4 ± 0.1 %, respectively. BDEs 17, 28/33, 47, 66, 75, 85/155, 99, 100, 138, 153, and 154 were consistently detected in the spiked sediments and are components of the Penta-BDE commercial product DE-71 (LaGuardia et al. 2006). BDEs 183, 196, 197, 206, 207, 208 and 209 were also consistently detected in the spiked sediments and are components of the Deca-BDE commercial product, with the exception of BDE 183 (LaGuardia et al 2006). BDE 183 may either be an impurity in the commercial mixture used for this study (FR300BA) or the result of debromination during experimental setup and/or laboratory processing since it was present in the sediment on both days 0 and 28 of the experiment. The primary components of Deca-BDE were detected at high concentrations in the field sediments and were similar to concentrations in the spiked sediment (Figure 4-1). Components of the Penta-BDE product (DE-71), as well as BDEs 196 and 197 which are minor components of the Deca-BDE product, were detected at low concentrations in the field sediments (0.1-3 ng/g dry). The BDE congener profile in the field sediments indicates that Deca-BDE is the primary source of BDEs to Back River, with only a small contribution of Penta-BDE.

BDE concentrations in the field sediments on day 28 were not significantly different from day 0 values. For the spiked sediments, statistical comparisons were not possible due to 20-50% lower recoveries of the surrogate standards on day 28 compared to day 0. If concentrations were corrected for recoveries, concentrations on day 28 are similar or higher than those on day 0 for most congeners, suggesting low potential for significant degradation of these congeners over the time course of the exposure. However, concentrations of BDEs 47, 99, 85/155, and 100 in sediments were ~50% lower on day 28 compared to day 0 (Figure 4-1), with no change in concentration for BDEs 153 and 154. Sample processing may have influenced this apparent decrease over time, as indicated by the difference in surrogate standard recoveries. However, chemical-sediment interactions related to contact time (i.e. sediment aging) likely influenced this decrease to a greater extent since the concentrations of BDE 153 and 154 did not change over time. Ciparis and Hale (2005) observed 25 - 45% reductions in the spiked sediment concentrations of all BDE congeners during the six week chemical-sediment aging period prior to their bioaccumulation experiment, and similar to our study, did not observe differences in BDE concentrations in the naturally contaminated sediment (i.e. biosolids) over time. The authors suggested that this change in concentration may have represented a change in binding strength or partitioning of the BDEs in the spiked sediment matrix over time. Changes in BDE partitioning in sediments may have caused a reduction in the solvent-extractable concentration of BDEs 47, 99, 85/155, and 100 by day 28 over the time course of our experiment as well. Any changes in partitioning occurring in this study would likely have been exacerbated since sediments were aged for only 48 hrs prior to worm exposure. The reason for differential changes in partitioning among congeners (i.e. reductions in BDEs 47, 99, 85/155, 100 but not 153 and 154) is not clear, but is likely influenced by the smaller congener size and K_{ow} of the lower brominated congeners which may allow them to be more strongly incorporated to the sediment particles. BDE and PCB 209 concentrations were variable among replicates in the spiked sediments, presumably due to their extreme hydrophobicity, incomplete homogenization, and short chemical/sediment contact time (< 48 hrs). The bioavailability (BSAF) of BDE 209 and PCB 209 to the worms was determined for each replicate tank, thus variation in sediment concentrations among tanks was not a concern. Congener-specific concentrations in sediment are listed in Appendix C.

4.3.3 Accumulation from spiked sediments

BDEs and PCB 209 were not detected in worms on day 0 (detection limits 0.002 - 0.3 and 0.1 ng/g wet weight, respectively). Penta-BDE congeners accumulated in worms exposed to control sediments, though concentrations were low (total BDEs 0.6 ± 0.2 ng/g wet wt). BDE concentrations in worms exposed to the spiked sediments increased over time, reaching a total BDE concentration of 58 ± 13 ng/g wet weight by day 28. BDEs that accumulated in the highest concentrations in the worms are shown in Figure 4-2, with BDEs 47, 99 >100, 153, 154 > 66 > 28/33, 85/155, 209. BDEs 17, 25, 75, 138, 183, 196, and 207 were also detected in the worms on day 28 at lower concentrations (0.04-0.4 ng/g wet weight). BDE 209 was not detected in the worms on days 0, 2, or 4 (< 0.3 ng/g wet weight) but was consistently detected in the replicates on day 28 (0.5 ± 0.1 ng/g wet weight). *N. virens* selectively accumulated the Penta-BDE congeners over BDE 209, the other Deca-BDE congeners, and PCB 209 even though concentrations of the Deca-BDE congeners and PCB 209 in the exposure sediments were an order of magnitude higher than the Penta-BDE congeners (Figures 4-1 and 4-2). Selective accumulation of the Penta-BDE congeners over BDE 209 was also observed in *L. variegatus* after 28 days of exposure to spiked sediments (Ciparis and Hale 2005). Congener-specific concentrations in the worms are listed in Appendix C.

The predominance of BDEs 47 and 99 in *N. virens* followed by BDEs 100, 153, and 154 was also observed for the oligochaete *Lumbriculus variegatus* in a 28 day study by Ciparis and Hale (2005), which exposed the worms to sediments spiked with the same Penta-BDE mixture (DE-71) and BDE 209. BDEs 47 and 99 together comprise ~87% of the DE-71 mixture, though BDE 99 dominates (~50%; LaGuardia et al. 2006) and was thus slightly higher than BDE 47 in the exposure sediments (Figure 4-1). Despite a higher exposure to BDE 99, concentrations of BDEs 47 and 99 in *N. virens* on day 28 were similar. A similar finding was reported in the study with *L. variegatus*, in which BDE 47 was twice as bioavailable as BDE 99 from spiked sediments (Ciparis and Hale 2005). Despite the higher percentage of BDE 99 in the Penta-BDE commercial mixture, BDE 47 almost always dominates the BDE body burden in higher trophic level species (Hites 2004) and may be influenced by the higher availability of this congener from sediments to deposit-feeding species at the base of food webs. Conversion of higher brominated congeners to BDE 47 via biotransformation pathways (Stapleton et al. 2004) may also contribute to the higher bioavailability of this congener in some vertebrates; however similar biotransformation capacities in invertebrates have not been reported.

Upon exposure to spiked sediments, BDEs and PCB 209 worm concentrations increased until day 16, after which the Penta-BDE congeners (47, 99, 100, 153, 154) appeared to decrease or plateau while the other BDEs and PCB 209 continued to increase to day 28. The lack of an increase in the Penta-BDE congener concentrations between days 16 and 28 suggests that these congeners may have been approaching steady-state towards the end of the exposure (Figure 4-2). A gradual reduction in the bioavailable fraction of the Penta-BDE congeners in the spiked sediment is a possible explanation for this apparent steady-state condition. As mentioned previously, concentrations of BDEs 47, 99, 85/155, and 100 in sediments were ~50% lower on day 28 compared to day 0 (Figure 4-1), with no change in concentration for BDEs 153 and 154. These differences were likely due to increases in the binding strength or partitioning of the BDEs in the spiked sediment matrix over time (i.e. sediment aging), which may have also affected the bioavailability to *N. virens* over the 28 day exposure in our study. Ciparis and Hale (2005) suggested this to be the case in their BDE spiked sediment bioaccumulation with the oligochaete *L. variegatus* as well. Several studies have shown that increased chemical-sediment contact results in decreased bioavailability as the chemical becomes more tightly associated with the sediment matrix (e.g., Landrum 1989). Our spiked sediments were aged for less than 48 hrs prior to worm exposure so substantial increases in sediment-chemical binding strength over the 28 day exposure were likely. Thus non-equilibrium conditions in the spiked sediment prevented the determination of whether the concentrations of the Penta-BDE congeners in *N. virens* were at steady-state by day 28.

4.3.4 Uptake rates from spiked sediment

Uptake rates (k_1) for BDEs from spiked sediment into *N. virens* ranged from 2.6 x 10^{-3} to 3 x 10^{-7} g carbon g lipid^{-1} hr^{-1} and declined with increasing K_{ow} (Figure 4-3; Appendix C). This trend is associated with slower diffusion of larger molecules through aqueous media and across membranes. The uptake rate for BDE 209 (3 x 10^{-7} g carbon/g lipid*hr) was three orders of magnitude lower than the uptake rates for congeners in the Penta-BDE mixture. The uptake rate for BDE 47 was twice as high as the uptake rate for BDE 99 and the other Penta-BDE congeners, in agreement with the higher bioavailability of BDE 47. *Lumbriculus variegatus* also accumulated BDE 47 at a rate twice as high as BDE 99 from spiked sediments and the uptake rates for these congeners were three orders of magnitude higher than those for *N. virens* (Leppänen and Kukkonen 2004). Interestingly, the uptake rates for the Penta-BDE congeners in this study with spiked sediments were similar to the PCB uptake rates for *N. virens* exposed to field-contaminated sediments in a previous 28 day bioaccumulation study (Chapter 3).

4.3.5 Accumulation from field sediments

BDE concentrations in *Nereis virens* exposed to field sediments for 28 days were very low (total BDEs 1.1 ± 0.2 ng/g wet weight; Appendix C). The BDE concentration in the worms exposed to the field sediment was very similar to the worms exposed to control sediments for 28 days (total BDE 0.63 ± 0.2 ng/g wet weight). BDEs 47 and 99 accumulated in the highest concentrations (both ~0.4 ng/g wet weight), followed by BDE 100 (0.1 ng/g wet weight), and then BDEs 28/33, 66, 85/155, 153, 154, 183, 197, 207, and 208, which were all < 0.1 ng/g wet weight in the worms. These congeners are components of either the Penta- or Deca-BDE commercial mixtures (LaGuardia et al. 2006) and also accumulated in worms exposed to the spiked sediments, with the exception of BDEs 197 and 208. BDE 197 was not detected in the spiked sediments but was detected in the field sediments and is either a component of other BDE commercial mixtures not used in this study or is a debromination product of BDE 209. The reason for detection of BDE 208 in worms exposed to the field sediments but not the spiked sediments is unclear since it was detected in the sediments at similar concentrations in both exposures (~5 ng/g dry weight). BDE 209 was not detected in worms exposed to field sediments (< 0.3 ng/g wet) despite an exposure concentration of 2250 ± 48 ng/g dry weight. BDEs 196 and 206, minor components of the Deca-BDE commercial mixtures, were also below detection in the worms (< 0.06 ng/g wet).

4.3.6 Bioavailability of BDE 209

Despite exposure to similar sediment concentrations, BDE 209 was not available to worms from field sediments; whereas worms exposed to the spiked sediments accumulated BDE 209 above detection limits by day 28 (0.5 ± 0.1 ng/g wet weight). BDE 209 was also not available to the oligochaete *L. variegatus* from biosolids but was minimally detected in this species after exposure to BDE 209-spiked sediments (Ciparis and Hale 2005). The large molecular weight, size, and extreme hydrophobicity of BDE 209 (log K_{ow} 6.2-9.97; EU risk assessment 2002) would be expected to result in strong sorptive interactions with sediment particles and reduced rates of diffusion through solutions (e.g. digestive fluid) and across biological membranes, ultimately limiting uptake by organisms. Even though HOCs are generally more bioavailable from spiked sediments compared to field sediments, this study revealed that the physical properties of BDE 209 appear to so strongly constrain desorption from sediment and/or absorption in the organism that even bioavailability from highly contaminated spiked sediments with very short chemical-sediment contact time was low. Biotransformation of BDE 209 did not appear to be occurring in our study since the concentrations of the lower brominated congeners were uniformly low in the worms exposed to field sediments. Detection of BDE 209 in aquatic species collected from the field has generally been sporadic and concentrations are usually low when detected (EU risk assessment 2002). Low availability from sediments into deposit feeders may limit the transfer of BDE 209 to higher trophic levels.

4.3.7 BSAFs in spiked vs. field sediments

Biota-sediment accumulation factors (BSAFs) were determined for each congener detected in *N. virens* from both the spiked sediment and field sediment to compare the relative bioavailability from each matrix (Appendix C). Mean day 28 BSAFs ($BSAFs_{28}$) for worms exposed to spiked sediments ranged from ~0.0003-0.6 (Figure 4-4). BDEs 28/33 and 66 had the highest $BSAFs_{28}$ followed by BDE 17 and the predominant congeners in the Penta-BDE mixture, which had similar bioavailabilities ($BSAFs_{28}$ 0.15-0.3). The mean $BSAF_{28}$ for BDE 207, BDE 209, and PCB 209 from the spiked sediments were 0.0012 ± 0.0003, 0.0003 ± 0.00008, and 0.0024 ± 0.0001, respectively. $BSAFs_{28}$ for the field sediments ranged from 0.3-1.6 and were ~2-5 times higher than the BSAFs for the Penta-BDE congeners in *N. virens* exposed to the spiked sediments.

BDE $BSAFs_{28}$ for *N. virens* exposed to the spiked sediments decreased with increasing K_{ow} (Figure 4-4). $BSAFs_{28}$ for the Penta-BDE congeners were three orders of magnitude higher than the $BSAFs_{28}$ for BDE 209. BDEs that were the most bioavailable (BDEs 28/33, 66) had log K_{ow}'s of ~6-7, with lower accumulation of the more hydrophobic congeners. This trend is generally consistent with other studies of HOC uptake by deposit feeders (e.g. Tracey and Hansen 1996) and highly chlorinated PCBs specifically (Maruya and Lee 1998). For HOCs with log $K_{ow} > 7$, bioavailability generally decreases with increasing molecular weight due to stronger associations with sediment particles and lower solubility in water and digestive fluids. When considering only the predominant Penta-BDE congeners (BDEs 47, 99, 100, 153, 154), which represent a log K_{ow} range of 6.8-7.9, bioavailability did not vary with K_{ow} for *N. virens* in this study (Figure 4-4) or for *L. variegatus* in the study by Ciparis and Hale (2005).

Congener substitution pattern was a better predictor of BDE bioavailability in *L. variegatus*, though this was not the case for *N. virens* in this study. BDE BSAFs$_{28}$ for *Nereis virens* exposed to field sediments were independent of log K_{ow}. Since only the Penta-BDE congeners were detected in worms exposed to the field sediment, this independence of BSAFs$_{28}$ with K_{ow} is similar to that observed for the Penta-BDE congeners in worms exposed to the spiked sediment.

In Figure 4-5, BDE BSAFs$_{28}$ for *Nereis virens* exposed to field sediments for 28 days are compared to BSAFs for *Nereis succinea* collected from Back River sediments in a previous study (Chapter 2). The BSAFs for *N. succinea*, which are presumed to represent a steady-state condition, were widely variable and ranged from ~2 – 7. These BSAFs are within range of the BDE BSAFs for field-collected earthworms (Matscheko et al. 2002) and those predicted for the oligochaete *L. variegatus* (Leppänen and Kukkonen 2004). The day 28 values for *N. virens* exposed to the field sediment in this study were two to nine times lower than the field-derived BSAFs for *N. succinea*, suggesting that *N. virens* did not reach steady-state in the field sediments by day 28. This is consistent with the previous bioaccumulation study with *N. virens* exposed to Baltimore Harbor sediments, in which most of the higher molecular weight PCBs, which have similar K_{ow} values to the Penta-BDE congeners, did not reach steady state by day 28 (Chapter 3). These results suggest that BSAFs$_{28}$ calculated from 28 day bioaccumulation tests underestimate the actual, in situ concentration of BDEs in deposit-feeding species.

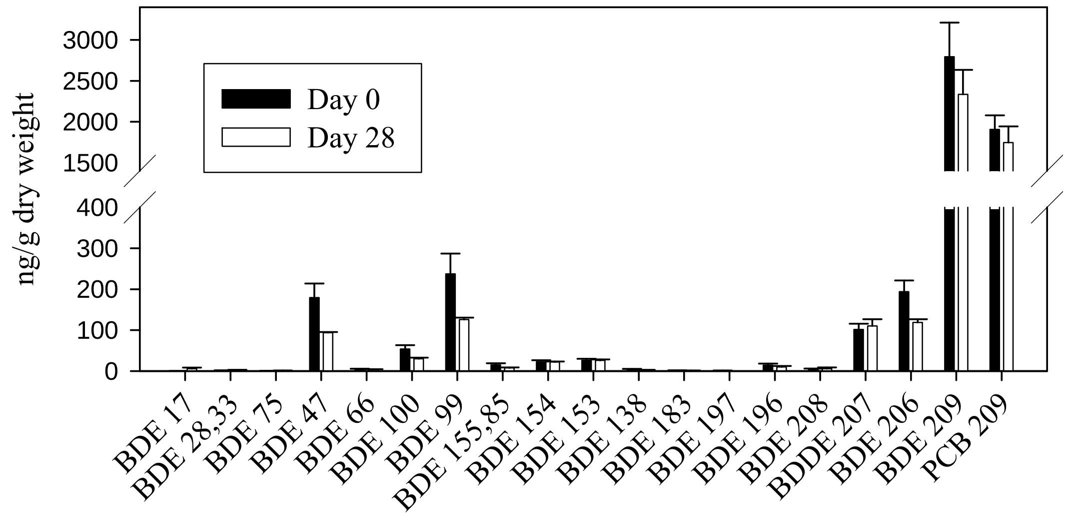
In contrast to what is usually observed for HOCs, BDEs appeared to be more bioavailable to *N. virens* from the field sediments than the spiked sediments, as indicated by the two to five-fold difference in BSAFs$_{28}$ (Figures 4-4 and 4-5). We predicted that

BDE bioavailability would be higher from the spiked sediments since the chemical-sediment contact time (i.e. sediment aging) was only 48 hrs. Such a short period of time for the BDEs to become incorporated into the sediment matrix was expected to result in easier desorption and thus higher accumulation in tissue compared to field sediments in which BDEs may have had months or years to age. For example, in the Ciparis and Hale study (2005) bioaccumulation factors for BDEs 47, 99, and 100 were 5-10 times higher for the oligochaete *L. variegatus* exposed to spiked sediments aged for six weeks compared to those exposed to composted biosolids, in which the BDE contact time was likely much longer. It is possible that the higher than predicted $BSAFs_{28}$ for *N. virens* exposed to field sediments in this study were the result of the low BDE concentrations in both the worms and the sediment (< 1 ng/g). The propagation of error associated with these small values would be manifested as large differences in $BSAFs_{28}$. These $BSAFs_{28}$ were also higher than expected for a deposit feeder exposed to field sediment for only 28 days. Most BDE BSAFs for deposit feeders collected from Back River ranged from 1-7 (Chapter 2) and most BSAFs for earthworms collected from BDE-contaminated soil were within this range or higher (Matscheko et al. 2002). The $BSAFs_{28}$ for *N. virens* exposed to the field sediment were already at the lower end of this range by day 28 (0.3-1.6), suggesting that comparisons of these $BSAFs_{28}$ with other BSAFs are not valid. In exposures to Passaic River (NJ, USA) sediments, it took *N. virens* 70-120 days to attain steady-state PCB concentrations (Pruell et al. 1993). An equally long time to steady-state is expected for the structurally similar BDEs.

4.4 Conclusions

The bioavailability of BDEs to *N. virens* indicates that these chemicals can be remobilized from sediments and transferred to aquatic food webs. Selective accumulation of congeners in the Penta-BDE commercial mixture over BDE 209 and other components of the Deca-BDE mixture support the prevalence of the Penta BDE congeners in higher trophic level species. Chemical hydrophobicity (K_{ow}) was not a good predictor of bioavailability for congeners in the Penta-BDE commercial mixture, but the large difference in hydrophobicity between congeners in the Penta- and Deca-BDE mixtures controlled the differences in bioavailability observed. Comparison of BDE bioavailability from the spiked and field sediments after 28 days was confounded by the low concentration of the Penta-BDE congeners in the field sediment and the worms exposed to it. However, the BSAF for *N. virens* after 28 days of exposure to the field sediment was still lower than the BSAF for field-collected *Nereis succinea* indicating that 28 day bioaccumulation tests using *N. virens* may underestimate the actual, in situ concentration of BDEs in deposit-feeding species. BDE 209 was not bioavailable to *N. virens* from the highly contaminated field sediment after 28 days of exposure and was only minimally detected in worms exposed to spiked sediments in which bioavailability was maximized. Studies which investigate the mechanisms responsible for the lack of BDE 209 bioaccumulation under such high exposure conditions would improve our understanding of BDE bioavailability in aquatic environments and assist in clarifying potential exposure routes to higher trophic level species.

Spiked sediment mixture



Field sediment

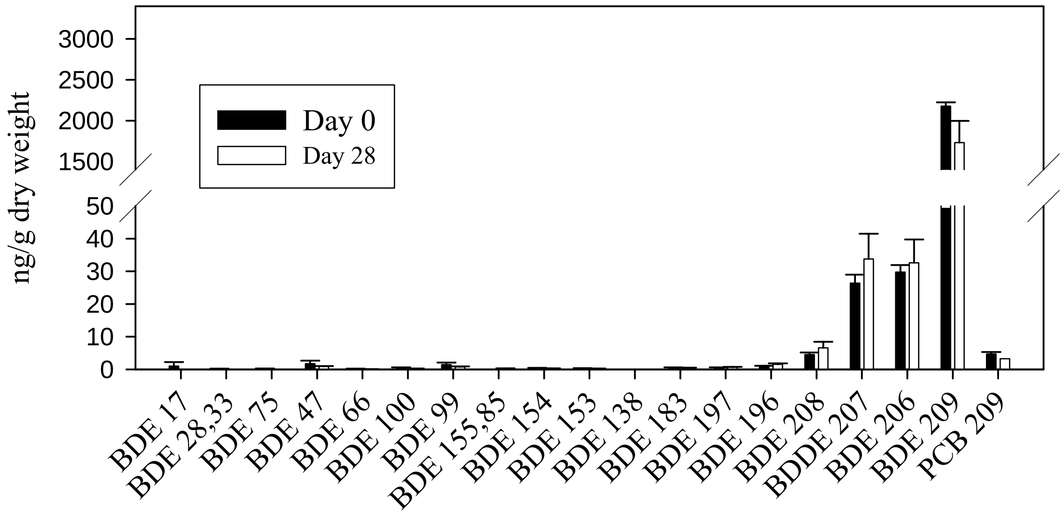
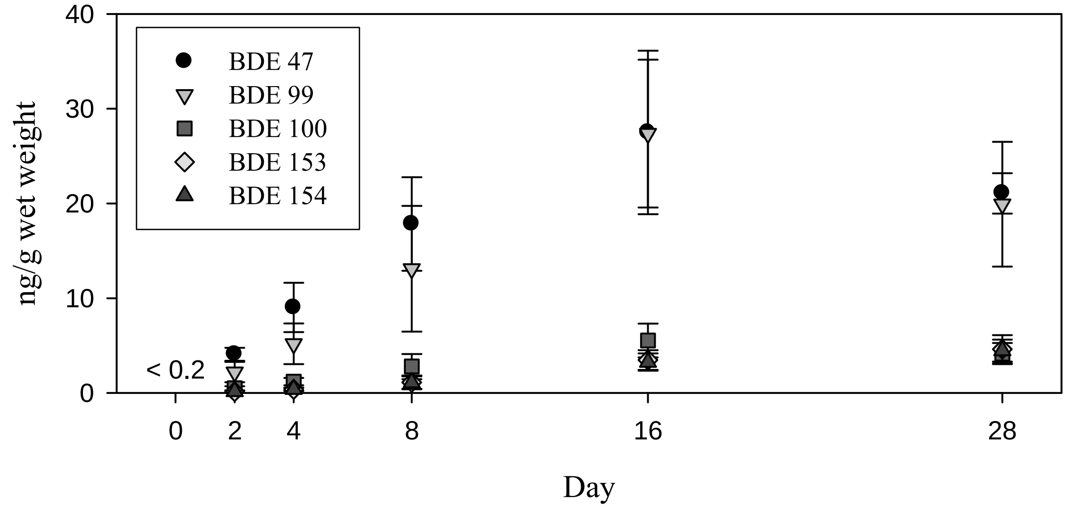


Figure 4-1. Mean concentrations of BDEs and PCB 209 in experimental sediments on days 0 and 28 of the exposure. Error bars represent one standard deviation of the mean.



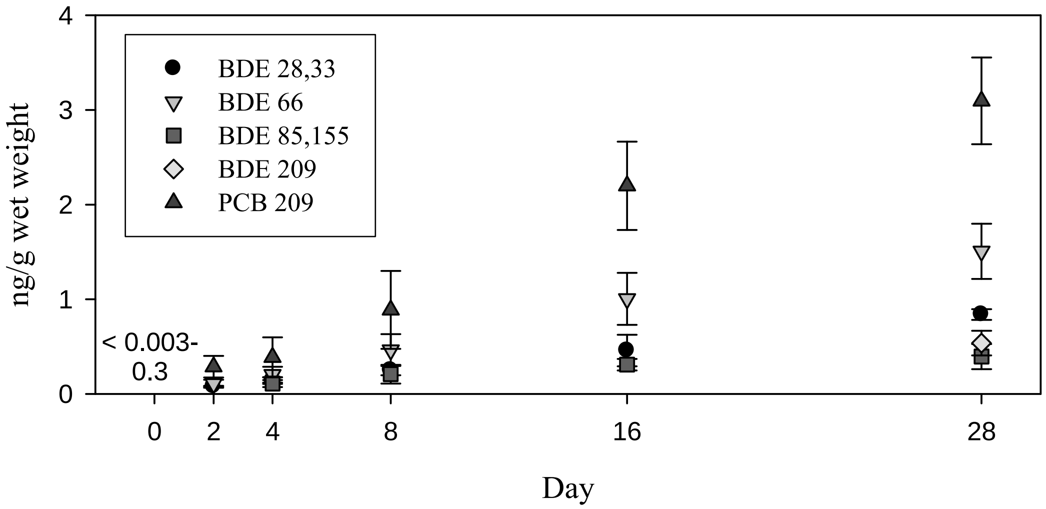


Figure 4-2. Mean concentrations of BDEs and PCB 209 accumulated in *Nereis virens* during a 28 day exposure to spiked sediments. Error bars represent one standard deviation of the mean. BDEs 17, 25, 75, 138, 183, 196 and 207 were detected at concentrations ranging from 0.04 - 0.4 ng/g wet weight but are not shown.

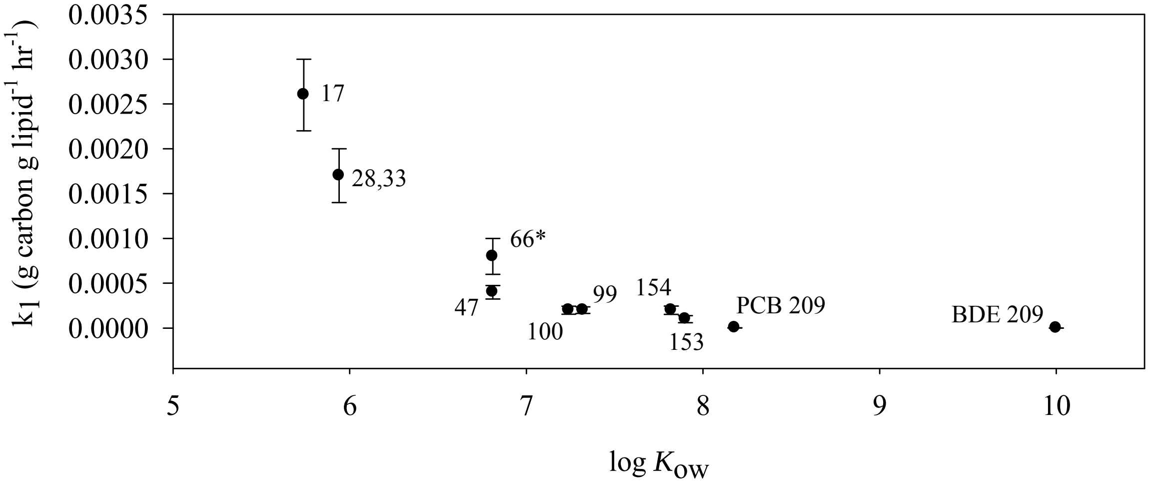


Figure 4-3. BDE and PCB 209 uptake rates (k_1) for *Nereis virens* exposed to spiked sediments. Error bars represent the standard error. * Estimated log K_{ow} for BDE 66. The uptake rate for BDE 209 was calculated using data from all sampling days, including day 28. Polynomial regression: $p < 0.001$, $y = 0.0204 - 0.00470x + 0.000267x^2$, $R^2 = 0.907$.

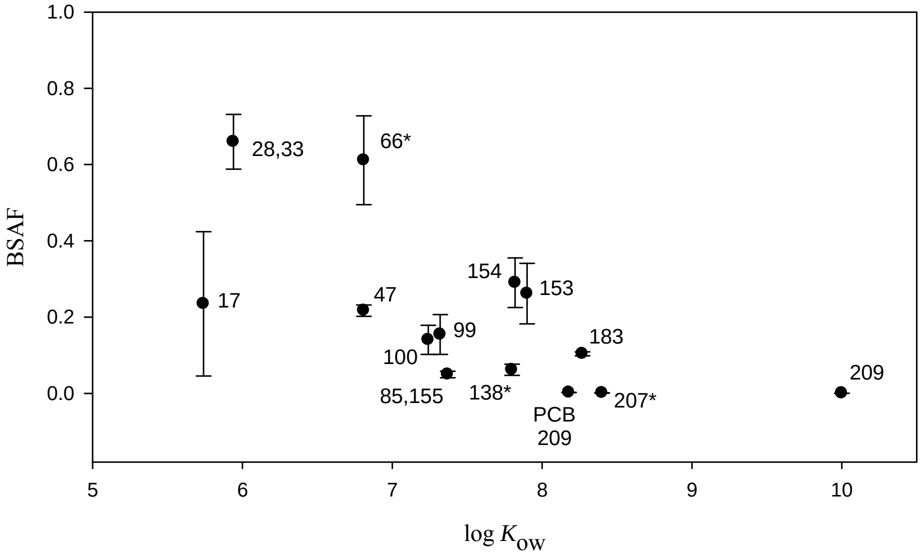


Figure 4-4. Biota-sediment accumulation factors (BSAFs) vs. log K_{ow} for *Nereis virens* exposed to spiked sediments for 28 days. Linear regression: p = 0.019, y = -0.1212x + 1.1225, R^2 = 0.407. Error bars represent one standard deviation of the mean.*Estimated log K_{ow} for BDEs 66, 138, and 207.

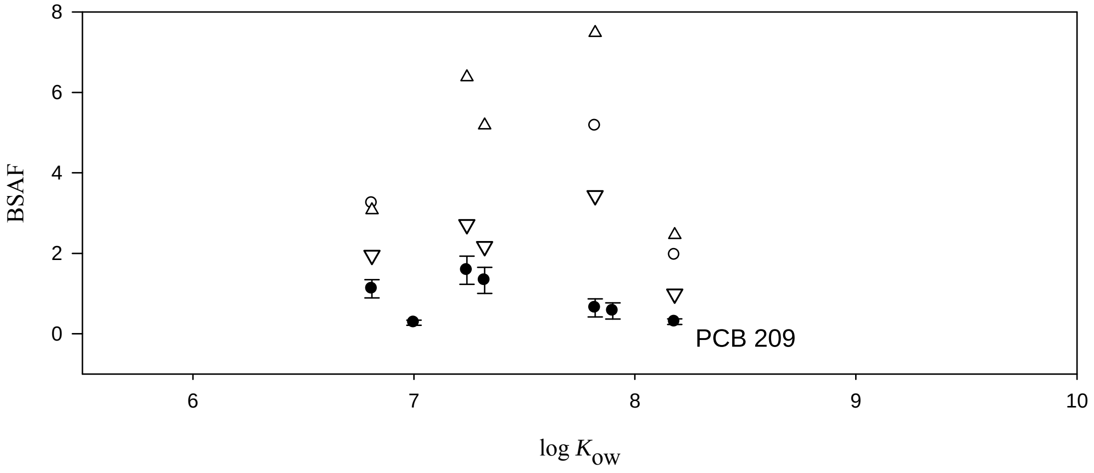


Figure 4-5. BDE and PCB 209 biota-sediment accumulation factors (BSAFs) vs. log K_{ow} for *Nereis* sp. in Back River sediments (Baltimore, MD, USA). Filled symbols: *Nereis virens* after 28 days of exposure to field sediment in this study (mean, one standard deviation). Open symbols: *Nereis succinea* collected from various sites in Back River from a previous study (Chapter 2). Shapes represent different field samples. Linear regression for 28 day data, not including PCB 209: p = 0.79, y = -0.1497x + 2.0151.

Chapter 5

The bioavailability of decabromodiphenyl ether to the marine polychaete *Nereis virens*

5.1 Introduction

Decabromodiphenyl ether (BDE 209) is the main component of Deca-BDE, a commercial flame retardant mixture commonly used in thermoplastics for electrical and electronic equipment, as well as in the automotive, textile, and building construction industries to comply with fire safety regulations. The total worldwide production of Deca-BDE was over 56,000 tons in 2001 (BSEF 2004) and in the United States, industrial emissions of Deca-BDE to the environment have approximately doubled from 1988 to 2001 (Hale et al. 2006).

Because BDE 209 is extremely hydrophobic and has a very low water solubility (< 0.1 μg/L), low volatility, and large molecular weight (959 g/mol), it forms strong associations with particles and concentrates in dust, sewage sludge, and aquatic sediments (Hale et al. 2006; EU risk assessment 2002). Mechanism(s) of entry into the environment are not clear, but include release from the consumer products during use. A growing number of studies are reporting accumulation of BDE 209 in biota, including human breast milk (Schecter et al. 2003), mammals (e.g. Christensen et al. 2005), predatory birds (e.g. Lindberg et al. 2004) and fish (e.g. Johnson-Restrepo et al. 2005). Detection of BDE 209 in biota is generally sporadic however, leading to questions regarding routes of exposure to these species. BDE 209 caused developmental neurotoxicity in mice (Viberg et al. 2003) and is capable of undergoing debromination via photolysis (Soderstrom et al. 2004), biotransformation (Stapleton et al. 2004), and microbes under anaerobic conditions (Gerecke et al. 2005) to form lower brominated congeners which are more bioaccumulative and also potentially more toxic than BDE 209 itself. Congeners in Penta-BDE, a mixture now phased out of production and use in new products, are potential neurotoxicants (Eriksson et al. 2001), interfere with endocrine function (Stoker et al. 2005), and are the BDE congeners most frequently detected in biota worldwide (Hites 2004). The potential for formation of these more bioaccumulative and potentially toxic Penta-BDE congeners as a result of exposure to BDE 209 has heightened concern for this very persistent chemical and prompted investigations into the environmental relevance of these debromination processes. Because of the uncertainties regarding toxicity, the continued use of Deca-BDE in large volumes, and limited availability of BDE 209 fate data, elucidation of BDE 209 exposure routes to higher trophic levels is needed.

Deposit-feeding invertebrates living in contaminated sediments efficiently accumulate hydrophobic organic contaminants (HOCs) such as polychlorinated biphenyls (PCBs), and are capable of transferring them from sediments to aquatic food webs (e.g., Pruell et al 2000). In a previous study, we collected polychaete worms (*Nereis succinea* and *Marenzelleria viridis*) and amphipods (*Leptocheirus plumulosus*) from a highly BDE-contaminated tributary of the Chesapeake Bay that receives effluent from a major wastewater treatment plant serving the city of Baltimore (Maryland, USA) to investigate the potential for transfer of BDEs to sediment-ingesting invertebrates (Chapter 2). We found that BDE 209 did not accumulate in worms or amphipods despite living in sediments containing up to 2000 ng BDE 209/g dry sediment; however, detection limits were high (20-180 ng/g wet weight) due to the small amount of tissue sample available. In a subsequent laboratory study investigating the uptake of HOCs from several sites within the highly contaminated Baltimore Harbor estuary, we also found that while the marine polychaete *Nereis virens* and estuarine amphipod *Leptocheirus plumulosus* accumulated polycyclic aromatic hydrocarbons (PAHs) and PCBs from sediments after a 28 day exposure, BDE 209 did not accumulate in these species (MDLs 0.3-4 ng/g wet weight) despite exposures ranging from 50–350 ng/g dry sediment (Klosterhaus et al. 2006; Chapter 3). Lack of any detectable accumulation by these deposit-feeding species under such high exposure conditions was surprising, particularly for *Nereis*, since polychaete worms typically process large volumes of sediment and sediment ingestion is the major route of HOC uptake for many deposit-feeding species (Weston et al. 2000). Our results agree with a study by Ciparis and Hale (2005) in which the freshwater oligochaete *Lumbriculus variegatus* did not accumulate BDE 209 after a 28 day exposure to sewage sludge containing 300 ng BDE 209/g dry solid. In contrast to these results, earthworms living in BDE-contaminated soils accumulated BDE 209 (Sellstrom et al. 2005), which may indicate that BDE 209 is more bioavailable to terrestrial food webs.

Sediment ingestion is considered to be the primary route of HOC exposure for deposit-feeding invertebrates. In vertebrates, a general mechanism for absorption of nutritional lipids from gut contents is solubilization into digestive fluid surfactant micelles followed by diffusional transport and absorption across the gut wall (Shiau 1987). Absorption of nutritional lipids from ingested sediment is thought to follow a similar mechanism in deposit-feeders, with the inadvertent solubilization of HOCs into digestive fluid coinciding with nutritional lipid transport (Voparil et al. 2003). Studies have investigated the role of surfactant micelles in the absorption of sediment-associated PAHs and chlorinated hydrocarbons using polychaete gut fluids, with the results suggesting that solubilization in gut fluid, and specifically surfactant micelles, is a prerequisite for absorption (Weston and Mayer 1998; Voparil and Mayer 2000; Ahrens et al. 2001). However studies have not yet investigated the solubility of BDEs in gut fluid.

Mechanisms that could potentially limit BDE 209 accumulation in *Nereis* sp. include (1) the inability of digestive fluid to mobilize BDE 209 from the sediment matrix in the gut (i.e. sediment desorption), (2) chemical interactions in the gut which limit BDE 209 solubility, and/or (3) an inability or inefficiency of BDE 209 transfer from the gut fluid across the gut wall (i.e. steric hindrance). Strong associations with organic matter and/or other reactive sites on sediment particles reduce the bioavailability of PAHs and PCBs to benthic organisms (e.g. Cornelissen et al. 2005) and may also play a role in the fate of sediment-associated BDEs by limiting desorption into the gut fluid of deposit-feeders. Once solubilized from sediments, BDE 209 availability may be limited by competition for micellar space or other interactions occurring in the gut fluid. Studies have shown that similar classes of nutritional lipids compete for space in vertebrate digestive fluid micelles (Shiau 1987) and in a study with polychaete gut fluid, it was speculated that the less than expected solubilization of PAH from field sediments was the result of competition for micellar space (Voparil and Mayer 2000). Because there are likely a limited number of micelles at a given time, it is possible that other HOCs in sediments outcompete BDE 209 for space in gut fluid micelles, limiting BDE 209 bioavailability. Lastly, the large molecular size and weight of BDE 209 may also inhibit or prevent its transport in gut fluid and across the gut wall.

The purpose of this study was to elucidate the mechanism(s) limiting bioavailability of BDE 209 to *N. virens*. Our specific objectives were to test the hypothesis that BDE 209 does not accumulate because it is too large to cross the gut wall, and to determine if the bioavailability of BDE 209 is influenced by the presence of other BDEs. To meet these objectives, we conducted a 28 day bioaccumulation experiment in which bioavailability was maximized by introducing BDE 209 to *N. virens* in minimally aged spiked sediments (< 48 hrs) and a no sediment treatment in which worms were exposed to BDE 209 via spiked food. In addition to exposure to Deca-BDE alone in spiked sediments, worms were exposed to Deca-BDE in spiked sediments also containing a Penta-BDE commercial mixture and PCB 209 to investigate whether the presence of other BDEs influenced the accumulation of BDE 209.

5.2 Methods

5.2.1 Experimental Design

Uncontaminated *Nereis virens* (Aquatic Research Organisms, Hampton, NH) were exposed to five sediment treatments and three food treatments for 28 days. Worms in the sediment treatments were not fed and worms in the feeding treatments were kept in water only without sediment. The sediment treatments were: (1) Deca-BDE spiked sediment, (2) Deca-BDE/ Penta-BDE/ PCB 209 spiked sediment (referred to as the mixture spiked sediment treatment), (3) PCB 209 spiked sediment, (4) highly contaminated field sediment, and (5) a solvent control sediment. The feeding treatments were Deca-BDE spiked clam meat, PCB 209 spiked clam meat, and control clam meat with no chemicals added. The target concentration for Deca-BDE and PCB 209 in the individual and mixture spiked sediment treatments and the clam meat treatments was 2500 ng/g dry sediment or wet weight clam meat and was designed to approximate the BDE 209 concentration in the field sediment treatment. Field sediments were collected from the site which had the highest BDE 209 sediment concentration where organisms were found in a previous field study (Chapter 2). The Penta-BDE target concentration in the mixture sediment treatment was 1000 ng/g dry sediment and though much higher than typically sediment concentrations, was chosen to be sure accumulation was detectable after only a 28 day exposure. PCB 209 was used as a positive control for sediment and food ingestion since it accumulated in *N. virens* in a previous study (Chapter 3). An abiotic control treatment containing Deca-BDE and PCB 209 at the same target concentrations was also set up to track any changes in sediment chemical concentrations over 28 days.

5.2.2 Sediment collection and treatment spiking

Control sediment was collected from the Wye River, a tributary of the Chesapeake Bay on the eastern shore of Maryland with undetectable concentrations of BDEs and other contaminants (Klosterhaus et al. 2006; Chapter 3). The field sediment was collected from Back River, a highly BDE-contaminated tributary of the Chesapeake Bay that receives effluent from a major wastewater treatment plant serving the city of Baltimore (Maryland, USA). Surficial sediment was collected from each site using a

Ponar grab. The top 2-3 cm of sediment was placed in plastic buckets using stainless steel spatulas and kept at 4°C until use.

The Deca-BDE technical mixture (FR 300BA, decabromodiphenyl oxide 85.5%, ± 4% purity) and 2,2',3,3',4,4',5,5',6,6'-decachlorobiphenyl (PCB 209, ± 4% purity) were purchased from Accustandard (New Haven, CT) in neat form and dissolved into toluene and hexane, respectively. Deca-BDE technical mixtures generally contain >97% BDE 209 with a small contribution of nona- and octa-BDEs. The Penta-BDE technical mixture DE-71 was purchased from Great Lakes Chemical (IN, USA) and dissolved into toluene. Our analysis indicated that BDEs 47, 85, 99, 100, 153, and 154 comprised 32, 2, 48, 9, 4, and 4% of the DE-71 technical mixture by weight. For each spiked sediment treatment, the appropriate volume of each chemical standard was added to a small volume of control sediment in a glass beaker using either a glass seriological pipet or syringe and homogenized with a stainless steel spatula for several minutes. Since a large volume of solvent was required, and toluene and hexane are toxic, the spiked sediment was left under a fume hood in the dark overnight, and then exposed to a nitrogen gas stream for several hours the following day to facilitate solvent evaporation. Once most of the solvent had evaporated, the small volume of spiked sediment was transferred to a plastic bucket containing the rest of the control sediment used for each treatment and stirred vigorously with a stainless steel spoons and a shovel. The spiked sediments were then added to the exposure tanks after ~15 min of hand mixing.

For the treatments where worms were fed contaminated clam meat, fresh clams were purchased from a local seafood supplier, shucked, and homogenized in a mini food processor. Deca-BDE and PCB 209 (neat chemical, no solvent) were spiked individually into glass beakers containing cod liver oil and homogenized overnight on a stir plate using a Teflon-coated stir bar. The following day the oil mixture was transferred to aliquots of clam meat in a glass jar, stirred thoroughly with a stainless steel spatula, and frozen. Because oil was present on the water surface immediately after addition of the clam meat to the worm tanks, BDEs and PCB 209 were quantified in each clam meat treatment after immersion in seawater to provide a more accurate estimate of the chemical exposure.

5.2.3 Bioaccumulation experiment

Worms were exposed to each of the sediment treatments in triplicate 20 L glass aquaria containing 1.7 L of sediment and 15 L of overlying seawater, with the exception of the mixture spiked sediment treatment for which triplicate 56 L aquaria containing 4.5 L of sediment and 40 L of overlying seawater were used to accommodate a larger number of worms for a parallel kinetic uptake study (Chapter 4). Sediments and overlying water were added to each aquaria and allowed to settle overnight prior to worm addition. Ten worms per replicate were used for the Deca-BDE, PCB 209, field sediment, and control sediment treatments and 24 worms per replicate were used for the mixture spiked sediment treatment. Worms exposed to the sediment treatments did not receive supplementary food. Two replicate 20L aquaria were used for the abiotic control sediment treatment. Worms exposed to the spiked food treatments were housed individually in 4 inch diameter polyvinylchloride (PVC) tubes with nylon mesh attached to one end with silicone sealant. Eight PVC cylinders containing one worm each were placed in triplicate 56L glass aquaria containing a one inch thick plastic grating which covered the bottom of the tank to facilitate dissolved oxygen exchange among the cylinders. Each worm received ~200 mg of thawed, spiked food every two days for 28 days. Excess food, if any, and worm feces were removed from each cylinder prior to addition of 'fresh' food. For all treatments, ambient Patuxent River seawater (14 ppt) was supplemented with Instant Ocean to maintain 20 ppt overlying seawater in each tank. The experiment was conducted as a static renewal test with 1/3 of the overlying water exchanged 3 times per week. Room temperature was 20 ± 3 °C and a photoperiod of 16 hrs light, 8 hours dark was used. A glass pipette connected to silicone tubing and an air supply was used to gently aerate each tank. Salinity (20.6 ± 0.4 ppt) and dissolved oxygen (5.6 ± 0.9 mg/L) were monitored in each aquaria before each water change.

Sediment was sampled from each tank on day 0 prior to water and worm addition and on day 28 using a stainless steel spatula, placed in a glass jar, and frozen until analysis. Thirty worms were randomly selected on day 0, their individual weights recorded, and then separated into 3 composites of 10 worms each, and kept frozen in a glass jar until analysis. On day 28, worms from the sediment treatments were removed from each tank and transferred to aquaria containing control sediment. They were allowed to feed on the control sediment for 5 hours to facilitate purging of contaminated sediment from the gut and were then transferred to aquaria containing only seawater. Worms were then allowed an additional 19 hours for gut clearance. For worms fed clam meat, on day 28 any leftover food and fecal matter was removed from each cylinder and worms were allowed to clear their guts in the same experimental aquaria for 24 hours. Day 26 was the last day of feeding, thus worms in the food treatments were essentially without food for ~ 48 hrs. Following gut clearance, worms from all treatments were placed on aluminum foil, blotted with laboratory tissue to remove any debris and excess water, and their individual weights were recorded. Worms were then composited by replicate, placed in a glass jar, and kept frozen until analysis.

5.2.4 Chemical analysis

Composite worm samples were homogenized using a mini food processor. Worms and wet sediment were ground with sodium sulfate using a ceramic mortar and pestle to remove water. BDEs and PCBs were extracted from the samples using accelerated solvent extraction (ASE 300, Dionex, Sunnyvale, CA, USA) in dichloromethane. Deactivated alumina was added to the ASE extraction cell to remove lipids and other polar interferences from the samples. PCB 14 (3,5-dichlorobiphenyl), PCB 65 (2,3,5,6-tetrachlorobiphenyl), PCB 166 (2,3,4,4',5,6-hexachlorobiphenyl), ^{13}C-BDE 15 (4,4'-dibromodiphenyl ether) and ^{13}C-BDE 118 (2,3',4,4',5-pentabromodiphenyl ether) were used as surrogate standards and added directly to the ASE extraction cells prior to extraction. Following extraction, activated copper shavings were added to the sediment extracts to remove sulfur and left in the freezer overnight. Worm and sediment extracts were concentrated down to 1 mL using a rotary evaporator and exchanged into hexane. Nonpolar interferences were removed from the extracts using deactivated Florisil® column chromatography, and concentrated with a turbo evaporator to 1mL in hexane. Worm lipids were quantified gravimetrically by running a separate ASE extraction (without alumina added to the cells) of the worm sample ground in sodium sulfate, rotary evaporating the extract to 5 mL, transferring the extract to an aluminum weigh boat, and then allowing the dichloromethane to evaporate overnight under a fume hood. Sediment carbon was quantified using an Exeter Analytical CE440 Elemental Analyzer. PCBs in the worms and sediment were quantified using an Agilent 6890N gas chromatograph equipped with a ^{63}Ni electron micro electron capture detector and a 60 m DB-5 column (0.32 mm inner diameter, 0.25 µm film; J&W Scientific, Folsom, CA, USA). The oven temperature program consisted of an initial hold for 2 minutes at 100°C, a 4°C/min ramp to 170°C, and a 3°C/min ramp to 280°C that was held for 10 minutes. Samples were run using the splitless injection mode and the injector and detector temperatures were 250 °C for the GC-µECD. PCB 30 (2,3,6-trichlorobiphenyl) and PCB 204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl) were used as internal standards and were added to samples and calibration standards just prior to instrumental analysis. PCB standards were purchased from Ultra Scientific (North Kingstown, RI, USA) congeners were identified and quantified following methods routinely used in our laboratory (Ashley and Baker 1999). BDEs (34 congeners total) were quantified using programmed temperature vaporization (PTV) injection (5 µl injections in pulsed splitless mode) on an Agilent 6890N gas chromatograph coupled to an Agilent 5973N mass selective detector operated in negative chemical ionization mode. A 15 m DB-5MS column (J&W Scientific, Folsom, CA, USA) with an inner diameter of 0.25 mm and 0.1 µm film thickness was used. The oven temperature program consisted of an initial hold at 40°C for 1 min, a 20 °C/min ramp to 250 °C with no hold, a 1.5 °C/min ramp to 260 °C and held for 1 min, and a 25 °C/min ramp to 320 °C and held for 20 min. The injector and detector temperatures were 45 °C and 320 °C, respectively. Inlet and column flow were 100 ml/min and 1.5 ml/min, respectively. Prior to instrumental analysis, ^{13}C-CDE 86 (2,2',3,4,5-pentachlorodiphenyl ether) and ^{13}C-BDE 209 (decabromodiphenyl ether) were added as internal standards to all samples and calibration standards. The mass fragments *m/z* -79 and -81 were monitored for di- to octa-BDEs, -487 and -409 for the nona-BDEs and BDE 209, -318 and -316 for ^{13}C-CDE 86, and -495 and -415 for ^{13}C BDE 209 for quantitative and qualitative ions, respectively. BDE standards were purchased from Cambridge Isotope Laboratories (Andover, MA, USA), Wellington Labs (Guelph, Ontario, Cananda), and Accustandard (New Haven, CT, USA) or received from the U.S. National Institute of Standards and Technology (NIST).

Laboratory blanks were processed with each set of samples to determine the extent of contamination in samples due to laboratory air and sample processing. Matrix blanks (surrogate recovery and analyte standards spiked into sodium sulfate) and sample matrix spikes (surrogate recovery standards and analyte standards spiked into a sample containing sodium sulfate) were also extracted to determine extraction efficiency. Method detection limits (MDLs) for all organic analytes were defined as three times the mean analyte mass in laboratory blanks divided by the mass of worm or sediment extracted in each sample. Mean recoveries of the PCB surrogate standards PCB 14, PCB 65, and PCB 166 were 64 ± 26, 57 ± 11, and 71 ± 11% in worms and clams and 42 ± 6, 50 ± 8, and 69 ± 9% in sediment samples, respectively. Mean recoveries of PCB 14 and 65 for the field sediment samples were not quantifiable, likely due to interference(s) from some reactive component of the field sediment matrix. Mean recoveries of the BDE surrogate standards ^{13}C-BDE 15 and ^{13}C-BDE 118 were 69 ± 13% and 97 ± 18% in worms and clams and 58 ± 20% and 93 ± 27% in sediment, respectively. Mean recoveries for the field sediment samples were abnormally high with 133 ± 13% and 143 ± 20% for ^{13}C-BDE 15 and ^{13}C-BDE 118, respectively. Sample values were not corrected for recoveries and thus may be conservative measurements for all samples but the field sediments. PCB 209 matrix spike recoveries (n = 5) were 69 ± 5%. The mean matrix spike recoveries for the BDEs detected in these samples ranged from 52-80%.

5.2.5 Data analysis

A one sample t-test (Systat v. 11) was used to determine differences in worm wet weights and lipid between days 0 and 28. One-way ANOVA with Tukey's studentized range test was used to test for differences in worm wet weights and lipid among treatments on day 28. Differences in sediment concentration between days 0 and 28 for each treatment were determined using a student's two-sided t test. An α of 0.05 was used for all statistical tests.

5.3 Results and Discussion

5.3.1 Worm health

Worms remained buried beneath the sediment surface during the entire exposure. The sediment surface showed signs of active re-working in all sediment treatments except the PCB 209 spiked sediment, in which worms showed signs of sediment avoidance for the first few days of the exposure. Incomplete evaporation of hexane from the sediments may have caused the sediment avoidance. Survival was 90%, 100%, 93%, 83%, 88%, and 99% for the control sediment, Deca-BDE spiked sediment, PCB 209 spiked sediment, field sediment, mixture spiked sediment, and all clam feeding treatments, respectively, and was calculated by pooling individuals from the replicates in each treatment. Worm lipid content (~1% wet weight basis) was not significantly different among treatments on day 28 or between days 0 and 28. Worm wet weights (mean ± 1SD) in the control sediment (2.2 ± 0.5 g), Deca-BDE sediment (2.25 ± 0.4 g), and field sediment (2.57 ± 0.07 g) on day 28 were significantly lower than the worms on day 0 (3.7 ± 1.6 g). Day 28 worm wet weights in the PCB 209 sediment (2.53 ± 0.6 g), mixture sediment (3.4 ± 0.9 g), and the spiked feeding treatments (3.1 ± 0.6 g for control, 3.1 ± 0.5 g for Deca-BDE, and 3.4 ± 0.1 g for PCB 209) were not significantly different from day 0 wet weights. Wet weights on day 28 for worms fed spiked food (3.2 ± 1.4 g for controls, 3.4 ± 1.4 g for PCB 209, 3.0 ± 1.2 g for Deca-BDE) were not significantly different among treatments or from day 0. On day 28, worms exposed to the control and Deca-BDE sediment had lower wet weights than worms in the mixture sediment treatment and the PCB 209 spiked food treatment.

5.3.2 Exposure substrates

Concentrations of all BDE congeners in the worms and their exposure substrates on days 0 and 28 are provided in Appendix C. Concentrations of the predominant BDE congeners and PCB 209 detected in the sediment treatments on day 28 are shown in Figures 5-1 and 5-3. BDEs 183, 196, 197, 206, 207, 208 and 209 were consistently detected in the Deca-BDE spiked sediments, the mixture spiked sediments, the abiotic control sediments, and the Deca-BDE spiked food. These congeners are components of the Deca-BDE commercial products (LaGuardia et al 2006) with the exception of BDE 183, which may either be an impurity in the commercial mixture used for this study (FR300BA) or the result of debromination during experimental setup and/or laboratory processing since it was present on both days 0 and 28 of the experiment. BDEs 17, 28/33, 47, 66, 75, 85/155, 99, 100, 138, 153, and 154 were also consistently detected in the mixture spiked sediments and are components of the DE-71 Penta-BDE commercial product (LaGuardia et al. 2006). BDEs and PCB 209 were not detected in the control sediment (MDLs 0.004-4 and 2 ng/g dry, respectively). BDE 209 and PCB 209 were detected in the control food (1 and 0.5 ng/g wet wt, respectively) but other BDEs were below detection (MDLs 0.004-0.8 ng/g wet). BDE and PCB 209 concentrations were highly variable among replicates in the spiked sediment treatments, presumably due to their extreme hydrophobicity, incomplete homogenization, and short chemical/sediment contact time (<48 hrs). Variation in accumulation of BDE 209 and PCB 209 among replicates is therefore likely the result of variation in the sediment concentrations among tanks.

The primary components of Deca-BDE were detected at high concentrations in the field sediments and were similar to concentrations in the spiked sediment (Figure 5-1). Components of the Penta-BDE product (DE-71), as well as BDEs 196 and 197 which are minor components of the Deca-BDE product, were detected at low concentrations in the field sediments (0.1-3 ng/g dry). The BDE congener profile in the field sediments indicates that Deca-BDE is the primary source of BDEs to the river, with only a small contribution of Penta-BDE.

BDE concentrations on day 28 were not significantly different from day 0 in the field sediments, Deca-BDE spiked sediments, or PCB 209 spiked sediments. For the mixture spiked sediments and abiotic controls, statistical comparisons were not possible due to differences in recoveries of the surrogate standards on day 28 compared to day 0. However, if concentrations were corrected for recovery differences, concentrations on day 28 are approximately equal to or higher than day 0 concentrations, thus suggesting low potential for substantial degradation of these congeners over the time course of the exposure.

5.3.3 Debromination in the sediment

There was no evidence of BDE 209 debromination in any of the sediment treatments over the course of the 28 day experiment. However, in the mixture spiked sediment treatment, which contained the Penta-BDE commercial product in addition to the Deca-BDE product, BDEs 17 and 28/33 were more than fifteen times and three times higher, respectively, on day 28 compared to day 0. This increase may have been even larger but it was not possible to determine since surrogate recovery standards were 20-50% lower on day 28 compared to day 0 in the mixture spiked sediment. The increase of these lower brominated congeners in the mixture spiked sediment treatment but not the treatment containing Deca-BDE alone or the abiotic control (Deca-BDE and PCB 209 only) suggests that these lower brominated congeners were produced as a result of debromination of congener(s) in the Penta-BDE commercial mixture during the experiment. Interestingly, in these same sediments the concentration of BDEs 47, 99, 100, 85/155 (congeners in Penta-BDE) and 206 decreased between ~ 30-60% and BDE 197 went from detected (1 ng/g) to not detected (< 0.06 ng/g) between days 0 and 28. By weight, the decrease in BDEs 47 and 99 was the most substantial, with a difference of ~100 ng/g between days 0 and 28. Corrections for the discrepancy in surrogate standard recoveries between days 0 and 28 indicate that degradation of BDEs during the experiment was not substantial. The increase in BDE 17 (0.3 ± 0.1 to 5.8 ± 2.6 ng/g) and BDEs 28/33 (1.1 ± 0.4 to 2.9 ± 0.1 ng/g) concentrations during the experiment were noteworthy, but the mass of each congener produced was relatively low. Thus it is possible that BDEs 17 and 28/33 were produced via debromination of higher brominated congeners despite the lack of any obvious differences in concentration of these higher brominated congeners between days 0 and 28. The loss of one Br- in the para or ortho position from BDE 47 forms BDE 17 and BDE 28, respectively, and may have occurred during the experiment. Unfortunately, positive identification of potential parent congeners was not possible due to the discrepancy in surrogate standard recoveries. In a similar spiked sediment bioaccumulation study by Ciparis and Hale (2005), a 25-45% reduction in the Penta-BDE congeners occurred over the course of a six week chemical-sediment aging period and the BDE 99 sediment concentration decreased further during the 28 day exposure. However, the authors did not quantify BDE 17, BDE 28, or other potential metabolites.

5.3.4 Uptake from field sediment vs. spiked substrates

Despite exposure to similar sediment concentrations, BDE 209 was not available to worms exposed to field sediments (< 0.3 ng/g wet) whereas worms exposed to the Deca-BDE spiked sediments consistently accumulated BDE 209 well above detection limits (Figure 5-1; Appendix C). Concentrations of PCB 209 in worms exposed to field sediments for 28 days (0.4 ng/g wet) were higher than unexposed worms on day 0, indicating that worms were ingesting sediment during the exposure. Other components of the Deca-BDE mixture were either detectable at very low concentrations (BDEs 197, 207, and 208 0.02-0.08 ng/g wet) or not detected (BDEs 196 and 206 < 0.06 ng/g wet) in worms exposed to concentrations of 0.5-40 ng/g dry in the field sediment. Worms exposed to Deca-BDE spiked sediments containing 1-190 ng/g dry of these same congeners consistently accumulated concentrations well above detection (0.1-3 ng/g wet weight). Deca-BDE congeners were not detected in worms after 28 days of exposure to control sediments (< 0.3 ng/g wet).

To compare the relative bioavailability of Deca-BDE and PCB 209 to *N. virens* from the spiked sediment or spiked food exposures, bioaccumulation factors (BAFs) were calculated by normalizing the day 28 wet weight concentration in the worm to the dry weight exposure concentration (Figure 5-2; Appendix C). BAFs for BDE 209 from both spiked sediment and the spiked food were < 0.05, indicating very low availability of this congener, even under high exposure conditions. The availabilities of BDE 209 and PCB 209 were similar, with BAFs for both congeners 3-4 times higher in the food exposure compared to the spiked sediment exposure. BAFs for BDEs 206, 207, and 208 from the spiked food exposure were 5, 2.5, and 8 times higher, respectively, than the BAFs from the spiked sediment exposure. BDE 208 had the highest BAF for both the spiked food and sediment exposures followed by BDE 207 and then BDEs 206 and 209. This was in contrast to the food and sediment exposures, in which BDE 209 was in the highest concentration, followed by BDEs 206 > 207 > 208. Higher BAFs for BDEs 207 and 208 compared to BDEs 206 and 209 may indicate biotransformation of BDE 209 by *N. virens* to these lower brominated congeners. *N. virens* efficiently metabolizes PAHs (Rust et al. 2004) and may have a limited ability to biotransform PCBs (Pruell et al. 2000), however BDE biotransformation potential in this species or any other invertebrate has not been studied.

These results suggest that BDE 209 and other congeners in the Deca-BDE mixture are capable of crossing the gut wall and accumulating in *Nereis virens* when presented to the organism in an artificially bioavailable form, but that accumulation from field sediment is in some way constrained. Our results are consistent with a similar 28 day study by Ciparis and Hale (2005) in which BDE 209 was not detected in the freshwater oligochaete worm *Lumbriculus variegatus* exposed to a naturally-contaminated matrix (biosolids) but was minimally detected, though below quantitation limits, in worms exposed to spiked artificial sediment despite both matrices containing similar concentrations of BDE 209 (300 ng/g dry sediment). For *L. variegatus* and *N. virens*, 28 days is enough time to accumulate other sediment-associated HOCs in laboratory exposures (ASTM and references therein) and *L. variegatus* in particular accumulated the Penta-BDE congeners efficiently from biosolids in 28 days (Ciparis and Hale 2005). As mentioned previously, in a presumed steady-state field situation, our analysis of amphipods and other polychaete worm species collected from the highly Deca-BDE contaminated field site also showed BDE 209 concentrations below detection limits. In contrast to these studies, earthworms living in soils that were amended with BDE-contaminated sewage sludge or were adjacent to a highly BDE-contaminated river accumulated concentrations of BDE 209 up to 5200 ng/g lipid (Sellstrom et al 2005). Together with observations that BDE 209 detection in aquatic invertebrates and fish are generally sporadic and concentrations are usually low when detected (EU risk assessment 2002), these results indicate that characteristics of the sediment matrix in aquatic environments render BDE 209 unavailable for uptake to any great extent by aquatic organisms.

The large molecular weight, size, and extreme hydrophobicity of BDE 209 (log K_{ow} 6.2-9.97; EU risk assessment 2002) would be expected to result in strong sorptive interactions with sediment particles and reduced rates of diffusion through solutions (e.g. digestive fluid) and across biological membranes, ultimately limiting uptake by organisms. Sorption to sediment and organic carbon in particular is the fundamental process controlling HOC bioavailability in aquatic environments and is likely a dominant factor in controlling BDE availability as well, though studies have not specifically addressed this. Soot carbon and other carbonaceous materials within sediments have been demonstrated to serve as sorbents for other HOCs such as PAHs and PCBs, altering their bioavailability to aquatic organisms (Cornelissen et al 2005). The effect of soot carbon or other potential reactive/sorptive sites in sediments on BDE bioavailability has not been investigated, however extensive sorption to soot carbon has been reported for BDEs 47 and 99, with the soot carbon partition coefficient for BDE 99 being the highest reported for any compound (Barring et al. 2002). The physical properties of BDE 209 also likely restricted transport and absorption processes in the gut since even without the sediment interaction (i.e. spiked clam treatment), accumulation was low (Figure 5-2).

5.3.5 Uptake from sediment containing both Deca- and Penta-BDE

Compared to spiked sediments containing only Deca-BDE, BDE 209 was much less bioavailable to *N. virens* when sediments also contained Penta-BDE and PCB 209 (Figure 5-3; Appendix C). Selective uptake was evident, with concentrations of BDE 209 30 times lower in worms exposed to the contaminant mixture compared to worms exposed to Deca-BDE alone, even though concentrations of BDE 209 were similar in both spiked sediment treatments. Penta-BDE congeners were selectively accumulated over the Deca-BDE congeners and PCB 209 despite Penta-BDE concentrations in the sediment that were approximately 20 times lower. Accumulation of the nona-BDEs was also substantially reduced in the mixture compared to exposure to Deca-BDE alone, with concentrations of BDE 207 decreasing by 98% and BDEs 206 and 208 decreasing from ~1 ng/g dry to below detection limit (< 0.05 ng/g dry). The accumulation profile for the Penta-BDE congeners in *N. virens* (47, 99 >> 100, 153,154) was consistent with the composition of the exposure sediments (Figure 5-3). BDEs 47 and 99 also dominated in the freshwater oligochaete *Lumbriculus variegtus* after 28 days of exposure to Penta-BDE spiked sediments (Ciparis and Hale 2005), though BDE 100 was more than double the concentration of BDEs 153 and 154 in *L. variegtus* and approximately equal to BDEs 153 and 154 in *N. virens* in this study. The Penta-BDE congeners were detected at low concentrations in the worms exposed to the Deca-BDE only spiked sediments (0.02-0.2 ng/g wet) even though they were not detected in the sediments (< 0.01-0.2 ng/g dry), with the exception of BDE 154 (0.1 ng/g dry). The congener pattern in these worms was similar to the pattern in the worms exposed to the Penta-BDE spiked sediments and the Penta-BDE product, thus congeners were likely just below detection in the sediments and were accumulated during the 28 day exposure. PCB 209, present at a concentration ~30% lower than BDE 209 in sediments, was also preferentially accumulated over BDE 209 in the worms.

Compared to spiked sediments containing only Deca-BDE, much lower accumulation of BDE 209 from the spiked sediment mixture may have been the result of competition with the lower brominated Penta-BDE congeners and PCB 209 for space in digestive fluid micelles. *N. virens* have high amounts of micelles in their gut fluid (Mayer et al. 1997) and although BDE solubilization in gut fluid has not yet been investigated, solubilization in micelles is likely required before accumulation can occur, similar to other sediment-bound HOCs (Weston and Mayer 1998b; Voparil and Mayer 2000; Ahrens et al. 2001). The Penta-BDE congeners are smaller and less hydrophobic than BDE 209 which may have enabled them to outcompete the larger and heavier BDE 209 for micellar space. Weaker association of the Penta-BDE congeners to sediment particles may enable these congeners to be more easily desorbed in the gut, thus allowing them to saturate digestive micelles and limit the solubility of BDE 209 in the gut. Competition for space and saturation of digestive micelles was previously suggested to have occurred in the gut fluid of the polychaete *Arenicola marina* (Voparil and Mayer 2000) when less solubilization of PAH from highly contaminated field sediment in the gut fluid was observed compared to when pure PAH solid was added directly to the fluid. Other studies have examined the solubility of PAHs in commercial surfactant micelles and polychaete gut fluid and found that interactions are complex, exhibiting both synergistic and antagonistic effects on solubility (Guha et al 1998; Chun et al. 2002; Voparil et al. 2003). In vitro gut fluid incubations of BDE contaminated sediments would assist in clarifying the mechanism responsible for our results.

5.4 Conclusions

Our study indicates that BDE 209 is capable of crossing the gut wall and accumulating in *N. virens*, but that availability is highly dependent on the exposure conditions. Accumulation of BDE 209 from field sediments did not occur in 28 days; although a longer exposure may have resulted in low accumulation. *N. virens* did however accumulate BDEs 207 and 208, known degradation products of BDE 209. The mechanism responsible for limiting accumulation of BDE 209 from field sediments remains unclear but appears to involve characteristics of the sediment matrix. Low transfer efficiency in the digestive fluid and across the gut wall may also contribute, since even when presented to the worms in a form expected to greatly enhance bioavailability (i.e. dissolved in oil and without the presence of sediment), accumulation of BDE 209 was very low. The presence of other HOCs in the spiked sediments influenced the availability of BDE 209 to *N. virens*. If applicable to field sediments, this has strong implications for predicting the bioavailability of HOCs to deposit feeders since sediments usually contain complex mixtures of chemicals and sediment bioaccumulation models do not account for such interactions.

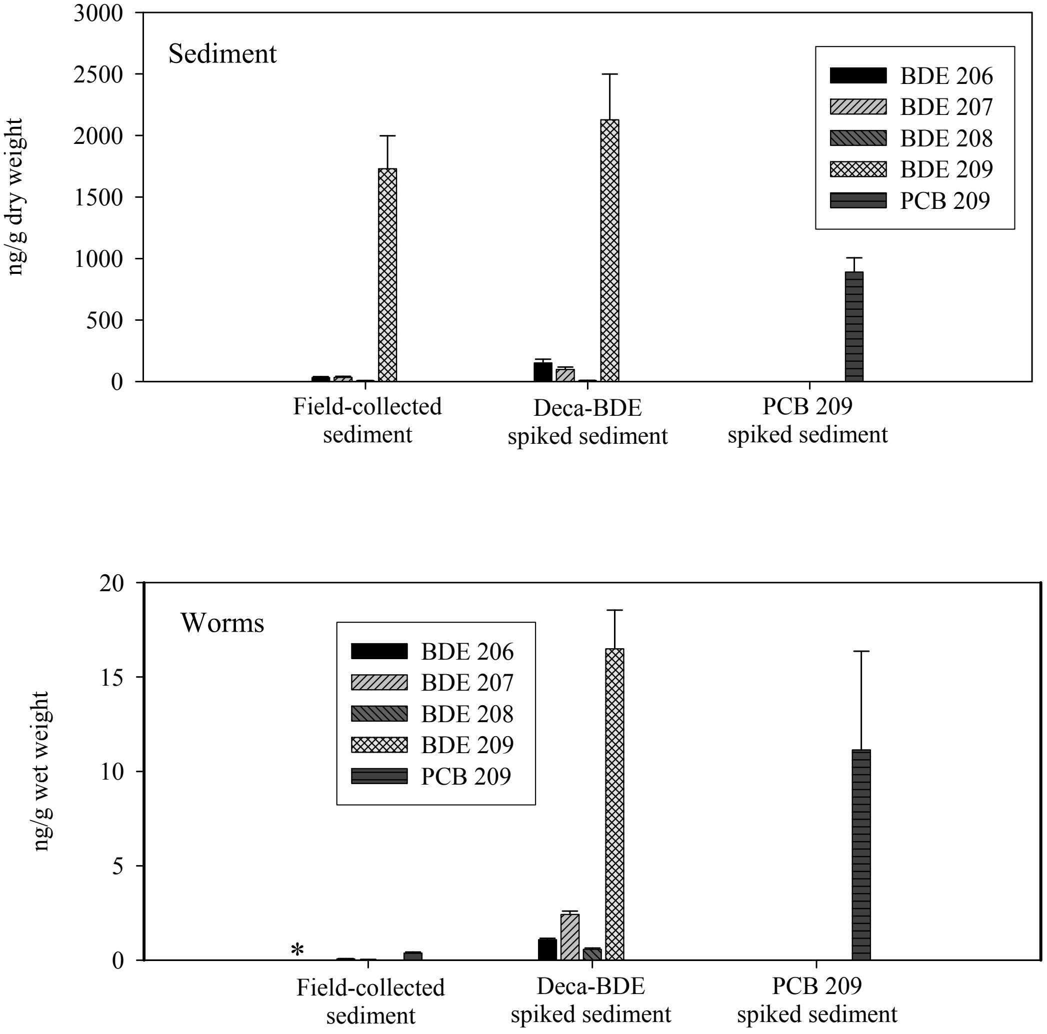


Figure 5-1. Mean concentrations of the Deca-BDE congeners and PCB 209 in sediments and worms after 28 days of exposure. Error bars represent one standard deviation of the mean. * BDE 206 < 0.06 ng/g wet weight, BDEs 207 and 208 0.05 ng/g wet weight, BDE 209 < 0.3 ng/g wet weight.

