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Spatial Mapping of Sedimentary Contaminants in the Baltimore Harbor/Patapsco River/Back River System



August 1997

A report submitted to Maryland Department of the Environment

Spatial Mapping of Sedimentary Contaminants in the Baltimore Harbor/Patapsco River/Back River System

FINAL REPORT

4 August 1997

Contract Number: P.O. UOOP6002389
Reference No. UMCES [CBL] 97-142

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Executive Summary

The primary objective of this program was to map concentrations of target contaminants in surficial sediments in the Baltimore Harbor/Patapsco River/Back River system to assist the Maryland Department of the Environment's management activities. Secondary objectives included characterization of potential sites for sediment capping demonstration projects, further characterization of sediment depositional and accumulation patterns, and estimation of historical contaminant inventories through sediment geochronology. This report details the results of the chemical analyses of surficial sediments, documents spatial trends, and compares contaminant levels in the Baltimore region to those measured elsewhere and to benchmark toxicity thresholds. Results of sediment coring for geochronological interpretations are pending, and will be included in a supplement to this report.

During the week of June 3 to 5, 1996 surficial sediments were collected from 80 (out of 81 planned) sites in the Patapsco River/Baltimore Harbor/Back River system. The sites encompassed locations in the Patapsco River, Baltimore Harbor, Curtis Creek and Back River and in many of the smaller tributaries and embayments such as Rock Creek, Stony Creek, Bear Creek, Colgate Creek and Old Road Bay.

This report summarizes a wealth of data on contaminants in the Baltimore Harbor/Patapsco River/Back River system. The contaminants of interest were polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCs), cadmium, chromium, copper, iron, lead, mercury, methylmercury, nickel, and zinc. In addition, acid volatile sulfide (AVS), carbon, nitrogen, and sulfur contents of these surficial sediments were measured. These data provide some striking insights into the quality of the sediments and the region in general. Concentrations of PAHs and PCBs in the Inner Harbor were extremely high and may reflect the large influence of urban runoff carried to the harbor by the Jones Falls storm water outfall. Nickel concentrations exceeded the "effects range - median" (ER-M) value of 51.6 μg/g dry wgt at 70% of the sites sampled. Methylmercury was found at relatively high concentrations in Back River and may be due to discharges from the Back Creek Municipal Treatment Plant or conditions favorable for mercury methylation in the river. Zinc, chromium and lead were enriched in Bear Creek, presumably influenced by runoff from the Sparrows Point Industrial complex. Chlordanes and hexachlorobenzene were found in most of the sediments analyzed, although concentrations did not range widely. A substantial number of sites analyzed contained concentrations of metals and organic contaminants well above 'no effects' levels. Though this is not a direct measure of effects, it strongly suggests impaired habitat.

In conclusion, the compilation of this data set ends countless hours of analysis in the laboratory but marks the beginning of many hours of interpretation regarding the quality of these sediments in terms of toxicity. Moreover, insights into sources and the dynamic processes of contaminant accumulation will be elucidated upon further analyses of these data.

Spatial Mapping of Sedimentary Contaminants in the Baltimore Harbor/Patapsco River/Back River System

I. Overview

The primary objective of this program was to map concentrations of target contaminants in surficial sediments in the Baltimore Harbor/Patapsco River/Back River system to assist the Maryland Department of the Environment's management activities. Secondary objectives included characterization of sites of potential sediment capping demonstration projects, further characterization of sediment depositional and accumulation patterns, and estimation of historical contaminant inventories through sediment geochronology.

This report summarizes the wealth of data resulting from the analyses of eighty surficial sediment samples collected in June 1996. Included in this report are surface maps of each analyte as well as interpretations of spatial trends made to date. This report details the results of the chemical analyses of surficial sediments, documents spatial trends, and compares contaminant levels in the Baltimore region to those measured elsewhere and to benchmark toxicity thresholds. Results of sediment coring for geochronological interpretations are pending, and will be included in a supplement to this report.

II. Sample Collection

During the week of June 3 to 5, 1996 surficial sediments were collected from 80 (out of 81 planned) sites in the Patapsco River/Baltimore Harbor/Back River system. The sites encompassed locations in the Patapsco River, Baltimore Harbor, Curtis Creek and Back River. Also, many of the smaller tributaries and embayments such as Rock Creek, Stony Creek, Bear Creek, Colgate Creek and Old Road Bay were sampled (Figure 1). Site 66, located in the upper reaches of the Middle Branch, was too shallow for sample collection. At sites 15 and 74, two separate collections were made; the second collection was labeled 'J' (*e.g.*, 15J and 74J). Table 1 lists the coordinants of each site, depth of collection and date collected. In addition to surficial sediment sample collection, piston cores were collected from eight sites on April 29, 1997. Based on ^{210}Pb analysis, a relatively undisturbed core will be sectioned and analyzed for contaminants (Results to be described in a subsequent addendum to this report).

Sediment samples at each location were collected using Ponar grabs. The top 2 cm of surficial sediments were removed from a minimum of two Ponar grabs. The collected surficial sediments were homogenized and aliquots were removed for subsequent analyses (*i.e.*, grain size, trace metal and organic contaminant evaluation, toxicity testing).

III. Sample Analysis

A. Polychlorinated Biphenyls, Polycyclic Aromatic Hydrocarbons, and Organochlorine Pesticides (Baker and Ashley, Chesapeake Biological Laboratory)

i) Sample Extraction

Sediment samples were frozen and stored below - 5°C until extraction. Subsamples (1-2g) were taken to measure water content. These subsamples were weighed and allowed to dry at 60°C for 24 hours, cooled to room temperature in a desiccator, and reweighed to ± 0.001g. An additional 10-20 g subsample of wet sediment was used for organic contaminant analysis. Approximately 30 g of Na_2SO_4 was added to the subsample to eliminate water. The mixture was transferred into a mortar and ground with a pestle. The dried sample was placed in a ceramic thimble and was Soxhlet extracted with ca. 200 mL dichloromethane (DCM) for 24 hours. The solvent was exchanged with hexane using rotoevaporation and further concentrated under a N_2 stream.

Alumina (Al_2O_3) powder was baked at 550°C for five hours to rid residual contamination and water, and cooled to room temperature in a desiccator prior to use. The activated Al_2O_3 was deactivated by adding 6 % deionized water. Four grams of the deactivated Al_2O_3 was placed into a 9 mm i.d. glass column containing a cleaned glass wool plug. Approximately 1 g of precleaned Na_2SO_4 was added on the top. The sample extract was added and eluted with 20 ml of petroleum ether. The eluate was concentrated to 1 mL by evaporation under the nitrogen and analyzed for PAHs before further clean-up procedures in preparation for PCB and OC analyses. Florisil was cleaned with a hexane:acetone mixture (1:1 v/v) for 24 hours, activated at 550 °C for 4 hours and deactivated with 2% deionized water prior to use. The deactivated Florisil was placed into a 12 mm i.d. glass column containing a pre-cleaned glass wool plug. Approximately 1 g of precleaned Na_2SO_4 was added on the top. The PCBs were eluted from the column with 40 mL petroleum ether, and the remaining organochlorine pesticides were then eluted from the column with 50 mL 1:1 (v/v) petroleum ether:dichloromethane. Each fraction was further concentrated to 4~5 mL by rotary evaporation and then ~1 mL under the N_2 stream.

Activated elemental copper wire was used to remove elemental sulfur which interferes with the detection of PCB congeners when using electron capture detector. Prior to use, the copper was washed by 1 N HCl and rinsed with dichloromethane. The cleaned copper (0.5 - 1 g) was exposed to each sample solution during the intervals between every clean-up procedure in addition to the initial Soxhlet extraction step. The activated copper immediately turned black in those sample solution containing sulfur due to the formation of CuS. This process was successively repeated until no color change was observed.

ii) Instrumental Analysis

Congener specific PCBs and OC compounds were analyzed using a Hewlett Packard 5890 gas chromatograph equipped with a ^{63}Ni electron capture detector and a 5% phenylmethyl silicon

capillary column. The column was 60 m long and had a 0.25 mm internal diameter with 0.25μm stationary phase film thickness (DB-5, J&W Scientific). Nitrogen and hydrogen were used as the carrier and make-up gases, respectively (flow rates = 30 mL/min), and the inlet pressure was 100 kPa. The temperature program was as follows: 100°C for 2 minutes, 100-170°C at 4°C/min, 170-280°C at 3°C/min, and 5 minutes at 280°C. The injector and detector temperatures were 225°C and 285°C respectively. An auto sampler (HP 7673) was used to inject a 2 μL sample in the splitless injection-mode. Data were acquired using both an HP3393A integrator and a computer operating Chemstation software (Hewlett Packard). The identification and quantification of PCB congeners followed the method of Mullin *et al.* (1984), in which the identities and concentrations of each congener in a mixed Aroclor standard (25:18:18 mixture of Archolors 1232, 1248 and 1262) were determined by calibration with individual PCB congener standards (Mullin *et al.*, 1984). Congener identities in the sample extracts were based on their chromatographic retention times relative to the internal standards add. In cases where two or more congeners could not be chromatographically resolved, the combined concentrations are reported. Organochlorine pesticides were identified using a standard prepared from individual neat compounds.

PAHs were identified and quantified using a capillary gas chromatograph (Hewlett Packard 5890) and a mass spectrometer (5970A) operated in selected ion monitoring mode. The column was a 5% phenylmethyl silicon capillary column of 25 m length, 0.2 mm i.d., and 0.33 μ m stationary phase film thickness (J&W Scientific). Helium was used as the carrier gas at a flow rate of 0.87 mL/min and the head pressure was 100 kPa. The temperature program was as follows: 50°C for 0.5 minutes, 50-280°C at 5°C/minutes, 280°C-290°C at 2°C/minutes, and 5 minutes at 310°C. The injector and capillary interface temperatures were 225°C and 285°C respectively. Two microliters of each sample were injected in a splitless injection. Each PAH was identified by its retention time relative to the retention time of mixed standards (Supelco Separation Technologies, Bellefonte, PA), and this identification was confirmed by the abundance of a secondary mass fragment relative to the molecular ion.

A mixed Aroclor calibration standard containing 250 ng/mL of Aroclor 1232, 180 ng/mL of Aroclor 1248 and 180 ng/mL of Aroclor 1262 was prepared to yield a PCB concentration of 610 ng/ml (Mullin 1985). Internal standards were added to all the samples and calibration standards prior to instrumental analysis: 2,3,6-trichlorobiphenyl (PCB#30) and 2,2',3,4,4'5,6,6'-octachlorobiphenyl (PCB#204) for PCBs and d_8-naphthalene, d_{10}-phenanthrene, d_{12}-anthracene, d_{12}-benz[*a*]anthracene, d_{12}-benzo[*g,h,i*]perylene for PAHs.

iii) Analytical Quality Assurance

To assess precision of the PCB, PAH and OC analyses, two sample replicates were taken from each sample jar of randomly selected samples. Precision was assessed by calculating the standard error (SE). For example, the SE for individual PAHs between two replicates ranged from to % (Table 2) where SE is given by:

$$SE = |[\text{replicate1}]-[\text{replicate2}]| \times 100/\ \text{mean}$$

For both PCBs and PAHs, recoveries were assessed by the addition of surrogate PCB congeners 14, 65 and 166, and perdeuterated PAHs (d_8-napthalene, d_{10}-fluorene, d_{10}-fluoranthene and d_{12}-perylene). These surrogates were not produced in industrial synthesis. Recoveries of congeners 14, 65 and 166 were 76 ± 24%, 71 ± 18% and 87 ± 26% . Recoveries of d_8-napthalene, d_{10}-fluorene, d_{10}-fluoranthene and d_{12}-perylene were 32 ± 16%, 58 ±15%, 79 ±13% and 81 ± 13%, respectively. All data were corrected for surrogate recoveries.

Blanks were generated in each analytical procedure to monitor possible laboratory contamination. Matrix blanks consisting of approximately 30 g of clean Na_2SO_4 were analyzed using the same procedures used for the samples. The mass of most PCB congeners in the blanks showed insignificant values relative to those in the samples. PCB, OC and PAH data were not adjusted for the contribution of the blank.

In the quantification of each PCB congener, OCs and each PAH, the method detection limit was estimated as three times the peak areas on the chromatogram of the matrix blanks (Tables 3-5). In other words, analyte levels in samples less than three times those in the blanks were considered below the method detection limit (BDL). The blank based detection limits for total PCBs and total PAHS were ng/sample and ng/sample, respectively. The blank based detection limits for PCBs may be compared to the sample of lowest concentration (site 27). For the majority of PCB congeners, sample concentrations are well above detectable levels (Figure 2).

B. Mercury and Methylmercury

i) Sample extraction and analysis

Sediment was collected from designated sites around Baltimore Harbor and placed in acid-cleaned plastic containers which were stored on ice until they were transported to the lab. The samples were stored in the dark at -4°C for future analysis.

Samples for mercury (1-3 g wet weight) were digested in a solution of 70% sulfuric/30% nitric acid in Teflon vials, heated overnight in a VWR Scientific forced air oven at 60°C. The digestate was then diluted with 10 mL distilled-deionized water. Prior to analysis, the samples were further oxidized for 30 minutes with 2 mL 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 via cold vapor atomic fluorescence detection in accordance with protocols outlined in EPA Method 1631.

Samples for methylmercury (1 g wet weight) were distilled with 1mL 50% sulfuric acid and 0.4 mL 20% potassium chloride. The distillate was then reacted with sodium tetraethylborate, to convert the nonvolatile monomethylmercury to gaseous methylethylmercury. The volatile adduct was then purged from solution, and recollected on a graphitic carbon column at room temperature. The methylethylmercury was then thermally desorbed from the column, and analyzed by cryogenic gas chromatography with cold vapor atomic fluorescence detection.

A subsample was used for dry weight determination. Weighed samples were placed in a VWR Scientific forced air oven at 60°C overnight and reweighed in order to calculate the dry/wet ratio of the sediment.

ii) Quality Assurance/Quality Control

For the samples processed, two blanks were carried throughout the entire sample preparation and analytical process for both mercury and methyl mercury. Field replicates were taken and laboratory duplicates (sample splits) were prepared to measure reproducibility of replicate samples. The laboratory replicate consisted of a split homogenized sample that was digested and then analyzed separately. Digestates were often analyzed twice, in addition to the replicates described above. Reported values are the average if duplicate analysis was performed. Standard reference material (SRM 1646a) was analyzed in conjunction with each batch of samples.

C. Metals and Ancilliary Measurements

i) Water Content and Grain Size

After collection, the wet samples were stored at 40°C until they were prepared for analyses. Samples for trace metals, and total carbon, nitrogen and sulfur were held no longer than one month prior to sample preparation. Samples for grain size determination were held longer than three months.

Water content was calculated as the percentage of the water weight to the total weight of the wet sediment:

$$W_c = \frac{W_w \times 100}{W_t} \quad (1)$$

Where: W_c = water content (%)
W_w = weight of water (g)
W_t = weight of wet sediment (g).

Water weight was determined by weighing approximately 25 g of the wet sample, drying the sediment at 65°C, and reweighing it. The difference between total wet weight (W_t) and dry weight equals water weight (W_w). Bulk density was also determined from water content measurements.

The relative proportions of sand, silt, and clay were determined using the sedimentological procedures described in Kerhin *et al.* (1988). The sediment samples were pre-treated with hydrochloric acid and hydrogen peroxide to remove carbonate and organic matter, respectively. Then the samples were wet sieved through a 62-μm mesh to separate the sand from the mud (silt plus clay) fraction. The finer fraction was analyzed using the pipette method to determine the silt and

clay components (Blatt *et al.*, 1980). Each fraction was weighed; percent sand, silt, and clay were determined; and the sediments were categorized according to Pejrup's (1988) classification.

ii) Total Carbon, Nitrogen, and Sulfur

The sediments were analyzed for total nitrogen, carbon and sulfur (CNS) contents using a Carlo Erba NA1500 analyzer. This analyzer used complete combustion of the sample followed by separation and analysis of the resulting gasses by gas chromatographic techniques employing a thermal conductivity detector. The NA1500 Analyzer was configured for CNS analysis using the manufacturer's recommended settings. As a primary standard, 5-chloro- 4-hydroxy- 3-methoxy-benzylisothiourea phosphate was used. Blanks (tin capsules containing only vanadium pentoxide) were run at the beginning of the analyses and after 12 to 15 unknowns (samples) and standards. Replicates of every fifth sample were run. As a secondary standard, a NIST reference material (NIST SRM #1646 - Estuarine Sediment) was run after every 6 to 7 sediment samples. The recovery of the SRM was excellent as seen in Table 6. There was excellent agreement between the NIST values and MGS's values. Acid volatile sulfide was analyzed by acid distillation of 1-2 grams of wet sediment, with sulfide analysis using a potentiometric titration with Pb perchlorate (Cornwell and Morse, 1986).

iii) Trace metals

Sediment solids were analyzed for eight trace metals - iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), chromium (Cr), nickel (Ni), lead (Pb), and cadmium (Cd). Trace metal concentrations were determined using a modified EPA method 3051 digestion followed by analysis of the digestate on an Inductively Coupled Argon Plasma unit (ICAP). The method is considered the more reliable than the EPA standard methodology because it provides total recovery of the metals of interest. This is in keeping with the guidelines of the US EPA-EMAP program, The NOAA Status and Trends Program, and the recommendations of the EPA/USACE Testing Manual (Evaluation of Dredged Material Proposed for Ocean Dumping; Draft). The modified method places reliance on the NIST, and CRC standard reference materials (SRM's) in order to achieve QA/QC in regard to accuracy and precision. Using SRM allows the analyses to be related to other studies, and allows the use of normalization to indicate enrichment over background.

The steps in microwave digestion, modified from EPA method #3051, are outlined below:

1. Samples were homogenized in the "Whirl-Pak" bags in which they were stored and refrigerated (4°C).

2. Approximately 10 g of wet sample were transferred to Teflon evaporating dishes and dried overnight at 105-110°C.

3. Dried samples were then hand-ground with an agate mortar and pestle, powdered in a ball mill, and stored in "Whirl-Pak" bags.

4. 0.5000±0.0005 g of dried, ground sample was weighed and transferred to a Teflon digestion vessel.

5. 2.5 mL concentrated HNO_3 (trace metal grade), 7.5 mL concentrated HCl (trace metal grade), and 1 mL ultra-pure water were added to the Teflon vessel.

6. The vessel was capped with a Teflon seal, and the cap was hand tightened. Between four and twelve vessels were placed in the microwave carousel. (Preparation blanks were made by using 0.5 mL of high purity water plus the acids used in Step 5.)

7. Samples were irradiated using programmed steps appropriate for the number of samples in the carousel. These steps have been optimized based on pressure and percent power. The samples were brought to a temperature of 175°C in 5.5 minutes, then maintained between 175-180°C for 9.5 minutes. (The pressure during this time peaks at approximately 6 atm for most samples.)

8. Vessels were cooled to room temperature and uncapped. The contents were transferred to a 100 mL volumetric flask, and high purity water was added to bring the volume to 100 mL. The dissolved samples were transferred to polyethylene bottles and stored for analysis.

9. The samples were analyzed.

Samples were analyzed using a Thermo Jarrel-Ash Atom-Scan 25 sequential ICAP. The wavelengths and conditions selected for the elements of interest were determined using digested bottom sediments from the vicinity of Hart-Miller Island and standard reference materials from the National Institute of Standards and Technology (#1646 - Estuarine Sediment; #2704 -Buffalo River Sediment) and the National Research Council of Canada (PACS-1-Marine Sediment). The wavelengths and conditions were optimized for the expected metal levels and the sample matrix.

The modifications to EPA method #3051 are:

1. The samples are ground;
2. Aqua regia [a mixture of nitric and hydrochloric acids] is used in place of nitric acid alone; and
3. The length of time at the maximum temperature and pressure of digestion is doubled.

These modifications are designed to improve recovery and precision. Table 7 shows the recoveries of the modified EPA method for NIST and CRC SRM's analyzed for this study.

IV. Results

A. Sediment Characteristics

The percentage of clay, silt, sand and gravel was calculated for each site (Halka, MGS). For the majority of the sites, clay and silt were the predominate constituents, indicating sediments in region ranged from mud to sandy mud (Figure 3). There were five notable exceptions to the trend. Sediments from sites 1, 3, 5, 27 and 36 were primarily composed of sand. The former three sites of sediment collection were close to Paradise Beach and the latter two flanked the northern end of the Key Bridge. Water content followed sand content; those sites having low silt and clay content had the lowest water content and vice-versa. Carbon concentrations varied from 0.1% (Site 1- Paradise Beach) to 11.3% (mouth of Bear Creek). In general, the percentage of sedimentary carbon was relatively high in all sites sampled in Bear Creek (Figure 4). Most sites in the Patapsco and Back Rivers contained sediments having carbon contents above those found in the mainstem upper Chesapeake Bay (average of 3.0%; MDE, 1992). Sulfur (Figure 5), acid volatile sulfide (Figure 6 and 7) and nitrogen (Figure 8) content in sediments were also evaluated. Considerably elevated sulfur and nitrogen contents, as well as acid volatile sulfide, occurred at all Bear Creek sites. Sulfur was also high in the Northwest branch and at some sites in Curtis Creek. Nitrogen was elevated at sites in Curtis Creek compared to the rest of the sites in the system. Back River also had elevated levels of nitrogen except for the site at the upper reaches of the river.

B. Summary of Contaminant Concentrations

Percent water, carbon, nitrogen and sulfur content, AVS, metals (Table 8), PAHs (Table 9), PCBs (Table 10) and organochlorine pesticide (Table 11) have been analyzed for the 80 sediment samples. Mean values and ranges for all contaminants are summarized in Table 12.

C. General Patterns in the Spatial Distribution of Contaminants

Polycyclic Aromatic Hydrocarbons

Thirty five individual PAHs were analyzed (Table 9). A value for "total PAHs" (t-PAHs) was defined as being the sum of all quantifiable PAHs analyzed. Total PAH concentrations ranged from 116 to 47, 260 ng/g dry wgt (Figure 9). By inspection of both Figures 7 and 8, considerable spatial variation in PAHs was observed in surficial sediments. Regionally, the highest concentrations were found in the Northwest Branch/Inner Harbor (containing the highest value at site 72 at the outflow of Jones Falls). Site 24, located on the southern shore of Sparrows Point, had the second highest t-PAH concentration (40, 000 ng/g dry wgt). Site 28, located on the western side of Sparrows Point, contained considerable oil and tar that interfered with accurate quantification of organic contaminants. Sites 24 and presumably site 28 likely reflect the influence of the heavily industrialized Sparrows Point complex. Those sites having the lowest t-PAHs concentrations were those having high sand contents (sites 1, 3, 5, 27 and 36). Also noteworthy are the gradients that exist within the tributaries. For example, t-PAH concentrations in the Back River increased from

the mouth to the head of the river (near the outfall of Back River Sewage Treatment Plant), possibly indicative of storm water discharges of PAH (Figures 7 and 8). A similarly distinct gradient existed along Bear Creek. Total PAH concentrations decreased as the distance from Sparrows Point increased (from site 29 to 35), once again reflecting the influence of the industrial complex.

The patterns of individual PAHs between sites in the Baltimore Harbor/Patapsco River/Back River system did not vary considerably. However, use of statistical methods such as cluster analysis, principle component analysis (PCA) and source apportionment will provide insight into regions of similar patterns (if any are discernable) and may indicate possible sources.

Polychlorinated biphenyls

Congener-specific PCB analysis was conducted on seventy-seven of the eighty samples collected (Table 10). The sum of 112 identifiable congeners was defined as total PCBs (t-PCBs). Total PCB concentrations ranged from 8 to 2150 ng/g dry wgt with a mean of 282 ng/g dry wgt (Figure 11). The highest concentration was found at site 73 in the Inner Harbor (Figure 12), the lowest at site 27 (eastern side of the northern end of the Key bridge). In general, higher concentrations of t-PCBs were found in the tributaries of the Patapsco River rather than in the mainstem/channel. Bear Creek and Curtis Creek had elevated concentrations compared to most sites along the Patapsco River (Figure 12). Middle Branch and the Northwest Branch also had higher than mean concentrations, most likely influenced by urban stormwater runoff from Gwynn's and Jones Falls, respectively. Back River also contained sites which were elevated in t-PCBs (*e.g.*, site 75 and 77).

The patterns of PCB congeners between sites in the Baltimore Harbor/Patapsco River/Back River system did vary considerably. Congeners were binned into homolog groups according to the number of chlorine atoms substituted on the phenyl rings. Although PCA and cluster analysis will definitively identify differences between sites, visual inspection of randomly chosen homolog patterns suggests a considerable difference in loadings or sources (Figure 13).

Organochlorine Pesticides

A subset (n=23) of the original eighty sites were analyzed for organochlorine pesticides. Seventeen OCs were chosen (Table 11); only two failed to be detected in all samples (alpha-HCH and beta-HCH). Due to problems with resolution, *4,4*-DDT, although present in some samples, was not quantified. The most frequently detected compounds were hexachlorobenzene (HCH), chlordanes (cis and trans), *4,4*-DDE, and *4,4*-DDD (Table 13). Detection limits for individual OCs ranged from 0.04-0.1 ng/g dry wgt (Table 4).

In general, concentrations for all detectable OCs were similar and ranges were not wide as those for PAHs and PCBs (Table 12). The chlordanes (*cis* + *trans*) ranged from 0.5 to 20 ng/g dry wgt. The highest concentrations were found at site 31 in Bear Creek for both forms of the compound (Figures 12 and 13). Curtis Creek sites also had elevated concentrations compared to the mainstem Patapsco River, Back River and the Northwest Branch. Dieldrin concentrations ranged from 0.5 to 4.7 ng/g

dry wgt (Figure 16) with the highest site in Curtis Creek. Both 4,4-DDE (Figure 17) and 4,4-DDD (Figure 18) ranged in concentration from 1-10 ng/g dry wgt. As with chlordane, high concentrations were found at site 31. Hexachlorobenzene (Figure 19) ranged in concentration from 0.2 to 8 ng/g dry wgt. Highest values were found at site 23 and 31. *Trans*-nonachlor (Figure 20) was detected more frequently than the *cis* conformation (Figure 21). The Inner Harbor site (72) had the highest concentration of trans-nonachlor (9.2 ng/g dry wgt).