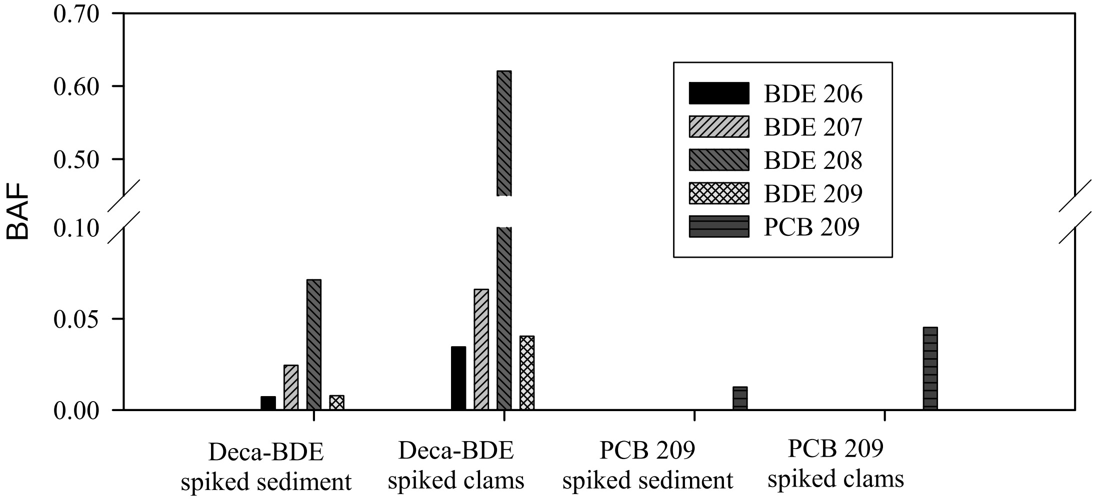


Figure 5-2. Deca-BDE congeners and PCB 209 bioaccumulation factors (BAFs) for worms exposed to spiked sediments or fed spiked food for 28 days. BAFs are equal to (ng/g wet weight worm)/(ng/g dry sediment or clam).

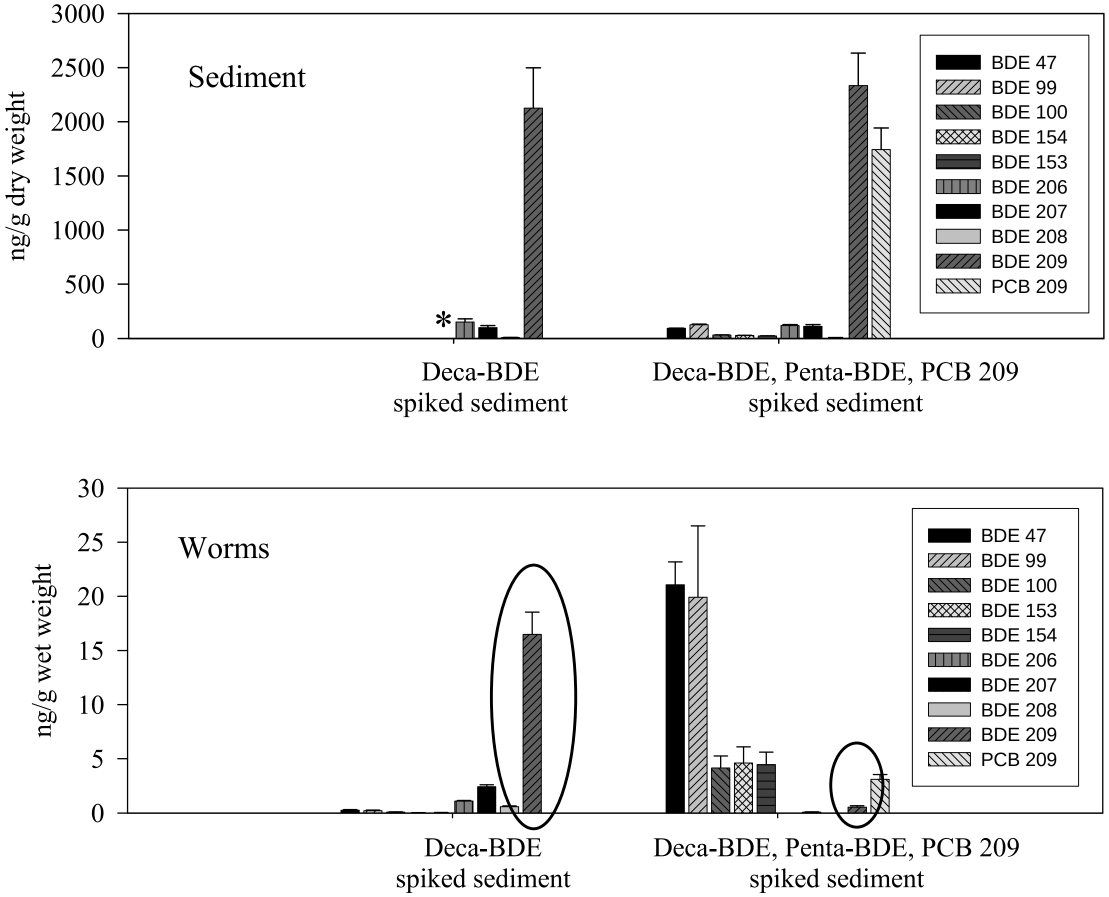


Figure 5-3. Mean concentrations of Penta- and Deca-BDE congeners and PCB 209 in spiked sediments and worms after 28 days of exposure. Error bars represent one standard deviation of the mean. * Penta-BDEs below detection in Deca-BDE spiked sediments (MDLs 0.02-0.2 ng/g dry weight).

Appendix A:

Organic chemical concentrations in invertebrates and sediments and biota-sediment accumulation factors (BSAFs) from field collections

Back River/Hart-Miller Island Field Collections 2003

Invertebrate PAH (ng/g wet weight)	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
Napthalene	ND	ND	ND	ND	ND	2.04	ND	ND	ND	ND	ND
2MeNapthalene	ND	1.06	ND	1.97	ND	2.05	1.53	2.30	ND	ND	ND
1MeNapthalene	ND	ND	ND	ND	ND	0.89	0.68	ND	ND	ND	ND
Acenapthylene	ND	0.43	0.32	0.50	ND	0.46	0.44	0.47	ND	ND	0.10
Biphenyl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenapthene	ND	1.00	ND	0.96	ND	0.58	0.51	0.70	1.47	1.08	0.82
Fluorene	0.71	1.22	0.93	1.00	ND	1.33	1.18	1.24	1.14	0.94	1.00
Phenanthrene	6.22	7.28	6.76	5.55	8.66	7.77	7.65	9.60	7.38	5.90	5.33
Anthracene	ND	0.93	ND	0.98	ND	1.90	1.74	1.72	0.43	0.28	0.32
1Mefluorene	0.82	0.48	ND	0.46	ND	0.79	0.74	0.84	0.98	0.35	0.68
4,5-Methylenephenanthrene	1.58	0.72	0.51	0.70	2.70	0.99	0.89	1.04	2.39	1.11	0.79
2Methylphenanthrene	ND	2.46	1.11	2.14	1.87	2.36	2.34	3.23	1.85	1.32	1.49
2Methylanthracene	ND	0.79	2.50	2.34	ND	3.64	3.79	4.65	ND	ND	ND
1Methylanthracene	1.43	1.14	0.97	1.22	1.87	1.68	1.55	1.99	1.25	0.80	0.62
1Methylphenanthrene	ND	0.56	ND	0.72	0.83	1.20	1.15	1.38	0.87	0.73	0.48
9Methylanthracene	4.33	ND	ND	ND	5.13	1.31	1.10	1.33	ND	ND	ND
Fluoranthene	7.59	5.40	3.66	4.26	25.21	6.13	5.93	6.93	8.74	4.68	4.01
Pyrene	3.21	3.15	ND	3.65	12.19	6.70	6.50	7.77	10.42	5.45	4.76
3,6Dimethylphenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	1.12	0.88	0.60	0.92	4.43	1.34	1.20	1.33	0.76	0.52	0.63
Benzo[b]fluorene	0.66	0.32	0.23	0.46	2.49	0.64	0.59	0.68	1.19	0.62	0.46
Benz[a]anthracene	ND	0.85	ND	1.31	1.94	2.12	1.94	1.92	1.95	0.76	0.60
Chrysene + Triphenylene	14.32	3.97	3.89	3.97	15.58	3.61	3.13	3.59	3.80	2.19	1.57
Napthacene	ND	ND	ND	ND	ND	0.22	0.25	ND	0.43	ND	0.22
Benzo[b]fluoranthene	5.10	5.37	2.59	2.38	8.52	1.32	1.70	1.51	1.79	0.94	3.14
Benzo[k]fluoranthene	1.83	ND	1.16	1.86	4.09	2.76	2.31	2.03	2.06	0.83	ND
Benzo[e]pyrene	7.49	2.54	2.78	2.07	11.98	2.30	1.85	1.67	1.25	0.55	0.46
Benzo[a]pyrene	ND	1.59	ND	1.75	ND	2.30	1.85	2.78	1.25	ND	0.60
Perylene	ND	2.68	ND	2.36	ND	7.73	7.94	7.74	ND	0.49	0.81
Dimethylbenz[a]anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3Methylcholanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	0.21	ND	0.76	ND	1.70	1.75	0.68	ND	ND	0.30
Benzo[g,h,i]perylene	2.09	1.72	2.27	1.88	4.64	2.31	2.61	2.28	2.28	1.08	0.73
Anthanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenz[a,h+ac]anthracene	ND	0.45	ND	ND	ND	ND	3.87	ND	ND	ND	ND
Coronene	ND	ND	ND	ND	ND	0.31	0.22	ND	ND	ND	ND
Total PAH	58.51	47.23	30.28	46.16	112.14	70.48	68.94	71.39	53.68	30.59	29.91

Back River/Hart-Miller Island Field Collections 2003

MDLs (ng/g wet weight)	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
Napthalene	6.57	2.07	5.97	2.82	8.94	1.13	1.77	2.91	7.00	4.47	2.04
Azulene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2MeNapthalene	2.68	0.84	2.43	1.15	3.64	0.46	0.72	1.19	2.85	1.82	0.83
1MeNapthalene	2.52	0.80	2.29	1.08	3.43	0.43	0.68	1.12	2.69	1.72	0.78
Acenapthylene	0.15	0.05	0.14	0.07	0.21	0.03	0.04	0.07	0.16	0.10	0.05
Biphenyl	10.24	3.23	9.31	4.39	13.92	1.75	2.75	4.54	10.91	6.97	3.19
Acenapthene	1.22	0.39	1.11	0.52	1.66	0.21	0.33	0.54	1.30	0.83	0.38
Fluorene	0.61	0.19	0.56	0.26	0.83	0.10	0.16	0.27	0.65	0.42	0.19
Phenanthrene	3.21	1.01	2.92	1.38	4.36	0.55	0.86	1.42	3.42	2.19	1.00
Anthracene	0.38	0.12	0.35	0.16	0.52	0.07	0.10	0.17	0.41	0.26	0.12
1Mefluorene	0.46	0.14	0.42	0.20	0.62	0.08	0.12	0.20	0.49	0.31	0.14
4,5-Methylenephenanthrene	0.31	0.10	0.28	0.13	0.42	0.05	0.08	0.14	0.33	0.21	0.10
2Methylphenanthrene	0.92	0.29	0.83	0.39	1.25	0.16	0.25	0.41	0.98	0.62	0.29
2Methylanthracene	0.15	0.05	0.14	0.07	0.21	0.03	0.04	0.07	0.16	0.10	0.05
1Methylanthracene	0.46	0.14	0.42	0.20	0.62	0.08	0.12	0.20	0.49	0.31	0.14
1Methylphenanthrene	0.46	0.14	0.42	0.20	0.62	0.08	0.12	0.20	0.49	0.31	0.14
9Methylanthracene	1.45	0.46	1.32	0.62	1.97	0.25	0.39	0.64	1.55	0.99	0.45
Fluoranthene	1.83	0.58	1.67	0.79	2.49	0.31	0.49	0.81	1.95	1.25	0.57
Pyrene	2.52	0.80	2.29	1.08	3.43	0.43	0.68	1.12	2.69	1.72	0.78
3,6Dimethylphenanthrene	0.38	0.12	0.35	0.16	0.52	0.07	0.10	0.17	0.41	0.26	0.12
9,10,dimethylanthracene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]fluorene	0.15	0.05	0.14	0.07	0.21	0.03	0.04	0.07	0.16	0.10	0.05
Benzo[b]fluorene	0.23	0.07	0.21	0.10	0.31	0.04	0.06	0.10	0.24	0.16	0.07
Benz[a]anthracene	0.54	0.17	0.49	0.23	0.73	0.09	0.14	0.24	0.57	0.36	0.17
Chrysene + Triphenylene	0.54	0.17	0.49	0.23	0.73	0.09	0.14	0.24	0.57	0.36	0.17
Napthacene	0.31	0.10	0.28	0.13	0.42	0.05	0.08	0.14	0.33	0.21	0.10
Benzo[b]fluoranthene	0.31	0.10	0.28	0.13	0.42	0.05	0.08	0.14	0.33	0.21	0.10
Benzo[k]fluoranthene	0.15	0.05	0.14	0.07	0.21	0.03	0.04	0.07	0.16	0.10	0.05
Benzo[e]pyrene	0.15	0.05	0.14	0.07	0.21	0.03	0.04	0.07	0.16	0.10	0.05
Benzo[a]pyrene	0.31	0.10	0.28	0.13	0.42	0.05	0.08	0.14	0.33	0.21	0.10
Perylene	0.46	0.14	0.42	0.20	0.62	0.08	0.12	0.20	0.49	0.31	0.14
Dimethylbenz[a]anthracene	0.99	0.31	0.90	0.43	1.35	0.17	0.27	0.44	1.06	0.68	0.31
3Methylcholanthrene	0.54	0.17	0.49	0.23	0.73	0.09	0.14	0.24	0.57	0.36	0.17
Indeno[1,2,3-c,d]pyrene	0.54	0.17	0.49	0.23	0.73	0.09	0.14	0.24	0.57	0.36	0.17
Benzo[g,h,i]perylene	0.61	0.19	0.56	0.26	0.83	0.10	0.16	0.27	0.65	0.42	0.19
Anthanthrene	0.38	0.12	0.35	0.16	0.52	0.07	0.10	0.17	0.41	0.26	0.12
Dibenz[a,h+ac]anthracene	0.31	0.10	0.28	0.13	0.42	0.05	0.08	0.14	0.33	0.21	0.10
Coronene	0.31	0.10	0.28	0.13	0.42	0.05	0.08	0.14	0.33	0.21	0.10

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Final ng/g lipid	BUOY 12	HMI 17	HMI 3	HMI 9	TRAP 7	HMI 16	HMI 17	HMI 3	BUOY 12	TRAP 6	TRAP 7
	N. succinea	N. succinea	N. succinea	N. succinea	N. succinea	M.viridis	M.viridis	M.viridis	amphipods	amphipods	amphipods
Napthalene	ND	ND	ND	ND	ND	205.67	ND	ND	ND	ND	ND
2MeNapthalene	ND	56.98	ND	115.02	ND	206.55	141.61	199.68	ND	ND	ND
1MeNapthalene	ND	ND	ND	ND	ND	89.65	63.22	ND	ND	ND	ND
Acenapthylene	ND	23.31	11.58	29.39	ND	46.58	40.46	41.11	ND	ND	8.55
Biphenyl	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenapthene	ND	53.53	ND	56.23	ND	58.01	46.78	60.69	97.92	79.49	74.11
Fluorene	38.79	65.62	33.10	58.79	ND	133.60	108.74	107.67	76.16	69.23	89.79
Phenanthrene	337.99	391.11	241.61	324.62	411.13	782.25	706.78	832.00	493.21	435.89	478.88
Anthracene	ND	50.08	ND	57.51	ND	191.61	160.57	148.78	29.01	20.51	28.50
1Mefluorene	44.33	25.90	ND	26.84	ND	79.10	68.28	72.43	65.28	25.64	61.28
4,5-Methylenephenanthrene	85.88	38.85	18.20	40.90	128.27	100.20	82.18	90.05	159.57	82.05	71.26
2Methylphenanthrene	ND	132.10	39.72	125.25	88.80	238.19	216.21	279.94	123.30	97.43	133.97
2Methylanthracene	ND	42.31	89.36	136.75	ND	366.51	350.23	403.27	ND	ND	ND
1Methylanthracene	77.57	61.30	34.75	71.57	88.80	168.75	142.87	172.27	83.41	58.97	55.58
1Methylphenanthrene	ND	30.22	ND	42.17	39.47	121.29	106.21	119.42	58.03	53.85	42.76
9Methylanthracene	235.48	ND	ND	ND	243.39	131.84	101.15	115.50	ND	ND	ND
Fluoranthene	412.79	290.09	130.73	249.22	1197.21	617.89	547.47	600.99	583.88	346.15	360.58
Pyrene	174.53	169.22	ND	213.43	578.87	675.02	600.58	673.43	696.30	402.56	427.57
3,6Dimethylphenanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	60.95	47.49	21.51	53.68	210.50	134.48	111.26	115.50	50.77	38.46	57.01
Benzo[b]fluorene	36.01	17.27	8.27	26.84	118.41	64.16	54.37	58.73	79.78	46.15	41.33
Benz[a]anthracene	ND	45.76	ND	76.68	92.09	213.58	179.54	166.40	130.56	56.41	54.16
Chrysene + Triphenylene	778.48	213.25	139.01	232.60	740.03	363.88	289.54	311.26	253.86	161.54	141.10
Napthacene	ND	ND	ND	ND	ND	21.97	22.76	ND	29.01	ND	19.95
Benzo[b]fluoranthene	277.04	288.37	92.67	139.31	404.55	132.72	156.78	131.16	119.68	69.23	282.20
Benzo[k]fluoranthene	99.73	ND	41.37	108.63	194.05	277.74	213.68	176.19	137.81	61.54	ND
Benzo[e]pyrene	407.25	136.41	99.29	121.41	569.00	232.04	170.69	144.87	83.41	41.03	41.33
Benzo[a]pyrene	ND	85.47	ND	102.24	ND	231.16	170.69	240.79	83.41	ND	54.16
Perylene	ND	144.18	ND	138.03	ND	778.73	733.33	671.47	ND	35.90	72.69
Dimethylbenz[a]anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3Methylcholanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	11.22	ND	44.73	ND	171.39	161.84	58.73	ND	ND	27.08
Benzo[g,h,i]perylene	113.59	92.38	81.09	109.91	220.37	232.92	241.49	197.72	152.32	79.49	65.56
Anthanthrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenz[a,h+ac]anthracene	ND	24.17	ND	ND	ND	ND	357.82	ND	ND	ND	ND
Coronene	ND	ND	ND	ND	ND	31.64	20.23	ND	ND	ND	ND
Total PAH	3180.40	2536.59	1082.26	2701.75	5324.96	7099.12	6367.36	6190.05	3586.67	2261.51	2689.41

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Sediment PAH (ng/g dry)	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
Napthalene	ND	31.29	20.32	42.53	54.35	99.10	52.38	53.49
Azulene	ND	ND	0.11	0.10	0.21	0.32	0.28	0.21
2MeNapthalene	18.90	44.67	40.14	64.22	72.75	131.59	91.21	72.86
1MeNapthalene	7.27	15.80	14.89	22.77	26.49	47.00	32.95	25.98
Acenapthylene	5.46	7.21	7.91	9.13	16.27	27.62	24.52	15.68
Biphenyl	ND	ND	ND	ND	19.01	31.75	24.63	17.87
Acenapthene	10.18	9.38	14.41	22.77	16.27	24.88	21.98	13.12
Fluorene	32.63	30.41	47.16	46.50	52.33	78.73	74.46	48.21
Phenanthrene	205.22	171.56	249.26	353.11	244.97	389.59	396.35	227.73
Anthracene	58.00	46.75	66.65	64.08	77.16	119.30	121.07	68.73
1Mefluorene	14.95	12.83	21.08	22.10	17.18	26.34	26.89	15.75
4,5-Methylenephenanthrene	46.97	29.89	56.79	81.37	31.87	50.22	47.71	27.87
2Methylphenanthrene	49.17	41.92	59.03	82.27	60.00	94.49	97.94	56.87
2Methylanthracene	16.36	14.05	17.94	22.69	20.43	31.52	34.11	18.44
1Methylanthracene	42.82	34.94	51.06	68.94	51.48	80.90	82.96	47.11
1Methylphenanthrene	29.56	25.44	34.86	46.13	37.27	57.89	60.62	36.07
9Methylanthracene	1.83	1.54	3.02	2.63	2.39	3.19	3.36	1.11
Fluoranthene	433.00	266.68	507.70	1069.00	215.92	364.88	302.44	182.75
Pyrene	401.92	254.66	469.37	967.88	211.32	352.63	296.84	179.24
3,6Dimethylphenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
9,10,dimethylanthracene	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	81.07	52.01	95.04	171.39	48.52	83.54	72.26	43.25
Benzo[b]fluorene	66.38	37.51	77.62	138.15	29.87	53.67	41.02	26.10
Benz[a]anthracene	251.80	155.64	268.71	500.71	118.59	197.17	161.79	101.11
Chrysene + Triphenylene	201.01	132.99	245.27	563.91	103.20	168.19	145.05	89.56
Napthacene	40.92	24.67	41.47	101.61	13.82	26.36	18.79	11.71
Benzo[b]fluoranthene	505.08	254.41	586.20	1194.25	151.00	155.53	196.79	134.09
Benzo[k]fluoranthene	208.30	128.92	258.72	596.68	79.88	149.98	111.31	68.90
Benzo[e]pyrene	201.76	119.48	247.57	529.49	74.80	112.59	100.54	64.50
Benzo[a]pyrene	200.66	121.13	229.92	493.31	79.87	128.46	107.64	70.46
Perylene	124.88	107.73	141.33	176.93	229.68	285.94	275.79	175.22
Dimethylbenz[a]anthracene	7.37	3.82	8.27	18.30	2.20	3.67	3.11	1.90
3Methylcholanthrene	2.43	1.51	4.07	6.22	0.67	ND	0.72	0.30
Indeno[1,2,3-c,d]pyrene	775.55	425.64	878.26	1797.53	264.54	367.16	359.24	219.38
Benzo[g,h,i]perylene	242.06	150.64	303.52	672.47	104.34	126.62	122.25	79.36
Anthanthrene	25.15	7.62	21.49	38.19	12.12	10.54	9.58	8.37
Dibenz[a,h+ac]anthracene	39.05	19.16	37.76	58.61	8.66	14.34	14.32	9.50
Coronene	22.71	19.35	35.65	92.02	27.37	37.01	42.11	22.88
Total PAH	4370.39	2801.23	5162.62	10137.98	2576.81	3932.70	3575.01	2235.71

Back River/Hart-Miller Island Field Collections 2003

Sediment PAH MDLs (ng/g dry)

	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
Napthalene	8.52	7.50	9.61	8.89	4.91	5.94	5.60	7.33
Azulene	0.08	0.07	0.09	0.08	0.05	0.06	0.05	0.07
2MeNapthalene	4.55	4.00	5.13	4.75	2.62	3.17	2.99	3.92
1MeNapthalene	2.78	2.45	3.14	2.90	1.60	1.94	1.83	2.39
Acenapthylene	0.03	0.03	0.04	0.04	0.02	0.02	0.02	0.03
Biphenyl	19.67	17.31	22.20	20.53	11.33	13.72	12.92	16.93
Acenapthene	0.80	0.70	0.90	0.83	0.46	0.56	0.52	0.69
Fluorene	0.70	0.62	0.79	0.74	0.41	0.49	0.46	0.61
Phenanthrene	4.33	3.81	4.89	4.52	2.49	3.02	2.84	3.73
Anthracene	0.05	0.04	0.05	0.05	0.03	0.03	0.03	0.04
1Mefluorene	1.60	1.41	1.81	1.67	0.92	1.12	1.05	1.38
4,5-Methylenephenanthrene	0.31	0.27	0.35	0.33	0.18	0.22	0.20	0.27
2Methylphenanthrene	0.68	0.60	0.77	0.71	0.39	0.48	0.45	0.59
2Methylanthracene	0.07	0.06	0.08	0.07	0.04	0.05	0.05	0.06
1Methylanthracene	0.45	0.40	0.51	0.47	0.26	0.31	0.30	0.39
1Methylphenanthrene	0.43	0.38	0.48	0.45	0.25	0.30	0.28	0.37
9Methylanthracene	0.74	0.65	0.83	0.77	0.43	0.52	0.49	0.64
Fluoranthene	2.27	2.00	2.57	2.37	1.31	1.59	1.49	1.96
Pyrene	1.10	0.97	1.24	1.14	0.63	0.77	0.72	0.94
3,6Dimethylphenanthrene	0.07	0.06	0.08	0.07	0.04	0.05	0.05	0.06
9,10,dimethylanthracene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzo[a]fluorene	0.03	0.03	0.04	0.04	0.02	0.02	0.02	0.03
Benzo[b]fluorene	0.09	0.08	0.10	0.10	0.05	0.06	0.06	0.08
Benz[a]anthracene	0.06	0.05	0.07	0.06	0.03	0.04	0.04	0.05
Chrysene + Triphenylene	0.28	0.24	0.31	0.29	0.16	0.19	0.18	0.24
Napthacene	0.12	0.10	0.13	0.12	0.07	0.08	0.08	0.10
Benzo[b]fluoranthene	0.27	0.23	0.30	0.28	0.15	0.19	0.17	0.23
Benzo[k]fluoranthene	0.05	0.04	0.05	0.05	0.03	0.03	0.03	0.04
Benzo[e]pyrene	0.09	0.08	0.10	0.10	0.05	0.06	0.06	0.08
Benzo[a]pyrene	0.07	0.06	0.08	0.07	0.04	0.05	0.05	0.06
Perylene	0.08	0.07	0.09	0.08	0.05	0.06	0.05	0.07
Dimethylbenz[a]anthracene	0.21	0.18	0.23	0.22	0.12	0.14	0.14	0.18
3Methylcholanthrene	0.15	0.13	0.17	0.16	0.09	0.10	0.10	0.13
Indeno[1,2,3-c,d]pyrene	0.37	0.33	0.42	0.39	0.21	0.26	0.24	0.32
Benzo[g,h,i]perylene	0.14	0.12	0.16	0.14	0.08	0.10	0.09	0.12
Anthanthrene	0.21	0.18	0.23	0.22	0.12	0.14	0.14	0.18
Dibenz[a,h+ac]anthracene	0.18	0.16	0.21	0.19	0.11	0.13	0.12	0.16
Coronene	0.30	0.26	0.34	0.31	0.17	0.21	0.20	0.26

Back River/Hart-Miller Island Field Collections 2003

Sediment PAH ng/g carbon	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
Napthalene	ND	893.98	424.30	759.41	1861.28	2656.72	2086.81	1981.27
Azulene	ND	ND	2.36	1.86	7.13	8.64	11.28	7.61
2MeNapthalene	470.04	1276.35	838.09	1146.87	2491.27	3527.81	3633.74	2698.70
1MeNapthalene	180.74	451.44	310.79	406.53	907.34	1260.14	1312.94	962.29
Acenapthylene	135.75	206.08	165.19	163.10	557.12	740.39	976.85	580.76
Biphenyl	ND	ND	ND	ND	651.09	851.08	981.08	661.98
Acenapthene	253.11	268.00	300.82	406.67	557.28	667.13	875.56	486.05
Fluorene	811.60	868.83	984.60	830.28	1792.06	2110.64	2966.59	1785.47
Phenanthrene	5104.94	4901.62	5203.71	6305.53	8389.50	10444.82	15790.69	8434.43
Anthracene	1442.85	1335.75	1391.50	1144.28	2642.47	3198.49	4823.43	2545.59
1Mefluorene	371.82	366.49	440.08	394.62	588.24	706.28	1071.29	583.46
4,5-Methylenephenanthrene	1168.30	854.12	1185.69	1452.98	1091.48	1346.35	1900.74	1032.22
2Methylphenanthrene	1223.25	1197.59	1232.30	1469.19	2054.83	2533.37	3901.96	2106.40
2Methylanthracene	407.05	401.33	374.62	405.10	699.82	845.03	1358.85	682.83
1Methylanthracene	1065.29	998.28	1066.02	1231.07	1762.91	2168.93	3305.30	1744.99
1Methylphenanthrene	735.40	726.99	727.84	823.82	1276.53	1551.89	2415.24	1335.98
9Methylanthracene	45.57	44.12	63.10	46.91	81.82	85.50	133.91	41.22
Fluoranthene	10771.24	7619.57	10599.08	19089.31	7394.57	9782.30	12049.42	6768.70
Pyrene	9997.92	7276.10	9798.89	17283.59	7236.84	9453.98	11826.10	6638.66
3,6Dimethylphenanthrene	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	2016.66	1485.91	1984.07	3060.46	1661.81	2239.60	2879.00	1601.70
Benzo[b]fluorene	1651.35	1071.81	1620.52	2467.01	1023.01	1438.90	1634.12	966.71
Benz[a]anthracene	6263.66	4446.89	5609.88	8941.24	4061.39	5286.10	6445.88	3744.66
Chrysene + Triphenylene	5000.21	3799.62	5120.48	10069.75	3534.32	4509.00	5778.94	3317.00
Napthacene	1017.81	704.74	865.83	1814.47	473.33	706.71	748.50	433.79
Benzo[b]fluoranthene	12564.08	7268.74	12237.91	21325.81	5171.23	4169.75	7840.37	4966.30
Benzo[k]fluoranthene	5181.52	3683.33	5401.35	10655.01	2735.68	4020.93	4434.79	2551.97
Benzo[e]pyrene	5018.97	3413.59	5168.53	9455.22	2561.56	3018.57	4005.67	2388.81
Benzo[a]pyrene	4991.59	3460.80	4800.08	8809.13	2735.22	3444.04	4288.59	2609.63
Perylene	3106.46	3077.86	2950.55	3159.44	7865.92	7665.90	10987.60	6489.72
Dimethylbenz[a]anthracene	183.42	109.14	172.62	326.77	75.30	98.31	123.84	70.42
3Methylcholanthrene	60.50	43.15	85.04	111.03	22.92	ND	28.80	11.29
Indeno[1,2,3-c,d]pyrene	19292.23	12161.08	18335.38	32098.74	9059.72	9843.32	14312.43	8125.04
Benzo[g,h,i]perylene	6021.27	4303.89	6336.64	12008.44	3573.34	3394.53	4870.35	2939.39
Anthanthrene	625.50	217.69	448.60	681.95	415.03	282.69	381.60	309.89
Dibenz[a,h+ac]anthracene	971.28	547.42	788.23	1046.60	296.47	384.45	570.68	351.84
Coronene	564.81	552.84	744.35	1643.19	937.24	992.13	1677.82	847.47
Total PAH	108716.19	80035.14	107779.04	181035.40	88247.07	105434.44	142430.77	82804.23

Back River/Hart-Miller Island Field Collections 2003

BSAFs	BUOY 12	TRAP 7	BUOY 12	TRAP 6	TRAP 7	HMI 16	HMI 17	HMI 3	HMI 17	HMI 3	HMI 9
	N. succinea	N. succinea	amphipods	amphipods	amphipods	M.viridis	M.viridis	M.viridis	N. succinea	N. succinea	N. succinea
Napthalene						0.110					
2MeNapthalene						0.083	0.040	0.074	0.016		0.032
1MeNapthalene						0.099	0.050				
Acenapthylene					0.041	0.084	0.055	0.071	0.031	0.020	0.030
Biphenyl											
Acenapthene			0.326	0.314	0.277	0.104	0.070	0.125	0.080		0.064
Fluorene	0.039		0.077	0.085	0.103	0.075	0.052	0.060	0.031	0.019	0.020
Phenanthrene	0.065	0.084	0.095	0.085	0.098	0.093	0.068	0.099	0.037	0.029	0.021
Anthracene			0.021	0.014	0.021	0.073	0.050	0.058	0.016		0.012
1Mefluorene	0.101		0.148	0.069	0.167	0.134	0.097	0.124	0.037		0.025
4,5-Methylenephenanthrene	0.072	0.150	0.135	0.070	0.083	0.092	0.061	0.087	0.029	0.018	0.022
2Methylphenanthrene		0.074	0.100	0.080	0.112	0.116	0.085	0.133	0.052	0.019	0.032
2Methylanthracene						0.524	0.414	0.591	0.050	0.131	0.101
1Methylanthracene	0.073	0.089	0.078	0.055	0.056	0.096	0.066	0.099	0.028	0.020	0.022
1Methylphenanthrene		0.054	0.080	0.073	0.059	0.095	0.068	0.089	0.019		0.017
9Methylanthracene	3.732	5.517				1.611	1.183	2.802			
Fluoranthene	0.039	0.157	0.055	0.032	0.047	0.084	0.056	0.089	0.030	0.019	0.021
Pyrene	0.018	0.080	0.071	0.040	0.059	0.093	0.064	0.101	0.018		0.018
Benzo[a]fluorene	0.031	0.142	0.026	0.019	0.038	0.081	0.050	0.072	0.021	0.013	0.019
Benzo[b]fluorene	0.022	0.110	0.049	0.028	0.039	0.063	0.038	0.061	0.012	0.009	0.016
Benz[a]anthracene		0.021	0.023	0.009	0.012	0.053	0.034	0.044	0.009		0.012
Chrysene + Triphenylene	0.152	0.195	0.050	0.032	0.037	0.103	0.064	0.094	0.047	0.042	0.040
Napthacene			0.034		0.028	0.046	0.032				
Benzo[b]fluoranthene	0.023	0.056	0.010	0.006	0.039	0.026	0.038	0.026	0.069	0.019	0.018
Benzo[k]fluoranthene	0.018	0.053	0.026	0.012		0.102	0.053	0.069		0.016	0.024
Benzo[e]pyrene	0.079	0.167	0.016	0.008	0.012	0.091	0.057	0.061	0.045	0.042	0.030
Benzo[a]pyrene			0.017		0.016	0.085	0.050	0.092	0.025		0.024
Perylene				0.012	0.024	0.099	0.096	0.103	0.019		0.013
Dimethylbenz[a]anthracene											
3Methylcholanthrene											
Indeno[1,2,3-c,d]pyrene					0.002	0.019	0.016	0.007	0.001		0.003
Benzo[g,h,i]perylene	0.018	0.051	0.024	0.013	0.015	0.065	0.071	0.067	0.027	0.028	0.023
Anthanthrene											
Dibenz[a,h+ac]anthracene							0.931		0.063		
Coronene						0.034	0.020				

Back River/Hart-Miller Island Field Collections 2003

Invertebrate PCB (ng/g wet)	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
PCB											
1	ND	ND	ND	ND	ND	ND	ND	ND	51.72	ND	ND
3	ND	ND	ND	ND	29.77	ND	ND	ND	ND	ND	6.83
4,10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7,9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6	ND	0.21	ND	2.50	0.69	ND	1.46	ND	ND	ND	ND
8,5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
19	ND	0.17	ND	ND	ND	ND	ND	ND	ND	ND	0.14
12,13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
18	0.77	0.24	ND	ND	ND	ND	ND	ND	ND	ND	0.15
17	0.82	0.37	0.27	0.14	0.48	0.03	0.07	ND	0.19	0.31	0.24
24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
16,32	1.68	0.94	ND	0.68	ND	ND	ND	ND	ND	ND	0.67
29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
26	0.42	0.23	ND	ND	ND	ND	ND	ND	0.23	0.19	0.08
25	0.53	ND	ND	ND	0.70	ND	0.08	0.17	0.28	ND	0.09
31, 28	2.42	0.86	1.32	ND	2.16	ND	0.23	ND	1.33	0.84	0.93
33,21,53	2.19	0.93	ND	ND	2.10	ND	ND	ND	ND	1.05	1.00
51	0.28	0.11	0.13	0.09	0.18	0.03	ND	ND	0.10	0.11	0.10
22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
45	0.67	0.36	0.43	ND	0.58	0.07	ND	ND	ND	0.32	0.28
46	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
52	3.81	0.48	0.41	0.32	2.36	0.13	0.11	0.12	1.59	1.29	0.95
49	4.61	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.15
47,48	2.80	1.20	1.23	0.75	2.08	0.14	0.11	0.12	0.75	0.61	1.05
44	1.95	0.34	0.30	0.26	1.43	0.10	0.09	0.05	0.82	1.03	0.57
37,42	0.98	0.38	0.42	0.27	1.05	0.07	ND	ND	0.41	0.76	0.40
41,64,71	3.11	1.31	ND	ND	ND	ND	ND	ND	ND	2.56	1.44
40	0.70	0.26	0.27	0.20	0.92	0.08	0.10	0.12	0.35	0.91	0.61
100	0.64	0.20	0.31	0.19	0.65	0.12	0.08	0.10	0.29	0.44	0.31
63	ND	0.06	ND	ND	0.32	ND	0.04	ND	ND	0.36	0.18
74	1.22	0.38	0.67	0.41	1.70	0.23	0.20	0.27	ND	0.98	0.82
70,76	3.51	0.42	ND	ND	2.01	ND	ND	ND	1.23	1.47	0.76
66,95	10.17	2.32	3.18	2.24	8.03	0.53	0.34	0.77	4.04	4.55	3.96
91	1.01	0.44	0.53	0.32	1.03	0.07	0.10	0.10	0.52	0.48	0.46
56,60(92,84)	2.82	1.54	2.01	ND	5.04	ND	ND	ND	2.80	2.66	2.10
89	2.35	0.94	1.20	0.87	2.63	0.19	ND	ND	1.35	ND	1.09
101	4.35	1.76	2.07	1.30	3.78	0.22	0.22	0.26	1.89	1.92	1.33
99	2.80	1.09	1.25	0.75	2.35	0.11	0.10	0.11	1.41	1.48	1.02
119	0.63	0.33	0.56	0.32	ND	ND	ND	ND	ND	0.43	0.26
83	0.23	0.10	0.08	0.07	0.28	0.03	0.03	ND	0.11	0.18	0.13
97	7.26	2.89	ND	ND	ND	ND	ND	ND	ND	ND	3.03
81,	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Back River/Hart-Miller Island Field Collections 2003

Invertebrate PCB (ng/g wet)	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
85	0.80	0.39	0.61	0.28	0.94	0.07	0.05	0.06	0.48	0.61	0.43
136	0.45	0.31	0.29	0.23	0.54	0.03	0.03	0.04	0.25	0.26	0.23
77110	5.83	2.22	2.55	1.65	5.96	0.32	0.30	0.30	3.56	3.20	2.54
82, 151	0.32	0.20	0.21	0.14	0.37	0.03	0.02	0.03	0.21	0.19	0.17
135144	0.94	0.60	0.64	0.41	1.19	0.09	0.08	0.10	0.77	0.66	0.54
107	0.57	0.19	0.26	0.15	0.48	0.04	0.04	0.05	0.26	0.27	0.18
123149	5.66	3.98	4.86	3.43	6.40	0.51	0.46	0.60	3.33	3.00	2.53
118	3.72	0.90	ND	ND	3.22	ND	0.40	ND	2.14	2.13	1.30
134	0.27	0.18	0.19	0.15	ND	0.05	ND	ND	ND	ND	0.07
146	2.53	1.88	2.36	1.48	ND	ND	ND	ND	ND	ND	1.09
132153105	17.28	11.54	12.47	7.61	16.15	1.33	1.35	ND	10.70	9.25	6.90
141	1.64	1.30	1.22	0.92	1.69	0.18	0.16	0.18	1.18	0.91	0.70
137130176	ND	0.58	ND	0.46	ND	ND	ND	ND	ND	ND	0.35
163138	10.41	7.06	7.99	4.77	10.89	0.97	0.91	1.04	7.48	6.49	4.86
158	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
129178	1.01	1.17	1.12	0.83	1.02	0.19	0.19	0.20	0.55	0.48	0.44
187182	4.66	5.12	5.86	3.48	5.86	0.71	0.67	0.85	3.12	2.62	2.18
183	3.28	2.29	2.54	1.43	3.21	0.24	0.19	0.20	1.36	1.16	1.10
128	0.72	0.38	0.44	0.30	0.91	0.07	0.07	0.09	0.70	0.54	0.49
185	0.37	0.45	0.50	0.30	0.44	0.15	0.09	0.12	0.20	0.23	0.19
174	2.17	2.28	2.25	1.49	2.53	0.45	0.44	0.52	1.48	1.30	1.11
177	1.42	1.74	1.98	1.11	1.89	0.32	0.29	0.36	1.07	0.90	0.83
202171156	1.60	1.97	2.23	1.25	1.77	0.37	0.34	0.43	0.93	0.81	0.73
157200	0.47	0.72	0.61	0.45	ND	0.15	ND	ND	ND	ND	ND
172	0.26	0.46	0.24	0.17	ND	0.08	ND	ND	ND	ND	0.06
197	0.35	0.25	0.29	0.16	0.29	0.04	0.04	0.05	0.17	0.08	0.09
180	5.18	5.09	5.65	3.25	6.38	0.92	0.83	0.97	3.24	3.01	2.42
193	ND	0.87	1.55	ND	ND	ND	ND	ND	ND	ND	0.53
191	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
199	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
170190	2.49	2.00	2.48	1.31	3.24	0.40	0.35	0.44	ND	1.22	0.96
198	0.26	0.26	0.37	0.19	0.33	0.06	0.06	0.08	ND	ND	ND
201	1.84	3.79	4.15	2.38	2.35	0.82	0.75	0.99	ND	0.78	0.71
203196	5.11	5.23	5.91	3.15	5.41	0.91	0.89	1.17	ND	1.98	1.45
189	ND	0.08	ND	ND	0.38	ND	ND	ND	ND	0.53	ND
208195	1.22	4.59	4.49	2.70	1.63	1.38	1.31	1.71	0.37	0.61	0.43
207	0.85	1.21	1.18	0.73	0.97	0.30	0.30	0.32	ND	0.14	0.18
194	0.60	0.73	0.81	0.43	0.77	0.26	0.27	0.29	0.25	0.37	0.27
205	ND	0.14	ND	ND	0.54	ND	ND	0.06	ND	ND	ND
206	2.06	6.89	6.10	3.93	2.10	2.07	2.02	2.42	0.23	0.36	0.34
209	2.22	4.27	4.41	2.63	2.29	1.90	1.82	2.48	ND	0.35	0.32
Total PCB	153.29	104.16	105.45	65.03	164.48	17.52	18.07	18.34	115.43	69.38	68.80

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Invertebrate PCB MDLs (ng/g wet)	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
PCB											
1	16.87	5.32	15.33	7.23	22.93	2.89	4.53	7.47	17.97	11.48	5.25
3	11.12	3.51	10.10	4.76	15.11	1.90	2.99	4.93	11.84	7.57	3.46
4,10	6.43	2.03	5.84	2.76	8.74	1.10	1.73	2.85	6.85	4.38	2.00
7,9	0.36	0.11	0.33	0.15	0.49	0.06	0.10	0.16	0.38	0.24	0.11
6	0.45	0.14	0.41	0.19	0.62	0.08	0.12	0.20	0.48	0.31	0.14
8,5	16.72	5.28	15.20	7.17	22.73	2.86	4.49	7.41	17.81	11.38	5.20
19	0.33	0.11	0.30	0.14	0.45	0.06	0.09	0.15	0.35	0.23	0.10
12,13	0.10	0.03	0.09	0.04	0.13	0.02	0.03	0.04	0.10	0.07	0.03
18	0.17	0.06	0.16	0.07	0.24	0.03	0.05	0.08	0.19	0.12	0.05
17	0.11	0.04	0.10	0.05	0.15	0.02	0.03	0.05	0.12	0.08	0.03
24	0.85	0.27	0.78	0.37	1.16	0.15	0.23	0.38	0.91	0.58	0.27
16,32	1.50	0.47	1.36	0.64	2.04	0.26	0.40	0.66	1.60	1.02	0.47
29	0.24	0.07	0.22	0.10	0.32	0.04	0.06	0.10	0.25	0.16	0.07
26	0.14	0.04	0.13	0.06	0.19	0.02	0.04	0.06	0.15	0.09	0.04
25	0.14	0.04	0.13	0.06	0.19	0.02	0.04	0.06	0.15	0.09	0.04
31, 28	0.71	0.22	0.64	0.30	0.96	0.12	0.19	0.31	0.76	0.48	0.22
33,21,53	1.46	0.46	1.33	0.63	1.99	0.25	0.39	0.65	1.56	1.00	0.46
51	0.07	0.02	0.07	0.03	0.10	0.01	0.02	0.03	0.08	0.05	0.02
22	1.93	0.61	1.75	0.83	2.62	0.33	0.52	0.85	2.05	1.31	0.60
45	0.22	0.07	0.20	0.10	0.30	0.04	0.06	0.10	0.24	0.15	0.07
46	0.75	0.24	0.68	0.32	1.02	0.13	0.20	0.33	0.80	0.51	0.23
52	0.09	0.03	0.08	0.04	0.13	0.02	0.02	0.04	0.10	0.06	0.03
49	2.60	0.82	2.37	1.12	3.54	0.45	0.70	1.15	2.77	1.77	0.81
47,48	0.16	0.05	0.15	0.07	0.22	0.03	0.04	0.07	0.17	0.11	0.05
44	0.09	0.03	0.08	0.04	0.13	0.02	0.02	0.04	0.10	0.06	0.03
37,42	0.17	0.05	0.15	0.07	0.23	0.03	0.04	0.07	0.18	0.11	0.05
41,64,71	2.67	0.84	2.43	1.14	3.63	0.46	0.72	1.18	2.85	1.82	0.83
40	0.10	0.03	0.09	0.04	0.14	0.02	0.03	0.04	0.11	0.07	0.03
100	0.09	0.03	0.08	0.04	0.12	0.02	0.02	0.04	0.10	0.06	0.03
63	0.14	0.05	0.13	0.06	0.20	0.02	0.04	0.06	0.15	0.10	0.04
74	0.50	0.16	0.46	0.22	0.68	0.09	0.13	0.22	0.54	0.34	0.16
70,76	1.03	0.32	0.93	0.44	1.40	0.18	0.28	0.46	1.09	0.70	0.32
66,95	0.51	0.16	0.46	0.22	0.69	0.09	0.14	0.22	0.54	0.34	0.16
91	0.07	0.02	0.06	0.03	0.09	0.01	0.02	0.03	0.07	0.04	0.02
56,60(92,84)	1.73	0.55	1.57	0.74	2.35	0.30	0.46	0.77	1.84	1.18	0.54
89	0.86	0.27	0.78	0.37	1.17	0.15	0.23	0.38	0.92	0.59	0.27
101	0.54	0.17	0.49	0.23	0.73	0.09	0.14	0.24	0.57	0.37	0.17
99	0.10	0.03	0.09	0.04	0.13	0.02	0.03	0.04	0.10	0.07	0.03
119	0.61	0.19	0.56	0.26	0.83	0.10	0.16	0.27	0.65	0.42	0.19
83	0.03	0.01	0.03	0.01	0.05	0.01	0.01	0.02	0.04	0.02	0.01
97	6.65	2.10	6.04	2.85	9.03	1.14	1.79	2.94	7.08	4.52	2.07
81,	5.61	1.77	5.10	2.40	7.63	0.96	1.51	2.49	5.98	3.82	1.75

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Invertebrate PCB MDLs (ng/g wet)	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
85	0.11	0.04	0.10	0.05	0.16	0.02	0.03	0.05	0.12	0.08	0.04
136	0.06	0.02	0.06	0.03	0.09	0.01	0.02	0.03	0.07	0.04	0.02
77110	0.55	0.17	0.50	0.24	0.75	0.09	0.15	0.24	0.59	0.37	0.17
82, 151	0.02	0.01	0.01	0.01	0.02	0.00	0.00	0.01	0.02	0.01	0.01
135144	0.07	0.02	0.06	0.03	0.09	0.01	0.02	0.03	0.07	0.05	0.02
107	0.07	0.02	0.07	0.03	0.10	0.01	0.02	0.03	0.08	0.05	0.02
123149	0.08	0.03	0.07	0.03	0.11	0.01	0.02	0.04	0.08	0.05	0.02
118	1.37	0.43	1.25	0.59	1.86	0.23	0.37	0.61	1.46	0.93	0.43
134	0.20	0.06	0.18	0.09	0.27	0.03	0.05	0.09	0.21	0.14	0.06
146	2.15	0.68	1.95	0.92	2.92	0.37	0.58	0.95	2.29	1.46	0.67
132153105	4.02	1.27	3.66	1.72	5.47	0.69	1.08	1.78	4.29	2.74	1.25
141	0.09	0.03	0.08	0.04	0.12	0.02	0.02	0.04	0.09	0.06	0.03
137130176	0.96	0.30	0.87	0.41	1.30	0.16	0.26	0.42	1.02	0.65	0.30
163138	0.11	0.04	0.10	0.05	0.15	0.02	0.03	0.05	0.12	0.08	0.04
158	4.71	1.49	4.28	2.02	6.40	0.81	1.27	2.09	5.02	3.21	1.47
129178	0.24	0.08	0.22	0.10	0.33	0.04	0.06	0.11	0.26	0.16	0.07
187182	1.14	0.36	1.03	0.49	1.54	0.19	0.31	0.50	1.21	0.77	0.35
183	0.11	0.03	0.10	0.05	0.15	0.02	0.03	0.05	0.12	0.08	0.03
128	0.07	0.02	0.06	0.03	0.09	0.01	0.02	0.03	0.07	0.05	0.02
185	0.07	0.02	0.06	0.03	0.09	0.01	0.02	0.03	0.07	0.05	0.02
174	0.77	0.24	0.70	0.33	1.05	0.13	0.21	0.34	0.82	0.53	0.24
177	0.12	0.04	0.11	0.05	0.17	0.02	0.03	0.06	0.13	0.08	0.04
202171156	0.12	0.04	0.11	0.05	0.17	0.02	0.03	0.06	0.13	0.08	0.04
157200	0.12	0.04	0.11	0.05	0.16	0.02	0.03	0.05	0.13	0.08	0.04
172	0.18	0.06	0.16	0.08	0.24	0.03	0.05	0.08	0.19	0.12	0.06
197	0.11	0.03	0.10	0.05	0.14	0.02	0.03	0.05	0.11	0.07	0.03
180	0.12	0.04	0.11	0.05	0.16	0.02	0.03	0.05	0.13	0.08	0.04
193	1.67	0.53	1.52	0.72	2.28	0.29	0.45	0.74	1.78	1.14	0.52
191	0.70	0.22	0.63	0.30	0.95	0.12	0.19	0.31	0.74	0.48	0.22
199	10.38	3.27	9.43	4.45	14.11	1.78	2.79	4.60	11.06	7.07	3.23
170190	0.31	0.10	0.29	0.13	0.43	0.05	0.08	0.14	0.34	0.21	0.10
198	0.16	0.05	0.15	0.07	0.22	0.03	0.04	0.07	0.17	0.11	0.05
201	0.13	0.04	0.12	0.06	0.18	0.02	0.04	0.06	0.14	0.09	0.04
203196	2.15	0.68	1.95	0.92	2.92	0.37	0.58	0.95	2.28	1.46	0.67
189	0.20	0.06	0.19	0.09	0.28	0.03	0.05	0.09	0.22	0.14	0.06
208195	0.18	0.06	0.17	0.08	0.25	0.03	0.05	0.08	0.20	0.13	0.06
207	0.12	0.04	0.11	0.05	0.16	0.02	0.03	0.05	0.13	0.08	0.04
194	0.10	0.03	0.09	0.04	0.13	0.02	0.03	0.04	0.10	0.07	0.03
205	0.12	0.04	0.11	0.05	0.17	0.02	0.03	0.05	0.13	0.08	0.04
206	0.19	0.06	0.17	0.08	0.25	0.03	0.05	0.08	0.20	0.13	0.06
209	0.45	0.14	0.41	0.19	0.61	0.08	0.12	0.20	0.48	0.30	0.14

Invertebrate PCB (ng/g lipid)	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
PCB											
1	ND	ND	ND	ND	ND	ND	ND	ND	3455.44	ND	ND
3	ND	ND	ND	ND	1413.77	ND	ND	ND	ND	ND	613.81
4,10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7,9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6	ND	11.27	ND	146.30	32.64	ND	135.21	ND	ND	ND	ND
8,5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
19	ND	9.05	ND	ND	ND	ND	ND	ND	ND	ND	12.66
12,13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
18	41.81	12.99	ND	ND	ND	ND	ND	ND	ND	ND	13.48
17	44.39	19.97	9.55	8.11	22.71	3.06	6.19	ND	13.01	23.12	21.24
24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
16,32	91.36	50.24	ND	39.76	ND	ND	ND	ND	ND	ND	60.41
29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
26	22.70	12.61	ND	ND	ND	ND	ND	ND	15.25	14.17	7.15
25	28.70	ND	ND	ND	33.48	ND	7.66	14.95	18.48	ND	7.97
31, 28	131.44	46.01	47.15	ND	102.75	ND	21.16	ND	88.99	62.15	83.54
33,21,53	119.28	49.75	ND	ND	99.92	ND	ND	ND	ND	77.92	89.55
51	15.17	6.06	4.72	5.28	8.60	2.63	ND	ND	6.87	8.41	9.14
22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
45	36.51	19.45	15.27	ND	27.43	7.23	ND	ND	ND	23.87	25.28
46	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
52	207.01	25.92	14.55	19.02	111.90	12.87	10.42	10.70	106.49	95.19	85.33
49	250.35	ND	ND	ND	ND	ND	ND	ND	ND	ND	103.45
47,48	152.48	64.51	43.98	44.03	98.66	14.58	9.82	10.78	49.84	44.99	93.97
44	106.25	18.53	10.81	15.08	68.05	9.79	8.41	4.15	54.61	76.22	51.31
37,42	53.52	20.53	14.83	15.83	50.01	6.68	ND	ND	27.14	56.31	35.72
41,64,71	169.04	70.21	ND	ND	ND	ND	ND	ND	ND	189.08	129.53
40	38.16	13.76	9.74	11.79	43.55	8.08	8.92	10.33	23.57	67.59	54.58
100	34.65	10.88	10.90	11.01	30.80	11.76	6.98	8.36	19.42	32.55	28.15
63	ND	2.98	ND	ND	15.28	ND	4.04	ND	ND	26.92	16.09
74	66.47	20.28	23.87	23.80	80.94	22.66	18.22	23.40	ND	72.30	73.52
70,76	190.83	22.70	ND	ND	95.57	ND	ND	ND	81.89	108.66	68.57
66,95	553.01	124.76	113.60	131.21	381.25	53.51	31.81	66.79	269.98	336.54	356.14
91	54.72	23.76	19.06	18.71	49.14	6.98	9.58	8.47	34.43	35.13	41.22
56,60(92,84)	153.21	82.64	71.99	ND	239.15	ND	ND	ND	187.35	196.96	188.61
89	127.70	50.27	42.73	50.64	125.09	19.51	ND	ND	90.14	ND	98.02
101	236.64	94.65	74.06	75.90	179.28	22.51	20.35	22.21	126.60	141.81	119.45
99	151.96	58.69	44.84	44.15	111.72	11.01	8.89	9.50	94.21	109.23	91.67
119	34.15	17.94	19.92	18.74	ND	ND	ND	ND	ND	31.69	23.18
83	12.29	5.19	2.91	4.08	13.22	2.56	2.64	ND	7.67	13.53	11.68
97	394.52	155.08	ND	ND	ND	ND	ND	ND	ND	ND	272.15
81,	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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Invertebrate PCB (ng/g lipid)	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
85	43.60	20.93	21.95	16.10	44.41	6.56	5.04	5.09	31.98	45.33	38.89
136	24.28	16.39	10.19	13.30	25.55	3.41	2.89	3.32	16.42	19.55	20.25
77110	317.15	119.02	90.99	96.49	282.94	32.72	28.13	26.24	238.20	236.50	228.15
82, 151	17.29	10.63	7.52	8.20	17.44	2.98	2.29	2.95	14.22	14.33	15.13
135144	50.86	32.03	22.80	23.74	56.59	8.59	7.14	8.81	51.26	48.47	48.99
107	30.92	10.43	9.21	8.81	22.91	3.67	3.24	4.62	17.69	19.79	16.34
123149	307.64	213.66	173.52	200.89	303.91	51.56	42.24	52.19	222.49	221.68	227.17
118	202.17	48.19	ND	ND	153.05	ND	37.03	ND	142.90	157.50	116.51
134	14.60	9.87	6.82	8.66	ND	4.92	ND	ND	ND	ND	6.09
146	137.32	101.12	84.33	86.51	ND	ND	ND	ND	ND	ND	98.05
132153105	939.53	620.00	445.74	445.70	767.11	133.52	124.80	ND	715.05	683.61	620.14
141	89.28	69.62	43.58	53.92	80.44	17.72	14.45	15.27	78.73	67.01	63.01
137130176	ND	30.90	ND	27.16	ND	ND	ND	ND	ND	ND	31.64
163138	566.12	378.92	285.38	279.09	517.26	98.08	83.67	89.76	499.95	479.74	436.75
158	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
129178	55.14	62.95	40.05	48.85	48.50	19.24	17.32	17.00	37.05	35.76	39.16
187182	253.49	275.16	209.57	203.81	278.39	71.84	61.84	74.04	208.18	193.45	195.91
183	178.51	123.19	90.93	83.43	152.20	23.68	17.16	16.98	90.79	85.40	98.69
128	39.15	20.40	15.75	17.59	43.31	7.30	6.33	8.03	46.81	40.09	43.95
185	20.34	24.33	17.90	17.50	20.98	14.84	8.27	10.17	13.20	17.16	17.48
174	117.93	122.69	80.43	87.27	120.23	45.42	40.90	45.36	98.97	96.03	99.84
177	77.44	93.66	70.76	64.84	89.64	32.20	26.78	31.38	71.21	66.85	74.41
202171156	87.14	105.66	79.82	73.27	84.04	36.90	31.22	36.93	61.82	59.73	66.01
157200	25.68	38.53	21.92	26.60	ND	15.07	ND	ND	ND	ND	ND
172	14.00	24.45	8.48	9.82	ND	7.61	ND	ND	ND	ND	5.72
197	19.06	13.24	10.26	9.38	13.89	3.99	3.31	4.09	11.49	5.59	7.90
180	281.73	273.43	201.79	190.02	302.85	92.53	76.56	84.06	216.37	222.33	217.41
193	ND	46.62	55.41	ND	ND	ND	ND	ND	ND	ND	47.25
191	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
199	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
170190	135.19	107.32	88.62	76.50	153.91	40.53	32.24	38.27	ND	90.51	85.98
198	13.94	14.17	13.26	11.09	15.59	6.25	5.56	7.34	ND	ND	ND
201	99.91	203.41	148.22	139.49	111.76	82.16	69.58	86.06	ND	57.62	64.27
203196	277.53	280.90	211.35	184.42	256.75	91.26	81.77	101.33	ND	146.32	130.29
189	ND	4.08	ND	ND	17.82	ND	ND	ND	ND	38.97	ND
208195	66.23	246.33	160.42	158.31	77.17	139.12	120.77	148.40	24.41	44.75	38.62
207	46.38	64.81	42.28	42.52	46.02	29.96	27.95	27.86	ND	10.31	16.01
194	32.55	39.25	28.94	25.42	36.66	26.19	25.03	25.09	16.67	27.66	24.15
205	ND	7.67	ND	ND	25.83	ND	ND	5.40	ND	ND	ND
206	112.10	370.13	218.16	230.27	99.59	208.37	186.97	209.62	15.32	26.63	30.51
209	120.48	229.28	157.53	154.02	108.94	191.01	168.40	215.19	ND	26.14	28.36
Total PCB	8332.98	5594.07	3768.35	3806.41	7810.56	1764.58	1669.17	1590.49	7712.54	5129.13	6185.62

Back River/Hart-Miller Island Field Collections 2003

Sediment PCB (ng/g dry)

	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
PCB								
1	1.39	ND	0.88	0.43	1.46	ND	5.58	0.87
3	ND	0.65	0.85	1.22	17.57	11.76	25.30	2.92
4,10	0.10	ND	ND	ND	0.12	0.10	0.28	0.09
7,9	0.05	ND	ND	ND	ND	0.04	0.11	ND
6	ND	ND	0.23	0.09	0.16	0.10	0.18	ND
8,5	3.36	0.94	4.38	8.06	0.54	0.29	0.94	ND
19	0.02	0.01	0.01	0.01	0.06	0.13	0.05	0.01
12,13	ND	ND	0.69	0.02	0.15	0.13	0.19	0.05
18	0.22	ND	0.36	0.69	0.14	0.05	ND	ND
17	0.28	0.12	0.41	0.54	0.20	0.08	2.58	0.08
24	0.40	0.19	0.42	0.83	0.01	0.00	0.03	0.00
16,32	0.34	0.45	0.40	0.70	0.15	0.13	0.38	0.08
29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
26	0.58	0.16	0.76	1.18	0.02	0.03	0.04	ND
25	0.27	0.08	0.32	0.44	0.02	0.02	0.02	ND
31, 28	4.86	2.23	5.60	7.54	1.15	1.06	1.11	0.54
33,21,53	0.94	0.45	0.96	1.64	0.29	0.35	0.36	0.27
51	0.21	0.10	0.24	0.39	0.11	0.22	0.13	0.09
22	0.76	0.35	0.78	1.30	0.40	ND	1.18	0.26
45	0.38	0.07	0.37	0.91	0.09	0.08	0.51	0.06
46	0.71	0.41	0.48	ND	0.17	0.12	0.14	0.06
52	2.44	1.05	3.20	4.46	0.51	0.57	0.59	0.43
49	1.89	1.08	2.47	3.24	0.63	0.76	1.00	0.59
47,48	0.98	0.51	ND	1.68	0.25	0.29	0.19	ND
44	1.60	0.62	1.83	3.04	0.47	0.46	0.53	0.22
37,42	1.20	0.46	1.22	2.07	0.50	0.54	0.66	0.27
41,64,71	1.77	0.77	2.00	2.88	0.44	0.42	0.59	0.27
40	0.65	0.24	0.80	1.48	0.13	0.16	0.25	0.07
100	0.26	0.14	0.36	0.61	0.12	0.15	51.49	0.08
63	0.11	0.08	0.20	0.26	0.16	ND	ND	ND
74	1.02	0.51	1.22	1.85	0.27	0.27	0.27	0.13
70,76	3.16	1.60	3.94	5.38	0.83	0.92	0.89	0.66
66,95	5.88	2.92	7.42	9.91	1.20	1.54	1.56	0.99
91	0.60	0.31	0.71	0.87	0.13	0.16	0.12	0.09
56,60(92,84)	2.64	2.69	4.15	5.22	1.50	2.11	1.94	1.39
89	2.08	0.93	2.50	4.94	0.12	0.10	0.08	0.05
101	2.30	ND	2.97	3.82	0.39	0.56	0.51	0.40
99	3.56	3.24	3.59	5.57	0.33	0.36	0.33	0.28
119	ND	0.11	0.28	0.64	0.03	ND	0.05	0.04
83	0.15	0.05	0.13	0.23	0.03	0.05	0.06	0.02
97	5.93	2.80	5.31	7.48	0.82	0.93	1.32	0.49
81,	0.38	0.62	1.58	0.67	ND	ND	ND	ND

Back River/Hart-Miller Island Field Collections 2003

Sediment PCB (ng/g dry)

	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
85	0.69	0.36	0.78	1.05	0.16	0.21	0.19	0.15
136	0.35	0.14	0.38	0.49	0.06	0.04	0.09	0.04
77110	4.49	2.30	5.45	7.37	0.94	1.30	1.25	0.92
82, 151	0.23	0.08	0.29	0.41	0.05	0.07	0.07	0.04
135144	0.72	0.36	0.95	1.28	0.14	0.18	0.16	0.10
107	0.27	0.15	0.34	0.43	0.06	0.12	0.09	0.06
123149	3.45	1.72	7.53	5.78	0.64	0.99	0.85	0.63
118	2.70	1.44	0.69	4.18	0.74	0.87	0.88	0.66
134	0.14	0.06	0.15	0.21	0.05	0.05	0.06	0.02
146	0.50	0.66	1.63	1.89	0.36	0.59	0.43	0.32
132153105	11.64	6.36	15.23	16.94	2.81	3.73	3.20	2.50
141	1.19	0.58	1.55	2.03	0.36	0.42	0.38	0.26
137130176	0.57	0.21	0.79	0.85	0.18	0.16	0.18	ND
163138	8.46	4.32	11.14	12.99	2.08	2.67	2.01	1.79
158	0.15	ND	0.18	0.23	ND	0.09	0.10	ND
129178	0.68	0.68	0.73	0.91	0.26	0.38	0.30	0.18
187182	3.55	1.83	4.53	5.27	0.87	1.01	0.90	0.66
183	1.81	0.83	2.32	2.76	0.23	0.16	0.31	ND
128	1.51	0.80	1.81	2.33	0.22	0.21	0.25	0.15
185	0.27	0.08	0.26	0.39	0.07	0.06	0.05	0.04
174	1.84	0.91	2.35	2.91	0.45	0.55	0.52	0.26
177	2.40	1.15	2.53	3.07	0.43	0.42	0.44	0.25
202171156	2.98	1.40	3.29	4.73	0.50	0.56	0.61	0.40
157200	0.74	ND	0.38	0.72	0.16	0.12	0.15	0.10
172	0.45	0.20	ND	0.68	ND	0.13	0.17	0.07
197	0.95	0.38	0.44	0.85	0.07	0.04	0.11	0.05
180	5.13	2.55	6.32	7.66	1.28	1.58	1.38	ND
193	0.66	ND	0.60	1.00	0.22	ND	0.43	ND
191	0.24	ND	0.21	0.29	ND	ND	ND	ND
199	0.47	ND	ND	0.55	0.31	0.45	0.46	0.42
170190	2.88	1.38	3.19	4.40	0.66	0.78	0.69	0.46
198	0.17	0.07	0.19	0.30	0.63	0.15	0.09	0.09
201	2.07	1.19	2.39	2.53	0.91	1.20	1.32	0.82
203196	2.96	1.58	3.82	3.95	1.03	1.38	1.44	ND
189	0.37	0.09	0.30	0.34	0.09	ND	0.13	ND
208195	1.25	1.07	1.65	1.47	1.31	2.02	2.03	1.25
207	0.49	0.31	0.58	0.49	0.30	0.45	0.49	0.24
194	1.33	0.79	1.88	2.07	0.31	0.35	0.34	0.21
205	ND	ND	ND	ND	0.36	ND	ND	ND
206	4.37	2.91	5.34	6.12	2.18	3.34	3.66	1.98
209	1.78	1.59	2.50	1.97	2.16	3.47	3.90	2.17
Total PCB	130.38	67.42	158.68	206.24	55.28	55.34	131.69	29.14

Back River/Hart-Miller Island Field Collections 2003

Sediment PCB MDLs (ng/g dry)

PCB	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
1	0.17	0.15	0.19	0.18	0.10	0.12	0.11	0.15
3	0.57	0.50	0.64	0.59	0.33	0.40	0.37	0.49
4,10	0.08	0.07	0.09	0.08	0.04	0.05	0.05	0.07
7,9	0.03	0.03	0.04	0.04	0.02	0.02	0.02	0.03
6	0.07	0.06	0.08	0.07	0.04	0.05	0.04	0.06
8,5	0.28	0.25	0.31	0.29	0.16	0.19	0.18	0.24
19	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
12,13	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01
18	0.02	0.02	0.03	0.03	0.01	0.02	0.02	0.02
17	0.04	0.03	0.04	0.04	0.02	0.03	0.02	0.03
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16,32	0.05	0.05	0.06	0.06	0.03	0.04	0.04	0.05
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.03
25	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
31, 28	0.19	0.17	0.22	0.20	0.11	0.13	0.13	0.17
33,21,53	0.12	0.10	0.13	0.12	0.07	0.08	0.08	0.10
51	0.03	0.02	0.03	0.03	0.01	0.02	0.02	0.02
22	0.07	0.06	0.08	0.07	0.04	0.05	0.04	0.06
45	0.04	0.03	0.04	0.04	0.02	0.03	0.03	0.03
46	0.04	0.04	0.05	0.05	0.03	0.03	0.03	0.04
52	0.03	0.02	0.03	0.03	0.01	0.02	0.02	0.02
49	0.09	0.08	0.10	0.10	0.05	0.06	0.06	0.08
47,48	0.23	0.20	0.26	0.24	0.13	0.16	0.15	0.20
44	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02
37,42	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.03
41,64,71	0.20	0.18	0.23	0.21	0.12	0.14	0.13	0.17
40	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
100	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02
63	0.06	0.05	0.07	0.06	0.03	0.04	0.04	0.05
74	0.04	0.03	0.04	0.04	0.02	0.02	0.02	0.03
70,76	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.03
66,95	0.07	0.06	0.08	0.07	0.04	0.05	0.04	0.06
91	0.03	0.03	0.04	0.03	0.02	0.02	0.02	0.03
56,60(92,84)	0.28	0.25	0.32	0.30	0.16	0.20	0.19	0.24
89	0.05	0.04	0.05	0.05	0.03	0.03	0.03	0.04
101	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02
99	0.04	0.03	0.04	0.04	0.02	0.02	0.02	0.03
119	0.04	0.04	0.05	0.05	0.03	0.03	0.03	0.04
83	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
97	0.25	0.22	0.28	0.26	0.14	0.17	0.16	0.21
81,	0.25	0.22	0.29	0.27	0.15	0.18	0.17	0.22