Trace metals

Sediments were analyzed for nine metals (Table 8). In addition to total mercury, methyl mercury was also analyzed. Cadmium concentrations ranged from 0.006 to 18 µg/g dry wgt with a mean of 2.23 µg/g dry wgt (Figure 22). The highest cadmium concentration was found at site 38 (Colgate Creek). Regionally, Bear Creek had significantly higher concentrations than most other sites (Figure 23). To a lesser degree, Back River also had high concentrations of cadmium. Chromium concentrations ranged from 5 to 1830 µg/g dry wgt (Figure 24). Bear Creek had chromium concentrations well above the mean and contained site 28, having a maximum value of all sites (Figure 25). Several sites in Northwest Branch had significantly higher concentrations compared to most of the other sites sampled from. Copper concentrations ranged from 5 to 530 µg/g dry wgt (Figure 26). Some elevated sites were situated in the Northwest Branch and Curtis Creek (Figure 27). Iron concentrations ranged from 0.01 to 15 µg/g dry wgt (Figure 28) with the highest value from near Sparrows Point, site 28. Elevated values for iron were found in Bear Creek and Old Road Bay, presumably influenced from runoff from the nearby Sparrow Point industrial complex (Figure 29). Similarly, lead, having a range from 1-1000 µg/g dry wgt (Figure 30), was found in high concentrations at some sites in Bear Creek and Old Road Bay (Figure 31). Highest concentrations were found in the Northwest Branch, which included the highest site at 69. Manganese concentrations ranged from 300 to 4000 µg/g dry wgt (Figure 32). Concentrations above the 1300 µg/g dry wgt mean were found in Old Road Bay and along the Patapsco River from Curtis Bay to Paradise Beach (Figure 33). Site 74 at the mouth of Back River also had a relatively high concentration of manganese. Total mercury concentrations ranged from 4 to 3125 ng/g dry wgt with a mean of 508 ng/g dry wgt (Figure 34). Higher concentrations were found in some of the tributaries of the Patapsco River: Curtis Creek, Bear Creek and Back River (Figure 35). The highest mercury concentration was found at site 70 at the entrance to the Inner Harbor and, like PAHs and PCBs, is likely a result of urban storm water runoff. Methyl mercury was evaluated at 47 of the 80 sites (Figure 36). Concentrations for methyl mercury ranged from 0.1 to 10 ng/g dry wgt. Highest concentrations were found in the Back River (Figure 37). Concentrations for nickel ranged from 3 to 160 ppm dry wgt with a mean value of 65 µg/g dry wgt (Figure 38). Nickel concentrations varied little, except at those sites having high sand contents (Figure 39). Elevated concentrations were seen in the Back River. Zinc concentrations varied from 40 to 2600 µg/g dry wgt with a mean value of 640 µg/g dry wgt (Figure 40). As with nickel, zinc concentrations varied little spatially with the exception of those sediments with high sand contents (Figure 41) where concentrations were well below the mean. Two exceptions are notable. High concentrations of zinc were found in Bear Creek and, to a lesser magnitude, Old Road Bay (Figure 41).

D. Comparison of BSM Data to Previous Studies

In 1994, the Maryland Department of the Environment compiled a report entitled "**Contaminants in Cheasapeake Bay Sediments (1984-1991)**" which summarized the results of various sediment contaminant monitoring programs within the mainstem Chesapeake Bay as well as those in some of its tributaries. Within the Baltimore Harbor/Patapsco River/Back River System, ten stations were monitored for both metals and organic contaminants. Nine stations were arrayed along three lines transecting the Patapsco River parallel to the Key Bridge. An additional site was located in Back River, east of Stansbury Point and downstream of the Back River Sewage Treatment Plant.

Mean concentration values and ranges from this study were compared to the results summarized in MDE's 1994 report (Table 14). Values for both metals and organics are comparable. In general, mean values were higher from this study (especially for selected PAHs) than those summarized in the 1994 report. This is most likely a direct result of the limited spatial range in the selected sampling sites for the 1994 compared to this study. Many sites in the Middle Branch and Bear Creek had relatively high concentrations compared to other sites in the system. These site were not sampled in the monitoring programs during the 1980's. However, despite the limited spatial range of the previous study, mean metal concentrations were similar.

Other studies have also reported sedimentary concentrations of contaminants such as PCBs and PAHs (Table 15) in Baltimore Harbor as well as other estuarine sites. Previous work by Nakanishi (1996) provided organic contaminant concentrations at four sites in the Patapsco River. BSM sites close to those sites were similar in magnitude. Concentrations of organic contaminants in the Baltimore Harbor system often greatly exceed those found in the mainstem Chesapeake Bay (Nakanishi, 1996) as well as other urban areas such as Miami (Gassman *et al.*, 1994) and Washington, D.C. (Wade *et al.*, 1994).

E. Evaluating Potential Toxic Effects

Long *et al.* (1995) compiled biological and chemical data from numerous modeling, laboratory, and field studies performed in marine and estuarine sediments. Using these data, two guideline values, ER-L and ER-M, defined three concentration ranges for a particular chemical. Concentrations below the "effects range-low" (ER-L) value represents a minimal-effects range in which effects would "rarely" be observed. Concentrations equal to and above the ER-L, but below the "effects range-median" (ER-M), represent a possible-effects range within which effects would occasionally occur. Contaminant concentrations equivalent to and above the ER-M value represent probable-effects range within which effects would frequently occur.

Table 16 presents the ER-L and ER-M values for thirteen PAHs (Long *et al.*, 1995). The number of PAHs which exceeded the ER-L at each location are shown in Figure 42. For example, at site 2, off-shore of Paradise Beach, 9 of the 13 individual PAH concentrations exceeded the ER-L values. Table 16 summarizes this data by expressing the percentage of total sites sampled which exceeded the ER-L. On average, 80% of the sites exceeded the individual PAH ER-Ls. Similarly, Figure 43

shows the sites which exceeded the ER-M. The numerical values represent the number of individual PAHs, out of a possible thirteen, which exceeded the ER-M. The sites of highest potential toxicity were in the Inner Harbor. Site 24 also possesses the potential to be toxic frequently. On average, 5% of the sites exceeded the ER-M for PAHs (Figure 43).

All but one site exceeded the ER-L (23 ng/g dry wgt) for t-PCBs and forty percent of the sites exceeded the ER-M value of 180 ng/g dry wgt (Table 16). The sites exceeding the ER-M for t-PCBs were primarily found in Back River, Bear Creek, Curtis Creek, Curtis Bay, the upper reaches of Middle Branch and the Inner Harbor (Figure 44). Site 9 in Old Road Bay and site 10, located at the southern end of Sparrows Point, exceeded the ER-M. With the exception of site 25 and those in Curtis Bay, sites exceeding the ER-M in the mainstem Patapsco River were absent.

Over 90% of sites exceeded the ER-L for chromium, copper, nickel, lead, and zinc (Table 16). Of those sites, approximately 20% exceeded the ER-M values with the exception of zinc. For zinc, 70% of the analyzed sites exceeded the ER-M value of 410 µg/g dry wgt (Table 16). Cadmium concentrations exceeded the ER-L of 44 µg/g dry wgt at 44% of the sites and the ER-M was exceeded at only 1 site (Colgate Creek). The ER-L and ER-M values for mercury were exceeded at 76% and 19% of the sites, respectively. Long *et al.* (1995) did not report effect ranges for methylmercury.

Concentrations of zinc and chromium, exceeding the ER-M, were primarily found at sites located in Bear Creek. In fact, all sites within the creek exceeded the "frequent" toxicity range for these two metals. The Northwest Branch and Curtis Bay also contained sites where the ER-Ms were exceeded. Sites where copper concentrations exceeded the ER-M were the Northwest Branch, Curtis Bay, and one site in Rock Creek. A similar spatial pattern was observed for lead with sites in the Northwest Branch, Curtis Creek and Old Road Bay exceeding the ER-M. Nickel exceeded its ER-M at almost every site of the study region.

Subsamples of sediments from 25 selected sites were used for ten day acute toxicity tests with the estuarine amphipod *Leptocheirus plumulosus* (McGee and Fisher) and benthic population surveys were completed at 6 sites (Brown).

Summary

This report summarizes a wealth of data on contaminants in the Baltimore Harbor/Patapsco River/Back River system. Although overwhelming at times, these data to provide some striking insights into the quality of the sediments and the region in general. Some notable observations are:

- Concentrations of PAHs and PCBs in the Inner Harbor were extremely high and may reflect the large influence of urban runoff carried to the harbor by Jones Falls

- Nickel concentrations exceeded the ER-M value of 51.6 µg/g dry wgt at 70% of the sites sampled

- Methylmercury was found at relatively high concentrations in Back River and may be due to discharges from the Back Creek Municipal Treatment Plant or conditions favorable for Hg methylation in the river

- Zinc, chromium and lead were enriched in Bear Creek, presumably influenced by runoff from the Sparrows Point Industrial complex

- Chlordanes and hexachlorobenzene were found at low levels in most of the sediments analyzed, although concentrations did not range widely

- A substantial number of sites analyzed contained concentrations of metals and organic contaminants well above 'no effects' levels. Though this is not a direct measure of effects, it strongly suggests impaired habitat.

In conclusion, the compilation of this data set ends countless hours of analysis in the laboratory but marks the beginning of many hours of interpretation regarding the quality of these sediments in terms of toxicity. Moreover, insights into sources and the dynamic processes of contaminant accumulation will be elucidated in coming months.

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APPENDIX A: FIGURES

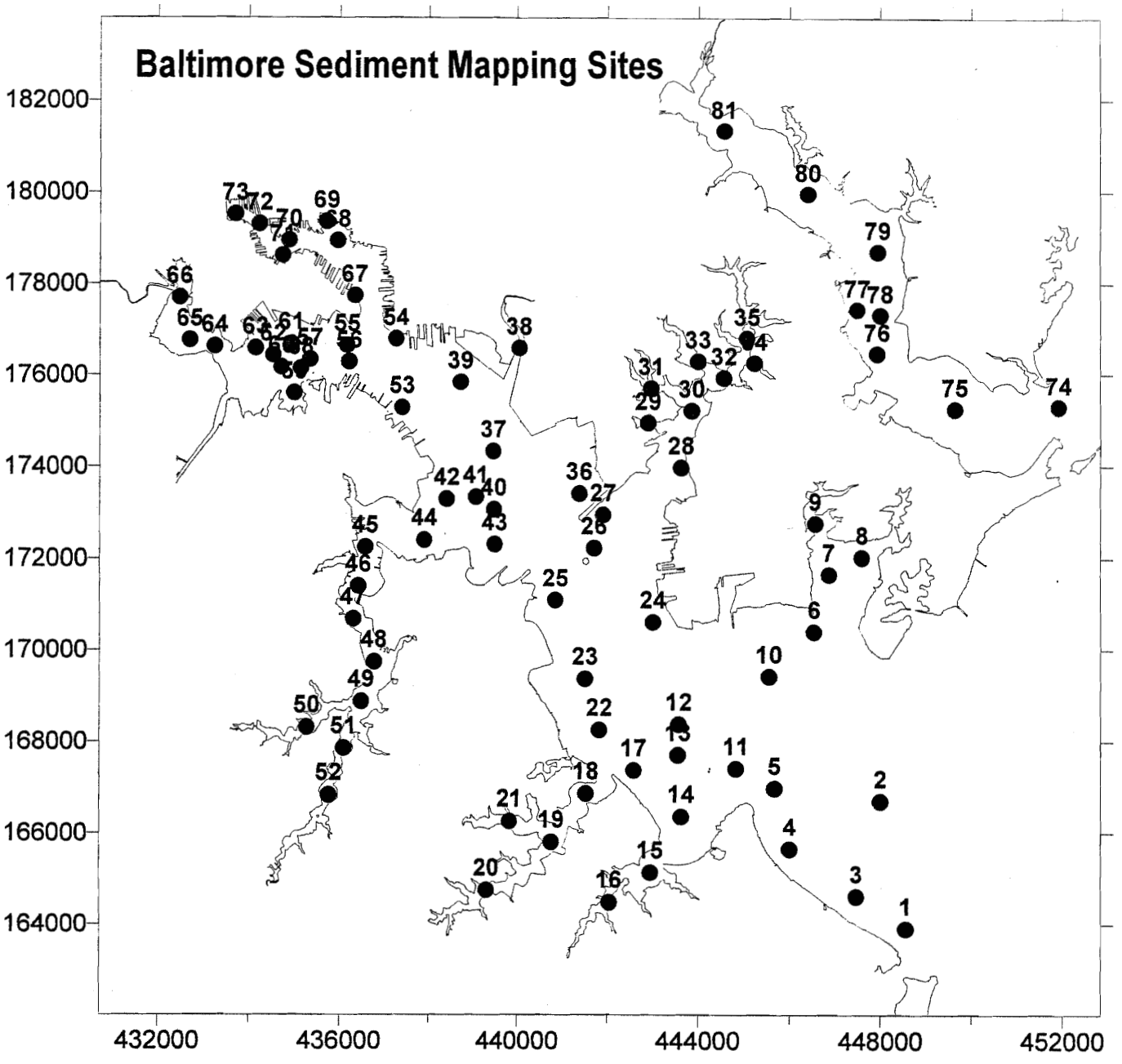


Figure 1. Locations of surficial sediments collected during the week of June 3 to 5, 1996 in the Baltimore Harbor/Patapsco River/Back River System. Site 66 was too shallow for sampling.

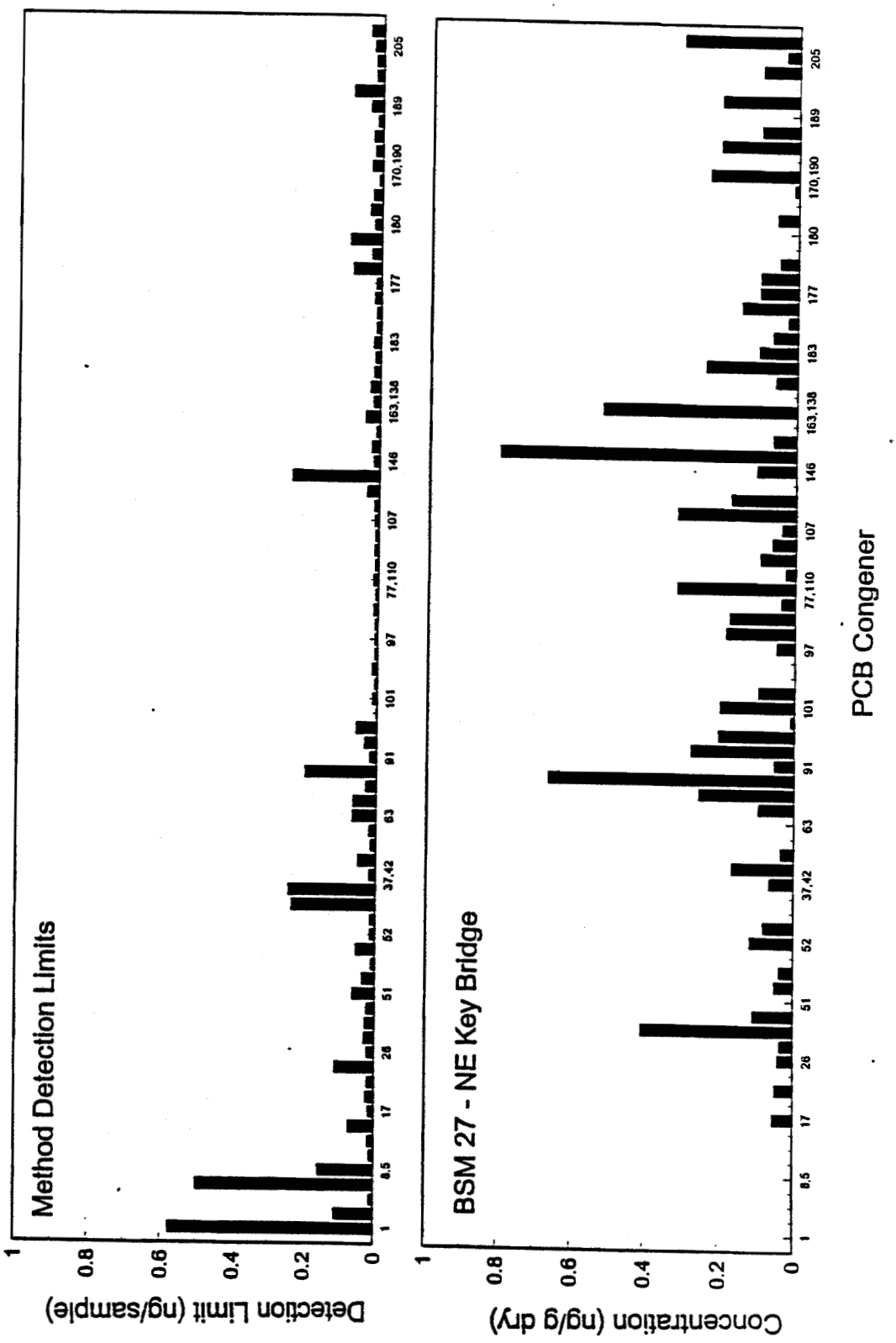


Figure 2. A comparison of matrix blank generated detection limits for each PCB congener and detected PCB congeners for site 27, the least PCB contaminated site in the BSM study. For most congeners, sample concentrations were above the detection limits.

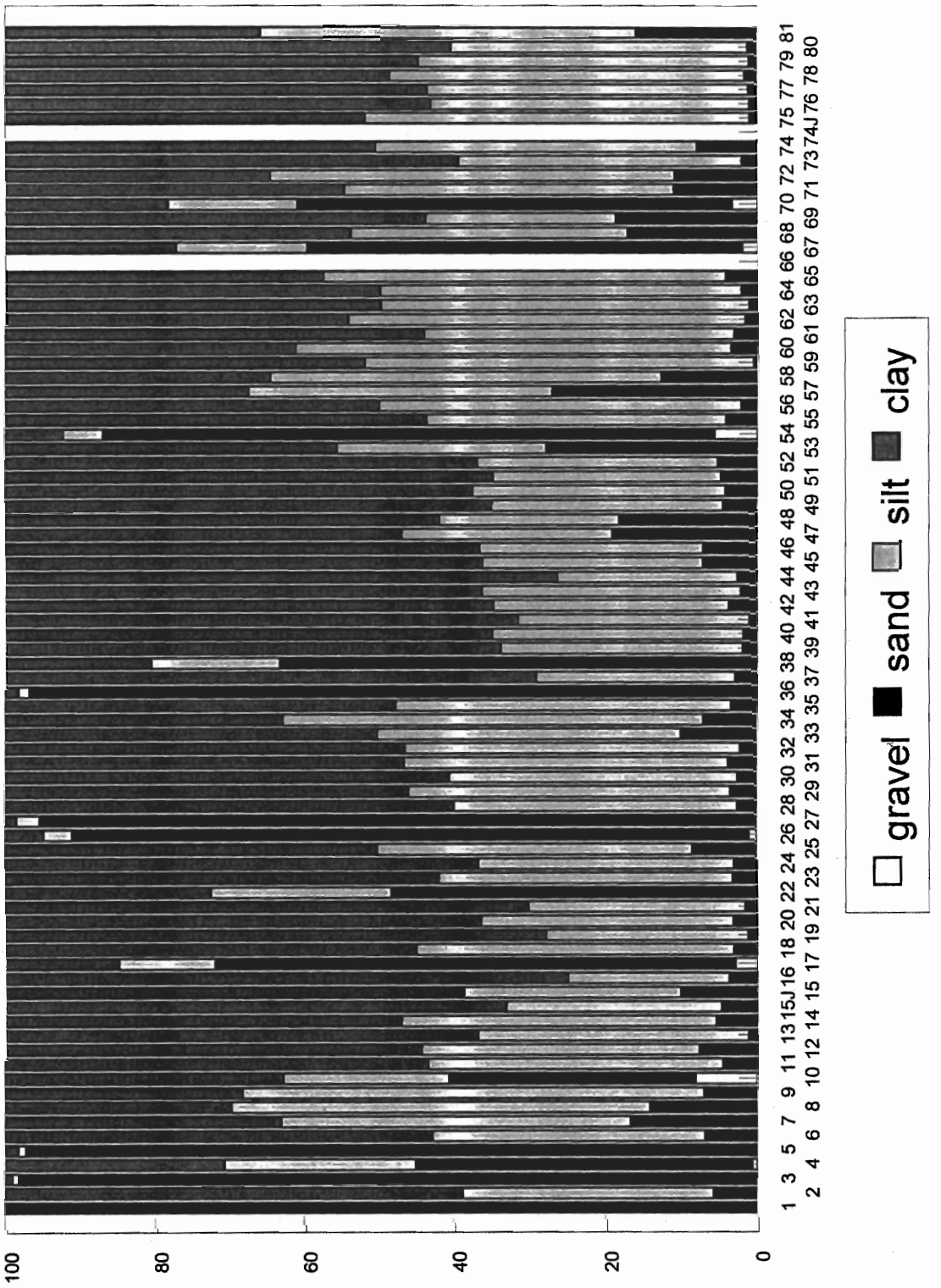


Figure 3. Percentage of clay, silt, sand and gravel in BSM sediments.

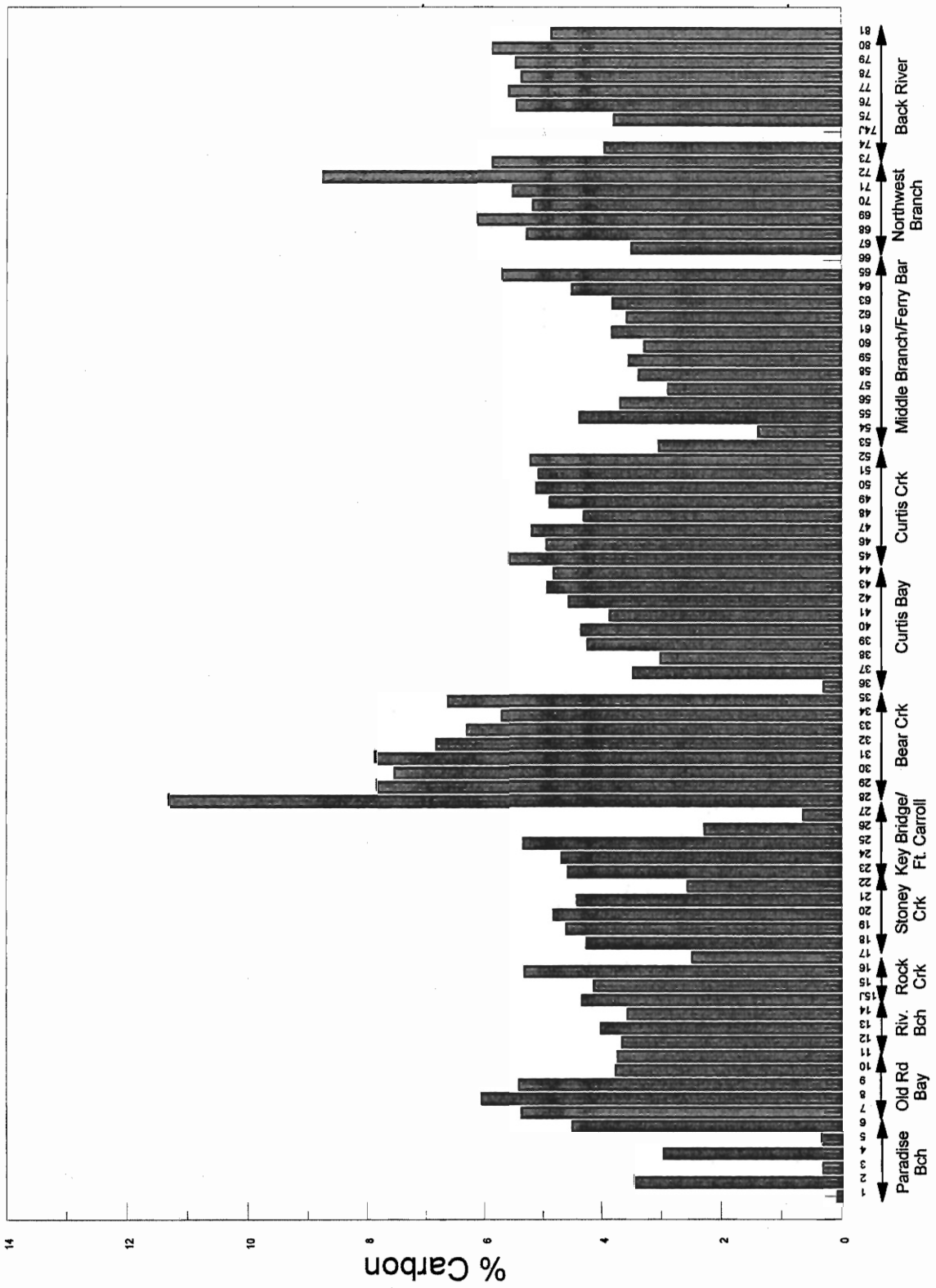


Figure 4. Percent total carbon in BSM sediments.

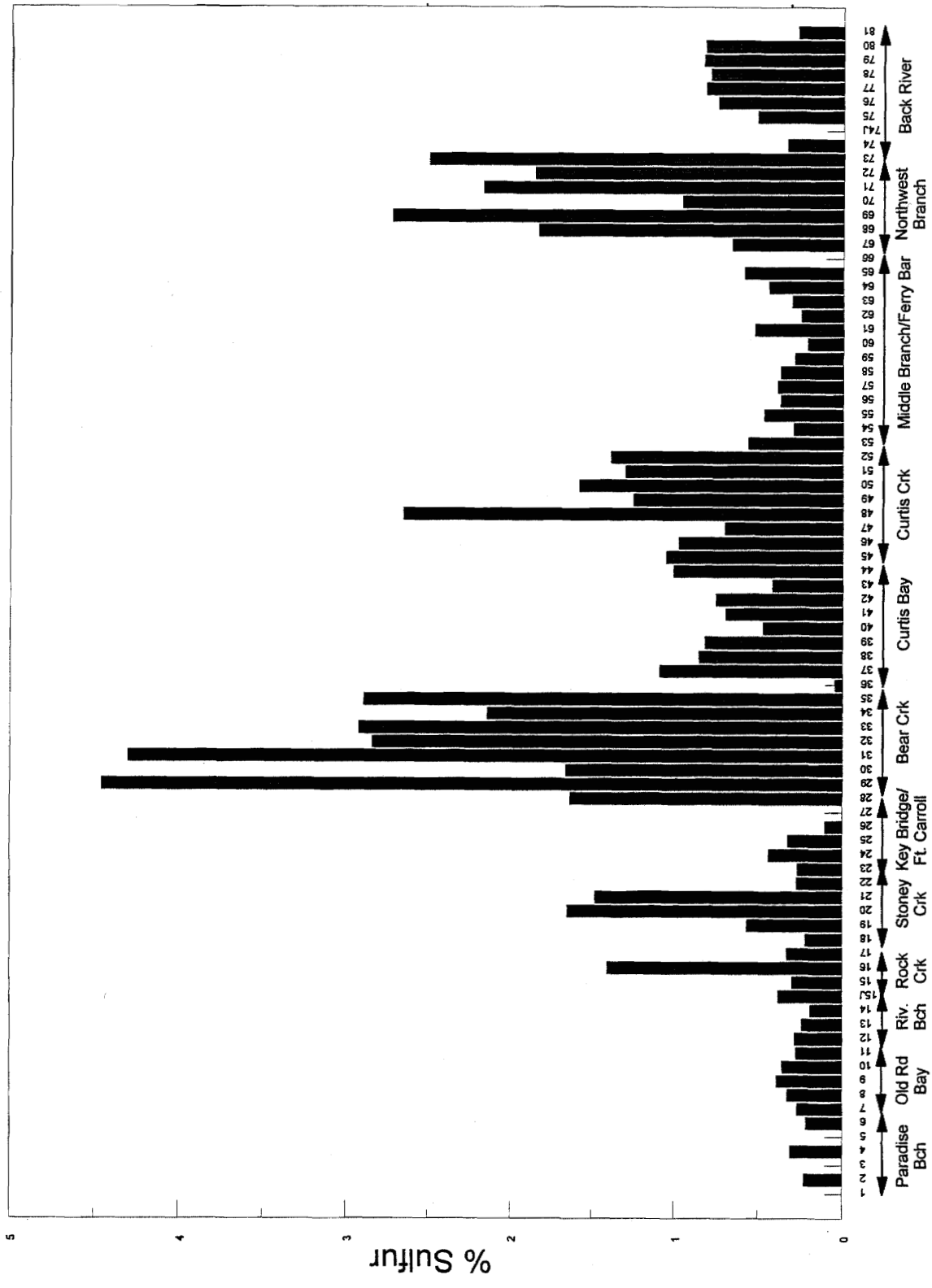


Figure 5. Percent total sulfur in BSM sediments.

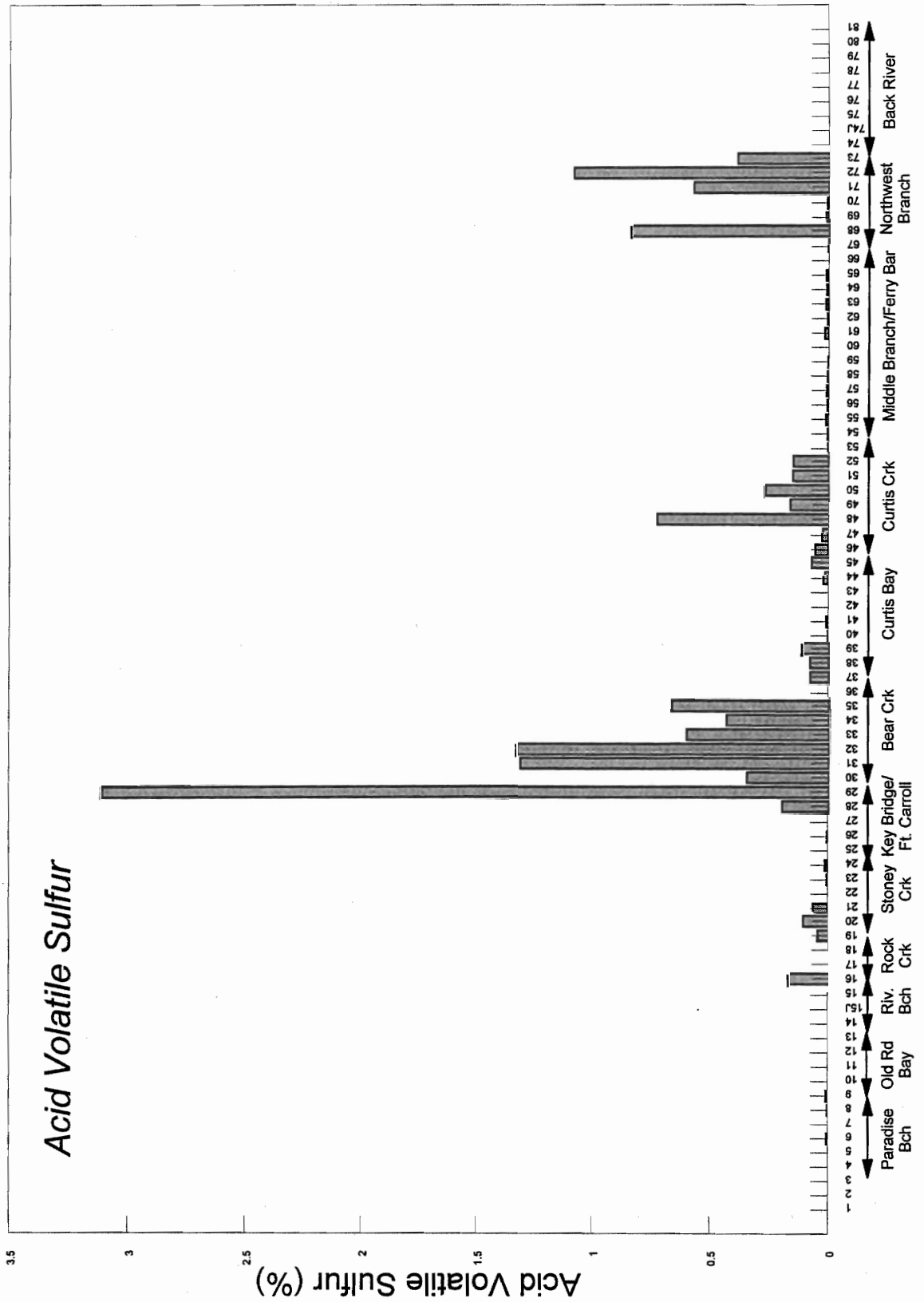


Figure 6. Percent acid volatile sulfide (AVS) for BSM sediments.

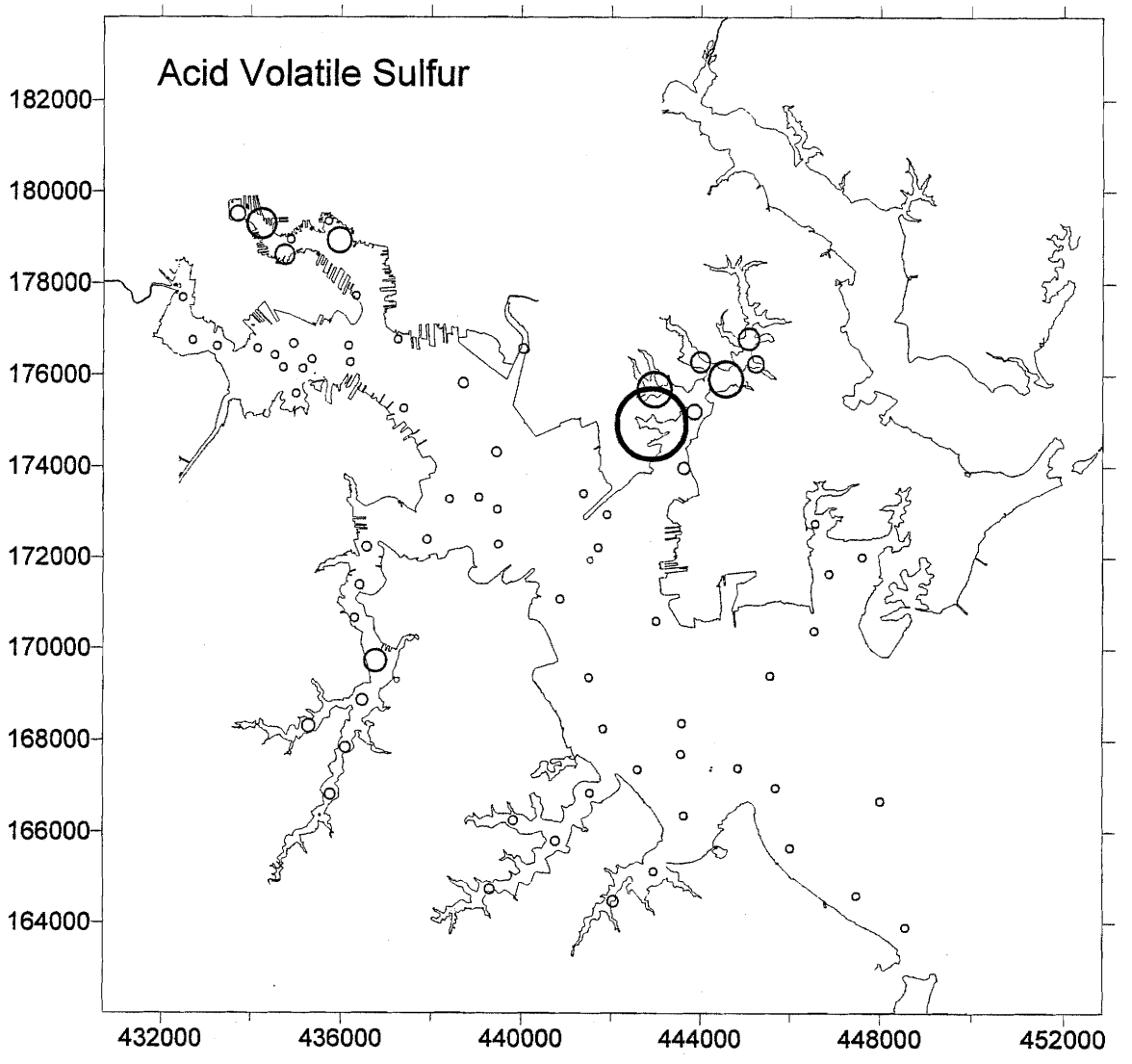


Figure 7. Spatial distribution of acid volatile sulfide (AVS) in the Baltimore Harbor/ Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

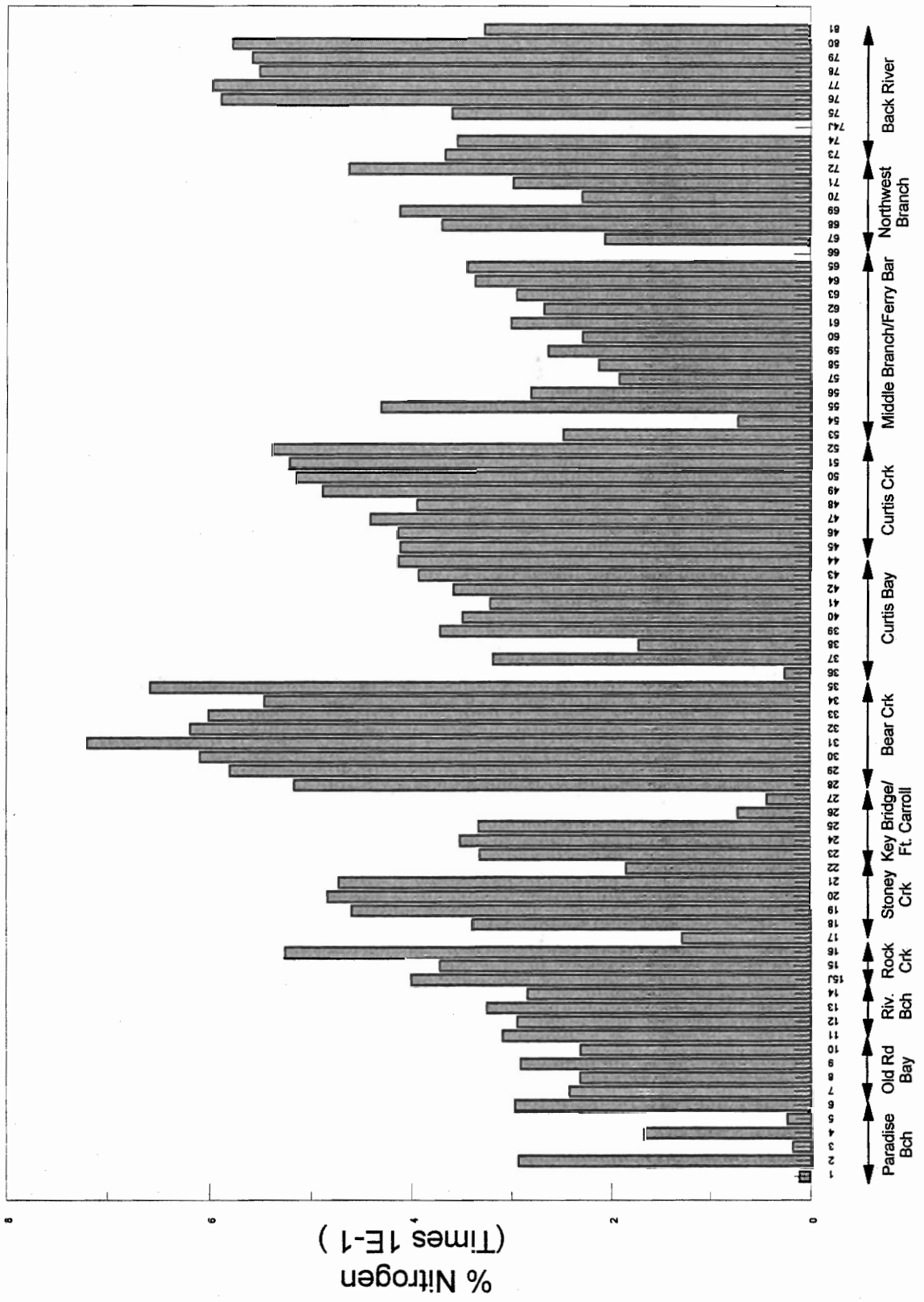


Figure 8. Percent total nitrogen in sediments.

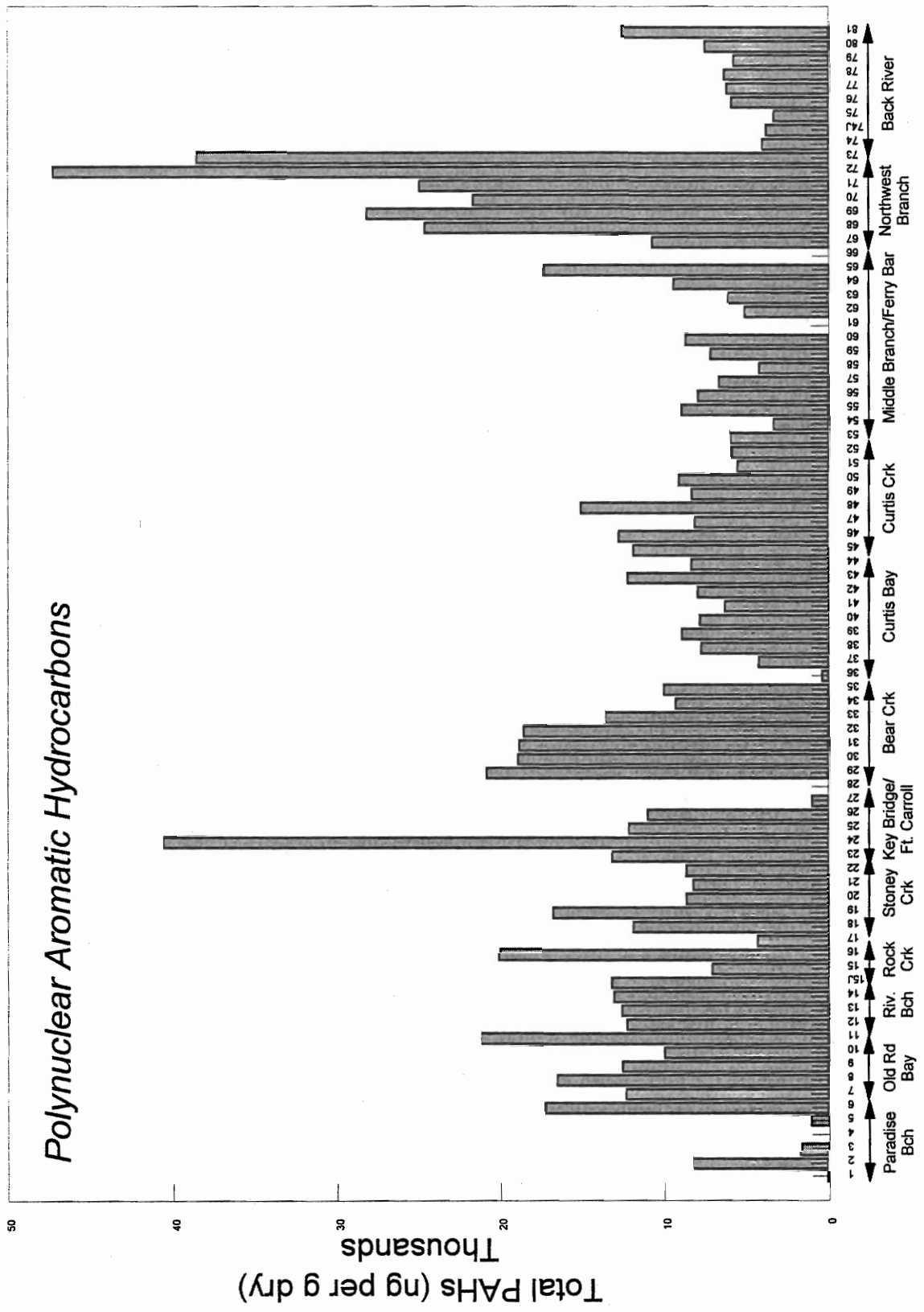


Figure 9. Total PAH (t-PAH) concentrations for BSM sediments.

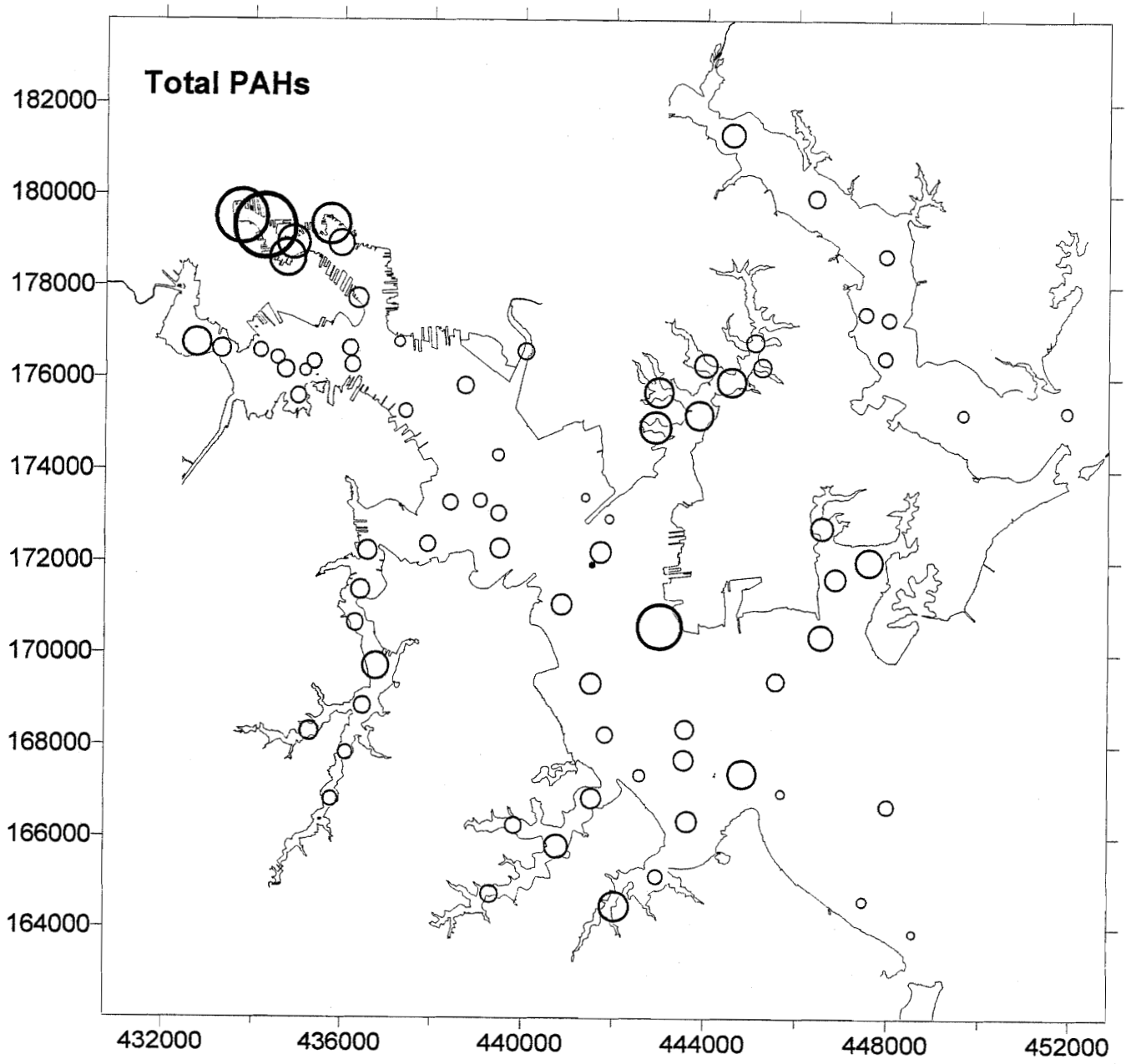


Figure 10. Spatial distribution of t-PAHs in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

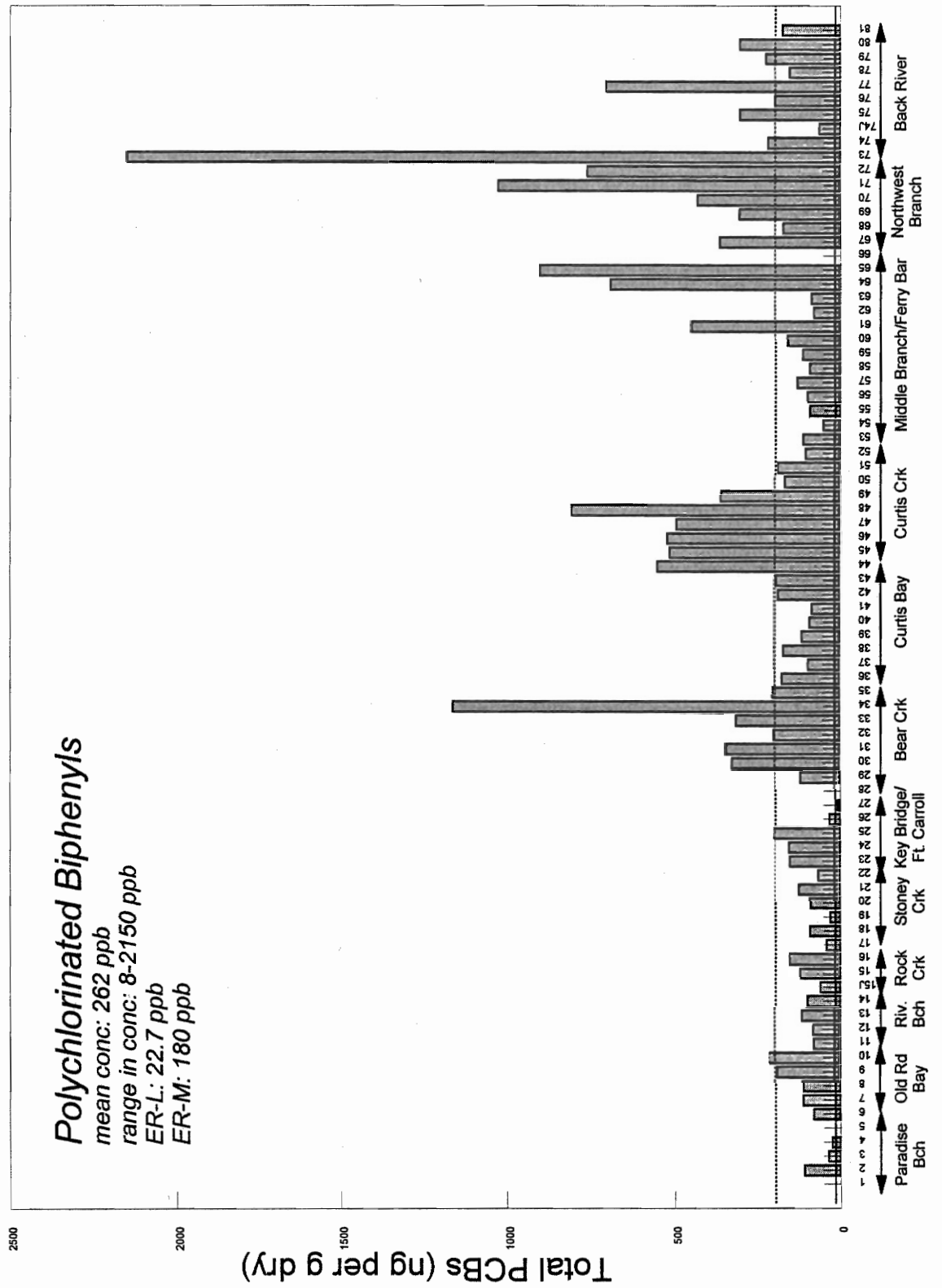


Figure 11. Total PCB (t-PCB) concentrations for BSM sediments.