Back River/Hart-Miller Island Field Collections 2003

Sediment PCB MDLs (ng/g dry)

	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
85	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01
136	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01
77110	0.03	0.02	0.03	0.03	0.01	0.02	0.02	0.02
82, 151	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
135144	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01
107	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
123149	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02
118	0.23	0.21	0.26	0.24	0.13	0.16	0.15	0.20
134	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
146	0.29	0.26	0.33	0.30	0.17	0.20	0.19	0.25
132153105	0.86	0.76	0.97	0.90	0.50	0.60	0.56	0.74
141	0.02	0.02	0.03	0.02	0.01	0.02	0.02	0.02
137130176	0.07	0.06	0.08	0.07	0.04	0.05	0.04	0.06
163138	0.46	0.41	0.52	0.48	0.27	0.32	0.30	0.40
158	0.11	0.10	0.12	0.11	0.06	0.08	0.07	0.09
129178	0.05	0.04	0.05	0.05	0.03	0.03	0.03	0.04
187182	0.02	0.02	0.03	0.02	0.01	0.02	0.02	0.02
183	0.15	0.13	0.17	0.16	0.09	0.11	0.10	0.13
128	0.06	0.05	0.07	0.06	0.03	0.04	0.04	0.05
185	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
174	0.10	0.09	0.11	0.10	0.06	0.07	0.06	0.08
177	0.05	0.04	0.06	0.05	0.03	0.03	0.03	0.04
202171156	0.10	0.09	0.12	0.11	0.06	0.07	0.07	0.09
157200	0.04	0.04	0.05	0.05	0.02	0.03	0.03	0.04
172	0.02	0.02	0.03	0.03	0.01	0.02	0.02	0.02
197	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.03
180	0.60	0.53	0.68	0.63	0.35	0.42	0.39	0.52
193	0.33	0.29	0.37	0.34	0.19	0.23	0.21	0.28
191	0.09	0.08	0.11	0.10	0.05	0.07	0.06	0.08
199	0.32	0.28	0.36	0.33	0.18	0.22	0.21	0.27
170190	0.43	0.38	0.49	0.45	0.25	0.30	0.28	0.37
198	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.02
201	0.08	0.07	0.09	0.08	0.04	0.05	0.05	0.07
203196	0.35	0.30	0.39	0.36	0.20	0.24	0.23	0.30
189	0.05	0.04	0.05	0.05	0.03	0.03	0.03	0.04
208195	1.20	1.05	1.35	1.25	0.69	0.83	0.79	1.03
207	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.02
194	0.10	0.09	0.11	0.10	0.06	0.07	0.07	0.09
205	0.46	0.41	0.52	0.48	0.27	0.32	0.30	0.40
206	0.08	0.07	0.09	0.08	0.05	0.06	0.05	0.07
209	0.29	0.26	0.33	0.31	0.17	0.21	0.19	0.25

Back River/Hart-Miller Island Field Collections 2003

Sediment PCB (ng/g carbon)

PCB	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
1	34.66	ND	18.38	7.70	50.08	ND	222.30	32.14
3	ND	18.58	17.82	21.79	601.70	315.39	NQ	108.20
4,10	2.41	ND	ND	ND	4.10	2.56	11.35	3.41
7,9	1.31	ND	ND	ND	ND	1.07	4.24	ND
6	ND	ND	4.82	1.56	5.34	2.67	7.08	ND
8,5	83.57	26.89	91.37	143.99	18.35	7.78	37.38	ND
19	0.55	0.24	0.26	0.22	2.05	3.43	1.98	0.23
12,13	ND	ND	14.48	0.44	5.05	3.55	7.42	1.98
18	5.44	ND	7.55	12.30	4.70	1.39	ND	ND
17	7.04	3.40	8.46	9.72	6.80	2.12	102.79	2.87
24	10.04	5.30	8.72	14.86	0.32	0.07	1.02	0.13
16,32	8.40	12.91	8.28	12.53	5.18	3.48	15.14	3.13
29	0.04	0.04	0.05	0.05	0.12	0.08	0.45	0.12
26	14.35	4.54	15.83	21.01	0.84	0.82	1.72	ND
25	6.59	2.40	6.61	7.88	0.63	0.54	0.98	ND
31, 28	120.77	63.72	116.91	134.57	39.28	28.52	44.28	20.08
33,21,53	23.35	12.98	19.99	29.29	9.94	9.48	14.30	10.13
51	5.11	2.79	5.04	7.01	3.79	5.99	5.31	3.48
22	18.83	10.10	16.21	23.17	13.85	ND	47.02	9.78
45	9.54	2.03	7.83	16.32	2.92	2.27	20.40	2.09
46	17.62	11.70	10.03	ND	5.71	3.10	5.73	2.10
52	60.72	29.86	66.82	79.59	17.47	15.33	23.31	15.74
49	47.05	30.80	51.57	57.91	21.57	20.28	40.04	21.71
47,48	24.31	14.43	ND	29.99	8.62	7.72	7.66	ND
44	39.72	17.63	38.26	54.27	16.07	12.22	21.15	8.19
37,42	29.87	13.08	25.49	37.05	17.16	14.42	26.32	9.98
41,64,71	43.97	21.90	41.68	51.46	15.11	11.34	23.57	9.93
40	16.11	6.87	16.77	26.51	4.57	4.41	9.79	2.66
100	6.49	3.89	7.42	10.94	3.98	4.01	NQ	2.82
63	2.78	2.19	4.15	4.57	5.54	ND	ND	ND
74	25.32	14.61	25.56	33.12	9.16	7.16	10.79	4.88
70,76	78.57	45.58	82.34	96.06	28.59	24.57	35.65	24.41
66,95	146.35	83.45	154.91	177.05	41.13	41.33	62.23	36.53
91	14.85	8.73	14.78	15.60	4.44	4.18	4.95	3.32
56,60(92,84)	65.58	76.82	86.63	93.25	51.44	56.56	77.20	51.64
89	51.80	26.56	52.24	88.22	4.17	2.62	3.07	1.80
101	57.32	ND	62.04	68.17	13.38	14.91	20.44	14.76
99	88.66	92.61	74.92	99.52	11.25	9.78	13.22	10.51
119	ND	3.04	5.75	11.39	1.00	ND	2.14	1.62
83	3.77	1.40	2.81	4.10	1.01	1.45	2.22	0.81
97	147.40	79.99	110.77	133.64	28.15	24.93	52.68	18.29
81,	9.54	17.68	33.06	11.99	ND	ND	ND	ND

Back River/Hart-Miller Island Field Collections 2003

Sediment PCB (ng/g carbon)

PCB	TRAP 6 SEDIMENT	TRAP 7 SEDIMENT	BUOY 12 SEDIMENT	COX POINT SEDIMENT	HMI 16 SEDIMENT	HMI 17 SEDIMENT	HMI 9 SEDIMENT	HMI 3 SEDIMENT
85	17.25	10.28	16.37	18.84	5.31	5.63	7.46	5.49
136	8.73	3.90	7.87	8.83	1.95	1.16	3.50	1.47
77110	111.57	65.72	113.68	131.69	32.03	34.83	49.80	34.12
82, 151	5.71	2.37	6.05	7.36	1.76	1.86	2.70	1.31
135144	17.91	10.39	19.94	22.87	4.64	4.92	6.57	3.72
107	6.77	4.37	7.08	7.70	2.21	3.31	3.42	2.18
123149	85.86	49.28	157.30	103.22	21.86	26.42	33.97	23.18
118	67.13	41.02	14.32	74.68	25.30	23.20	35.00	24.34
134	3.43	1.63	3.13	3.80	1.54	1.28	2.23	0.73
146	12.56	18.96	33.99	33.68	12.40	15.77	17.17	12.01
132153105	289.66	181.57	317.88	302.48	96.32	99.92	127.59	92.68
141	29.59	16.45	32.34	36.17	12.35	11.23	15.30	9.60
137130176	14.19	6.13	16.44	15.24	6.01	4.25	7.02	ND
163138	210.36	123.41	232.66	231.90	71.25	71.61	80.13	66.12
158	3.84	ND	3.80	4.13	ND	2.43	3.82	ND
129178	16.96	19.53	15.23	16.31	8.85	10.07	12.11	6.50
187182	88.31	52.28	94.57	94.08	29.86	27.10	35.92	24.56
183	45.09	23.72	48.33	49.35	7.96	4.30	12.19	ND
128	37.65	22.84	37.88	41.58	7.44	5.68	9.79	5.43
185	6.79	2.26	5.35	6.95	2.44	1.68	2.18	1.41
174	45.80	25.91	49.15	51.89	15.51	14.86	20.53	9.47
177	59.80	32.91	52.81	54.79	14.71	11.33	17.57	9.38
202171156	74.17	40.06	68.59	84.53	17.21	14.95	24.46	14.87
157200	18.30	ND	7.84	12.88	5.36	3.32	5.82	3.53
172	11.31	5.66	ND	12.16	ND	3.43	6.89	2.76
197	23.61	10.86	9.28	15.26	2.44	0.95	4.45	1.89
180	127.53	72.99	131.87	136.82	43.74	42.36	54.96	ND
193	16.38	ND	12.51	17.90	7.70	ND	17.23	ND
191	6.06	ND	4.34	5.12	ND	ND	ND	ND
199	11.70	ND	ND	9.79	10.52	12.14	18.46	15.56
170190	71.73	39.36	66.59	78.49	22.68	20.91	27.65	17.03
198	4.22	1.93	3.90	5.28	21.54	3.92	3.46	3.17
201	51.47	34.03	49.86	45.16	31.13	32.14	52.44	30.43
203196	73.52	45.04	79.65	70.52	35.33	36.97	57.49	ND
189	9.20	2.65	6.36	6.14	3.03	ND	5.31	ND
208195	31.05	30.45	34.40	26.31	44.76	54.16	81.07	46.14
207	12.29	8.72	12.06	8.83	10.12	11.98	19.45	9.01
194	32.97	22.46	39.20	36.92	10.69	9.43	13.38	7.86
205	ND	ND	ND	ND	12.33	ND	ND	ND
206	108.60	83.03	111.41	109.25	74.50	89.64	145.97	73.44
209	44.33	45.29	52.12	35.09	73.83	93.02	155.37	80.38
Total PCB	3243.19	1926.23	3312.74	3682.82	1893.19	1483.69	2187.16	1079.24

Back River/Hart-Miller Island Field Collections 2003

PCB BSAFs	BUOY 12	HMI 17	HMI 3	HMI 9	TRAP 7	HMI 16	HMI 17	HMI 3	BUOY 12	TRAP 6	TRAP 7
	N. succinea	N. succinea	N. succinea	N. succinea	N. succinea	M.viridis	M.viridis	M.viridis	amphipods	amphipods	amphipods
PCB											
1									188.041		
3					76.091						33.036
4,10											
7,9											
6		4.223		20.661			50.684				
8,5											
19		2.636									52.267
12,13											
18	5.537	9.340									
17	5.248	9.416	3.328	0.079	6.671	0.449	2.918		1.538	3.285	6.239
24											
16,32	11.036	14.424		2.626							4.678
29											
26	1.434	15.402							0.964	0.987	1.576
25	4.342				13.971		14.254		2.796		3.326
31, 28	1.124	1.614	2.348		1.612		0.742		0.761	0.515	1.311
33,21,53	5.967	5.251			7.700					3.337	6.901
51	3.012	1.011	1.355	0.993	3.083	0.695			1.363	1.646	3.275
22											
45	4.665	8.567	7.294		13.497	2.479				2.502	12.439
46											
52	3.098	1.691	0.924	0.816	3.748	0.737	0.680	0.680	1.594	1.568	2.858
49	4.855										3.359
47,48		8.361		5.748	6.836	1.692	1.273			1.851	6.511
44	2.777	1.516	1.320	0.713	3.861	0.609	0.688	0.507	1.428	1.919	2.911
37,42	2.100	1.424	1.487	0.602	3.825	0.389			1.065	1.886	2.732
41,64,71	4.055	6.191								4.300	5.914
40	2.276	3.121	3.663	1.205	6.342	1.769	2.024	3.885	1.405	4.196	7.948
100	4.667	2.715	3.873	0.005	7.909	2.956	1.742	2.971	2.616	5.016	7.230
63					6.989					9.690	7.360
74	2.601	2.834	4.896	2.206	5.539	2.475	2.546	4.798		2.855	5.031
70,76	2.317	0.924			2.097				0.994	1.383	1.504
66,95	3.570	3.019	3.110	2.108	4.569	1.301	0.770	1.829	1.743	2.300	4.268
91	3.703	5.687	5.747	3.782	5.625	1.574	2.294	2.554	2.330	2.366	4.718
56,60(92,84)	1.769	1.461	1.394		3.113				2.163	3.003	2.455
89	2.445	19.210	23.725	16.520	4.709	4.679			1.726		3.690
101	3.814	6.348	5.017	3.713		1.682	1.365	1.504	2.041	2.474	
99	2.028	6.004	4.266	3.340	1.206	0.979	0.910	0.903	1.258	1.232	0.990
119	5.941		12.331	8.774							7.614
83	4.365	3.586	3.596	1.834	9.454	2.532	1.823		2.727	3.586	8.355
97	3.562	6.220									3.402
81,87											

Back River/Hart-Miller Island Field Collections 2003

PCB BSAFs	BUOY 12 N. succinea	HMI 17 N. succinea	HMI 3 N. succinea	HMI 9 N. succinea	TRAP 7 N. succinea	HMI 16 M.viridis	HMI 17 M.viridis	HMI 3 M.viridis	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods
85	2.664	3.718	3.997	2.157	4.320	1.236	0.895	0.928	1.954	2.628	3.783
136	3.084	14.168	6.954	3.796	6.547	1.751	2.502	2.265	2.086	2.238	5.188
77110	2.790	3.418	2.666	1.937	4.305	1.021	0.808	0.769	2.095	2.120	3.472
82, 151	2.857	5.704	5.762	3.041	7.355	1.691	1.226	2.258	2.350	2.509	6.383
135144	2.551	6.505	6.132	3.614	5.448	1.850	1.450	2.369	2.571	2.707	4.716
107	4.364	3.151	4.228	2.572	5.241	1.657	0.978	2.123	2.496	2.923	3.739
123149	1.956	8.086	7.487	5.913	6.167	2.359	1.598	2.252	1.414	2.582	4.610
118	14.114	2.077			3.731		1.596		9.976	2.346	2.840
134	4.660	7.709	9.300	3.884		3.188					3.741
146	4.040	6.413	7.021	5.039							5.170
132153105	2.956	6.205	4.810	3.493	4.225	1.386	1.249		2.249	2.360	3.415
141	2.761	6.200	4.540	3.525	4.889	1.434	1.287	1.591	2.435	2.265	3.830
137130176		7.272		3.868							5.162
163138	2.433	5.291	4.316	3.483	4.191	1.376	1.168	1.358	2.149	2.281	3.539
158											
129178	3.621	6.249	6.157	4.034	2.483	2.173	1.720	2.614	2.433	2.108	2.005
187182	2.681	10.154	8.531	5.674	5.325	2.406	2.282	3.014	2.201	2.191	3.748
183	3.693	28.620		6.842	6.417	2.974	3.986		1.878	1.894	4.161
128	1.034	3.589	2.902	1.797	1.896	0.982	1.113	1.480	1.236	1.065	1.924
185	3.801	14.469	12.722	8.028	9.266	6.090	4.917	7.224	2.467	2.525	7.720
174	2.399	8.254	8.494	4.252	4.640	2.928	2.751	4.791	2.014	2.097	3.853
177	1.466	8.267	7.543	3.691	2.724	2.189	2.364	3.345	1.348	1.118	2.261
202171156	1.270	7.066	5.368	2.996	2.098	2.144	2.087	2.484	0.901	0.805	1.648
157200	3.277	11.604	6.210	4.567		2.813					
172		7.138	3.067	1.425							1.010
197	2.053	13.895	5.426	2.108	1.280	1.631	3.478	2.164	1.238	0.237	0.728
180	2.136	6.455		3.457	4.149	2.115	1.807		1.641	1.743	2.979
193											
191											
199											
170190	2.030	5.133	5.203	2.767	3.910	1.787	1.542	2.247		1.262	2.184
198	3.569	3.614	4.185	3.204	8.066	0.290	1.418	2.317			
201	2.004	6.328	4.871	2.660	3.284	2.639	2.165	2.828		1.120	1.888
203196	3.485	7.597		3.208	5.700	2.583	2.212			1.990	2.892
189					6.716					4.237	
208195	1.925	4.548	3.477	1.953	2.534	3.108	2.230	3.216	0.710	1.441	1.268
207	3.847	5.412	4.691	2.186	5.276	2.960	2.334	3.091		0.839	1.835
194	0.830	4.162	3.683	1.899	1.632	2.450	2.654	3.193	0.425	0.839	1.075
205											
206	1.006	4.129	2.971	1.577	1.199	2.797	2.086	2.854	0.138	0.245	0.367
209	2.312	2.465	1.960	0.991	2.405	2.587	1.810	2.677		0.590	0.626

Back River/Hart-Miller Island Field Collections 2003

Invertebrate BDEs (ng/g wet)	BUOY 12 N. succinea	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods	TRAP 7 N. succinea	HMI 3 M.viridis	HMI 3 N. succinea	HMI 16 M.viridis	HMI 9 N. succinea	HMI 17 M.viridis	HMI 17 N. succinea
BDE-30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-17	0.06	0.04	0.03	0.03	0.09	0.01	0.09	0.01	0.04	ND	0.04
BDE-25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-28,33	ND	0.10	0.06	0.05	0.10	ND	0.07	ND	ND	ND	0.03
BDE-75	ND	ND	0.02	0.02	0.04	ND	0.06	0.01	0.02	ND	0.02
BDE-49,71	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-47	ND	ND	ND	0.84	ND	ND	2.61	ND	1.07	ND	1.25
BDE-66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-100	ND	0.43	ND	0.15	ND	ND	0.59	0.10	0.25	ND	0.39
BDE-119	ND	ND	0.04	0.01	ND	ND	ND	ND	ND	ND	ND
BDE-99	ND	1.57	ND	0.49	ND	ND	1.81	0.49	0.79	0.48	1.20
BDE-116	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-155,85	ND	ND	ND	0.08	0.22	0.02	ND	0.03	0.03	0.03	0.07
BDE-154	0.18	0.19	0.12	0.10	0.64	ND	0.29	0.05	0.14	0.05	0.25
BDE-153	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.12
BDE-138	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-156	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-183	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND
BDE-191	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-181	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-204	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-197	ND	ND	ND	0.02	ND	ND	ND	ND	ND	ND	ND
BDE-198,203	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-196	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-205	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-208	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-207	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-206	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE-209	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total BDE	0.23	2.34	0.26	1.79	1.08	0.03	5.52	0.69	2.36	0.57	3.37

Back River/Hart-Miller Island Field Collections 2003

Invertebrate BDE MDLs (ng/g wet)	BUOY 12 N. succinea	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods	TRAP 7 N. succinea	HMI 3 M.viridis	HMI 3 N. succinea	HMI 16 M.viridis	HMI 9 N. succinea	HMI 17 M.viridis	HMI 17 N. succinea
BDE-30	0.01	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.00
BDE-17	0.02	0.02	0.02	0.01	0.03	0.01	0.02	0.00	0.01	0.01	0.01
BDE-25	0.02	0.02	0.01	0.01	0.03	0.01	0.02	0.00	0.01	0.01	0.01
BDE-28,33	0.06	0.06	0.04	0.02	0.08	0.02	0.05	0.01	0.02	0.01	0.02
BDE-75	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.00	0.01	0.00	0.01
BDE-49,71	0.19	0.20	0.13	0.06	0.25	0.08	0.17	0.03	0.08	0.05	0.06
BDE-47	2.20	2.34	1.50	0.68	2.99	0.97	2.00	0.38	0.94	0.59	0.69
BDE-66	0.13	0.14	0.09	0.04	0.18	0.06	0.12	0.02	0.06	0.04	0.04
BDE-100	0.39	0.41	0.27	0.12	0.53	0.17	0.35	0.07	0.17	0.10	0.12
BDE-119	0.01	0.02	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.00
BDE-99	1.45	1.54	0.99	0.45	1.97	0.64	1.32	0.25	0.62	0.39	0.46
BDE-116	0.03	0.03	0.02	0.01	0.04	0.01	0.03	0.01	0.01	0.01	0.01
BDE-155,85	0.04	0.04	0.03	0.01	0.05	0.02	0.03	0.01	0.02	0.01	0.01
BDE-154	0.10	0.11	0.07	0.03	0.14	0.05	0.09	0.02	0.04	0.03	0.03
BDE-153	0.25	0.27	0.17	0.08	0.34	0.11	0.23	0.04	0.11	0.07	0.08
BDE-138	0.06	0.06	0.04	0.02	0.08	0.03	0.06	0.01	0.03	0.02	0.02
BDE-156	0.02	0.02	0.01	0.00	0.02	0.01	0.01	0.00	0.01	0.00	0.00
BDE-183	0.02	0.02	0.02	0.01	0.03	0.01	0.02	0.00	0.01	0.01	0.01
BDE-191	0.03	0.03	0.02	0.01	0.04	0.01	0.03	0.01	0.01	0.01	0.01
BDE-181	0.02	0.02	0.01	0.01	0.02	0.01	0.02	0.00	0.01	0.00	0.01
BDE-190	0.03	0.03	0.02	0.01	0.04	0.01	0.03	0.00	0.01	0.01	0.01
BDE-204	0.03	0.03	0.02	0.01	0.04	0.01	0.02	0.00	0.01	0.01	0.01
BDE-197	0.03	0.03	0.02	0.01	0.04	0.01	0.03	0.01	0.01	0.01	0.01
BDE-198,203	0.03	0.03	0.02	0.01	0.04	0.01	0.03	0.00	0.01	0.01	0.01
BDE-196	0.13	0.14	0.09	0.04	0.18	0.06	0.12	0.02	0.06	0.03	0.04
BDE-205	0.02	0.02	0.02	0.01	0.03	0.01	0.02	0.00	0.01	0.01	0.01
BDE-208	0.97	1.04	0.66	0.30	1.32	0.43	0.89	0.17	0.42	0.26	0.31
BDE-207	0.53	0.56	0.36	0.16	0.72	0.23	0.48	0.09	0.23	0.14	0.17
BDE-206	1.72	1.84	1.17	0.54	2.34	0.76	1.57	0.30	0.74	0.46	0.54
BDE-209	129.73	138.16	88.29	40.35	176.31	57.47	117.87	22.21	55.58	34.85	40.92

Back River/Hart-Miller Island Field Collections 2003

Invertebrate BDEs (ng/g lipid)	BUOY 12 N. succinea	BUOY 12 amphipods	TRAP 6 amphipods	TRAP 7 amphipods	TRAP 7 N. succinea	HMI 3 M.viridis	HMI 3 N. succinea	HMI 16 M.viridis	HMI 9 N. succinea	HMI 17 M.viridis	HMI 17 N. succinea
fraction lipid	0.018	0.015	0.014	0.011	0.021	0.012	0.028	0.010	0.017	0.011	0.019
BDE-30											
BDE-17	3.06	2.97	1.97	2.46	4.34	0.99	3.30	0.72	2.26		2.25
BDE-25											
BDE-28,33		6.76	4.26	4.14	4.61		2.52				1.65
BDE-75			1.24	1.72	1.83		2.06	0.61	1.28		0.98
BDE-49,71											
BDE-47				75.28			93.30		62.74		67.13
BDE-66											
BDE-100		28.99		13.91			21.24	10.07	14.41		20.97
BDE-119			3.29	0.95							
BDE-99		104.98		44.39			64.71	49.62	46.43	44.71	64.43
BDE-116											
BDE-155,85				7.58	10.28	1.93		2.96	1.94	3.01	3.74
BDE-154	9.66	12.90	8.55	8.98	30.32		10.23	5.17	8.13	4.57	13.41
BDE-153											6.63
BDE-138											
BDE-156											
BDE-183									0.75		
BDE-191											
BDE-181											
BDE-190											
BDE-204											
BDE-197				1.69							
BDE-198,203											
BDE-196											
BDE-205											
BDE-208											
BDE-207											
BDE-206											
BDE-209											

Back River/Hart-Miller Island Field Collections 2003

Sediment BDEs (ng/g dry)

	COX POINT	BUOY 12	TRAP 6	TRAP 7	HMI 3	HMI 9	HMI 16	HMI 17
BDE-30	ND	ND	ND	ND	ND	ND	ND	ND
BDE-17	0.26	0.13	0.10	0.07	0.05	0.09	0.06	0.08
BDE-25	0.03	ND	ND	0.01	ND	0.01	ND	0.01
BDE-28,33	0.40	0.14	0.09	0.06	0.05	0.07	0.04	0.07
BDE-75	0.15	ND	ND	ND	ND	0.02	0.01	0.01
BDE-49,71	ND	ND	ND	ND	ND	ND	ND	ND
BDE-47	2.34	1.47	ND	ND	0.78	0.81	0.65	0.81
BDE-66	0.27	0.11	0.03	0.03	0.03	0.03	0.02	0.04
BDE-100	0.75	0.32	0.17	ND	ND	0.13	0.09	0.12
BDE-119	ND	ND	ND	ND	ND	ND	ND	ND
BDE-99	3.08	1.18	0.62	ND	ND	0.54	0.36	0.46
BDE-116	ND	ND	ND	ND	ND	ND	ND	ND
BDE-155,85	ND	ND	ND	ND	0.03	ND	ND	ND
BDE-154	0.81	1.25	0.34	0.19	0.05	0.06	0.05	0.07
BDE-153	ND	ND	ND	0.08	ND	0.05	0.05	0.05
BDE-138	ND	ND	ND	ND	ND	ND	ND	ND
BDE-156	ND	ND	ND	ND	ND	ND	ND	ND
BDE-183	ND	ND	0.45	0.29	ND	ND	0.05	ND
BDE-191	ND	ND	ND	ND	ND	ND	ND	ND
BDE-181	ND	ND	ND	ND	ND	ND	ND	ND
BDE-190	ND	ND	ND	ND	ND	ND	ND	ND
BDE-204	ND	ND	ND	ND	ND	ND	ND	ND
BDE-197	ND	ND	0.91	0.46	ND	0.07	0.07	0.16
BDE-198,203	ND	ND	ND	ND	ND	0.08	ND	0.12
BDE-196	ND	ND	2.67	1.33	ND	0.10	0.12	0.18
BDE-205	ND	ND	ND	ND	ND	ND	ND	ND
BDE-208	30.29	18.69	13.11	8.87	0.25	0.47	0.64	2.33
BDE-207	108.46	59.48	45.34	26.57	0.71	1.57	2.04	4.78
BDE-206	157.45	80.57	64.23	34.32	0.75	2.62	2.79	1.84
BDE-209	4430.95	2134.65	2196.18	936.92	50.30	115.67	119.60	60.43
Total BDE	4735.24	2298.00	2324.23	1009.21	52.99	122.39	126.66	71.56

Back River/Hart-Miller Island Field Collections 2003

Sediment BDE MDLs (ng/g dry)	COX POINT	BUOY 12	TRAP 6	TRAP 7	HMI 3	HMI 9	HMI 16	HMI 17
	0.056	0.0479	0.0402	0.035	0.027	0.0251	0.0292	0.0373
BDE-30	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002
BDE-17	0.008	0.008	0.008	0.007	0.006	0.005	0.004	0.005
BDE-25	0.004	0.004	0.004	0.003	0.003	0.003	0.002	0.003
BDE-28,33	0.016	0.017	0.015	0.013	0.013	0.010	0.009	0.010
BDE-75	0.006	0.006	0.006	0.005	0.005	0.004	0.003	0.004
BDE-49,71	0.004	0.005	0.004	0.004	0.004	0.003	0.002	0.003
BDE-47	0.909	0.983	0.871	0.767	0.750	0.572	0.502	0.608
BDE-66	0.026	0.028	0.025	0.022	0.022	0.016	0.014	0.017
BDE-100	0.159	0.171	0.152	0.134	0.131	0.100	0.087	0.106
BDE-119	0.007	0.008	0.007	0.006	0.006	0.005	0.004	0.005
BDE-99	0.601	0.650	0.576	0.506	0.495	0.378	0.331	0.401
BDE-116	0.005	0.006	0.005	0.005	0.005	0.003	0.003	0.004
BDE-155,85	0.014	0.015	0.013	0.011	0.011	0.009	0.007	0.009
BDE-154	0.025	0.027	0.024	0.021	0.021	0.016	0.014	0.017
BDE-153	0.056	0.060	0.053	0.047	0.046	0.035	0.031	0.037
BDE-138	0.015	0.016	0.014	0.013	0.012	0.010	0.008	0.010
BDE-156	0.009	0.009	0.008	0.007	0.007	0.006	0.005	0.006
BDE-183	0.012	0.013	0.012	0.010	0.010	0.008	0.007	0.008
BDE-191	0.007	0.007	0.006	0.006	0.005	0.004	0.004	0.004
BDE-181	0.006	0.006	0.006	0.005	0.005	0.004	0.003	0.004
BDE-190	0.016	0.017	0.015	0.013	0.013	0.010	0.009	0.010
BDE-204	0.014	0.015	0.013	0.012	0.012	0.009	0.008	0.009
BDE-197	0.013	0.014	0.012	0.011	0.010	0.008	0.007	0.008
BDE-198,203	0.011	0.012	0.010	0.009	0.009	0.007	0.006	0.007
BDE-196	0.007	0.008	0.007	0.006	0.006	0.005	0.004	0.005
BDE-205	0.014	0.015	0.013	0.012	0.011	0.009	0.008	0.009
BDE-208	0.082	0.089	0.079	0.070	0.068	0.052	0.046	0.055
BDE-207	0.256	0.277	0.245	0.216	0.211	0.161	0.141	0.171
BDE-206	0.251	0.272	0.241	0.212	0.207	0.158	0.139	0.168
BDE-209	14.120	15.267	13.529	11.904	11.644	8.884	7.791	9.437

Back River/Hart-Miller Island Field Collections 2003

Sediment BDEs (ng/g carbon)

	COX POINT	BUOY 12	TRAP 6	TRAP 7	HMI 3	HMI 9	HMI 16	HMI 17
fraction carbon	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.04
BDE-30								
BDE-17	4.66	2.78	2.58	1.95	1.71	3.45	2.09	2.14
BDE-25	0.53			0.33		0.36		0.22
BDE-28,33	7.11	2.96	2.27	1.68	1.88	2.88	1.52	1.80
BDE-75	2.68					0.63	0.31	0.30
BDE-49,71								
BDE-47	41.83	30.65			28.76	32.10	22.35	21.84
BDE-66	4.82	2.37	0.86	0.87	0.96	1.32	0.74	0.97
BDE-100	13.45	6.71	4.11			5.30	3.17	3.29
BDE-119								
BDE-99	54.94	24.73	15.31			21.38	12.45	12.44
BDE-116								
BDE-155,85					1.00			
BDE-154	14.39	26.19	8.42	5.53	1.98	2.37	1.88	1.79
BDE-153				2.38		2.05	1.58	1.25
BDE-138								
BDE-156								
BDE-183			11.10	8.25			1.59	
BDE-191								
BDE-181								
BDE-190								
BDE-204								
BDE-197			22.52	13.25		2.72	2.37	4.32
BDE-198,203						3.26		3.28
BDE-196			66.34	37.99		4.08	4.12	4.95
BDE-205								
BDE-208	540.91	390.27	326.04	253.51	9.10	18.78	21.96	62.47
BDE-207	1936.71	1241.71	1127.82	759.11	26.34	62.65	70.02	128.18
BDE-206	2811.64	1681.98	1597.87	980.67	27.94	104.54	95.69	49.23
BDE-209	79124.09	44564.68	54631.41	26769.06	1862.86	4608.22	4095.86	1620.10
Total BDE	84557.77	47975.03	57816.66	28834.58	1962.52	4876.10	4337.70	1918.57

Back River/Hart-Miller Island Field Collections 2003

BSAFs	BUOY 12	BUOY 12	TRAP 6	TRAP 7	TRAP 7	HMI 3	HMI 3	HMI 16	HMI 9	HMI 17	HMI 17
	N. succinea	amphipods	amphipods	amphipods	N. succinea	M.viridis	N. succinea	M.viridis	N. succinea	M.viridis	N. succinea
BDE-30											
BDE-17	1.10	1.07	0.76	1.27	2.23	0.58	1.92	0.34	0.65		1.05
BDE-25											
BDE-28,33		2.28	1.87	2.46	2.74		1.34				0.92
BDE-75								1.98	2.02		3.26
BDE-49,71											
BDE-47							3.24		1.95		3.07
BDE-66											
BDE-100		4.32						3.18	2.72		6.38
BDE-119											
BDE-99		4.24						3.99	2.17	3.59	5.18
BDE-116											
BDE-155,85						1.93					
BDE-154	0.37	0.49	1.02	1.63	5.49		5.17	2.75	3.43	2.55	7.48
BDE-153											5.28
BDE-138											
BDE-156											
BDE-183											
BDE-191											
BDE-181											
BDE-190											
BDE-204											
BDE-197				0.13							
BDE-198,203											
BDE-196											
BDE-205											
BDE-208											
BDE-207											
BDE-206											
BDE-209											

Back River/Hart-Miller Island Field Collections 2005

							Invertebrate PAH MDLs (ng/g wet)					
Invertebrate PAH (ng/g wet)	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis
Naphthalene	ND	ND	ND	ND	ND	ND	12.52	14.49	25.35	21.57	26.00	24.73
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	7.59	8.79	15.38	13.09	15.77	15.00
Azulene	ND	ND	ND	ND	ND	ND	0.30	0.34	0.60	0.51	0.62	0.59
1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	3.33	3.86	6.75	5.74	6.92	6.59
Biphenyl	ND	ND	ND	ND	ND	ND	11.15	12.90	22.58	19.21	23.15	22.02
Acenapthylene	ND	ND	ND	0.62	ND	ND	0.33	0.39	0.68	0.57	0.69	0.66
Acenapthene	ND	ND	ND	ND	ND	5.63	2.74	3.17	5.55	4.72	5.69	5.41
Fluorene	ND	ND	ND	ND	ND	ND	6.74	7.80	13.65	11.62	14.00	13.32
1-Methylfluorene	1.58	1.80	ND	ND	ND	ND	1.26	1.46	2.55	2.17	2.62	2.49
Phenanthrene	ND	ND	ND	ND	ND	42.41	20.48	23.70	41.48	35.30	42.54	40.46
Anthracene	0.58	0.67	1.08	1.15	1.13	1.37	0.07	0.09	0.15	0.13	0.15	0.15
2-Methylphenanthrene	2.06	2.40	ND	ND	ND	5.46	2.00	2.31	4.05	3.45	4.15	3.95
2-Methylanthracene	ND	ND	ND	ND	ND	ND	2.78	3.21	5.63	4.79	5.77	5.49
4,5-Methylenephenanthrene	2.84	1.74	ND	2.36	1.51	1.51	0.67	0.77	1.35	1.15	1.38	1.32
1-Methylanthracene	1.79	2.39	2.45	2.19	ND	3.05	1.15	1.33	2.33	1.98	2.38	2.27
1-Methylphenanthrene	1.68	1.89	2.10	2.23	ND	2.73	0.96	1.11	1.95	1.66	2.00	1.90
9-Methylanthracene	ND	ND	ND	ND	ND	ND	0.15	0.17	0.30	0.26	0.31	0.29
Fluoranthene	26.89	23.77	ND	27.40	ND	34.39	10.56	12.21	21.38	18.19	21.92	20.85
Pyrene	22.81	22.10	13.15	24.17	14.33	11.71	2.19	2.53	4.43	3.77	4.54	4.32
3,6-Dimethylphenanthrene	0.32	ND	ND	ND	ND	ND	0.15	0.17	0.30	0.26	0.31	0.29
Benzo[a]fluorene	3.25	2.99	2.28	3.77	2.38	1.66	0.11	0.13	0.23	0.19	0.23	0.22
Benzo[b]fluorene	2.54	1.23	0.28	2.49	1.08	0.71	0.11	0.13	0.23	0.19	0.23	0.22
Benz[a]anthracene	3.23	2.43	1.33	5.06	3.41	1.90	0.41	0.47	0.83	0.70	0.85	0.80
Chrysene+Triphenylene	18.01	14.47	ND	20.26	ND	16.34	6.26	7.24	12.68	10.79	13.00	12.37
Napthacene	0.91	ND	ND	ND	0.54	ND	0.19	0.21	0.38	0.32	0.38	0.37
Benzo[b]fluoranthene	10.73	10.83	6.60	7.26	5.79	ND	1.30	1.50	2.63	2.23	2.69	2.56
Benzo[k]fluoranthene	2.85	4.47	ND	17.26	6.95	5.68	1.37	1.59	2.78	2.36	2.85	2.71
Dimethylbenz[a]anthracene	ND	ND	ND	ND	ND	ND	0.96	1.11	1.95	1.66	2.00	1.90
Benzo[e]pyrene	8.12	6.00	3.88	14.04	6.69	3.59	0.33	0.39	0.68	0.57	0.69	0.66
Benzo[a]pyrene	1.25	1.84	1.25	7.85	3.54	2.20	0.26	0.30	0.53	0.45	0.54	0.51
Perylene	2.47	3.31	3.03	8.49	6.23	4.22	0.26	0.30	0.53	0.45	0.54	0.51
3-Methylchloanthrene	0.67	ND	ND	ND	ND	ND	0.52	0.60	1.05	0.89	1.08	1.02
Indeno[1,2,3-c,d]pyrene	ND	ND	ND	6.32	4.82	0.88	0.26	0.30	0.53	0.45	0.54	0.51
Dibenz[a,h+ac]anthracene	ND	ND	ND	ND	ND	1.73	0.56	0.64	1.13	0.96	1.15	1.10
Benzo[g,h,i]perylene	2.20	2.17	1.48	11.96	6.33	3.95	0.52	0.60	1.05	0.89	1.08	1.02
Anthanthrene	ND	ND	ND	ND	ND	ND	0.15	0.17	0.30	0.26	0.31	0.29
Coronene	ND	ND	ND	2.94	1.92	ND	0.22	0.26	0.45	0.38	0.46	0.44
Total PAH	116.79	106.50	38.88	167.81	66.67	151.12						

Back River/Hart-Miller Island Field Collections 2005

Invertebrate PAH (ng/g lipid)	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis
fraction lipid	0.0132	0.0132	0.0132	0.0108	0.0108	0.0108
Naphthalene						
2-Methylnaphthalene						
Azulene						
1-Methylnaphthalene						
Biphenyl						
Acenapthylene				57.13		
Acenapthene						521.68
Fluorene						
1-Methylfluorene	119.72	136.36				
Phenanthrene						3927.28
Anthracene	43.96	50.87	81.44	106.38	104.46	126.47
2-Methylphenanthrene	156.19	181.82				505.87
2-Methylanthracene						
4,5-Methylenephenanthrene	215.11	132.03		218.68	140.08	140.02
1-Methylanthracene	135.62	180.74	185.61	202.92		282.29
1-Methylphenanthrene	127.20	142.86	159.09	206.86		252.94
9-Methylanthracene						
Fluoranthene	2037.04	1800.87		2537.43		3184.28
Pyrene	1728.40	1674.24	996.21	2237.98	1327.16	1084.01
3,6-Dimethylphenanthrene	24.32					
Benzo[a]fluorene	245.98	226.19	172.35	348.70	220.80	153.57
Benzo[b]fluorene	192.67	93.07	20.83	230.50	99.72	65.49
Benz[a]anthracene	245.04	183.98	100.38	468.87	315.76	176.15
Chrysene+Triphenylene	1364.57	1096.32		1875.49		1513.10
Napthacene	69.21				49.86	
Benzo[b]fluoranthene	812.76	820.35	500.00	671.79	536.56	
Benzo[k]fluoranthene	216.05	338.74		1597.71	643.40	526.20
Dimethylbenz[a]anthracene						
Benzo[e]pyrene	615.41	454.55	293.56	1300.24	619.66	331.98
Benzo[a]pyrene	94.46	139.61	94.70	726.95	327.64	203.25
Perylene	187.06	251.08	229.17	786.05	576.92	390.70
3-Methylchloanthrene	50.51					
Indeno[1,2,3-c,d]pyrene				585.11	446.34	81.30
Dibenz[a,h+ac]anthracene						160.34
Benzo[g,h,i]perylene	166.48	164.50	111.74	1107.17	586.42	365.85
Anthanthrene						
Coronene				271.87	178.06	
Total PAH	8847.74	8068.18	2945.08	15537.83	6172.84	13992.77

Back River/Hart-Miller Island Field Collections 2005

	Sediment PAH (ng/g dry)			Sediment PAH MDLs (ng/g dry)				Sediment PAH (ng/g carbon)		
	BR 4	BR 5	BR 6	BR 4	BR 5	BR 6		BR 4	BR 5	BR 6
							fraction OC	0.0474	0.0449	0.0052
Naphthalene	34.47	62.97	10.97	4.03	3.85	2.00		727.31	1402.43	2109.71
2-Methylnaphthalene	32.39	49.72	7.57	3.24	3.10	1.61		683.41	1107.45	1454.85
Azulene	0.58	0.39	ND	0.13	0.12	0.06		12.30	8.62	
1-Methylnaphthalene	11.41	17.47	2.73	1.77	1.69	0.88		240.63	389.13	524.35
Biphenyl	7.48	10.17	1.45	0.59	0.56	0.29		157.87	226.56	277.98
Acenapthylene	6.79	9.98	1.27	0.11	0.11	0.05		143.24	222.25	244.62
Acenapthene	5.92	7.62	0.80	0.68	0.65	0.34		124.97	169.62	154.50
Fluorene	31.69	29.30	2.60	0.63	0.60	0.31		668.52	652.64	500.36
1-Methylfluorene	15.33	14.70	1.28	0.44	0.42	0.22		323.51	327.49	246.96
Phenanthrene	192.08	191.45	17.40	1.64	1.57	0.81		4052.42	4263.96	3346.86
Anthracene	56.33	55.12	5.02	0.28	0.26	0.14		1188.49	1227.58	966.19
2-Methylphenanthrene	45.11	51.68	6.25	1.14	1.09	0.57		951.62	1150.93	1202.62
2-Methylanthracene	21.15	16.13	1.54	0.17	0.16	0.08		446.28	359.23	296.71
4,5-Methylenephenanthrene	38.34	31.64	2.74	0.18	0.18	0.09		808.90	704.74	526.70
1-Methylanthracene	35.78	46.36	5.42	0.74	0.70	0.37		754.90	1032.63	1041.69
1-Methylphenanthrene	27.88	27.67	3.44	0.37	0.35	0.18		588.22	616.21	661.30
9-Methylanthracene	ND	ND	ND	0.11	0.11	0.05				
Fluoranthene	319.31	287.99	28.10	0.52	0.49	0.26		6736.60	6413.96	5403.89
Pyrene	313.24	276.81	28.12	0.46	0.44	0.23		6608.39	6164.94	5408.58
3,6-Dimethylphenanthrene	ND	ND	ND	0.17	0.16	0.08				
Benzo[a]fluorene	46.80	42.57	4.29	0.13	0.12	0.06		987.37	948.14	825.16
Benzo[b]fluorene	49.20	38.53	3.58	0.18	0.18	0.09		1038.00	858.04	687.63
Benz[a]anthracene	150.15	131.45	13.07	0.06	0.05	0.03		3167.76	2927.60	2513.51
Chrysene+Triphenylene	180.89	146.06	17.68	0.42	0.40	0.21		3816.33	3253.01	3400.70
Napthacene	24.51	19.92	1.65	0.37	0.35	0.18		516.99	443.71	316.60
Benzo[b]fluoranthene	273.07	188.80	15.75	0.13	0.12	0.06		5761.02	4204.80	3027.91
Benzo[k]fluoranthene	193.12	142.12	17.73	0.06	0.05	0.03		4074.18	3165.26	3408.89
Dimethylbenz[a]anthracene	3.29	3.73	ND	0.37	0.35	0.18		69.42	83.05	
Benzo[e]pyrene	148.07	109.04	11.44	0.20	0.19	0.10		3123.85	2428.53	2199.83
Benzo[a]pyrene	182.87	138.98	16.06	1.95	1.86	0.97		3858.03	3095.40	3088.78
Perylene	173.95	172.72	22.81	0.11	0.11	0.05		3669.86	3846.75	4386.79
3-Methylchloanthrene	2.92	1.33	ND	0.26	0.25	0.13		61.52	29.64	
Indeno[1,2,3-c,d]pyrene	250.46	183.54	14.47	0.29	0.28	0.15		5283.91	4087.81	2783.29
Dibenz[a,h+ac]anthracene	16.63	12.32	1.12	0.17	0.16	0.08		350.84	274.35	215.36
Benzo[g,h,i]perylene	198.06	144.09	13.61	0.31	0.30	0.16		4178.56	3209.13	2617.09
Anthanthrene	20.06	16.02	1.30	0.24	0.23	0.12		423.23	356.87	250.47
Coronene	34.11	26.04	1.84	0.28	0.26	0.14		719.54	579.91	352.89
Total PAH	3143.47	2704.43	283.10					66318.01	60232.35	54442.74

Back River/Hart-Miller Island Field Collections 2005

PAH BSAFs	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod
Naphthalene			
2-Methylnaphthalene			
Azulene			
1-Methylnaphthalene			
Biphenyl			
Acenapthylene			
Acenapthene			
Fluorene			
1-Methylfluorene	0.370	0.416	
Phenanthrene			
Anthracene	0.037	0.041	0.084
2-Methylphenanthrene	0.164	0.158	
2-Methylanthracene			
4,5-Methylenephenanthrene	0.266	0.187	
1-Methylanthracene	0.180	0.175	0.178
1-Methylphenanthrene	0.216	0.232	0.241
9-Methylanthracene			
Fluoranthene	0.302	0.281	
Pyrene	0.262	0.272	0.184
3,6-Dimethylphenanthrene			
Benzo[a]fluorene	0.249	0.239	0.209
Benzo[b]fluorene	0.186	0.108	0.030
Benz[a]anthracene	0.077	0.063	0.040
Chrysene+Triphenylene	0.358	0.337	
Napthacene	0.134		
Benzo[b]fluoranthene	0.141	0.195	0.165
Benzo[k]fluoranthene	0.053	0.107	
Dimethylbenz[a]anthracene			
Benzo[e]pyrene	0.197	0.187	0.133
Benzo[a]pyrene	0.024	0.045	0.031
Perylene	0.051	0.065	0.052
3-Methylchloanthrene	0.821		
Indeno[1,2,3-c,d]pyrene			
Dibenz[a,h+ac]anthracene			
Benzo[g,h,i]perylene	0.040	0.051	0.043
Anthanthrene			
Coronene			

Back River/Hart-Miller Island Field Collections 2005

Invertebrate PCB (ng/g wet)

	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis
Cong 1	ND	ND	ND	ND	ND	ND
Cong 3	ND	ND	ND	ND	ND	ND
Cong 4,10	ND	ND	ND	ND	ND	ND
Cong 7,9	ND	ND	ND	ND	ND	ND
Cong 6	0.04	ND	ND	0.06	ND	ND
Cong 8,5	1.88	1.16	1.28	0.91	ND	1.78
Cong 19	ND	ND	ND	ND	ND	ND
Cong 12,13	ND	ND	ND	ND	ND	ND
Cong 18	0.39	0.14	ND	0.47	0.17	0.15
Cong 17	0.24	0.15	ND	0.27	ND	ND
Cong 24	ND	ND	ND	ND	ND	ND
Cong 16,32	0.42	ND	ND	ND	ND	ND
Cong 29	ND	ND	ND	ND	ND	ND
Cong 26	0.07	ND	ND	ND	ND	ND
Cong 25	ND	ND	ND	ND	ND	ND
Cong 31,28	0.51	ND	ND	ND	ND	ND
Cong 33,21,53	0.97	ND	ND	1.06	ND	ND
Cong 51	0.06	0.05	ND	0.06	ND	ND
Cong 22	ND	ND	ND	ND	ND	ND
Cong 45	0.26	0.18	ND	0.28	0.17	0.17
Cong 46	ND	ND	ND	ND	ND	ND
Cong 52	1.09	0.67	0.44	0.91	0.45	0.56
Cong 49	1.02	0.76	0.46	0.95	ND	ND
Cong 47,48	ND	ND	ND	ND	ND	ND
Cong 44	0.86	0.54	ND	0.66	ND	0.51
Cong 37,42	0.75	0.47	0.31	0.48	ND	0.42
Cong 41,64,71	1.36	0.92	ND	1.48	ND	ND
Cong 40	0.28	0.16	ND	0.23	ND	0.16
Cong 100	0.28	ND	0.13	0.14	ND	0.08
Cong 63	0.05	ND	ND	ND	ND	ND
Cong 74	0.53	ND	ND	0.62	ND	ND
Cong 70,76	1.24	0.62	ND	1.05	ND	1.04
Cong 66,95	3.80	2.12	ND	3.60	ND	2.80
Cong 91	0.49	0.33	0.17	0.37	0.17	0.19
Cong 56,60,92,84	1.09	ND	ND	ND	ND	ND
Cong 84	0.93	0.71	0.55	0.79	0.46	0.51
Cong 101,89	1.62	1.05	ND	1.60	ND	1.21
Cong 99	1.02	0.66	0.48	0.91	0.41	0.48
Cong 119	0.22	ND	ND	ND	ND	ND
Cong 83	0.09	0.07	0.04	0.07	ND	0.05
Cong 97	0.81	0.54	ND	1.56	ND	0.90
Cong 81,87	0.72	ND	1.67	ND	1.73	1.59

Invertebrate PCB (ng/g wet)

	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis
Cong 85	0.49	0.32	0.23	0.40	0.20	0.26
Cong 136	0.22	0.16	0.12	0.20	0.11	0.16
Cong 77,110	2.86	1.93	1.45	2.42	1.27	1.61
Cong 82,151	0.21	0.15	0.13	0.18	ND	0.18
Cong 135,144	ND	ND	ND	ND	ND	ND
Cong 107	ND	ND	ND	ND	ND	ND
Cong 123,149	2.88	2.32	ND	3.07	ND	ND
Cong 118	1.50	ND	ND	1.55	ND	ND
Cong 134	ND	ND	ND	ND	ND	ND
Cong 114	0.34	ND	ND	ND	ND	ND
Cong 146	1.35	ND	ND	ND	ND	ND
Cong 132,153,105	6.76	4.48	ND	7.50	ND	ND
Cong 141	0.79	0.57	ND	0.87	ND	0.96
Cong 137,130,176	0.34	0.26	ND	0.32	0.18	0.27
Cong 163,138	4.54	3.20	ND	4.64	ND	3.40
Cong 158	ND	ND	ND	ND	ND	ND
Cong 129,178	0.39	0.23	ND	0.43	0.24	0.38
Cong 187,182	1.86	1.59	ND	2.39	ND	1.93
Cong 183	1.18	0.85	ND	1.07	ND	0.99
Cong 128	0.32	0.22	0.16	0.32	0.18	0.14
Cong 167	0.06	0.06	0.05	0.10	0.08	0.10
Cong 185	0.12	ND	ND	0.16	ND	0.19
Cong 174	1.02	0.83	ND	1.51	1.01	1.30
Cong 177	0.76	0.63	ND	1.11	ND	0.94
Cong 202,171,156	0.76	0.60	0.54	0.82	0.55	0.68
Cong 157,200	0.20	0.22	0.12	0.37	0.21	0.26
Cong 172	0.23	0.16	0.19	0.35	0.16	0.23
Cong 197	0.08	0.07	ND	0.16	0.06	0.06
Cong 180	2.95	2.26	1.69	3.53	2.19	2.25
Cong 193	0.50	ND	ND	ND	ND	ND
Cong 191	0.08	0.06	ND	0.04	ND	ND
Cong 199	ND	ND	ND	ND	1.89	ND
Cong 170,190	1.21	0.96	0.81	1.44	0.88	0.90
Cong 198	0.04	0.04	ND	0.06	0.02	0.08
Cong 201	0.74	0.76	0.78	1.45	1.06	1.16
Cong 203,196	1.42	1.22	1.17	1.92	1.38	1.40
Cong 189	0.05	0.04	0.03	0.03	0.02	0.01
Cong 208,195	0.41	0.52	0.64	1.21	1.23	1.47
Cong 207	0.13	0.12	0.13	0.37	0.34	0.34
Cong 194	0.45	0.37	0.32	0.75	0.44	0.39
Cong 205	0.02	0.02	0.03	0.03	0.02	0.01
Cong 206	0.49	0.71	0.93	1.59	1.69	2.08
Cong 209	0.31	0.45	0.59	1.83	1.90	2.46
Total PCB	61.14	37.65	15.61	62.74	20.86	39.19

Back River/Hart-Miller Island Field Collections 2005

Invertebrate PCB MDLs (ng/g wet)

Back River/Hart-Miller Island Field Collections 2005

Invertebrate PCB MDLs (ng/g wet)

	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis
Cong 1	1.69	1.95	3.41	2.91	3.50	3.33
Cong 3	1.63	1.89	3.30	2.81	3.38	3.22
Cong 4,10	1.38	1.59	2.79	2.37	2.86	2.72
Cong 7,9	0.11	0.13	0.22	0.19	0.23	0.22
Cong 6	0.01	0.01	0.01	0.01	0.01	0.01
Cong 8,5	0.06	0.07	0.12	0.10	0.13	0.12
Cong 19	0.08	0.10	0.17	0.14	0.17	0.16
Cong 12,13	0.01	0.01	0.02	0.02	0.02	0.02
Cong 18	0.05	0.06	0.11	0.09	0.11	0.10
Cong 17	0.08	0.09	0.16	0.14	0.17	0.16
Cong 24	0.11	0.12	0.22	0.18	0.22	0.21
Cong 16,32	0.41	0.47	0.82	0.70	0.84	0.80
Cong 29	0.03	0.03	0.06	0.05	0.06	0.06
Cong 26	0.03	0.04	0.06	0.05	0.06	0.06
Cong 25	0.10	0.11	0.19	0.17	0.20	0.19
Cong 31,28	0.39	0.45	0.80	0.68	0.82	0.78
Cong 33,21,53	0.52	0.60	1.06	0.90	1.08	1.03
Cong 51	0.03	0.03	0.06	0.05	0.06	0.06
Cong 22	0.30	0.35	0.62	0.52	0.63	0.60
Cong 45	0.08	0.09	0.16	0.14	0.17	0.16
Cong 46	0.17	0.20	0.35	0.30	0.36	0.34
Cong 52	0.16	0.19	0.33	0.28	0.33	0.32
Cong 49	0.19	0.22	0.39	0.33	0.40	0.38
Cong 47,48	1.66	1.92	3.37	2.86	3.45	3.28
Cong 44	0.19	0.22	0.38	0.32	0.39	0.37
Cong 37,42	0.14	0.17	0.29	0.25	0.30	0.28
Cong 41,64,71	0.56	0.65	1.14	0.97	1.17	1.11
Cong 40	0.08	0.09	0.16	0.14	0.17	0.16
Cong 100	0.04	0.04	0.08	0.06	0.08	0.07
Cong 63	0.05	0.06	0.10	0.08	0.10	0.09
Cong 74	0.27	0.31	0.55	0.47	0.56	0.54
Cong 70,76	0.43	0.49	0.86	0.73	0.89	0.84
Cong 66,95	1.28	1.48	2.59	2.20	2.65	2.53
Cong 91	0.07	0.08	0.14	0.12	0.15	0.14
Cong 56,60,92,84	0.75	0.86	1.51	1.29	1.55	1.48
Cong 84	0.16	0.19	0.33	0.28	0.33	0.32
Cong 101,89	0.57	0.66	1.16	0.99	1.19	1.13
Cong 99	0.17	0.19	0.34	0.29	0.35	0.33
Cong 119	0.20	0.23	0.40	0.34	0.41	0.39
Cong 83	0.02	0.02	0.04	0.04	0.04	0.04
Cong 97	0.43	0.50	0.88	0.75	0.90	0.86
Cong 81,87	0.72	0.83	1.45	1.23	1.49	1.41
Cong 85	0.09	0.11	0.19	0.16	0.19	0.18
Cong 136	0.04	0.04	0.08	0.07	0.08	0.08
Cong 77,110	0.58	0.67	1.18	1.00	1.21	1.15
Cong 82,151	0.06	0.07	0.12	0.10	0.12	0.12
Cong 135,144	2.26	2.62	4.58	3.90	4.70	4.47
Cong 107	0.46	0.54	0.94	0.80	0.96	0.92
Cong 123,149	1.36	1.57	2.75	2.34	2.82	2.68
Cong 118	0.86	1.00	1.74	1.48	1.79	1.70
Cong 134	0.06	0.07	0.12	0.10	0.13	0.12
Cong 114	0.31	0.36	0.63	0.53	0.64	0.61
Cong 146	1.16	1.34	2.35	2.00	2.41	2.30
Cong 132,153,105	3.32	3.85	6.73	5.73	6.90	6.56
Cong 141	0.39	0.45	0.79	0.67	0.81	0.77
Cong 137,130,176	0.09	0.10	0.17	0.15	0.18	0.17
Cong 163,138	1.45	1.67	2.93	2.49	3.01	2.86
Cong 158	1.42	1.64	2.88	2.45	2.95	2.81
Cong 129,178	0.11	0.12	0.22	0.19	0.22	0.21
Cong 187,182	0.74	0.86	1.50	1.27	1.54	1.46
Cong 183	0.37	0.43	0.75	0.64	0.77	0.73
Cong 128	0.05	0.06	0.10	0.09	0.11	0.10
Cong 167	0.02	0.02	0.04	0.03	0.04	0.03
Cong 185	0.09	0.10	0.18	0.16	0.19	0.18
Cong 174	0.42	0.48	0.84	0.72	0.86	0.82
Cong 177	0.37	0.43	0.75	0.63	0.76	0.73
Cong 202,171,156	0.21	0.24	0.43	0.36	0.44	0.42
Cong 157,200	0.02	0.03	0.05	0.04	0.05	0.05
Cong 172	0.05	0.06	0.10	0.08	0.10	0.10
Cong 197	0.03	0.03	0.05	0.04	0.05	0.05
Cong 180	0.71	0.82	1.44	1.22	1.47	1.40
Cong 193	0.41	0.47	0.82	0.70	0.84	0.80
Cong 191	0.01	0.01	0.02	0.02	0.02	0.02
Cong 199	0.66	0.76	1.33	1.13	1.36	1.30
Cong 170,190	0.28	0.32	0.57	0.48	0.58	0.55
Cong 198	0.01	0.01	0.01	0.01	0.01	0.01
Cong 201	0.15	0.17	0.29	0.25	0.30	0.29
Cong 203,196	0.38	0.44	0.77	0.65	0.79	0.75
Cong 189	0.00	0.01	0.01	0.01	0.01	0.01
Cong 208,195	0.05	0.06	0.10	0.08	0.10	0.10
Cong 207	0.02	0.02	0.03	0.03	0.03	0.03
Cong 194	0.05	0.06	0.10	0.08	0.10	0.10
Cong 205	0.00	0.00	0.00	0.00	0.00	0.00
Cong 206	0.06	0.07	0.12	0.10	0.12	0.12
Cong 209	0.08	0.09	0.16	0.14	0.17	0.16

Back River/Hart-Miller Island Field Collections 2005

Invertebrate PCB (ng/g lipid)

	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis
fraction lipid	0.0132	0.0132	0.0132	0.0108	0.0108	0.0108
Cong 1						
Cong 3						
Cong 4,10						
Cong 7,9						
Cong 6	3.30			5.90		
Cong 8,5	142.36	88.02	97.06	84.47		165.26
Cong 19						
Cong 12,13						
Cong 18	29.32	10.49		43.72	15.37	14.30
Cong 17	18.41	11.05		25.16		
Cong 24						
Cong 16,32	31.96					
Cong 29						
Cong 26	5.48					
Cong 25						
Cong 31,28	38.83					
Cong 33,21,53	73.43			97.82		
Cong 51	4.41	3.57		5.86		
Cong 22						
Cong 45	19.52	13.41		25.49	16.00	15.37
Cong 46						
Cong 52	82.56	51.13	33.13	84.70	41.32	51.99
Cong 49	77.58	57.58	34.96	87.60		
Cong 47,48						
Cong 44	64.94	40.60		61.39		47.16
Cong 37,42	56.88	35.97	23.47	44.39		39.15
Cong 41,64,71	102.79	69.47		137.44		
Cong 40	21.04	12.20		21.64		14.88
Cong 100	21.21		9.82	13.07		7.43
Cong 63	3.64					
Cong 74	39.98			57.40		
Cong 70,76	94.24	47.23		97.03		96.56
Cong 66,95	287.67	160.77		333.64		259.59
Cong 91	36.78	24.93	12.66	34.26	15.95	17.59
Cong 56,60,92,84	82.91					
Cong 84	70.59	53.46	41.81	73.12	42.53	46.83
Cong 101,89	122.74	79.24		148.45		111.95
Cong 99	77.09	49.78	35.99	83.80	38.38	44.65
Cong 119	16.60					
Cong 83	7.10	5.02	3.31	6.52		4.75
Cong 97	61.22	40.95		144.37		83.68
Cong 81,87	54.38		126.28		160.15	146.93

Back River/Hart-Miller Island Field Collections 2005

Invertebrate PCB (ng/g lipid)

	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis
Cong 85	37.34	24.60	17.50	36.98	18.73	23.66
Cong 136	16.39	12.21	9.26	18.36	9.98	15.00
Cong 77,110	216.79	145.97	110.09	223.71	117.16	149.17
Cong 82,151	15.71	11.22	9.72	16.92		16.45
Cong 135,144						
Cong 107						
Cong 123,149	218.29	175.41		284.71		
Cong 118	113.44			143.93		
Cong 134						
Cong 114	25.69					
Cong 146	102.22					
Cong 132,153,105	512.23	339.02		694.75		
Cong 141	59.79	43.35		80.64		88.59
Cong 137,130,176	25.75	19.81		29.61	16.67	25.02
Cong 163,138	343.84	242.23		429.87		315.05
Cong 158						
Cong 129,178	29.27	17.37		39.49	21.83	35.59
Cong 187,182	141.08	120.25		221.35		178.39
Cong 183	89.48	64.55		99.49		91.45
Cong 128	24.59	16.69	11.80	29.77	16.25	13.19
Cong 167	4.64	4.42	3.53	9.61	7.27	9.39
Cong 185	9.41			14.96		17.31
Cong 174	77.39	62.83		139.86	93.11	119.95
Cong 177	57.76	47.35		102.59		86.77
Cong 202,171,156	57.92	45.57	40.83	75.52	50.91	63.09
Cong 157,200	14.86	16.38	9.25	34.27	19.41	24.31
Cong 172	17.16	12.34	14.50	32.25	14.89	21.14
Cong 197	6.26	4.99		15.11	5.96	5.16
Cong 180	223.49	171.33	127.84	326.63	202.70	208.02
Cong 193	37.81					
Cong 191	6.04	4.24		3.64		
Cong 199					174.68	
Cong 170,190	91.82	72.77	61.13	133.73	81.82	82.93
Cong 198	2.65	3.35		5.10	2.06	7.81
Cong 201	56.03	57.45	59.44	134.57	98.10	107.25
Cong 203,196	107.25	92.42	88.34	177.44	128.06	129.21
Cong 189	3.81	2.82	2.02	3.20	2.01	1.23
Cong 208,195	30.94	39.68	48.40	111.60	113.93	136.50
Cong 207	9.81	9.42	9.49	34.67	31.20	31.32
Cong 194	34.31	28.01	24.02	69.74	40.48	36.29
Cong 205	1.63	1.44	2.19	2.49	1.75	1.35
Cong 206	36.77	53.73	70.19	146.82	156.93	192.67
Cong 209	23.45	34.17	44.59	169.00	176.25	227.45
Total PCB	4632.05	2852.26	1182.60	5809.64	1931.86	3628.78

Back River/Hart-Miller Island Field Collections 2005

Sediment PCBs (ng/g dry)

	BR 4	BR 5	BR 6
Cong 1	ND	ND	ND
Cong 3	ND	ND	ND
Cong 4,10	ND	ND	ND
Cong 7,9	ND	ND	ND
Cong 6	ND	ND	ND
Cong 8,5	1.63	0.77	ND
Cong 19	0.04	0.03	ND
Cong 12,13	ND	ND	ND
Cong 18	0.10	0.07	ND
Cong 17	0.19	0.13	ND
Cong 24	0.50	0.16	ND
Cong 16,32	0.24	0.14	ND
Cong 29	ND	ND	ND
Cong 26	0.20	0.09	ND
Cong 25	0.20	0.12	ND
Cong 31,28	3.74	1.77	0.10
Cong 33,21,53	0.55	0.39	0.06
Cong 51	0.20	0.14	ND
Cong 22	0.60	0.40	ND
Cong 45	0.20	0.11	0.01
Cong 46	1.31	0.52	ND
Cong 52	1.07	0.56	0.03
Cong 49	1.04	0.48	0.05
Cong 47,48	0.53	0.35	0.03
Cong 44	0.75	0.41	0.02
Cong 37,42	0.68	0.39	ND
Cong 41,64,71	0.88	0.52	0.09
Cong 40	0.21	0.12	ND
Cong 100	0.14	0.12	ND
Cong 63	0.08	0.06	ND
Cong 74	0.51	0.27	ND
Cong 70,76	1.77	0.96	ND
Cong 66,95	3.60	1.79	0.13
Cong 91	0.34	0.15	0.02
Cong 56,60,92,84	2.36	1.27	0.14
Cong 89	0.91	0.47	0.03
Cong 101	1.39	0.77	0.07
Cong 99	1.47	0.63	0.02
Cong 119	ND	ND	ND
Cong 83	0.06	0.04	ND
Cong 97	4.53	2.03	0.06
Cong 81,87	ND	0.80	ND
Cong 85	0.50	0.29	0.03
Cong 136	0.15	0.08	ND
Cong 77,110	2.37	1.47	0.12
Cong 82,151	0.15	0.09	ND
Cong 135,144	0.34	0.20	ND
Cong 107	0.16	0.09	ND
Cong 123,149	2.01	1.23	0.12
Cong 118	1.45	0.90	0.11
Cong 134	ND	ND	ND
Cong 114	0.15	ND	ND
Cong 146	0.88	ND	ND
Cong 132,153,105	5.50	3.21	ND
Cong 141	0.58	0.35	0.03
Cong 137,130,176	0.26	0.14	ND
Cong 163,138	3.94	2.16	0.19
Cong 158	ND	ND	ND
Cong 129,178	0.34	0.22	0.02
Cong 187,182	1.60	0.95	0.12
Cong 183	0.81	0.40	0.03
Cong 128	0.46	0.25	0.02
Cong 167	ND	ND	ND
Cong 185	0.07	0.05	ND
Cong 174	0.87	0.51	0.05
Cong 177	0.76	0.62	0.06
Cong 202,171,156	0.95	0.55	0.05
Cong 157,200	0.36	0.18	0.02
Cong 172	0.16	0.11	ND
Cong 197	0.09	0.12	ND
Cong 180	2.46	1.39	0.12
Cong 193	0.28	0.29	ND
Cong 191	0.04	0.02	ND
Cong 199	0.20	0.17	0.07
Cong 170,190	1.55	0.81	0.06
Cong 198	0.10	0.04	ND
Cong 201	1.26	0.80	0.09
Cong 203,196	1.68	1.03	0.12
Cong 189	0.09	0.06	ND
Cong 208,195	1.01	0.91	0.14
Cong 207	0.45	0.34	0.05
Cong 194	0.89	0.47	0.03
Cong 205	0.05	ND	ND
Cong 206	3.99	2.15	0.20
Cong 209	1.85	1.75	0.23
Total PCB	72.84	41.44	2.93

Back River/Hart-Miller Island Field Collections 2005

Sediment PCB MDLs (ng/g dry)

	BR 4	BR 5	BR 6
Cong 1	0.50	0.47	0.25
Cong 3	0.02	0.02	0.01
Cong 4,10	0.44	0.42	0.22
Cong 7,9	0.04	0.04	0.02
Cong 6	0.02	0.02	0.01
Cong 8,5	0.39	0.37	0.19
Cong 19	0.02	0.02	0.01
Cong 12,13	0.02	0.02	0.01
Cong 18	0.02	0.02	0.01
Cong 17	0.04	0.04	0.02
Cong 24	0.04	0.04	0.02
Cong 16,32	0.09	0.09	0.05
Cong 29	0.02	0.02	0.01
Cong 26	0.02	0.02	0.01
Cong 25	0.06	0.05	0.03
Cong 31,28	0.04	0.04	0.02
Cong 33,21,53	0.07	0.07	0.04
Cong 51	0.06	0.05	0.03
Cong 22	0.11	0.11	0.05
Cong 45	0.02	0.02	0.01
Cong 46	0.04	0.04	0.02
Cong 52	0.02	0.02	0.01
Cong 49	0.02	0.02	0.01
Cong 47,48	0.02	0.02	0.01
Cong 44	0.02	0.02	0.01
Cong 37,42	0.04	0.04	0.02
Cong 41,64,71	0.17	0.16	0.08
Cong 40	0.02	0.02	0.01
Cong 100	0.04	0.04	0.02
Cong 63	0.02	0.02	0.01
Cong 74	0.06	0.05	0.03
Cong 70,76	0.28	0.26	0.14
Cong 66,95	0.02	0.02	0.01
Cong 91	0.02	0.02	0.01
Cong 56,60,92,84	0.07	0.07	0.04
Cong 89	0.02	0.02	0.01
Cong 101	0.06	0.05	0.03
Cong 99	0.02	0.02	0.01
Cong 119	0.13	0.12	0.06
Cong 83	0.02	0.02	0.01
Cong 97	0.02	0.02	0.01
Cong 81,87	0.70	0.67	0.35

Sediment PCB MDLs (ng/g dry)

	BR 4	BR 5	BR 6
Cong 85	0.02	0.02	0.01
Cong 136	0.02	0.02	0.01
Cong 77,110	0.02	0.02	0.01
Cong 82,151	0.02	0.02	0.01
Cong 135,144	0.07	0.07	0.04
Cong 107	0.04	0.04	0.02
Cong 123,149	0.04	0.04	0.02
Cong 118	0.11	0.11	0.05
Cong 134	0.02	0.02	0.01
Cong 114	0.09	0.09	0.05
Cong 146	0.61	0.58	0.30
Cong 132,153,105	0.94	0.90	0.47
Cong 141	0.02	0.02	0.01
Cong 137,130,176	0.04	0.04	0.02
Cong 163,138	0.07	0.07	0.04
Cong 158	0.79	0.76	0.39
Cong 129,178	0.02	0.02	0.01
Cong 187,182	0.13	0.12	0.06
Cong 183	0.02	0.02	0.01
Cong 128	0.02	0.02	0.01
Cong 167	0.02	0.02	0.01
Cong 185	0.02	0.02	0.01
Cong 174	0.02	0.02	0.01
Cong 177	0.02	0.02	0.01
Cong 202,171,156	0.02	0.02	0.01
Cong 157,200	0.02	0.02	0.01
Cong 172	0.02	0.02	0.01
Cong 197	0.02	0.02	0.01
Cong 180	0.04	0.04	0.02
Cong 193	0.09	0.09	0.05
Cong 191	0.02	0.02	0.01
Cong 199	0.07	0.07	0.04
Cong 170,190	0.02	0.02	0.01
Cong 198	0.02	0.02	0.01
Cong 201	0.02	0.02	0.01
Cong 203,196	0.09	0.09	0.05
Cong 189	0.02	0.02	0.01
Cong 208,195	0.02	0.02	0.01
Cong 207	0.02	0.02	0.01
Cong 194	0.02	0.02	0.01
Cong 205	0.02	0.02	0.01
Cong 206	0.02	0.02	0.01
Cong 209	0.02	0.02	0.01

Back River/Hart-Miller Island Field Collections 2005

Sediment PCBs (ng/g carbon)

Final ng/g OC	BR 4	BR 5	BR 6
fraction OC	0.0474	0.0449	0.0052
Cong 1			
Cong 3			
Cong 4,10			
Cong 7,9			
Cong 6			
Cong 8,5	34.32	17.24	
Cong 19	0.78	0.65	
Cong 12,13			
Cong 18	2.07	1.57	
Cong 17	4.01	2.87	
Cong 24	10.62	3.66	
Cong 16,32	5.05	3.13	
Cong 29			
Cong 26	4.14	1.96	
Cong 25	4.27	2.61	
Cong 31,28	79.00	39.44	18.73
Cong 33,21,53	11.66	8.62	11.12
Cong 51	4.27	3.13	
Cong 22	12.69	9.01	
Cong 45	4.27	2.35	2.34
Cong 46	27.71	11.62	
Cong 52	22.53	12.54	5.27
Cong 49	21.89	10.71	8.78
Cong 47,48	11.14	7.83	5.85
Cong 44	15.80	9.14	4.10
Cong 37,42	14.38	8.62	
Cong 41,64,71	18.52	11.49	16.39
Cong 40	4.53	2.61	
Cong 100	2.98	2.61	
Cong 63	1.68	1.44	
Cong 74	10.75	6.01	
Cong 70,76	37.43	21.42	
Cong 66,95	76.02	39.83	25.75
Cong 91	7.12	3.40	3.51
Cong 56,60,92,84	49.86	28.21	26.92
Cong 89	19.17	10.58	6.44
Cong 101	29.27	17.11	12.87
Cong 99	31.08	14.10	4.68
Cong 119			
Cong 83	1.17	0.78	
Cong 97	95.58	45.18	11.70
Cong 81,87			

Sediment PCBs (ng/g carbon)

	BR 4	BR 5	BR 6
Cong 85	10.62	6.40	5.85
Cong 136	3.11	1.83	
Cong 77,110	49.99	32.78	23.41
Cong 82,151	3.11	1.96	
Cong 135,144	7.25	4.44	
Cong 107	3.37	2.09	
Cong 123,149	42.48	27.29	22.24
Cong 118	30.56	20.11	21.07
Cong 134			
Cong 114	3.11		
Cong 146	18.52		
Cong 132,153,105	116.04	71.56	
Cong 141	12.17	7.83	5.85
Cong 137,130,176	5.44	3.13	
Cong 163,138	83.14	48.18	37.45
Cong 158			
Cong 129,178	7.12	4.83	4.68
Cong 187,182	33.67	21.15	22.24
Cong 183	17.10	8.88	5.85
Cong 128	9.71	5.61	3.51
Cong 167			
Cong 185	1.42	1.04	
Cong 174	18.39	11.36	9.95
Cong 177	16.06	13.71	11.12
Cong 202,171,156	19.94	12.27	8.78
Cong 157,200	7.64	3.92	3.51
Cong 172	3.37	2.48	
Cong 197	1.81	2.74	
Cong 180	51.93	30.95	22.24
Cong 193	5.96	6.40	
Cong 191	0.91	0.52	
Cong 199	4.27	3.79	14.05
Cong 170,190	32.64	18.15	11.70
Cong 198	2.20	0.91	
Cong 201	26.68	17.89	16.39
Cong 203,196	35.49	22.98	23.99
Cong 189	1.94	1.31	
Cong 208,195	21.24	20.24	26.33
Cong 207	9.45	7.57	10.53
Cong 194	18.78	10.58	5.27
Cong 205	1.04		
Cong 206	84.18	47.92	38.62
Cong 209	38.98	38.91	45.06
Total PCB	1536.61	905.18	564.15

Back River/Hart-Miller Island Field Collections 2005

PCB BSAFs	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod
Cong 1			
Cong 3			
Cong 4,10			
Cong 7,9			
Cong 6			
Cong 8,5	4.15	5.11	
Cong 19			
Cong 12,13			
Cong 18	14.15	6.70	
Cong 17	4.59	3.85	
Cong 24			
Cong 16,32	6.33		
Cong 29			
Cong 26	1.32		
Cong 25			
Cong 31,28	0.49		
Cong 33,21,53	6.30		
Cong 51	1.03	1.14	
Cong 22			
Cong 45	4.57	5.71	
Cong 46			
Cong 52	3.66	4.08	6.29
Cong 49	3.54	5.38	3.98
Cong 47,48			
Cong 44	4.11	4.44	
Cong 37,42	3.96	4.17	
Cong 41,64,71	5.55	6.05	
Cong 40	4.64	4.67	
Cong 100	7.12	0.00	
Cong 63	2.16	0.00	
Cong 74	3.72	0.00	
Cong 70,76	2.52	2.21	
Cong 66,95	3.78	4.04	
Cong 91	5.16	7.34	3.61
Cong 56,60,92,84	1.66		
Cong 89	3.68	5.05	6.49
Cong 101	4.19	4.63	
Cong 99	2.48	3.53	7.69
Cong 119			
Cong 83	6.09	6.41	
Cong 97	0.64	0.91	
Cong 81,87			
Cong 85	3.52	3.84	2.99
Cong 136	5.27	6.68	
Cong 77,110	4.34	4.45	4.70
Cong 82,151	5.05	5.73	
Cong 135,144			
Cong 107			
Cong 123,149	5.14	6.43	
Cong 118	3.71		
Cong 134			
Cong 114	8.27		
Cong 146	5.52		
Cong 132,153,105	4.41	4.74	
Cong 141	4.91	5.53	
Cong 137,130,176	4.73	6.32	
Cong 163,138	4.14	5.03	
Cong 158			
Cong 129,178	4.11	3.60	
Cong 187,182	4.19	5.68	
Cong 183	5.23	7.27	
Cong 128	2.53	2.97	3.36
Cong 167			
Cong 185	6.61		
Cong 174	4.21	5.53	
Cong 177	3.60	3.45	
Cong 202,171,156	2.90	3.71	4.65
Cong 157,200	1.94	4.18	2.63
Cong 172	5.10	4.97	
Cong 197	3.45	1.82	
Cong 180	4.30	5.54	5.75
Cong 193	6.35		
Cong 191	6.67	8.11	
Cong 199			
Cong 170,190	2.81	4.01	5.22
Cong 198	1.20	3.67	
Cong 201	2.10	3.21	3.63
Cong 203,196	3.02	4.02	3.68
Cong 189	1.96	2.16	
Cong 208,195	1.46	1.96	1.84
Cong 207	1.04	1.24	0.90
Cong 194	1.83	2.65	4.56
Cong 205	1.58		
Cong 206	0.44	1.12	1.82
Cong 209	0.60	0.88	0.99

Back River/Hart-Miller Island Field Collections 2005

Invertebrate BDEs (ng/g wet weight)

	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 worm	BR 5 worm	BR 6 worm
BDE-30	ND	ND	ND	ND	ND	ND
BDE-17	0.029	0.023	ND	0.030	0.015	ND
BDE-25	ND	ND	ND	ND	ND	ND
BDE-28,33	0.066	ND	ND	ND	ND	0.099
BDE-75	ND	ND	ND	ND	ND	ND
BDE-49,71	ND	ND	ND	ND	ND	ND
BDE-47	ND	ND	ND	ND	ND	ND
BDE-66	0.054	ND	ND	ND	ND	ND
BDE-100	0.282	ND	ND	ND	ND	ND
BDE-119	ND	ND	ND	ND	ND	ND
BDE-99	ND	ND	ND	ND	ND	ND
BDE-116	ND	ND	ND	ND	ND	ND
BDE-155,85	ND	ND	ND	ND	ND	ND
BDE-154	0.073	ND	0.139	0.183	ND	0.209
BDE-153	ND	ND	ND	ND	ND	ND
BDE-138	ND	ND	ND	ND	ND	ND
BDE-156	ND	ND	ND	ND	ND	ND
BDE-183	ND	ND	ND	ND	ND	ND
BDE-191	ND	ND	ND	ND	ND	ND
BDE-181	ND	ND	ND	ND	ND	ND
BDE-190	ND	ND	ND	ND	ND	ND
BDE-204	ND	ND	ND	ND	ND	ND
BDE-197	ND	ND	ND	ND	ND	ND
BDE-198,203	ND	ND	ND	ND	ND	ND
BDE-196	ND	ND	ND	ND	ND	ND
BDE-205	ND	ND	ND	ND	ND	ND
BDE-208	ND	ND	ND	ND	ND	ND
BDE-207	ND	ND	ND	ND	ND	ND
BDE-206	ND	ND	ND	ND	ND	ND
BDE-209	ND	ND	ND	ND	ND	ND
Total BDE	0.505	0.023	0.139	0.213	0.015	0.308

Back River/Hart-Miller Island Field Collections 2005

Invertebrate BDE MDLs (ng/g wet weight)

	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 worm	BR 5 worm	BR 6 worm
BDE-30	0.006	0.007	0.012	0.010	0.012	0.012
BDE-17	0.005	0.006	0.010	0.008	0.010	0.009
BDE-25	0.029	0.033	0.058	0.049	0.060	0.057
BDE-28,33	0.048	0.056	0.098	0.084	0.101	0.096
BDE-75	0.006	0.007	0.012	0.010	0.012	0.012
BDE-49,71	0.005	0.006	0.010	0.009	0.010	0.010
BDE-47	1.736	2.008	3.515	2.991	3.605	3.429
BDE-66	0.035	0.041	0.071	0.060	0.073	0.069
BDE-100	0.245	0.284	0.497	0.423	0.509	0.485
BDE-119	0.004	0.004	0.007	0.006	0.008	0.007
BDE-99	1.201	1.390	2.433	2.070	2.495	2.373
BDE-116	0.012	0.014	0.024	0.020	0.025	0.023
BDE-155,85	0.037	0.043	0.075	0.064	0.077	0.073
BDE-154	0.062	0.072	0.126	0.107	0.129	0.123
BDE-153	0.002	0.003	0.005	0.004	0.005	0.005
BDE-138	0.003	0.003	0.006	0.005	0.006	0.005
BDE-156	0.027	0.032	0.056	0.047	0.057	0.054
BDE-183	0.004	0.005	0.008	0.007	0.008	0.008
BDE-191	0.003	0.003	0.006	0.005	0.006	0.006
BDE-181	0.003	0.003	0.006	0.005	0.006	0.006
BDE-190	0.009	0.011	0.019	0.016	0.019	0.018
BDE-204	0.007	0.008	0.014	0.012	0.015	0.014
BDE-197	0.004	0.004	0.007	0.006	0.007	0.007
BDE-198,203	0.003	0.004	0.007	0.006	0.007	0.007
BDE-196	0.003	0.004	0.007	0.006	0.007	0.007
BDE-205	0.004	0.005	0.008	0.007	0.008	0.008
BDE-208	0.103	0.120	0.210	0.178	0.215	0.204
BDE-207	0.071	0.082	0.144	0.122	0.147	0.140
BDE-206	0.203	0.235	0.411	0.350	0.422	0.401
BDE-209	16.875	19.527	34.172	29.082	35.048	33.338

Back River/Hart-Miller Island Field Collections 2005

Invertebrate BDEs (ng/g lipid)

	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 worm	BR 5 worm	BR 6 worm
fraction lipid	0.0132	0.0132	0.0132	0.0108	0.0108	0.0108
BDE-30						
BDE-17	2.21	1.75		2.81	1.41	
BDE-25						
BDE-28,33	4.99					9.20
BDE-75						
BDE-49,71						
BDE-47						
BDE-66	4.12					
BDE-100	21.39					
BDE-119						
BDE-99						
BDE-116						
BDE-155,85						
BDE-154	5.52		10.52	16.94		19.32
BDE-153						
BDE-138						
BDE-156						
BDE-183						
BDE-191						
BDE-181						
BDE-190						
BDE-204						
BDE-197						
BDE-198,203						
BDE-196						
BDE-205						
BDE-208						
BDE-207						
BDE-206						
BDE-209						
Total BDE	38.22	1.75	10.52	19.74	1.41	28.52

Back River/Hart-Miller Island Field Collections 2005

	Sediment BDEs (ng/g dry)			Sediment BDE MDLs (ng/g dry)				Sediment BDEs (ng/g carbon)		
	BR 4	BR 5	BR 6	BR 4	BR 5	BR 6		BR 4	BR 5	BR 6
							fraction carbon	0.0474	0.0449	0.0052
BDE-30	ND	ND	ND	0.01	0.01	0.00		0.63	0.51	
BDE-17	0.03	0.02	ND	0.01	0.01	0.01		0.34	0.27	
BDE-25	0.02	0.01	ND	0.00	0.00	0.00		1.51	1.62	2.19
BDE-28,33	0.07	0.07	0.01	0.01	0.01	0.00				
BDE-75	ND	ND	ND	0.02	0.02	0.01				
BDE-49,71	ND	ND	ND	0.01	0.01	0.01		15.58	42.87	
BDE-47	0.74	1.92	ND	0.63	0.60	0.31		0.88	1.37	
BDE-66	0.04	0.06	ND	0.04	0.03	0.02		3.61	12.19	
BDE-100	0.17	0.55	ND	0.13	0.12	0.06				
BDE-119	ND	ND	ND	0.01	0.01	0.01		12.11	49.89	
BDE-99	0.57	2.24	ND	0.46	0.44	0.23				
BDE-116	ND	ND	ND	0.01	0.01	0.01				
BDE-155,85	ND	ND	ND	0.01	0.01	0.01		4.82	5.31	
BDE-154	0.23	0.24	ND	0.06	0.05	0.03				
BDE-153	ND	ND	ND	0.15	0.15	0.08				
BDE-138	ND	ND	ND	0.01	0.01	0.00				
BDE-156	ND	ND	ND	0.01	0.01	0.01		10.00		
BDE-183	0.47	ND	ND	0.25	0.24	0.12				
BDE-191	ND	ND	ND	0.01	0.01	0.00				
BDE-181	ND	ND	ND	0.00	0.00	0.00				
BDE-190	ND	ND	ND	0.01	0.01	0.01				
BDE-204	ND	ND	ND	0.01	0.01	0.01		14.52	9.88	
BDE-197	0.69	0.44	ND	0.01	0.01	0.00				
BDE-198,203	ND	ND	ND	0.01	0.01	0.01		40.19	24.17	
BDE-196	1.91	1.09	ND	0.01	0.01	0.01				
BDE-205	ND	ND	ND	0.01	0.01	0.01		395.94	169.99	34.79
BDE-208	18.77	7.63	0.18	0.01	0.01	0.01		1361.27	609.21	145.72
BDE-207	64.52	27.35	0.76	0.06	0.06	0.03		1490.00	613.08	202.89
BDE-206	70.63	27.53	1.06	0.06	0.06	0.03		80948.07	33260.50	13669.86
BDE-209	3836.94	1493.40	71.08	1.59	1.52	0.79				
Total BDE	3995.7944	1562.5587	73.088325					84299.461	34800.862	14055.447

Back River/Hart-Miller Island Field Collections 2003

Surrogate Standard Recoveries

PAHs	HMI 16	HMI 17	HMI 17	HMI 3	HMI 3	HMI 9	BLANK 1	BLANK 2	M SPIKE 1	M SPIKE 2	SRM 1946 1	SRM 1946 2		
	M. viridis	M. viridis	N Succinea	M. viridis	N Succinea	N Succinea	tissue	tissue	tissue	tissue				
% recovery														
d8 Napthalene	16.66	8.57	9.98	19.68	11.67	19.51	5.66	1.60	3.86	4.00	0.23	22.93	MEAN	SD
d10 Fluorene	54.39	48.81	62.18	60.09	64.04	54.07	51.57	36.24	40.03	44.14	50.71	54.06	10.36	7.73
d10 Fluoranthene	63.23	59.45	77.47	72.54	82.62	64.54	75.12	64.06	68.64	71.65	68.45	64.54	51.69	8.49
d12 Perylene	75.89	73.19	91.90	89.54	90.44	76.01	100.64	74.64	72.32	83.86	67.37	78.82	69.36	6.75

	TRAP 6	TRAP 7	BUOY 12	COX POINT	HMI 16	HMI 17	HMI 9	HMI 3	M SPIKE 1	M SPIKE 2	BLANK 1	BLANK 2		
	sediment	sediment	sediment	sediment	sediment	sediment	sediment	sediment	sediment	sediment	sediment	sediment		
% recovery													MEAN	SD
d8 Napthalene	3.85	19.02	9.03	30.12	14.35	16.38	8.85	15.20	2.68	2.41	16.32	24.88	13.59	8.69
d10 Fluorene	57.29	68.15	70.37	72.95	59.57	62.88	59.43	59.76	37.71	48.76	57.23	65.48	59.97	9.62
d10 Fluoranthene	86.77	85.67	88.05	83.20	75.51	79.50	74.95	72.92	92.70	112.46	78.13	99.60	85.79	11.48
d12 Perylene	61.61	63.16	61.67	56.56	63.19	62.57	62.77	60.78	90.75	50.64	100.84	73.96	67.38	14.45

PCBs	Sediment											
% recovery	TRAP 6	TRAP 7	BUOY 12	COX POINT	HMI 16	HMI 17	HMI 9	HMI 3	BLANK 1	BLANK 2	MEAN	SD
PCB 14	77.45	79.84	79.37	92.37	119.90	83.64	127.74	86.73	59.53	64.43	87.10	21.72
PCB 65	49.91	51.65	46.91	51.46	56.31	50.33	56.13	54.86	49.35	50.11	51.70	3.11
PCB 166	64.31	67.50	60.85	55.42	77.26	76.18	69.14	73.33	73.18	69.69	68.68	6.92

% recovery	BUOY 12	HMI 17	HMI 3	HMI 9	TRAP 7	HMI 16	HMI 17	HMI 3	BUOY 12	TRAP 6	TRAP 7	SRM 1946 1	SRM 1946 2	BLANK 1	BLANK 2	MEAN	SD
	Nereis	Nereis	Nereis	Nereis	Nereis	M.viridis	M.viridis	M.viridis	amphipods	amphipods	amphipods			tissue	tissue		
PCB 65	60.87	61.04	61.91		63.59	49.03	44.52	58.92	51.84	59.64	59.23	52.74	49.30	53.78	52.19	55.61	5.85
PCB 166	75.89	75.01	74.81	63.37	77.67	62.13	57.17	75.06	70.84	74.95	73.32	75.85	71.98	71.90	67.33	71.15	5.99

BDEs	BUOY 12	BUOY 12	TRAP 6	TRAP 7	TRAP 7	HMI 3	HMI 3	HMI 16	HMI 9	HMI 17	HMI 17	MATRIX1	MATRIX2	BLANK1	BLANK2		
% recovered	Nereis	amphipods	amphipods	amphipods	Nereis	M.viridis	Nereis	M.viridis	Nereis	M.viridis	Nereis					MEAN	SD
BDE 15L	77.961756	73.263088	78.9295444	78.60334431	72.24463163	72.15568617	84.701603	61.211934	61.9895961	55.2610437	81.8087727	58.14528878	62.14252367	74.905793	65.086544	70.56	9.25
BDE 118L	65.788361	67.576114	64.92999947	69.74657397	68.26471911	71.17712972	72.790239	62.087511	57.6253924	56.29239822	69.22117147	53.64325734	55.7243959	67.604731	61.596591	64.27	6.10

BDE sediment recoveries not available

Back River/Hart-Miller Island Field Collections 2005

Surrogate Standard Recoveries

PAH surrogate recoveries not added to Back River amphipods

PCB % recovery	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 M. viridis	BR 5 M. viridis	BR 6 M. viridis	BR SRM 1	BR SRM 2	Back River Blank 1	Back River Blank 2	MEAN	SD
Cong 14	45.18	48.90	47.62	46.29	50.62	56.46	31.41	36.03	29.59	26.38	41.85	10.20
Cong 65	46.99	49.03	50.96	54.67	54.07	53.42	40.35	39.92	30.09	27.49	44.70	9.88
Cong 166	80.74	74.18	79.51	79.24	77.86	86.43	73.65	72.87	69.93	64.53	75.89	6.19

PCB % recovery	Sediment BR 4	BR 5	BR 6	BR blank	Mean	SD
Cong 14	86.81	84.59	37.82	20.76	57.50	33.32
Cong 65	64.00	67.20	51.00	31.50	53.43	16.21
Cong 166	75.24	75.53	74.47	57.93	70.79	8.59

% recovery	BR 4 amphipod	BR 5 amphipod	BR 6 amphipod	BR 4 worm	BR 5 worm	BR 6 worm	BLANK1	BLANK2	MEAN	SD
BDE 15L	75.14	92.76	84.43	69.54	86.44	111.77	55.15	53.63	78.61	19.51
BDE 118L	72.84	58.74	85.06	89.01	71.16	76.35	65.06	66.85	73.13	10.14

BDE sediment recoveries not available

Back River/Hart-Miller Island Field Collections 2003

Matrix spike recoveries

	% recovery				
	matrix spike 1	matrix spike 1	matrix spike 2		
	sediment	tissue	tissue	MEAN	SD
Napthalene	2.76	4.26	4.48	3.84	0.93
Azulene	1.98	7.73	7.15	5.62	3.17
2MeNapthalene	5.57	8.99	9.41	7.99	2.11
1MeNapthalene	5.65	9.32	9.71	8.23	2.23
Acenapthylene	12.17	21.81	22.98	18.99	5.93
Biphenyl	11.98	17.90	18.40	16.09	3.57
Acenapthene	15.56	24.42	27.79	22.59	6.32
Fluorene	36.19	39.99	44.70	40.29	4.27
Phenanthrene	66.43	62.61	68.10	65.71	2.82
Anthracene	54.75	58.92	66.82	60.16	6.13
1Mefluorene	54.85	56.48	63.43	58.25	4.56
4,5-Methylenephenanthrene	71.52	69.08	74.70	71.77	2.82
2Methylphenanthrene	75.83	71.90	79.28	75.67	3.69
2Methylanthracene	66.34	66.81	76.13	69.76	5.52
1Methylanthracene	65.07	66.40	75.16	68.88	5.48
1Methylphenanthrene	77.00	75.12	77.61	76.58	1.30
9Methylanthracene	58.51	65.50	73.52	65.84	7.51
Fluoranthene	96.55	71.04	74.79	80.79	13.77
Pyrene	87.51	72.31	76.41	78.74	7.86
3,6Dimethylphenanthrene	58.02	55.13	58.21	57.12	1.72
Benzo[a]fluorene	87.98	72.48	77.03	79.16	7.97
Benzo[b]fluorene	88.84	71.02	77.21	79.02	9.04
Benz[a]anthracene	79.88	70.55	78.01	76.15	4.94
Chrysene + Triphenylene	98.28	82.60	84.98	88.62	8.45
Napthacene	38.04	33.63	41.05	37.57	3.73
Benzo[b]fluoranthene	77.09	51.04	61.92	63.35	13.08
Benzo[k]fluoranthene	78.97	68.59	80.86	76.14	6.60
Benzo[e]pyrene	87.43	76.13	81.20	81.59	5.66
Benzo[a]pyrene	109.83	72.26	73.58	85.22	21.32
Perylene	85.26	81.11	84.50	83.63	2.21
Dimethylbenz[a]anthracene	74.55	59.87	68.12	67.51	7.36
3Methylcholanthrene	53.85	50.94	64.56	56.45	7.17
Indeno[1,2,3-c,d]pyrene	86.79	38.42	45.30	56.84	26.17
Benzo[g,h,i]perylene	85.65	69.08	79.37	78.04	8.36
Anthanthrene	44.90	41.71	49.01	45.21	3.66
Dibenz[a,h+ac]anthracene	81.87	67.39	65.87	71.71	8.83
Coronene	50.63	48.57	55.68	51.63	3.66

SRM 1946	SRM 1 ng/g wet wt	SRM 2 ng/g wet wt
Napthalene	ND	ND
Azulene		
2MeNapthalene	ND	ND
1MeNapthalene	ND	ND
Acenapthylene	ND	0.04
Biphenyl	ND	ND
Acenapthene	6.69	7.07
Fluorene	ND	ND
Phenanthrene	1.05	0.83
Anthracene	ND	ND
1Mefluorene	ND	ND
4,5-Methylenephenanthrene	ND	ND
2Methylphenanthrene	ND	ND
2Methylanthracene	ND	ND
1Methylanthracene	0.13	ND
1Methylphenanthrene	ND	ND
9Methylanthracene	ND	0.59
Fluoranthene	0.44	ND
Pyrene	ND	ND
3,6Dimethylphenanthrene	0.71	0.63
Benzo[a]fluorene	ND	ND
Benzo[b]fluorene	ND	0.12
Benz[a]anthracene	ND	ND
Chrysene + Triphenylene	ND	ND
Napthacene	ND	ND
Benzo[b]fluoranthene	ND	ND
Benzo[k]fluoranthene	ND	ND
Benzo[e]pyrene	ND	ND
Benzo[a]pyrene	ND	ND
Perylene	ND	ND
Dimethylbenz[a]anthracene	ND	ND
3Methylcholanthrene	ND	ND
Indeno[1,2,3-c,d]pyrene	ND	ND
Benzo[g,h,i]perylene	ND	ND
Anthanthrene	ND	ND
Dibenz[a,h+ac]anthracene	ND	ND
Coronene	ND	ND
Sum PAH	9.01	9.29

Back River/Hart-Miller Island Field Collections 2003

Matrix spike recoveries

PCB	% recovery Sediment 1	biota1	biota2
1	18.21	65.02	69.63
3	17.62	102.23	76.90
4,10	29.70	194.59	191.20
7,9	38.69	56.69	59.07
6	51.03	52.71	59.93
8,5	46.03	67.04	76.83
19	10.14	60.07	47.30
12,13	9.38	25.02	41.15
18	27.21	23.28	25.47
17	40.73	37.42	38.64
24			
16,32	43.02	57.74	70.36
29			
26	2.09	2.18	3.96
25	2.45	2.73	4.66
31, 28	5.74	5.78	6.67
33,21,53	4.11	5.63	5.66
51			
22	45.46	36.21	42.95
45	82.12	113.11	120.64
46	200.91	257.99	238.18
52	73.10	62.49	69.49
49	64.87	66.75	65.93
47,48			
44	71.62	54.89	71.71
37,42	58.17	32.24	64.48
41,64,71	49.02	46.45	61.17
40	61.82	55.42	69.06
100	172.71	166.25	111.07
63	238.64	236.02	199.18
74	59.47	51.00	77.10
70,76	69.39	60.11	77.51
66,95	62.85	64.43	71.89
91	67.24	62.31	110.16
56,60(92,8	99.05	82.96	97.95
89	40.14	28.10	59.02
101	62.78	59.21	74.28
99	80.05	81.70	83.41
119	130.12	307.97	382.67
83	62.33	120.56	89.32
97	871.39	1021.85	1089.59
81,	49.06	117.70	130.08

PCB	% recovery Sediment 1	biota1	biota2
85	77.71	56.04	76.87
136	56.42	72.20	63.55
77110	77.13	58.93	71.44
82, 151	16.35	17.86	19.03
135144			
107	84.86	137.65	88.14
123149	69.42	68.51	70.06
118	109.68	145.94	134.63
134	3.72	22.27	19.32
146	142.05	168.95	159.51
132153105	93.73	86.73	88.99
141	78.18	70.29	73.98
137130176		78.83	76.34
163138	99.39	79.90	85.74
158			
129178	53.30	60.67	63.43
187182	97.26	94.77	102.30
183	101.25	80.62	87.55
128	280.38	187.11	46.21
185	74.56	77.82	85.67
174	99.55	81.94	85.59
177	110.33	104.95	113.42
202171156	95.13	94.96	102.29
157200			
172			
197			
180	120.94	80.95	86.71
193	1831.77	859.41	928.67
191		96.00	141.08
199	392.20	302.85	990.96
170190	139.10	50.42	62.64
198	477.35	64.23	111.12
201	67.97	56.90	63.29
203196	88.07	85.94	93.20
189			
208195	179.11	36.14	36.93
207	237.83	64.56	88.62
194	110.47	240.53	89.16
205	1120.04	91.22	217.21
206	58.83	41.90	46.60
209			

PAH BSAFs for clams (Rangia) collected from sites surrounding Hart-Miller Island (HMI) in April 2003

	HMI3	HMI9	HMI16	HMI17	HMI27	HMI28	HMI30	HMI35	HMI36
Napthalene									
Azulene									
2MeNapthalene									
1MeNapthalene									
Acenapthylene	0.049	0.031							
Biphenyl				0.032			0.041	0.023	
Acenapthene									
Fluorene				0.099			0.146		
Phenanthrene	0.047	0.049	0.057	0.066	0.047	0.089	0.100	0.055	0.177
Anthracene							0.042	0.021	
1Mefluorene		0.090	0.231	0.077	0.066	0.138	0.132	0.096	
4,5-Methylenephenanthrene	0.075	0.048	0.072	0.078	0.067	0.069	0.094	0.054	
2Methylphenanthrene	0.038	0.027	0.031	0.037			0.051	0.044	
2Methylanthracene									
1Methylanthracene	0.027	0.022	0.027	0.036	0.027	0.040	0.044	0.033	0.097
1Methylphenanthrene	0.043	0.030		0.053				0.050	
9Methylanthracene									
Fluoranthene	0.070	0.063	0.095	0.119	0.059	0.108	0.131	0.058	0.161
Pyrene	0.065	0.058	0.085	0.113	0.060	0.092	0.111	0.053	0.132
3,6Dimethylphenanthrene									
9,10,dimethylanthracene	0.102	0.544		0.196	0.142	0.198	0.204	0.098	
Benzo[a]fluorene		0.013	0.023					0.015	
Benzo[b]fluorene		0.018		0.034					
Benz[a]anthracene	0.008	0.004	0.010	0.007	0.005			0.008	
Chrysene + Triphenylene	0.036	0.019	0.050	0.041	0.030	0.042	0.036	0.020	0.070
Napthacene		0.021							
Benzo[b]fluoranthene									
Benzo[k]fluoranthene									
Benzo[e]pyrene			0.021						
Benzo[a]pyrene									
Perylene	0.010	0.011	0.027	0.028				0.006	
Dimethylbenz[a]anthracene									
3Methylcholanthrene									
Indeno[1,2,3-c,d]pyrene									
Benzo[g,h,i]perylene	0.010								
Anthanthrene									
Dibenz[a,h+ac]anthracene									
Coronene									

PCB BSAFs for clams (Rangia) collected from sites surrounding Hart-Miller Island (HMI) in April 2003

PCB	HMI3	HMI9	HMI16	HMI17	HMI27	HMI28	HMI30	HMI35	HMI36
cong1									
cong3									
cong4,10									
cong7,9									
cong6									
cong8,5									
cong19	1.26			6.54		9.98			
cong12,13									
cong18									
cong17			7.87	0.09	3.20				
cong24									
cong16,32									
cong29	1.30	3.96	7.47	2.43	4.08	9.86		8.77	
cong26									
cong25									
cong31,28									
cong33,21,53	3.71	6.82	4.99	1.39	3.76	4.40	3.75	5.91	
cong51	0.87	1.99	3.90	1.90	2.09	2.00		1.53	
cong22									
cong45	2.66	6.48	7.63	14.05	3.62	6.40	3.52	5.86	
cong46									
cong52	1.53	2.83	1.96	3.32	1.96	2.52	1.36	2.36	
cong49	2.30		6.11						
cong48,47	4.19	9.76			8.59			6.63	
cong44	2.05	16.14	1.99	4.29	2.19	3.01	1.74	2.47	
cong37,42			2.64	5.59	2.32			2.55	
cong41,64,71									
cong40	2.23	2.75	5.19	4.20	3.99	5.51	4.05	4.92	
cong100			1.86		2.42	4.98		2.24	
cong63									
cong74	2.25		3.28	8.19	2.63	3.18		2.63	
cong70,76									
cong66,95	4.53	5.21	3.45	4.91	1.80	3.09	2.06	2.82	3.04
cong91	2.46	8.89	3.98	9.60	2.80	4.83	3.06	3.78	9.24
cong56,60	1.67								
cong89	12.38	20.73	11.39	26.24	2.45	11.03	6.57	12.80	
cong101	3.35	5.62	4.52	5.06	2.29	3.66	2.22	3.59	
cong99	3.77	5.75	5.03	6.00	1.85	2.83	2.22	3.31	
cong119									
cong83				9.04	5.29				
cong97	6.41	13.75	5.17	8.15	3.77	7.61	5.18	11.35	
cong81,87									
cong85	3.55	5.72	4.76	5.18	2.68	4.76	1.97	2.98	
cong136	6.59	9.37	11.40	8.87	3.65	13.94	4.89	11.43	13.23
cong77,110	2.55	3.71	3.19	3.82	1.95	2.82	1.46	2.11	2.39
cong151	8.12	18.36	9.93	7.17	2.85	5.49	3.40	3.59	3.10
cong134,144	3.76	7.52	5.29	4.48	2.41	5.60	2.93	5.00	5.25
cong107	1.54	3.28	2.57	1.96	1.45	3.37	1.32	2.34	
cong123,149	5.56	9.75	7.03	6.65	3.05	5.89	3.79	6.09	4.83
cong118									
cong134	3.19							9.00	
cong114									
cong146									
cong132,153,105	8.19	13.35	11.90						
cong141	3.02	7.47	4.87	5.29	2.26	4.39	2.48	4.29	2.58
cong137,130,176	5.87								
cong163,138	3.82	6.55	5.64	4.91	2.31	4.01	2.48	3.61	2.83
cong158									
cong129,178	3.69	12.87	10.34	5.10	1.84	6.19	4.64	6.74	
cong187,182	7.96	13.78	11.90	10.30	3.81	8.30	6.10	8.33	
cong183	9.17	19.00	14.96	12.08	4.23	9.86	6.87	9.54	5.32
cong128	2.22	3.83	5.36	2.33	1.26	2.67	1.05	2.35	
cong167	2.14								
cong185	2.95	21.12	5.65		5.93	12.02	5.04	7.73	
cong174	7.35	19.89	11.66	12.36	3.85	8.00	6.73	9.29	
cong177	5.72	11.57	8.36	6.42	2.81	5.47	4.01	5.70	4.08
cong202,171,156	5.53	11.49	9.25	8.09	2.83	5.37	4.51	6.65	
cong157	7.60	23.04	14.12	30.52	2.64	9.08	6.67	10.00	5.18
cong172,197	3.86	5.39	3.80	10.56	2.59	4.63		4.46	
cong197	7.89	24.44	14.37	28.17	7.84	27.38	8.30	12.77	
cong180	4.84	7.56	7.46	7.33	2.58	5.36	3.62	5.33	3.30
cong193	1.62		5.56	4.49				3.18	
cong191									
cong199									
cong170,190	3.70	8.32	7.23	7.11	2.08	5.03	3.37	5.15	4.10
cong198	5.66	10.81	10.65	8.53	5.70	5.99	4.70	6.94	7.69
cong201	6.82	9.55	9.87	8.21	3.21	5.98	4.65	6.35	4.64
cong203,196	8.25	13.08	12.26	10.53	4.07	7.91	5.85	8.71	5.51
cong189									
cong208,195	6.97	9.78	9.86	10.71	3.05	6.87	5.69	8.80	5.92
cong207	7.34	15.28	12.64	18.50	3.95	9.07	7.25	11.37	6.73
cong194	3.70	6.91	7.05	6.58	2.20	6.83	3.06	5.94	
cong205									
cong206	5.84	6.36	8.08	7.34	1.98	6.31	4.65	6.91	4.94
cong209	9.25	10.18	7.37	12.26	2.80	7.01	5.12	7.73	6.36

BDEs in clams (Rangia) collected from sites surrounding Hart-Miller Island (HMI) in April 2003

Clam BDEs (ng/g wet)										Clam BDE MDLs (ng/g wet)								
	HMI 3	HMI 9	HMI 16	HMI 17	HMI 27	HMI 28	HMI 30	HMI 35	HMI 36	HMI 3	HMI 9	HMI 16	HMI 17	HMI 27	HMI 28	HMI 30	HMI 35	HMI 36
BDE 30	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001
BDE 17	0.013	0.011	0.013	0.014	0.011	0.013	ND	0.013	ND	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
BDE 25	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001
BDE 28,33	0.003	0.005	0.004	0.005	ND	0.004	ND	0.004	0.004	0.002	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.004
BDE 75	0.003	ND	0.002	0.003	ND	0.004	ND	ND	ND	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003
BDE 49, 71	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.002	0.003	0.002	0.003	0.003	0.003	0.003	0.002	0.003
BDE 47	ND	0.258	0.265	ND	ND	ND	ND	ND	0.332	0.166	0.216	0.173	0.229	0.267	0.239	0.218	0.214	0.287
BDE 66	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.015	0.019	0.016	0.021	0.024	0.022	0.020	0.019	0.026
BDE 100	0.050	0.089	0.070	0.054	ND	ND	ND	0.049	0.078	0.038	0.049	0.039	0.052	0.061	0.054	0.050	0.049	0.065
BDE 119	ND	ND	ND	ND	ND	ND	ND	0.006	ND	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
BDE 99	ND	0.428	0.227	ND	ND	ND	ND	ND	0.374	0.190	0.247	0.197	0.261	0.305	0.273	0.249	0.244	0.327
BDE 116	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002
BDE 155,85	0.008	0.017	0.012	ND	0.017	ND	ND	ND	ND	0.005	0.007	0.006	0.007	0.009	0.008	0.007	0.007	0.009
BDE 154	0.036	0.051	0.047	0.037	ND	0.025	0.022	0.043	0.029	0.012	0.016	0.013	0.017	0.020	0.018	0.016	0.016	0.021
BDE 153	0.035	0.052	0.036	0.030	0.029	0.026	0.017	0.039	0.021	0.011	0.014	0.011	0.014	0.017	0.015	0.014	0.014	0.018
BDE 138	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002
BDE 156	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
BDE 183	0.013	0.009	0.017	0.011	ND	0.022	0.010	0.022	ND	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
BDE 191	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002
BDE 181	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
BDE 190	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002
BDE 204	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.003	0.003	0.003	0.003	0.004	0.004	0.003	0.003	0.004
BDE 197	ND	ND	ND	ND	ND	0.027	ND	ND	ND	0.004	0.005	0.004	0.005	0.006	0.005	0.005	0.005	0.006
BDE 198,203	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.004	0.005	0.004	0.006	0.007	0.006	0.005	0.005	0.007
BDE 196	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.003	0.004	0.003	0.004	0.005	0.005	0.004	0.004	0.005
BDE 205	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.002	0.003	0.002	0.003	0.004	0.003	0.003	0.003	0.004
BDE 208	0.038	0.029	0.055	0.045	0.116	0.092	0.032	0.031	ND	0.009	0.012	0.010	0.013	0.015	0.013	0.012	0.012	0.016
BDDE 207	0.033	0.041	0.055	0.059	0.185	0.120	0.041	0.049	ND	0.023	0.030	0.024	0.032	0.038	0.034	0.031	0.030	0.040
BDE 206	ND	ND	ND	ND	ND	0.062	ND	ND	ND	0.042	0.055	0.044	0.058	0.068	0.061	0.055	0.054	0.073
BDE 209	ND	ND	ND	ND	2.832	1.681	ND	ND	ND	1.115	1.449	1.160	1.535	1.792	1.607	1.462	1.433	1.923

BDEs in clams (Rangia) collected from sites surrounding Hart-Miller Island (HMI) in April 2003

Clam BDEs (ng/g lipid)

	HMI 3	HMI 9	HMI 16	HMI 17	HMI 27	HMI 28	HMI 30	HMI 35	HMI 36
BDE 30									
BDE 17	1.13	1.14	1.10	1.39	0.80	1.56		1.17	
BDE 25									
BDE 28,33	0.26	0.47	0.37	0.50		0.44		0.39	0.93
BDE 75	0.27		0.20	0.27		0.43			
BDE 49, 71									
BDE 47		25.83	22.48						76.34
BDE 66									
BDE 100	4.37	8.93	5.94	5.42				4.44	17.88
BDE 119								0.53	
BDE 99		42.82	19.26						86.16
BDE 116									
BDE 155,85	0.67	1.66	1.00		1.24				
BDE 154	3.15	5.06	4.00	3.68		3.07	1.90	3.84	6.72
BDE 153	3.02	5.17	3.02	3.01	2.16	3.22	1.47	3.50	4.91
BDE 138									
BDE 156									
BDE 183	1.16	0.89	1.40	1.09		2.67	0.82	1.99	
BDE 191									
BDE 181									
BDE 190									
BDE 204									
BDE 197						3.26			
BDE 198,203									
BDE 196									
BDE 205									
BDE 208	3.29	2.89	4.71	4.53	8.74	11.22	2.73	2.83	
BDDE 207	2.85	4.08	4.65	5.99	13.89	14.54	3.49	4.37	
BDE 206						7.49			
BDE 209					212.40	204.48			

BDEs in sediments collected from sites surrounding Hart-Miller Island (HMI) in April 2003

Sediment BDEs (ng/g dry)

	HMI 3	HMI 9	HMI 16	HMI 17	HMI 27	HMI 28	HMI 30	HMI 35	HMI 36
BDE 30	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 17	0.05	0.09	0.05	ND	0.04	0.07	0.04	0.07	0.02
BDE 25	ND	0.01	0.00	ND	0.01	ND	ND	0.00	ND
BDE 28,33	0.05	0.06	0.04	0.06	0.04	0.04	0.03	0.04	0.01
BDE 75	0.01	0.03	0.01	0.01	0.02	ND	ND	0.02	0.00
BDE 49, 71	ND	ND	ND	ND	0.09	ND	ND	ND	ND
BDE 47	1.19	0.71	ND	ND	0.60	ND	ND	0.48	ND
BDE 66	0.03	0.05	ND	ND	ND	ND	ND	0.03	ND
BDE 100	0.15	0.10	ND	ND	0.12	ND	ND	ND	ND
BDE 119	0.01	0.02	0.01	0.01	0.03	0.02	0.01	0.01	ND
BDE 99	0.60	ND	ND	ND	0.66	ND	ND	ND	ND
BDE 116	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 155,85	0.02	ND	0.02	ND	ND	ND	ND	ND	ND
BDE 154	0.05	ND	0.05	0.07	0.06	0.04	ND	ND	0.02
BDE 153	0.03	ND	0.03	ND	ND	ND	ND	ND	ND
BDE 138	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 156	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 183	0.03	ND	ND	0.04	ND	ND	0.05	ND	0.01
BDE 191	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 181	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 190	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 204	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 197	0.02	ND	ND	ND	ND	ND	ND	ND	ND
BDE 198,203	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 196	0.03	ND	ND	ND	ND	ND	ND	ND	ND
BDE 205	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 208	0.59	1.09	1.73	0.89	10.42	3.87	1.01	0.85	0.12
BDDE 207	1.74	3.30	4.61	3.12	33.36	12.68	3.07	2.63	0.30
BDE 206	1.55	3.04	3.45	2.68	30.70	13.11	3.04	2.51	0.29
BDE 209	50.07	105.38	95.85	105.12	741.75	341.69	100.25	89.95	11.23

Sediment BDE MDLs (ng/g dry)

	HMI 3	HMI 9	HMI 16	HMI 17	HMI 27	HMI 28	HMI 30	HMI 35	HMI 36
BDE 30	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
BDE 17	0.003	0.003	0.004	0.006	0.003	0.004	0.004	0.003	0.003
BDE 25	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.001
BDE 28,33	0.007	0.007	0.008	0.013	0.008	0.009	0.009	0.007	0.006
BDE 75	0.002	0.002	0.002	0.004	0.002	0.002	0.002	0.002	0.002
BDE 49, 71	0.002	0.002	0.002	0.004	0.002	0.003	0.003	0.002	0.002
BDE 47	0.451	0.469	0.544	0.868	0.495	0.580	0.579	0.467	0.371
BDE 66	0.030	0.031	0.036	0.057	0.033	0.038	0.038	0.031	0.024
BDE 100	0.087	0.090	0.105	0.167	0.095	0.112	0.112	0.090	0.071
BDE 119	0.004	0.004	0.004	0.007	0.004	0.005	0.005	0.004	0.003
BDE 99	0.466	0.485	0.562	0.896	0.512	0.599	0.598	0.482	0.383
BDE 116	0.009	0.009	0.010	0.017	0.010	0.011	0.011	0.009	0.007
BDE 155,85	0.012	0.013	0.015	0.023	0.013	0.016	0.016	0.013	0.010
BDE 154	0.025	0.026	0.030	0.048	0.027	0.032	0.032	0.026	0.021
BDE 153	0.027	0.028	0.032	0.051	0.029	0.034	0.034	0.028	0.022
BDE 138	0.002	0.002	0.002	0.004	0.002	0.002	0.002	0.002	0.002
BDE 156	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000
BDE 183	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
BDE 191	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001
BDE 181	0.000	0.000	0.001	0.001	0.000	0.001	0.001	0.000	0.000
BDE 190	0.003	0.003	0.004	0.006	0.004	0.004	0.004	0.003	0.003
BDE 204	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.001
BDE 197	0.001	0.001	0.002	0.003	0.002	0.002	0.002	0.001	0.001
BDE 198,203	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001
BDE 196	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.001
BDE 205	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001
BDE 208	0.004	0.004	0.004	0.007	0.004	0.005	0.005	0.004	0.003
BDDE 207	0.024	0.025	0.029	0.046	0.026	0.031	0.031	0.025	0.020
BDE 206	0.011	0.011	0.013	0.020	0.012	0.014	0.014	0.011	0.009
BDE 209	0.819	0.852	0.988	1.576	0.900	1.054	1.051	0.849	0.674

BDEs in sediments collected from sites surrounding Hart-Miller Island (HMI) in April 2003

Sediment BDEs (ng/g carbon)

	HMI 3	HMI 9	HMI 16	HMI 17	HMI 27	HMI 28	HMI 30	HMI 35	HMI 36
BDE 30									
BDE 17	2.45	2.91	1.59		1.61	2.15	1.40	2.11	1.40
BDE 25		0.16	0.15		0.21			0.15	
BDE 28,33	2.17	1.95	1.35	1.60	1.48	1.33	0.87	1.25	1.03
BDE 75	0.32	1.11	0.18	0.23	0.62			0.58	0.25
BDE 49, 71					3.50				
BDE 47	56.99	22.76			22.23			15.10	
BDE 66	1.51	1.55						0.99	
BDE 100	7.02	3.27			4.57				
BDE 119	0.41	0.61	0.28	0.39	0.95	0.60	0.36	0.32	
BDE 99	28.73				24.59				
BDE 116									
BDE 155,85	1.04		0.54						
BDE 154	2.25		1.51	1.87	2.36	1.33			1.73
BDE 153	1.63		1.11						
BDE 138									
BDE 156									
BDE 183	1.45			1.06			1.60		0.57
BDE 191									
BDE 181									
BDE 190									
BDE 204									
BDE 197	1.18								
BDE 198,203									
BDE 196	1.43								
BDE 205									
BDE 208	28.52	34.78	57.90	24.29	388.72	122.03	33.06	27.14	9.64
BDDE 207	83.85	105.22	154.77	84.88	1244.92	399.96	100.26	83.59	24.20
BDE 206	74.76	96.69	115.81	72.85	1145.41	413.64	99.36	79.84	22.91
BDE 209	2407.19	3355.97	3216.37	2856.43	27677.36		3276.18	2855.41	891.05

BDE BSAFs for clams collected from sites surrounding Hart-Miller Island (HMI) in April 2003

BSAFs	HMI 3	HMI 9	HMI 16	HMI 17	HMI 27	HMI 28	HMI 30	HMI 35	HMI 36
BDE 30									
BDE 17	0.46	0.39	0.69		0.49	0.73		0.56	
BDE 25									
BDE 28,33	0.12	0.24	0.27	0.31		0.33		0.31	0.89
BDE 75	0.83		1.10	1.15					
BDE 49, 71									
BDE 47		1.13							
BDE 66									
BDE 100	0.62	2.73							
BDE 119								1.66	
BDE 99									
BDE 116									
BDE 155,85	0.64		1.84						
BDE 154	1.40		2.64	1.97		2.31			3.88
BDE 153	1.85		2.73						
BDE 138									
BDE 156									
BDE 183	0.80			1.03			0.51		
BDE 191									
BDE 181									
BDE 190									
BDE 204									
BDE 197									
BDE 198,203									
BDE 196									
BDE 205									
BDE 208	0.12	0.08	0.08	0.19	0.02	0.09	0.08	0.10	
BDDE 207	0.03	0.04	0.03	0.07	0.01	0.04	0.03	0.05	
BDE 206						0.02			
BDE 209					0.01	0.02			

PAH BSAFs for clams collected from sites surrounding Poplar Island in June 2000 (continued on next page)

Species	Macoma /	Macoma	Macoma (	Macoma I	Mya B	Mya C	Mya D	Mya E	Macoma A	Macoma B	Macoma C	Macoma D	Macoma E	Mya A	Mya B	Mya C	Mya E
Site	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3
Naphthalene	0.574	0.536	0.495	1.039	0.356	0.952	0.423	0.769	0.082	0.156	0.203	0.305	0.844	1.216	0.151	0.185	0.120
Azulene			0.066		0.629												
2-Methylnaphthale	0.594	0.249	0.871	1.496	0.625	0.664	0.241	0.344	0.293	0.308	0.243	0.350	0.364	0.444	0.191	0.219	0.254
1-Methylnaphthale	0.588	0.310	0.368	1.201		1.001	0.449	0.849	0.070	0.095	0.141	0.095	0.187	0.200	0.124	0.129	0.110
Acenapthylene	0.068											0.012					
Biphenyl	0.526	0.392	0.549	0.649		0.846	0.649	0.831	0.194	0.168	0.145	0.083	0.434	1.636	0.352	0.254	0.261
Acenapthene	0.544	0.891	0.617	0.661		1.714	1.760	1.479	0.070	0.103	0.071	0.087	0.106	0.276	0.235	0.153	0.258
Fluorene	0.332	0.194	0.453	0.426		0.752	0.411	0.557	0.160	0.231	0.241	0.155	0.060	0.468	0.243	0.276	0.222
Phenanthrene	0.375	0.456	0.416	0.386		1.701	0.638	1.370	0.155	0.209	0.191	0.207	0.205	0.609	0.330	0.305	0.429
Anthracene	0.088	0.132	0.051	0.062		0.234	0.110	0.122	0.017	0.029	0.028	0.034	0.036	0.067	0.016	0.041	
1-Methylfluorene	0.112	0.170	0.024	0.100		0.320	0.171	0.197	0.020	0.010	0.024	0.028	0.032	0.187	0.021	0.031	0.051
4,5-Methylenephenanthrene																	
2-Methylphenanthr	0.621	0.991	0.613	0.576		1.216	0.701	0.865	0.102	0.089				0.291	0.193	0.127	0.268
2-Methylanthracene																	
1-Methylanthracen	0.257	0.223	0.317	0.320		1.209	0.652	0.741		0.037	0.041	0.031	0.060	0.143	0.098	0.073	0.109
1-Methylphenanthr	0.218	0.167	0.209	0.201		0.710	0.413	0.439	0.037	0.036	0.037	0.041	0.039	0.127	0.070	0.062	0.116
9-Methylanthracen	0.091		0.049	0.000		0.421	0.182	0.161		0.009				0.107	0.052	0.039	0.024
Fluoranthene	0.286	0.330	0.288	0.236		1.704	0.489	1.160	0.086	0.127	0.118	0.127	0.130	0.512	0.169	0.167	0.179
Pyrene	0.189	0.273	0.222	0.186		1.209	0.322	0.804	0.103	0.135	0.117	0.136	0.117	0.293	0.177	0.177	0.185
3,6-Dimethylphena	0.155	0.087	0.128	0.111	0.736	0.239		0.309	0.015	0.027	0.019	0.025	0.028	0.108			0.035
910MeA	0.307						0.411										
Benzo[a]fluorene	0.201	0.364	0.145	0.230	1.054	0.356	0.171	0.330	0.046	0.060	0.046	0.052	0.103	0.275	0.051	0.031	0.041
Benzo[b]fluorene	0.162	0.399			0.661	0.444	0.328	0.189		0.043	0.009	0.037	0.101		0.030	0.052	0.036
Benz[a]anthracene	0.101	0.063	0.068	0.105		0.416	0.044	0.221	0.045	0.060	0.053	0.070	0.065	0.039		0.036	0.051
Chrysene+Triphen	0.178	0.188	0.253	0.204	0.315	0.708	0.310	0.534	0.101	0.115	0.156	0.131	0.102	0.159	0.070	0.136	0.140
Napthacene								0.127						0.593			
Benzo[b]fluoranthene					0.406												0.031
Benzo[k]fluoranth	0.327					1.019	0.552	1.010		0.032	0.034	0.030			0.050	0.038	0.011
Benzo[e]pyrene		0.498				0.874	0.472	0.604		0.030		0.009	0.092	1.019	0.090	0.077	0.073
Benzo[a]pyrene					0.356												0.018
Perylene	0.102				0.186		0.203	0.176			0.018				0.049	0.035	0.025
Dimethylbenz[a]anthracene					1.159					0.057							
3-Methylchloanthrene																	
Indeno[1,2,3-c,d]pyrene					2.248												
Benzo[g,h,i]perylene					0.115	0.271	0.272	0.342						0.067	0.038	0.088	0.068
Anthanthrene					1.642												0.007
Dibenz[a,h+ac]anthracene									0.217								
Coronene																	

PAH BSAFs for clams collected from sites surrounding Poplar Island in June 2000 (continued on next page)

Species	Mya A	Mya B	Mya C	Mya D	Mya E	Rangia A	Rangia B	Rangia C	Rangia D	Macoma A	Macoma B	Macoma C	Macoma D	Macoma	Mya A	Mya B	Mya C	Mya D	Mya E
Site	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ6	WQ6	WQ6	WQ6	WQ6	WQ6	WQ6	WQ6	WQ6	WQ6
Naphthalene	0.129	0.201	0.145	0.126	0.047	0.174	0.321	0.310	0.401	0.214	0.179	0.211	0.143	0.272	0.123	0.304	0.069	0.761	0.031
Azulene						0.004													
2-Methylnaphthale	0.032	0.069	0.028	0.044	0.009	0.050	0.099	0.048	0.075	0.060	0.124	0.143	0.131	0.141	0.123	0.073	0.050	0.085	0.019
1-Methylnaphthale	0.043	0.066	0.048	0.063	0.033	0.099	0.140	0.124	0.143	0.116	0.033	0.088	0.068	0.041	0.056	0.110	0.037	0.066	0.019
Acenapthylene												0.059	0.028	0.060				0.036	
Biphenyl	0.103	0.142	0.084	0.115	0.065					0.047	0.064	0.065	0.144	0.060	0.162	0.187	0.135	0.875	0.037
Acenapthene	0.030	0.024	0.030	0.031	0.024	0.071	0.058	0.048	0.099	0.101	0.112	0.179	0.137	0.116	0.224	0.162	0.137	0.228	0.062
Fluorene	0.055	0.036	0.049	0.068	0.048	0.036	0.082	0.037	0.032	0.043	0.039	0.040	0.047	0.053	0.039	0.018	0.037	0.116	0.018
Phenanthrene	0.190	0.203	0.180	0.229	0.191	0.253	0.276	0.364	0.261	0.069	0.066	0.062	0.049	0.047	0.072	0.059	0.055	0.164	0.021
Anthracene	0.059		0.083	0.070	0.077	0.066	0.069	0.110	0.104	0.008	0.010	0.007	0.003		0.004		0.016	0.023	
1-Methylfluorene	0.016	0.015	0.019	0.016	0.016	0.013				0.041	0.060	0.041	0.021	0.026	0.077	0.040	0.026	0.350	0.017
4,5-Methylenephenanthrene																			
2-Methylphenanth	0.167	0.153	0.171	0.213	0.193	0.238	0.163	0.363	0.192	0.127	0.131	0.124	0.113	0.127	0.127	0.099	0.123	0.234	0.044
2-Methylanthracene																0.015	0.014		
1-Methylanthracen	0.042	0.037	0.026	0.033	0.034	0.047	0.042	0.033	0.039	0.053	0.057	0.050	0.044	0.051	0.085	0.045	0.073	0.151	0.023
1-Methylphenanth	0.032	0.022	0.031	0.030	0.029	0.043	0.056	0.058	0.029	0.055	0.061	0.058	0.045	0.056	0.059	0.031	0.056	0.119	0.018
9-Methylanthracene		0.006			0.008	0.023	0.024						0.014	0.007	0.027		0.030	0.020	0.009
Fluoranthene	0.112	0.090	0.102	0.114	0.118	0.197	0.178	0.168	0.181	0.020	0.023	0.018	0.020	0.020	0.026	0.017	0.021	0.081	0.007
Pyrene	0.127	0.093	0.118	0.134	0.126	0.198	0.218	0.100	0.097	0.018	0.020	0.016	0.016	0.017	0.019	0.013	0.015	0.041	0.006
3,6-Dimethylphena	0.020	0.016	0.019	0.024	0.023	0.013	0.013	0.036	0.010	0.243	0.270	0.239	0.231	0.248	0.155	0.080	0.129	0.341	0.051
910MeA					0.004	0.020													
Benzo[a]fluorene	0.024	0.017	0.020	0.017	0.026	0.019	0.032	0.016	0.037	0.030	0.026	0.020	0.021	0.026	0.019	0.008	0.007	0.079	0.004
Benzo[b]fluorene	0.008	0.004	0.009	0.007	0.010	0.008			0.027	0.021	0.020	0.027	0.029	0.027	0.011	0.005	0.005		0.005
Benz[a]anthracene	0.021	0.016	0.020	0.014	0.029	0.046	0.045	0.023		0.015	0.017	0.019	0.014	0.017	0.010	0.004	0.005		
Chrysene+Triphen	0.072	0.049	0.081	0.079	0.080	0.077	0.091	0.040		0.025	0.025	0.024	0.025	0.028	0.023	0.010	0.018	0.033	0.007
Napthacene																			
Benzo[b]fluoranthene																		0.032	
Benzo[k]fluoranth	0.005	0.004	0.003	0.005	0.005	0.035	0.015	0.028	0.011	0.036	0.023	0.038	0.034	0.020	0.022		0.022		
Benzo[e]pyrene	0.015		0.014	0.015	0.014			0.126			0.013			0.008	0.020	0.019	0.015		
Benzo[a]pyrene		0.031			0.028												0.005		
Perylene	0.040	0.039	0.045	0.037	0.041					0.014	0.028	0.024	0.011	0.015	0.028	0.022	0.024	0.021	0.011
Dimethylbenz[a]anthracene																			
3-Methylchloanthrene																			
Indeno[1,2,3-c,d]pyrene																			
Benzo[g,h,i]peryle	0.128	0.108	0.123	0.148	0.125					0.006					0.008	0.007	0.008	0.011	
Anthanthrene																			
Dibenz[a,h+ac]anthracene						0.371													
Coronene																			

PAH BSAFs for clams collected from sites surrounding Poplar Island in June 2000

Species	Mya A	Mya B	Mya C	Mya D	Mya E
Site	WQR1	WQR1	WQR1	WQR1	WQR1
Naphthalene	1.303	0.336	0.382	0.286	0.098
Azulene		0.015			0.003
2-Methylnaphthale	1.391	0.235	0.305	0.284	0.077
1-Methylnaphthale	1.249	0.157	0.415	0.253	0.097
Acenapthylene					
Biphenyl	1.042	0.159	0.623	0.338	0.133
Acenapthene	0.179	0.266	0.140	0.150	0.072
Fluorene	0.285	0.111	0.198	0.122	0.058
Phenanthrene	0.705	0.282	0.265	0.232	0.092
Anthracene		0.046		0.021	0.006
1-Methylfluorene	0.090	0.026	0.020	0.019	0.010
4,5-Methylenephenanthrene					
2-Methylphenanthı	1.253	0.346	0.378	0.332	0.081
2-Methylanthracene					
1-Methylanthracen	0.486	0.233	0.212	0.252	0.058
1-Methylphenanthı	0.215	0.082	0.093	0.093	0.025
9-Methylanthracen	0.017	0.022	0.015	0.021	0.003
Fluoranthene	0.560	0.297	0.263	0.238	0.070
Pyrene	0.405	0.185	0.187	0.170	0.061
3,6-Dimethylphena	0.285	0.053	0.047	0.073	
910MeA					
Benzo[a]fluorene	0.066	0.022	0.061	0.026	0.017
Benzo[b]fluorene	0.047	0.015	0.058	0.021	0.010
Benz[a]anthracene	0.062	0.025	0.018	0.058	0.030
Chrysene+Triphen	0.344	0.140	0.110	0.148	0.055
Napthacene					
Benzo[b]fluoranthene					
Benzo[k]fluoranthe	0.166	0.124	0.135	0.130	0.044
Benzo[e]pyrene	0.408	0.175	0.200	0.177	
Benzo[a]pyrene					
Perylene	0.631	0.084			0.027
Dimethylbenz[a]anthracene					
3-Methylchloanthrene					
Indeno[1,2,3-c,d]pyrene					
Benzo[g,h,i]peryle	0.303	0.236	0.344		
Anthanthrene					
Dibenz[a,h+ac]anthracene					
Coronene					

PCB BSAFs for clams collected from sites surrounding Poplar Island in June 2000 (continued next page)

Site	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3
Species	Macoma	Macoma	Macoma	Macoma	Mya B	Mya C	Mya D	Mya E	Macoma A	Macoma B	Macoma C	Macoma D	Macoma E	Mya A	Mya B	Mya C	Mya E
PCB																	
cong1																	
cong3																	
cong4,10									1.21	1.76	1.95	1.39	2.21	3.45	3.13	2.81	2.36
cong7,9									0.10								
cong6																	
cong8,5																	
cong19		0.28	0.73	0.61	2.42	2.15	4.12	3.11	0.47	0.27		0.20	0.46	3.07	1.19	0.67	1.25
cong12,13																	
cong18																	
cong17		0.41		0.11		0.65				0.24		0.15					
cong24		0.23	0.26	0.10	0.80	1.02	1.08	1.06	0.06	0.12		0.08		1.14	0.50	0.28	0.38
cong16,32				0.18	1.31	1.90		1.03	0.12	0.24		0.27	0.29		0.94	0.80	1.13
cong29		0.60		0.54	0.62	1.51		0.60									
cong26																	
cong25									1.09	0.86	2.16	0.80	5.20				
cong31,28																	
cong33,21,53	1.50	1.21	2.14	1.07	4.74	3.82	7.00	5.96	0.71	0.71		0.62	1.01	3.59	2.17	1.21	1.96
cong51									1.05	0.77	3.23	0.74	1.34			1.49	
cong22	0.27	0.27	0.15		0.98	0.43	1.69	0.71	0.33	0.11		0.14		1.50			
cong45									2.70	2.14	4.36	2.07	2.54		8.02	5.18	5.79
cong46	0.36	0.64	0.40	0.32	1.10	1.48		1.10	0.54	0.32		0.32			1.90	0.93	1.43
cong52	4.39	6.44	5.52	4.96	10.15	11.16	9.24	11.36	3.57	3.79	3.80	3.54	5.19	7.69	9.53	7.35	9.05
cong49	2.65	2.82	2.78	2.31	4.27	5.51	3.20	4.13	0.85	1.31	2.51	1.69	1.86	1.98	3.55	2.40	2.33
cong48,47																	
cong44	1.49	2.84	1.90	1.15	5.29	5.95	4.74	7.89	0.39	0.44	0.25	0.36	0.97		1.69	2.07	2.55
cong37,42	0.93	1.12	1.09	1.02	1.68	1.94	1.29	2.32	0.31	0.48	0.50	0.37	0.40	1.03	0.61	0.92	1.45
cong41,64,71	1.08	1.62	1.68	3.40	1.96	2.52	1.60	2.06	0.26	0.55	0.65	0.36	0.28	1.07	0.64	0.64	0.82
cong40			0.62		1.24	1.53	1.27	1.76					0.39		0.36	0.68	
cong100									0.11	0.18		0.30	0.82	3.09	1.25	2.74	1.67
cong63									0.68	1.00		0.39					
cong74																	
cong70,76																	
cong66,95																	
cong91	2.75	2.23	3.38	3.80	3.29	6.01	4.30	8.00	0.72	1.03	1.56	1.27	0.59		1.99	1.51	1.83
cong56,60	2.78	1.74	3.93	3.96	4.81	5.68	5.48	7.60	0.65	0.99	1.22	0.89	0.53		1.82	1.38	1.16
cong89																	
cong101	8.89	8.14	11.71	11.30	13.19	12.27	12.34	15.99	3.36	5.55	5.05	4.20	3.32	5.60	7.03		4.21
cong99	39.04	23.85	46.96	52.21	53.57	55.40	54.17	83.96	6.39	8.89	9.57	6.23	4.04	11.80		7.63	6.71
cong119	5.55	4.26	7.60	6.30	13.77	13.87	13.76	17.08	1.35	2.12	2.86	1.60	2.57	4.02	5.41	4.06	3.54
cong83									0.27	0.29	0.46	0.27	0.72	2.14	2.77	1.62	2.14
cong97	4.61	2.30	5.13	3.04	6.15	6.29	5.05	7.09	1.01	1.38	1.55	1.29	1.18	1.51	2.82	1.85	1.98
cong81,87																	

PCB BSAFs for clams collected from sites surrounding Poplar Island in June 2000 (continued next page)

Site	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ2	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3	WQ3
Species	Macoma	Macoma	Macoma	Macoma	Mya B	Mya C	Mya D	Mya E	Macoma A	Macoma B	Macoma C	Macoma D	Macoma E	Mya A	Mya B	Mya C	Mya E
cong85					1.17	1.59	1.45	1.53				2.30	2.19	1.93		3.11	3.03
cong136									1.31	2.07	2.14	2.55	2.73	6.59	4.21	3.75	4.08
cong151	2.74	2.13	2.53	2.33	4.83	3.31	4.28	4.42	1.20	1.95	1.59	1.20	2.64	2.40	4.12	2.63	1.85
cong134,144	3.19	2.45	3.36	2.43	7.08	5.93	8.74	8.42									
cong107	3.78	2.83	3.47	2.79	4.64	4.23	5.92	5.58	0.99	1.50	1.43	1.13	1.58	2.18	2.39	2.16	1.41
cong123,149	12.37	9.97	13.31	12.49	16.23	13.04	15.07	17.25	3.57	6.59	6.33	4.67	4.70	5.30	7.61	9.05	4.40
cong118	4.04	3.74	3.97	3.79	4.01	3.79	4.68	4.93	2.63	3.94	4.32	3.32	3.05	3.89	4.72		2.94
cong134		1.13	1.41	1.07			1.07	0.98	0.52	0.39		0.58		1.01		0.66	
cong146	2.59	2.36	2.81	2.56	3.59	3.82	3.97	4.14	1.05	1.83	1.72	1.40	1.41	2.25	2.46	2.10	1.53
cong132,153,105	8.55	8.31	9.67	8.89	8.94	7.79	8.34	9.18	2.20	4.17	3.73	2.98	2.23	2.84	3.66	2.95	1.88
cong141	1.99	1.36	1.82	1.77	1.74	1.48	1.78	2.25	2.64	4.35	4.48	3.60	2.00	8.71	4.97	2.73	2.86
cong137,130,176																	
cong163,138	12.19	11.20	12.92	12.97	13.36	12.37	12.74	14.15	4.79	8.79	8.85	6.14	5.02	7.02	7.77	6.28	6.11
cong158																	
cong129,178	4.81	4.07	3.93	3.02	6.82	5.15	5.74	4.61	2.18	3.00	2.66	1.61	2.86	5.15	1.93	3.86	4.20
cong187,182																	
cong183	6.77	5.87	7.81	5.24	10.24	12.58	9.96	10.41									
cong128	4.94	3.97	4.24	4.21	7.70	7.67	7.47	8.00	1.10	1.52	1.57	1.22	1.46	6.28	3.00	2.38	4.25
cong167																	
cong185		1.70	1.75	1.09					0.18	0.18		0.28				0.47	
cong174	3.91	3.71	4.55	3.87	6.19	5.33	5.05	6.16	0.44	0.99	1.15	0.68	0.81	2.82	1.34	0.88	1.13
cong177	3.22	3.21	3.19	3.34	5.21	5.54	4.65	5.20	0.73	0.94	1.03	0.77	1.01	1.99	1.19	1.17	1.37
cong202,171,156	4.42	4.33	4.76	4.83	8.20	7.93	7.72	8.63	0.80	1.41	1.40	0.88	1.51	2.63	1.95	1.75	1.79
cong157																	
cong172,197																	
cong197																	
cong180	7.35	7.17	8.80	9.18	8.31	6.24	7.75	7.43	0.98	1.84	1.62	1.47	0.94	1.51	1.75	1.26	1.11
cong193																	
cong191									0.16	0.25	0.00	0.37	0.00	0.00	0.00	0.37	0.00
cong199	2.25	1.93	1.48	7.18	1.86	1.41	1.65	0.95	0.43	2.13	3.32	3.77	0.81	2.31	1.35	0.57	1.35
cong170,190	7.22	5.77	7.60	8.05	3.53	4.43	4.31	9.86	0.61	1.07	0.99	0.85	0.50	0.00	0.58	0.40	0.52
cong198																	
cong201	12.56	12.25	14.05	13.74	12.81	10.54	12.18	11.82	1.38	2.43	2.14	1.73	1.07	2.74	1.83	1.38	1.09
cong203,196	4.76	4.41	7.26	5.63	5.49	4.01	4.52	4.85	1.44	2.46	1.82	1.93	0.98	4.36	1.67	1.39	0.99
cong189																	
cong208,195																	
cong207	3.75	2.46	4.06	3.58	1.45	1.36	1.41	0.00	0.57	1.31	1.27	0.89	0.13		0.32	0.22	0.45
cong194	5.27	5.15	4.09	5.10	2.98	2.32	2.07	0.00	0.77	1.30	2.16	1.20	0.58	3.77	0.86	0.72	1.18
cong205																	
cong206	7.85	6.96	8.37	8.45	1.96	2.12	1.78	1.79	1.12	2.59	2.47	1.44	0.38	0.84	0.58	0.40	0.40
cong209	3.61	3.54	4.01	3.81	0.67	0.63	0.46	0.68	0.82	2.07	1.88	1.08	0.53	0.59	0.25	0.22	0.29