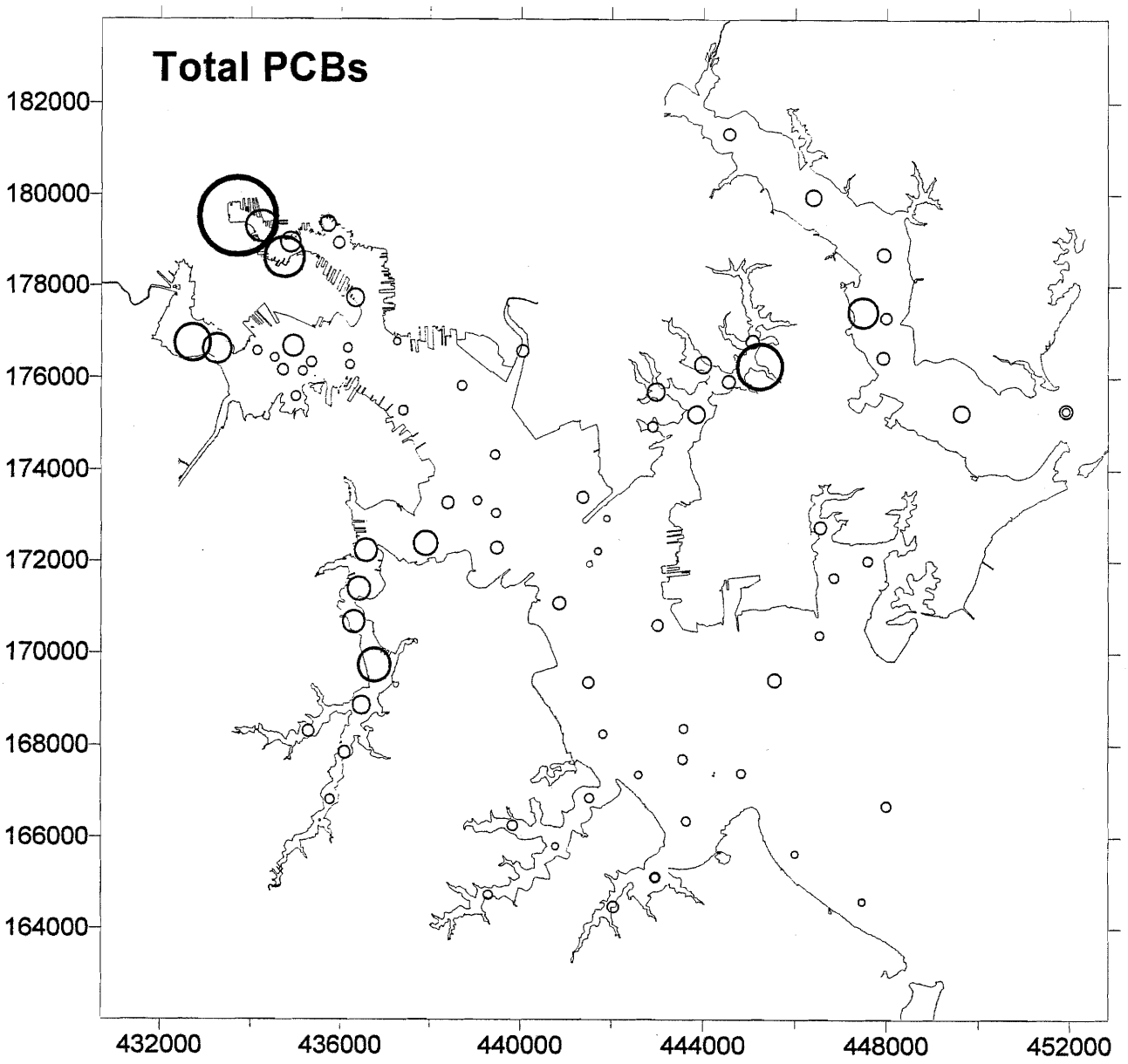


Figure 12. Spatial distribution of t-PCBs in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

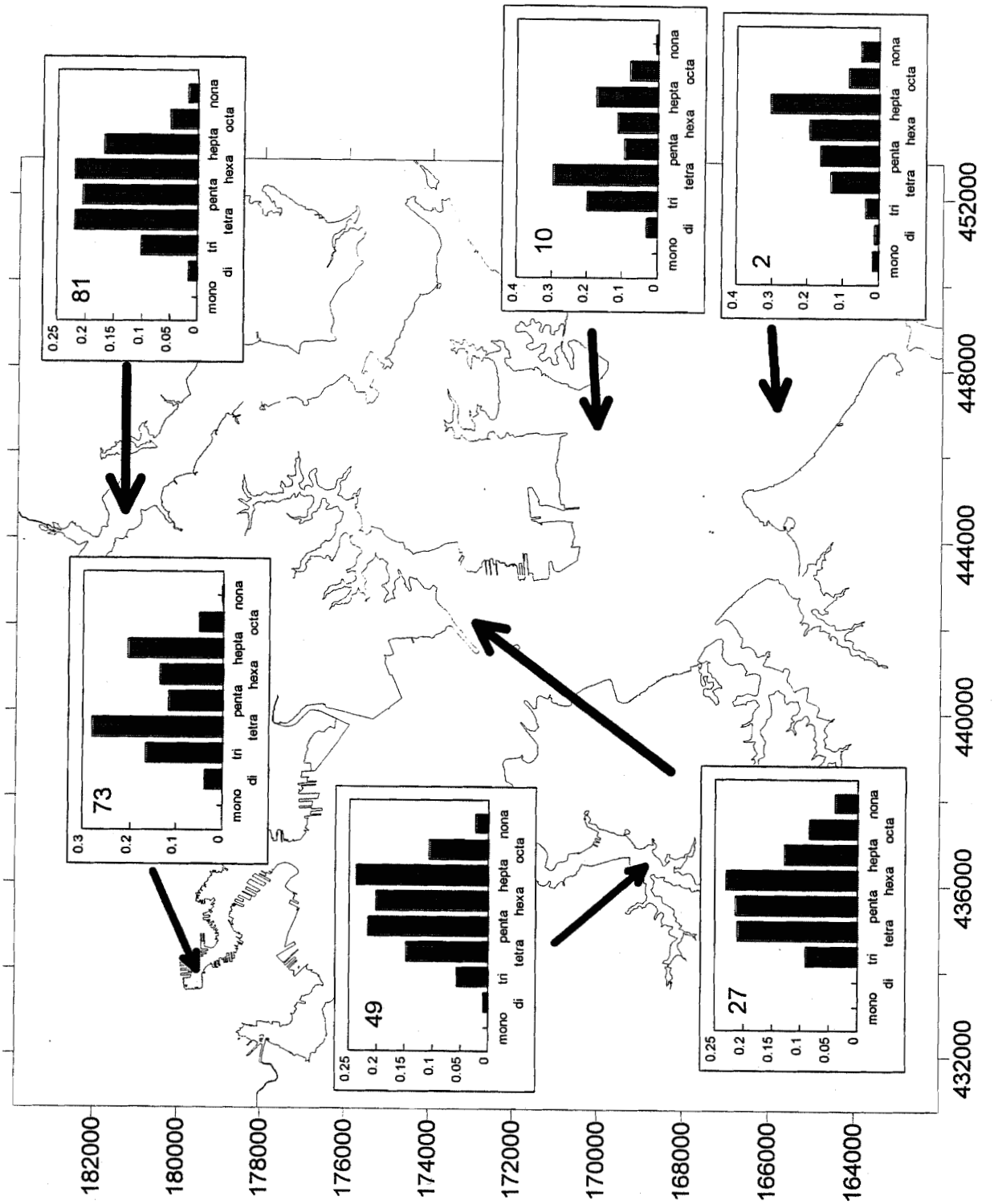


Figure 13. PCB homolog patterns for six randomly chosen sites in the Baltimore Harbor/Patapsco River/Back River system.

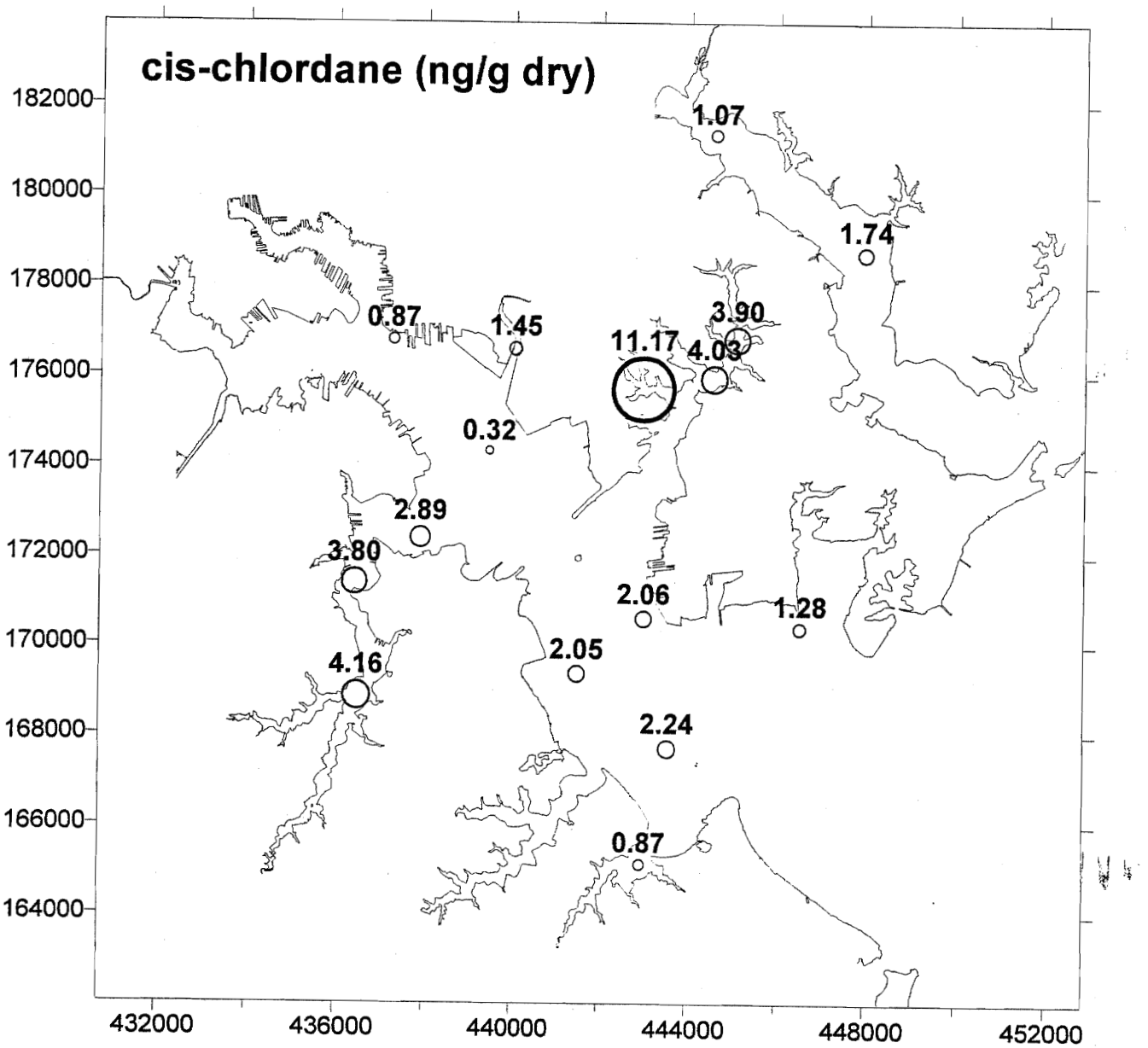


Figure 14. Spatial distribution of cis-chlordane in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

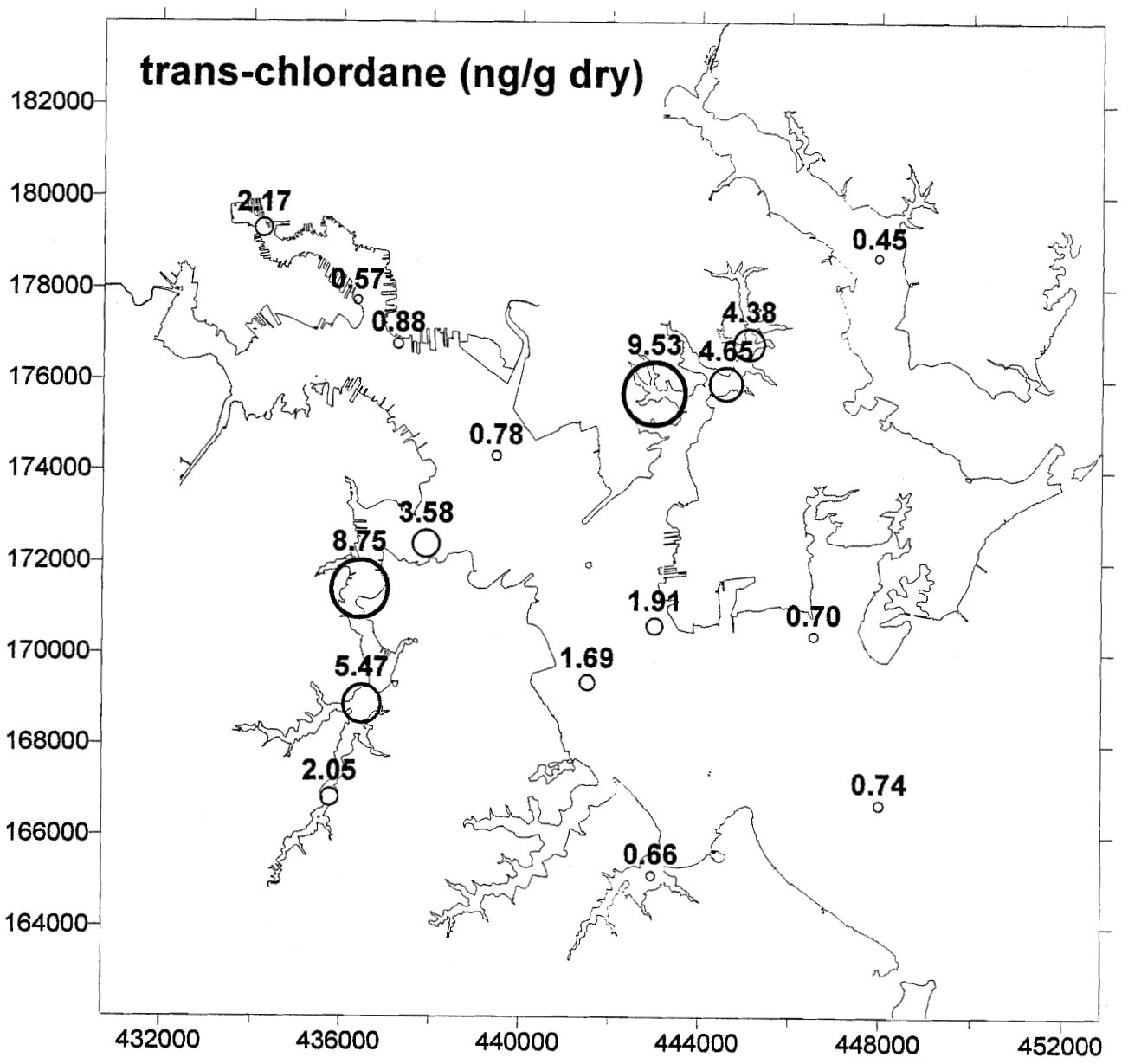


Figure 15. Spatial distribution of trans-chlordane in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

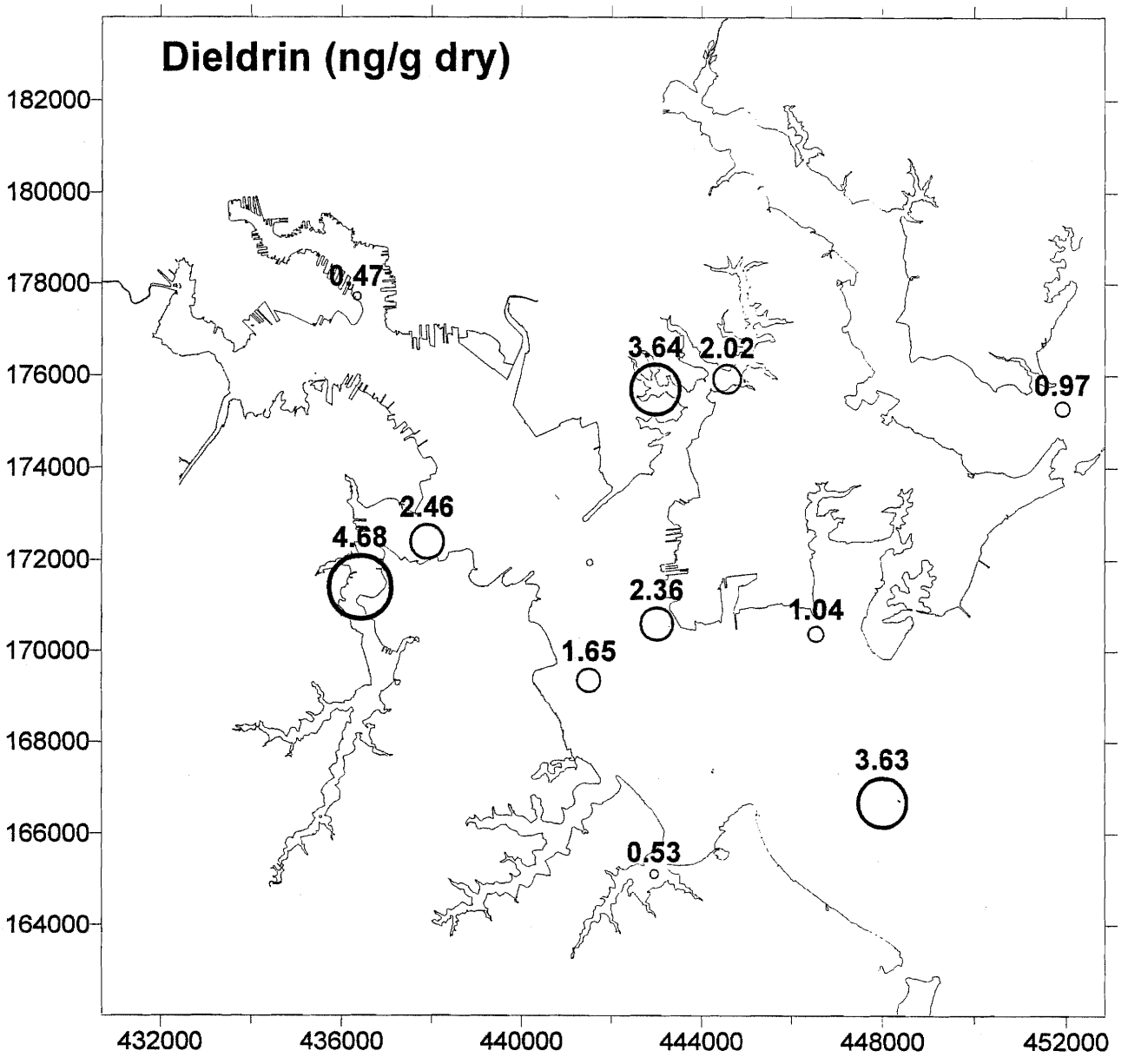


Figure 16. Spatial distribution of dieldrin in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

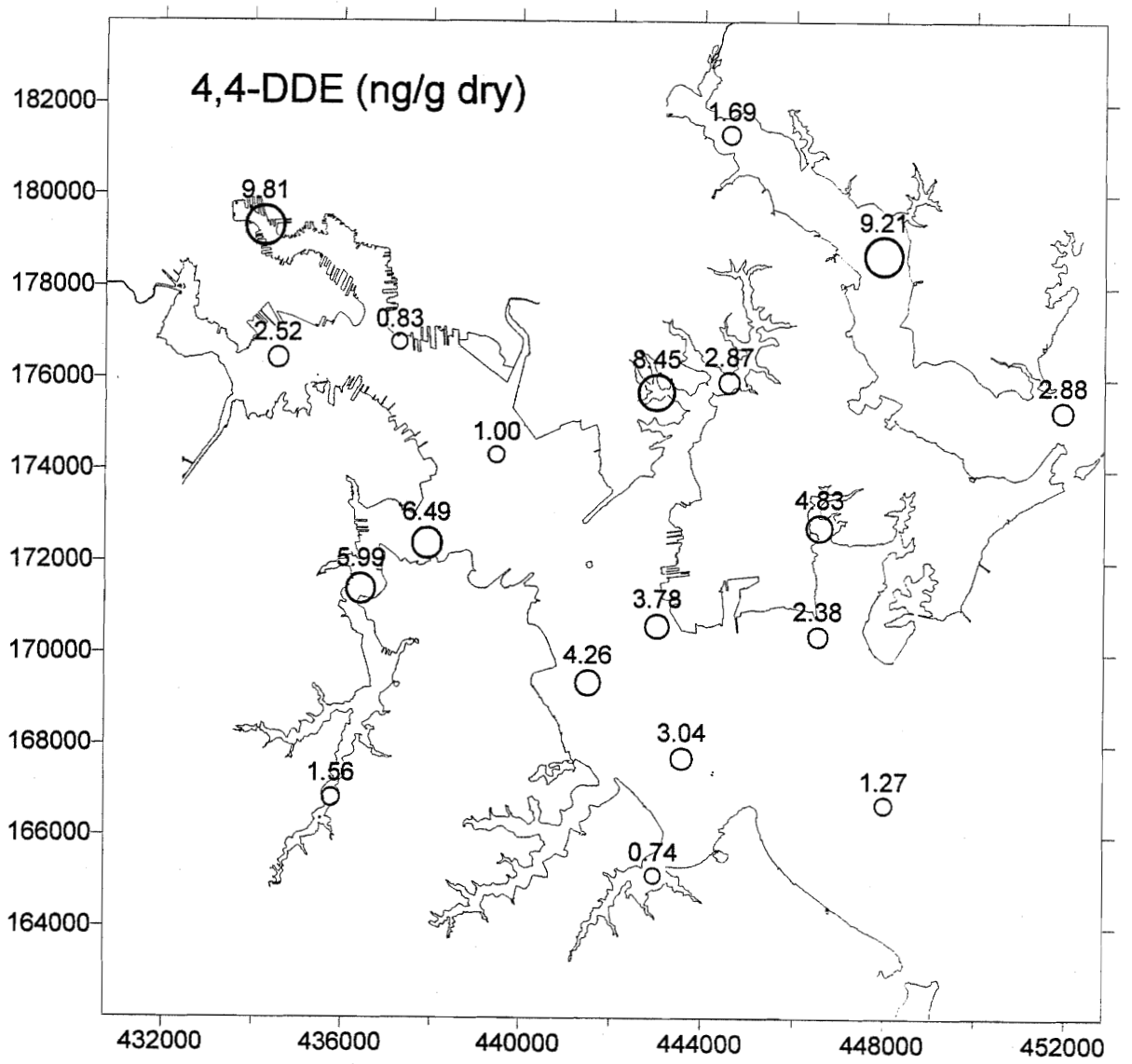


Figure 17. Spatial distribution of 4,4-DDE in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

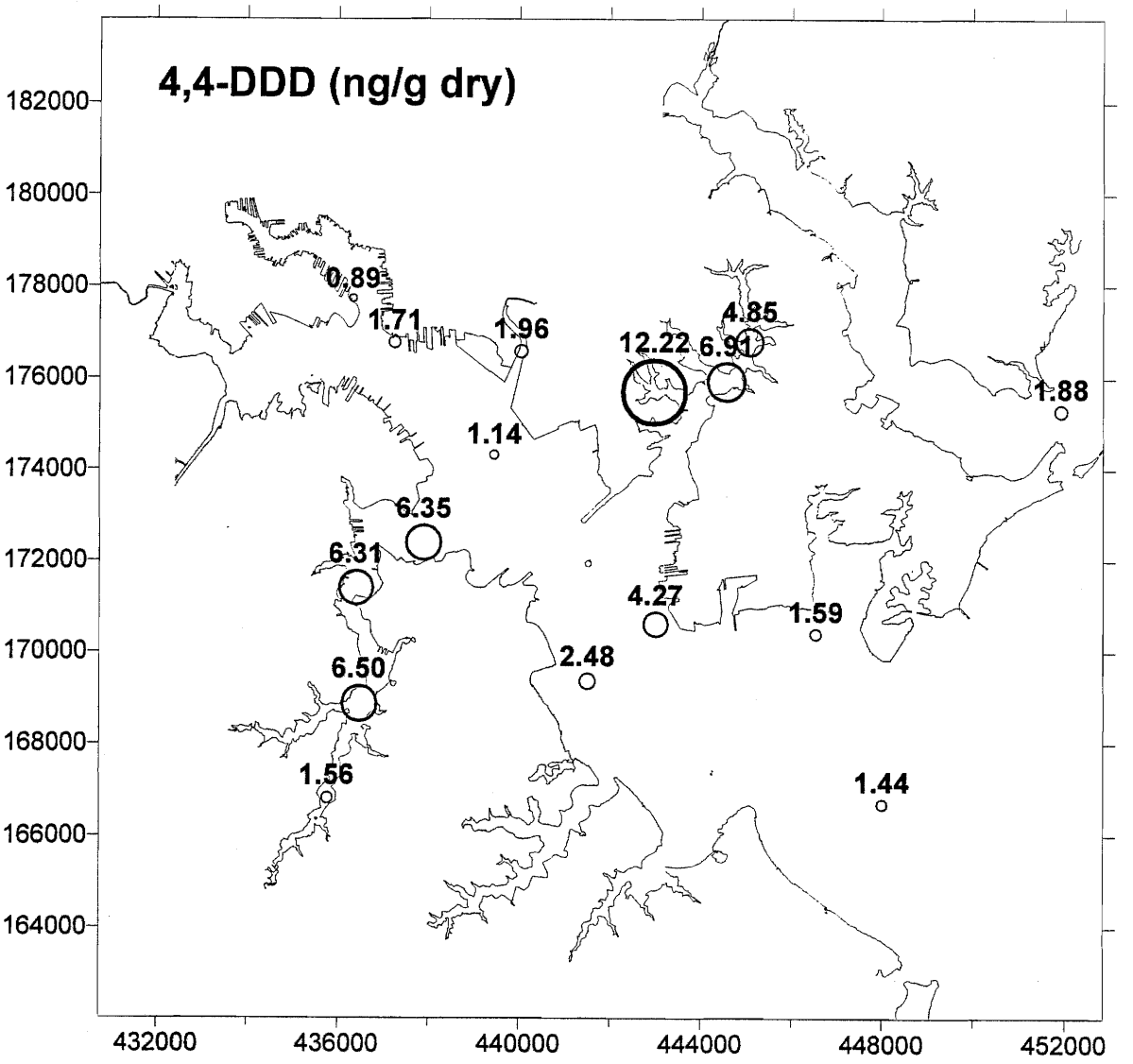


Figure 18. Spatial distribution of 4,4-DDD in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