PCB BSAFs for clams collected from sites surrounding Poplar Island in June 2000 (continued next page)

Site	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ6	WQ6	WQ6	WQ6	WQ6
Species	Mya A	Mya B	Mya C	Mya D	Mya E	Rangia A	Rangia B	Rangia C	Rangia D	Macoma A	Macoma B	Macoma C	Macoma D	Macoma E
PCB														
cong1														
cong3														
cong4,10	1.60	1.45	1.52	1.73	1.51	1.38	1.34	1.80	1.38	0.29	0.36	0.32	0.29	0.18
cong7,9					0.07	0.15		0.29		0.01				
cong6														
cong8,5														
cong19	0.27	0.51		0.27	0.21	0.22	0.21	1.29	0.19	0.05		0.04	0.06	0.01
cong12,13														
cong18														
cong17	0.21				0.06	0.72	0.70	0.87	0.80					
cong24	0.18	0.14	0.12	0.21	0.12	0.10	0.09	0.33	0.11	0.06		0.02	0.01	0.01
cong16,32	0.23	0.20	0.41	0.22	0.18	0.89	0.91	1.15	0.80					
cong29	0.30													
cong26														
cong25														
cong31,28											0.08			0.01
cong33,21,53	1.14	0.74	0.78	0.89	0.63	0.78	1.08	0.98	0.99	0.02		0.01	0.01	0.01
cong51	0.38			0.38	0.13	0.31	0.58	0.47	0.35					
cong22	0.13			0.12	0.08	0.67	0.63	0.77	0.49					
cong45														
cong46	0.57			0.16	0.14	0.18	0.37	0.41	0.47					
cong52	4.07	3.22	3.47	3.77	3.20	4.75	5.72	8.05	5.46					
cong49	1.44	1.02	1.03	1.20	1.51	2.70	3.13	4.09	2.39	0.11	0.47	0.19	0.11	0.09
cong48,47										0.07	0.12	0.03	0.04	0.02
cong44	2.23	0.95	1.46	1.13	0.99	3.23	3.17	3.41	2.40					
cong37,42	0.49	0.20		0.21	0.20	2.97	2.64	3.12	1.75					
cong41,64,71	0.48	0.31	0.38	0.33	0.18	1.39	1.55	1.89	1.06					
cong40						0.51	0.41	0.49	0.19					
cong100	0.21	0.59	1.24	0.07	0.06	0.20	0.16		0.09					
cong63														
cong74														
cong70,76														
cong66,95														
cong91	1.26	1.29	3.28	1.21	0.62	7.50	5.72	6.87	5.71					
cong56,60	0.89	0.72		0.92	0.60	5.08	5.43	6.02	3.91					
cong89														
cong101	2.84	2.13	2.23	2.60	2.15	4.95	5.08	5.60	3.81					
cong99	5.31	3.61	2.42	3.05	2.24	25.10	25.06	24.64	18.71					
cong119	1.86	1.72	1.44	1.86	1.36	1.32	1.62	1.73	1.28	0.20	0.31	0.17	0.22	0.15
cong83														
cong97	2.22	1.87	2.32	1.83	1.48	7.00	7.27	7.15	5.81					
cong81,87										0.02	0.02	0.01	0.01	0.01

PCB BSAFs for clams collected from sites surrounding Poplar Island in June 2000 (continued next page)

Site	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ4	WQ6	WQ6	WQ6	WQ6	WQ6
Species	Mya A	Mya B	Mya C	Mya D	Mya E	Rangia A	Rangia B	Rangia C	Rangia D	Macoma A	Macoma B	Macoma C	Macoma D	Macoma E
cong85		0.59		0.39	0.37	1.87	2.04	2.23	1.88					
cong136	0.66	0.87		0.57	0.57	1.05	1.21	1.34	1.23					
cong151	0.87	0.70	0.92	0.79	0.64	0.54	0.95	0.82	0.69					
cong134,144	0.92	0.84	0.98	0.89	0.57	0.63	0.95	0.83	0.80					
cong107	0.89	0.84		0.82	0.59	1.44	1.67	1.71	1.38					
cong123,149	3.01	2.38	2.06	2.57	2.48	5.53	5.62	6.08	4.47	0.46	0.77	0.51	0.62	0.43
cong118	4.34	3.56	2.77	4.26	3.54	7.75	10.00	9.12	8.20					
cong134	0.13	0.10	0.00	0.20	0.11	0.25	0.28	0.21	0.36					
cong146	0.76	0.70	0.75	0.75	0.68	0.94	1.03	1.20	0.93	0.17	0.26	0.13	0.19	0.14
cong132,153,105	1.24	1.04	1.02	1.05	1.06	1.74	1.84	1.96	1.65	0.22	0.33	0.17	0.25	0.18
cong141	0.35	0.31	0.46	0.35	0.33	0.49	0.51	0.63	0.36					
cong137,130,176														
cong163,138	3.75	3.16	4.04	3.36	3.23	9.61	9.74	10.56	7.18	0.66	1.06	0.51	0.78	0.57
cong158														
cong129,178	1.65	0.55	1.34	0.49	0.52	0.48	0.52		0.68					
cong187,182														
cong183														
cong128														
cong167														
cong185				0.35	0.21	0.16	0.24	0.29	0.14					
cong174	0.98	2.03	2.47	0.96	1.13	0.80	1.45	2.05	1.52					
cong177	2.23	3.23	3.98	1.44	2.85	2.08	2.20	5.61	2.13					
cong202,171,156	2.66	4.05	4.86	1.85	3.07	1.88	1.83	4.27	2.04					
cong157														
cong172,197														
cong197														
cong180	1.49	1.13	1.18	1.05	1.09	1.48	1.46	1.64	1.24					
cong193										0.03	0.03	0.02	0.02	0.04
cong191														
cong199	0.23	0.16	0.20	0.63	3.22	0.53	3.73	1.35	0.21	0.45	0.10	0.05	0.52	0.35
cong170,190	0.60	0.46	0.00	0.51	0.54	0.58	1.44	1.22	1.24					
cong198														
cong201	0.68	0.62	0.71	0.63	0.58	0.45	0.41	0.45	0.42					
cong203,196	0.07	0.14		0.08	0.06	0.06	0.05	0.10	0.05					
cong189														
cong208,195														
cong207	0.18	0.12		0.16	0.14	0.23	0.36	0.32	0.28					
cong194	0.71	0.57		0.66	1.29	0.69	1.00	1.50	0.91					
cong205														
cong206	0.48	0.49	0.37	0.64	0.57	0.74	0.81	1.17	0.98	0.10	0.17	0.08	0.14	0.08
cong209	0.44	0.30	0.36	0.35	0.37	0.82	0.95	1.02	0.94	0.07	0.13	0.05	0.11	0.06

PCB BSAFs for clams collected from sites surrounding Poplar Island in June 2000 (continued next page)

Site	WQ6	WQ6	WQ6	WQ6	WQ6	WQR1	WQR1	WQR1	WQR1	WQR1
Species	Mya A	Mya B	Mya C	Mya D	Mya E	Mya A	Mya B	Mya C	Mya D	Mya E
PCB										
cong1										
cong3										
cong4,10	0.14	0.31	0.33	0.36	0.34					
cong7,9										
cong6				0.02						
cong8,5										
cong19	0.01		0.03	0.04	0.04					
cong12,13						2.29				
cong18						18.86	3.02			6.54
cong17									0.21	6.30
cong24	0.01	0.03	0.03	0.04	0.04					
cong16,32										
cong29										
cong26										
cong25										
cong31,28										
cong33,21,53	0.01	0.03	0.02		0.03	0.56	0.30	0.19	0.15	0.45
cong51										
cong22									0.33	3.02
cong45										
cong46									0.15	
cong52						3.37	2.57	2.48	2.50	2.51
cong49	0.06	0.08	0.07	0.07	0.09					
cong48,47		0.01	0.01	0.01		2.33	1.87			2.98
cong44							0.70	0.57	0.41	0.54
cong37,42										
cong41,64,71										
cong40										
cong100										
cong63										
cong74										
cong70,76										
cong66,95						4.96	4.36	2.48	2.29	3.15
cong91										
cong56,60						13.86	4.58	3.39	1.82	3.10
cong89										
cong101						8.14	3.24	3.13	2.99	2.96
cong99										
cong119	0.12	0.34	0.25	0.42	0.27					
cong83						0.85	0.24	0.15	0.07	0.21
cong97										
cong81,87		0.05	0.04	0.08	0.04					

PCB BSAFs for clams collected from sites surrounding Poplar Island in June 2000

Site	WQ6	WQ6	WQ6	WQ6	WQ6	WQR1	WQR1	WQR1	WQR1	WQR1
Species	Mya A	Mya B	Mya C	Mya D	Mya E	Mya A	Mya B	Mya C	Mya D	Mya E
cong85										
cong136										
cong151						3.48	3.29	2.50	2.58	3.79
cong134,144						2.30	1.50	1.53	1.13	1.80
cong107										
cong123,149	0.14	0.39	0.35	0.56	0.37	3.21	1.48	1.36	1.36	1.42
cong118						1.24	0.55	0.45	0.38	0.55
cong134									0.11	
cong146	0.08	0.15	0.14	0.18	0.15					
cong132,153,105	0.05	0.12	0.11	0.23	0.13					
cong141										
cong137,130,176						0.85	0.32	0.40	0.23	0.39
cong163,138	0.16	0.35	0.54	0.79	0.37					
cong158										
cong129,178										
cong187,182										
cong183										
cong128										
cong167										
cong185										
cong174										
cong177										
cong202,171,156										
cong157										
cong172,197										
cong197										
cong180										
cong193	0.01	0.04	0.03	0.04	0.03	1.45	1.41	0.57	0.68	0.82
cong191										
cong199	0.10	0.28	0.17	0.14	0.12					
cong170,190										
cong198										
cong201										
cong203,196										
cong189										
cong208,195										
cong207						1.78			0.12	
cong194						2.34	2.34		0.24	
cong205						2.62	3.71		0.96	
cong206	0.01	0.02	0.01	0.07	0.02					
cong209		0.01	0.01	0.05	0.01					

PCB BSAFs for amphipods collected from the Delaware River Estuary

PCB	Fall 2001	Fall 2001	Fall 2001	Fall 2001	Fall 2001	Spring 2002	Spring 2002	Spring 2002	Spring 2002	Spring 2002
4,10							26.43	21.13	11.82	39.22
7,9							17.49		0.21	4.05
6		16.55	8.11		3.03	2.71	0.45		3.44	
8,5					13.58	8.50	15.07	2.79	11.02	
19						1.47				
12,13		8.78	14.30		7.48	4.69	2.51			
17	5.39	7.94	11.24		3.18	2.24	1.77	0.52	4.10	
24						2.07	4.34	0.77	1.19	0.82
16,32			25.02		8.77	3.16	1.96	2.11		1.35
29						8.20	3.85	0.00		
26			4.05				0.38			
25		10.12	6.90	5.67						
31, 28	7.14	3.95	3.90		3.71	10.73	0.68	0.30	5.59	
33,21,53	15.60	11.34	19.13	13.09	10.17	13.50	2.71	2.08		
22					13.56	5.63	1.03	0.69		
45	15.36	11.70	29.33	7.71	14.78	30.27	3.82	3.28	34.33	1.41
46					20.04	0.51	5.52	10.10	45.06	6.33
52	3.16	2.71	8.10	2.02	3.68	13.56	2.50	1.77	14.46	7.17
44	3.43	2.42	5.93	3.49	4.06	12.86	1.22	1.28	14.60	5.32
37,42	4.05	4.66	4.21	5.28	5.68	12.66	1.31	0.84	12.85	6.00
41,64,71	12.00	8.68	12.70		8.48	7.28	1.19	2.12	25.25	3.75
40	6.12	4.40	10.40		6.49	3.38	1.03	1.28	13.93	2.83
100		37.06	22.57			43.51	32.09	30.11	0.29	
74	10.56	9.12	8.54	9.46	7.82	16.78	1.66	1.38	21.34	6.40
70,76	2.78		4.34		2.68	8.91	1.18	0.40	10.53	4.53
66,95	3.61	3.18	10.79	4.02	4.22	21.41	1.85	1.50	22.39	8.73
91	6.24	7.91	19.37	6.57	6.90	9.73	3.01	0.11	1.69	8.21
56,60/92,84	5.52	6.98	8.83	2.94	3.04	7.90	1.47	1.35	11.95	2.02
101	4.24	7.00	14.54	6.08	4.31	18.98	2.80	1.93	21.39	9.17
99	2.97	5.83	14.81	3.54	3.84	16.91	3.27	1.99	16.40	7.09
83	26.38	18.22	23.45	5.96	8.09	11.77	1.22	0.40	6.90	2.70
97					20.77		17.35	10.99	63.25	27.02
81,87						3.45	1.71	0.34	4.80	4.54

PCB BSAFs for amphipods collected from the Delaware River Estuary

PCB	Fall 2001	Fall 2001	Fall 2001	Fall 2001	Fall 2001	Spring 2002	Spring 2002	Spring 2002	Spring 2002	Spring 2002
85			23.14		7.78		1.08	0.28	1.05	
136	4.00	3.70	19.32	4.32	6.06		1.43	0.70		
77110	3.16	3.88	14.63	4.88	4.08	10.85	2.97	1.41	12.51	4.44
82, 151	0.87	1.36	2.33	1.41	1.15	3.02	0.70	0.29	4.64	1.03
135144	4.26	5.21	15.81	7.61	5.33	21.42	3.38	1.28	9.93	9.68
107	6.87	22.81	23.36	17.16	7.33	14.77	1.96	0.66	4.78	2.97
123149	4.25	4.25	15.24	7.91	5.48	18.91	3.51	2.03	12.50	7.80
118	4.28	8.05	13.21	4.55	3.73	19.41	2.63	1.86	7.26	5.47
134				10.80	30.50	1.32	0.46	0.25	0.47	0.23
146					20.82	23.76	3.44	1.58	9.85	13.80
132105153	9.52	18.03	21.47	24.50	7.26	26.25	3.38	1.95	18.86	12.34
141	6.73	9.57	23.34	4.06	10.69	39.95	6.09	1.90	17.80	17.83
137130176						11.10		1.55		
163138	2.97	9.29	13.34	6.25	3.88	23.38	2.62	1.59	14.35	5.99
129178	3.14	11.67	20.22	3.74	5.72		1.43			
187182	5.95	22.86	21.13	6.67	5.99	30.99	3.21	2.17	8.82	11.97
183	3.93	11.21	9.89		5.06	34.02	2.11	1.63	6.96	7.33
128	2.30	5.47	22.13		3.49	10.89	1.96	0.89	7.72	2.68
185	5.44	5.53	17.62	6.99	5.35	14.82	4.39	1.28	11.20	8.55
174	3.53	3.23	10.88	3.43	5.35	17.77	1.93	1.04	12.21	8.72
177	3.46	12.30	13.95	5.40	4.78	27.44	2.58	1.23	12.47	3.43
202171156	3.46	6.53	11.57	1.59	4.95	20.64	1.92	1.09	1.83	4.29
157200	1.72	6.22	15.70	0.88	1.53	11.65	0.91		1.34	4.32
172197		42.59	43.80	29.00	8.63		1.57			
180	2.38	8.09	8.50	6.99	3.08	15.06	1.97	1.58		
193	14.96	20.73	31.30		17.39	11.00	16.14	2.58	24.47	
191						19.93	0.29			
199										
170190	1.18	4.91	4.98	3.61	1.70	12.42	1.41	0.69	8.35	2.44
198		4.89	12.08	1.50	3.91	5.82	0.11	0.04	0.54	
203196	1.37	4.52	8.13	1.13	1.73	23.97	1.26	0.44	0.85	3.44
189						13.72	0.02	0.01	0.47	
208195	1.93	11.15	24.81	9.11	2.34	9.49	0.44	0.51	1.23	3.23
207		2.31	7.27	0.98	1.75	15.16	0.38	0.48	0.36	4.04
194		4.25	4.93	1.93	0.83	4.62	0.55	0.02	1.38	0.18
205			15.68		1.98	2.20		0.00		
206	0.19	0.87	2.61	0.33	0.30	7.23	0.36	0.06	1.06	0.54
209		4.80	13.64	3.39	6.37	23.43	0.89	0.26	0.17	

Appendix B:

Bioaccumulation factors, bioaccumulation rates, and organic chemical, butyltin, and metals concentrations in *Nereis virens* and *Leptocheirus plumulosus* exposed to Baltimore Harbor sediments

Worm PAHs (ng/g wet)	**Time series uptake and depuration**												
	DAY 0	**BSM 45 Uptake 2A**	**BSM 45 Uptake 2B**	**BSM 45 Uptake 4A**	**BSM 45 Uptake 4B**	**BSM 45 Uptake 8A**	**BSM 45 Uptake 8B**	**BSM 45 Uptake 16A**	**BSM 45 Uptake 16B**	**BSM 45 Uptake 28A**	**BSM 45 Uptake 28B**	**BSM 45 Uptake 56A**	**BSM 45 Uptake 56B**
Naphthalene	<2.30	<3.75	<3.44	<4.23	<2.98	<2.45	<3.14	<3.61	<6.13	<.53	<4.26	<8.93	<5.10
2-Methylnaphthalene	<1.34	<2.19	<2.01	<2.47	<1.74	<1.43	<1.83	<2.11	<3.57	<2.06	<2.48	<5.21	<2.97
Azulene	0.03	<0.04	<0.04	<0.05	<0.03	<0.03	<0.03	<0.04	<0.07	<0.04	<0.05	<0.10	<0.06
1-Methylnaphthalene	1.50	<1.22	<1.12	<1.38	<0.97	0.98	<1.02	<1.18	<2.0	<1.15	<1.39	<2.91	<1.66
Biphenyl	<0.33	<0.55	<0.50	0.62	<0.43	<0.36	<0.46	<0.53	<0.89	<0.51	<0.62	<1.30	<0.74
Acenapthylene	0.05	0.05	<0.04	<0.05	0.04	0.05	0.07	0.06	<0.07	0.09	0.06	<0.10	0.08
Acenapthene	<1.08	<1.77	<1.62	<2.00	1.41	<1.16	<1.48	<1.70	<2.89	<1.66	<2.01	<4.21	<2.41
Fluorene	<0.69	<1.13	<1.03	<1.27	<0.90	<0.74	<0.94	<1.08	<1.84	<1.06	<1.28	<2.68	1.86
1-Methylfluorene	0.24	<0.23	<0.21	<0.26	<0.19	0.21	<0.20	<0.23	10.62	<0.22	<0.27	<0.56	<0.32
Phenanthrene	<1.37	<2.24	<2.06	<2.53	<1.78	<1.47	<1.88	<2.16	<3.67	<2.11	<2.55	<5.34	3.51
Anthracene	0.06	0.07	<0.06	<0.07	0.05	0.11	<0.05	0.08	0.89	0.13	0.11	0.25	0.25
2-Methylphenanthrene	<0.17	<0.29	<0.26	<0.32	<0.23	<0.19	0.24	<0.27	<0.47	<0.27	<0.32	<0.68	0.46
2-Methylanthracene	0.28	0.17	0.14	<0.07	0.12	0.20	0.19	<0.06	0.11	0.27	<0.07	<0.15	<0.09
4,5-Methylenephenanthrene	0.08	0.52	0.59	0.30	0.90	1.42	0.64	0.65	14.32	1.11	0.39	0.46	0.37
1-Methylanthracene	<0.13	<0.21	<0.19	<0.24	0.22	0.30	0.23	0.27	2.24	0.26	<0.24	<0.50	<0.29
1-Methylphenanthrene	<0.09	<0.15	<0.13	<0.17	<0.12	0.14	0.14	0.15	1.27	<0.14	<0.17	<0.35	<0.20
9-Methylanthracene	<0.03	<0.05	<0.04	<0.05	<0.04	<0.03	<0.04	<0.04	<0.08	<0.04	<0.05	<0.11	0.39
Fluoranthene	0.59	4.28	3.63	2.46	6.16	10.66	5.17	5.85	7.56	13.04	4.57	4.03	3.46
Pyrene	0.51	4.18	3.83	2.66	6.34	12.05	5.43	5.78	7.64	15.80	4.69	4.18	3.41
3,6-Dimethylphenanthrene	<0.09	<0.15	0.21	<0.17	<0.12	<0.10	<0.12	0.40	0.47	<0.14	<0.17	1.06	5.99
Benzo[a]fluorene	<0.02	0.44	0.36	0.33	0.68	1.11	0.44	0.54	0.83	1.37	0.40	0.45	0.29
Benzo[b]fluorene	<0.07	0.23	0.19	0.13	0.30	0.45	0.14	0.25	0.21	0.32	0.18	<0.26	0.82
Benz[a]anthracene	0.10	0.25	0.17	0.08	0.24	0.40	0.12	0.19	0.21	0.28	0.18	0.28	0.90
Chrysene+Triphenylene	0.19	1.26	1.27	1.22	1.83	2.91	2.03	2.63	3.05	5.58	4.23	2.48	5.90
Napthacene	<0.04	<0.06	0.09	0.12	0.15	0.19	<0.05	<0.06	0.17	<0.06	<0.07	<0.15	<0.09
Benzo[b]fluoranthene	<0.08	0.25	0.33	0.25	0.33	0.45	0.23	0.28	<0.20	0.41	0.28	<0.30	0.19
Benzo[k]fluoranthene	<0.07	0.28	0.47	0.29	0.58	0.83	0.53	0.51	<0.18	0.88	0.60	0.43	0.70
Dimethylbenz[a]anthracene	<0.10	<0.16	<0.15	<0.18	<0.13	<0.11	<0.13	<0.15	<0.26	<0.15	<0.18	<0.38	<0.22
Benzo[e]pyrene	<0.14	0.32	0.54	0.37	0.61	0.86	0.55	0.73	0.62	1.50	1.07	<0.55	0.87
Benzo[a]pyrene	<0.16	<0.27	0.34	<0.30	0.26	0.44	0.30	0.40	1.16	0.57	<0.30	<0.63	0.69
Perylene	<0.04	<0.07	0.10	<0.08	0.11	0.12	0.08	0.07	<0.11	<0.06	<0.08	<0.16	<0.10
3-Methylchloanthrene	<0.15	<0.24	<0.22	<0.27	<0.19	<0.16	<0.20	<0.23	<0.40	<0.23	<0.28	<0.58	<0.33
Indeno[1,2,3-c,d]pyrene	<0.05	<0.08	<0.07	<0.09	<0.06	<0.05	<0.07	<0.08	<0.13	<0.07	<0.09	<0.19	<0.11
Dibenz[a,h+ac]anthracene	<0.06	<0.10	<0.08	<0.10	<0.07	<0.06	<0.08	<0.09	<0.15	<0.09	<0.10	<0.22	<0.13
Benzo[g,h,i]perylene	<0.04	<0.07	0.09	<0.08	0.08	0.13	0.16	<0.07	<0.11	0.13	<0.08	<0.16	<0.09
Anthanthrene	<0.04	<0.06	<0.06	<0.07	<0.05	<0.04	<0.05	<0.06	<0.11	<0.06	<0.07	<0.15	<0.09
Coronene	<0.04	<0.06	<0.06	<0.07	<0.05	<0.04	<0.05	<0.06	<0.11	<0.06	<0.07	<0.15	<0.09
Total PAH	3.62	12.30	12.35	8.85	20.42	33.98	16.69	18.85	51.36	41.73	16.77	13.62	30.14

Worm PAHs (ng/g wet)	**Time series uptake and depuration**					
	BSM 45 Depuration 7A	**BSM 45 Depuration 7B**	**BSM 45 Depuration 14A**	**BSM 45 Depuration 14B**	**BSM 45 Depuration 21A**	**BSM 45 Depuration 21B**
Naphthalene	<5.66	<7.27	<.18	<4.25	<4.26	<5.79
2-Methylnaphthalene	3.47	<4.24	<1.86	<2.48	<2.48	<3.38
Azulene	<0.06	<0.08	<0.04	0.38	<0.05	<0.06
1-Methylnaphthalene	1.86	<2.37	<1.04	<1.38	1.61	<1.89
Biphenyl	<0.82	<1.06	<0.46	0.63	<0.62	<0.84
Acenapthylene	0.08	0.12	0.05	0.15	0.05	<0.06
Acenapthene	<2.67	<3.43	<1.50	<2.00	<2.01	<2.73
Fluorene	<1.70	<2.18	1.01	<1.27	<1.28	<1.74
1-Methylfluorene	<0.35	<0.45	<0.20	<0.27	<0.27	<0.36
Phenanthrene	<3.38	<4.35	<1.90	<2.54	<2.55	<0.46
Anthracene	<0.10	0.17	0.09	0.80	<0.07	<0.10
2-Methylphenanthrene	<0.43	<0.55	<0.24	<0.32	<0.32	<0.44
2-Methylanthracene	<0.10	<0.12	<0.05	<0.07	<0.07	0.21
4,5-Methylenephenanthrene	0.24	<0.20	0.11	0.14	0.15	0.28
1-Methylanthracene	<0.32	<0.41	<0.18	<0.24	<0.24	<0.33
1-Methylphenanthrene	<0.22	<0.29	<0.12	<0.17	<0.17	<0.23
9-Methylanthracene	<0.07	<0.09	<0.04	<0.05	0.06	<0.07
Fluoranthene	2.00	<1.02	0.53	0.82	1.76	0.83
Pyrene	1.34	0.72	0.31	0.54	1.28	0.85
3,6-Dimethylphenanthrene	<0.22	0.37	<0.12	<0.17	<0.17	<0.23
Benzo[a]fluorene	<0.05	<0.06	<0.03	0.09	0.12	<0.05
Benzo[b]fluorene	<0.17	<0.21	<0.10	<0.12	<0.13	<0.17
Benz[a]anthracene	<0.10	<0.12	<0.05	0.23	<0.07	<0.10
Chrysene+Triphenylene	2.01	0.85	0.50	0.46	2.19	0.35
Napthacene	<0.10	<0.12	<0.05	<0.07	<0.07	<0.10
Benzo[b]fluoranthene	<0.19	<0.24	<0.11	<0.14	<0.14	<0.19
Benzo[k]fluoranthene	0.17	<0.21	<0.09	<0.12	<0.13	<0.17
Dimethylbenz[a]anthracene	<0.24	<0.31	<0.14	<0.18	<0.18	<0.25
Benzo[e]pyrene	<0.35	<0.45	<0.20	<0.26	<0.26	<0.35
Benzo[a]pyrene	<0.40	<0.52	<0.23	<0.30	<0.30	<0.41
Perylene	<0.10	<0.13	<0.06	<0.08	<0.08	<0.11
3-Methylchloanthrene	<0.37	<0.47	<0.21	<0.28	<0.28	<0.38
Indeno[1,2,3-c,d]pyrene	<0.12	<0.15	<0.07	<0.09	<0.09	<0.12
Dibenz[a,h+ac]anthracene	<0.14	<0.18	<0.08	<0.10	<0.10	<0.14
Benzo[g,h,i]perylene	<0.10	<0.13	<0.06	0.10	<0.08	<0.11
Anthanthrene	<0.10	<0.12	<0.05	<0.07	<0.07	<0.10
Coronene	<0.10	<0.12	0.05	<0.07	<0.07	<0.10
Total PAH	11.18	2.22	2.65	4.34	7.24	2.52

Worm PAHs (ng/g wet)	**Day 28 Bioaccumulation**											
	Bigwood A	**Bigwood B**	**BSM 33 A**	**BSM 33 B**	**BSM 38 A**	**BSM 38 B**	**BSM 45 A**	**BSM 45 B**	**BSM 54 A**	**BSM 54 B**	**BSM 68 A**	**BSM 68 B**
Naphthalene	<4.13	<4.13	<11.21	<4.45	<4.30	<4.08	<.53	<4.26	<4.12	<4.20	<4.21	<4.26
2-Methylnaphthalene	<2.41	<2.41	<6.54	<2.60	<2.51	<2.38	<2.06	<2.48	<2.40	<2.45	<2.46	<2.48
Azulene	<0.05	<0.05	<0.12	<0.05	<0.05	<0.05	<0.04	<0.05	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	<1.34	<1.35	<3.65	<1.45	<1.40	<1.33	<1.15	<1.39	<1.34	<1.37	<1.37	<1.39
Biphenyl	<0.60	<0.60	1.63	<0.65	<0.63	<0.60	<0.51	<0.62	<0.60	<0.61	<0.61	<0.62
Acenapthylene	<0.05	<0.05	<0.12	0.06	<0.05	<0.05	<0.09	<0.06	0.11	0.13	<0.05	<0.05
Acenapthene	<1.95	<1.95	<5.29	<2.10	<2.03	<1.93	<1.66	<2.01	<1.94	<1.98	<1.99	<2.01
Fluorene	<1.24	<1.24	<3.37	<1.34	<1.29	<1.22	<1.06	<1.28	<1.24	<1.26	<1.26	<1.28
1-Methylfluorene	<0.26	<0.26	<0.70	<0.28	<0.27	<0.26	<0.22	<0.27	<0.26	<0.26	<0.26	<0.27
Phenanthrene	<2.47	<2.47	<6.70	<2.66	<2.57	<2.44	<2.11	<2.55	<2.46	<2.51	<2.52	<2.55
Anthracene	<0.07	0.08	<0.19	0.11	0.12	0.15	0.13	0.11	0.18	0.14	0.08	0.11
2-Methylphenanthrene	<0.31	<0.31	<0.85	<0.34	<0.33	<0.31	<0.27	<0.32	<0.31	<0.32	<0.32	<0.32
2-Methylanthracene	0.16	<0.07	<0.19	0.14	<0.07	<0.07	<0.27	<0.07	<0.07	<0.07	0.07	<0.07
4,5-Methylenephenanthrene	<0.11	<0.11	3.70	2.45	0.74	0.82	1.11	0.39	0.88	0.80	0.76	1.15
1-Methylanthracene	<0.23	<0.23	<0.63	0.27	0.27	0.27	0.26	<0.24	<0.23	<0.24	<0.24	<0.24
1-Methylphenanthrene	<0.16	<0.16	<0.44	<0.18	<0.17	0.19	<0.14	<0.17	<0.16	0.18	<0.17	<0.17
9-Methylanthracene	<0.05	<0.05	<0.14	<0.05	<0.05	<0.05	<0.04	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	<0.58	<0.58	18.41	14.61	7.22	5.98	13.04	4.57	6.23	8.10	6.85	10.15
Pyrene	<0.40	<0.40	19.59	14.30	6.89	6.54	15.80	4.69	5.68	9.19	10.26	13.58
3,6-Dimethylphenanthrene	<0.16	<0.16	<0.44	<0.17	0.28	<0.16	<0.14	<0.17	<0.16	<0.16	<0.17	<0.17
Benzo[a]fluorene	<0.04	<0.04	1.03	0.92	0.73	0.31	1.37	0.40	0.18	0.84	0.77	1.14
Benzo[b]fluorene	<0.12	<0.12	<0.33	0.51	0.20	0.28	0.32	0.18	0.13	0.25	0.24	0.43
Benz[a]anthracene	<0.07	<0.07	<0.19	<0.08	0.18	0.25	0.28	0.18	0.15	0.21	0.23	0.17
Chrysene+Triphenylene	0.12	<0.06	7.67	5.55	4.35	3.85	5.58	4.23	2.82	4.52	5.17	7.46
Napthacene	<0.07	<0.07	<0.19	<0.08	<0.07	<0.07	<0.06	<0.07	<0.07	<0.07	<0.07	<0.07
Benzo[b]fluoranthene	<0.14	<0.14	<0.37	0.44	0.28	0.37	0.41	0.28	0.36	0.61	0.30	0.44
Benzo[k]fluoranthene	<0.12	<0.12	<0.33	0.76	0.60	0.45	0.88	0.60	0.18	0.76	0.39	0.95
Dimethylbenz[a]anthracene	<0.18	<0.18	<0.48	<0.19	<0.18	<0.18	<0.15	<0.18	<0.18	<0.18	<0.18	<0.18
Benzo[e]pyrene	<0.25	<0.25	<0.69	0.92	1.06	0.85	1.50	1.07	0.47	1.13	1.15	1.84
Benzo[a]pyrene	<0.29	<0.29	<0.80	<0.32	0.47	0.36	0.57	<0.30	<0.29	<0.30	0.39	0.97
Perylene	<0.08	<0.08	<0.21	<0.08	<0.08	<0.08	<0.06	<0.08	<0.08	<0.08	<0.08	<0.08
3-Methylchloanthrene	<0.27	<0.27	<0.73	<0.29	<0.28	<0.27	<0.23	<0.28	<0.27	<0.27	<0.27	<0.28
Indeno[1,2,3-c,d]pyrene	<0.09	<0.09	<0.23	<0.09	<0.09	<0.09	<0.07	<0.09	<0.09	<0.09	<0.09	<0.09
Dibenz[a,h+ac]anthracene	<0.10	<0.10	<0.27	<0.11	<0.11	<0.10	<0.09	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[g,h,i]perylene	<0.08	<0.08	<0.21	0.27	0.16	0.11	0.13	<0.08	<0.08	<0.08	0.19	0.28
Anthanthrene	<0.07	<.07	<0.19	<0.08	<0.07	<0.07	<0.06	<0.07	<0.07	<0.07	<0.07	<0.07
Coronene	<0.07	<0.07	<0.19	<0.08	<0.07	<0.07	<0.06	<0.07	<0.07	<0.07	<0.07	<0.07
Total PAH	0.28	0.08	52.02	41.30	23.56	20.77	41.37	16.71	17.37	26.84	26.84	38.68

Worm PAHs (ng/g lipid)	Time series uptake and depuration DAY 0	BSM 45 Uptake 2A	BSM 45 Uptake 2B	BSM 45 Uptake 4A	BSM 45 Uptake 4B	BSM 45 Uptake 8A	BSM 45 Uptake 8B	BSM 45 Uptake 16A	BSM 45 Uptake 16B	BSM 45 Uptake 28A	BSM 45 Uptake 28B	BSM 45 Uptake 56A	BSM 45 Uptake 56B
fraction lipid	0.013	0.012	0.011	0.010	0.013	0.015	0.012	0.016	0.014	0.015	0.013	0.017	0.011
Naphthalene													
2-Methylnaphthalene													
Azulene	2.26												
1-Methylnaphthalene	112.94					66.39							
Biphenyl				60.97									
Acenapthylene	3.60	3.72			2.78	3.24	5.55	3.62		5.78	4.48		7.29
Acenapthene					107.35								
Fluorene													166.48
1-Methylfluorene	18.22					13.97			773.34				
Phenanthrene													314.45
Anthracene	4.24	5.95			4.17	7.08		5.02	64.49	8.97	8.56	14.74	22.42
2-Methylphenanthrene							20.57						41.48
2-Methylanthracene	21.19	13.76	12.97		9.18	13.16	16.00		8.20	17.93			
4,5-Methylenephenanthrene	5.72	42.01	53.04	29.08	68.45	95.94	54.52	40.99	1042.77	74.04	30.16	26.92	33.07
1-Methylanthracene					16.97	20.04	19.91	16.73	162.87	17.64			
1-Methylphenanthrene						9.51	12.08	9.20	92.36				
9-Methylanthracene													34.75
Fluoranthene	44.08	345.74	328.92	242.34	469.15	718.71	439.08	368.35	550.35	873.19	357.38	235.90	310.53
Pyrene	38.78	338.31	346.47	261.72	482.51	812.22	460.63	364.17	555.82	1057.43	366.35	244.88	305.49
3,6-Dimethylphenanthrene			19.46					25.37	33.88			62.18	536.98
Benzo[a]fluorene		35.69	32.82	32.65	51.48	75.09	37.22	34.30	60.12	91.40	30.97	26.28	26.34
Benzo[b]fluorene		18.59	17.17	12.75	23.10	30.36	12.08	15.89	15.30	21.40	14.26		73.43
Benz[a]anthracene	7.20	20.08	15.64	8.16	18.64	27.12	10.12	11.71	15.30	18.80	14.26	16.67	80.72
Chrysene+Triphenylene	14.62	101.86	115.23	119.89	139.41	195.92	172.70	165.91	221.89	373.40	330.89	145.52	529.13
Napthacene			8.01	12.24	11.13	12.55			12.02				
Benzo[b]fluoranthene		20.08	29.76	25.00	25.32	30.36	19.26	17.57		27.19	22.01		17.38
Benzo[k]fluoranthene		22.68	42.35	28.57	44.24	55.66	45.38	32.35		59.00	46.86	25.00	62.78
Dimethylbenz[a]anthracene													
Benzo[e]pyrene		26.02	48.84	36.73	46.19	57.89	46.36	46.29	45.36	100.65	83.95		78.47
Benzo[a]pyrene			30.53		19.76	29.35	25.14	25.37	84.71	37.89			62.22
Perylene			8.78		8.35	7.89	7.18	4.46					
3-Methylchloanthrene													
Indeno[1,2,3-c,d]pyrene													
Dibenz[a,h+ac]anthracene													
Benzo[g,h,i]perylene			8.39		6.40	8.50	13.38			8.39			
Anthanthrene													
Coronene													
Total PAH	272.86	994.48	1118.39	870.11	1554.59	2290.93	1417.14	1187.32	3738.80	2793.10	1310.13	798.10	2703.41

Worm PAHs (ng/g lipid)	Time series uptake and depuration					
	BSM 45 Depuration 7A	BSM 45 Depuration 7B	BSM 45 Depuration 14A	BSM 45 Depuration 14B	BSM 45 Depuration 21A	BSM 45 Depuration 21B
fraction lipid	0.02	0.01	0.01	0.01	0.02	0.01
Naphthalene						
2-Methylnaphthalene	211.16					
Azulene				25.47		
1-Methylnaphthalene	113.60				86.43	
Biphenyl				42.21		
Acenapthylene	5.07	9.75	4.14	9.77	2.80	
Acenapthene						
Fluorene			76.29			
1-Methylfluorene						
Phenanthrene						
Anthracene		14.25	7.10	53.37		
2-Methylphenanthrene						
2-Methylanthracene						17.41
4,5-Methylenephenanthrene	14.78		7.98	9.42	8.11	22.63
1-Methylanthracene						
1-Methylphenanthrene						
9-Methylanthracene					3.36	
Fluoranthene	121.63		40.22	55.12	94.54	67.90
Pyrene	81.93	60.75	23.66	36.28	68.80	69.65
3,6-Dimethylphenanthrene		30.75				
Benzo[a]fluorene				6.28	6.43	
Benzo[b]fluorene						
Benz[a]anthracene				15.35		
Chrysene+Triphenylene	122.47	71.25	37.55	31.05	117.47	28.44
Napthacene						
Benzo[b]fluoranthene						
Benzo[k]fluoranthene	10.56					
Dimethylbenz[a]anthracene						
Benzo[e]pyrene						
Benzo[a]pyrene						
Perylene						
3-Methylchloanthrene						
Indeno[1,2,3-c,d]pyrene						
Dibenz[a,h+ac]anthracene						
Benzo[g,h,i]perylene				6.98		
Anthanthrene						
Coronene			3.79			
Total PAH	681.19	186.75	200.73	291.29	387.94	206.04

Worm PAHs (ng/g lipid)	Day 28 Bioaccumulation Bigwood A	Bigwood B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
fraction lipid	0.015	0.011	0.016	0.013	0.013	0.014	0.015	0.013	0.014	0.019	0.012	0.015
Naphthalene												
2-Methylnaphthalene												
Azulene												
1-Methylnaphthalene												
Biphenyl			105.13									
Acenapthylene				4.62					7.86	6.93		
Acenapthene												
Fluorene												
1-Methylfluorene												
Phenanthrene												
Anthracene		6.74		8.81	9.09	10.58	8.97	8.56	12.50	7.48	7.08	7.81
2-Methylphenanthrene												
2-Methylanthracene	10.44			10.91							6.01	
4,5-Methylenephenanthrene			238.36	188.45	58.26	57.86	74.04	30.16	62.16	43.23	65.09	78.11
1-Methylanthracene				20.57	21.49	19.05	17.64					
1-Methylphenanthrene						13.41				9.70		
9-Methylanthracene												
Fluoranthene			1187.39	1123.14	566.52	421.93	873.19	357.38	441.19	435.86	587.56	690.24
Pyrene			1263.59	1099.21	540.49	461.09	1057.43	366.35	402.25	494.60	879.80	923.87
3,6-Dimethylphenanthrene					21.90							
Benzo[a]fluorene			66.46	70.51	57.02	21.52	91.40	30.97	12.50	45.17	65.97	77.40
Benzo[b]fluorene				39.03	15.70	19.76	21.40	14.26	8.93	13.30	20.81	29.47
Benz[a]anthracene					14.46	17.64	18.80	14.26	10.36	11.08	19.48	11.72
Chrysene+Triphenylene	8.08		494.45	426.42	341.32	271.29	373.40	330.89	199.70	243.01	443.66	507.74
Napthacene												
Benzo[b]fluoranthene				33.58	22.31	25.75	27.19	22.01	25.72	32.70	26.12	30.18
Benzo[k]fluoranthene				58.34	46.69	31.75	59.00	46.86	12.50	40.73	33.21	64.62
Dimethylbenz[a]anthracene												
Benzo[e]pyrene				70.93	83.06	59.97	100.65	83.95	33.58	60.68	98.30	124.98
Benzo[a]pyrene					36.78	25.40	37.89				33.21	65.69
Perylene												
3-Methylchloanthrene												
Indeno[1,2,3-c,d]pyrene												
Dibenz[a,h+ac]anthracene												
Benzo[g,h,i]perylene				20.99	12.40	7.76	8.39				16.38	18.82
Anthanthrene												
Coronene												
Total PAH	18.51	6.74	3355.38	3175.50	1847.49	1464.75	2769.38	1305.65	1229.26	1444.46	2302.69	2630.64

Worm PCBs (ng/g wet)		Time series uptake and depuration											
	DAY 0	BSM 45 Uptake 2A	BSM 45 Uptake 2B	BSM 45 Uptake 4A	BSM 45 Uptake 4B	BSM 45 Uptake 8A	BSM 45 Uptake 8B	BSM 45 Uptake 16A	BSM 45 Uptake 16B	BSM 45 Uptake 28A	BSM 45 Uptake 28B	BSM 45 Uptake 56A	BSM 45 Uptake 56B
Cong 1	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
Cong 3	<0.05	0.14	<0.08	<0.10	0.15	0.09	<0.07	<0.08	<0.14	0.09	<0.39	0.37	<0.12
Cong 4,10	<0.32	<0.52	<0.48	<0.59	<0.42	<0.34	<0.44	<0.50	<0.85	<0.49	<0.59	<1.24	<0.71
Cong 7,9	<0.03	<0.04	<0.04	<0.05	<0.03	<0.03	<0.03	<0.04	<0.07	<0.04	<0.05	<0.10	0.06
Cong 6	<0.01	<0.001	0.01	0.00	0.01	0.01	<0.001	0.01	<0.002	0.02	0.00	0.05	0.06
Cong 8,5	<0.01	0.14	0.11	0.22	0.20	0.29	0.27	0.43	<0.01	0.67	0.42	0.91	1.33
Cong 19	<0.02	<0.03	<0.03	<0.03	0.02	0.03	<0.02	<0.03	0.05	0.04	<0.03	0.12	0.14
Cong 12,13	0.01	<0.001	<0.001	<0.001	0.00	0.01	0.00	0.01	0.06	0.01	0.01	0.01	0.04
Cong 18	0.02	0.06	0.07	0.09	0.13	0.17	0.11	0.22	0.48	0.36	0.16	0.45	0.58
Cong 17	0.01	0.03	0.04	0.05	0.07	0.09	0.09	0.12	0.21	0.21	0.14	0.31	0.37
Cong 24	<0.02	<0.03	<0.03	<0.03	<0.02	<0.02	<0.02	<0.03	<0.05	<0.03	<0.03	<0.07	<0.04
Cong 16,32	0.03	0.06	0.05	0.08	0.08	0.12	0.08	0.13	0.19	0.24	0.13	0.46	0.65
Cong 29	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.02	0.01	<0.01	0.03	0.04
Cong 26	<0.002	0.01	0.01	0.03	0.02	0.03	0.02	0.02	0.10	0.07	0.02	0.02	0.03
Cong 25	0.03	0.04	0.08	0.06	0.07	0.06	0.05	0.06	0.09	0.10	0.05	0.08	0.10
Cong 31,28	<0.02	0.08	0.13	0.12	0.13	0.20	0.19	0.27	1.33	0.45	0.25	0.26	0.31
Cong 33,21,53	0.05	0.10	0.10	0.20	0.20	0.28	0.28	0.40	0.30	0.20	0.39	0.97	1.25
Cong 51	<0.01	0.02	0.03	0.04	0.05	0.07	0.06	0.11	0.16	0.19	0.10	0.16	0.20
Cong 22	<0.01	<0.02	0.04	0.07	0.07	0.11	0.11	0.16	0.27	0.22	0.11	0.22	0.22
Cong 45	0.01	0.03	0.03	0.06	0.05	0.08	0.07	0.12	0.25	0.18	0.10	0.30	0.42
Cong 46	<0.03	<0.04	<0.04	<0.05	<0.03	<0.03	<0.04	<0.04	0.44	0.05	<0.05	0.11	0.12
Cong 52	0.03	0.13	0.16	0.22	0.26	0.35	0.40	0.67	0.44	1.05	0.58	0.99	1.14
Cong 49	0.04	0.15	0.17	0.19	0.21	0.31	0.32	0.48	0.50	0.85	0.41	0.75	0.82
Cong 47,48	0.08	0.16	0.17	0.28	0.27	0.39	0.33	0.53	1.02	1.00	0.56	1.70	2.36
Cong 44	<0.02	0.05	0.06	0.06	0.07	0.14	0.08	0.18	0.10	0.34	0.19	0.20	0.31
Cong 37,42	<0.01	0.03	0.05	0.07	0.08	0.09	0.11	0.17	0.06	0.30	0.21	0.26	0.36
Cong 41,64,71	0.06	0.10	0.11	0.15	0.16	0.19	0.19	0.30	0.23	0.54	0.34	0.73	1.03
Cong 40	0.01	0.03	0.04	0.07	0.05	0.07	0.09	0.13	0.12	0.21	0.11	0.28	0.37
Cong 100	<0.01	0.02	0.02	0.03	0.03	0.04	0.05	0.07	0.34	0.12	0.11	0.15	0.21
Cong 63	0.01	0.02	0.03	0.03	0.02	0.02	0.02	0.04	<0.01	0.05	0.04	0.07	0.08
Cong 74	0.02	0.04	0.06	0.07	0.07	0.08	0.09	0.12	<0.01	0.23	0.15	0.41	0.66
Cong 70,76	0.01	0.03	0.04	0.05	0.08	0.11	0.10	0.09	0.54	0.25	0.09	0.05	0.12
Cong 66,95	0.20	0.42	0.47	0.73	0.69	0.96	1.05	1.68	2.26	2.66	1.41	3.84	5.31
Cong 91	<0.004	0.03	0.03	0.05	0.05	0.07	0.10	0.16	0.05	0.27	0.15	0.30	0.43
Cong 56,60,92,84	<0.04	0.07	0.11	0.10	0.12	0.13	0.16	0.22	0.59	0.41	0.32	0.41	0.61
Cong 84,89	0.01	0.06	0.07	0.11	0.13	0.17	0.19	0.33	<0.003	0.49	0.28	0.58	0.81
Cong 101	0.08	0.13	0.14	0.21	0.20	0.29	0.33	0.54	0.56	0.90	0.49	1.20	1.63
Cong 99	0.04	0.06	0.08	0.12	0.12	0.17	0.20	0.33	0.28	0.57	0.30	0.68	1.02
Cong 119	<0.04	<0.07	<0.06	<0.08	<0.05	0.05	<0.06	0.07	<0.11	0.10	0.10	<0.16	0.20
Cong 83	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.04	0.03	0.06	0.03	0.06	0.10
Cong 97	0.03	0.09	0.08	0.14	0.10	0.14	0.13	0.20	0.26	0.48	0.27	1.36	1.83
Cong 81,87	0.13	0.17	0.13	0.19	0.17	0.16	0.14	0.16	0.31	0.19	0.18	0.37	0.42

Worm PCBs (ng/g wet)		Time series uptake and depuration											
	DAY 0	BSM 45 Uptake 2A	BSM 45 Uptake 2B	BSM 45 Uptake 4A	BSM 45 Uptake 4B	BSM 45 Uptake 8A	BSM 45 Uptake 8B	BSM 45 Uptake 16A	BSM 45 Uptake 16B	BSM 45 Uptake 28A	BSM 45 Uptake 28B	BSM 45 Uptake 56A	BSM 45 Uptake 56B
Cong 85	0.01	0.03	0.03	0.05	0.05	0.07	0.08	0.12	0.04	0.21	0.15	0.28	0.43
Cong 136	0.01	0.01	0.02	0.03	0.03	0.04	0.06	0.09	0.07	0.16	0.07	0.22	0.34
Cong 77,110	0.06	0.13	0.19	0.27	0.27	0.41	0.48	0.76	0.66	1.27	0.68	1.51	2.31
Cong 82,151	0.01	0.01	0.02	0.02	0.02	0.03	0.04	0.06	0.05	0.10	0.05	0.15	0.23
Cong 135,144	<0.46	<0.75	<0.68	<0.84	<0.59	<0.49	<0.62	<0.72	<1.22	<0.70	<0.85	<1.77	<1.01
Cong 107	<0.09	<0.15	<0.14	<0.17	<0.12	<0.10	<0.13	<0.15	<0.25	<0.14	<0.17	<0.36	0.34
Cong 123,149	0.16	0.26	0.30	0.46	0.38	0.53	0.67	1.06	1.03	1.66	0.97	3.01	4.56
Cong 118	0.10	0.09	0.13	0.16	0.16	0.22	0.22	0.27	0.18	0.54	0.40	0.71	0.81
Cong 134	<0.01	<0.02	<0.02	<0.02	<0.01	<0.01	<0.02	<0.02	<0.03	0.02	<0.02	<0.04	0.05
Cong 114	<0.03	0.06	<0.5	0.06	<0.04	0.04	0.07	0.08	<0.08	0.12	0.08	0.29	0.35
Cong 146	<0.17	<0.27	<0.25	0.32	0.24	0.30	0.38	0.55	0.45	0.92	0.56	1.83	2.55
Cong 132,153,105	0.61	0.74	0.73	1.09	0.94	1.18	1.39	2.13	1.90	3.55	2.38	6.86	9.81
Cong 141	0.01	0.02	0.04	0.04	0.04	0.07	0.09	0.13	0.11	0.25	0.15	0.36	0.61
Cong 137,130,176	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.08	0.05	0.15	0.08	0.24	0.39
Cong 163,138	0.37	0.40	0.39	0.58	0.54	0.72	0.81	1.25	0.94	2.22	1.56	3.97	5.80
Cong 158	<0.31	<0.51	<0.47	<0.57	<0.40	<0.33	<0.43	<0.49	<0.83	<0.48	<0.58	<1.21	<0.69
Cong 129,178	0.02	0.02	0.02	0.03	0.03	0.05	0.06	0.10	0.07	0.21	0.10	0.37	0.57
Cong 187,182	0.17	0.21	0.27	0.35	0.29	0.38	0.48	0.74	0.58	1.34	0.80	2.80	4.40
Cong 183	0.08	0.08	0.12	0.14	0.12	0.18	0.24	0.38	0.27	0.71	0.44	1.49	2.42
Cong 128	0.03	0.03	0.02	0.04	0.04	0.05	0.05	0.08	0.06	0.13	0.11	0.22	0.31
Cong 167	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.04	0.02	0.06	0.04	0.08	0.15
Cong 185	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.03	0.02	0.07	0.03	0.11	0.19
Cong 174	0.01	0.03	0.03	0.04	0.03	0.05	0.10	0.13	0.08	0.26	0.14	0.39	0.59
Cong 177	0.04	0.05	0.08	0.09	0.08	0.12	0.16	0.23	0.15	0.46	0.28	0.81	1.28
Cong 202,171,156	0.05	0.05	0.06	0.10	0.08	0.11	0.14	0.20	0.13	0.40	0.28	0.74	1.21
Cong 157,200	0.01	0.02	0.02	0.03	0.02	0.02	0.03	0.05	0.10	0.12	0.09	0.22	0.36
Cong 172	<0.003	0.01	0.01	0.02	0.02	0.03	0.06	0.09	0.07	0.19	0.13	0.39	0.63
Cong 197	<0.006	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.02	0.05	0.03	0.02	0.06	0.11
Cong 180	0.14	0.20	0.35	0.41	0.31	0.43	0.62	0.97	0.72	1.92	1.28	4.23	6.91
Cong 193	<0.09	<0.15	<0.14	0.22	<0.12	0.13	<0.13	0.16	<0.25	0.24	0.24	0.53	0.84
Cong 191	<0.001	<0.002	<0.002	<0.002	0.02	0.01	0.02	0.02	<0.003	0.05	0.03	0.09	0.20
Cong 199	<2.97	<4.84	<4.43	<5.46	<3.85	<3.16	<4.05	<4.66	<7.90	<4.55	<5.49	<11.51	<6.58
Cong 170,190	0.04	0.08	0.11	0.15	0.11	0.17	0.25	0.37	0.28	0.79	0.54	1.71	2.87
Cong 198	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	0.01	0.01	<0.003	0.03	0.02	0.06	0.11
Cong 201	0.02	0.04	0.09	0.08	0.07	0.10	0.16	0.23	0.20	0.51	0.29	1.00	1.66
Cong 203,196	0.08	0.13	0.21	0.23	0.17	0.22	0.33	0.51	0.39	1.10	0.69	2.46	4.18
Cong 189	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	<0.002	0.02	0.02	0.06	0.09
Cong 208,195	0.02	0.03	0.04	0.06	0.04	0.06	0.08	0.12	0.10	0.26	0.19	0.50	0.90
Cong 207	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.04	0.04	0.08	0.14
Cong 194	0.02	0.02	0.05	0.08	0.05	0.07	0.12	0.18	0.04	0.39	0.21	0.81	1.38
Cong 205	<0.02	<0.03	<0.03	<0.04	<0.03	<0.02	<0.03	<0.03	<0.05	<0.03	<0.04	<0.08	0.10
Cong 206	0.04	0.05	0.05	0.08	0.06	0.07	0.09	0.14	0.12	0.30	0.27	0.66	1.02
Cong 209	0.03	0.04	<0.03	0.05	0.04	0.04	0.04	0.06	0.07	0.09	0.17	0.15	0.25
Total PCB	3.10	5.39	6.15	9.25	8.45	11.60	12.87	20.00	20.63	35.10	21.81	58.64	87.18

Worm PCBs (ng/g wet) Time series uptake and depuration

	BSM 45 Depuration 7A	BSM 45 Depuration 7B	BSM 45 Depuration 14A	BSM 45 Depuration 14B	BSM 45 Depuration 21A	BSM 45 Depuration 21B
Cong 1	NQ	NQ	NQ	NQ	NQ	NQ
Cong 3	<0.13	<0.17	<0.07	<0.10	<0.10	<0.13
Cong 4,10	<0.79	<1.01	<0.44	<0.59	<0.59	<0.81
Cong 7,9	<0.06	<0.08	<0.03	<0.05	<0.05	<0.06
Cong 6	0.02	0.01	0.01	0.02	0.01	<0.002
Cong 8,5	0.62	0.65	0.42	0.62	0.52	0.42
Cong 19	0.08	0.09	<0.02	<0.03	0.04	<0.04
Cong 12,13	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002
Cong 18	0.25	0.28	0.11	0.18	0.23	0.12
Cong 17	0.17	0.18	0.08	0.12	0.17	0.12
Cong 24	<0.04	<0.06	<0.03	<0.03	<0.03	<0.05
Cong 16,32	0.29	0.34	0.11	0.16	0.18	0.14
Cong 29	0.02	0.02	0.01	<0.01	0.01	<0.02
Cong 26	0.03	0.01	0.01	<0.004	0.02	<0.006
Cong 25	0.05	<0.05	0.05	<0.03	0.07	<0.04
Cong 31,28	0.22	0.19	0.09	0.18	0.24	<0.06
Cong 33,21,53	0.61	0.23	0.40	0.20	0.54	0.32
Cong 51	0.11	0.09	0.06	0.07	0.10	0.04
Cong 22	0.13	<0.04	0.12	<0.03	0.16	<0.03
Cong 45	0.23	0.21	0.12	0.14	0.14	0.10
Cong 46	0.07	0.09	<0.04	<0.05	<0.05	<0.07
Cong 52	0.60	0.52	0.46	0.63	0.75	0.53
Cong 49	0.45	0.44	0.26	0.39	0.48	0.28
Cong 47,48	1.00	1.13	0.54	0.71	0.82	0.75
Cong 44	0.15	0.18	0.08	0.12	0.13	0.07
Cong 37,42	0.18	0.18	0.13	0.11	0.19	0.08
Cong 41,64,71	0.46	0.51	0.25	0.34	0.37	0.28
Cong 40	0.17	0.17	0.13	0.15	0.17	0.15
Cong 100	0.09	0.09	0.07	0.08	0.10	0.11
Cong 63	0.03	0.04	0.04	0.04	0.04	0.03
Cong 74	0.25	0.31	0.14	0.20	0.19	0.18
Cong 70,76	0.03	0.05	0.02	0.03	0.07	0.02
Cong 66,95	2.41	2.56	1.76	2.15	2.26	2.02
Cong 91	0.21	0.18	0.18	0.23	0.22	0.19
Cong 56,60,92,84	0.36	0.28	0.18	0.44	0.27	0.18
Cong 84,89	0.39	0.38	0.33	0.35	0.39	0.26
Cong 101	0.70	0.74	0.48	0.70	0.72	0.71
Cong 99	0.40	0.41	0.27	0.42	0.44	0.45
Cong 119	<0.10	<0.13	0.08	<0.08	0.09	0.11
Cong 83	0.04	0.04	0.04	0.04	0.05	0.03
Cong 97	0.68	1.08	0.29	0.40	0.45	0.52
Cong 81,87	0.26	0.32	0.13	<0.16	0.17	<0.22

Worm PCBs (ng/g wet) Time series uptake and depuration

	BSM 45 Depuration 7A	BSM 45 Depuration 7B	BSM 45 Depuration 14A	BSM 45 Depuration 14B	BSM 45 Depuration 21A	BSM 45 Depuration 21B
Cong 85	0.17	0.16	0.14	0.17	0.19	0.20
Cong 136	0.15	0.15	0.13	0.14	0.15	0.13
Cong 77,110	0.90	0.95	0.68	0.87	0.97	0.77
Cong 82,151	0.09	0.10	0.07	0.08	0.09	0.08
Cong 135,144	<1.12	<1.44	<0.63	<0.84	<0.85	<1.15
Cong 107	<0.23	<0.29	<0.13	<0.17	<0.17	<0.23
Cong 123,149	1.87	2.09	1.46	1.63	1.58	1.91
Cong 118	0.32	0.43	0.20	0.37	0.37	0.33
Cong 134	<0.03	0.04	<0.02	<0.02	<0.02	<0.03
Cong 114	0.14	0.22	0.09	0.14	0.13	0.18
Cong 146	1.08	1.27	0.82	0.93	0.94	1.19
Cong 132,153,105	4.11	4.77	2.99	3.53	3.61	4.26
Cong 141	0.22	0.26	0.12	0.15	0.19	0.18
Cong 137,130,176	0.03	0.17	0.08	0.11	0.13	0.12
Cong 163,138	2.30	2.57	1.69	1.96	2.18	2.51
Cong 158	<0.77	<0.99	<0.43	<0.58	<0.58	<0.79
Cong 129,178	0.21	0.27	0.16	0.16	0.14	0.21
Cong 187,182	1.69	2.06	1.17	1.35	1.31	1.80
Cong 183	0.52	1.09	0.57	0.67	0.63	0.95
Cong 128	0.14	0.16	0.11	0.11	0.13	0.15
Cong 167	0.06	0.06	0.04	0.04	0.04	0.06
Cong 185	0.06	0.09	0.04	0.05	0.05	0.06
Cong 174	0.08	0.23	0.10	0.09	0.12	0.12
Cong 177	0.42	0.62	0.35	0.37	0.45	0.52
Cong 202,171,156	0.41	0.53	0.30	0.31	0.35	0.48
Cong 157,200	0.11	0.17	0.08	0.09	0.09	0.12
Cong 172	0.17	0.25	0.14	0.14	0.15	0.22
Cong 197	0.03	0.04	0.02	0.03	0.02	0.04
Cong 180	2.16	3.16	1.68	1.86	1.79	2.78
Cong 193	0.35	0.41	0.23	0.29	0.28	0.33
Cong 191	0.06	0.07	0.04	0.06	0.04	0.06
Cong 199	<7.29	<9.37	<0.11	<5.48	<5.49	<7.46
Cong 170,190	0.99	1.29	0.69	0.74	0.71	1.15
Cong 198	0.02	0.04	0.03	0.02	0.02	0.03
Cong 201	0.55	0.79	0.41	0.34	0.37	0.62
Cong 203,196	1.31	1.86	0.90	1.10	0.93	1.61
Cong 189	0.03	0.04	0.02	<0.001	0.02	0.03
Cong 208,195	0.28	0.38	0.21	0.24	0.19	0.34
Cong 207	0.04	0.05	0.03	<0.003	0.03	0.05
Cong 194	0.43	0.57	0.31	0.50	0.29	0.50
Cong 205	<0.05	<0.06	<0.03	<0.04	0.13	<0.05
Cong 206	0.33	0.42	0.23	<0.01	0.20	0.37
Cong 209	0.09	0.10	0.07	0.12	0.07	0.10
Total PCB	33.68	39.90	23.83	27.97	29.90	32.78

Worm PCBs (ng/g wet)

	Bigwood A	Bigwood B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
Cong 1	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ	NQ
Cong 3	<0.10	<0.10	0.52	<0.10	<0.10	<0.09	0.09	<0.39	<0.10	NQ	<0.10	0.20
Cong 4,10	<0.57	<0.58	<1.56	<0.62	<0.60	<0.57	<0.49	<0.59	<0.57	NQ	<0.59	<0.59
Cong 7,9	<0.05	<0.05	<0.12	<0.05	<0.05	<0.04	<0.04	<0.05	<0.05	NQ	<0.05	<0.05
Cong 6	<0.001	<0.001	<0.003	<0.005	<0.001	<0.001	0.02	0.00	0.02	NQ	<0.001	<0.001
Cong 8,5	<0.01	<0.01	0.89	0.73	0.41	0.43	0.67	0.42	0.55	NQ	0.64	0.57
Cong 19	<0.03	<0.03	<0.08	<0.03	<0.03	<0.03	0.04	<0.03	0.04	NQ	<0.03	<0.03
Cong 12,13	<0.001	<0.001	<0.003	<0.001	0.00	<0.001	0.01	0.01	0.01	NQ	<0.001	0.00
Cong 18	<0.003	<0.003	0.24	0.18	0.06	0.07	0.36	0.16	0.21	NQ	0.10	0.10
Cong 17	0.02	<0.01	0.05	0.04	0.05	0.04	0.21	0.14	0.17	NQ	0.05	0.07
Cong 24	<0.03	<0.03	<0.09	<0.04	<0.03	<0.03	<0.03	<0.03	<0.03	NQ	<0.03	<0.03
Cong 16,32	<0.04	<0.04	0.18	0.14	0.06	0.08	0.24	0.13	0.18	NQ	0.06	0.08
Cong 29	<0.01	<0.01	<0.03	<0.01	<0.01	<0.01	0.01	<0.01	0.01	NQ	<0.01	<0.01
Cong 26	<0.004	<0.004	<0.01	0.01	0.01	<0.004	0.07	0.02	0.02	NQ	0.01	0.02
Cong 25	0.06	0.04	<0.08	0.06	0.06	0.04	0.10	0.05	0.04	NQ	0.05	0.05
Cong 31,28	0.05	<0.04	0.76	0.45	0.10	0.10	0.45	0.25	0.19	NQ	0.16	0.18
Cong 33,21,53	0.05	<0.05	0.33	0.13	0.23	0.27	0.20	0.39	0.60	NQ	0.06	0.27
Cong 51	<0.01	<0.01	0.04	0.02	0.08	0.08	0.19	0.10	0.12	NQ	0.06	0.07
Cong 22	<0.02	<0.02	0.18	0.14	0.14	0.12	0.22	0.11	0.16	NQ	0.17	0.21
Cong 45	0.03	0.03	0.11	0.10	0.06	0.08	0.18	0.10	0.16	NQ	0.07	0.08
Cong 46	<0.05	<0.05	<0.13	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	NQ	<0.05	<0.05
Cong 52	0.05	<0.02	0.65	0.54	0.29	0.32	1.05	0.58	0.84	NQ	0.37	0.45
Cong 49	<0.04	<0.04	0.44	0.33	0.25	0.18	0.85	0.41	0.53	NQ	0.19	0.26
Cong 47,48	0.16	0.09	0.43	0.38	0.25	0.32	1.00	0.56	0.85	NQ	0.31	0.34
Cong 44	<0.04	<0.04	0.31	0.27	0.09	0.08	0.34	0.19	0.17	NQ	0.11	0.14
Cong 37,42	<0.01	<0.01	0.18	0.19	0.09	0.09	0.30	0.21	0.22	NQ	0.12	0.16
Cong 41,64,71	<0.11	<0.11	0.37	0.31	0.16	0.13	0.54	0.34	0.43	NQ	0.20	0.24
Cong 40	0.02	<0.02	<0.04	0.03	0.07	0.07	0.21	0.11	0.21	NQ	0.08	0.10
Cong 100	<0.01	<0.01	<0.03	0.06	0.08	0.08	0.12	0.11	0.12	NQ	0.08	0.10
Cong 63	0.01	0.01	0.05	0.03	0.02	0.03	0.05	0.04	0.04	NQ	0.02	0.05
Cong 74	0.02	0.02	0.21	0.17	0.06	0.07	0.23	0.15	0.15	NQ	0.08	0.10
Cong 70,76	0.01	<0.01	0.25	0.18	0.03	0.02	0.25	0.09	0.05	NQ	0.07	0.05
Cong 66,95	0.28	0.17	1.37	1.19	0.82	0.88	2.66	1.41	2.60	NQ	0.97	1.13
Cong 91	0.02	0.01	0.15	0.14	0.09	0.10	0.27	0.15	0.26	NQ	0.13	0.15
Cong 56,60,92,84	<0.07	<0.07	0.66	0.43	0.17	0.15	0.41	0.32	0.36	NQ	0.19	0.28
Cong 84,89	0.04	0.02	0.24	0.23	0.30	0.32	0.49	0.28	0.53	NQ	0.31	0.36
Cong 101	0.09	<0.07	0.41	0.35	0.23	0.23	0.90	0.49	0.86	NQ	0.30	0.40
Cong 99	0.04	0.01	0.21	0.18	0.12	0.11	0.57	0.30	0.52	NQ	0.16	0.20
Cong 119	<0.08	<0.08	<0.20	<0.08	0.10	0.12	0.10	0.10	0.10	NQ	0.12	0.14
Cong 83	0.01	0.01	0.02	0.03	0.02	0.02	0.06	0.03	0.06	NQ	0.02	0.03
Cong 97	0.07	0.05	0.20	0.15	0.11	0.17	0.48	0.27	0.49	NQ	0.14	0.11
Cong 81,87	<0.15	0.16	<0.42	0.18	<0.16	0.17	0.19	0.18	<0.15	NQ	<0.16	<0.16

Worm PCBs (ng/g wet)