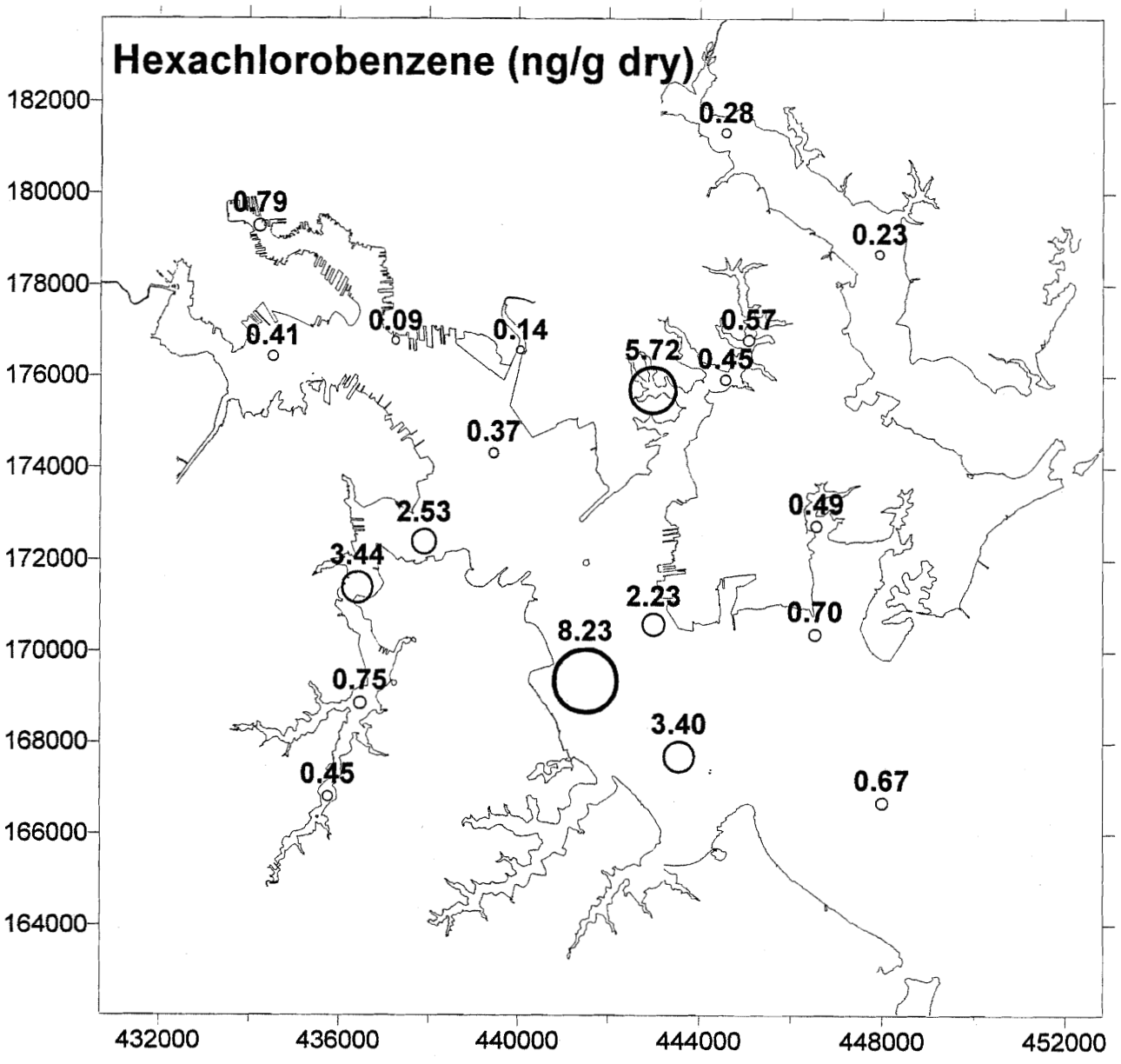


Figure 19. Spatial distribution of hexachlorobenzene in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

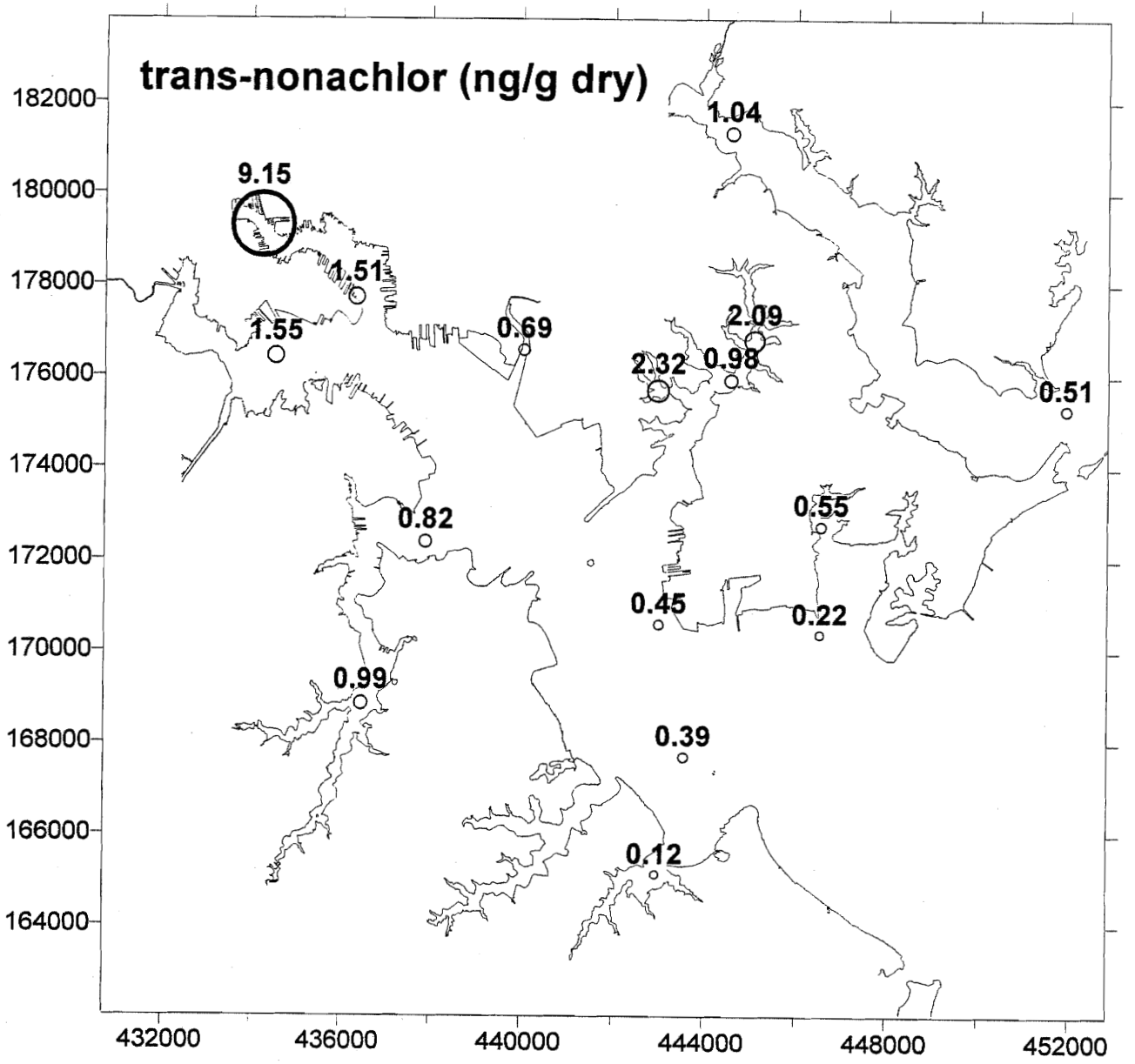


Figure 20. Spatial distribution of trans-nonachlor in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

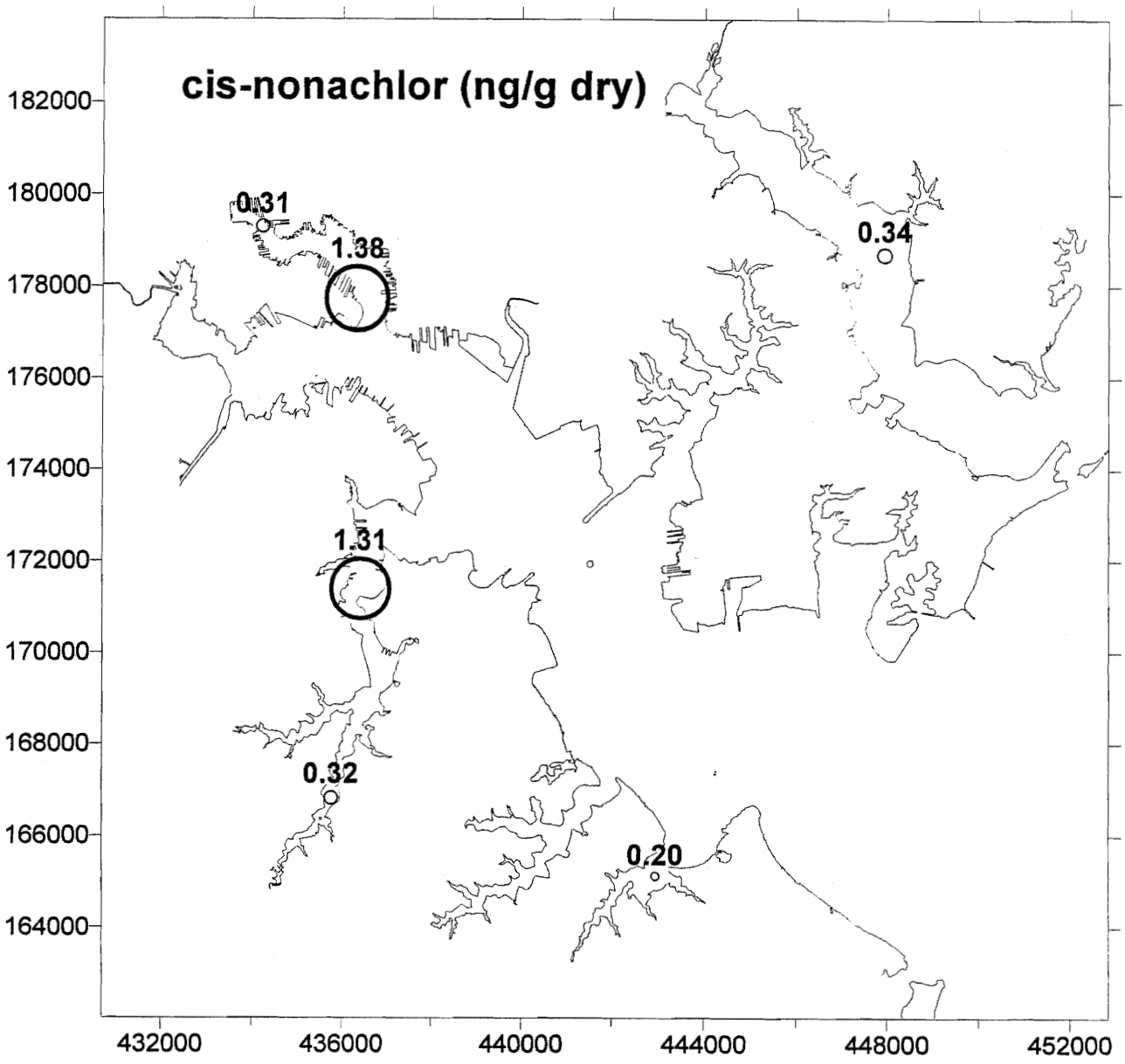


Figure 21. Spatial distribution of cis-nonachlor in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

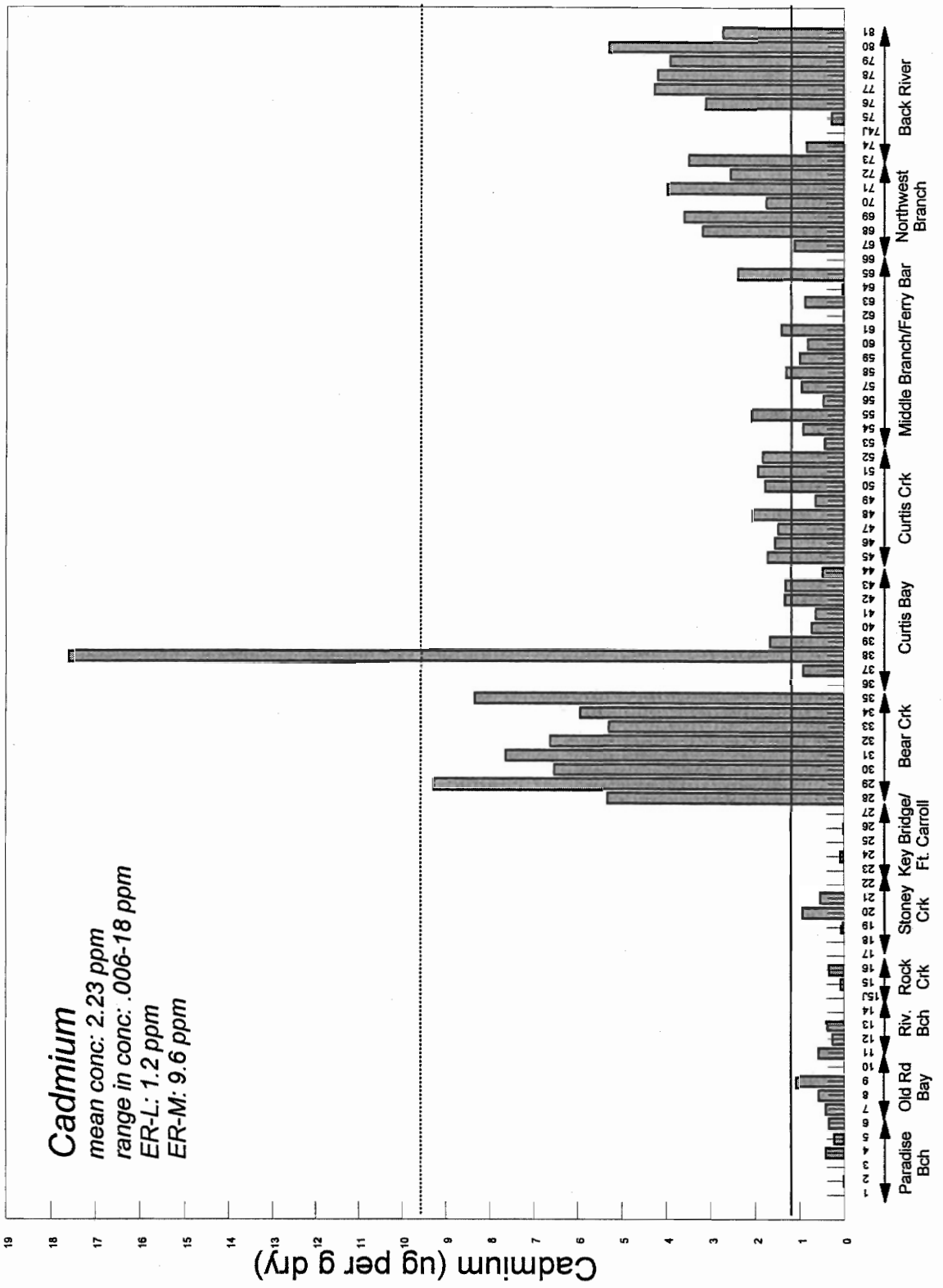


Figure 22. Cadmium concentrations (ppm dry wgt) in BSM sediments.

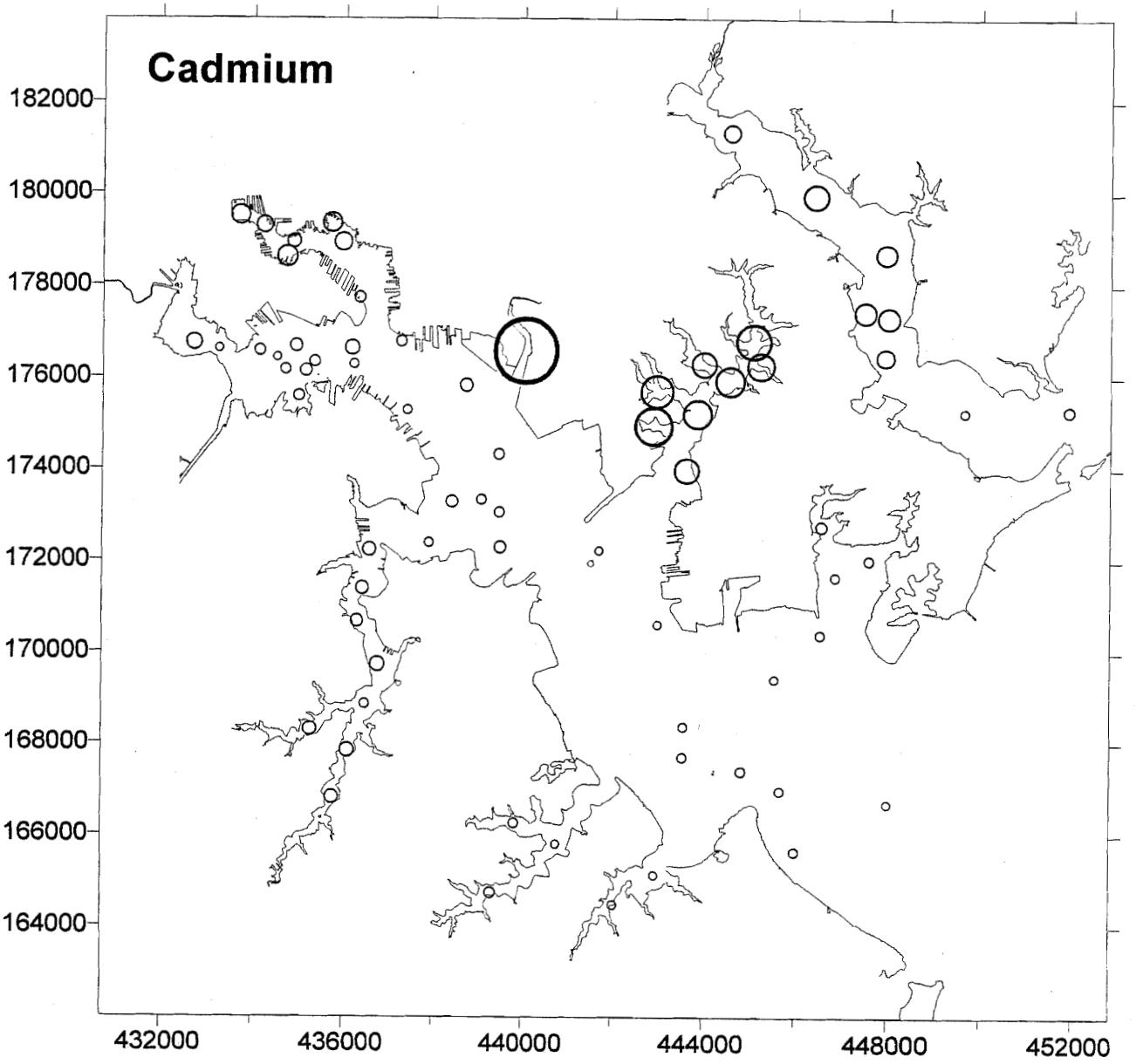


Figure 23. Spatial distribution of cadmium in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

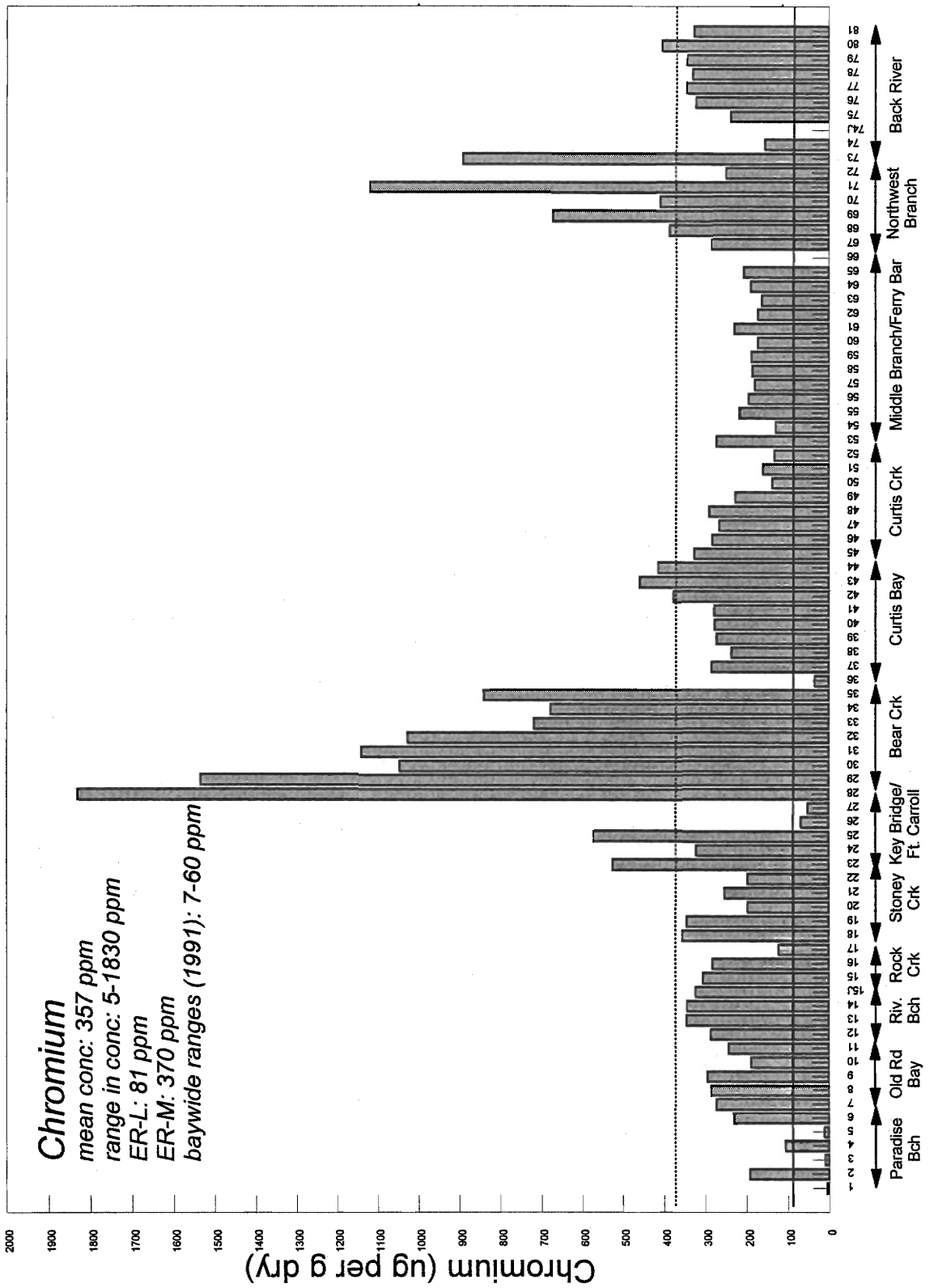


Figure 24. Chromium concentrations (ppm dry wgt) in BSM sediments.