	Bigwood	Bigwood	BSM 33	BSM 33	BSM 38	BSM 38	BSM 45	BSM 45	BSM 54	BSM 54	BSM 68	BSM 68
	A	B	A	B	A	B	A	B	A	B	A	B
Cong 85	0.03	<0.01	0.12	0.10	0.07	0.06	0.21	0.15	0.21	NQ	0.09	0.13
Cong 136	0.01	0.00	0.03	0.03	0.04	0.04	0.16	0.07	0.20	NQ	0.05	0.05
Cong 77,110	0.06	0.02	0.51	0.53	0.35	0.31	1.27	0.68	1.31	NQ	0.39	0.55
Cong 82,151	0.01	0.00	0.03	0.03	0.02	0.02	0.10	0.05	0.12	NQ	0.03	0.04
Cong 135,144	<0.82	<0.82	<2.23	<0.88	<0.85	<0.81	<0.70	<0.85	<0.82	NQ	<0.84	<0.85
Cong 107	<0.17	<0.17	<0.45	<0.18	<0.17	<0.16	<0.14	<0.17	<0.17	NQ	<0.17	<0.17
Cong 123,149	0.19	0.17	0.59	0.57	0.54	0.55	1.66	0.97	2.13	NQ	0.64	0.74
Cong 118	<0.08	<0.08	0.48	0.36	0.15	0.14	0.54	0.40	0.53	NQ	0.25	0.32
Cong 134	<0.02	<0.02	<0.05	<0.02	<0.02	<0.01	0.02	<0.02	0.02	NQ	<0.02	<0.02
Cong 114	<0.05	<0.05	<0.15	<0.06	<0.06	0.07	0.12	0.08	0.15	NQ	0.09	<0.06
Cong 146	<0.30	<0.30	<0.81	<0.32	0.35	0.36	0.92	0.56	1.10	NQ	0.39	0.43
Cong 132,153,105	0.70	0.41	1.65	1.56	1.35	1.44	3.55	2.38	4.18	NQ	1.57	1.85
Cong 141	0.01	<0.005	0.08	0.09	0.07	0.04	0.25	0.15	0.30	NQ	0.06	0.10
Cong 137,130,176	0.01	<0.002	0.03	0.04	0.03	0.03	0.15	0.08	0.19	NQ	0.03	0.03
Cong 163,138	0.36	0.17	1.02	1.02	0.79	0.85	2.22	1.56	2.49	NQ	0.94	1.21
Cong 158	<0.56	<0.56	<1.52	<0.60	<0.58	<0.55	<0.48	<0.58	<0.56	NQ	<0.57	<0.58
Cong 129,178	0.01	<0.001	0.01	0.04	0.04	0.04	0.21	0.10	0.24	NQ	0.06	0.05
Cong 187,182	0.18	0.12	0.37	0.39	0.44	0.45	1.34	0.80	1.71	NQ	0.49	0.55
Cong 183	0.08	0.04	0.16	0.23	0.21	0.23	0.71	0.44	0.90	NQ	0.26	0.31
Cong 128	0.03	0.01	0.08	0.07	0.05	0.06	0.13	0.11	0.14	NQ	0.07	0.09
Cong 167	0.01	0.01	0.02	0.03	0.02	0.02	0.06	0.04	0.05	NQ	0.03	0.03
Cong 185	0.00	0.00	0.02	0.02	0.01	0.02	0.07	0.03	0.09	NQ	0.01	0.02
Cong 174	0.01	0.01	0.04	0.04	0.04	0.03	0.26	0.14	0.37	NQ	0.04	0.04
Cong 177	0.04	0.02	0.12	0.13	0.13	0.13	0.46	0.28	0.59	NQ	0.14	0.19
Cong 202,171,156	0.06	0.03	0.12	0.15	0.14	0.14	0.40	0.28	0.48	NQ	0.16	0.18
Cong 157,200	0.02	0.01	0.04	0.04	0.04	0.04	0.12	0.09	0.15	NQ	0.04	0.05
Cong 172	<0.005	<0.005	0.03	0.03	0.03	0.05	0.19	0.13	0.27	NQ	0.06	0.05
Cong 197	<0.01	<0.01	<0.03	<0.01	<0.01	0.02	0.03	0.02	0.04	NQ	0.02	<0.01
Cong 180	0.16	0.10	0.52	0.51	0.55	0.58	1.92	1.28	2.58	NQ	0.70	0.72
Cong 193	<0.17	<0.17	<0.45	<0.18	<0.17	<0.16	0.24	0.24	0.23	NQ	<0.17	<0.17
Cong 191	<0.002	<0.002	<0.005	<0.002	0.02	<0.002	0.05	0.03	0.07	NQ	0.01	0.01
Cong 199	<5.32	<5.33	<14.46	<5.74	<5.55	<5.26	<4.55	<5.49	<5.31	NQ	<5.43	<5.49
Cong 170,190	0.06	0.04	0.22	0.25	0.23	0.24	0.79	0.54	1.07	NQ	0.29	0.32
Cong 198	<0.002	<0.002	<0.01	0.01	0.01	0.00	0.03	0.02	0.05	NQ	0.02	0.01
Cong 201	0.03	0.03	0.12	0.12	0.17	0.17	0.51	0.29	0.74	NQ	0.11	0.13
Cong 203,196	0.10	0.07	0.26	0.28	0.37	0.38	1.10	0.69	1.53	NQ	0.30	0.32
Cong 189	<0.001	<0.001	0.01	0.01	0.01	0.01	0.02	0.02	0.03	NQ	0.01	0.01
Cong 208,195	0.03	<0.03	<0.08	0.07	0.10	0.11	0.26	0.19	0.34	NQ	0.08	0.08
Cong 207	0.01	0.01	0.02	0.01	0.03	0.02	0.04	0.04	0.06	NQ	0.01	0.02
Cong 194	0.02	0.01	0.08	0.09	0.10	0.10	0.39	0.21	0.55	NQ	0.10	0.10
Cong 205	<0.04	<0.04	<0.10	<0.04	<0.04	<0.04	<0.03	<0.04	0.04	NQ	<0.04	<0.04
Cong 206	0.05	0.04	0.09	0.11	0.19	0.19	0.30	0.27	0.40	NQ	0.10	0.10
Cong 209	0.04	0.03	<0.10	0.06	0.10	0.10	0.09	0.17	0.12	NQ	0.06	0.07
Total PCB	3.36	1.98	16.30	14.39	11.39	12.00	35.10	21.81	37.63		13.12	15.60

Worm PCBs (ng/g lipid)		Time series uptake and depuration											
	DAY 0 N. virens	BSM 45 Uptake 2A	BSM 45 Uptake 2B	BSM 45 Uptake 4A	BSM 45 Uptake 4B	BSM 45 Uptake 8A	BSM 45 Uptake 8B	BSM 45 Uptake 16A	BSM 45 Uptake 16B	BSM 45 Uptake 28A	BSM 45 Uptake 28B	BSM 45 Uptake 56A	BSM 45 Uptake 56B
fraction lipid	0.013	0.012	0.011	0.010	0.013	0.015	0.012	0.016	0.014	0.015	0.013	0.017	0.011
Cong 1													
Cong 3		11.35			11.59	6.23				6.32		21.59	
Cong 4,10													
Cong 7,9													5.19
Cong 6			0.66	0.47	0.53	0.78		0.71		1.38	0.35	2.75	5.13
Cong 8,5		11.56	9.93	21.71	15.24	19.52	23.24	27.18		45.10	32.63	53.38	119.05
Cong 19					1.88	1.96			3.42	2.72		7.17	12.92
Cong 12,13	0.70				0.24	0.43	0.36	0.36	4.15	0.74	0.61	0.87	3.48
Cong 18	1.25	5.02	6.46	8.77	9.67	11.57	9.14	13.73	34.67	24.40	12.41	26.27	52.31
Cong 17	1.05	2.38	4.02	5.26	5.17	5.78	7.49	7.37	15.63	14.20	10.90	18.05	33.49
Cong 24													
Cong 16,32	2.61	4.56	4.21	7.74	6.44	8.07	6.58	8.14	13.49	15.92	10.40	26.71	58.13
Cong 29						0.60				0.98		1.96	3.54
Cong 26		0.70	1.21	2.52	1.49	1.74	1.53	1.27	7.15	4.46	1.63	1.03	2.68
Cong 25	1.98	3.04	7.51	5.45	5.66	4.04	4.53	3.54	6.69	6.86	4.22	4.68	8.78
Cong 31,28		6.26	11.35	11.33	9.87	13.75	15.90	17.00	96.65	29.89	19.38	15.35	27.95
Cong 33,21,53	3.86	8.48	9.34	19.27	14.93	18.71	23.35	25.42	22.09	13.26	30.26	56.86	111.86
Cong 51		1.93	2.38	3.77	3.54	4.63	5.13	6.84	11.57	12.57	8.14	9.19	18.20
Cong 22			3.32	6.86	5.63	7.37	9.13	9.91	19.80	14.87	8.83	12.90	19.46
Cong 45	0.97	2.66	2.77	5.83	4.09	5.66	5.67	7.31	17.86	12.12	7.54	17.72	37.29
Cong 46									32.31	3.05		6.48	10.85
Cong 52	2.11	10.60	14.93	22.08	19.49	23.48	34.30	42.34	32.11	70.10	45.69	57.94	102.24
Cong 49	2.98	12.04	15.75	19.07	15.95	21.21	27.47	30.31	36.70	56.87	32.38	43.76	73.72
Cong 47,48	5.66	13.03	15.82	27.37	20.71	26.12	28.04	33.55	74.48	66.93	44.08	99.46	211.39
Cong 44		3.83	5.16	5.84	5.09	9.51	7.17	11.41	7.05	22.93	14.54	11.94	27.46
Cong 37,42		2.76	4.30	6.86	5.98	6.32	9.74	10.58	4.59	20.23	16.48	15.07	32.48
Cong 41,64,71	4.86	8.42	9.63	14.43	12.10	12.96	15.95	18.70	17.02	36.32	26.71	42.61	91.98
Cong 40	0.73	2.65	3.39	6.50	3.94	4.46	7.22	8.32	8.54	14.21	8.39	16.29	33.09
Cong 100		1.30	2.07	3.06	1.96	2.55	4.10	4.42	24.76	8.09	8.38	8.69	19.00
Cong 63	0.75	1.31	2.63	2.65	1.27	1.33	1.81	2.31		3.07	3.15	4.36	7.32
Cong 74	1.51	3.42	5.16	7.21	4.99	5.53	7.44	7.76		15.50	11.75	23.85	58.97
Cong 70,76	0.74	2.64	3.90	4.84	5.75	7.69	8.48	5.50	39.25	16.48	7.37	2.91	11.00
Cong 66,95	14.73	33.88	42.26	71.47	52.51	64.45	89.44	105.87	164.55	178.29	110.55	225.24	476.34
Cong 91		2.06	2.80	5.35	4.04	4.66	8.35	10.02	3.46	18.21	11.62	17.76	38.65
Cong 56,60,92,84		5.87	9.52	10.25	8.92	9.05	13.82	14.02	42.78	27.48	24.84	24.23	54.97
Cong 84,89	1.05	5.22	5.90	11.27	9.53	11.32	16.52	20.82		32.98	22.12	33.72	73.10
Cong 101	5.91	10.16	13.12	20.93	15.28	19.59	27.75	33.70	40.66	60.42	38.40	70.03	146.25
Cong 99	2.99	4.75	6.92	11.55	8.82	11.54	17.11	20.85	20.32	38.07	23.09	39.72	91.45
Cong 119						3.31		4.71		6.59	7.73		17.80
Cong 83	0.84	0.93	1.15	1.44	1.37	1.56	2.07	2.38	2.43	3.73	2.29	3.40	9.31
Cong 97	2.47	6.99	7.14	13.50	7.94	9.26	11.01	12.65	19.08	32.02	21.13	79.42	164.06
Cong 81,87	9.63	13.62	11.90	18.47	12.80	11.00	11.46	10.15	22.73	12.57	13.96	21.71	37.85

Worm PCBs (ng/g lipid) Time series uptake and depuration

	DAY 0 N. virens	BSM 45 Uptake 2A	BSM 45 Uptake 2B	BSM 45 Uptake 4A	BSM 45 Uptake 4B	BSM 45 Uptake 8A	BSM 45 Uptake 8B	BSM 45 Uptake 16A	BSM 45 Uptake 16B	BSM 45 Uptake 28A	BSM 45 Uptake 28B	BSM 45 Uptake 56A	BSM 45 Uptake 56B
Cong 85	1.09	2.58	2.39	4.71	3.66	4.68	6.62	7.62	3.02	14.15	11.96	16.23	38.82
Cong 136	0.38	1.04	1.61	2.97	1.94	2.78	4.79	5.92	5.39	10.78	5.48	13.10	30.82
Cong 77,110	4.35	10.18	17.25	26.58	20.43	27.48	40.95	47.74	48.13	85.31	53.39	88.42	207.35
Cong 82,151	0.47	0.82	1.38	2.26	1.34	1.87	3.01	3.65	3.53	6.61	3.92	8.51	20.95
Cong 135,144													
Cong 107													30.92
Cong 123,149	12.25	20.98	27.16	45.64	29.03	35.83	57.06	66.51	74.96	110.93	76.07	176.63	409.38
Cong 118	7.34	7.03	11.53	15.42	11.81	14.75	18.74	16.86	12.88	36.18	30.88	41.35	72.45
Cong 134										1.44			4.64
Cong 114		4.56		5.84		3.03	5.75	4.84		8.24	6.11	17.05	31.58
Cong 146				31.28	18.09	20.09	32.05	34.90	32.99	61.62	43.69	107.07	228.82
Cong 132,153,105	45.94	59.95	66.11	106.76	71.76	79.62	118.03	134.17	138.43	237.71	186.24	401.79	879.97
Cong 141	0.68	1.54	3.25	4.28	3.12	4.42	7.30	7.97	7.65	16.76	11.75	21.14	54.66
Cong 137,130,176	0.91	0.93	2.24	2.94	2.03	2.59	4.24	4.83	3.65	10.20	6.57	14.29	35.18
Cong 163,138	27.64	32.41	35.74	56.73	41.14	48.28	68.68	78.76	68.77	148.77	122.06	232.62	519.94
Cong 158													
Cong 129,178	1.64	1.97	2.11	2.87	2.30	3.55	5.27	6.01	5.37	14.35	7.84	21.69	51.26
Cong 187,182	13.02	16.64	24.52	34.09	22.35	25.30	40.63	46.68	42.01	89.55	62.63	164.14	394.36
Cong 183	5.96	6.74	10.93	14.20	8.94	11.97	20.41	23.82	19.34	47.27	34.62	87.31	216.76
Cong 128	2.21	2.23	2.13	3.79	2.76	3.13	4.38	4.97	4.35	9.03	8.41	12.85	27.96
Cong 167	0.60	1.31	0.92	1.41	1.43	1.30	1.82	2.22	1.67	4.19	3.51	4.89	13.76
Cong 185	0.14	0.40	0.90	1.20	0.57	0.73	1.66	1.79	1.59	4.42	2.47	6.30	17.14
Cong 174	0.46	2.07	2.46	4.26	2.19	3.37	8.52	8.48	5.95	17.28	10.92	22.76	52.98
Cong 177	3.19	4.23	7.03	8.73	6.44	8.21	13.54	14.34	11.23	30.65	21.66	47.47	114.82
Cong 202,171,156	3.94	3.89	5.87	9.98	6.05	7.35	11.72	12.87	9.22	26.67	21.54	43.20	108.12
Cong 157,200	0.82	1.69	1.45	2.48	1.71	1.68	2.83	3.33	7.48	7.84	7.14	13.00	32.52
Cong 172		0.72	1.07	1.96	1.32	2.14	4.90	5.54	5.18	12.87	9.84	22.66	56.31
Cong 197					0.70	0.62	0.77	1.01	3.36	2.05	1.52	3.23	9.67
Cong 180	10.75	16.52	31.95	40.11	23.26	28.99	52.76	60.98	52.35	128.28	100.21	247.78	619.64
Cong 193				21.36		8.88		9.94		16.04	19.00	30.96	75.51
Cong 191					1.19	0.63	1.52	1.06		3.05	2.34	5.25	18.17
Cong 199													
Cong 170,190	3.32	6.11	9.70	14.83	8.54	11.40	21.05	23.47	20.13	53.11	42.33	100.43	257.24
Cong 198							0.44	0.81		1.95	1.21	3.60	9.60
Cong 201	1.77	3.04	7.71	8.30	5.26	6.83	13.56	14.76	14.35	34.39	22.36	58.40	148.47
Cong 203,196	5.93	10.20	18.98	22.87	12.93	14.96	27.82	32.27	28.11	73.80	53.70	144.00	374.90
Cong 189	0.29	0.41	0.40	1.15	0.45	0.44	0.86	0.66		1.44	1.32	3.36	7.98
Cong 208,195	1.58	2.78	3.95	5.96	3.35	3.82	6.84	7.34	7.56	17.14	15.10	29.58	80.61
Cong 207	0.57	0.87	0.63	1.27	0.89	0.75	1.20	1.29	0.37	2.88	3.11	4.82	12.18
Cong 194	1.70	1.63	4.89	7.51	3.88	4.81	10.14	11.12	3.06	26.18	16.54	47.51	123.36
Cong 205													8.96
Cong 206	2.97	3.82	4.56	7.96	4.89	4.95	7.76	8.60	8.53	20.26	21.20	38.61	91.10
Cong 209	2.13	3.07		4.50	3.04	2.68	3.81	3.51	4.97	6.22	13.33	8.80	22.45
Total PCB	233.41	435.78	557.41	909.29	643.23	781.68	1092.73	1259.80	1501.56	2349.55	1703.89	3435.89	7820.04

Worm PCBs (ng/g lipid)

	BSM 45 Depuration 7A	BSM 45 Depuration 7B	BSM 45 Depuration 14A	BSM 45 Depuration 14B	BSM 45 Depuration 21A	BSM 45 Depuration 21B
fraction lipid	0.016	0.012	0.013	0.015	0.019	0.012
Cong 1						
Cong 3						
Cong 4,10						
Cong 7,9						
Cong 6	1.10	1.14	0.72	1.02	0.61	
Cong 8,5	37.54	54.81	31.48	41.41	27.71	34.61
Cong 19	4.76	7.47			2.14	
Cong 12,13						
Cong 18	15.18	23.21	8.49	12.32	12.18	9.46
Cong 17	10.15	15.08	6.38	7.74	8.89	9.80
Cong 24						
Cong 16,32	17.75	28.53	8.54	11.00	9.49	11.51
Cong 29	1.24	2.10	0.66		0.76	
Cong 26	1.53	1.00	0.51		0.97	
Cong 25	2.83		3.59		4.00	
Cong 31,28	13.70	16.10	6.47	12.13	12.61	
Cong 33,21,53	36.91	18.96	30.36	13.12	28.87	25.94
Cong 51	6.49	7.64	4.63	4.77	5.23	3.19
Cong 22	8.20		9.29		8.73	
Cong 45	14.19	17.39	8.86	9.72	7.74	8.43
Cong 46	4.34	7.34				
Cong 52	36.76	43.66	34.49	42.50	40.16	43.66
Cong 49	27.25	37.23	19.35	26.39	25.79	23.05
Cong 47,48	60.84	94.91	40.88	47.81	43.98	61.45
Cong 44	9.19	14.81	5.98	8.33	7.13	6.06
Cong 37,42	11.13	15.54	9.72	7.36	10.09	6.80
Cong 41,64,71	28.28	42.76	18.61	22.71	19.75	22.92
Cong 40	10.31	14.07	10.09	10.08	9.11	12.30
Cong 100	5.71	7.50	5.52	5.47	5.42	8.88
Cong 63	2.04	3.68	2.70	2.48	2.31	2.27
Cong 74	15.53	26.39	10.83	13.23	10.31	14.73
Cong 70,76	1.80	4.33	1.31	2.02	3.56	1.74
Cong 66,95	146.84	215.52	133.50	144.03	121.08	165.66
Cong 91	12.66	14.81	13.94	15.35	12.01	15.71
Cong 56,60,92,84	22.23	23.70	13.43	29.54	14.67	15.02
Cong 84,89	23.67	32.08	25.10	23.73	20.77	21.66
Cong 101	42.89	62.63	36.28	46.92	38.66	58.12
Cong 99	24.45	34.70	20.24	28.21	23.62	36.93
Cong 119			5.69		4.94	8.93
Cong 83	2.47	3.61	2.98	2.58	2.48	2.37
Cong 97	41.68	91.20	22.04	26.92	24.00	42.42
Cong 81,87	15.90	26.88	9.62		9.32	

Worm PCBs (ng/g lipid) Time series uptake and depuration

	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45
	Depuration 7A	Depuration 7B	Depuration 14A	Depuration 14B	Depuration 21A	Depuration 21B
Cong 85	10.20	13.11	10.78	11.62	10.32	16.48
Cong 136	9.10	12.92	10.06	9.44	7.79	10.99
Cong 77,110	54.64	79.75	51.68	58.00	52.09	63.17
Cong 82,151	5.43	8.46	5.58	5.23	4.65	6.94
Cong 135,144						
Cong 107						
Cong 123,149	113.66	176.15	110.90	109.43	84.88	156.27
Cong 118	19.33	35.91	15.53	24.68	20.07	26.69
Cong 134		3.09				
Cong 114	8.28	18.81	6.52	9.26	6.98	14.85
Cong 146	66.04	106.73	62.38	62.48	50.12	97.17
Cong 132,153,105	250.22	401.20	226.72	236.48	193.51	348.81
Cong 141	13.32	21.96	9.32	10.22	10.10	14.35
Cong 137,130,176	2.10	14.72	5.96	7.32	6.77	9.58
Cong 163,138	139.85	216.38	127.99	131.61	117.07	205.02
Cong 158						
Cong 129,178	12.90	22.34	12.28	10.44	7.62	16.90
Cong 187,182	102.91	173.48	88.32	90.56	70.24	147.50
Cong 183	31.41	91.69	43.09	44.93	33.79	77.90
Cong 128	8.44	13.12	7.97	7.27	6.93	12.08
Cong 167	3.45	4.68	2.83	2.93	2.37	4.89
Cong 185	3.71	7.32	3.33	3.44	2.69	4.88
Cong 174	5.05	19.30	7.65	5.70	6.39	9.52
Cong 177	25.53	52.56	26.41	24.52	24.30	42.93
Cong 202,171,156	24.70	44.23	22.90	20.64	18.66	38.98
Cong 157,200	6.89	14.52	6.21	5.81	5.02	9.72
Cong 172	10.55	21.04	10.72	9.48	7.78	17.92
Cong 197	1.79	2.99	1.71	2.01	1.25	3.46
Cong 180	131.64	266.15	127.67	124.71	96.07	227.22
Cong 193	21.26	34.20	17.06	19.32	14.95	26.68
Cong 191	3.45	5.56	3.12	3.82	2.15	5.04
Cong 199						
Cong 170,190	60.06	108.73	52.63	49.45	38.04	94.20
Cong 198	1.48	3.16	2.00	1.36	1.27	2.78
Cong 201	33.52	66.56	30.96	22.99	19.70	50.90
Cong 203,196	80.03	156.92	68.17	73.44	50.09	131.50
Cong 189	1.83	3.02	1.42		1.02	2.76
Cong 208,195	17.24	31.63	15.71	16.17	10.38	27.79
Cong 207	2.74	4.47	2.39		1.52	4.20
Cong 194	26.30	47.92	23.11	33.63	15.72	40.74
Cong 205					6.78	
Cong 206	19.81	35.05	17.07		10.71	30.03
Cong 209	5.72	8.80	5.48	7.99	3.50	8.08
Total PCB	2052.11	3359.43	1805.92	1875.27	1602.39	2682.53

Worm PCBs (ng/g lipid)

	Bigwood A	Bigwood B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
fraction lipid	0.015	0.011	0.016	0.013	0.013	0.014	0.015	0.013	0.014	0.019	0.012	0.015
Cong 1												
Cong 3			33.28				6.32					13.86
Cong 4,10												
Cong 7,9												
Cong 6							1.38	0.35	1.25			
Cong 8,5			57.62	55.86	31.98	30.17	45.10	32.63	38.63		54.59	38.94
Cong 19							2.72		2.64			
Cong 12,13					0.17		0.74	0.61	0.40			0.29
Cong 18			15.62	13.69	4.45	5.22	24.40	12.41	15.14		8.33	6.99
Cong 17	1.29		3.33	2.71	3.82	2.80	14.20	10.90	11.69		4.36	4.57
Cong 24												
Cong 16,32			11.60	10.93	4.72	5.79	15.92	10.40	12.95		5.54	5.16
Cong 29							0.98		0.85			
Cong 26				1.12	0.56		4.46	1.63	1.27		0.86	1.03
Cong 25	4.12	3.46		4.49	4.79	3.01	6.86	4.22	2.82		3.93	3.46
Cong 31,28	3.37		49.11	34.78	8.16	6.80	29.89	19.38	13.68		13.81	12.11
Cong 33,21,53	3.53		21.44	10.17	17.78	19.38	13.26	30.26	42.65		5.57	18.27
Cong 51			2.30	1.89	6.04	5.62	12.57	8.14	8.73		4.93	5.08
Cong 22			11.69	10.47	11.29	8.49	14.87	8.83	11.66		14.85	14.42
Cong 45	2.06	2.26	7.17	7.40	4.53	5.96	12.12	7.54	11.57		5.68	5.35
Cong 46							3.05					
Cong 52	3.14		41.66	41.55	22.60	22.54	70.10	45.69	59.17		31.35	30.68
Cong 49			28.64	25.60	19.46	12.70	56.87	32.38	37.72		16.69	17.61
Cong 47,48	10.67	8.12	27.72	28.92	19.71	22.24	66.93	44.08	60.02		26.62	22.96
Cong 44			20.03	21.01	6.75	5.30	22.93	14.54	12.21		9.63	9.70
Cong 37,42			11.78	14.35	7.00	6.36	20.23	16.48	15.47		9.95	11.22
Cong 41,64,71			23.99	23.58	12.22	9.32	36.32	26.71	30.76		17.34	16.34
Cong 40	1.04			1.94	5.69	5.25	14.21	8.39	15.21		7.17	7.03
Cong 100				4.37	6.25	5.35	8.09	8.38	8.30		6.50	6.90
Cong 63	0.76	0.91	3.23	2.62	1.67	2.03	3.07	3.15	3.01		2.08	3.58
Cong 74	1.40	2.20	13.55	13.07	5.02	4.85	15.50	11.75	10.61		7.10	6.51
Cong 70,76	0.88		16.29	13.69	2.02	1.07	16.48	7.37	3.19		5.80	3.43
Cong 66,95	18.72	15.17	88.38	91.60	64.05	61.94	178.29	110.55	183.95		83.47	76.96
Cong 91	1.15	1.06	9.37	10.79	7.40	6.81	18.21	11.62	18.67		10.73	10.04
Cong 56,60,92,84			42.39	33.16	13.61	10.68	27.48	24.84	25.58		16.49	19.08
Cong 84,89	2.84	1.36	15.34	17.86	23.21	22.52	32.98	22.12	37.37		26.32	24.59
Cong 101	6.16		26.36	27.30	18.01	16.43	60.42	38.40	61.15		26.15	27.32
Cong 99	2.79	1.10	13.47	13.54	9.40	7.69	38.07	23.09	36.98		13.62	13.65
Cong 119					8.10	8.66	6.59	7.73	6.77		10.33	9.19
Cong 83	0.63	0.70	1.26	1.95	1.73	1.61	3.73	2.29	4.17		1.65	1.86
Cong 97	4.64	4.79	12.99	11.37	8.81	11.80	32.02	21.13	34.33		11.78	7.48
Cong 81,87		14.26		13.64		11.76	12.57	13.96				

Worm PCBs (ng/g lipid)

	Bigwood A	Bigwood B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
Cong 85	2.08		7.75	7.71	5.17	4.18	14.15	11.96	15.07		7.47	8.70
Cong 136	0.37	0.16	1.64	2.51	2.98	2.76	10.78	5.48	13.91		4.03	3.68
Cong 77,110	4.28	1.72	32.65	41.02	27.57	22.06	85.31	53.39	92.47		33.80	37.41
Cong 82,151	0.43	0.15	1.80	1.96	1.88	1.55	6.61	3.92	8.31		2.55	2.67
Cong 135,144												
Cong 107												
Cong 123,149	12.90	14.65	38.05	43.79	42.47	38.62	110.93	76.07	150.57		55.14	50.51
Cong 118			30.73	27.87	11.96	10.00	36.18	30.88	37.47		21.86	21.58
Cong 134							1.44		1.62			
Cong 114						5.00	8.24	6.11	10.44		7.72	
Cong 146					27.44	25.05	61.62	43.69	78.20		33.26	29.37
Cong 132,153,105	46.32	36.67	106.32	119.83	105.92	101.67	237.71	186.24	295.84		134.81	125.87
Cong 141	0.58		5.36	6.86	5.34	3.08	16.76	11.75	20.99		5.07	6.87
Cong 137,130,176	0.58		1.78	3.44	2.73	2.03	10.20	6.57	13.12		2.58	1.94
Cong 163,138	24.27	15.05	65.78	78.50	62.18	59.89	148.77	122.06	176.48		81.02	82.51
Cong 158												
Cong 129,178	0.75		0.54	3.24	3.42	3.13	14.35	7.84	16.95		5.32	3.54
Cong 187,182	12.31	10.37	23.78	30.07	34.26	31.68	89.55	62.63	120.88		41.99	37.12
Cong 183	5.42	3.51	10.09	17.47	16.58	16.32	47.27	34.62	63.89		22.12	21.05
Cong 128	1.94	1.24	5.06	5.76	4.24	4.15	9.03	8.41	9.91		6.19	5.88
Cong 167	0.66	0.73	1.58	2.30	1.48	1.53	4.19	3.51	3.34		2.39	2.14
Cong 185	0.14	0.25	1.03	1.17	1.01	1.15	4.42	2.47	6.36		1.17	1.03
Cong 174	0.46	0.45	2.86	2.92	3.11	2.41	17.28	10.92	26.51		3.40	2.79
Cong 177	2.67	1.97	8.03	10.34	10.32	8.90	30.65	21.66	42.09		12.09	12.78
Cong 202,171,156	3.68	2.46	8.02	11.23	10.60	9.59	26.67	21.54	33.85		13.73	12.39
Cong 157,200	1.09	0.83	2.62	3.04	2.79	2.76	7.84	7.14	10.38		3.54	3.34
Cong 172			1.72	2.69	2.70	3.47	12.87	9.84	18.85		5.55	3.67
Cong 197						1.10	2.05	1.52	2.91		1.29	
Cong 180	10.61	9.03	33.45	39.49	42.88	41.09	128.28	100.21	182.53		60.38	49.16
Cong 193							16.04	19.00	16.43			
Cong 191					1.53		3.05	2.34	4.64		0.97	0.90
Cong 199												
Cong 170,190	4.21	3.35	14.04	19.26	18.01	16.90	53.11	42.33	75.79		25.28	21.48
Cong 198				0.40	0.42	0.23	1.95	1.21	3.25		1.32	0.62
Cong 201	2.25	2.34	7.60	8.95	13.49	11.92	34.39	22.36	52.27		9.27	8.90
Cong 203,196	6.62	5.92	16.91	21.67	28.81	26.55	73.80	53.70	108.30		25.36	21.51
Cong 189			0.51	0.74	0.69	0.63	1.44	1.32	1.98		1.06	0.81
Cong 208,195	2.15			5.37	8.09	7.53	17.14	15.10	24.32		7.16	5.64
Cong 207	0.54	0.98	0.97	1.07	1.99	1.67	2.88	3.11	4.18		1.13	1.10
Cong 194	1.63	1.32	5.11	6.91	7.55	7.40	26.18	16.54	39.06		8.46	6.60
Cong 205									2.92			
Cong 206	3.03	3.77	5.74	8.37	14.86	13.26	20.26	21.20	28.21		8.58	6.75
Cong 209	2.33	3.01		4.82	7.53	7.02	6.22	13.33	8.46		5.13	4.87
Total PCB	223.49	175.32	1051.13	1106.16	893.01	846.40	2349.55	1703.89	2663.34	0.00	1125.39	1060.85

Worm BDEs (ng/g wet)		Time series uptake and depuration											
	DAY 0	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45	BSM 45
		Uptake 2A	Uptake 2B	Uptake 4A	Uptake 4B	Uptake 8A	Uptake 8B	Uptake 16A	Uptake 16B	Uptake 28A	Uptake 28B	Uptake 56A	Uptake 56B
BDE-30	<0.002	<0.003	<0.002	<0.003	<0.002	<0.002	<0.002	<0.003	<0.004	<0.002	<0.003	<0.006	<0.004
BDE-17	<0.003	<0.005	<0.005	<0.006	<0.004	<0.003	<0.004	<0.005	<0.008	<0.005	<0.006	<0.01	<0.007
BDE-25	<0.001	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	<0.002	<0.004	<0.002	<0.002	<0.005	<0.003
BDE-28,33	0.01	0.01	0.01	0.02	0.01	0.03	0.01	0.04	0.06	0.06	0.10	0.16	0.10
BDE-75	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
BDE-49,71	<0.003	<0.004	<0.004	<0.01	<0.003	<0.003	<0.004	<0.004	<0.01	<0.004	<0.01	<0.01	<0.01
BDE-47	<0.41	<0.67	<0.61	<0.75	<0.53	<0.44	<0.56	<0.64	<1.09	<0.63	<0.76	<1.59	<0.91
BDE-66	0.00	0.02	0.01	0.02	<0.004	0.02	0.02	<0.01	<0.01	0.01	0.03	0.04	<0.01
BDE-100	0.08	<0.12	<0.11	<0.14	<0.10	<0.08	<0.10	<0.12	<0.20	<0.11	<0.14	<0.29	<0.16
BDE-119	<0.004	<0.01	<0.01	<0.01	<0.01	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE-99	0.24	<0.39	<0.36	<0.44	<0.31	<0.26	<0.33	<0.38	<0.64	<0.37	<0.44	<0.93	<0.53
BDE-116	<0.01	<0.01	<0.01	<0.01	<0.01	<0.010	<0.01	<0.01	<0.02	<0.01	<0.01	<0.03	<0.02
BDE-155,85	<0.02	<0.03	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.04	<0.02	<0.03	<0.06	<0.03
BDE-154	0.02	0.03	<0.02	0.03	0.02	0.01	0.02	0.03	0.04	0.03	0.04	0.06	0.05
BDE-153	0.02	0.02	0.01	0.03	0.02	0.01	0.01	0.03	ND	0.02	0.03	0.05	0.03
BDE-138	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
BDE-156	<0.004	<0.01	<0.01	<0.01	<0.01	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
BDE-183	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.02	<0.03	<0.02
BDE-191	<0.003	<0.01	<0.01	<0.01	<0.004	<0.003	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE-181	<0.002	<0.004	<0.003	<0.004	<0.003	<0.002	<0.003	<0.003	<0.01	<0.003	<0.004	<0.01	<0.01
BDE-190	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
BDE-204	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
BDE-197	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
BDE-198,203	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
BDE-196	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01	<0.02	<0.01
BDE-205	<0.004	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
BDE-208	<0.01	<0.02	<0.02	<0.03	<0.02	<0.02	<0.02	<0.02	<0.04	<0.02	<0.03	0.07	<0.03
BDE-207	<0.02	<0.04	<0.04	<0.04	<0.03	<0.03	<0.03	<0.04	<0.06	<0.04	<0.04	<0.10	<0.05
BDE-206	<0.03	<0.04	<0.04	<0.05	<0.03	<0.03	<0.04	<0.04	<0.07	<0.04	<0.05	<0.10	<0.06
BDE-209	<0.78	<1.28	<1.17	<1.44	<1.02	<0.83	<1.07	<1.23	<2.09	<1.2	<1.45	<3.04	<1.7
Total BDE	0.38	0.09	0.03	0.14	0.05	0.07	0.06	0.10	0.10	0.12	0.20	0.37	0.18

Worm BDEs (ng/g wet) Time series uptake and depuration

	BSM 45 Depuration 7A	BSM 45 Depuration 7B	BSM 45 Depuration 14A	BSM 45 Depuration 14B	BSM 45 Depuration 21A	BSM 45 Depuration 21B
BDE-30	<0.004	<0.01	<0.002	<0.003	<0.003	<0.004
BDE-17	<0.008	<0.01	<0.004	<0.01	<0.01	<0.01
BDE-25	<0.003	<0.004	<0.002	<0.002	<0.002	<0.003
BDE-28,33	0.10	0.05	0.09	0.11	0.15	0.12
BDE-75	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE-49,71	<0.01	<0.01	<0.004	<0.01	<0.01	<0.01
BDE-47	<1.01	<1.30	<0.57	<0.76	<0.76	<1.03
BDE-66	<0.01	<0.01	<0.004	0.02	<0.01	<0.01
BDE-100	<0.18	<0.24	<0.10	<0.14	<0.14	<0.19
BDE-119	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE-99	<0.59	<0.76	<0.33	<0.44	<0.44	<0.60
BDE-116	<0.02	<0.02	<0.01	<0.01	<0.01	<0.02
BDE-155,85	<0.04	<0.05	<0.02	<0.03	<0.03	<0.04
BDE-154	0.03	<0.03	0.03	0.03	<0.02	0.03
BDE-153	0.03	<0.03	0.02	0.03	<0.02	0.04
BDE-138	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE-156	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE-183	<0.02	<0.03	<0.01	<0.02	<0.02	<0.02
BDE-191	<0.01	<0.01	<0.004	<0.01	<0.01	<0.01
BDE-181	<0.01	<0.01	<0.003	<0.004	<0.004	<0.01
BDE-190	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01
BDE-204	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01
BDE-197	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01
BDE-198,203	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE-196	<0.02	<0.02	<0.01	<0.01	<0.01	<0.02
BDE-205	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
BDE-208	0.04	<0.05	<0.02	<0.03	<0.03	<0.04
BDE-207	<0.06	<0.08	<0.03	<0.04	<0.04	<0.06
BDE-206	0.07	<0.08	<0.04	<0.05	<0.05	<0.07
BDE-209	<1.93	<2.47	<1.008	<1.45	<1.45	<1.97
Total BDE	0.27	0.05	0.14	0.19	0.15	0.18

Worm BDEs (ng/g wet)		Day 28 Bioaccumulation										
	Bigwood A	Bigwood B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
BDE-30	<0.003	<0.003	<0.01	<0.003	<0.003	<0.003	<0.002	<0.003	<0.003	NQ	<0.003	<0.003
BDE-17	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.005	<0.006	<0.01	NQ	<0.01	<0.01
BDE-25	<0.002	<0.002	<0.01	<0.003	<0.003	<0.002	<0.002	<0.002	<0.002	NQ	<0.002	<0.002
BDE-28,33	0.05	0.02	0.04	0.07	0.04	0.02	0.06	0.10	0.08	NQ	0.10	0.11
BDE-75	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-49,71	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.004	<0.01	<0.01	NQ	<0.01	<0.01
BDE-47	<0.74	<0.74	<2.0	<0.79	<0.77	<0.73	<0.63	<0.76	<0.73	NQ	<0.75	<0.76
BDE-66	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	<0.01	NQ	0.02	0.03
BDE-100	<0.13	<0.13	<0.36	<0.14	<0.14	<0.13	<0.11	<0.14	<0.13	NQ	<0.14	<0.14
BDE-119	<0.01	0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-99	0.60	<0.43	<1.17	<0.47	<0.45	<0.43	<0.37	<0.44	<0.43	NQ	<0.44	<0.44
BDE-116	<0.01	<0.01	<0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-155,85	<0.03	<0.03	<0.08	<0.03	<0.03	<0.03	<0.02	<0.03	<0.03	NQ	<0.03	<0.03
BDE-154	0.04	0.02	<0.05	<0.02	0.04	0.02	0.03	0.04	0.02	NQ	0.03	0.04
BDE-153	0.03	0.03	<0.04	0.02	0.04	0.02	0.02	0.03	ND	NQ	0.03	0.05
BDE-138	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-156	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-183	<0.02	<0.02	<0.04	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	NQ	<0.02	<0.02
BDE-191	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-181	<0.004	<0.004	<0.01	<0.004	<0.004	<0.004	<0.003	<0.004	<0.004	NQ	<0.004	<0.004
BDE-190	<0.01	<0.01	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-204	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-197	<0.01	<0.01	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-198,203	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-196	<0.01	<0.01	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-205	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NQ	<0.01	<0.01
BDE-208	<0.03	<0.03	<0.07	<0.03	<0.03	<0.03	<0.02	<0.03	<0.03	NQ	<0.03	<0.03
BDE-207	<0.04	<0.04	<0.12	<0.05	<0.05	<0.04	<0.04	<0.04	<0.04	NQ	<0.04	<0.05
BDE-206	<0.05	<0.05	<0.13	<0.05	<0.05	<0.05	<0.04	<0.05	<0.05	NQ	<0.05	<0.05
BDE-209	<1.40	<1.41	<3.82	<1.52	<1.46	<1.39	<1.2	<1.45	<1.40	NQ	<1.43	<1.45
Total BDE	0.76	0.09	0.04	0.09	0.12	0.07	0.12	0.20	0.10		0.18	0.23

Worm BDEs (ng/g lipid)		Time series uptake and depuration											
	DAY 0	BSM 45 Uptake 2A	BSM 45 Uptake 2B	BSM 45 Uptake 4A	BSM 45 Uptake 4B	BSM 45 Uptake 8A	BSM 45 Uptake 8B	BSM 45 Uptake 16A	BSM 45 Uptake 16B	BSM 45 Uptake 28A	BSM 45 Uptake 28B	BSM 45 Uptake 56A	BSM 45 Uptake 56B
fraction lipid	0.013	0.012	0.011	0.010	0.013	0.015	0.012	0.016	0.014	0.015	0.013	0.017	0.011
BDE-30													
BDE-17													
BDE-25													
BDE-28,33	0.94	0.74	0.99	2.10	0.90	1.79	1.07	2.46	4.37	4.35	7.95	9.19	8.93
BDE-75													
BDE-49,71													
BDE-47													
BDE-66	0.29	1.76	0.76	1.48		1.05	1.39			0.66	2.23	2.20	
BDE-100	6.24												
BDE-119													
BDE-99	18.34												
BDE-116													
BDE-155,85				4.37									
BDE-154	1.31	2.81		3.42	1.67	0.87	1.29	2.17	2.98	2.14	3.11	3.28	4.55
BDE-153	1.37	1.83	1.18	2.46	1.43	0.91	1.01	1.74		1.18	2.25	2.74	2.93
BDE-138													
BDE-156													
BDE-183													
BDE-191													
BDE-181													
BDE-190													
BDE-204													
BDE-197													
BDE-198,203													
BDE-196													
BDE-205													
BDE-208												4.16	
BDE-207													
BDE-206													
BDE-209													
Total BDE	28.50	7.15	2.93	13.83	4.01	4.62	4.76	6.37	7.35	8.33	15.54	21.57	16.42

Worm BDEs (ng/g lipid)		Time series uptake and depuration				
	BSM 45 Depuration 7A	BSM 45 Depuration 7B	BSM 45 Depuration 14A	BSM 45 Depuration 14B	BSM 45 Depuration 21A	BSM 45 Depuration 21B
fraction lipid	0.016	0.012	0.013	0.015	0.019	0.012
BDE-30						
BDE-17						
BDE-25						
BDE-28,33	5.92	4.30	7.13	7.34	7.92	9.53
BDE-75						
BDE-49,71						
BDE-47						
BDE-66				1.54		
BDE-100						
BDE-119						
BDE-99						
BDE-116						
BDE-155,85						
BDE-154	2.09		2.11	1.77		2.29
BDE-153	1.87		1.50	2.10		2.97
BDE-138						
BDE-156						
BDE-183						
BDE-191						
BDE-181						
BDE-190						
BDE-204						
BDE-197						
BDE-198,203						
BDE-196						
BDE-205						
BDE-208	2.52					
BDE-207						
BDE-206	3.97					
BDE-209						
Total BDE	16.37	4.30	10.74	12.76	7.92	14.80

Worm BDEs (ng/g lipid)

	Bigwood A	Bigwood B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
fraction lipid	0.015	0.011	0.016	0.013	0.013	0.014	0.015	0.013	0.014	0.019	0.012	0.015
BDE-30										NQ		
BDE-17										NQ		
BDE-25										NQ		
BDE-28,33	3.46	2.16	2.74	5.13	3.08	1.72	4.35	7.95	5.40	NQ	8.17	7.27
BDE-75										NQ		
BDE-49,71										NQ		
BDE-47										NQ		
BDE-66	2.04						0.66	2.23		NQ	2.12	1.86
BDE-100										NQ		
BDE-119		0.87								NQ		
BDE-99	40.08									NQ		
BDE-116										NQ		
BDE-155,85										NQ		
BDE-154	2.73	2.00			3.34	1.72	2.14	3.11	1.57	NQ	2.40	2.99
BDE-153	2.25	2.55		1.46	3.22	1.15	1.18	2.25		NQ	2.84	3.41
BDE-138										NQ		
BDE-156										NQ		
BDE-183										NQ		
BDE-191										NQ		
BDE-181										NQ		
BDE-190										NQ		
BDE-204										NQ		
BDE-197										NQ		
BDE-198,203										NQ		
BDE-196										NQ		
BDE-205										NQ		
BDE-208										NQ		
BDE-207										NQ		
BDE-206										NQ		
BDE-209										NQ		
Total BDE	50.56	7.58	2.74	6.59	9.64	4.59	8.33	15.54	6.97		15.52	15.53

Worm butyltins (ng/g wet) Time series uptake and depuration

	DAY 0	BSM 45 Uptake 2A	BSM 45 Uptake 2B	BSM 45 Uptake 4A	BSM 45 Uptake 4B	BSM 45 Uptake 8A	BSM 45 Uptake 8B	BSM 45 Uptake 16A	BSM 45 Uptake 16B	BSM 45 Uptake 28A	BSM 45 Uptake 28B	BSM 45 Uptake 56A	BSM 45 Uptake 56B
Tributyltin	0.80	0.10	<0.2	0.20	0.20	0.30	<0.3	0.40	NQ	0.50	0.40	NQ	NQ
Dibutyltin	1.00	2.00	2.00	3.00	3.00	4.00	3.00	5.00	NQ	19.00	16.00	NQ	NQ
Monobutyltin	1.00	0.50	0.60	0.50	0.80	1.00	0.50	2.00	NQ	7.00	4.00	NQ	NQ

Worm butyltins (ng/g lipid) Time series uptake and depuration

	DAY 0	BSM 45 Uptake 2A	BSM 45 Uptake 2B	BSM 45 Uptake 4A	BSM 45 Uptake 4B	BSM 45 Uptake 8A	BSM 45 Uptake 8B	BSM 45 Uptake 16A	BSM 45 Uptake 16B	BSM 45 Uptake 28A	BSM 45 Uptake 28B	BSM 45 Uptake 56A	BSM 45 Uptake 56B
fraction lipid	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01
Tributyltin	60.24	8.09		19.67	15.23	20.22		25.19	NQ	33.47	31.26	NQ	NQ
Dibutyltin	75.30	161.70	181.14	295.01	228.41	269.66	254.71	314.92	NQ	1271.86	1250.21	NQ	NQ
Monobutyltin	75.30	40.43	54.34	49.17	60.91	67.41	42.45	125.97	NQ	468.58	312.55	NQ	NQ

Worm butyltins (ng/g wet) Day 28 Bioaccumulation

	Bigwood A	Bigwood B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
Tributyltin	ND	ND	NQ	NQ	NQ	NQ	0.50	0.40	NQ	4.00	1.00	0.70
Dibutyltin	6.00	11.00	NQ	NQ	NQ	NQ	19.00	16.00	NQ	24.00	15.00	12.00
Monobutyltin	3.00	2.00	NQ	NQ	NQ	NQ	7.00	4.00	NQ	15.00	3.00	3.00

Worm butyltins (ng/g lipid) Day 28 Bioaccumulation

	Bigwood A	Bigwood B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
fraction lipid	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01
Tributyltin							33.47	31.26		215.26	85.79	47.61
Dibutyltin	399.53	976.30					1271.86	1250.21		1291.57	1286.81	816.23
Monobutyltin	199.76	177.51					468.58	312.55		807.23	257.36	204.06

Metals in Nereis virens (ng/g wet)

Time series uptake and depuration in BSM 45 sediment

		Uptake													**Depuration**					
	Day 0	**Day 2A**	**Day 2B**	**Day 4A**	**Day 4B**	**Day 8A**	**Day 8B**	**Day 16A**	**Day 16B**	**Day 28A**	**Day 28B**	**Day 56A**	**Day 56B**	**Day 7A**	**Day 7B**	**Day 14A**	**Day 14B**	**Day 21A**	**Day 21B**
Cr	186.82	278.83	249.83	NQ	185.56	177.16	247.03	137.00	179.00	161.02	263.68	184.27	200.10	140.96	165.97	175.69	139.34	110.26	166.51
Ni	124.83	182.24	179.65	NQ	116.54	118.81	155.14	156.00	253.71	229.58	269.63	262.22	287.99	253.79	219.55	1020.85	2566.73	206.17	247.54
Cu	1240.19	1996.52	2095.52	NQ	1317.00	1454.56	1753.26	1918.53	2490.67	1945.54	3275.17	2644.18	2827.24	2145.50	2256.65	2437.88	1774.87	1618.63	2247.26
Zn	60732.81	11551.61	12485.27	NQ	43567.33	8095.12	57999.11	16987.67	11032.04	9079.78	63008.19	9427.57	12522.83	21998.77	9302.64	11801.08	9415.33	29110.65	83353.12
Ag	14.08	11.91	11.31	NQ	13.52	9.42	16.28	8.36	16.59	7.28	30.28	21.46	19.05	12.72	49.01	11.33	10.46	12.00	24.43
Cd	137.55	137.23	141.70	NQ	120.84	127.18	160.87	119.23	191.36	145.50	192.44	191.04	217.22	152.68	220.85	211.23	167.95	155.34	216.40
Pb	300.06	276.18	276.94	NQ	251.83	288.05	335.25	254.41	319.84	296.12	337.18	347.31	363.06	344.31	373.51	268.70	355.66	285.32	352.75
Hg	5.85	4.39	6.38	7.04	6.62	7.24	6.27	7.33	6.35	7.85	9.57	7.75	10.05	8.94	9.60	7.77	8.14	19.38	24.28

Day 28 Bioaccumulation

	Control A	**Control B**	**BSM 33 A**	**BSM 33 B**	**BSM 38 A**	**BSM 38 B**	**BSM 45 A**	**BSM 45 B**	**BSM 54 A**	**BSM 54 B**	**BSM 68 A**	**BSM 68 B**
Cr	95.61	193.66	196.07	188.11	222.03	141.12	161.02	263.68	194.64	180.57	161.54	218.49
Ni	105.24	159.99	212.06	237.17	193.40	194.12	229.58	269.63	176.79	182.23	259.56	330.77
Cu	2134.61	1636.86	1441.22	2236.50	2259.78	2265.43	1945.54	3275.17	2474.54	1986.65	3067.09	3109.18
Zn	8926.70	8687.83	51025.95	26273.54	76462.65	29400.00	9079.78	63008.19	37489.68	9969.16	62965.19	31022.44
Ag	14.67	4.14	5.84	25.17	12.48	10.22	7.28	30.28	31.31	14.38	39.04	37.39
Cd	140.53	202.92	180.46	373.73	230.11	204.33	145.50	192.44	155.29	173.81	179.09	180.34
Pb	266.33	393.57	433.50	316.23	296.52	282.73	296.12	337.18	263.28	337.78	451.77	455.37
Hg	8.56	10.45	9.00	9.65	6.81	4.25	7.85	9.57	7.06	8.89	9.94	9.57

Metals in amphipods (ng/g wet weight)

		Control	BSM 33
	Day 0	Day 28	Day 28
Cr	5486.73	2752.50	1144.42
Ni	256.48	1686.77	782.80
Cu	101891.12	192766.81	196255.28
Zn	4307.04	8639.92	9499.76
As	<160	<161	<162
Se	< 80	157.81	339.42
Ag	72.07	229.30	149.00
Cd	33.88	78.56	31.42

Amphipod PAH

	ng/g wet weight						MDL (ng/g wet weight)						ng/g lipid					
		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68
	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28
Naphthalene	ND	ND	ND	ND	ND	ND	3.78	5.20	2.51	2.82	2.06	4.30						
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND	4.31	5.92	2.86	3.21	2.35	4.90						
Azulene	ND	ND	ND	ND	ND	ND	0.03	0.05	0.02	0.02	0.02	0.04						
1-Methylnaphthalene	ND	ND	ND	ND	ND	ND	1.50	2.06	0.99	1.12	0.82	1.70						
Biphenyl	ND	ND	ND	ND	0.40	0.49	0.38	0.52	0.25	0.28	0.21	0.43					35.82	71.01
Acenapthylene	ND	ND	1.82	1.92	2.57	4.06	0.15	0.20	0.10	0.11	0.08	0.17			170.59	218.61	231.32	586.06
Acenapthene	ND	ND	0.56	0.73	0.76	2.03	0.25	0.34	0.16	0.18	0.13	0.28			52.54	83.44	68.13	293.03
Fluorene	ND	0.44	0.76	0.35	0.52	0.64	0.28	0.38	0.19	0.21	0.15	0.32		48.81	70.97	39.62	47.13	92.58
1-Methylfluorene	0.25	0.72	0.72	0.44	0.68	1.06	0.13	0.18	0.09	0.10	0.07	0.15	22.26	78.60	67.90	49.88	61.40	152.81
Phenanthrene	2.48	3.25	6.46	4.47	4.34	5.81	1.17	1.60	0.78	0.87	0.64	1.33	218.76	357.42	605.60	509.94	391.01	838.64
Anthracene	0.11	ND	1.78	0.57	0.94	0.72	0.10	0.14	0.07	0.07	0.05	0.11	9.68		166.50	64.79	84.56	104.27
2-Methylphenanthrene	0.99	1.33	2.91	2.38	2.40	4.26	0.21	0.29	0.14	0.16	0.12	0.24	87.12	146.44	272.95	271.75	215.97	614.82
2-Methylanthracene	1.16	ND	1.15	0.40	0.73	1.04	0.03	0.05	0.02	0.02	0.02	0.04	102.12		107.47	45.68	65.71	150.11
4,5-Methylenephenanthrene	0.27	0.23	6.20	1.03	2.78	3.24	0.10	0.14	0.07	0.07	0.05	0.11	23.71	25.65	581.03	117.93	250.44	468.31
1-Methylanthracene	0.96	1.02	5.08	1.72	2.42	ND	0.08	0.11	0.05	0.06	0.04	0.09	84.70	111.69	475.95	195.77	217.86	
1-Methylphenanthrene	ND	0.60	3.50	1.29	1.58	2.83	0.07	0.09	0.04	0.05	0.04	0.07		66.19	328.56	146.83	142.18	408.08
9-Methylanthracene	0.04	ND	ND	0.04	0.05	0.19	0.02	0.02	0.01	0.01	0.01	0.02	3.87			5.13	4.58	27.86
Fluoranthene	2.79	2.68	79.07	20.79	44.66	46.39	0.64	0.88	0.43	0.48	0.35	0.73	246.83	294.54	7411.82	2369.31	4022.91	6694.73
Pyrene	2.54	2.49	131.81	45.12	83.87	125.14	0.44	0.61	0.29	0.33	0.24	0.50	224.08	273.86	12355.88	5141.81	7554.64	18060.86
3,6-Dimethylphenanthrene	ND	ND	0.06	ND	ND	0.09	0.03	0.05	0.02	0.02	0.02	0.04			5.80			12.58
Benzo[a]fluorene	ND	ND	12.70	2.12	5.76	4.62	0.12	0.16	0.08	0.09	0.06	0.13			1190.72	241.92	518.92	666.96
Benzo[b]fluorene	ND	ND	16.15	4.72	9.22	10.53	0.12	0.16	0.08	0.09	0.06	0.13			1513.82	537.44	830.76	1519.08
Benz[a]anthracene	ND	ND	46.47	15.54	24.97	21.03	0.62	0.86	0.41	0.47	0.34	0.71			4355.86	1770.81	2249.10	3035.46
Chrysene+Triphenylene	1.17	ND	51.97	20.80	32.40	41.65	0.95	1.31	0.63	0.71	0.52	1.08	103.57		4872.07	2370.24	2918.29	6011.60
Napthacene	0.09	ND	0.29	0.52	0.45	1.43	0.05	0.07	0.03	0.04	0.03	0.06	8.23		27.64	58.73	40.66	206.74
Benzo[b]fluoranthene	1.69	1.87	113.09	63.59	83.28	137.25	0.76	1.04	0.50	0.56	0.41	0.86	149.06	205.19	10601.53	7246.36	7501.32	19809.15
Benzo[k]fluoranthene	ND	ND	27.64	17.71	21.49	35.70	0.44	0.61	0.29	0.33	0.24	0.50			2590.93	2018.78	1935.65	5152.28
Dimethylbenz[a]anthracene	ND	ND	5.29	4.14	5.15	11.98	0.58	0.79	0.38	0.43	0.31	0.65			495.74	471.72	463.99	1729.41
Benzo[e]pyrene	0.83	ND	61.82	38.69	51.80	83.40	0.48	0.66	0.32	0.36	0.26	0.54	73.56		5795.30	4409.53	4665.71	12037.58
Benzo[a]pyrene	ND	ND	34.87	23.12	30.61	56.74	0.48	0.66	0.32	0.36	0.26	0.54			3268.86	2635.00	2756.98	8188.64
Perylene	0.59	0.83	28.16	24.27	31.98	29.50	0.28	0.38	0.19	0.21	0.15	0.32	52.27	91.01	2639.38	2765.98	2880.32	4257.02
3-Methylchloanthrene	ND	ND	0.42	0.24	0.44	1.20	0.12	0.16	0.08	0.09	0.06	0.13			39.58	27.50	39.32	173.48
Indeno[1,2,3-c,d]pyrene	0.04	0.20	24.81	16.27	19.13	37.71	0.02	0.02	0.01	0.01	0.01	0.02	3.87	21.51	2325.49	1854.71	1723.18	5442.62
Dibenz[a,h+ac]anthracene	0.02	0.05	2.88	2.05	3.29	5.72	0.02	0.02	0.01	0.01	0.01	0.02	1.94	4.96	270.22	233.99	296.76	825.16
Benzo[g,h,i]perylene	0.56	0.39	34.81	22.77	29.75	53.62	0.10	0.14	0.07	0.07	0.05	0.11	49.85	43.02	3263.06	2595.38	2679.97	7739.21
Anthanthrene	ND	ND	1.43	1.77	2.12	5.75	0.03	0.05	0.02	0.02	0.02	0.04			133.74	201.83	191.20	829.65
Coronene	ND	0.10	2.24	0.44	1.12	2.79	0.05	0.07	0.03	0.04	0.03	0.06		10.76	210.17	50.34	100.44	402.69
Total PAH	16.59	16.21	706.93	340.03	501.68	738.61							1465.48	1779.65	66267.64	38750.75	45186.21	106602.49

Amphipod PCB	ng/g wet weight						MDL (ng/g wet weight)						ng/g lipid					
		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68
	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28
Cong 1	ND	ND	ND	ND	ND	ND	0.10	0.14	0.07	0.07	0.05	0.11						
Cong 3	0.24	0.53	ND	0.98	ND	1.97	0.21	0.29	0.14	0.16	0.12	0.24	20.81	58.74		111.40		284.94
Cong 4,10	ND	ND	ND	ND	ND	ND	0.28	0.38	0.19	0.21	0.15	0.32						
Cong 7,9	ND	ND	ND	ND	0.01	ND	0.02	0.02	0.01	0.01	0.01	0.02					1.08	
Cong 6	ND	ND	ND	ND	ND	ND	0.02	0.02	0.01	0.01	0.01	0.02						
Cong 8,5	ND	ND	2.12	1.32	1.35	2.55	0.25	0.34	0.16	0.18	0.13	0.28			198.57	150.09	121.45	368.53
Cong 19	ND	ND	0.03	0.02	0.02	ND	0.02	0.02	0.01	0.01	0.01	0.02			2.73	2.33	1.62	
Cong 12,13	ND	ND	ND	ND	ND	ND	0.02	0.02	0.01	0.01	0.01	0.02						
Cong 18	ND	ND	0.16	0.13	0.19	0.06	0.02	0.02	0.01	0.01	0.01	0.02			14.67	14.45	16.70	8.99
Cong 17	ND	ND	0.13	0.13	0.14	0.04	0.02	0.02	0.01	0.01	0.01	0.02			12.28	14.92	12.39	5.39
Cong 24	ND	ND	0.36	0.18	0.16	0.40	0.03	0.05	0.02	0.02	0.02	0.04			33.44	20.04	14.54	57.53
Cong 16,32	ND	ND	0.15	0.15	0.20	0.11	0.03	0.05	0.02	0.02	0.02	0.04			13.65	17.25	18.04	15.28
Cong 29	ND	ND	ND	ND	ND	ND	0.02	0.02	0.01	0.01	0.01	0.02						
Cong 26	ND	ND	0.05	0.10	0.07	0.04	0.03	0.05	0.02	0.02	0.02	0.04			4.78	11.65	6.19	6.29
Cong 25	ND	ND	ND	ND	ND	ND	0.21	0.29	0.14	0.16	0.12	0.24						
Cong 31,28	0.05	0.06	0.83	0.89	1.25	0.75	0.03	0.05	0.02	0.02	0.02	0.04	4.84	6.62	78.13	101.15	112.56	108.76
Cong 33,21,53	0.07	ND	0.44	0.57	0.63	0.32	0.03	0.05	0.02	0.02	0.02	0.04	6.29		41.62	65.26	56.55	45.84
Cong 51	ND	ND	ND	0.44	0.41	0.31	0.02	0.02	0.01	0.01	0.01	0.02				49.88	36.62	44.04
Cong 22	ND	ND	0.33	0.16	0.27	0.20	0.10	0.14	0.07	0.07	0.05	0.11			31.39	17.71	24.24	28.76
Cong 45	ND	ND	0.11	0.16	0.16	0.16	0.00	0.00	0.00	0.00	0.00	0.00			10.58	18.64	14.81	23.37
Cong 46	ND	ND	0.04	0.07	0.08	0.08	0.03	0.05	0.02	0.02	0.02	0.04			3.41	7.46	7.54	11.69
Cong 52	0.07	ND	1.16	2.05	1.20	0.95	0.02	0.02	0.01	0.01	0.01	0.02	6.29		108.50	233.99	108.52	137.53
Cong 49	0.06	ND	1.48	2.27	1.30	0.99	0.03	0.05	0.02	0.02	0.02	0.04	5.32		139.20	259.16	117.41	142.92
Cong 47,48	ND	ND	0.81	1.56	0.91	0.58	0.10	0.14	0.07	0.07	0.05	0.11			76.08	178.06	81.86	83.59
Cong 44	0.07	0.04	0.66	1.15	1.01	0.70	0.02	0.02	0.01	0.01	0.01	0.02	6.29	4.14	61.41	131.45	91.29	100.67
Cong 37,42	0.02	ND	0.62	0.85	0.74	0.62	0.02	0.02	0.01	0.01	0.01	0.02	1.94		58.00	96.95	66.78	89.89
Cong 41,64,71	0.07	ND	0.71	1.28	1.12	0.69	0.05	0.07	0.03	0.04	0.03	0.06	5.81		66.87	145.43	101.25	99.77
Cong 40	ND	ND	0.27	0.49	0.25	0.28	0.02	0.02	0.01	0.01	0.01	0.02			25.59	56.40	22.35	40.45
Cong 100	0.03	ND	0.37	0.30	0.17	0.24	0.02	0.02	0.01	0.01	0.01	0.02	2.42		34.80	34.03	15.62	35.06
Cong 63	ND	ND	0.05	0.08	0.07	0.06	0.03	0.05	0.02	0.02	0.02	0.04			5.12	9.32	5.92	8.09
Cong 74	ND	ND	0.44	0.65	0.58	0.48	0.02	0.02	0.01	0.01	0.01	0.02			40.94	74.11	52.51	69.21
Cong 70,76	ND	ND	1.40	2.34	1.93	1.43	0.31	0.43	0.21	0.23	0.17	0.35			131.35	266.62	173.96	206.74
Cong 66,95	0.53	ND	3.44	8.46	4.16	3.79	0.18	0.25	0.12	0.13	0.10	0.21	46.46		322.08	963.94	374.58	546.51
Cong 91	0.03	ND	0.39	1.01	0.45	0.36	0.02	0.02	0.01	0.01	0.01	0.02	2.90		36.85	115.60	40.12	52.13
Cong 56,60,92,84	ND	ND	2.85	2.36	2.05	3.31	1.07	1.47	0.71	0.80	0.58	1.21			267.14	268.49	185.00	478.20
Cong 89	0.13	0.05	0.91	1.92	0.94	1.05	0.02	0.02	0.01	0.01	0.01	0.02	11.62	5.79	84.95	219.08	84.83	151.91
Cong 101	0.20	0.04	1.20	3.48	1.03	1.02	0.02	0.02	0.01	0.01	0.01	0.02	17.42	4.14	112.93	396.67	93.17	146.51
Cong 99	0.09	ND	0.66	2.24	0.64	0.55	0.02	0.02	0.01	0.01	0.01	0.02	7.74		61.41	255.44	57.36	79.10
Cong 119	ND	ND	0.29	0.43	0.21	0.32	0.16	0.23	0.11	0.12	0.09	0.19			27.64	49.41	18.58	46.74
Cong 83	ND	ND	0.11	0.30	0.14	0.19	0.02	0.02	0.01	0.01	0.01	0.02			10.24	34.49	12.93	26.97
Cong 97	0.29	0.08	1.43	0.81	0.72	1.89	0.02	0.02	0.01	0.01	0.01	0.02	25.65	9.10	133.74	92.29	65.17	273.25
Cong 81,87	ND	ND	0.32	0.63	0.41	0.50	0.33	0.45	0.22	0.25	0.18	0.37			30.02	71.32	37.16	72.81

Amphipod PCB	ng/g wet weight						MDL (ng/g wet weight)						ng/g lipid					
		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68		CONTROL	BSM 38	BSM 45	BSM 54	BSM 68
	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28	DAY 0	Day 28	Day 28	Day 28	Day 28	Day 28
Cong 85	0.07	ND	0.32	0.81	0.48	0.45	0.02	0.02	0.01	0.01	0.01	0.02	5.81		29.68	91.83	43.36	64.72
Cong 136	ND	ND	0.24	0.78	0.31	0.30	0.02	0.02	0.01	0.01	0.01	0.02			22.52	89.03	28.28	43.15
Cong 77,110	0.37	0.13	2.23	6.43	2.87	3.01	0.02	0.02	0.01	0.01	0.01	0.02	32.43	14.07	208.80	732.75	258.52	435.05
Cong 82,151	0.02	ND	0.14	0.52	0.14	0.14	0.02	0.02	0.01	0.01	0.01	0.02	1.94		13.31	59.20	12.93	19.77
Cong 135,144	ND	ND	0.34	1.28	0.43	0.35	0.08	0.11	0.05	0.06	0.04	0.09			31.73	145.90	38.78	50.34
Cong 107	ND	ND	0.17	0.71	0.24	0.21	0.03	0.05	0.02	0.02	0.02	0.04			15.69	80.64	21.27	29.66
Cong 123,149	0.18	ND	2.33	8.22	2.17	2.12	0.05	0.07	0.03	0.04	0.03	0.06	15.49		218.36	936.91	195.23	305.61
Cong 118	0.10	ND	0.98	2.71	1.19	1.33	0.08	0.11	0.05	0.06	0.04	0.09	9.20		91.78	309.04	106.91	191.46
Cong 134	ND	ND	0.07	0.08	0.06	0.05	0.02	0.02	0.01	0.01	0.01	0.02			6.48	8.86	5.66	7.19
Cong 114	ND	ND	0.25	1.35	0.30	0.72	0.05	0.07	0.03	0.04	0.03	0.06			23.88	154.29	26.66	103.37
Cong 146	ND	ND	ND	ND	ND	ND	14.90	20.50	9.90	11.13	8.14	16.95						
Cong 132,153,105	0.34	ND	3.93	13.47	3.57	3.90	0.31	0.43	0.21	0.23	0.17	0.35	30.01		368.82	1534.95	321.53	563.59
Cong 141	ND	ND	0.54	1.93	0.44	0.40	0.02	0.02	0.01	0.01	0.01	0.02			50.49	220.48	39.32	57.53
Cong 137,130,176	ND	ND	0.21	1.19	0.28	0.27	0.03	0.05	0.02	0.02	0.02	0.04			19.45	135.18	25.31	39.55
Cong 163,138	0.24	0.11	3.46	12.63	4.05	4.26	0.02	0.02	0.01	0.01	0.01	0.02	21.29	11.58	324.80	1439.39	364.89	614.82
Cong 158	ND	ND	ND	ND	ND	ND	0.51	0.70	0.34	0.38	0.28	0.58						
Cong 129,178	ND	ND	0.31	1.47	0.33	0.27	0.02	0.02	0.01	0.01	0.01	0.02			29.34	167.34	29.62	39.55
Cong 187,182	0.07	ND	1.06	4.83	0.65	0.59	0.05	0.07	0.03	0.04	0.03	0.06	5.81		99.62	550.03	58.97	84.49
Cong 183	ND	ND	0.33	1.81	0.19	0.15	0.02	0.02	0.01	0.01	0.01	0.02			30.71	206.03	17.50	21.57
Cong 128	0.02	ND	0.20	0.78	0.28	0.29	0.02	0.02	0.01	0.01	0.01	0.02	1.94		19.11	89.03	25.58	41.35
Cong 167	ND	ND	ND	0.04	ND	ND	0.02	0.02	0.01	0.01	0.01	0.02				5.13		
Cong 185	ND	ND	0.06	0.30	0.03	ND	0.02	0.02	0.01	0.01	0.01	0.02			5.46	34.03	2.69	
Cong 174	0.04	ND	0.88	3.70	0.89	0.78	0.02	0.02	0.01	0.01	0.01	0.02	3.39		82.57	421.38	79.98	112.36
Cong 177	0.03	ND	0.72	3.54	0.87	0.82	0.02	0.02	0.01	0.01	0.01	0.02	2.90		67.21	403.20	78.09	117.75
Cong 202,171,156	0.04	ND	0.69	2.87	0.77	0.70	0.02	0.02	0.01	0.01	0.01	0.02	3.87		64.48	326.75	69.75	101.57
Cong 157,200	ND	ND	0.20	0.83	0.26	0.17	0.05	0.07	0.03	0.04	0.03	0.06			19.11	95.09	23.16	24.27
Cong 172	ND	ND	0.32	1.65	0.31	0.22	0.10	0.14	0.07	0.07	0.05	0.11			30.37	188.31	27.74	32.36
Cong 197	ND	ND	0.03	0.14	0.03	ND	0.02	0.02	0.01	0.01	0.01	0.02			3.07	16.31	2.42	
Cong 180	0.02	ND	2.13	9.91	1.46	1.30	0.02	0.02	0.01	0.01	0.01	0.02	1.94		199.25	1129.88	131.68	186.96
Cong 193	0.35	0.14	0.48	1.55	0.26	0.39	0.08	0.11	0.05	0.06	0.04	0.09	30.97	14.89	45.38	176.66	23.70	55.73
Cong 191	ND	ND	0.06	0.27	0.04	0.04	0.02	0.02	0.01	0.01	0.01	0.02			5.46	31.23	3.77	6.29
Cong 199	ND	ND	ND	0.74	ND	ND	0.66	0.90	0.44	0.49	0.36	0.75				84.37		
Cong 170,190	0.04	ND	1.27	6.69	1.60	1.46	0.02	0.02	0.01	0.01	0.01	0.02	3.39		119.41	762.58	144.07	210.33
Cong 198	ND	ND	0.07	0.24	0.10	0.05	0.02	0.02	0.01	0.01	0.01	0.02			6.82	27.04	9.43	7.19
Cong 201	ND	ND	0.93	3.73	0.65	0.42	0.02	0.02	0.01	0.01	0.01	0.02			87.00	424.64	58.71	61.12
Cong 203,196	ND	ND	0.82	3.88	0.55	0.40	0.08	0.11	0.05	0.06	0.04	0.09			77.11	441.89	49.82	58.43
Cong 189	ND	ND	0.05	0.19	0.05	0.04	0.02	0.02	0.01	0.01	0.01	0.02			4.44	21.91	4.85	6.29
Cong 208,195	ND	ND	0.44	1.57	0.40	0.26	0.02	0.02	0.01	0.01	0.01	0.02			41.62	179.46	35.82	37.75
Cong 207	ND	ND	0.06	0.14	0.04	ND	0.02	0.02	0.01	0.01	0.01	0.02			5.80	15.85	3.77	
Cong 194	ND	ND	0.52	2.92	0.46	0.32	0.02	0.02	0.01	0.01	0.01	0.02			49.13	332.81	41.47	45.84
Cong 205	ND	ND	0.03	0.07	0.01	0.03	0.02	0.02	0.01	0.01	0.01	0.02			2.39	8.39	1.35	4.49
Cong 206	ND	ND	0.63	1.26	0.39	0.14	0.02	0.02	0.01	0.01	0.01	0.02			58.68	144.03	35.55	19.77
Cong 209	ND	ND	0.19	0.17	0.18	0.06	0.03	0.05	0.02	0.02	0.02	0.04			17.74	19.58	16.16	8.99
Total PCB	3.87	1.18	52.03	147.38	52.35	53.40							342.17	129.07	4877.19	16795.85	4714.99	7707.75