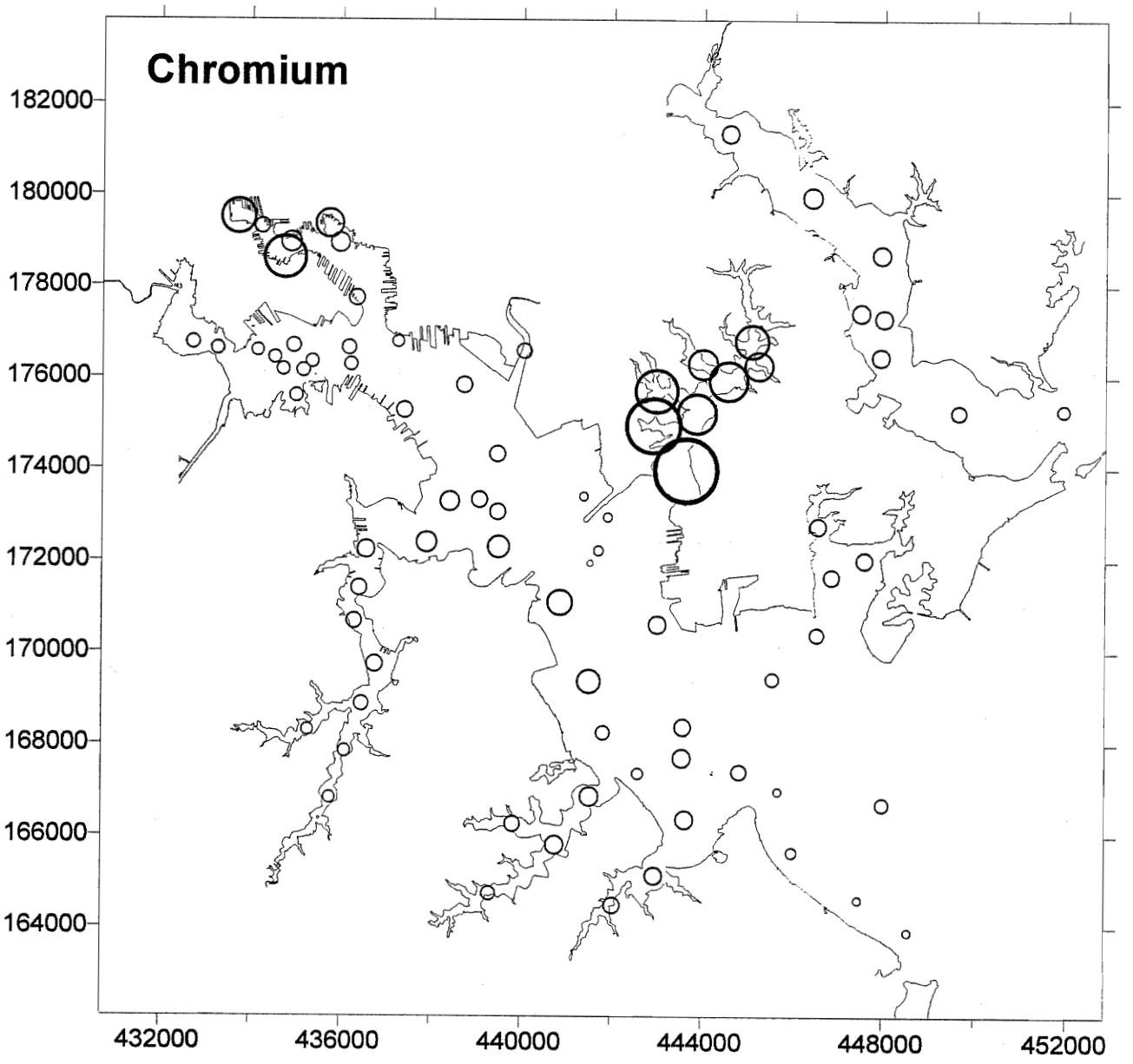


Figure 25. Spatial distribution of chromium in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

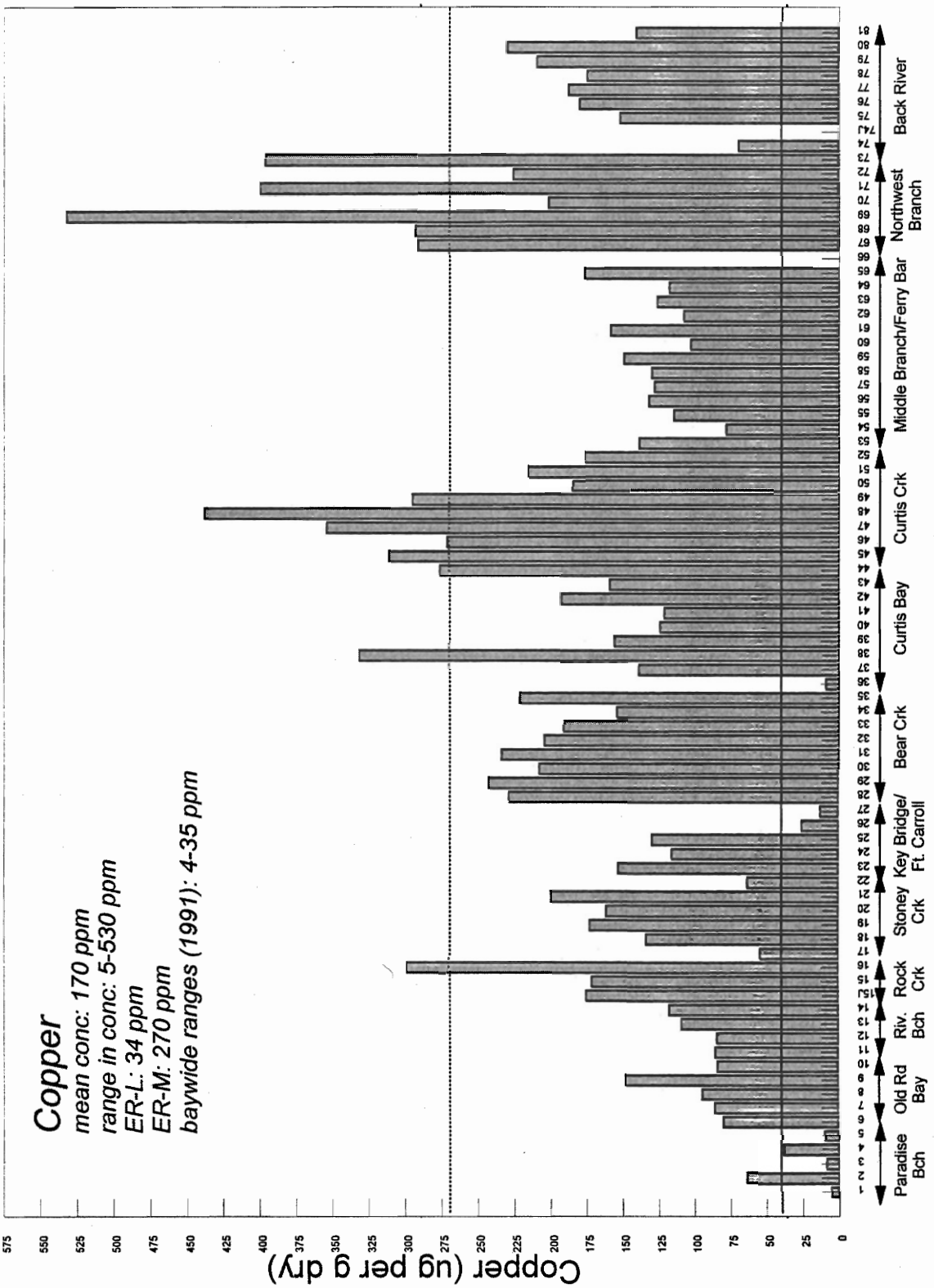


Figure 26. Copper concentrations (ppm dry wgt) in BSM sediments.

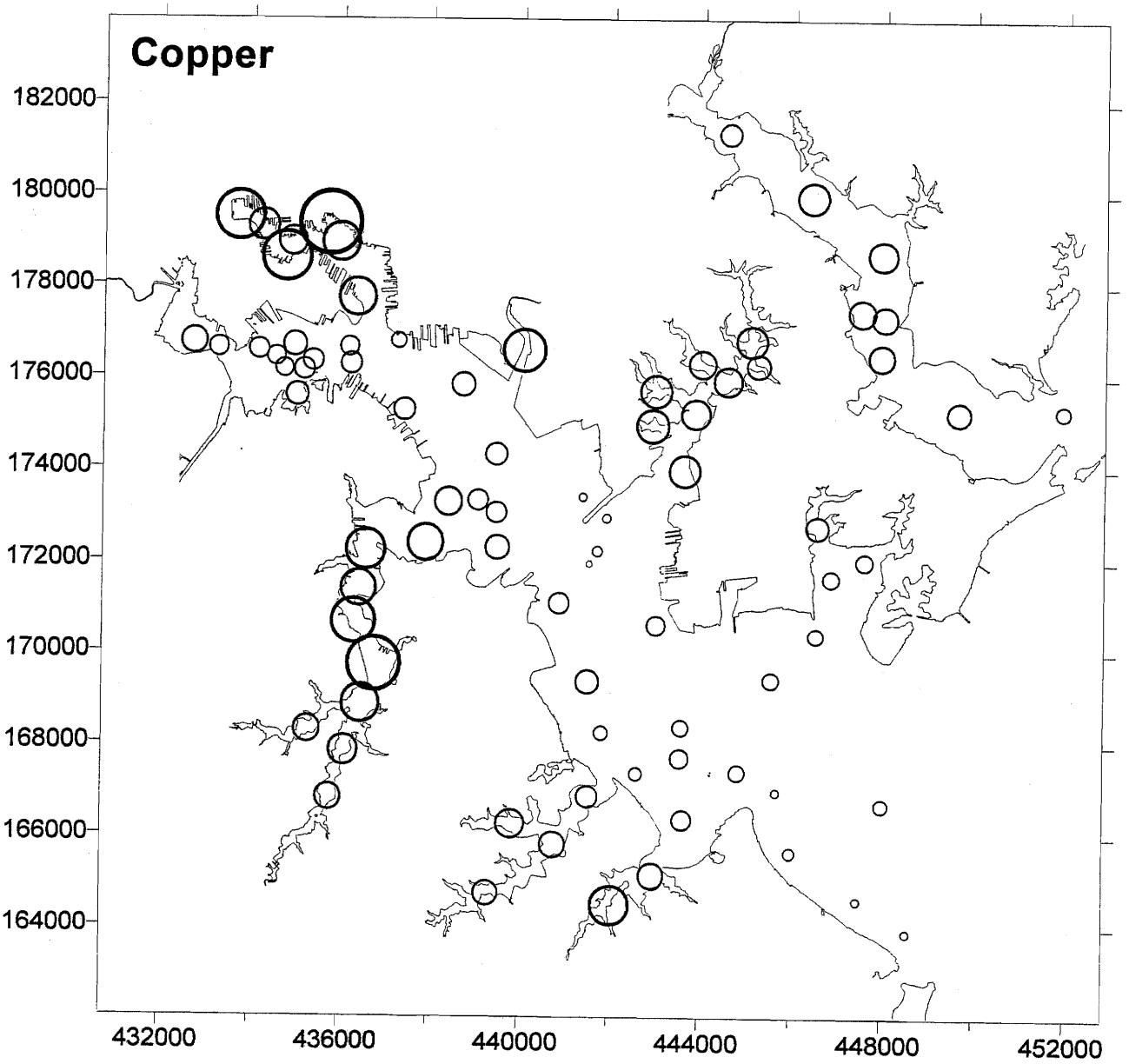


Figure 27. Spatial distribution of copper in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

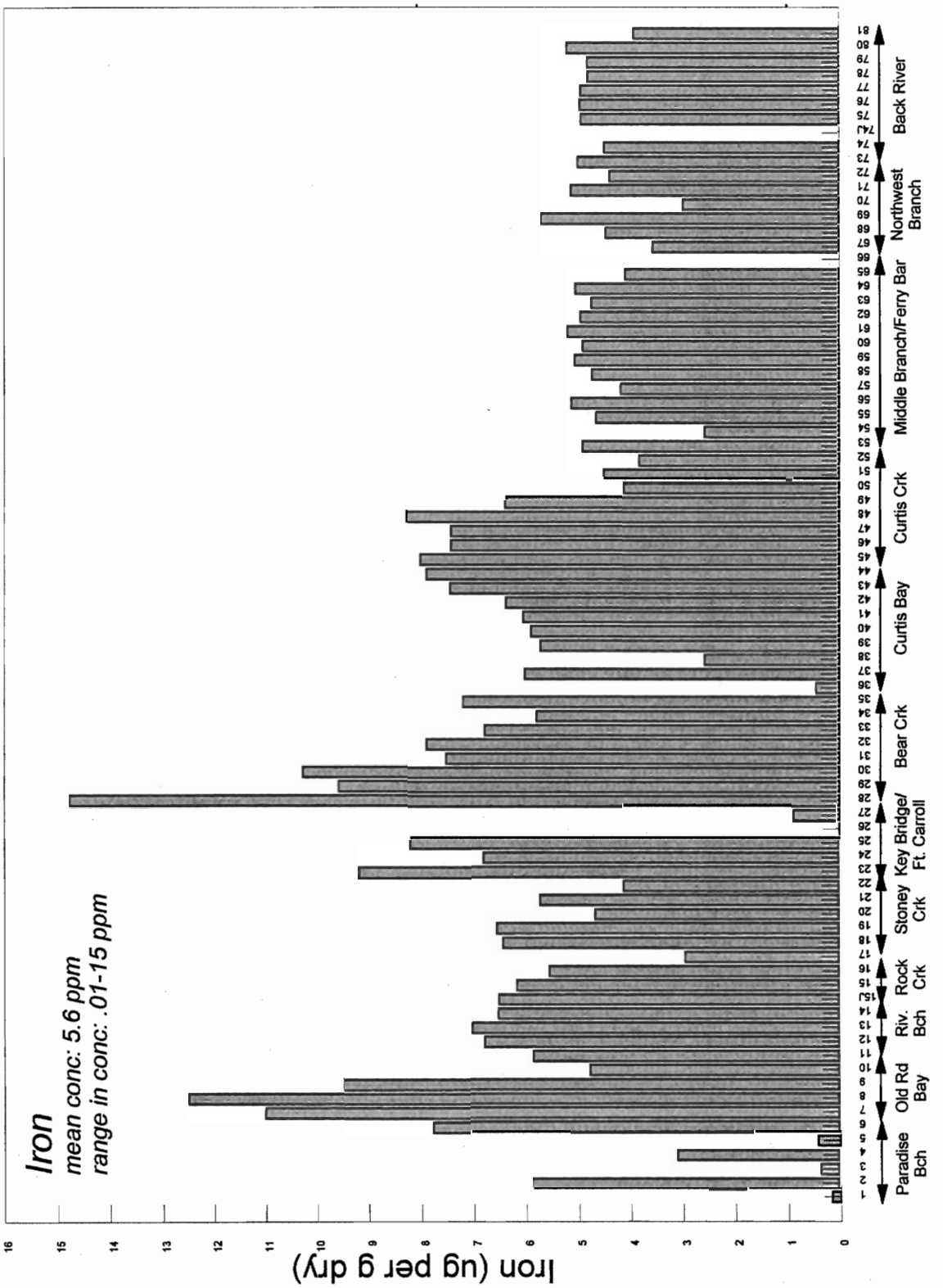


Figure 28. Iron concentrations (ppm dry wgt) in BSM sediments.

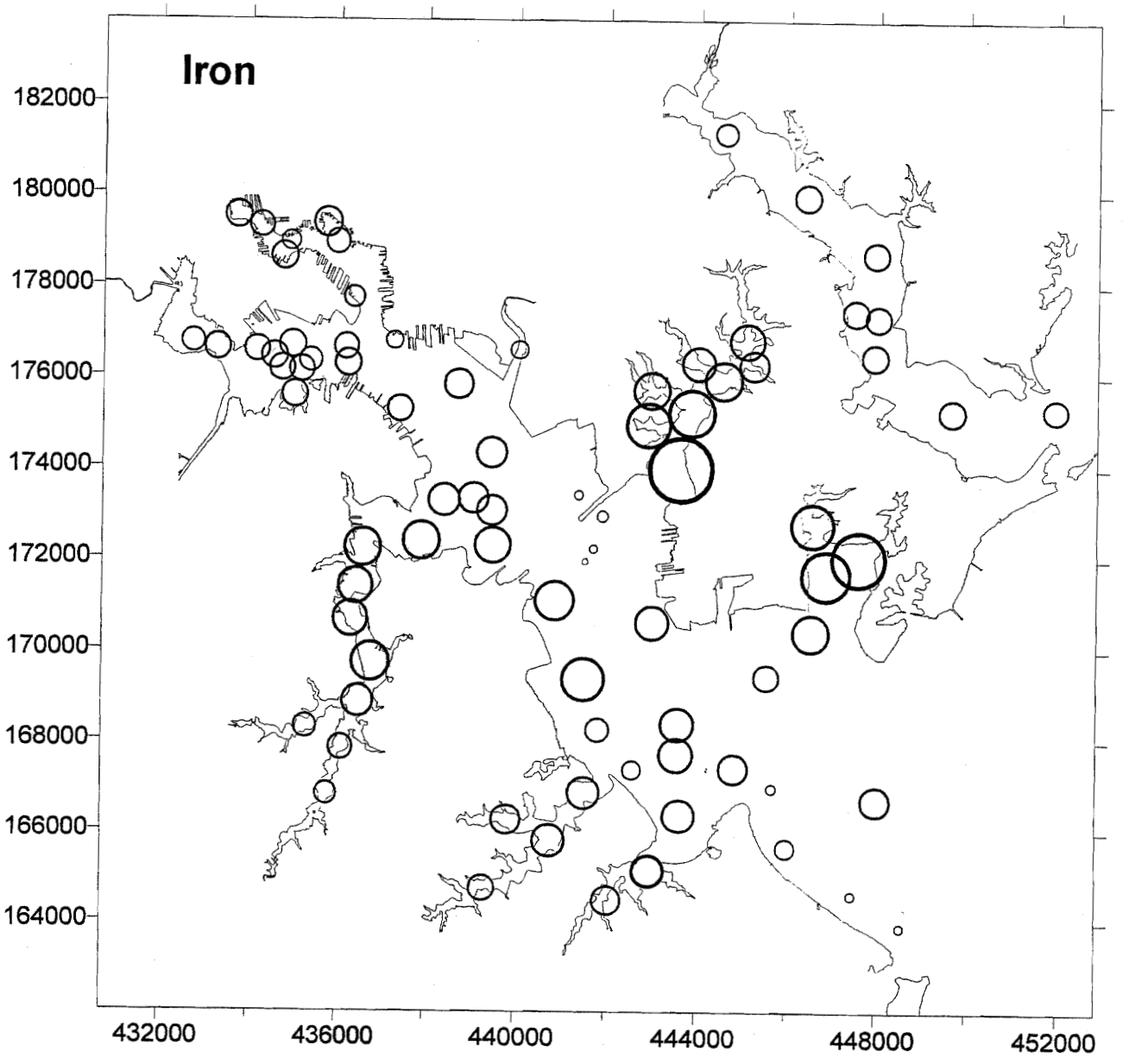


Figure 29. Spatial distribution of iron in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

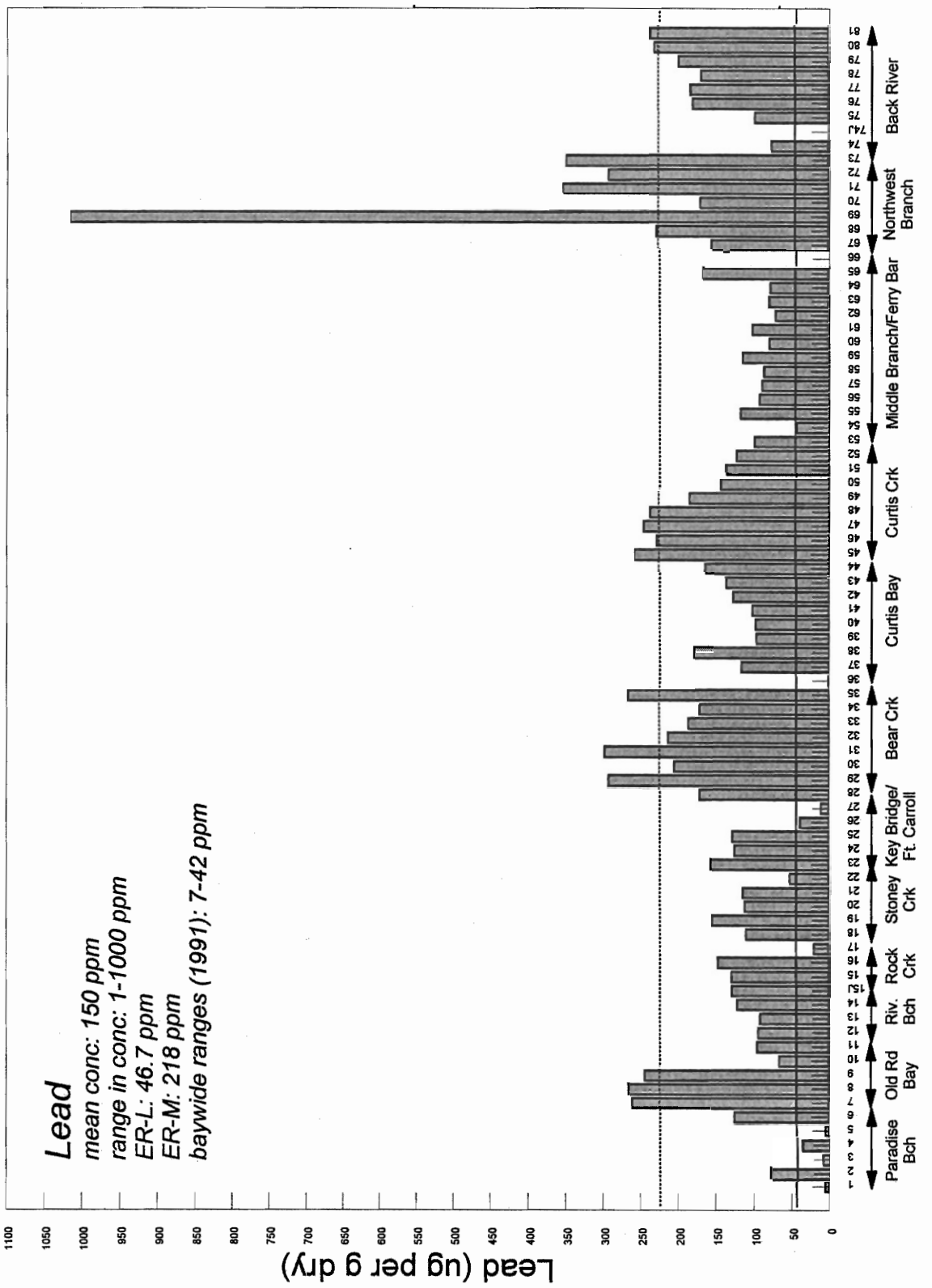


Figure 30. Lead concentrations (ppm dry wgt) in BSM sediments.

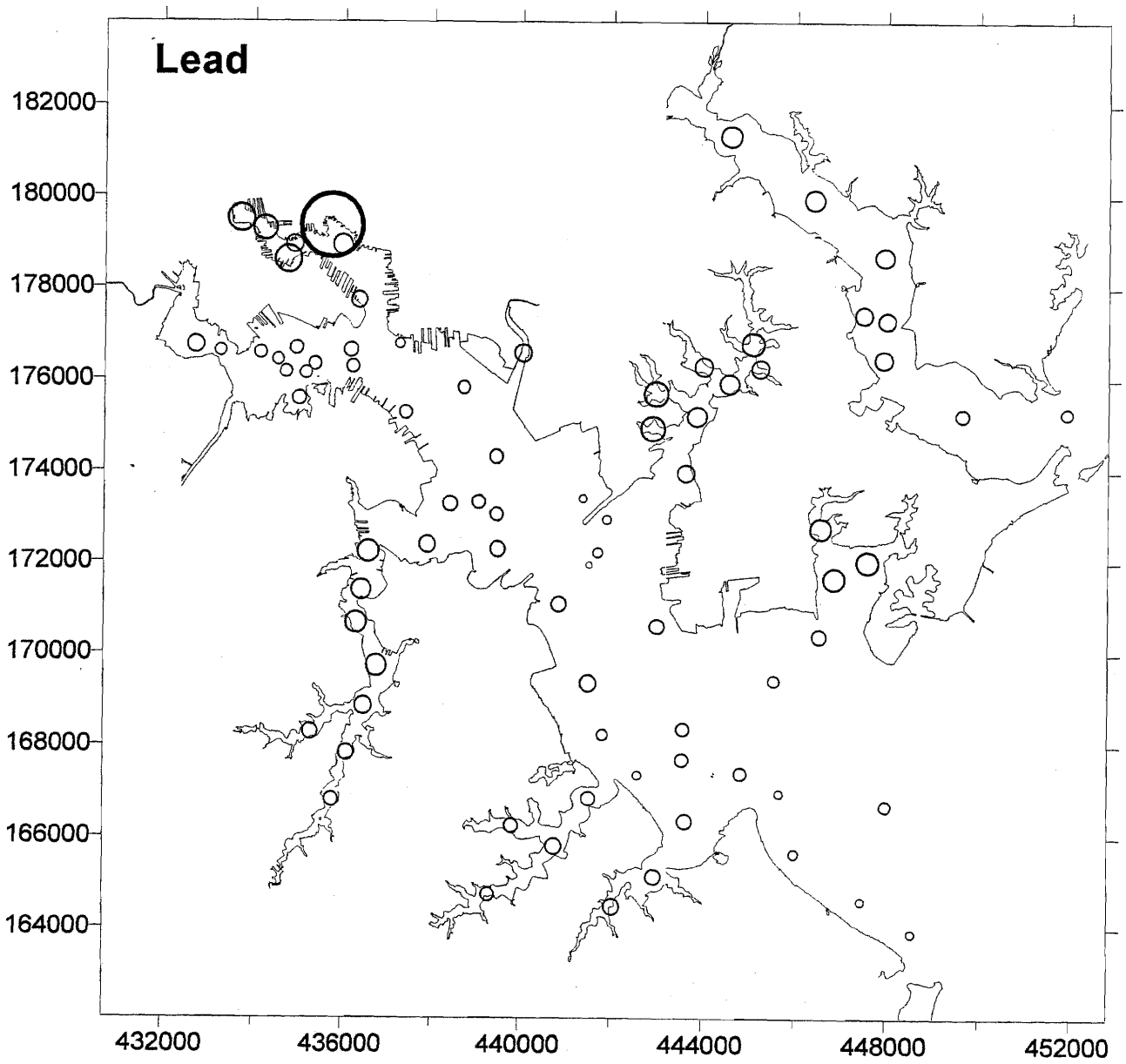


Figure 31. Spatial distribution of lead in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

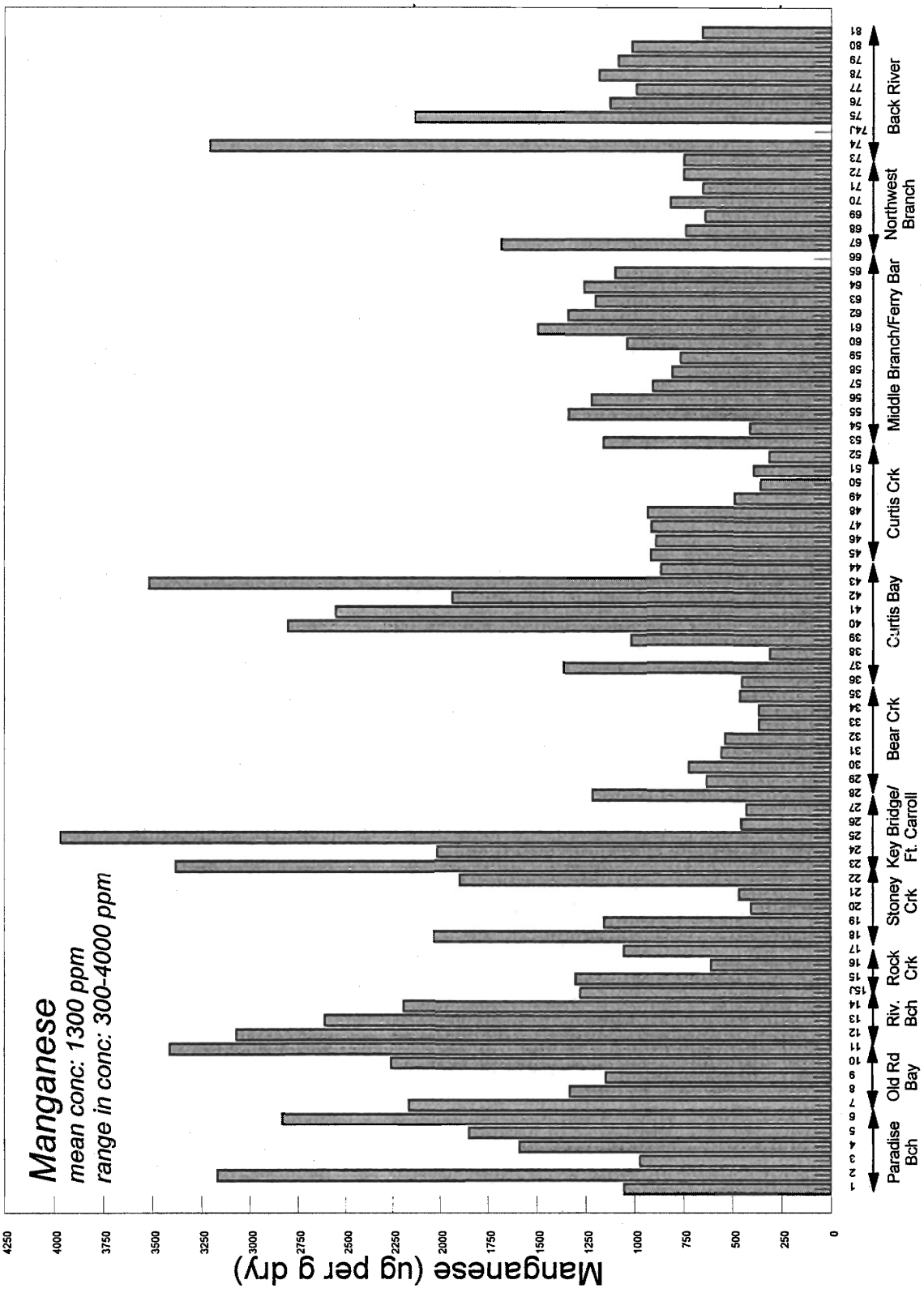


Figure 32. Manganese concentrations (ppm dry wgt) in BSM sediments.