Amphipod BDE	ng/g wet wt						MDL (ng/g wet weight)						ng/g lipid					
	DAY0	DAY 28 CONTROL	BSM38	BSM45	BSM54	BSM68	DAY0	DAY 28 CONTROL	BSM38	BSM45	BSM54	BSM68	DAY0	DAY 28 CONTROL	BSM38	BSM45	BSM54	BSM68
BDE-30	ND	ND	ND	ND	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00					0.56	2.70
BDE-17	0.09	ND	0.22	0.09	0.20	0.24	0.00	0.01	0.00	0.00	0.00	0.00	7.86		20.51	10.11	18.35	34.27
BDE-25	0.01	ND	0.02	ND	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.72		2.02		2.21	7.61
BDE-28,33	0.07	0.02	0.07	0.05	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	6.18	2.39	6.17	5.96	6.25	13.01
BDE-75	0.03	ND	0.06	ND	0.12	0.15	0.00	0.00	0.00	0.00	0.00	0.00	2.41		5.58		10.96	21.85
BDE-49,71	ND	ND	ND	ND	ND	ND	0.02	0.03	0.02	0.02	0.01	0.03						
BDE-47	3.72	1.28	1.89	1.76	1.74	2.90	0.81	1.11	0.54	0.60	0.44	0.92	329.10	140.76	177.45	200.89	156.75	418.23
BDE-66	0.21	0.03	0.06	ND	0.06	0.09	0.01	0.02	0.01	0.01	0.01	0.02	18.84	3.24	5.84		5.79	12.79
BDE-100	1.16	0.23	0.42	0.31	0.34	0.47	0.16	0.21	0.10	0.12	0.09	0.18	102.74	25.16	39.12	35.55	30.22	67.54
BDE-119	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00	0.00						
BDE-99	6.47	0.91	1.44	1.05	1.13	1.66	0.63	0.86	0.42	0.47	0.34	0.71	571.93	100.35	135.25	119.87	101.93	239.38
BDE-116	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00	0.00						
BDE-155,85	0.04	0.01	0.03	ND	ND	ND	0.01	0.01	0.00	0.01	0.00	0.01	3.72	1.47	3.09			
BDE-154	0.35	0.04	0.15	0.13	0.14	0.15	0.01	0.02	0.01	0.01	0.01	0.02	30.89	4.69	13.90	14.59	12.17	21.44
BDE-153	0.31	0.05	0.10	0.09	0.11	0.12	0.04	0.05	0.02	0.03	0.02	0.04	27.69	5.79	9.71	9.71	9.61	17.01
BDE-138	ND	ND	ND	ND	ND	ND	0.01	0.01	0.01	0.01	0.00	0.01						
BDE-156	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00	0.00						
BDE-183	ND	ND	ND	ND	ND	ND	0.03	0.05	0.02	0.02	0.02	0.04						
BDE-191	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00	0.00						
BDE-181	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00	0.00						
BDE-190	ND	ND	ND	ND	ND	ND	0.00	0.01	0.00	0.00	0.00	0.01						
BDE-204	ND	ND	ND	ND	ND	ND	0.00	0.01	0.00	0.00	0.00	0.01						
BDE-197	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00	0.00						
BDE-198,203	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00	0.00						
BDE-196	ND	ND	ND	ND	ND	ND	0.00	0.00	0.00	0.00	0.00	0.00						
BDE-205	ND	ND	ND	ND	ND	ND	0.00	0.01	0.00	0.00	0.00	0.00						
BDE-208	ND	ND	ND	ND	ND	ND	0.04	0.06	0.03	0.03	0.02	0.05						
BDE-207	ND	ND	ND	ND	ND	ND	0.01	0.01	0.00	0.01	0.00	0.01						
BDE-206	ND	ND	ND	ND	ND	ND	0.08	0.11	0.05	0.06	0.04	0.09						
BDE-209	ND	ND	ND	ND	ND	ND	0.50	0.69	0.33	0.37	0.27	0.57						
Total BDE	12.47	2.58	4.47	3.48	3.94	5.93							1102.09	283.86	418.63	396.68	354.24	853.13

Sediment PAHs (ng/g dry sediment)										Sediment PAHs (ng/g organic carbon)								
	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
fraction carbon										0.015	0.079	0.060	0.043	0.053	0.038	0.039	0.057	0.065
Naphthalene	<1.67	461.39	150.86	174.28	293.88	64.91	232.34	82.14	94.77		5862.67	2518.48	4053.05	5597.70	1717.11	5911.90	1446.08	1460.30
2-Methylnaphthalene	1.17	106.49	62.67	152.37	270.65	47.88	176.01	63.67	89.77	78.11	1353.10	1046.19	3543.54	5155.25	1266.67	4478.62	1120.95	1383.17
Azulene	<0.04	15.54	<0.08	0.36	1.55	0.11	0.16	0.19	0.62		197.45		8.28	29.59	2.78	3.95	3.34	9.63
1-Methylnaphthalene	0.51	42.62	25.07	66.01	134.96	20.03	80.97	26.56	35.10	33.69	541.53	418.45	1535.01	2570.72	529.87	2060.20	467.63	540.79
Biphenyl	<0.36	44.34	17.19	32.74	38.21	10.16	25.82	16.92	24.31		563.45	287.00	761.48	727.80	268.70	657.10	297.85	374.53
Acenapthylene	0.15	50.72	17.64	21.10	19.48	7.65	15.86	28.00	30.47	9.73	644.49	294.53	490.79	371.05	202.50	403.56	492.90	469.44
Acenapthene	<0.74	34.87	18.34	33.87	43.66	20.16	43.11	70.74	71.36		443.04	306.22	787.75	831.60	533.31	1096.96	1245.41	1099.47
Fluorene	0.67	42.82	33.23	92.83	108.98	24.58	59.24	64.34	139.59	44.67	544.15	554.77	2158.81	2075.82	650.33	1507.26	1132.72	2150.81
1-Methylfluorene	0.32	69.54	11.54	34.92	57.03	10.30	24.56	27.21	114.16	21.46	883.61	192.72	812.05	1086.26	272.46	624.89	479.13	1759.06
Phenanthrene	3.96	207.24	187.22	532.78	723.61	136.03	350.70	566.36	911.06	263.77	2633.24	3125.48	12390.25	13783.10	3598.80	8923.63	9971.20	14037.95
Anthracene	0.91	91.34	67.43	117.44	173.02	41.99	101.07	165.93	346.76	60.64	1160.65	1125.64	2731.13	3295.58	1110.91	2571.87	2921.29	5342.99
2-Methylphenanthrene	1.12	43.62	35.61	96.03	177.22	30.06	89.17	106.05	224.86	74.86	554.22	594.50	2233.32	3375.66	795.30	2268.92	1867.05	3464.67
2-Methylanthracene	0.25	49.42	11.25	32.43	58.12	11.82	30.95	39.90	127.06	16.72	627.96	187.86	754.10	1107.04	312.83	787.51	702.38	1957.71
4,5-Methylenephenanthrene	0.62	55.71	77.98	83.25	100.51	29.12	54.18	125.48	271.05	41.18	707.84	1301.92	1936.00	1914.56	770.46	1378.52	2209.15	4176.36
1-Methylanthracene	0.81	49.35	32.43	74.71	121.46	23.66	71.96	83.60	219.72	53.90	627.11	541.45	1737.49	2313.61	625.81	1830.98	1471.74	3385.50
1-Methylphenanthrene	0.89	21.31	26.52	64.02	108.20	20.50	54.03	70.34	177.51	59.14	270.80	442.66	1488.94	2060.90	542.46	1374.82	1238.46	2735.20
9-Methylanthracene	0.70	24.82	17.67	<0.98	2.70	0.90	1.82	3.14	10.61	46.42	315.40	294.99		51.47	23.70	46.23	55.35	163.43
Fluoranthene	13.30	1042.19	862.88	1180.83	1388.33	404.45	739.63	1859.22	3291.37	886.89	13242.61	14405.41	27461.25	26444.37	10699.65	18820.05	32732.75	50714.48
Pyrene	11.63	951.65	795.27	1016.96	1230.09	389.93	640.77	1987.55	3129.90	775.59	12092.11	13276.64	23650.26	23430.34	10315.73	16304.59	34992.04	48226.52
3,6-Dimethylphenanthrene	<0.07	<0.11	<0.12	<0.14	10.22	3.10	4.76	14.69	52.42					194.63	82.05	121.11	258.55	807.73
Benzo[a]fluorene	1.31	143.27	73.70	126.73	198.60	46.66	94.39	181.30	430.10	87.34	1820.44	1230.46	2947.10	3782.90	1234.47	2401.74	3191.87	6627.06
Benzo[b]fluorene	1.13	171.30	131.70	131.05	209.64	59.67	90.53	225.42	530.21	75.11	2176.67	2198.59	3047.71	3993.18	1578.51	2303.68	3968.72	8169.58
Benz[a]anthracene	4.48	330.27	259.70	409.44	679.06	159.91	342.78	695.94	1312.35	298.96	4196.55	4335.56	9521.80	12934.39	4230.34	8722.17	12252.54	20221.06
Chrysene+Triphenylene	8.99	276.84	291.71	563.74	699.88	204.33	405.81	777.82	1345.96	599.41	3517.70	4869.94	13110.34	13330.99	5405.64	10325.96	13694.07	20738.97
Napthacene	1.53	36.37	37.76	75.22	94.24	33.21	50.93	132.16	200.23	102.31	462.18	630.40	1749.36	1794.99	878.49	1295.87	2326.80	3085.27
Benzo[b]fluoranthene	6.34	787.59	715.44	816.42	994.25	333.63	467.01	1648.08	2281.26	422.98	10007.56	11943.92	18986.55	18938.10	8826.29	11883.14	29015.50	35150.43
Benzo[k]fluoranthene	10.80	437.05	402.65	447.20	557.60	218.86	345.39	645.46	1075.47	720.19	5553.35	6722.00	10400.08	10621.03	5790.05	8788.64	11363.67	16571.22
Dimethylbenz[a]anthracene	<0.08	62.24	16.41	15.67	24.68	6.91	12.51	40.17	63.73		790.81	273.91	364.45	470.08	182.89	318.36	707.20	981.91
Benzo[e]pyrene	6.31	410.41	362.29	436.31	507.96	186.13	286.24	893.87	1144.19	420.74	5214.88	6048.17	10146.86	9675.48	4923.98	7283.41	15737.19	17630.03
Benzo[a]pyrene	11.58	549.43	453.69	537.52	719.85	216.45	397.54	1091.68	1484.01	772.10	6981.34	7574.19	12500.40	13711.34	5726.31	10115.46	19219.69	22866.10
Perylene	3.69	174.63	154.30	242.84	307.00	97.83	221.81	376.11	481.05	246.30	2218.95	2576.04	5647.46	5847.59	2588.08	5644.09	6621.58	7412.14
3-Methylchloanthrene	<0.20	5.57	4.75	8.83	15.28	4.07	5.54	25.50	34.62		70.74	79.22	205.35	290.97	107.71	140.84	448.92	533.43
Indeno[1,2,3-c,d]pyrene	3.39	888.45	640.58	699.52	735.00	268.20	438.22	1405.16	2045.45	225.84	11289.07	10694.23	16268.01	13999.99	7095.13	11150.65	24738.76	31516.90
Dibenz[a,h+ac]anthracene	0.21	78.86	49.12	61.93	91.49	26.20	53.52	116.02	248.76	13.73	1002.02	820.11	1440.17	1742.66	693.15	1361.71	2042.58	3832.97
Benzo[g,h,i]perylene	6.37	647.90	493.52	563.68	531.71	215.34	327.11	1112.99	1414.98	424.98	8232.48	8239.11	13108.90	10127.84	5696.89	8323.45	19594.95	21802.42
Anthanthrene	0.14	132.41	93.46	99.28	117.85	34.86	70.01	208.47	261.30	9.23	1682.50	1560.31	2308.73	2244.78	922.30	1781.31	3670.20	4026.18
Coronene	0.06	148.79	71.12	105.70	83.82	44.38	59.75	110.70	133.88	4.00	1890.64	1187.37	2458.11	1596.56	1173.99	1520.25	1949.00	2062.92
Total PAH	103.35	8686.38	6702.72	9148.03	11629.80	3454.00	6466.16	15088.87	23849.99	6889.98	110373.30	111898.45	212744.88	221519.92	91375.63	164533.39	265649.21	367488.30

Sediment PCBs (ng/g dry sediment)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
fraction OC									
Cong 1	<0.98	<1.58	<1.82	<2.03	<1.68	<1.62	<1.31	<1.99	<1.92
Cong 3	<0.37	<0.59	6.61	<0.76	<0.63	<0.61	<0.49	<0.74	<0.72
Cong 4,10	<0.34	<0.55	<0.63	<0.70	<0.58	<0.56	<0.45	<0.69	<0.66
Cong 7,9	<0.07	<0.11	0.35	0.20	0.48	0.16	0.13	0.29	0.36
Cong 6	<0.002	0.08	0.43	<0.004	0.55	0.14	0.18	0.21	0.69
Cong 8,5	<0.60	3.60	17.73	<1.25	7.76	4.26	3.00	6.98	16.68
Cong 19	<0.08	<0.13	<0.15	<0.17	<0.14	<0.14	<0.11	<0.17	<0.16
Cong 12,13	<0.003	<0.005	0.34	<0.01	0.38	0.21	0.12	0.24	0.43
Cong 18	<0.002	1.54	2.20	0.87	1.77	0.86	0.60	1.33	4.94
Cong 17	<0.01	0.80	1.62	0.87	1.95	0.88	0.70	1.14	5.12
Cong 24	<0.06	0.67	0.23	0.14	0.19	0.13	0.11	0.18	3.00
Cong 16,32	<0.10	1.23	2.55	1.28	1.97	1.01	0.69	1.34	6.30
Cong 29	<0.06	<0.09	<0.11	<0.12	<0.10	<0.10	<0.08	<0.12	<0.11
Cong 26	<0.01	0.70	0.54	<0.02	1.15	0.35	0.31	0.58	4.41
Cong 25	<0.04	0.29	0.27	0.18	0.84	0.24	0.19	0.28	2.26
Cong 31,28	<0.003	11.76	7.09	3.65	9.36	3.17	3.58	5.23	32.06
Cong 33,21,53	<0.07	3.32	5.23	3.09	7.01	3.03	1.86	3.95	24.82
Cong 51	<0.03	0.55	0.50	1.20	1.31	0.50	0.44	0.93	18.77
Cong 22	<0.04	3.00	1.99	1.37	2.53	1.00	0.92	1.96	9.19
Cong 45	<0.02	1.00	1.11	1.10	1.38	0.64	0.36	1.19	4.26
Cong 46	<0.10	0.58	0.37	0.26	0.32	0.23	<0.13	0.48	1.02
Cong 52	<0.02	4.37	3.50	2.46	4.79	1.96	1.40	3.20	34.93
Cong 49	<6.85	<11.08	<12.70	<14.17	<11.75	<11.31	<9.16	<3.90	19.37
Cong 47,48	<0.02	2.35	3.42	2.66	6.37	2.99	1.58	3.50	43.86
Cong 44	<0.04	31.47	3.73	1.85	3.88	1.68	1.19	2.31	9.86
Cong 37,42	0.01	3.33	2.41	1.55	3.29	1.46	0.98	2.16	8.90
Cong 41,64,71	<0.10	3.82	5.00	2.66	6.29	2.96	1.57	3.64	17.13
Cong 40	<0.01	0.81	0.88	0.62	1.54	0.71	0.32	0.77	8.13
Cong 100	<0.03	1.33	0.40	1.00	1.56	0.57	0.40	0.91	18.68
Cong 63	<0.01	0.32	0.21	0.15	0.29	0.15	0.08	0.17	0.87
Cong 74	<0.01	2.80	2.06	1.15	2.66	1.24	0.68	1.52	6.98
Cong 70,76	0.01	7.30	4.89	2.78	8.30	2.80	1.99	3.87	18.55
Cong 66,95	0.02	10.01	10.89	7.59	20.72	9.50	4.03	10.35	66.78
Cong 91	0.00	0.72	0.73	1.02	2.33	1.11	0.46	1.12	19.81
Cong 56,60,92,84	<0.13	7.95	4.51	2.31	5.25	2.24	1.58	3.48	11.90
Cong 84,89	0.02	2.45	2.64	2.51	6.09	2.65	0.93	2.90	14.70
Cong 101	0.04	2.87	3.34	2.70	8.00	3.52	1.33	3.97	28.62
Cong 99	<0.001	1.45	1.85	1.55	5.66	2.32	0.85	2.24	20.59
Cong 119	<0.04	0.74	0.43	0.86	1.05	0.50	0.20	0.86	6.88
Cong 83	<0.001	0.28	0.22	0.17	0.72	0.26	0.08	0.29	1.33
Cong 97	<0.02	6.75	4.53	3.85	11.69	7.05	4.67	4.13	17.44
Cong 81,87	<0.25	1.37	1.40	0.93	2.05	0.90	0.44	1.40	6.77

Sediment PCBs (ng/g organic carbon)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
fraction OC	0.015	0.0787	0.0599	0.043	0.0525	0.0378	0.0393	0.0568	0.0649
Cong 1									
Cong 3			110.40						
Cong 4,10									
Cong 7,9			5.79	4.61	9.18	4.32	3.27	5.07	5.53
Cong 6		1.01	7.14		10.50	3.71	4.56	3.67	10.70
Cong 8,5		45.79	296.07		147.84	112.68	76.33	122.87	257.00
Cong 19									
Cong 12,13			5.73		7.33	5.58	3.01	4.19	6.57
Cong 18		19.62	36.66	20.16	33.66	22.65	15.26	23.45	76.12
Cong 17		10.19	27.00	20.26	37.19	23.26	17.72	20.05	78.89
Cong 24		8.47	3.87	3.14	3.60	3.40	2.82	3.17	46.20
Cong 16,32		15.58	42.57	29.69	37.44	26.63	17.65	23.58	97.03
Cong 29									
Cong 26		8.95	8.99		21.92	9.17	7.88	10.26	68.03
Cong 25		3.68	4.43	4.22	15.95	6.41	4.78	4.85	34.83
Cong 31,28		149.46	118.40	84.85	178.36	83.95	91.08	91.99	493.97
Cong 33,21,53		42.13	87.32	71.75	133.46	80.18	47.25	69.55	382.41
Cong 51		6.96	8.32	27.96	25.03	13.17	11.25	16.34	289.18
Cong 22		38.06	33.18	31.94	48.16	26.37	23.33	34.54	141.53
Cong 45		12.72	18.61	25.63	26.24	16.95	9.20	20.99	65.58
Cong 46		7.37	6.19	6.05	6.16	5.98		8.41	15.70
Cong 52		55.55	58.39	57.20	91.30	51.94	35.70	56.33	538.23
Cong 49									298.47
Cong 47,48		29.91	57.03	61.97	121.35	79.21	40.09	61.65	675.86
Cong 44		399.88	62.30	43.08	73.84	44.36	30.35	40.68	151.88
Cong 37,42		42.27	40.27	36.06	62.59	38.51	24.94	38.06	137.09
Cong 41,64,71		48.50	83.47	61.84	119.72	78.33	39.94	64.00	264.02
Cong 40		10.30	14.75	14.47	29.26	18.77	8.26	13.61	125.30
Cong 100		16.94	6.75	23.29	29.72	15.18	10.28	15.94	287.81
Cong 63		4.01	3.44	3.37	5.57	3.99	2.06	2.95	13.44
Cong 74		35.58	34.37	26.70	50.70	32.80	17.25	26.69	107.50
Cong 70,76	0.67	92.72	81.61	64.66	158.03	73.96	50.59	68.17	285.86
Cong 66,95	1.33	127.17	181.77	176.41	394.68	251.39	102.50	182.15	1028.95
Cong 91	0.27	9.11	12.15	23.63	44.29	29.29	11.69	19.69	305.18
Cong 56,60,92,84		100.97	75.34	53.64	100.07	59.35	40.24	61.27	183.38
Cong 84,89	1.57	31.11	44.11	58.33	115.91	70.18	23.66	51.14	226.46
Cong 101	2.80	36.42	55.76	62.74	152.40	93.15	33.88	69.95	441.04
Cong 99		18.43	30.96	36.10	107.82	61.46	21.60	39.37	317.24
Cong 119		9.38	7.12	20.05	19.98	13.35	5.04	15.11	106.07
Cong 83		3.58	3.60	3.85	13.80	6.90	1.98	5.02	20.43
Cong 97		85.81	75.65	89.51	222.75	186.59	118.74	72.64	268.68
Cong 81,87		17.37	23.35	21.74	39.14	23.71	11.30	24.69	104.25

Sediment PCBs (ng/g dry sediment)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
Cong 85	<0.01	<0.02	0.99	0.65	1.84	0.80	0.33	0.98	5.50
Cong 136	<0.001	0.60	0.58	0.55	1.58	0.85	0.21	0.70	8.21
Cong 77,110	0.03	4.03	5.00	4.24	13.52	5.13	2.07	6.35	52.94
Cong 82,151	<0.002	0.06	0.32	0.32	1.11	0.52	0.14	0.50	4.00
Cong 135,144	<0.04	0.55	0.93	0.92	3.52	1.63	0.41	1.33	11.66
Cong 107	<0.06	0.24	0.27	0.32	1.46	0.63	0.18	0.50	6.85
Cong 123,149	<0.06	3.10	4.09	4.64	15.74	7.75	2.02	6.23	64.55
Cong 118	<0.16	1.81	2.66	1.96	6.91	2.55	1.02	3.13	16.58
Cong 134	<0.01	<0.02	0.28	0.34	0.69	0.39	0.11	0.25	0.58
Cong 114	<0.03	4.88	1.17	1.08	3.88	1.28	0.59	1.73	15.53
Cong 146	<0.13	2.37	1.88	2.39	9.25	3.99	2.14	4.59	37.30
Cong 132,153,105	0.08	14.85	13.33	12.32	39.81	18.89	8.61	23.11	143.58
Cong 141	<0.014	2.00	2.24	1.93	6.76	3.15	1.18	3.57	23.19
Cong 137,130,176	<0.001	1.08	0.80	0.84	3.02	1.37	0.51	1.52	8.01
Cong 163,138	0.04	9.15	9.08	7.98	26.68	12.58	5.27	15.36	90.58
Cong 158	<0.47	<0.77	<0.88	<0.98	<0.81	<0.78	<0.63	<0.96	1.55
Cong 129,178	<0.001	1.18	1.31	1.30	5.00	2.11	0.81	2.03	13.23
Cong 187,182	<0.02	3.53	3.06	4.18	14.93	7.10	2.39	6.00	47.92
Cong 183	<0.002	1.81	1.95	2.20	8.95	4.04	2.26	3.88	23.75
Cong 128	0.03	1.32	1.24	1.00	3.74	1.35	0.97	2.07	8.76
Cong 167	<0.004	3.48	0.63	0.56	9.91	0.98	2.58	0.79	5.30
Cong 185	<0.001	0.22	0.32	0.50	1.77	0.75	0.24	0.43	4.23
Cong 174	<0.002	1.99	2.30	3.10	10.27	4.63	1.69	3.69	28.54
Cong 177	<0.01	1.74	1.47	1.76	6.65	3.47	1.30	3.34	20.19
Cong 202,171,156	<0.01	1.93	<0.01	2.47	6.74	3.02	1.12	2.93	17.12
Cong 157,200	<0.01	0.70	0.67	1.04	2.92	1.31	0.60	1.31	5.93
Cong 172	<0.01	0.25	0.50	0.57	2.44	0.99	0.31	0.95	7.13
Cong 197	<0.01	0.14	0.15	<0.01	<0.01	0.25	0.13	1.16	1.82
Cong 180	<0.01	5.35	5.54	6.33	26.21	12.30	3.79	9.83	71.60
Cong 193	<0.20	0.61	0.46	0.97	2.46	1.28	0.63	1.18	7.25
Cong 191	<0.002	<0.004	<0.004	<0.005	0.67	0.38	1.14	0.61	1.78
Cong 199	<0.85	<1.37	<1.57	<1.75	<1.45	<1.40	<1.13	<1.72	<1.66
Cong 170,190	<0.01	2.24	2.63	2.96	12.76	6.08	1.90	4.06	36.35
Cong 198	<0.002	0.14	0.08	0.27	0.72	0.30	0.63	1.95	1.49
Cong 201	<0.01	1.98	1.60	4.49	8.87	3.69	1.32	3.48	17.03
Cong 203,196	<0.20	3.53	2.79	7.07	17.20	6.93	2.31	3.95	33.58
Cong 189	<0.001	<0.001	0.08	0.07	0.31	0.15	<0.001	<0.002	0.84
Cong 208,195	<0.002	0.86	0.49	3.19	4.40	1.96	1.02	1.78	8.50
Cong 207	<0.003	0.13	0.27	0.92	0.89	0.38	0.54	0.75	1.06
Cong 194	<0.02	1.06	1.04	1.62	6.61	2.71	0.66	1.34	13.75
Cong 205	<0.01	0.02	0.07	0.04	0.23	0.06	0.54	2.57	0.64
Cong 206	<0.07	2.00	1.30	6.43	5.05	2.14	1.21	2.76	5.60
Cong 209	<0.03	0.77	0.97	2.50	1.87	1.13	0.95	0.84	1.63
Total PCB	0.30	203.29	180.73	150.60	438.81	194.37	93.78	212.60	1392.00

Sediment PCBs (ng/g organic carbon)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
Cong 85			16.58	15.07	34.99	21.18	8.41	17.17	84.77
Cong 136		7.66	9.63	12.68	30.13	22.50	5.45	12.24	126.46
Cong 77,110	2.08	51.18	83.43	98.51	257.50	135.83	52.68	111.75	815.67
Cong 82,151		0.77	5.40	7.50	21.23	13.86	3.68	8.79	61.67
Cong 135,144		7.04	15.61	21.37	67.08	43.20	10.36	23.49	179.63
Cong 107		2.99	4.56	7.53	27.73	16.61	4.65	8.79	105.56
Cong 123,149		39.33	68.27	108.02	299.73	204.96	51.42	109.67	994.60
Cong 118		23.00	44.38	45.68	131.54	67.40	26.02	55.17	255.52
Cong 134			4.69	7.82	13.22	10.39	2.71	4.38	9.01
Cong 114		62.04	19.45	25.07	73.82	33.74	14.94	30.51	239.35
Cong 146		30.15	31.47	55.57	176.13	105.65	54.55	80.79	574.73
Cong 132,153,105	5.48	188.64	222.47	286.58	758.25	499.79	219.16	406.79	2212.29
Cong 141		25.45	37.36	44.91	128.69	83.22	30.12	62.82	357.31
Cong 137,130,176		13.74	13.35	19.57	57.43	36.14	12.88	26.82	123.44
Cong 163,138	2.92	116.26	151.62	185.53	508.25	332.85	134.04	270.35	1395.74
Cong 158									23.84
Cong 129,178		14.99	21.80	30.23	95.17	55.70	20.49	35.79	203.87
Cong 187,182		44.84	51.17	97.22	284.47	187.71	60.72	105.61	738.33
Cong 183		23.06	32.62	51.13	170.52	106.88	57.52	68.40	366.02
Cong 128	1.88	16.71	20.69	23.25	71.30	35.60	24.80	36.48	134.91
Cong 167		44.24	10.57	13.02	188.75	25.90	65.65	13.96	81.66
Cong 185		2.82	5.34	11.64	33.79	19.82	6.21	7.50	65.19
Cong 174		25.28	38.39	72.14	195.70	122.57	42.92	64.93	439.68
Cong 177		22.10	24.49	40.91	126.59	91.83	33.03	58.79	311.11
Cong 202,171,156		24.55		57.54	128.41	79.83	28.53	51.50	263.84
Cong 157,200		8.92	11.19	24.28	55.56	34.78	15.22	23.13	91.42
Cong 172		3.18	8.31	13.26	46.42	26.19	7.76	16.73	109.93
Cong 197		1.74	2.53			6.72	3.35	20.49	27.98
Cong 180		67.99	92.42	147.22	499.22	325.29	96.34	173.09	1103.23
Cong 193		7.69	7.67	22.55	46.77	33.83	15.92	20.78	111.72
Cong 191					12.77	9.95	29.11	10.69	27.50
Cong 199									
Cong 170,190		28.41	43.94	68.89	243.06	160.73	48.35	71.49	560.04
Cong 198		1.80	1.30	6.39	13.70	7.98	16.14	34.29	22.89
Cong 201		25.13	26.78	104.33	168.92	97.70	33.46	61.22	262.44
Cong 203,196		44.85	46.63	164.46	327.67	183.36	58.66	69.60	517.39
Cong 189			1.26	1.72	5.84	3.89			12.87
Cong 208,195		10.94	8.19	74.15	83.89	51.90	26.07	31.38	130.97
Cong 207		1.69	4.49	21.33	16.97	10.05	13.65	13.28	16.31
Cong 194		13.47	17.32	37.67	125.88	71.77	16.92	23.58	211.79
Cong 205		0.19	1.20	1.03	4.47	1.65	13.73	45.23	9.94
Cong 206		25.45	21.65	149.61	96.22	56.58	30.91	48.68	86.25
Cong 209		9.82	16.12	58.09	35.61	29.83	24.17	14.76	25.16
Total PCB	19.93	2583.13	3017.17	3502.42	8358.33	5142.16	2386.20	3742.94	21448.42

Sediment BDEs (ng/g dry sediment)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
fraction OC									
BDE-30	<0.02	<0.04	<0.04	<0.05	<0.04	<0.04	<0.03	<0.04	<0.04
BDE-17	<0.03	<0.06	<0.06	0.17	0.09	<0.06	0.09	0.24	<0.07
BDE-25	<0.03	<0.04	<0.05	<0.05	<0.04	<0.04	<0.03	<0.05	<0.05
BDE-28,33	<0.03	<0.04	<0.05	<0.06	0.08	<0.04	<0.04	<0.05	<0.05
BDE-75	<0.05	<0.07	<0.08	<0.09	<0.08	<0.08	<0.06	<0.09	<0.09
BDE-49,71	<0.02	<0.04	<0.04	<0.05	<0.04	<0.04	<0.03	<0.05	<0.04
BDE-47	<0.90	<1.45	<1.67	<1.86	<1.54	<0.04	<0.03	2.26	<1.76
BDE-66	<0.02	<0.03	<0.03	<0.04	<0.03	<1.48	<1.20	0.12	<0.03
BDE-100	<0.22	<0.35	<0.40	0.71	<0.03	<0.03	<0.02	0.64	0.46
BDE-119	<0.02	<0.04	<0.05	<0.05	<0.04	<0.04	0.04	0.08	<0.05
BDE-99	<0.88	<1.42	<1.63	3.29	<1.51	<1.45	<1.17	2.78	<1.72
BDE-116	<0.01	<0.02	<0.02	0.30	<0.02	<0.02	<0.02	<0.03	1.67
BDE-155,85	<0.04	<0.07	<0.08	<0.09	<0.07	<0.07	<0.06	<0.09	<0.08
BDE-154	<0.02	0.84	<0.04	0.54	0.15	<0.03	0.09	0.50	0.43
BDE-153	<0.04	<0.07	<0.08	0.44	0.11	<0.07	0.07	0.43	0.33
BDE-138	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02
BDE-156	<0.03	<0.05	<0.06	<0.07	<0.06	<0.05	<0.04	<0.07	<0.06
BDE-183	<0.04	<0.06	<0.07	0.42	0.09	<0.06	0.12	0.48	0.19
BDE-191	<0.02	<0.04	<0.04	<0.05	<0.04	<0.04	<0.03	<0.05	<0.05
BDE-181	<0.03	<0.04	<0.05	<0.05	<0.04	<0.04	<0.03	<0.05	<0.05
BDE-190	<0.06	<0.10	<0.11	<0.12	<0.10	<0.10	<0.08	<0.12	<0.12
BDE-204	<0.14	<0.23	<0.26	<0.30	<0.24	<0.24	<0.19	<0.29	<0.28
BDE-197	<0.03	<0.06	<0.06	<0.07	0.11	<0.06	<0.05	0.27	0.29
BDE-198,203	<0.10	<0.16	<0.18	<0.20	<0.17	<0.16	<0.13	<0.13	0.29
BDE-196	<0.07	<0.11	<0.13	<0.14	0.22	0.23	0.10	0.25	0.35
BDE-205	<0.03	<0.05	<0.06	<0.07	<0.06	<0.05	<0.04	<0.07	<0.06
BDE-208	<0.24	10.45	2.06	1.13	0.67	0.84	0.42	1.43	1.58
BDE-207	<0.33	26.53	6.52	1.92	1.95	3.10	0.97	2.47	4.32
BDE-206	<0.44	28.61	7.87	1.70	1.96	3.86	1.66	2.82	5.19
BDE-209	<0.80	1604.97	344.99	80.28	120.25	128.39	56.49	89.74	285.07
Total BDE	0.00	1671.40	361.44	90.91	125.69	136.42	60.06	104.52	300.16

Sediment BDEs (ng/g organic carbon)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
fraction OC	0.015	0.079	0.060	0.043	0.053	0.038	0.039	0.057	0.065
BDE-30									
BDE-17				4.05	1.64		2.41	4.21	
BDE-25									
BDE-28,33					1.55				
BDE-75									
BDE-49,71									
BDE-47								39.81	
BDE-66								2.09	
BDE-100				16.52				11.35	7.05
BDE-119							0.94	1.48	
BDE-99				76.55				49.01	
BDE-116				7.09					25.70
BDE-155,85									
BDE-154		10.69		12.49	2.91		2.41	8.80	6.63
BDE-153				10.16	2.09		1.73	7.65	5.10
BDE-138									
BDE-156									
BDE-183				9.70	1.62		3.01	8.40	2.92
BDE-191									
BDE-181									
BDE-190									
BDE-204									
BDE-197					2.19			4.80	4.42
BDE-198,203									4.39
BDE-196					4.13	6.03	2.49	4.44	5.35
BDE-205									
BDE-208		132.76	34.34	26.28	12.85	22.10	10.76	25.13	24.38
BDE-207		337.13	108.87	44.54	37.21	82.03	24.78	43.52	66.54
BDE-206		363.53	131.40	39.65	37.42	102.13	42.26	49.56	80.00
BDE-209		20393.46	5759.39	1867.07	2290.55	3396.67	1437.48	1579.89	4392.47
Total BDE		21237.56	6034.00	2114.09	2394.16	3608.96	1528.26	1840.14	4624.94

Sediment butyltins (ng/g dry sediment)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
Tributyltin	<0.4	40.00	26.00	74.00	31.00	7.00	130.00	97.00	170.00
Dibutyltin	<0.4	17.00	<12	<5	2.00	<2.4	2.00	30.00	16.00
Monobutyltin	<0.4	<0.2	<12	<5	<1.4	<2.4	<0.3	<0.3	<0.3

Sediment butyltins (ng/g organic carbon)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
fraction OC	0.015	0.079	0.060	0.043	0.053	0.038	0.039	0.057	0.065
Tributyltin		508.26	434.06	1720.93	590.48	185.19	3307.89	1707.75	2619.41
Dibutyltin		216.01			38.10		50.89	528.17	246.53
Monobutyltin									

Sediment metals (µg/g)

	Control	BSM 28	BSM 33	BSM 38	BSM 45	BSM 48	BSM 54	BSM 68	BSM 71
Cr	38.3	929	860	213	265	127	246	472	967
Cu	12.9	190	211	226	269	210	150	356	421
Zn	45.8	1460	1640	449	487	332	335	529	637
As	5.47	46.3	41.2	28.8	46.5	33.2	23.9	30.0	28.5
Ag	1.61	2.26	2.44	1.84	1.98	1.23	1.72	3.07	3.04
Cd	0.198	5.49	7.97	16.0	1.42	1.07	1.75	2.95	3.92
Pb	14.4	163	265	184	270	153	134	335	362

Worm day 28 PAH BSAFs	Control A	Control B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
Naphthalene												
2-Methylnaphthalene												
Azulene												
1-Methylnaphthalene												
Biphenyl												
Acenapthylene				0.016			0.016	0.012	0.019	0.017		
Acenapthene												
Fluorene												
1-Methylfluorene												
Phenanthrene												
Anthracene		0.111		0.008	0.003	0.004	0.003	0.003	0.005	0.003	0.002	0.003
2-Methylphenanthrene												
2-Methylanthracene	0.624			0.058			0.016					
4,5-Methylenephenanthrene			0.183	0.145	0.030	0.030	0.039	0.016	0.045	0.031	0.029	0.035
1-Methylanthracene				0.038	0.012	0.011	0.008					
1-Methylphenanthrene						0.009				0.007		
9-Methylanthracene												
Fluoranthene			0.082	0.078	0.021	0.015	0.033	0.014	0.023	0.023	0.018	0.021
Pyrene			0.095	0.083	0.023	0.019	0.045	0.016	0.025	0.030	0.025	0.026
3,6-Dimethylphenanthrene												
Benzo[a]fluorene			0.054	0.057	0.019	0.007	0.024	0.008	0.005	0.019	0.021	0.024
Benzo[b]fluorene				0.018	0.005	0.006	0.005	0.004	0.004	0.006	0.005	0.007
Benz[a]anthracene					0.002	0.002	0.001	0.001	0.001	0.001	0.002	0.001
Chrysene+Triphenylene	0.013		0.102	0.088	0.026	0.021	0.028	0.025	0.019	0.024	0.032	0.037
Napthacene												
Benzo[b]fluoranthene				0.003	0.001	0.001	0.001	0.001	0.002	0.003	0.001	0.001
Benzo[k]fluoranthene				0.009	0.004	0.003	0.006	0.004	0.001	0.005	0.003	0.006
Dimethylbenz[a]anthracene												
Benzo[e]pyrene				0.012	0.008	0.006	0.010	0.009	0.005	0.008	0.006	0.008
Benzo[a]pyrene					0.003	0.002	0.003				0.002	0.003
Perylene												
3-Methylchloanthrene												
Indeno[1,2,3-c,d]pyrene												
Dibenz[a,h+ac]anthracene												
Benzo[g,h,i]perylene				0.003	0.001	0.001	0.001				0.001	0.001
Anthanthrene												
Coronene												

Worm day 28 PCB BSAFs

PCB	Control A	Control B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
3			0.301									
4,10												
7,9												
6				0.049			0.131	0.033	0.274			
8,5			0.195	0.189			0.305	0.221	0.506		0.444	0.317
19												
12,13							0.101	0.083	0.133			0.070
18			0.426	0.373	0.221	0.259	0.725	0.369	0.992		0.355	0.298
17			0.123	0.100	0.189	0.138	0.382	0.293	0.660		0.217	0.228
24												
16,32			0.272	0.257	0.159	0.195	0.425	0.278	0.734		0.235	0.219
29												
26				0.125			0.204	0.074	0.161		0.084	0.100
25				1.014	1.137	0.715	0.430	0.265	0.590		0.810	0.714
31,28			0.415	0.294	0.096	0.080	0.168	0.109	0.150		0.150	0.132
33,21,53			0.245	0.117	0.248	0.270	0.099	0.227	0.903		0.080	0.263
51			0.276	0.227	0.216	0.201	0.502	0.325	0.775		0.302	0.311
22			0.352	0.315	0.353	0.266	0.309	0.183	0.500		0.430	0.417
45			0.385	0.398	0.177	0.232	0.462	0.287	1.258		0.271	0.255
46							0.494					
52			0.714	0.712	0.395	0.394	0.768	0.500	1.658		0.557	0.545
49												
48,47			0.486	0.507	0.318	0.359	0.552	0.363	1.497		0.432	0.372
44			0.322	0.337	0.157	0.123	0.311	0.197	0.402		0.237	0.238
37,42			0.292	0.356	0.194	0.176	0.323	0.263	0.620		0.261	0.295
41,64,71			0.287	0.282	0.198	0.151	0.303	0.223	0.770		0.271	0.255
40				0.131	0.393	0.363	0.486	0.287	1.840		0.527	0.516
100				0.647	0.268	0.230	0.272	0.282	0.807		0.408	0.433
63			0.937	0.761	0.495	0.603	0.552	0.566	1.464		0.705	1.214
74			0.394	0.380	0.188	0.182	0.306	0.232	0.615		0.266	0.244
70,76			0.200	0.168	0.031	0.017	0.104	0.047	0.063		0.085	0.050
66,95			0.486	0.504	0.363	0.351	0.452	0.280	1.795		0.458	0.423
91			0.771	0.888	0.313	0.288	0.411	0.262	1.597		0.545	0.510
56,60			0.563	0.440	0.254	0.199	0.275	0.248	0.636		0.269	0.311
92,84	1.810	0.865	0.348	0.405	0.398	0.386	0.285	0.191	1.579		0.515	0.481
89	2.204		0.473	0.490	0.287	0.262	0.396	0.252	1.805		0.374	0.391
101			0.435	0.437	0.260	0.213	0.353	0.214	1.712		0.346	0.347
99					0.404	0.432	0.330	0.387	1.342		0.684	0.608
119			0.350	0.541	0.451	0.419	0.270	0.166	2.112		0.328	0.371
83			0.172	0.150	0.098	0.132	0.144	0.095	0.289		0.162	0.103
97				0.584		0.541	0.321	0.357				
81,87			0.467	0.465	0.343	0.277	0.404	0.342	1.792		0.435	0.506

Worm day 28 PCB BSAFs

	Control A	Control B	BSM 33 A	BSM 33 B	BSM 38 A	BSM 38 B	BSM 45 A	BSM 45 B	BSM 54 A	BSM 54 B	BSM 68 A	BSM 68 B
85			0.170	0.261	0.235	0.217	0.358	0.182	2.552		0.329	0.300
136	2.060	0.828	0.391	0.492	0.280	0.224	0.331	0.207	1.755		0.302	0.335
110,77			0.334	0.362	0.251	0.206	0.311	0.185	2.261		0.291	0.304
82												
151												
134144			0.557	0.641	0.393	0.358	0.370	0.254	2.928		0.503	0.461
107			0.692	0.628	0.262	0.219	0.275	0.235	1.440		0.396	0.391
123149							0.109		0.596			
118						0.200	0.112	0.083	0.699		0.253	
134					0.494	0.451	0.350	0.248	1.433		0.412	0.363
146	8.452	6.692	0.478	0.539	0.370	0.355	0.313	0.246	1.350		0.331	0.309
132153105			0.144	0.184	0.119	0.068	0.130	0.091	0.697		0.081	0.109
141			0.134	0.258	0.139	0.104	0.178	0.114	1.019		0.096	0.072
137130176	8.301	5.147	0.434	0.518	0.335	0.323	0.293	0.240	1.317		0.300	0.305
163138												
158			0.025	0.148	0.113	0.104	0.151	0.082	0.827		0.149	0.099
129178			0.465	0.588	0.352	0.326	0.315	0.220	1.991		0.398	0.352
187182			0.309	0.536	0.324	0.319	0.277	0.203	1.111		0.323	0.308
183	1.033	0.660	0.244	0.278	0.183	0.178	0.127	0.118	0.399		0.170	0.161
128			0.149	0.218	0.114	0.118	0.022	0.019	0.051		0.171	0.154
185			0.194	0.220	0.086	0.099	0.131	0.073	1.024		0.155	0.137
174			0.074	0.076	0.043	0.033	0.088	0.056	0.618		0.052	0.043
177			0.328	0.422	0.252	0.217	0.242	0.171	1.274		0.206	0.217
202171156					0.184	0.167	0.208	0.168	1.187		0.267	0.241
157			0.235	0.272	0.115	0.114	0.141	0.129	0.682		0.153	0.144
172197			0.207	0.324	0.204	0.261	0.277	0.212	2.429		0.332	0.220
180									0.869		0.063	
193			0.362	0.427	0.291	0.279	0.257	0.201	1.895		0.349	0.284
191							0.343	0.406	1.032			
199							0.239	0.183	0.159		0.091	0.084
170190												
198			0.320	0.438	0.261	0.245	0.218	0.174	1.568		0.354	0.300
201				0.311	0.066	0.036	0.142	0.088	0.202		0.038	0.018
203196			0.284	0.334	0.129	0.114	0.204	0.132	1.562		0.151	0.145
189			0.363	0.465	0.175	0.161	0.225	0.164	1.846		0.364	0.309
208195			0.407	0.585	0.399	0.363	0.246	0.225				
207				0.656	0.109	0.102	0.204	0.180	0.933		0.228	0.180
194			0.217	0.238	0.093	0.078	0.170	0.183	0.306		0.085	0.083
205			0.295	0.399	0.200	0.197	0.208	0.131	2.309		0.359	0.280
206									0.213			
209			0.265	0.386	0.099	0.089	0.211	0.220	0.913		0.176	0.139

Worm day 28 BDE BSAFs

BSAF	BSM 38	BSM 38	BSM 45	BSM 45	BSM 54	BSM 54	BSM 68	BSM 68
	A	B	A	B	A	B	A	B
BDE-28,33			2.806	5.130				
BDE-154	0.267	0.138	0.736	1.065	0.652	0.479	0.273	0.340
BDE-153	0.317	0.113	0.565	1.079	0.000	0.634	0.371	0.445

Worm day 28 butyltin BSAFs

	BSM 45	BSM 45	BSM 54	BSM 68	BSM 68
	A	B	B	A	B
Tributyltir	0.060	0.048	0.086	0.042	0.029
Dibutyltin	35.625	30.000	33.686	2.029	1.623

Amphipod day 28 PAH BSAFs

	CONTROL	BSM 38	BSM 45	BSM 54	BSM 68
Naphthalene					
2-Methylnaphthalene					
Azulene					
1-Methylnaphthalene					
Biphenyl				0.055	0.238
Acenapthylene		0.348	0.589	0.573	1.189
Acenapthene		0.067	0.100	0.062	0.235
Fluorene	1.093	0.033	0.019	0.031	0.082
1-Methylfluorene	3.662	0.084	0.046	0.098	0.319
Phenanthrene	1.355	0.049	0.037	0.044	0.084
Anthracene		0.061	0.020	0.033	0.036
2-Methylphenanthren	1.956	0.122	0.081	0.095	0.329
2-Methylanthracene		0.143	0.041	0.083	0.214
4,5-Methylenephenan	0.623	0.300	0.062	0.182	0.212
1-Methylanthracene	2.072	0.274	0.085	0.119	0.000
1-Methylphenanthren	1.119	0.221	0.071	0.103	0.330
9-Methylanthracene			0.100	0.099	0.503
Fluoranthene	0.332	0.270	0.090	0.214	0.205
Pyrene	0.353	0.522	0.219	0.463	0.516
3,6-Dimethylphenanthrene					0.049
Benzo[a]fluorene		0.404	0.064	0.216	0.209
Benzo[b]fluorene		0.497	0.135	0.361	0.383
Benz[a]anthracene		0.457	0.137	0.258	0.248
Chrysene+Triphenylene		0.372	0.178	0.283	0.439
Napthacene		0.016	0.033	0.031	0.089
Benzo[b]fluoranthene	0.485	0.558	0.383	0.631	0.683
Benzo[k]fluoranthene		0.249	0.190	0.220	0.453
Dimethylbenz[a]anthracene		1.360	1.003	1.457	2.445
Benzo[e]pyrene		0.571	0.456	0.641	0.765
Benzo[a]pyrene		0.262	0.192	0.273	0.426
Perylene	0.370	0.467	0.473	0.510	0.643
3-Methylchloanthrene		0.193	0.095	0.279	0.386
Indeno[1,2,3-c,d]pyre	0.095	0.143	0.132	0.155	0.220
Dibenz[a,h+ac]anthra	0.362	0.188	0.134	0.218	0.404
Benzo[g,h,i]perylene	0.101	0.249	0.256	0.322	0.395
Anthanthrene		0.058	0.090	0.107	0.226
Coronene		0.085	0.032	0.066	0.207

Amphipod day 28 PCB BSAFs

	CONTROL	BSM 38	BSM 45	BSM 54	BSM 68
Cong 1					
Cong 3					
Cong 4,10					
Cong 7,9				0.329	
Cong 6					
Cong 8,5			1.015	1.591	2.999
Cong 19					
Cong 12,13					
Cong 18		0.728	0.429	1.094	0.383
Cong 17		0.606	0.401	0.699	0.269
Cong 24		10.646	5.561	5.153	18.163
Cong 16,32		0.460	0.461	1.022	0.648
Cong 29					
Cong 26			0.532	0.786	0.613
Cong 25					
Cong 31,28		0.921	0.567	1.236	1.182
Cong 33,21,53		0.580	0.489	1.197	0.659
Cong 51			1.993	3.254	2.696
Cong 22		0.983	0.368	1.039	0.833
Cong 45		0.413	0.711	1.610	1.113
Cong 46		0.564	1.210		1.389
Cong 52		1.897	2.563	3.040	2.441
Cong 49					
Cong 47,48		1.228	1.467	2.042	1.356
Cong 44		1.425	1.780	3.008	2.475
Cong 37,42		1.608	1.549	2.678	2.362
Cong 41,64,71		1.081	1.215	2.535	1.559
Cong 40		1.769	1.928	2.705	2.972
Cong 100		1.494	1.145	1.519	2.200
Cong 63		1.517	1.674	2.878	2.741
Cong 74		1.534	1.462	3.044	2.594
Cong 70,76		2.031	1.687	3.438	3.033
Cong 66,95		1.826	2.442	3.654	3.000
Cong 91		1.559	2.610	3.432	2.647
Cong 56,60,92,84		4.980	2.683	4.598	7.804
Cong 89	3.693	1.456	1.890	3.585	2.970
Cong 101	1.479	1.800	2.603	2.750	2.094
Cong 99		1.701	2.369	2.655	2.009
Cong 119		1.378	2.473	3.684	3.093
Cong 83		2.659	2.500	6.542	5.368
Cong 97		1.494	0.414	0.549	3.762
Cong 81,87		1.381	1.822	3.290	2.949
Cong 85		1.969	2.624	5.155	3.768
Cong 136		1.775	2.954	5.187	3.525
Cong 77,110		2.120	2.846	4.907	3.893
Cong 82,151		1.775	2.789	3.516	2.250
Cong 135,144		1.485	2.175	3.742	2.143
Cong 107		2.084	2.908	4.573	3.375
Cong 123,149		2.021	3.126	3.797	2.787
Cong 118		2.009	2.349	4.109	3.471
Cong 134		0.829	0.670	2.088	1.643
Cong 114		0.953	2.090	1.784	3.388
Cong 146					
Cong 132,153,105		1.287	2.024	1.467	1.385
Cong 141		1.124	1.713	1.305	0.916
Cong 137,130,176		0.994	2.354	1.965	1.475
Cong 163,138	3.961	1.751	2.832	2.722	2.274
Cong 158					
Cong 129,178		0.971	1.758	1.445	1.105
Cong 187,182		1.025	1.933	0.971	0.800
Cong 183		0.601	1.208	0.304	0.315
Cong 128		0.822	1.249	1.032	1.134
Cong 167			0.027		
Cong 185		0.469	1.007	0.433	
Cong 174		1.145	2.153	1.864	1.731
Cong 177		1.643	3.185	2.365	2.003
Cong 202,171,156		1.121	2.545	2.445	1.972
Cong 157,200		0.787	1.712	1.521	1.049
Cong 172		2.290	4.057	3.574	1.934
Cong 197				0.723	
Cong 180		1.353	2.263	1.367	1.080
Cong 193		2.013	3.778	1.488	2.682
Cong 191			2.445	0.130	0.589
Cong 199					
Cong 170,190		1.733	3.137	2.980	2.942
Cong 198		1.068	1.973	0.584	0.210
Cong 201		0.834	2.514	1.754	0.998
Cong 203,196		0.469	1.349	0.849	0.839
Cong 189		2.574	3.748		
Cong 208,195		0.561	2.139	1.374	1.203
Cong 207		0.272	0.934	0.276	
Cong 194		1.304	2.644	2.451	1.944
Cong 205		2.310	1.878	0.098	0.099
Cong 206		0.392	1.497	1.150	0.406
Cong 209		0.305	0.550	0.668	0.609

Uptake rates (k1) and depuration rates (k2) for worms exposed to BSM 45 sediment

	nonlinear regression (NLR)		linear regression (LR)		Predicted BSAF NLR k1 and LR k2 LR k1 and LR k2	Day 28 BSAF (replicate mean)	% of predicted BSAF reached by day 28
PCB	k1	k2	k1	k2			
6	poor fit	poor fit	0.00048	0.00090	0.529	0.082	15.5
8,5	poor fit	poor fit	0.00127	0.00070	1.817	0.263	14.5
12,13	0.00058	0.00204	poor fit	poor fit		0.090	
18	0.00189	0.00151	0.00238	0.00140	1.351	0.547	40.5
17	0.00083	0.00084	0.00108	0.00090	0.921	0.337	36.6
16,32	poor fit	poor fit	0.00128	0.00120	1.068	0.352	32.9
26	0.00122	0.00929	0.00091	0.00250	0.490	0.139	28.4
25	poor fit	poor fit	0.00201	0.00040	5.016	0.347	6.9
31,28	0.00124	0.00698	0.00056	0.00160	0.775	0.138	17.8
33,21,53	poor fit	poor fit	0.00107	poor fit		0.163	
51	0.00142	0.00260	0.00148	0.00180	0.789	0.414	52.4
22	0.00148	0.00474	0.00143	0.00050	2.969	0.246	8.3
45	0.00093	0.00034	0.00160	0.00100	0.934	0.374	40.1
46	poor fit	poor fit	poor fit	poor fit		0.494	
52	0.00170	0.00181	0.00208	0.00040	4.249	0.634	14.9
48,47	poor fit	poor fit	0.00159	0.00060	2.651	0.457	17.3
44	0.00068	0.00241	0.00069	0.00210	0.324	0.254	78.3
37,42	0.00062	0.00138	0.00105	0.00160	0.387	0.293	75.7
41,64,71	0.00045	0.00015	0.00074	0.00110	0.413	0.263	63.8
40	0.00079	0.00039	0.00161	0.00030	2.624	0.386	14.7
100	0.00139	0.00310	0.00084	0.00030	4.627	0.277	6.0
63	0.00106	0.00052	0.00180	0.00060	1.761	0.559	31.7
74	poor fit	poor fit	0.00092	0.00070	1.307	0.269	20.6
70,76	0.00065	0.00791	0.00030	0.00250	0.259	0.075	29.2
66,95	0.00078	0.00031	0.00124	0.00030	2.616	0.366	14.0
91	0.00054	0.00022	0.00111	0.00008	6.790	0.337	5.0
56,60,92	0.00095	0.00241	0.00091	0.00110	0.860	0.261	30.4
84	0.00038	0.00015	0.00085	0.00060	0.626	0.237	37.8
101,89	0.00063	0.00030	0.00084	0.00020	3.149	0.324	10.3
99	0.00051	0.00022	0.00071	0.00010	5.142	0.283	5.5
119	0.00051	0.00063	poor fit	0.00010	5.108	0.358	7.0
83	0.00051	0.00070	0.00043	0.00050	1.021	0.218	21.4
97	poor fit	poor fit	0.00038	0.00060	0.633	0.119	18.8
81,87	poor fit	poor fit	0.00158	0.00090	1.760	0.339	19.3

Uptake rates (k1) and depuration rates (k2) for worms exposed to BSM 45 sediment

	nonlinear regression (NLR)		linear regression (LR)		Predicted BSAF NLR k1 and LR k2 LR k1 and LR k2	Day 28 BSAF	% of predicted BSAF
PCB	k1	k2	k1	k2		(replicate mean)	reached by day 28
85	poor fit	poor fit	0.00093	poor fit		0.373	
136	poor fit	poor fit	0.00073	poor fit		0.269	
110,77	poor fit	poor fit	0.00051	0.00040	1.264	0.269	21.3
82,151	poor fit	poor fit	0.00066	0.00010	6.595	0.247	3.7
123,149	poor fit	poor fit	0.00088	poor fit		0.312	
114	poor fit	poor fit	0.00038	poor fit		0.097	
118	0.00048	0.00068	0.00052	0.00070	0.693	0.255	36.8
146	poor fit	poor fit	0.00167	poor fit		0.300	
132,153,105	poor fit	poor fit	0.00061	poor fit		0.280	
141	poor fit	poor fit	0.00024	0.00070	0.342	0.110	32.2
137,130,176	poor fit	poor fit	0.00029	poor fit		0.146	
163,138	poor fit	poor fit	0.00046	poor fit		0.266	
129,178	poor fit	poor fit	0.00011	0.00040	0.265	0.117	44.1
187,182	poor fit	poor fit	0.00056	poor fit		0.267	
183	poor fit	poor fit	0.00034	poor fit		0.240	
128	poor fit	poor fit	0.00018	0.00020	0.898	0.122	13.6
167	poor fit	poor fit	0.00004	0.00040	0.109	0.020	18.3
185	poor fit	poor fit	0.00022	0.00040	0.539	0.102	18.9
174	poor fit	poor fit	0.00014	0.00120	0.118	0.072	61.3
177	poor fit	poor fit	0.00036	poor fit		0.207	
202,171,156	poor fit	poor fit	0.00036	0.00020	1.779	0.188	10.6
157,200	poor fit	poor fit	0.00023	0.00060	0.387	0.135	34.8
172,197	poor fit	poor fit	0.00036	0.00030	1.206	0.245	20.3
180	poor fit	poor fit	0.00042	poor fit		0.229	
193	poor fit	poor fit	0.00272	0.00020	13.578	0.375	2.8
191	poor fit	poor fit	0.00056	poor fit		0.211	
170,190	poor fit	poor fit	0.00035	0.00010	3.534	0.196	5.5
201	poor fit	poor fit	0.00029	0.00040	0.724	0.168	23.2
203,196	poor fit	poor fit	0.00036	0.00010	3.571	0.195	5.5
189	poor fit	poor fit	0.00098	0.00020	4.876	0.235	4.8
208,195	poor fit	poor fit	0.00037	0.00030	1.244	0.192	15.4
207	poor fit	poor fit	0.00033	0.00060	0.545	0.176	32.3
194	poor fit	poor fit	0.00034	0.00010	3.416	0.170	5.0
206	poor fit	poor fit	0.00039	0.00060	0.650	0.215	33.1
209	0.00047	0.00059	0.00059	0.00110	0.430	0.274	63.8

Uptake rates (k1) and depuration rates (k2) for worms exposed to BSM 45 sediment

	nonlinear regression (NLR)		linear regression (LR)		Predicted BSAF	Predicted BSAF	Day 28 BSAF	% of predicted BSAF reached by day 28	% of predicted BSAF reached by day 28
PAHs	k1	k2	k1	k2	NLR k1 and LR k2	NLR k1 and NLR k2	(replicate mean)	NLR k1 and LR k2	NLR k1 and NLR k2
Anthracene	0.000027	0.0047				0.006	0.003		46.2
4,5-Methylenephenanthrene	0.000793	0.0086		0.00300	0.264	0.092	0.027	10.3	29.5
Fluoranthene	0.000402	0.0225		0.00440	0.091	0.018	0.023	25.5	130.0
Pyrene	0.000446	0.0204		0.00470	0.095	0.022	0.030	32.0	139.1
Benzo[a]fluorene	0.000332	0.0265				0.013	0.016		129.0
Benzo[b]fluorene	0.000149	0.0264				0.006	0.004		79.1
Benz[a]anthracene	0.000003	0.0004				0.009	0.001		14.1
Chrysene+Triphenylene	0.000099	0.0039		0.00380	0.026	0.025	0.026	101.4	103.8
Benzo[k]fluoranthene	0.000124	0.0324				0.004	0.005		130.8
Benzo[e]pyrene	0.000099	0.0165				0.006	0.010		159.3
Benzo[a]pyrene	0.000021	0.0087				0.002	0.003		112.0
BDEs									
28,33	0.007195								
154	0.007870								
153	0.044378								
TBT	0.000187								
Metals							Day 28 Bioaccumulation factor (BAF) (g dry sediment/g wet weight)		
Copper	0.000350	0.0425		0.00053	0.660	0.008	0.010		
Cadmium	0.003800	0.0324							

PAH Surrogate Standard Recoveries

Worms

% recovery	DAY0	UP2A	UP2B	UP4A	UP4B	UP8A	UP8B	UP16A	UP16B	UP28A	UP28B	UP56A	UP56B
d8-naphthalene	45.55	45.73	35.60	46.33	46.43	45.22	44.21	46.11	30.75	40.84	39.39	21.49	47.77
d10-Fluorene	63.52	58.32	56.01	57.99	58.85	57.09	60.19	62.53	52.27	59.63	64.78	43.48	64.52
d10-Fluoranthene	105.36	89.53	83.47	92.42	87.99	90.41	87.94	90.27	96.61	87.20	95.29	83.36	120.49
d12-Perylene	125.11	104.09	99.75	100.80	95.25	105.24	119.46	114.37	137.50	127.15	144.15	139.33	134.83

% recovery	DEP7A	DEP7B	DEP14A	DEP14B	DEP21A	DEP21B	ControlA	ControlB	BSM33A	BSM33B	BSM38A	BSM38B	BSM54A	BSM54B	BSM68A	BSM68B
d8-naphthalene	26.05	36.19	47.95	10.13	43.92	43.38	43.60	32.81	37.15	39.34	39.54	39.73	34.79	49.25	43.56	31.81
d10-Fluorene	50.10	56.57	62.63	38.93	58.62	64.87	60.66	63.36	61.39	59.95	54.89	58.56	49.13	64.18	58.56	55.49
d10-Fluoranthene	89.49	85.73	91.18	89.38	90.82	101.92	88.31	93.27	92.39	92.48	77.81	87.98	78.93	101.46	91.77	85.11
d12-Perylene	122.40	149.14	136.11	116.52	139.27	164.86	94.32	116.66	138.80	136.08	139.86	121.99	114.00	167.56	152.19	123.92

% recovery	MATRIX SPIKE1	MATRIX SPIKE2	PMATRIX	SRM1	SRM2	**Mean**	**SD**
d8-naphthalene	35.79	32.69	35.76	31.67	26.56	**38.15**	**8.56**
d10-Fluorene	53.84	52.39	51.32	55.13	53.31	**57.15**	**5.97**
d10-Fluoranthene	87.44	80.59	101.38	89.36	104.48	**91.52**	**8.39**
d12-Perylene	141.73	138.62	86.10	116.04	126.88	**126.18**	**19.64**

Amphipods

% recovery	Day 0	Control	BSM 38	BSM 45	BSM 54	BSM 68	**MEAN**	**SD**
d8-naphthalene	42.55	40.46	33.09	42.34	43.11	37.93	**39.91**	**3.84**
d10-Fluorene	56.02	59.92	56.85	76.80	69.02	68.06	**64.44**	**8.19**
d10-Fluoranthene	78.22	71.94	76.77	81.46	86.23	78.69	**78.88**	**4.77**
d12-Perylene	111.46	86.92	78.82	89.10	94.22	87.80	**91.39**	**11.01**

Sediment	BLANK1	BLANK2	PMATSPK	CONTROL	MATRIX SPIKE1	MATRIX SPIKE2	SRM1941A	SRM1942B	BSM33	BSM38	BSM45	BSM48	BSM54	BSM68	BSM71	**MEAN**	**SD**
% recovery																	
d8-naphthalene	22.51	34.49	31.16	15.71	17.00	8.80	9.80	5.43	26.48	27.13	25.96	28.49	28.16	10.51	10.64	**23.10**	**9.32**
d10-Fluorene	52.23	46.48	37.04	27.53	28.96	33.75	28.30	21.18	55.52	53.04	41.00	42.14	42.09	32.69	36.46	**43.68**	**11.04**
d10-Fluoranthene	69.36	56.68	61.03	61.48	60.72	93.30	77.27	48.80	62.78	61.15	60.58	51.78	55.39	60.81	71.30	**62.90**	**12.68**
d12-Perylene	83.56	72.62	94.35	107.58	82.76	76.09	78.45	51.46	64.95	57.56	56.77	59.55	59.30	52.68	66.49	**67.69**	**15.46**

PCB Surrogate Standard Recoveries

Worms

% recovery	DAY0	UP2A	UP2B	UP4A	UP4B	UP8A	UP8B	UP16A	UP16B	UP28A	UP28B	UP56A	UP56B
Cong 14	118.94	80.63	100.95	87.63	98.62	99.76	91.00	127.74	70.22	136.28	113.84	100.85	149.97
Cong 65	57.13	51.23	54.22	60.77	60.31	57.72	58.64	62.92	71.15	66.07	61.96	47.60	80.45
Cong 166	72.37	64.39	76.65	79.00	73.43	77.07	82.50	89.24	83.72	87.21	89.11	74.24	124.19

% recovery	DEP7A	DEP7B	DEP14A	DEP14B	DEP21A	DEP21B	ControlA	ControlB	BSM33A	BSM33B	BSM38A	BSM38B	BSM54A	BSM54B	BSM68A	BSM68B
Cong 14	179.49	100.32	125.56	119.77	149.14	131.34	138.23	111.12	88.65	122.25	121.34	145.87	109.29	106.31	126.05	132.26
Cong 65	57.00	56.59	60.48	54.64	56.39	64.18	54.84	56.84	49.55	56.21	51.01	65.39	52.65	45.96	63.28	61.09
Cong 166	85.02	76.26	85.13	81.34	79.77	90.33	68.69	63.36	65.87	78.16	77.36	75.43	74.27	68.04	84.53	84.71

% recovery	MATRIX SPIKE1	MATRIX SPIKE2	PMATSPK	SRM1	SRM2	**MEAN**	**SD**
Cong 14	89.59	88.99	58.91	59.10	96.42	**111.07**	**26.65**
Cong 65	51.75	50.20	47.63	49.67	49.64	**57.21**	**7.29**
Cong 166	66.19	71.87	65.81	67.55	73.45	**78.13**	**11.22**

Amphipods

% recovery	BSM38	BSM45	BSM54	BSM68	BLANK	CONTROL	DAY0	**Mean**	**SD**
Cong 14	63.93	78.87	84.96	59.87	46.40	34.32	51.20	**59.94**	**17.87**
Cong 65	54.60	57.40	61.00	59.00	49.10	35.10	47.20	**51.91**	**8.97**
Cong 166	71.28	98.36	85.59	75.15	51.26	44.58	61.61	**69.69**	**18.90**

Sediment

% recovery	BLANK1	BLANK2	CONTROL	BSM28	BSM33	BSM38	BSM45	BSM48	BSM54	BSM68	BSM71	MATRIX1	MATRIX2	PMATRIX	SRM1	SRM2	**MEAN**	**SD**
Cong 14	50.02	45.69	40.90	108.81	96.17	81.91	112.83	72.63	84.57	78.06	111.26	35.19	96.39	33.53	82.21	72.53	**75.51**	**22.98**
Cong 65	51.31	43.56	47.48	88.38	57.85	57.19	64.59	53.69	51.70	48.51	63.39	39.00	70.18	37.88	61.32	46.52	**54.01**	**10.89**
Cong 166	53.90	48.46	64.33	40.23	53.56	59.14	80.14	68.52	46.58	41.49	106.11	64.47	73.39	65.07	62.99	50.20	**58.80**	**15.16**

BDE Surrogate Standard Recoveries

Worms

% recovery	DAY 0	UP 2A	UP 2B	UP 4A	UP 4B	UP 8A	UP 8B	UP 16A	UP 16B	UP 28A	UP 28B	UP 56A	UP 56B
BDE 15L	51.17	51.70	56.86	65.75	49.26	55.64	53.97	45.17	52.15	46.14	64.35	47.81	71.25
BDE 118L	79.51	76.47	72.64	90.19	88.87	88.83	80.42	83.36	72.39	79.96	86.92	74.12	100.45

% recovery	DEP 7A	DEP 7B	DEP 14A	DEP 14B	DEP 21A	DEP 21B	ControlA	ControlB	BSM 33A	BSM 33B	BSM 38A	BSM 38B	BSM 54A	BSM 54B	BSM 68A	BSM 68B
BDE 15L	48.08	55.46	46.87	75.72	52.73	80.39	49.60	55.47	63.84	62.76	54.84	62.98	55.90	58.05	71.74	77.48
BDE 118L	81.49	75.41	79.16	78.14	67.23	82.34	79.19	74.80	78.59	70.88	81.30	72.37	62.43	52.56	81.05	75.97

% recovery	SRM1	SRM2	MATRIX SPIKE1	MATRIX SPIKE2	PSPIKE	**MEAN**	**SD**
BDE 15L	46.33	39.93	64.17	47.07	50.44	**56.80**	**10.07**
BDE 118L	68.57	61.36	67.25	61.35	72.68	**76.42**	**9.46**

Amphipods

% recovery	DAY0	CONTROL	BSM38	BSM45	BSM54	BSM68	BLANK	**Mean**	**SD**
BDE 15L	78.90	54.44	86.60	87.62	93.52	90.58	62.35	**79.14**	**15.04**
BDE 118L	84.04	63.18	84.80	94.68	90.97	89.38	78.32	**83.62**	**10.47**

Sediment

% recovery	CONTROL	BSM28	BSM33	BSM38	BSM45	BSM48	BSM54	BSM68	BSM71	MATRIX1	MATRIX2	PMATRIX	SRM1	SRM2	BLANK1	BLANK2	**MEAN**	**SD**
BDE 15L	63.52	84.56	83.20	75.61	81.97	76.00	82.44	73.94	103.73	36.38	104.94	42.16	91.97	62.68	61.68	42.86	**69.26**	**19.75**
BDE 118L	91.88	65.85	68.57	66.94	68.69	74.78	65.62	59.36	81.57	72.49	82.13	85.99	80.72	64.05	59.22	60.42	**68.53**	**10.97**

PAH Matrix Spikes

	Worms		Sediment	
	% Recovery		% Recovery	
	MATRIX S	MATRIX SPIKE2	Matrix 1	Pseudo matrix spike
	Day 0	BSM 54B	Control	NaSO4 only
Naphthalene	35.71	33.96	19.74	35.16
2-Methylnaphthalene	53.03	53.62	22.71	37.39
Azulene	37.86	38.46	0.16	24.92
1-Methylnaphthalene	49.31	50.51	21.89	36.41
Biphenyl	55.22	53.73	22.87	35.08
Acenapthylene	54.01	54.92	23.86	29.97
Acenapthene	65.16	65.27	27.65	38.76
Fluorene	58.59	59.09	30.73	38.16
1-Methylfluorene	64.47	65.94	42.74	39.44
Phenanthrene	67.21	68.32	44.86	41.20
Anthracene	59.72	58.64	43.89	38.73
2-Methylphenanthrene	57.51	61.71	44.85	38.46
2-Methylanthracene	60.22	66.66	50.37	38.46
4,5-Methylenephenanthrene	70.73	75.68	57.73	45.58
1-Methylanthracene	57.33	62.72	46.05	35.82
1-Methylphenanthrene	74.45	78.17	68.02	56.61
9-Methylanthracene	61.80	66.07	48.46	38.61
Fluoranthene	92.97	85.50	55.58	67.15
Pyrene	95.23	85.72	56.58	66.17
3,6-Dimethylphenanthrene	80.48	77.93	40.53	45.04
Benzo[a]fluorene	83.96	71.79	67.56	69.79
Benzo[b]fluorene	82.93	75.58	70.20	71.18
Benz[a]anthracene	68.60	66.98	67.44	65.59
Chrysene+Triphenylene	112.36	103.05	85.47	102.48
Napthacene	32.28	21.93	7.42	21.60
Benzo[b]fluoranthene	62.23	56.59	75.80	72.97
Benzo[k]fluoranthene	133.02	144.75	83.89	126.53
Dimethylbenz[a]anthracene	90.57	92.22	64.40	69.02
Benzo[e]pyrene	93.60	94.11	83.57	100.45
Benzo[a]pyrene	118.36	118.13	68.04	100.62
Perylene	117.74	94.38	83.01	89.02
3-Methylchloanthrene	61.08	58.44	64.00	46.57
Indeno[1,2,3-c,d]pyrene	54.07	62.40	76.67	59.39
Dibenz[a,h+ac]anthracene	69.02	74.95	74.11	68.77
Benzo[g,h,i]perylene	87.15	90.85	84.18	86.84
Anthanthrene	41.03	46.71	38.61	30.93
Coronene	61.44	66.21	19.30	75.95

BDE Matrix Spikes

	Worms		Sediment		
	% Recovery		% Recovery		
	MATRIX SPIKE1	MATRIX SPIKE2	MATRIX1	MATRIX2	PMATRIX
	Day 0	BSM 54B	Control	BSM 68	
BDE-30	53.53	51.73	45.95	68.64	42.16
BDE-17	29.38	30.11	0.00	22.32	33.83
BDE-25	61.05	59.78	50.36	76.63	65.01
BDE-28,33	55.82	54.45	52.36	74.08	58.87
BDE-75	25.63	24.78	17.09	25.50	29.18
BDE-49,71	52.04	45.76	33.53	65.14	56.73
BDE-47	49.59	59.64	51.87	75.22	63.91
BDE-66	72.85	64.93	50.75	60.76	64.54
BDE-100	70.88	65.10	70.73	74.22	82.72
BDE-119	70.42	67.39	72.15	76.98	82.22
BDE-99	63.75	61.10	57.52	74.13	72.49
BDE-116	67.98	58.13	57.53	56.49	74.93
BDE-155,85	55.69	49.81	54.96	61.58	70.85
BDE-154	75.24	65.98	67.78	74.33	82.71
BDE-153	62.48	65.40	73.61	80.17	82.36
BDE-138	66.51	58.44	48.47	61.37	65.30
BDE-156	68.21	61.45	58.84	70.35	81.26
BDE-183	73.75	68.98	71.83	72.13	80.18
BDE-191	67.12	61.99	61.00	71.38	82.98
BDE-181	72.70	69.32	71.28	76.50	85.93
BDE-190	56.04	54.05	58.41	67.20	78.00
BDE-204	82.34	76.73	79.28	67.84	79.79
BDE-197	77.78	70.86	1169.14	69.14	136.24
BDE-198,203	39.48	37.33	32.75	37.03	43.29
BDE-196	71.14	69.04	60.19	65.62	80.96
BDE-205	41.45	40.34	25.40	37.73	41.57
BDE-208	126.57	118.86	87.91	76.26	101.09
BDE-207	98.45	92.80	67.84	60.39	76.61
BDE-206	71.43	87.25	44.11	27.44	82.70
BDE-209	137.84	133.22	65.53	121.91	85.97

PCB Matrix Spikes

	Worms			Worms			Sediment			Sediment	
	% Recovery			% Recovery			% Recovery			% Recovery	
	MATRIX SPIKE1	MATRIX SPIKE2		MATRIX S	MATRIX SPIKE2		Matrix 1	Matrix spike		Matrix 1	Matrix spike
	Day 0	BSM 54B		Day 0	BSM 54B		Control	NaSO4 only		Control	NaSO4 only
Cong 1	21.76	52.35	Cong 85	74.60	96.10	Cong 1	49.61	34.26	Cong 85	70.17	50.42
Cong 3	55.71	6.61	Cong 136	25.84	66.41	Cong 3		0.51	Cong 136	17.73	39.11
Cong 4,10			Cong 77,110	58.24	84.49	Cong 4,10	63.07	25.09	Cong 77,110	40.62	51.63
Cong 7,9	22.44	37.64	Cong 82,151	134.78	158.93	Cong 7,9	5.90	22.98	Cong 82,151	203.76	239.82
Cong 6	37.18	44.20	Cong 135,144			Cong 6	14.40	18.22	Cong 135,144	54.90	40.70
Cong 8,5	45.05	55.61	Cong 107		141.09	Cong 8,5	9.54	28.92	Cong 107		1.45
Cong 19	19.92	64.05	Cong 123,149	42.43	78.71	Cong 19	40.66	22.49	Cong 123,149	44.53	54.43
Cong 12,13		20.13	Cong 118	754.27	843.62	Cong 12,13			Cong 118		
Cong 18	33.44	54.34	Cong 134	14.59	42.01	Cong 18	25.60	24.60	Cong 134	82.22	30.42
Cong 17	31.72	53.94	Cong 114	38.55	268.19	Cong 17	25.58	24.16	Cong 114	532.72	97.50
Cong 24		4.78	Cong 146	9.57	12.02	Cong 24	27.36	0.00	Cong 146	68.73	34.64
Cong 16,32	35.66	56.62	Cong 132,153,105	50.38	88.97	Cong 16,32	43.41	35.66	Cong 132,153,105	41.27	74.89
Cong 29	30.21	86.48	Cong 141	46.90	53.52	Cong 29			Cong 141	64.74	57.97
Cong 26	44.99	49.16	Cong 137,130,176	37.66	58.45	Cong 26	29.06	42.74	Cong 137,130,176		53.81
Cong 25	52.02		Cong 163,138	51.32	102.84	Cong 25		36.33	Cong 163,138	60.41	67.75
Cong 31,28	67.86	77.45	Cong 158			Cong 31,28	54.97	58.68	Cong 158	12.92	
Cong 33,21,53	44.90	64.62	Cong 129,178	35.72	103.35	Cong 33,21,53	47.42	49.57	Cong 129,178	87.13	70.18
Cong 51	48.62	55.92	Cong 187,182	76.35	90.80	Cong 51	27.53	57.35	Cong 187,182	89.51	75.82
Cong 22	47.50	26.18	Cong 183	55.59	84.92	Cong 22	30.52	51.04	Cong 183		59.73
Cong 45	27.28	51.68	Cong 128	39.85	168.28	Cong 45	31.55	16.77	Cong 128	1143.08	981.39
Cong 46	291.77	421.18	Cong 167	141.10	289.57	Cong 46	317.65	319.64	Cong 167		
Cong 52	56.79	64.85	Cong 185	72.01	67.70	Cong 52	36.99	40.90	Cong 185	63.32	75.31
Cong 49	55.73	48.42	Cong 174	75.40	64.66	Cong 49			Cong 174	38.38	78.20
Cong 47,48	56.49	64.16	Cong 177	313.51	302.41	Cong 47,48	30.67	35.29	Cong 177	330.44	496.69
Cong 44	47.17	46.86	Cong 202,171,156	134.55	137.55	Cong 44	32.28	43.86	Cong 202,171,156	217.73	209.46
Cong 37,42	57.70	63.60	Cong 157,200	27.87	50.89	Cong 37,42	21.40	44.68	Cong 157,200		71.69
Cong 41,64,71	33.52	48.73	Cong 172	41.90	79.07	Cong 41,64,71	25.69	40.50	Cong 172		27.77
Cong 40	44.35	53.09	Cong 197	27.35	85.29	Cong 40	22.60	34.83	Cong 197		
Cong 100	1034.54	265.31	Cong 180	83.28	87.31	Cong 100	65.43	82.25	Cong 180	98.70	83.52
Cong 63	84.56	102.32	Cong 193	1538.79	1594.43	Cong 63	44.71	36.90	Cong 193	2349.11	2517.89
Cong 74	58.88	70.89	Cong 191	172.10	174.39	Cong 74	24.41	44.85	Cong 191		
Cong 70,76	60.81	63.69	Cong 199			Cong 70,76	32.98	44.17	Cong 199		
Cong 66,95	50.19	77.20	Cong 170,190	87.53	105.55	Cong 66,95	31.42	45.46	Cong 170,190	41.55	62.65
Cong 91	34.54	91.63	Cong 198		95.68	Cong 91	37.59	44.28	Cong 198		
Cong 56,60,92,84	73.11	53.01	Cong 201	88.88	96.77	Cong 56,60,92,84	29.05	41.29	Cong 201	36.83	110.17
Cong 84,89	52.69	59.60	Cong 203,196	84.46	90.03	Cong 84,89	30.35	35.69	Cong 203,196	69.60	97.74
Cong 101	275.90	305.61	Cong 189	3454.65	2590.90	Cong 101	360.57	395.50	Cong 189		
Cong 99	63.33	130.63	Cong 208,195	59.23	967.34	Cong 99	59.40	79.78	Cong 208,195	73.88	82.70
Cong 119			Cong 207	23.37	248.22	Cong 119	30.58		Cong 207		
Cong 83	27.19		Cong 194	116.79	100.45	Cong 83	78.63	34.61	Cong 194	97.49	97.69
Cong 97	66.48	166.64	Cong 205			Cong 97	199.83	261.75	Cong 205	5912.14	6763.76
Cong 81,87	62.67	169.90	Cong 206	149.10	212.67	Cong 81,87	65.45	6.71	Cong 206	188.31	257.19
			Cong 209						Cong 209		

NIST Standard Reference Materials

	Mussel tissue					Sediment						
PAH	SRM 1974a (ng/g wet)		MEAN	NIST value	% recovery	SRM 1941 (ng/g dry)		MEAN	NIST value	% recovery		MEAN
						Rep 1	Rep 2			Rep 1	Rep 2	% recovery
Naphthalene	ND	ND		2.68		151.98	84.32	118.15	1322.00	11.50	6.38	8.94
2-Methylnaphthalene	ND	ND		1.16		61.39	38.91	50.15	406.00	15.12	9.58	12.35
Azulene	ND	ND				ND	ND					
1-Methylnaphthalene	ND	ND		0.61		28.78	19.50	24.14	229.00	12.57	8.52	10.54
Biphenyl	4.99	4.68	4.83	0.58		25.15	18.68	21.92	115.00	21.87	16.25	19.06
Acenapthylene	0.30	0.38	0.34	0.60		16.45	12.87	14.66	115.00	14.30	11.19	12.75
Acenapthene	ND	ND		0.36		14.87	11.78	13.33	52.00	28.60	22.66	25.63
Fluorene	ND	ND		0.65		33.56	25.39	29.47	104.00	32.27	24.41	28.34
1-Methylfluorene	0.81	0.94	0.87			33.14	21.31	27.23				
Phenanthrene	ND	ND		2.53		398.31	275.53	336.92	577.00	69.03	47.75	58.39
Anthracene	ND	ND		7.00		119.28	77.82	98.55	202.00	59.05	38.53	48.79
2-Methylphenanthrene	0.94	0.88	0.91	2.34		128.93	87.06	107.99	150.00	85.95	58.04	72.00
2-Methylanthracene	0.17	ND	0.17			40.45	27.46	33.95	66.00	61.29	41.60	51.44
4,5-Methylenephenanthrene	1.28	1.30	1.29			69.02	45.36	57.19				
1-Methylanthracene	0.61	0.71	0.66			90.48	59.64	75.06				
1-Methylphenanthrene	0.52	0.64	0.58	1.20		80.75	54.01	67.38	109.00	74.08	49.55	61.82
9-Methylanthracene	ND	ND				6.02	1.99	4.00				
Fluoranthene	18.88	22.23	20.55	18.60	110.51	1155.17	748.03	951.60	1220.00	94.69	61.31	78.00
Pyrene	18.54	22.85	20.69	17.26	119.89	1054.83	696.67	875.75	1080.00	97.67	64.51	81.09
3,6-Dimethylphenanthrene	ND	ND				10.14	ND	10.14				
Benzo[a]fluorene	1.32	1.82	1.57			135.40	95.88	115.64				
Benzo[b]fluorene	1.37	1.08	1.22			118.14	76.04	97.09				
Benz[a]anthracene	2.22	2.00	2.11	3.71	56.95	562.92	372.43	467.67	550.00	102.35	67.71	85.03
Chrysene+Triphenylene	8.24	10.49	9.37	10.81	86.66	671.47	452.17	561.82	641.00	104.75	70.54	87.65
Napthacene	ND	ND				50.71	35.43	43.07				
Benzo[b]fluoranthene	2.37	2.95	2.66	5.28	50.38	1047.71	692.89	870.30	780.00	134.32	88.83	111.58
Benzo[k]fluoranthene	4.04	4.65	4.35	2.30	189.06	647.83	452.05	549.94	444.00	145.91	101.81	123.86
Dimethylbenz[a]anthracene	ND	ND				20.35	13.98	17.17				
Benzo[e]pyrene	7.26	9.36	8.31	9.56	86.91	540.77	369.06	454.91	573.00	94.37	64.41	79.39
Benzo[a]pyrene	1.75	3.94	2.85	1.78	159.94	609.26	407.16	508.21	670.00	90.93	60.77	75.85
Perylene	ND	ND		0.87	0.00	306.09	204.63	255.36	422.00	72.53	48.49	60.51
3-Methylchloanthrene	ND	ND				4.89	3.23	4.06				
Indeno[1,2,3-c,d]pyrene	0.61	ND	0.61	1.62	37.64	851.74	573.80	712.77	569.00	149.69	100.84	125.27
Dibenz[a,h+ac]anthracene	ND	ND		0.34		88.81	58.62	73.72				
Benzo[g,h,i]perylene	2.15	1.88	2.01	2.50	80.57	616.25	423.75	520.00	516.00	119.43	82.12	100.78
Anthanthrene	ND	ND		0.13		100.64	61.11	80.87				
Coronene	ND	ND				12.96	56.12	34.54				

Appendix C:

BDE concentrations, biota-sediment accumulation factors (BSAFs), and uptake rate constants for *Nereis virens* exposed to spiked and field sediments

BDEs in worms from the BDE 209 experiments
MDLs are listed in a subsequent table
(ng/g wet weight)

	Worm Day 0 Rep A	Worm Day 0 Rep B	Worm Day 0 Rep C	Time series Day 2 Rep A	Time series Day 2 Rep B	Time series Day 2 Rep C	Time series Day 4 Rep A	Time series Day 4 Rep B	Time series Day 4 Rep C	Time series Day 8 Rep A	Time series Day 8 Rep B	Time series Day 8 Rep C	Time series Day 16 Rep A	Time series Day 16 Rep B	Time series Day 16 Rep C	Time series Day 28 Rep A	Time series Day 28 Rep B	Time series Day 28 Rep C
BDE 30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 17	ND	ND	ND	ND	0.01	0.02	0.04	0.04	0.06	0.09	0.14	0.15	0.08	0.13	0.11	0.21	0.40	0.34
BDE 25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.03	ND	0.04	0.04	0.04
BDE 28,33	ND	ND	ND	0.08	0.08	0.08	0.13	0.11	0.18	0.21	0.23	0.31	0.41	0.64	0.32	0.77	0.87	0.87
BDE 75	ND	ND	ND	ND	0.01	0.01	ND	ND	0.04	0.04	0.05	0.07	0.07	0.12	0.07	0.17	0.18	0.18
BDE 49, 71	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 47	ND	ND	ND	3.81	4.86	3.56	8.37	6.78	11.89	16.85	13.44	23.18	22.06	37.44	22.95	22.43	18.61	22.14
BDE 66	ND	ND	ND	0.08	0.16	0.08	0.16	0.15	0.30	0.37	0.36	0.66	0.78	1.31	0.92	1.61	1.18	1.73
BDE 100	ND	ND	ND	0.37	0.74	0.35	1.12	0.84	1.62	2.61	1.55	4.20	4.01	7.48	5.09	5.23	3.01	4.21
BDE 119	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 99	ND	ND	ND	1.60	3.44	1.55	4.63	3.35	7.55	12.85	6.60	19.84	20.45	35.81	25.85	26.57	13.39	19.76
BDE 116	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 155,85	ND	ND	ND	ND	ND	ND	0.09	0.08	0.15	0.17	0.13	0.32	0.24	0.33	0.36	0.38	0.27	0.53
BDE 154	ND	ND	ND	0.08	0.27	0.07	0.36	0.23	0.55	1.08	0.43	1.76	2.39	4.21	3.17	5.47	3.20	4.73
BDE 153	ND	ND	ND	0.08	0.27	0.06	0.35	0.20	0.55	1.07	0.40	1.84	2.46	4.55	3.40	5.99	3.06	4.80
BDE 138	ND	ND	ND	0.01	ND	ND	0.03	0.02	0.03	0.06	0.03	0.12	0.09	0.19	0.15	0.16	0.09	0.16
BDE 156	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 183	ND	ND	ND	ND	0.01	ND	ND	ND	ND	0.03	ND	0.03	0.04	0.09	0.05	0.07	0.07	0.09
BDE 191	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 181	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 204	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 197	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 198,203	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 196	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	0.07	ND	0.05	0.04	ND
BDE 205	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 208	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDDE 207	ND	ND	ND	0.01	0.02	ND	ND	ND	0.02	0.04	ND	0.06	0.11	0.12	0.06	0.08	0.07	0.10
BDE 206	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	ND
BDE 209	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.42	ND	0.42	0.34	ND	0.46	0.47	0.69
Total BDE	0.00	0.00	0.00	6.13	9.86	5.78	15.28	11.80	22.95	35.48	23.78	52.60	53.67	92.86	62.50	69.70	44.94	60.37

BDEs in worms from the BDE 209 experiments
MDLs are listed in a subsequent table
(ng/g wet weight)

	Control Day 28 Rep A	Control Day 28 Rep B	Control Day 28 Rep C	BDE Day 28 Rep A	BDE Day 28 Rep B	BDE Day 28 Rep C	Back River Day 28 Rep A	Back River Day 28 Rep B	Back River Day 28 Rep C	PCB Day 28 Rep A	PCB Day 28 Rep B	PCB Day 28 Rep C
BDE 30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 17	ND	ND	ND	ND	ND	ND	ND	ND	0.00	ND	ND	ND
BDE 25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 28,33	ND	ND	0.00	0.00	ND	0.00	0.01	0.01	0.01	ND	0.00	ND
BDE 75	ND	ND	ND	ND	ND	ND	ND	ND	0.00	ND	ND	ND
BDE 49, 71	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 47	0.19	0.26	0.32	0.22	0.19	0.32	0.43	0.35	0.39	0.22	0.41	0.33
BDE 66	ND	ND	0.01	ND	ND	ND	0.01	0.01	0.01	0.01	0.01	ND
BDE 100	0.06	0.08	0.10	0.06	0.06	0.10	0.14	0.10	0.13	0.07	0.13	0.10
BDE 119	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 99	0.21	0.22	0.31	0.17	0.19	0.27	0.44	0.30	0.43	0.22	0.39	0.27
BDE 116	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 155,85	ND	ND	0.01	0.01	0.01	0.01	0.02	0.02	ND	ND	0.01	ND
BDE 154	0.03	0.03	0.03	0.03	0.05	0.05	0.08	0.05	0.06	0.03	0.04	0.03
BDE 153	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.03	0.05	0.02	0.03	0.02
BDE 138	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 156	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 183	ND	ND	ND	0.11	0.15	0.13	0.01	0.02	ND	ND	ND	ND
BDE 191	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 181	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 204	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 197	ND	ND	ND	0.07	0.08	0.07	ND	0.02	0.03	ND	ND	ND
BDE 198,203	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND
BDE 196	ND	ND	ND	0.21	0.27	0.25	ND	ND	ND	ND	ND	ND
BDE 205	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 208	ND	ND	ND	0.49	0.58	0.64	0.03	ND	0.04	ND	ND	ND
BDDE 207	ND	ND	ND	2.23	2.49	2.55	0.05	ND	0.08	ND	ND	ND
BDE 206	ND	ND	ND	1.00	1.12	1.12	ND	ND	ND	ND	ND	ND
BDE 209	ND	ND	ND	14.78	18.77	15.92	ND	ND	ND	ND	0.33	ND
Total BDE	0.50	0.60	0.80	19.41	23.98	21.46	1.26	0.91	1.24	0.56	1.36	0.74

BDEs in worms from the BDE 209 experiments
MDLs are listed in a subsequent table

(ng/g wet weight)	Control clam Day 28 Rep A	Control clan Day 28 Rep B	Control clan Day 28 Rep C	BDE clam Day 28 Rep A	BDE clam Day 28 Rep B	BDE clam Day 28 Rep C	PCB clam Day 28 Rep A	PCB clam Day 28 Rep B	PCB clam Day 28 Rep C	Control clamfood	BDE clamfood	BDE clamfood After 1 min in	BDE clamfood After 30 min in water	PCB clamfood	PCB clamfood After 1 min	PCB clamfood After 30 min in water	SRM Mussel Rep A	SRM Mussel Rep B
	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	ND
BDE 30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.05	0.07
BDE 17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
BDE 25	0.01	0.01	0.01	0.01	ND	ND	0.01	0.01	0.01	ND	ND	ND	ND	ND	ND	ND	0.07	0.07
BDE 28,33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01	0.01
BDE 75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 49, 71	0.52	0.50	0.61	0.88	0.36	0.35	0.30	0.46	0.64	ND	ND	ND	ND	ND	ND	ND	2.09	1.89
BDE 47	0.02	0.02	0.02	0.03	ND	ND	0.01	0.01	0.02	ND	ND	ND	ND	ND	ND	ND	0.07	0.07
BDE 66	0.10	0.11	0.12	0.14	0.10	0.08	0.06	0.11	0.17	ND	ND	ND	ND	ND	ND	ND	0.58	0.54
BDE 100	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 119	0.38	0.35	0.45	0.52	0.34	0.26	0.21	0.35	0.48	ND	ND	ND	ND	ND	ND	ND	0.97	0.86
BDE 99	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 116	0.01	0.01	0.01	0.05	0.04	0.02	0.01	0.01	0.02	ND	ND	ND	ND	ND	ND	ND	0.03	0.03
BDE 155,85	0.11	0.11	0.25	0.34	0.11	0.08	0.11	0.10	0.15	ND	ND	ND	ND	ND	ND	ND	0.06	0.06
BDE 154	0.03	0.03	0.03	0.03	0.03	0.02	0.01	0.02	0.04	ND	ND	ND	ND	ND	ND	ND	0.05	0.05
BDE 153	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 138	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 156	ND	ND	ND	0.19	0.13	0.12	ND	ND	ND	ND	0.21	0.09	0.07	ND	ND	ND	ND	ND
BDE 183	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 191	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 181	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 190	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 204	ND	ND	ND	0.17	0.13	0.10	ND	ND	ND	ND	0.62	0.32	0.22	ND	ND	ND	ND	ND
BDE 197	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 198,203	ND	ND	ND	0.44	0.32	0.24	ND	ND	ND	ND	5.47	2.83	1.65	ND	ND	ND	ND	ND
BDE 196	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BDE 205	ND	ND	ND	6.72	3.82	3.21	ND	ND	ND	ND	3.46	2.66	1.61	ND	ND	ND	ND	ND
BDE 208	ND	ND	ND	9.60	7.03	**3.20**	ND	ND	ND	ND	91.98	47.63	23.93	ND	ND	ND	ND	ND
BDDE 207	ND	ND	ND	3.05	2.73	**1.19**	ND	ND	ND	ND	66.95	34.85	15.91	ND	ND	ND	ND	ND
BDE 206	ND	ND	ND	43.78	36.50	**17.47**	ND	ND	ND	1.03	639.16	287.51	188.85	1.26	ND	ND	ND	2.23
BDE 209	1.17	1.13	1.50	65.94	51.65	**26.36**	0.73	1.09	1.52	1.03	807.85	375.89	232.25	1.26	0.00	0.00	4.01	5.89

Underestimates (sample spilled)

BDE MDLs for worms from the BDE 209 experiments

(ng/g wet weight)	Control Day 0 Rep A	Control Day 0 Rep B	Control Day 0 Rep C	Time series Day 2 Rep A	Time series Day 2 Rep B	Time series Day 2 Rep C	Time series Day 4 Rep A	Time series Day 4 Rep B	Time series Day 4 Rep C	Time series Day 8 Rep A	Time series Day 8 Rep B	Time series Day 8 Rep C	Time series Day 16 Rep A	Time series Day 16 Rep B	Time series Day 16 Rep C	Time series Day 28 Rep A	Time series Day 28 Rep B	Time series Day 28 Rep C
BDE 30	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 17	0.002	0.002	0.003	0.002	0.003	0.002	0.003	0.002	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002
BDE 25	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 28,33	0.003	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.004	0.002	0.002	0.002	0.003	0.002	0.003	0.002	0.003	0.002
BDE 75	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 49, 71	0.002	0.002	0.003	0.002	0.003	0.002	0.003	0.002	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002
BDE 47	0.138	0.139	0.149	0.139	0.187	0.137	0.164	0.138	0.195	0.136	0.133	0.137	0.158	0.134	0.138	0.135	0.139	0.127
BDE 66	0.003	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
BDE 100	0.032	0.032	0.034	0.032	0.043	0.032	0.038	0.032	0.045	0.031	0.031	0.032	0.036	0.031	0.032	0.031	0.032	0.029
BDE 119	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.002	0.001	0.002	0.001	0.002	0.001
BDE 99	0.156	0.156	0.167	0.157	0.210	0.154	0.184	0.155	0.220	0.153	0.149	0.154	0.178	0.151	0.156	0.152	0.156	0.142
BDE 116	0.005	0.005	0.005	0.005	0.006	0.005	0.006	0.005	0.007	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.004
BDE 155,85	0.006	0.006	0.007	0.006	0.009	0.006	0.008	0.006	0.009	0.006	0.006	0.006	0.007	0.006	0.006	0.006	0.006	0.006
BDE 154	0.011	0.011	0.011	0.011	0.014	0.010	0.012	0.011	0.015	0.010	0.010	0.010	0.012	0.010	0.011	0.010	0.011	0.010
BDE 153	0.013	0.013	0.014	0.013	0.017	0.013	0.015	0.013	0.018	0.012	0.012	0.013	0.014	0.012	0.013	0.012	0.013	0.012
BDE 138	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 156	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.002	0.002	0.003	0.003	0.002	0.003	0.002	0.003	0.002
BDE 183	0.003	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.004	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.002
BDE 191	0.002	0.002	0.002	0.002	0.003	0.002	0.003	0.002	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002
BDE 181	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 190	0.004	0.004	0.005	0.004	0.006	0.004	0.005	0.004	0.006	0.004	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.004
BDE 204	0.006	0.006	0.006	0.006	0.008	0.006	0.007	0.006	0.008	0.006	0.005	0.006	0.007	0.006	0.006	0.006	0.006	0.005
BDE 197	0.005	0.005	0.005	0.005	0.006	0.005	0.006	0.005	0.007	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.004
BDE 198,203	0.003	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
BDE 196	0.002	0.002	0.002	0.002	0.003	0.002	0.003	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 205	0.003	0.003	0.004	0.003	0.005	0.003	0.004	0.003	0.005	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003
BDE 208	0.007	0.007	0.007	0.007	0.009	0.007	0.008	0.007	0.009	0.006	0.006	0.007	0.008	0.006	0.007	0.006	0.007	0.006
BDDE 207	0.009	0.009	0.009	0.009	0.012	0.009	0.010	0.009	0.012	0.008	0.008	0.009	0.010	0.008	0.009	0.008	0.009	0.008
BDE 206	0.059	0.059	0.063	0.059	0.080	0.058	0.070	0.059	0.083	0.058	0.057	0.058	0.067	0.057	0.059	0.058	0.059	0.054
BDE 209	0.304	0.305	0.327	0.306	0.411	0.301	0.360	0.303	0.429	0.298	0.292	0.300	0.347	0.295	0.304	0.296	0.304	0.278

BDE MDLs for worms from the BDE 209 experiments

(ng/g wet weight)	Control Day 28 Rep A	Control Day 28 Rep B	Control Day 28 Rep C	BDE Day 28 Rep A	BDE Day 28 Rep B	BDE Day 28 Rep C	Back River Day 28 Rep A	Back River Day 28 Rep B	Back River Day 28 Rep C	PCB Day 28 Rep A	PCB Day 28 Rep B	PCB Day 28 Rep C
BDE 30	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 17	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002
BDE 25	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 28,33	0.002	0.002	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.002	0.002
BDE 75	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 49, 71	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002
BDE 47	0.137	0.134	0.139	0.139	0.138	0.133	0.138	0.139	0.138	0.159	0.137	0.137
BDE 66	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
BDE 100	0.032	0.031	0.032	0.032	0.032	0.031	0.032	0.032	0.032	0.037	0.032	0.032
BDE 119	0.001	0.001	0.002	0.002	0.002	0.001	0.002	0.002	0.002	0.002	0.001	0.001
BDE 99	0.154	0.151	0.156	0.156	0.155	0.150	0.155	0.156	0.155	0.178	0.154	0.154
BDE 116	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
BDE 155,85	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.007	0.006	0.006
BDE 154	0.010	0.010	0.011	0.011	0.010	0.010	0.011	0.011	0.011	0.012	0.010	0.010
BDE 153	0.013	0.012	0.013	0.013	0.013	0.012	0.013	0.013	0.013	0.015	0.012	0.012
BDE 138	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 156	0.003	0.002	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.002	0.002
BDE 183	0.003	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.003
BDE 191	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.002
BDE 181	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 190	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004	0.004
BDE 204	0.006	0.006	0.006	0.006	0.006	0.005	0.006	0.006	0.006	0.007	0.006	0.006
BDE 197	0.005	0.005	0.005	0.005	0.005	0.004	0.005	0.005	0.005	0.005	0.005	0.005
BDE 198,203	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
BDE 196	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
BDE 205	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.003
BDE 208	0.007	0.006	0.007	0.007	0.007	0.006	0.007	0.007	0.007	0.008	0.007	0.007
BDDE 207	0.009	0.008	0.009	0.009	0.009	0.008	0.009	0.009	0.009	0.010	0.008	0.008
BDE 206	0.058	0.057	0.059	0.059	0.059	0.057	0.059	0.059	0.059	0.068	0.058	0.058
BDE 209	0.300	0.295	0.304	0.305	0.303	0.293	0.303	0.305	0.303	0.348	0.300	0.300

BDE MDLs for worms from the BDE 209 experiments

(ng/g wet weight)	Control clam Day 28 Rep A	Control clam Day 28 Rep B	Control clam Day 28 Rep C	BDE clam Day 28 Rep A	BDE clam Day 28 Rep B	BDE clam Day 28 Rep C	PCB clam Day 28 Rep A	PCB clam Day 28 Rep B	PCB clam Day 28 Rep C	Control clamfood	BDE clamfood	BDE clamfood After 1 min in water	BDE clamfood After 30 min in water	PCB clamfood	PCB clamfood After 1 min in water	PCB clamfood After 30 min in water	SRM Mussel Rep A	SRM Mussel Rep B
BDE 30	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.005	0.006	0.008	0.005	0.014	0.006	0.002	0.002
BDE 17	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.007	0.008	0.009	0.012	0.007	0.020	0.008	0.003	0.003
BDE 25	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.002	0.002	0.005	0.005	0.006	0.008	0.005	0.014	0.005	0.002	0.002
BDE 28,33	0.002	0.003	0.002	0.002	0.002	0.002	0.002	0.003	0.002	0.007	0.008	0.009	0.012	0.007	0.020	0.008	0.003	0.003
BDE 75	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.006	0.007	0.009	0.006	0.015	0.006	0.002	0.002
BDE 49, 71	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.006	0.007	0.008	0.011	0.007	0.019	0.007	0.003	0.003
BDE 47	0.137	0.138	0.133	0.137	0.136	0.135	0.119	0.138	0.137	0.380	0.431	0.492	0.663	0.412	1.115	0.440	0.165	0.163
BDE 66	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.008	0.009	0.010	0.014	0.008	0.023	0.009	0.003	0.003
BDE 100	0.032	0.032	0.031	0.032	0.031	0.031	0.027	0.032	0.032	0.088	0.099	0.113	0.153	0.095	0.257	0.102	0.038	0.038
BDE 119	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.004	0.005	0.005	0.007	0.004	0.012	0.005	0.002	0.002
BDE 99	0.154	0.155	0.149	0.154	0.153	0.152	0.133	0.155	0.155	0.427	0.484	0.553	0.746	0.463	1.253	0.495	0.186	0.183
BDE 116	0.005	0.005	0.004	0.005	0.005	0.005	0.004	0.005	0.005	0.013	0.015	0.017	0.022	0.014	0.038	0.015	0.006	0.005
BDE 155,85	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.018	0.020	0.023	0.031	0.019	0.052	0.020	0.008	0.008
BDE 154	0.010	0.010	0.010	0.010	0.010	0.010	0.009	0.010	0.010	0.029	0.033	0.037	0.050	0.031	0.085	0.033	0.013	0.012
BDE 153	0.013	0.013	0.012	0.013	0.012	0.012	0.011	0.013	0.013	0.035	0.039	0.045	0.061	0.038	0.102	0.040	0.015	0.015
BDE 138	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.006	0.006	0.007	0.010	0.006	0.016	0.006	0.002	0.002
BDE 156	0.003	0.003	0.002	0.003	0.002	0.002	0.002	0.003	0.003	0.007	0.008	0.009	0.012	0.008	0.020	0.008	0.003	0.003
BDE 183	0.003	0.003	0.002	0.003	0.003	0.003	0.002	0.003	0.003	0.007	0.008	0.009	0.012	0.008	0.021	0.008	0.003	0.003
BDE 191	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.006	0.007	0.008	0.011	0.007	0.018	0.007	0.003	0.003
BDE 181	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.006	0.007	0.009	0.006	0.016	0.006	0.002	0.002
BDE 190	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.012	0.014	0.015	0.021	0.013	0.035	0.014	0.005	0.005
BDE 204	0.006	0.006	0.005	0.006	0.006	0.006	0.005	0.006	0.006	0.016	0.018	0.020	0.027	0.017	0.046	0.018	0.007	0.007
BDE 197	0.005	0.005	0.004	0.005	0.005	0.005	0.004	0.005	0.005	0.013	0.015	0.017	0.022	0.014	0.038	0.015	0.006	0.005
BDE 198,203	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.003	0.003	0.008	0.009	0.010	0.013	0.008	0.022	0.009	0.003	0.003
BDE 196	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.006	0.007	0.008	0.010	0.006	0.017	0.007	0.003	0.002
BDE 205	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.009	0.011	0.012	0.016	0.010	0.027	0.011	0.004	0.004
BDE 208	0.007	0.007	0.006	0.007	0.007	0.006	0.006	0.007	0.007	0.018	0.021	0.024	0.032	0.020	0.053	0.021	0.008	0.008
BDDE 207	0.009	0.009	0.008	0.009	0.008	0.008	0.007	0.009	0.009	0.024	0.027	0.031	0.041	0.026	0.069	0.027	0.010	0.010
BDE 206	0.058	0.059	0.057	0.058	0.058	0.058	0.051	0.059	0.059	0.162	0.184	0.210	0.283	0.176	0.476	0.188	0.071	0.069
BDE 209	0.301	0.303	0.292	0.301	0.299	0.297	0.261	0.302	0.302	0.835	0.946	1.080	1.457	0.904	2.448	0.966	0.363	0.357

% Lipid in Worms from 28 day BDE 209 bioaccumulation experiments

Sample	% lipid
Day 0A	0.84
Day 0B	0.96
Day 0C	1.09
Control day 28A	0.78
Control day 28B	1.46
Control day 28C	1.02
PCB day 28 A	0.99
PCB day 28 B	0.87
PCB day 28 C	1.22
BDE day 28 A	1.16
BDE day 28 B	0.92
BDE day 28 C	1.07
Back River day 28A	1.15
Back River day 28B	1.27
Back River day 28C	0.98
Control clam day 28 A	0.97
Control clam day 28 B	1.09
Control clam day 28 C	1.23
PCB clam day 28 A	1.57
PCB clam day 28 B	1.74
PCB clam day 28 C	0.82
BDE clam day 28 A	1.06
BDE clam day 28 B	1.15
BDE clam day 28 C	0.85

% Carbon in sediments from 28 day bioaccumulation experiments

Sample			% carbon
Control	Day 0	Rep A	1.16
Control	Day 0	Rep B	1.39
Control	Day 0	Rep C	1.42
Control	Day 28	Rep A	1.44
Control	Day 28	Rep B	1.23
Control	Day 28	Rep C	1.24
Mixture	Day 0	Rep A	1.15
Mixture	Day 0	Rep B	1.39
Mixture	Day 0	Rep C	1.32
Mixture	Day 28	Rep A	1.35
Mixture	Day 28	Rep B	1.74
Mixture	Day 28	Rep C	2.19
Abiotic control	Day 0	Rep A	
Abiotic control	Day 0	Rep B	
Abiotic control	Day 28	Rep A	
Abiotic control	Day 28	Rep B	
PCB	Day 0	Rep A	1.22
PCB	Day 0	Rep B	1.34
PCB	Day 0	Rep C	1.2
PCB	Day 28	Rep A	1.35
PCB	Day 28	Rep B	1.22
PCB	Day 28	Rep C	1.34
BDE	Day 0	Rep A	1.5
BDE	Day 0	Rep B	1.25
BDE	Day 0	Rep C	1.38
BDE	Day 28	Rep A	1.38
BDE	Day 28	Rep B	1.22
BDE	Day 28	Rep C	1.29
Back River	Day 0	Rep A	4.13
Back River	Day 0	Rep B	4.09
Back River	Day 0	Rep C	4.2
Back River	Day 28	Rep A	3.96
Back River	Day 28	Rep B	3.84
Back River	Day 28	Rep C	4.01

BDE MDLs for sediments from the BDE 209 experiments

(ng/g dry weight)	Control Day 0 Rep A	Control Day 0 Rep B	Control Day 0 Rep C	Control Day 28 Rep A	Control Day 28 Rep B	Control Day 28 Rep C	Mixture Day 0 Rep A	Mixture Day 0 Rep B	Mixture Day 0 Rep C	Mixture Day 28 Rep A	Mixture Day 28 Rep B	Mixture Day 28 Rep C
BDE 30	0.004	0.005	0.005	0.007	0.005	0.006	0.004	0.005	0.005	0.008	0.013	0.010
BDE 17	0.010	0.010	0.011	0.017	0.012	0.013	0.010	0.012	0.012	0.018	0.030	0.023
BDE 25	0.007	0.008	0.008	0.013	0.009	0.010	0.007	0.009	0.009	0.014	0.023	0.017
BDE 28,33	0.007	0.007	0.007	0.012	0.008	0.009	0.007	0.008	0.008	0.012	0.021	0.016
BDE 75	0.006	0.006	0.007	0.010	0.008	0.008	0.006	0.007	0.007	0.011	0.018	0.014
BDE 49, 71	0.006	0.007	0.007	0.011	0.008	0.008	0.006	0.008	0.008	0.012	0.020	0.015
BDE 47	0.154	0.166	0.174	0.272	0.198	0.202	0.153	0.189	0.190	0.284	0.484	0.364
BDE 66	0.010	0.011	0.011	0.018	0.013	0.013	0.010	0.012	0.012	0.018	0.031	0.024
BDE 100	0.027	0.029	0.030	0.048	0.035	0.035	0.027	0.033	0.033	0.050	0.085	0.064
BDE 119	0.008	0.008	0.009	0.013	0.010	0.010	0.008	0.009	0.009	0.014	0.024	0.018
BDE 99	0.094	0.102	0.107	0.167	0.121	0.124	0.094	0.116	0.117	0.174	0.297	0.223
BDE 116	0.011	0.011	0.012	0.019	0.014	0.014	0.011	0.013	0.013	0.020	0.033	0.025
BDE 155,85	0.013	0.014	0.015	0.023	0.017	0.017	0.013	0.016	0.016	0.024	0.041	0.031
BDE 154	0.008	0.008	0.009	0.013	0.010	0.010	0.008	0.009	0.009	0.014	0.024	0.018
BDE 153	0.021	0.023	0.024	0.037	0.027	0.028	0.021	0.026	0.026	0.039	0.067	0.050
BDE 138	0.010	0.011	0.011	0.017	0.013	0.013	0.010	0.012	0.012	0.018	0.031	0.023
BDE 156	0.039	0.042	0.044	0.068	0.050	0.051	0.038	0.048	0.048	0.071	0.122	0.091
BDE 183	0.009	0.010	0.011	0.017	0.012	0.012	0.009	0.012	0.012	0.017	0.030	0.022
BDE 191	0.013	0.014	0.015	0.023	0.017	0.017	0.013	0.016	0.016	0.024	0.041	0.031
BDE 181	0.010	0.010	0.011	0.017	0.012	0.013	0.009	0.012	0.012	0.018	0.030	0.023
BDE 190	0.013	0.014	0.015	0.023	0.017	0.017	0.013	0.016	0.016	0.024	0.041	0.031
BDE 204	0.016	0.018	0.018	0.029	0.021	0.021	0.016	0.020	0.020	0.030	0.051	0.038
BDE 197	0.020	0.021	0.022	0.035	0.025	0.026	0.020	0.024	0.024	0.036	0.062	0.047
BDE 198,203	0.010	0.011	0.011	0.018	0.013	0.013	0.010	0.012	0.012	0.019	0.032	0.024
BDE 196	0.013	0.014	0.014	0.022	0.016	0.017	0.013	0.016	0.016	0.023	0.040	0.030
BDE 205	0.013	0.014	0.014	0.022	0.016	0.017	0.013	0.016	0.016	0.023	0.040	0.030
BDE 208	0.025	0.027	0.029	0.045	0.033	0.033	0.025	0.031	0.031	0.047	0.080	0.060
BDDE 207	0.043	0.046	0.048	0.075	0.055	0.056	0.042	0.052	0.053	0.079	0.134	0.101
BDE 206	0.142	0.153	0.161	0.252	0.183	0.187	0.142	0.175	0.176	0.263	0.448	0.336
BDE 209	2.215	2.390	2.506	3.919	2.851	2.916	2.205	2.726	2.741	4.094	6.976	5.241

BDE MDLs for sediments from the BDE 209 experiments

(ng/g dry weight)	Abiotic control Day 0 Rep A	Abiotic co Day 0 Rep B	Abiotic control Day 28 Rep A	Abiotic contr Day 28 Rep B	PCB Day 0 Rep A	PCB Day 0 Rep B	PCB Day 0 Rep C	PCB Day 28 Rep A	PCB Day 28 Rep B	PCB Day 28 Rep C	BDE Day 0 Rep A	BDE Day 0 Rep B	BDE Day 0 Rep C
BDE 30	0.005	0.005	0.008	0.009	0.005	0.005	0.004	0.006	0.005	0.006	0.005	0.005	0.005
BDE 17	0.011	0.010	0.017	0.021	0.011	0.011	0.010	0.013	0.012	0.013	0.010	0.011	0.011
BDE 25	0.009	0.008	0.013	0.016	0.009	0.009	0.008	0.010	0.009	0.010	0.008	0.009	0.008
BDE 28,33	0.008	0.007	0.012	0.014	0.008	0.008	0.007	0.009	0.008	0.009	0.007	0.008	0.007
BDE 75	0.007	0.006	0.011	0.013	0.007	0.007	0.006	0.008	0.007	0.008	0.006	0.007	0.006
BDE 49, 71	0.007	0.007	0.012	0.014	0.008	0.008	0.007	0.008	0.008	0.008	0.007	0.007	0.007
BDE 47	0.181	0.164	0.280	0.336	0.183	0.183	0.161	0.202	0.195	0.202	0.168	0.180	0.169
BDE 66	0.012	0.011	0.018	0.022	0.012	0.012	0.010	0.013	0.013	0.013	0.011	0.012	0.011
BDE 100	0.032	0.029	0.049	0.059	0.032	0.032	0.028	0.035	0.034	0.035	0.029	0.031	0.029
BDE 119	0.009	0.008	0.014	0.016	0.009	0.009	0.008	0.010	0.010	0.010	0.008	0.009	0.008
BDE 99	0.111	0.101	0.172	0.206	0.112	0.112	0.099	0.124	0.120	0.124	0.103	0.111	0.103
BDE 116	0.013	0.011	0.019	0.023	0.013	0.013	0.011	0.014	0.013	0.014	0.012	0.012	0.012
BDE 155,85	0.015	0.014	0.024	0.028	0.015	0.016	0.014	0.017	0.017	0.017	0.014	0.015	0.014
BDE 154	0.009	0.008	0.014	0.017	0.009	0.009	0.008	0.010	0.010	0.010	0.008	0.009	0.008
BDE 153	0.025	0.023	0.039	0.046	0.025	0.025	0.022	0.028	0.027	0.028	0.023	0.025	0.023
BDE 138	0.011	0.010	0.018	0.021	0.012	0.012	0.010	0.013	0.012	0.013	0.011	0.011	0.011
BDE 156	0.046	0.041	0.071	0.084	0.046	0.046	0.041	0.051	0.049	0.051	0.042	0.045	0.042
BDE 183	0.011	0.010	0.017	0.021	0.011	0.011	0.010	0.012	0.012	0.012	0.010	0.011	0.010
BDE 191	0.015	0.014	0.024	0.028	0.015	0.015	0.014	0.017	0.016	0.017	0.014	0.015	0.014
BDE 181	0.011	0.010	0.017	0.021	0.011	0.011	0.010	0.012	0.012	0.013	0.010	0.011	0.010
BDE 190	0.015	0.014	0.024	0.028	0.015	0.015	0.014	0.017	0.016	0.017	0.014	0.015	0.014
BDE 204	0.019	0.017	0.030	0.036	0.019	0.019	0.017	0.021	0.021	0.021	0.018	0.019	0.018
BDE 197	0.023	0.021	0.036	0.043	0.023	0.023	0.021	0.026	0.025	0.026	0.022	0.023	0.022
BDE 198,203	0.012	0.011	0.018	0.022	0.012	0.012	0.011	0.013	0.013	0.013	0.011	0.012	0.011
BDE 196	0.015	0.013	0.023	0.028	0.015	0.015	0.013	0.017	0.016	0.017	0.014	0.015	0.014
BDE 205	0.015	0.014	0.023	0.028	0.015	0.015	0.013	0.017	0.016	0.017	0.014	0.015	0.014
BDE 208	0.030	0.027	0.046	0.055	0.030	0.030	0.027	0.033	0.032	0.033	0.028	0.030	0.028
BDDE 207	0.050	0.046	0.078	0.093	0.051	0.051	0.045	0.056	0.054	0.056	0.047	0.050	0.047
BDE 206	0.167	0.152	0.259	0.310	0.169	0.169	0.149	0.187	0.180	0.187	0.155	0.167	0.156
BDE 209	2.608	2.368	4.041	4.835	2.634	2.636	2.327	2.906	2.808	2.914	2.421	2.598	2.430

BDE MDLs for sediments from the BDE 209 experiments

(ng/g dry weight)	BDE Day 28 Rep A	BDE Day 28 Rep B	BDE Day 28 Rep C	Back River Day 0 Rep A	Back River Day 0 Rep B	Back River Day 0 Rep C	Back River Day 28 Rep A	Back River Day 28 Rep B	Back River Day 28 Rep C	SRM 1941b sediment Rep A	SRM 1941b sediment Rep B
BDE 30	0.006	0.006	0.005	0.008	0.010	0.010	0.017	0.015	0.011	0.005	0.006
BDE 17	0.014	0.013	0.011	0.019	0.024	0.023	0.039	0.034	0.026	0.012	0.013
BDE 25	0.011	0.010	0.008	0.015	0.018	0.017	0.030	0.026	0.020	0.009	0.010
BDE 28,33	0.010	0.009	0.007	0.013	0.016	0.016	0.027	0.023	0.018	0.008	0.009
BDE 75	0.009	0.008	0.007	0.012	0.014	0.014	0.024	0.020	0.016	0.007	0.008
BDE 49, 71	0.010	0.009	0.007	0.013	0.016	0.015	0.026	0.022	0.017	0.008	0.009
BDE 47	0.231	0.216	0.174	0.309	0.377	0.365	0.630	0.539	0.419	0.187	0.210
BDE 66	0.015	0.014	0.011	0.020	0.024	0.024	0.041	0.035	0.027	0.012	0.014
BDE 100	0.040	0.038	0.030	0.054	0.066	0.064	0.110	0.094	0.073	0.033	0.037
BDE 119	0.011	0.011	0.009	0.015	0.019	0.018	0.031	0.026	0.021	0.009	0.010
BDE 99	0.142	0.133	0.107	0.189	0.232	0.224	0.387	0.331	0.257	0.114	0.129
BDE 116	0.016	0.015	0.012	0.021	0.026	0.025	0.044	0.037	0.029	0.013	0.014
BDE 155,85	0.020	0.018	0.015	0.026	0.032	0.031	0.053	0.046	0.036	0.016	0.018
BDE 154	0.011	0.011	0.009	0.015	0.019	0.018	0.031	0.027	0.021	0.009	0.010
BDE 153	0.032	0.030	0.024	0.043	0.052	0.050	0.087	0.074	0.058	0.026	0.029
BDE 138	0.015	0.014	0.011	0.020	0.024	0.023	0.040	0.034	0.027	0.012	0.013
BDE 156	0.058	0.054	0.044	0.078	0.095	0.092	0.159	0.136	0.105	0.047	0.053
BDE 183	0.014	0.013	0.011	0.019	0.023	0.022	0.039	0.033	0.026	0.011	0.013
BDE 191	0.019	0.018	0.015	0.026	0.032	0.031	0.053	0.045	0.035	0.016	0.018
BDE 181	0.014	0.013	0.011	0.019	0.023	0.023	0.039	0.033	0.026	0.012	0.013
BDE 190	0.019	0.018	0.015	0.026	0.032	0.031	0.053	0.045	0.035	0.016	0.018
BDE 204	0.024	0.023	0.018	0.033	0.040	0.039	0.067	0.057	0.044	0.020	0.022
BDE 197	0.030	0.028	0.022	0.040	0.048	0.047	0.081	0.069	0.054	0.024	0.027
BDE 198,203	0.015	0.014	0.011	0.020	0.025	0.024	0.041	0.035	0.027	0.012	0.014
BDE 196	0.019	0.018	0.014	0.025	0.031	0.030	0.052	0.044	0.034	0.015	0.017
BDE 205	0.019	0.018	0.014	0.025	0.031	0.030	0.052	0.045	0.035	0.015	0.017
BDE 208	0.038	0.036	0.029	0.051	0.062	0.060	0.104	0.089	0.069	0.031	0.035
BDDE 207	0.064	0.060	0.048	0.086	0.105	0.101	0.175	0.149	0.116	0.052	0.058
BDE 206	0.214	0.200	0.161	0.286	0.349	0.337	0.583	0.499	0.388	0.173	0.194
BDE 209	3.332	3.114	2.513	4.449	5.439	5.254	9.083	7.766	6.039	2.688	3.020

BDE BSAFs for worms exposed to the spiked sediment mixture for 28 days

	BSAF Rep A	BSAF Rep B	BSAF Rep C
BDE 30			
BDE 17	0.074	0.427	0.169
BDE 25			
BDE 28,33	0.666	0.901	1.111
BDE 75	0.392	0.889	0.667
BDE 49, 71			
BDE 47	1.906	2.373	3.424
BDE 66	1.107	0.869	1.721
BDE 100	1.743	1.252	2.274
BDE 119			
BDE 99	1.897	1.486	2.645
BDE 116			
BDE 155,85	0.116	0.157	0.244
BDE 154	0.634	0.440	0.780
BDE 153	0.592	0.358	0.662
BDE 138	0.162	0.139	0.220
BDE 156			
BDE 183	0.210	0.228	0.349
BDE 191			
BDE 181			
BDE 190			
BDE 204			
BDE 197			
BDE 198,203			
BDE 196	0.012	0.017	
BDE 205			
BDE 208			
BDDE 207	0.002	0.002	0.004
BDE 206			
BDE 209	0.001	0.001	0.001

PCB 209 concentrations in worms and sediment from the BDE 209 bioaccumulation experiments

Worms			ng/g wet weight	ng/g lipid	MDL (ng/g wet)
Control	Day 0	Rep A	ND		0.088
Control	Day 0	Rep B	ND		0.089
Control	Day 0	Rep C	ND		0.095
Time series	Day 2	Rep A	0.205		0.089
Time series	Day 2	Rep B	0.418		0.119
Time series	Day 2	Rep C	0.238		0.088
Time series	Day 4	Rep A	0.337		0.105
Time series	Day 4	Rep B	0.204		0.088
Time series	Day 4	Rep C	0.618		0.125
Time series	Day 8	Rep A	1.011		0.087
Time series	Day 8	Rep B	0.428		0.085
Time series	Day 8	Rep C	1.223		0.087
Time series	Day 16	Rep A	2.299		0.101
Time series	Day 16	Rep B	2.607		0.086
Time series	Day 16	Rep C	1.690		0.088
Time series	Day 28	Rep A	3.617		0.086
Time series	Day 28	Rep B	2.757		0.089
Time series	Day 28	Rep C	2.911		0.081
Control	Day 28	Rep A	0.166	21.388	0.087
Control	Day 28	Rep B	0.177	12.150	0.086
Control	Day 28	Rep C	0.217	21.278	0.089
BDE	Day 28	Rep A	0.165	14.258	0.089
BDE	Day 28	Rep B	0.138	14.916	0.088
BDE	Day 28	Rep C	0.190	17.702	0.085
Back River	Day 28	Rep A	0.355	30.976	0.088
Back River	Day 28	Rep B	0.328	25.827	0.089
Back River	Day 28	Rep C	0.436	44.554	0.088
PCB	Day 28	Rep A	15.613	1576.499	0.101
PCB	Day 28	Rep B	12.408	1431.104	0.087
PCB	Day 28	Rep C	5.396	440.629	0.087
Control clam	Day 28	Rep A	0.136	14.097	0.088
Control clam	Day 28	Rep B	0.152	13.992	0.088
Control clam	Day 28	Rep C	0.157	12.714	0.085
BDE clam	Day 28	Rep A	0.237	22.275	0.088
BDE clam	Day 28	Rep B	0.242	20.953	0.087
BDE clam	Day 28	Rep C	0.137	16.094	0.086
PCB clam	Day 28	Rep A	75.010	4770.967	0.076
PCB clam	Day 28	Rep B	99.582	5710.475	0.088
PCB clam	Day 28	Rep C	84.764	10277.662	0.088
Control	clamfood		0.457		0.243
BDE	clamfood		ND		0.275
BDE	clamfood	After 1 min in water	ND		0.314
BDE	clamfood	After 30 min in water	ND		0.424
PCB	clamfood		1048.165		0.263
PCB	clamfood	After 1 min in water	240.237		0.712
PCB	clamfood	After 30 min in water	363.281		0.281
SRM 1974b	mussel	Rep A	0.197		0.106
SRM 1974b	mussel	Rep B	2.131		0.104

Sediment			ng/g dry	ng/g carbon	MDL (ng/g dry)
Control	Day 0	Rep A	ND		0.90
Control	Day 0	Rep B	ND		0.97
Control	Day 0	Rep C	ND		1.02
Control	Day 28	Rep A	ND		1.59
Control	Day 28	Rep B	ND		1.16
Control	Day 28	Rep C	ND		1.18
Mixture	Day 0	Rep A	1703.64	148143.01	0.89
Mixture	Day 0	Rep B	2012.66	144795.66	1.11
Mixture	Day 0	Rep C	1997.60	151333.56	1.11
Mixture	Day 28	Rep A	1558.64	115454.86	1.66
Mixture	Day 28	Rep B	1720.58	98883.97	2.83
Mixture	Day 28	Rep C	1954.12	89229.11	2.12
Abiotic control	Day 0	Rep A	1156.05		1.06
Abiotic control	Day 0	Rep B	1722.54		0.96
Abiotic control	Day 28	Rep A	2100.62		1.64
Abiotic control	Day 28	Rep B	1927.95		1.96
PCB	Day 0	Rep A	1312.33	107567.92	1.07
PCB	Day 0	Rep B	1443.90	107753.90	1.07
PCB	Day 0	Rep C	769.58	64132.05	0.94
PCB	Day 28	Rep A	855.85	63396.54	1.18
PCB	Day 28	Rep B	1018.82	83510.04	1.14
PCB	Day 28	Rep C	792.78	59162.72	1.18
BDE	Day 0	Rep A	1.26	83.90	0.98
BDE	Day 0	Rep B	ND		1.05
BDE	Day 0	Rep C	ND		0.99
BDE	Day 28	Rep A	ND		1.35
BDE	Day 28	Rep B	ND		1.26
BDE	Day 28	Rep C	1.20	93.40	1.02
Back River	Day 0	Rep A	5.17	125.28	1.80
Back River	Day 0	Rep B	3.98	97.42	2.20
Back River	Day 0	Rep C	4.87	116.02	2.13
Back River	Day 28	Rep A	ND		3.68
Back River	Day 28	Rep B	3.26	84.80	3.15
Back River	Day 28	Rep C	ND		2.45
SRM 1941b	sediment	Rep A	4.09		1.09
SRM 1941b	sediment	Rep B	4.24		1.22

Worm wet weights in BDE 209 bioaccumulation experiment

	Day 0	Control Sediment A	Control Sediment B	Control Sediment C	BDE 209 Sediment A	BDE 209 Sediment B	BDE 209 Sediment C	PCB 209 Sediment A	PCB 209 Sediment B	PCB 209 Sediment C	Back River Sediment A	Back River Sediment B	Back River Sediment C	Mixture Sediment A	Mixture Sediment B	Mixture Sediment C	Control Food A	Control Food B	Control Food C	BDE 209 Food A	BDE 209 Food B	BDE 209 Food C	PCB 209 Food A	PCB 209 Food B	PCB 209 Food C
	7.18	1.7	3.96	5.05	2.35	1.77	6.52	1.83	5.55	2.76	2.38	4.1	3.71	3.8	6.69	4.1	3.81	3.62	2.37	2.39	1.91	3.25	4.23	5.8	4.02
	3.09	1.14	3.64	2.16	3.22	3.31	2.38	2.66	3.38	1.75	2.53	3.64	1.88	2.36	2.44	4.9	6	4.1	6.24	2.3	4.14	5.83	5.56	3.89	2.89
	2.84	3.1	1.78	1.91	1.6	2.05	1.61	2.69	3.05	4.13	2.88	1.8	4.51	1.65	2.55	6.44	2.56	2.14	6.11	1.82	4.19	5.87	3.89	3.13	7.46
	5.38	1.18	2.41	2.82	2.15	2.62	3.85	2.2	2.2	3.45	1.3	2.4	1.97	4.12	2.26	5.44	1.87	1.72	3.72	1.88	2.51	2.77	3.09	4.5	3.44
	3.11	0.8	1.31	2.11	4.1	1.41	2.41	2.15	1.75	6.52	2.06	3.15	2.4	2.25	2.04	4.17	2.33	3.35	3.65	2.84	3.79	3.51	1.79	2.15	2.32
	6.34	1.58	2.53	2.6	1.02	2.54	2.72	1.31	1.71	2.45	5.94	1.54	1.52	2.04		2.19	2.43	1.5	2.77	4.8	3.74	2.43	3.39	2.03	3.63
	2.78	1.93	1.23	2.19	3.25	1.79	1.23	1.09	1.33	3.69	1.36	2.4	1.72	1.85		4.82	2.18	1.6	2.95	2.1	2.48	2.34	3.48	2.33	2.31
	2.02	2.54	1.04	1.63	1.91	1.2	3.07	1.27	3.32	4	1.77	3.04		2.5		2.9	2.59		2.93	1.7	2.41	2.15	2.54	2.41	1.79
	6.22	0.94		2.5	1.89	1.63	1.54		1.56	1.25		2.5				4.15									
	3.1			2.62	0.91	1.01	1.47		1.91	1.09		1.92				3.68									
	7.22				1.19																				
	3.71																								
	2.66																								
	5.35																								
	3.82																								
	4.46																								
	2.39																								
	2.4																								
	2.67																								
	2.77																								
	4.31																								
	1.72																								
	5.06																								
	2.89																								
	2.83																								
	2.87																								
	2.77																								
	2.13																								
	4.69																								
	2.56																								
Mean	3.71	1.66	2.24	2.56	2.14	1.93	2.68	1.90	2.58	3.11	2.53	2.65	2.53	2.57	3.20	4.28	2.97	2.58	3.84	2.48	3.15	3.52	3.50	3.28	3.48
SD	1.55	0.77	1.11	0.95	1.02	0.71	1.58	0.63	1.29	1.63	1.49	0.82	1.14	0.90	1.96	1.22	1.35	1.08	1.51	1.01	0.91	1.51	1.13	1.35	1.78

Uptake rates for worms exposed to the mixture spiked sediment

BDE	ks (g carbon/g lipid*hr)	Standard Error
17	0.0026	0.0004
28,33	0.0017	0.0003
47	0.0004	0.000075108
66	0.0008	0.0002
99	0.0002	0.000036787
100	0.0002	0.0000441
153	0.0001	0.00004042
154	0.0002	0.000045938
BDE 209	0.00000029	0.000000049
PCB 209	0.0000024	0.0000012

Surrogate Standard Recoveries for tissue samples from the BDE 209 exposure experiments

	Blank worm 2	Blank worm 3	Blank worm 4	Blank worm 5	Control worm Day 0 Rep A	Control worm Day 0 Rep B	Control worm Day 0 Rep C	Control worm Day 28 Rep A	Control worm Day 28 Rep B	Control worm Day 28 Rep C	Time series worm Day 2 Rep A	Time series worm Day 2 Rep B	Time series worm Day 2 Rep C	Time series worm Day 4 Rep A	Time series worm Day 4 Rep B	Time series worm Day 4 Rep C
Surrogate Standards																
13C BDE 15	46.56	52.79	86.98	42.31	55.59	50.96	30.03	47.85	50.46	59.74	70.29	0.00	69.95	47.96	52.55	49.81
13C BDE 118	79.16	92.71	106.57	65.49	92.17	89.57	56.06	77.91	86.64	102.14	73.30	0.00	115.76	84.53	93.59	99.87

% Recovery	Time series worm Day 8 Rep A	Time series worm Day 8 Rep B	Time series worm Day 8 Rep C	Time series worm Day 16 Rep A	Time series worm Day 16 Rep B	Time series worm Day 16 Rep C	Time series worm Day 28 Rep A	Time series worm Day 28 Rep B	Time series worm Day 28 Rep C	BDE clam worm Day 28 Rep A	BDE clam worm Day 28 Rep B	BDE clam worm Day 28 Rep C	BDE clamfood	BDE clamfood After 1 min in	BDE clamfood After 30 min in water
Surrogate Standards															
13C BDE 15	46.20	50.02	45.90	53.34	51.10	29.89	46.38	53.16	54.23	81.68	59.54	58.84	85.34	82.10	74.77
13C BDE 118	103.33	103.81	89.58	115.36	121.89	68.85	137.96	110.77	155.47	105.74	71.97	74.10	109.33	111.30	114.70

% Recovery	Control clam worm Day 28 Rep A	Control clam worm Day 28 Rep B	Control clam worm Day 28 Rep C	Control clamfood	SRM Mussel Rep A	SRM Mussel Rep B	PCB clam worm Day 28 Rep A	PCB clam worm Day 28 Rep B	PCB clam worm Day 28 Rep C	PCB clamfood	PCB clamfood After 1 min in	PCB clamfood After 30 min in water	Pseudo matrix Rep A	Pseudo matrix spike Rep B
Surrogate Standards														
13C BDE 15	76.45	62.38	67.80	70.18	80.10	79.26	67.11	76.07	81.62	82.66	52.11	78.49	57.28	54.07
13C BDE 118	100.33	80.08	85.30	90.14	91.54	95.25	78.80	90.43	99.31	111.87	75.16	104.91	99.22	88.67

% Recovery	BDE worm Day 28 Rep A	BDE worm Day 28 Rep B	BDE worm Day 28 Rep C	Back River worm Day 28 Rep A	Back River worm Day 28 Rep B	Back River worm Day 28 Rep C	Matrix Spike worm Rep A	Matrix Spike worm Rep B	PCB worm Day 28 Rep A	PCB worm Day 28 Rep B	PCB worm Day 28 Rep C
Surrogate Standards											
13C BDE 15	52.33	78.42	72.60	92.64	82.12	80.65	66.65	56.40	78.85	75.38	63.16
13C BDE 118	73.24	98.61	100.51	116.05	102.88	94.76	99.04	74.40	113.63	107.73	92.68

Surrogate Standard Recoveries for sediment samples from the BDE 209 exposure experiments

% Recovery	Blank sediment 1	Blank sediment 2	Blank sediment 3	Blank sediment 4	Control sediment Day 0 Rep A	Control sediment Day 0 Rep B	Control sediment Day 0 Rep C	Control sediment Day 28 Rep A	Control sediment Day 28 Rep B	Control sediment Day 28 Rep C	Mixture sediment Day 0 Rep A	Mixture sediment Day 0 Rep B	Mixture sediment Day 0 Rep C	Mixture sediment Day 28 Rep A	Mixture sediment Day 28 Rep B	Mixture sediment Day 28 Rep C
Surrogate Standards																
13C BDE 15	40.46	35.64	45.37	41.59	31.68	45.36	40.66	36.34	41.95	39.90	53.38	72.23	72.62	49.82	31.03	45.61
13C BDE 118	81.22	74.47	72.06	74.32	59.79	70.10	63.72	60.77	66.97	63.86	118.99	141.10	154.74	97.85	72.20	90.57

% Recovery	Abiotic control sediment Day 0 Rep A	Abiotic control sediment Day 0 Rep B	Abiotic control sediment Day 28 Rep A	Abiotic control sediment Day 28 Rep B	PCB sediment Day 0 Rep A	PCB sediment Day 0 Rep B	PCB sediment Day 0 Rep C	PCB sediment Day 28 Rep A	PCB sediment Day 28 Rep B	PCB sediment Day 28 Rep C	BDE sediment Day 0 Rep A	BDE sediment Day 0 Rep B	BDE sediment Day 0 Rep C	BDE sediment Day 28 Rep A	BDE sediment Day 28 Rep B	BDE sediment Day 28 Rep C
Surrogate Standards																
13C BDE 15	66.76	95.53	113.09	68.62	60.61	76.21	103.90	47.14	75.79	58.60	62.76	73.98	52.21	40.28	62.49	62.00
13C BDE 118	85.35	147.32	158.10	113.59	87.38	113.66	131.91	80.49	102.70	93.33	96.34	114.76	90.68	64.92	87.91	98.01

% Recovery	Back River sediment Day 0 Rep A	Back River sediment Day 0 Rep B	Back River sediment Day 0 Rep C	Back River sediment Day 28 Rep A	Back River sediment Day 28 Rep B	Back River sediment Day 28 Rep C	Matrix spike sediment Rep A	Matrix spike sediment Rep B	SRM sediment Rep A	SRM sediment Rep B
Surrogate Standards										
13C BDE 15	123.21	134.94	114.38	143.09	130.64	150.80	42.83	38.60	92.18	73.23
13C BDE 118	118.97	172.78	158.70	136.61	128.92	141.15	78.14	66.75	95.99	80.45

% Recoveries of analytes from the matrix spikes in the BDE 209 bioaccumulation experiments

	Matrix Spike worm Rep A Day 0A	Matrix Spike worm Rep B PCB clam 28C	Matrix spike sediment Rep A Control 0B	Matrix spike sediment Rep B BDE 0B	Pseudo pike NaSO4 only Rep A	Pseudo spike NaSO4 only Rep B
BDE 30	70.23	53.63	53.03	42.06	59.98	53.61
BDE 17	27.89	18.71	12.43	8.25	14.03	9.50
BDE 25	76.75	61.43	59.98	47.16	69.71	65.99
BDE 28,33	71.61	55.75	54.55	43.17	63.23	56.63
BDE 75	21.69	14.35	10.64	10.90	12.55	10.89
BDE 49, 71	50.75	32.08	30.60	24.58	35.18	30.53
BDE 47	77.60	48.61	65.03	56.50	81.33	66.66
BDE 66	88.75	68.22	73.33	63.20	84.15	75.76
BDE 100	83.14	66.44	71.43	63.25	87.42	80.77
BDE 119	83.30	67.83	72.45	64.03	87.13	81.83
BDE 99	83.80	58.47	71.51	64.67	89.47	78.99
BDE 116	74.83	53.66	51.84	43.75	62.96	52.58
BDE 155,85	62.96	47.04	45.64	39.91	51.49	48.63
BDE 154	87.50	72.38	76.59	70.13	91.44	85.44
BDE 153	93.93	75.61	77.25	70.04	97.37	90.33
BDE 138	74.66	49.75	49.40	38.70	55.94	47.44
BDE 156	84.89	59.84	57.97	46.40	69.04	60.41
BDE 183	87.85	67.93	70.27	61.19	81.86	75.20
BDE 191	78.91	52.61	56.13	45.31	63.47	56.00
BDE 181	83.57	67.44	66.85	55.10	79.50	75.84
BDE 190	53.77	32.16	38.78	23.93	35.55	28.83
BDE 204	75.78	62.95	68.06	63.33	84.63	78.69
BDE 197	84.89	65.32	63.06	59.20	82.73	82.57
BDE 198,203	44.31	31.85	31.81	28.40	40.82	34.25
BDE 196	75.08	52.36	53.18	40.34	68.06	57.11
BDE 205	33.69	22.65	22.91	17.85	21.31	20.14
BDE 208	72.26	67.59	76.31	52.86	82.94	69.91
BDDE 207	70.78	63.65	52.13		82.79	72.47
BDE 206	56.02	46.64	54.87		50.45	49.96
BDE 209	76.27	59.39	62.06		82.04	75.80

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