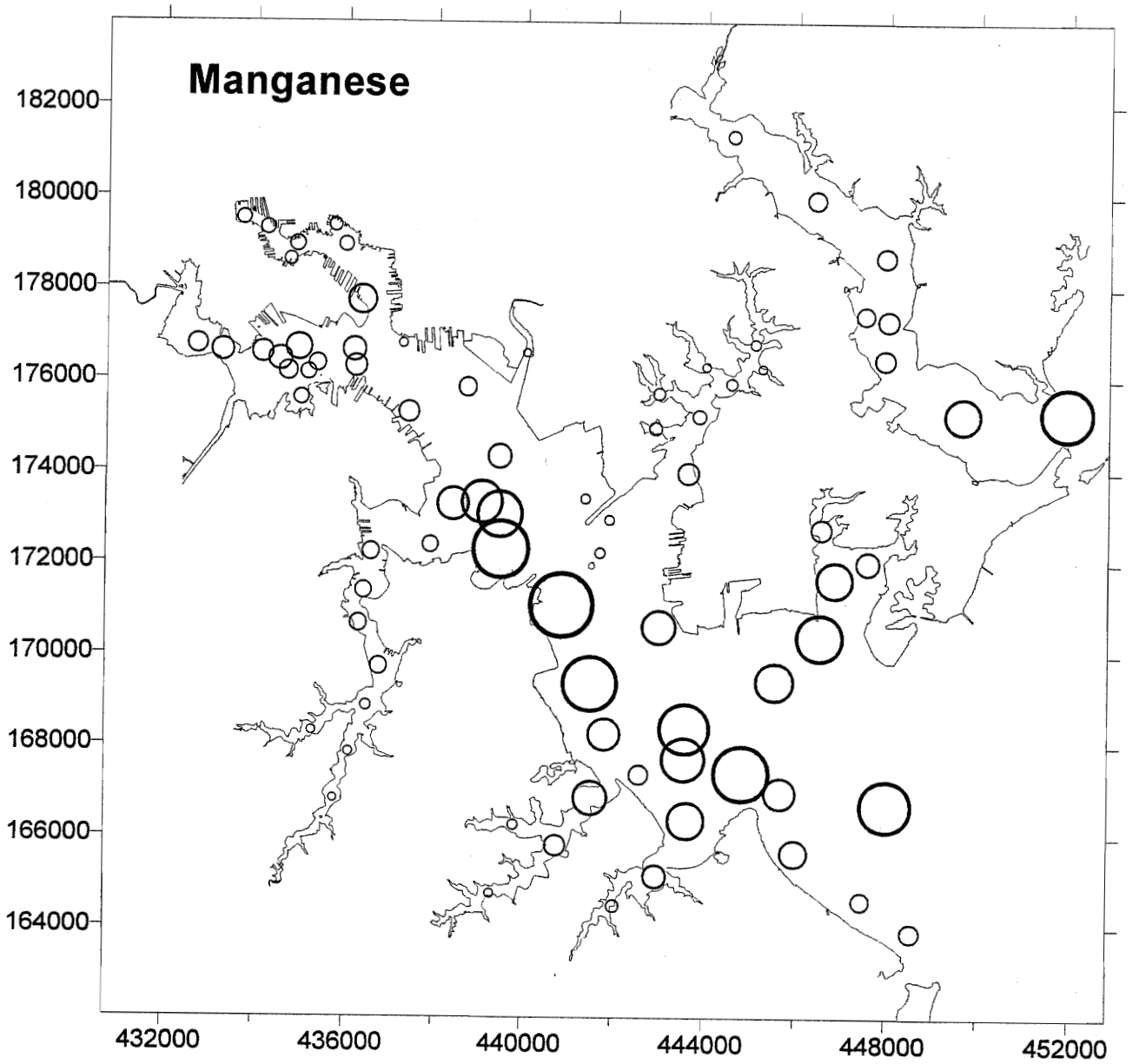


Figure 33. Spatial distribution of manganese in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

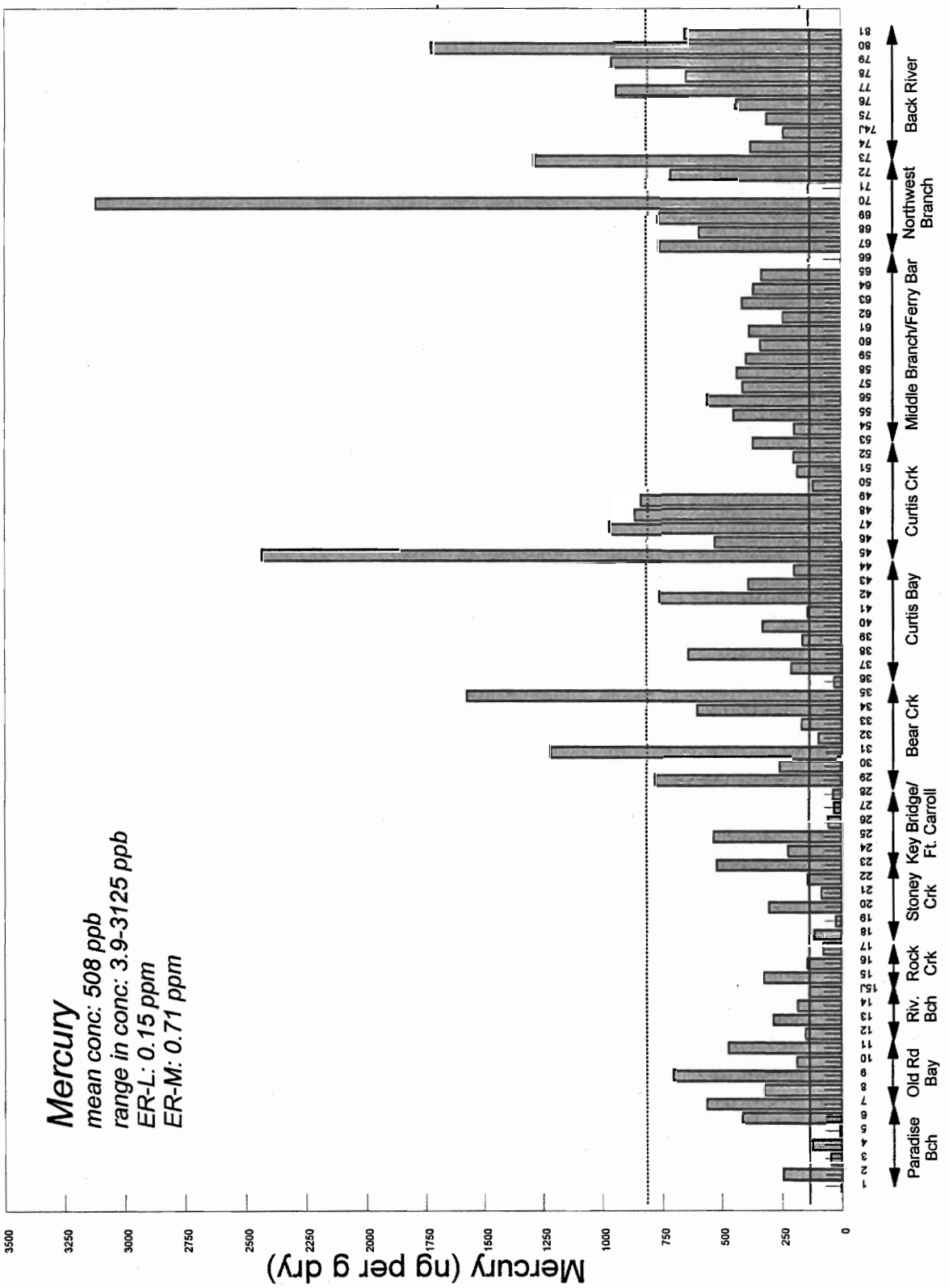


Figure 34. Mercury concentrations (ppb dry wgt) in BSM sediments.

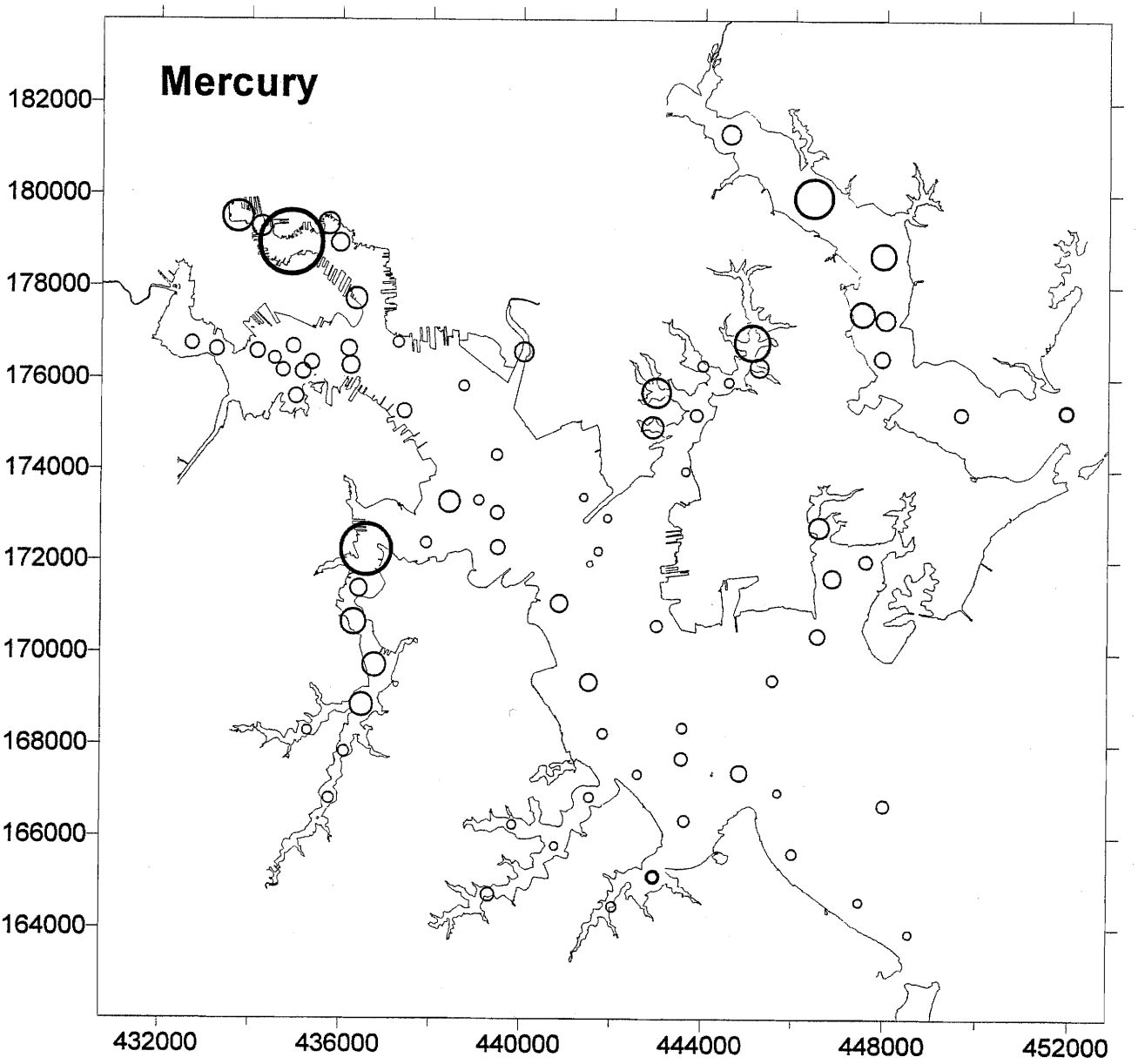


Figure 35. Spatial distribution of mercury in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

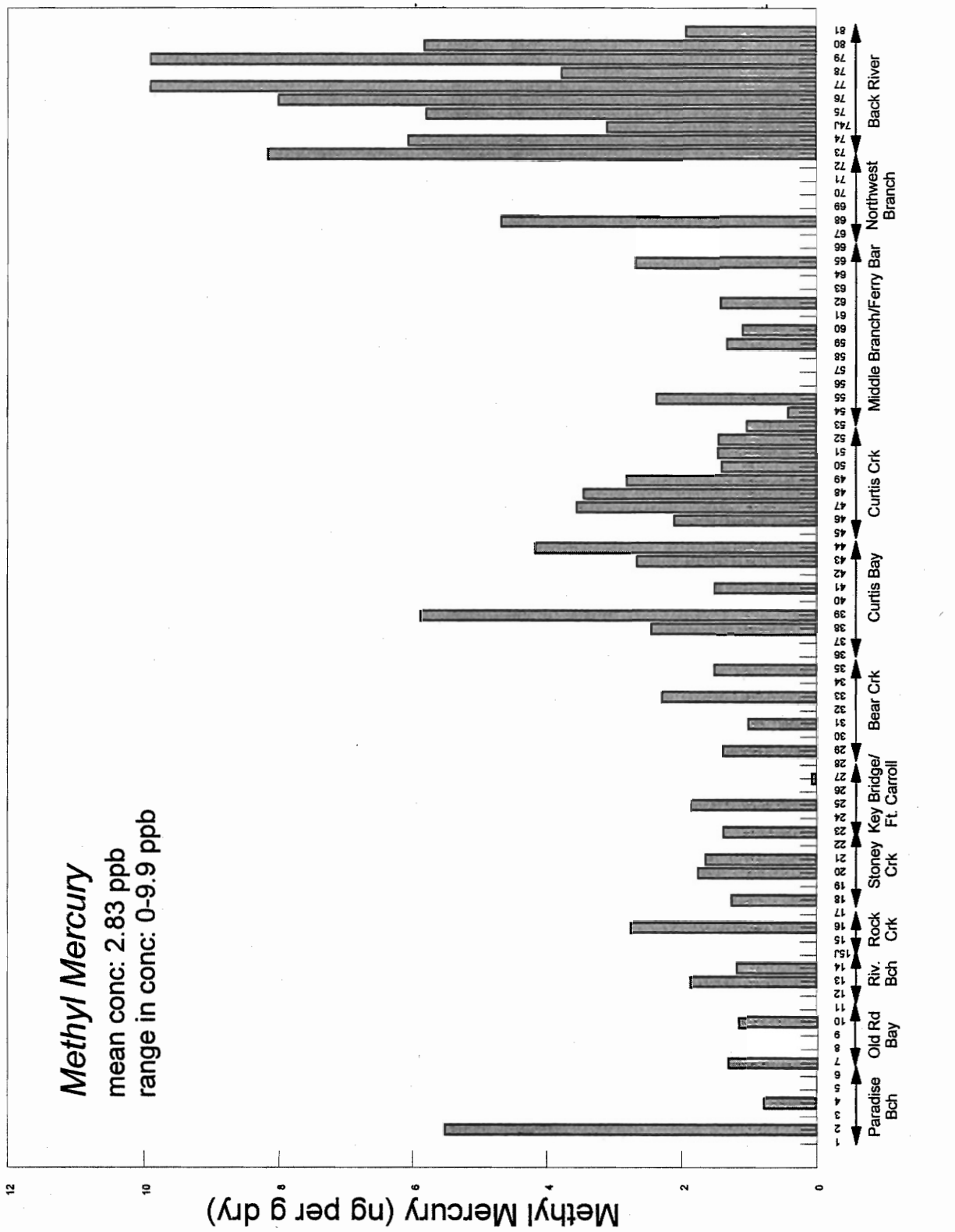


Figure 36. Methylmercury concentrations (ng/g dry wgt) in BSM sediments.

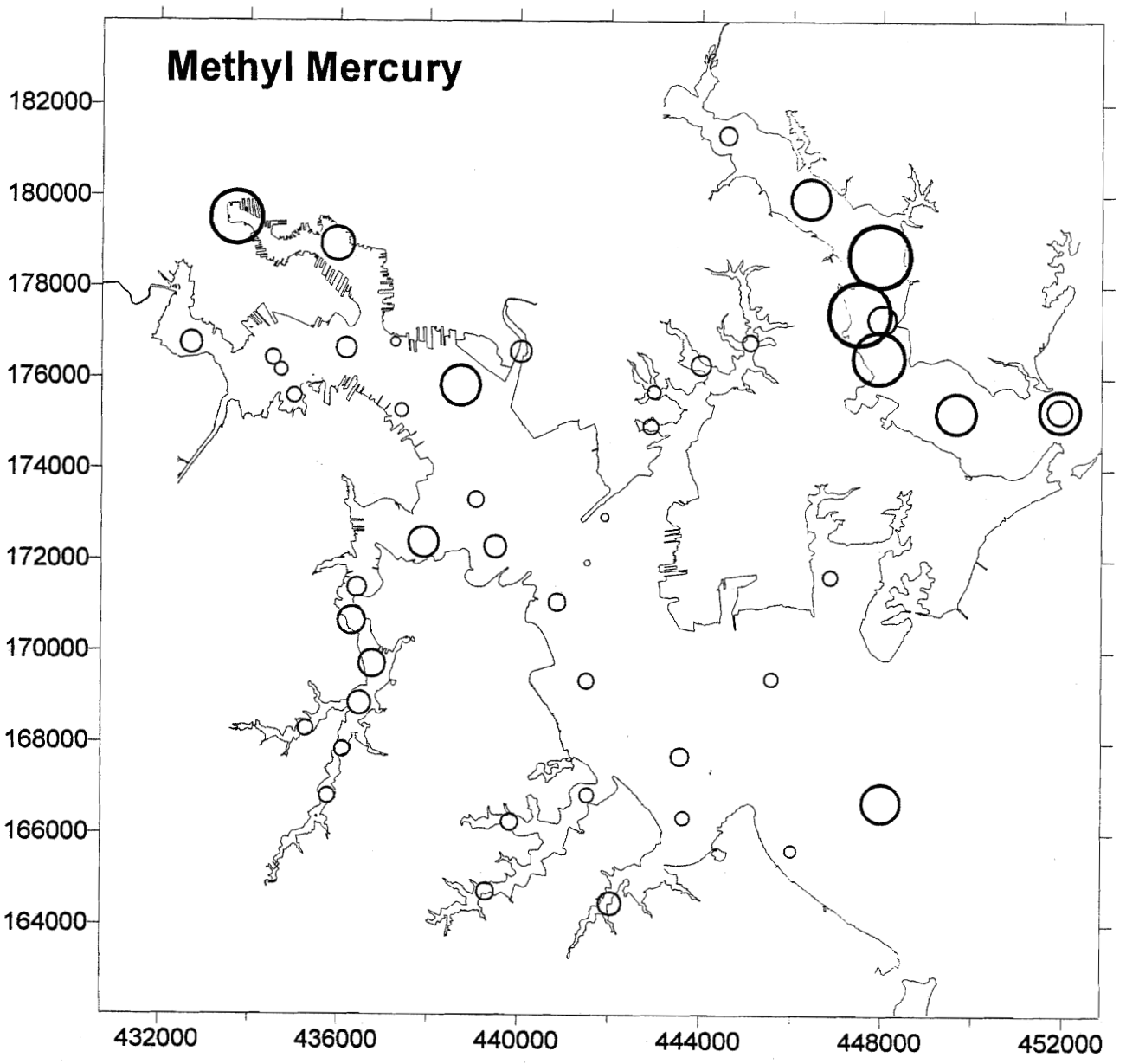


Figure 37. Spatial distribution of methylmercury in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

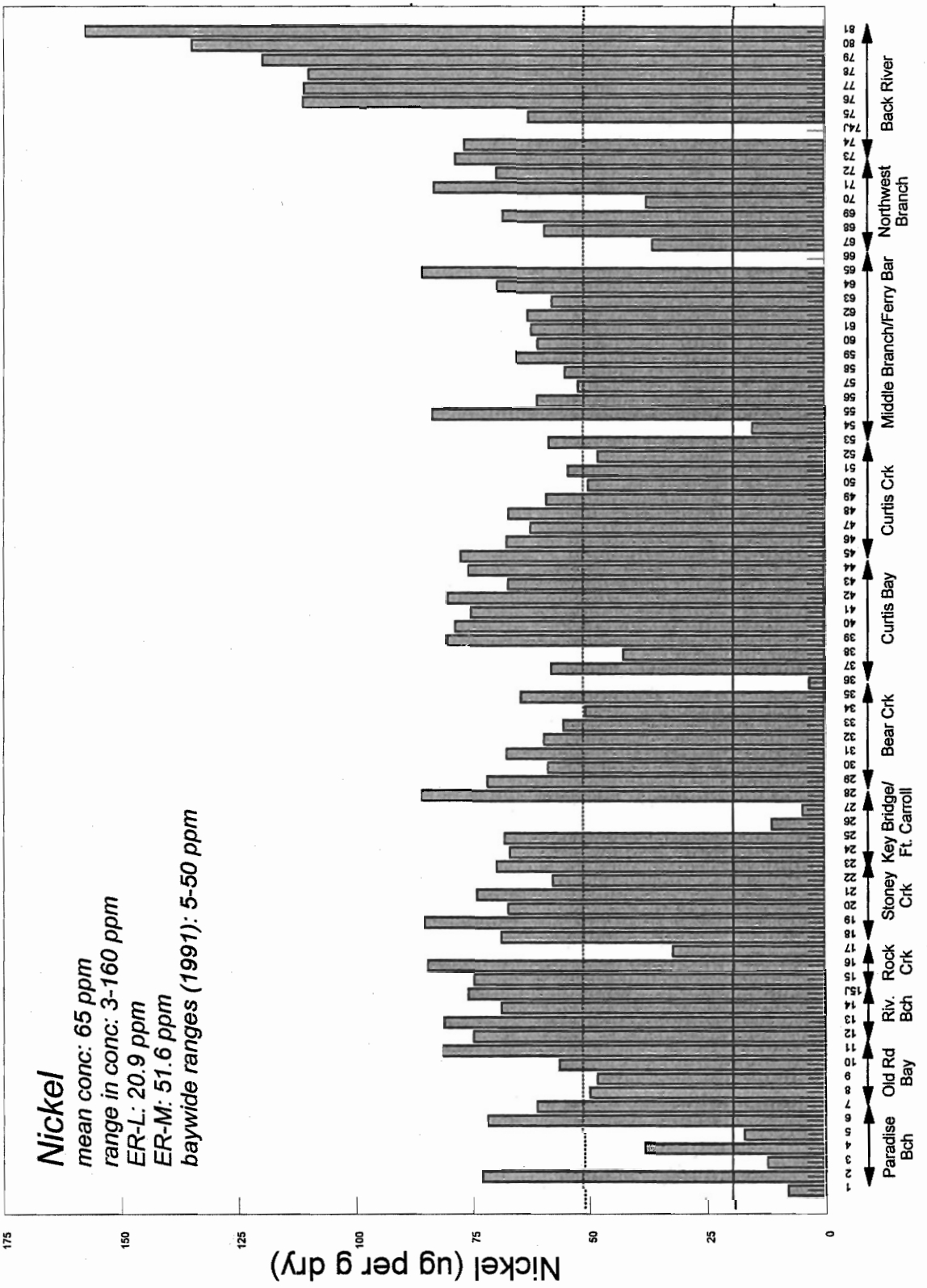


Figure 38. Nickel concentrations (ppm dry wgt) in BSM sediments.

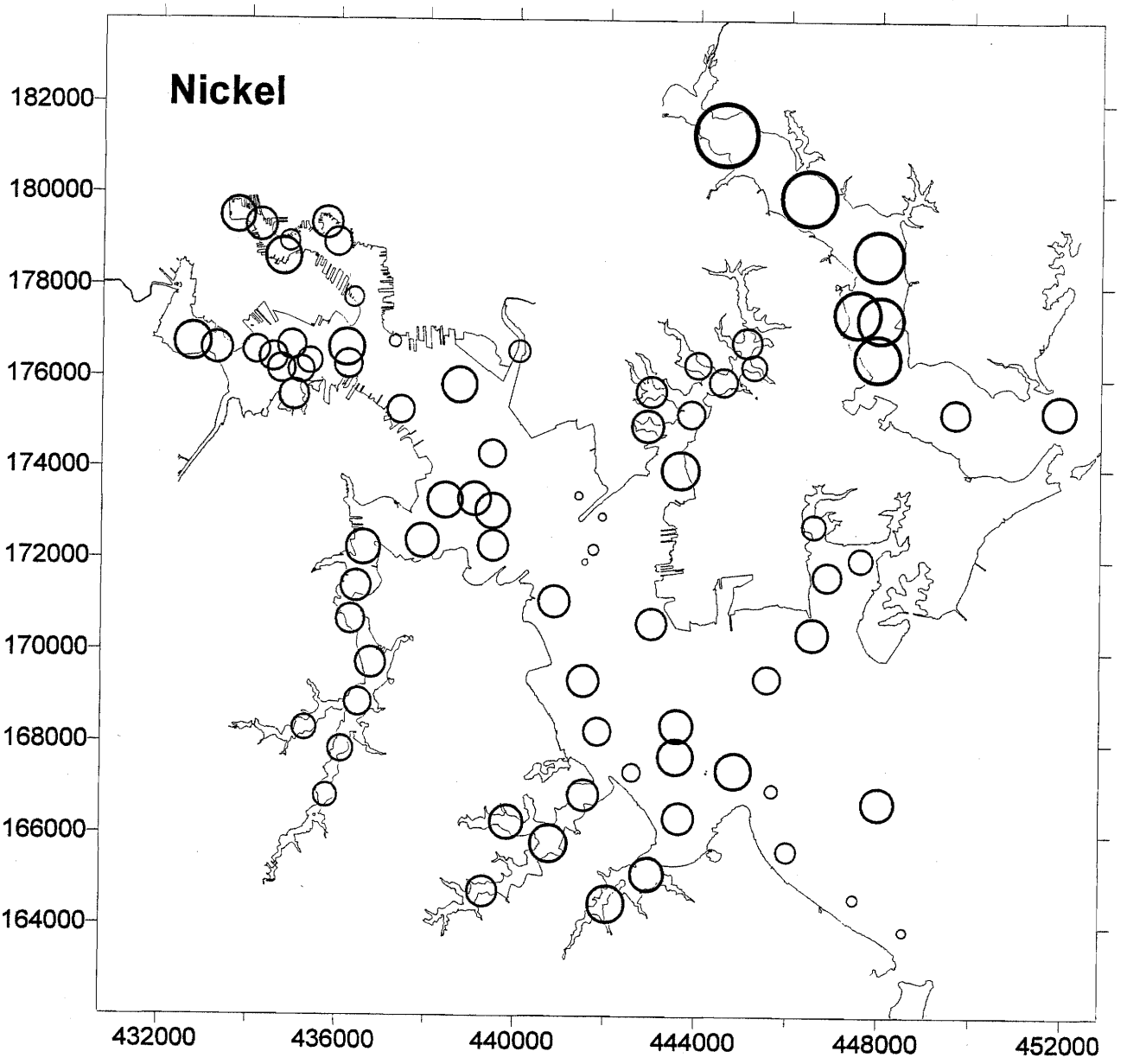


Figure 39. Spatial distribution of nickel in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

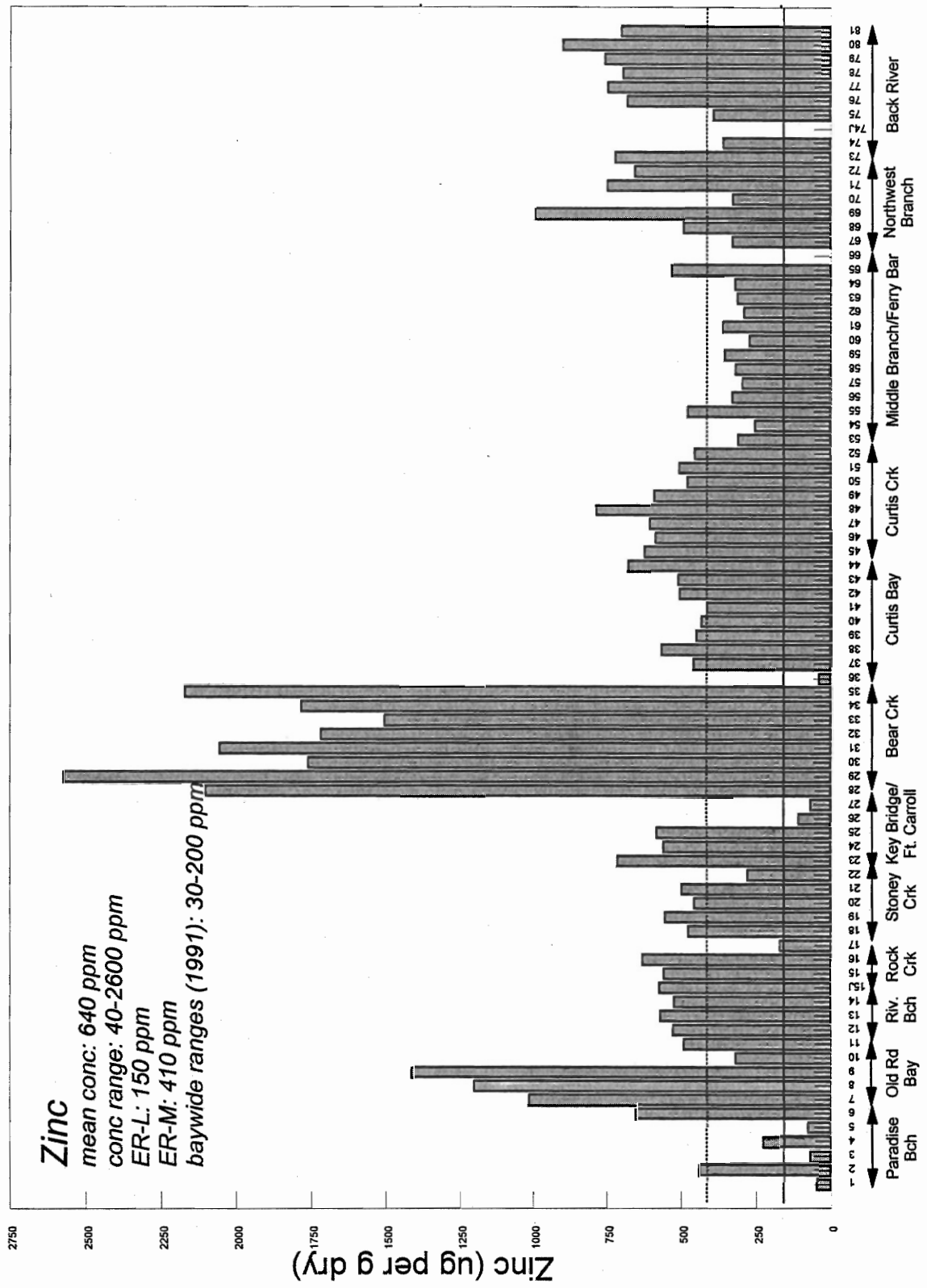


Figure 40. Zinc concentrations (ppm dry wgt) in BSM sediments.

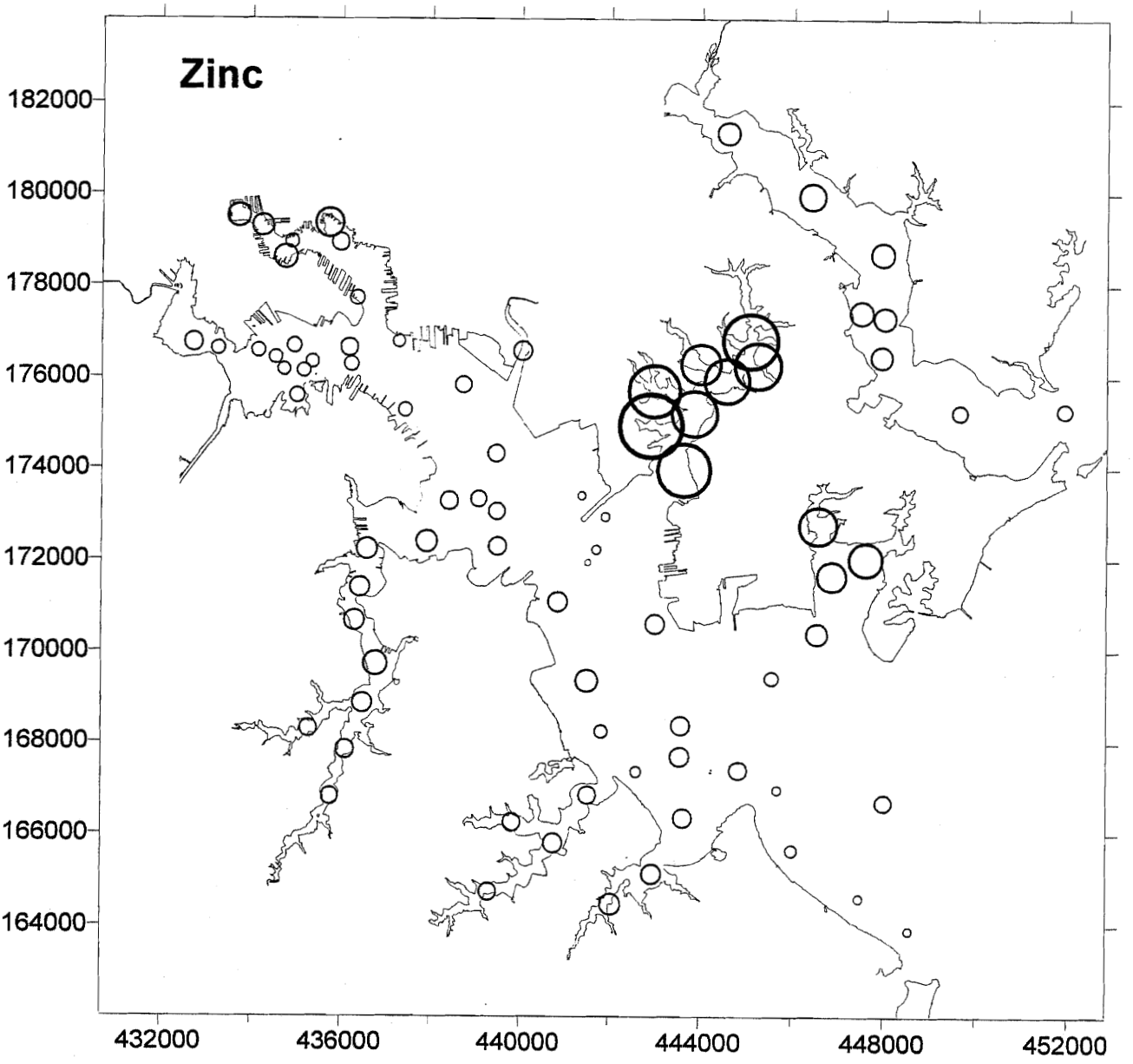


Figure 41. Spatial distribution of zinc in the Baltimore Harbor/Patapsco River/Back River system. Size of circle is directly proportional to the concentration.

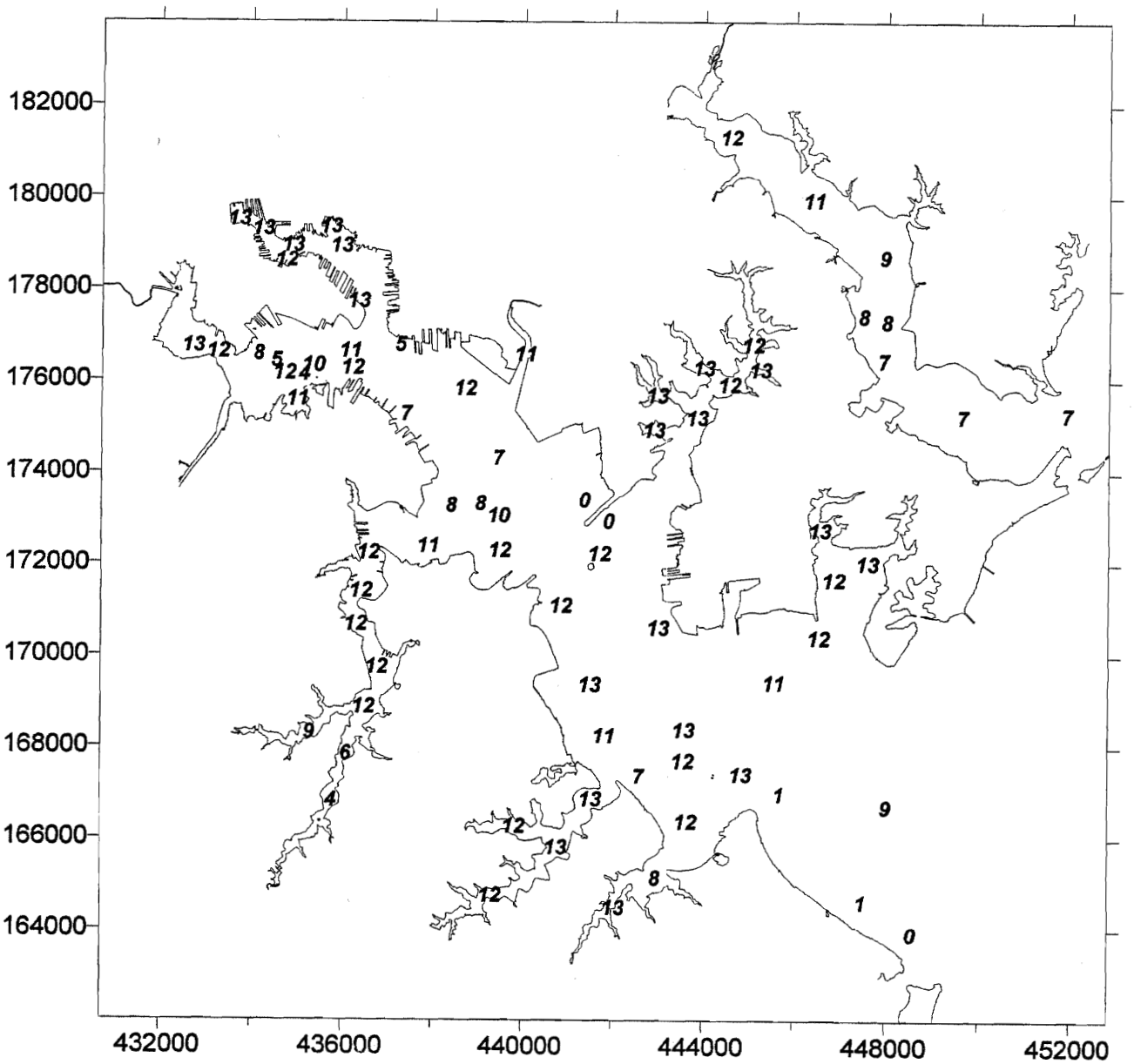


Figure 42. The number of PAHs (out of a possible 13 compounds) which exceeded the ER-L at each location.

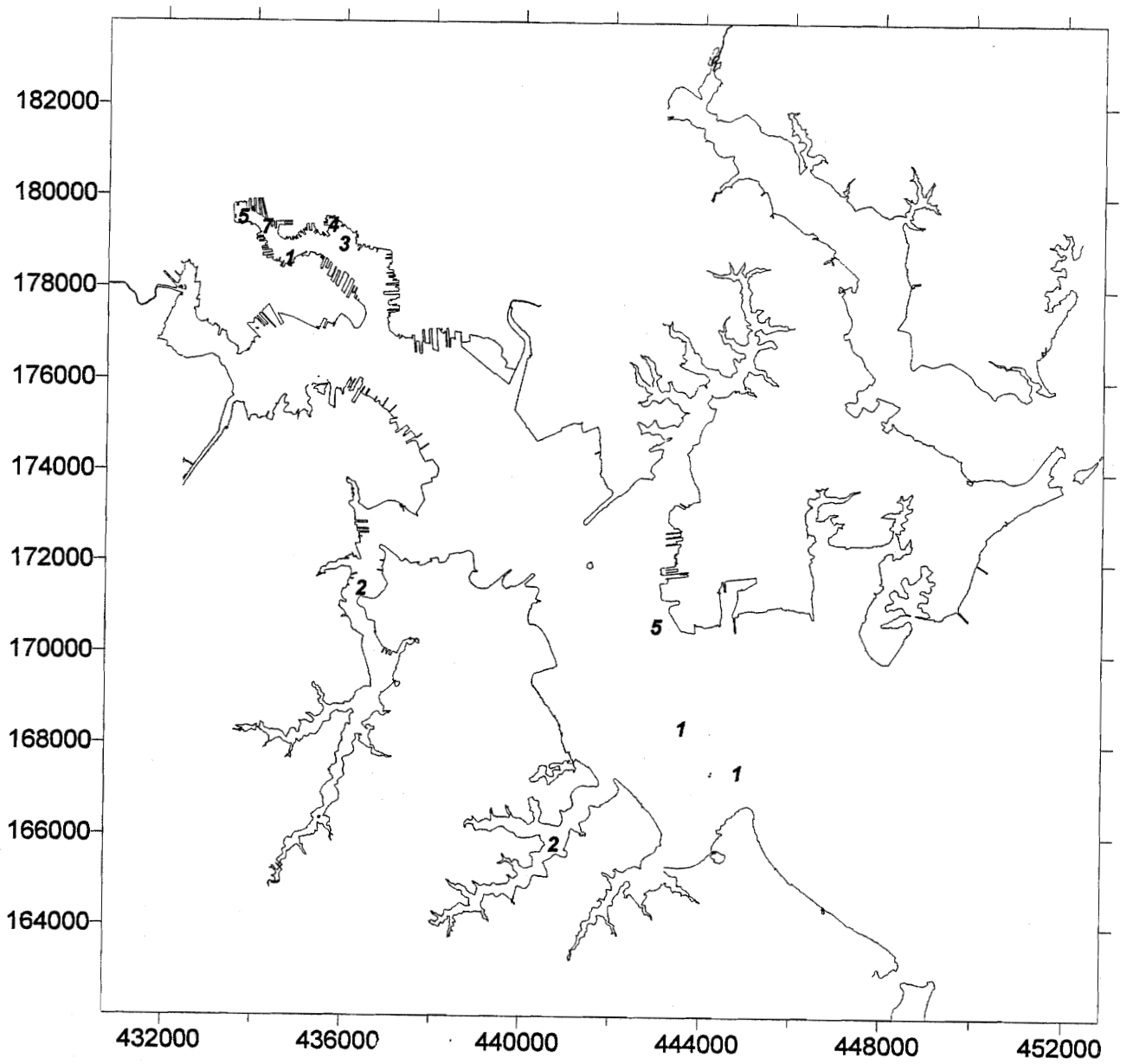


Figure 43. The number of PAHs (out of a possible 13 compounds) which exceeded the ER-M at each location.

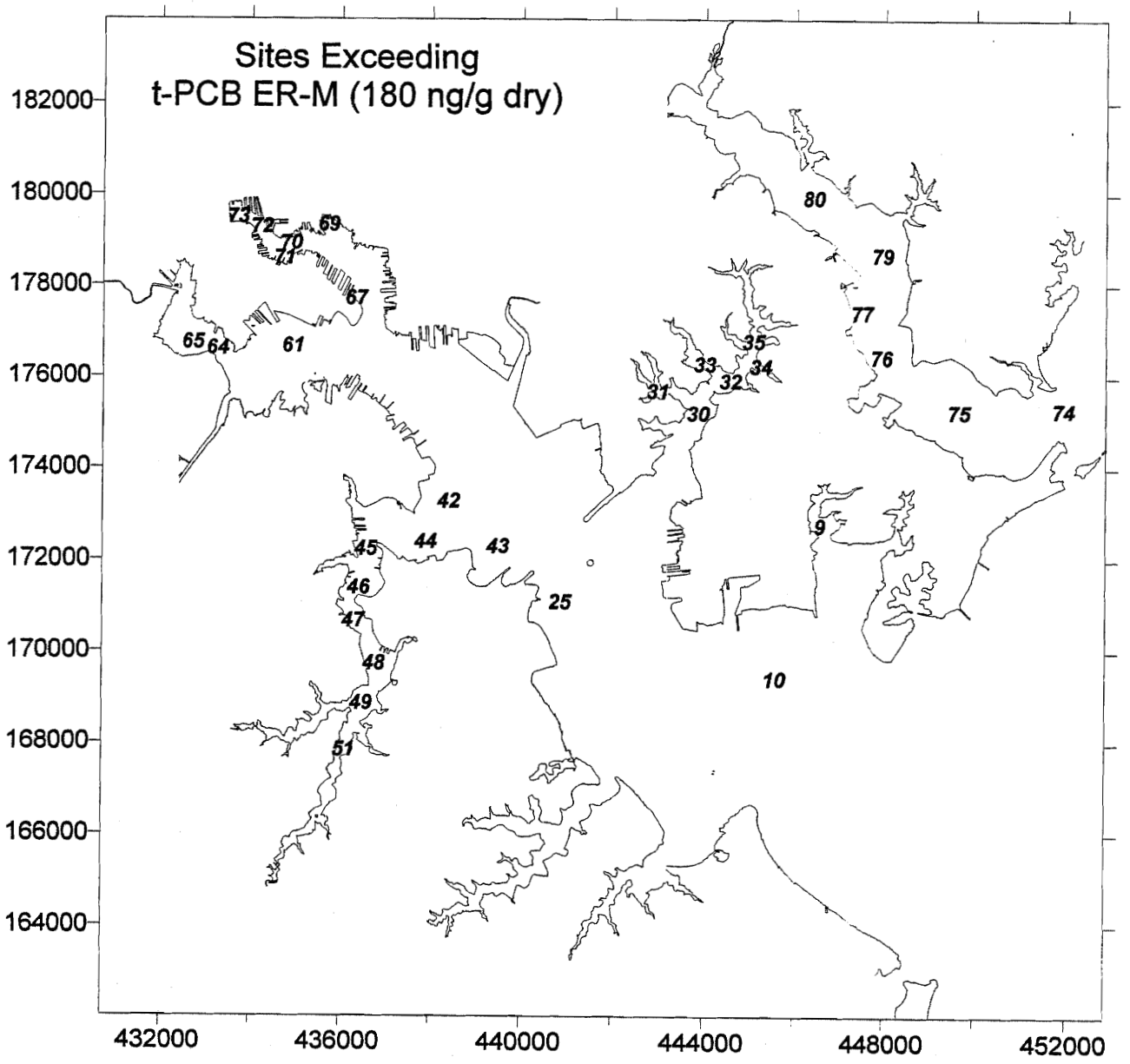


Figure 44. Sites at which the t-PCB ER-M (180 ng/g dry wgt) was exceeded.

APPENDIX B: TABLES

Table 1. Location, depth and date of collection of BSM sediments.

Site	1	2	3	4	5	6	7	8	9	10	11	12
Description	Paradise Beach #1	Sample # 4 Paradise	Paradise Beach #2	Paradise Beach #3	Paradise Beach #4	BH1 Sample #17a	BH1 Sample #16	Old Road Bay #1	Old Road Bay #2	BH1 Sample #13A	Benthic monitor #1	BH1 Sample #7
Date	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3
Time	845	915	945	1000	1020	1055	1105	1120	1135	1155	1210	1220
Depth, m	1.5	6.1	3.2	3.6	2.4	4.8	3.3	2.7	2.1	7	4.8	4.8
Coordinates												
Latitude												
degrees	39	39	39	39	39	39	39	39	39	39	39	39
minutes	8	10	8	9	10	12	12	12	13	11	10	10
seconds	31	1.5	54	28	11	1.5	42.2	54	18	30.1	25	56.7
Longitude												
degrees	76	76	76	76	76	76	76	76	76	76	76	76
minutes	26	26	27	28	28	27	27	26	27	28	28	29
seconds	18	40.4	3	4	17	40.5	26.7	56	39	21.5	52	44.2
Northing	163913.1	166700.5	164615.8	165655.6	166979.7	170392.3	171649.4	172017.7	172751.6	169418.3	167406.6	168377.1
Easting	448555.6	448000.7	447470.7	445999.9	445680.1	446536.2	446859.8	447594.1	446558.2	445558	444837.5	443579.2

Table 1. Location, depth and date of collection of BSM sediments.

Site	13	14	15J	15	16	17	18	19	20	21	22	23
Description	Benthic monitor #2	BH1 Sample #1	Repeat sampling at Site	Rock Creek #1	Rock Creek #2	BH1 Sample #2	Stony Creek #1	Stony Creek #2	Stony Creek #3	Stony Creek #4	BH1 Sample #9	BH1 Sample #10
Date	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3
Time	1225	1240	1330	1248	1300	1350	1400	1412	1430	1445	1505	1515
Depth, m	5.1	4.8	3.6	3.6	3.6	3.6	4.2	4.5	3.3	3.6	4.2	4.2
Coordinates												
Latitude												
degrees	39	39	39	39	39	39	39	39	39	39	39	39
minutes	10	9	9	9	8	10	10	9	9	9	10	11
seconds	35	51.5	12	12	51	24.3	8	34	0	49	53	29.2
Longitude												
degrees	76	76	76	76	76	76	76	76	76	76	76	76
minutes	29	29	30	30	30	30	31	31	32	32	30	31
seconds	45	42.4	11	11	49	25.6	10	42	43	21	57.4	10.5
Northing	167707.9	166366.8	165145	165145	164492.5	167372.6	166864.3	165811.8	164755.9	166269.6	168253.5	169368.2
Easting	443563.7	443633.5	442953.6	442953.6	442044.7	442591	441527.9	440765.2	439306	439826.6	441823	441502.7

Table 1. Location, depth and date of collection of BSM sediments.

Site	24	25	26	27	28	29	30	31	32	33	34	35
Description	BH1 Sample #20	BH1 Sample #22	BH1 Sample #24	Capping site 8	Bear Creek #1	Bear Creek #2	Bear Creek #3	Bear Creek #4	Bear Creek #5	Bear Creek #6	Bear Creek #7	Bear Creek #8
Date	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3	June 3
Time	1530	1540	1550	1600	1618	1633	1640	1655	1715	1720	1735	1740
Depth, m	5.7	4.2	4.2	2.1	2.4	2.1	3.9	2.7	3.6	4.5	2.7	3.3
Coordinates												
Latitude												
degrees	39	39	39	39	39	39	39	39	39	39	39	39
minutes	12	12	13	13	13	14	14	14	15	15	15	15
seconds	9.1	25	1.7	25	58	29.5	38	54	1	13	11.5	29
Longitude												
degrees	76	76	76	76	76	76	76	76	76	76	76	76
minutes	30	31	31	30	29	30	29	30	29	29	28	28
seconds	7.4	37.2	1.4	53	41	11	31	8	1.5	25	33.5	40
Northing	170606.7	171085.5	172221.8	172941.3	173968.3	174935.8	175203.2	175691.7	175916.4	176283.3	176244	176782.8
Easting	443010.2	440853.1	441706	441903.7	443625.1	442900.3	443858	442968.1	444561.4	443995.9	445230.9	445071.9

Table 1. Location, depth and date of collection of BSM sediments.

Site	36	37	38	39	40	41	42	43	44	45	46	47
Description	changed per MDE/BH1	BH1 Sample #30	CC1	SeaGirt	BH1 Sample #53	Curtis Bay piston	BH1 Sample #47	BH1 Sample #54	MDE change,BH1 Samp	BH1 Sample #49	BH1 Sample #50	Curtis Creek #1
Date	June 4	June 4	June 4	June 4	June 4	June 4	June 4	June 4	June 5	June 5	June 5	June 5
Time	825	845	900	917	1457	1445	1435	1505	1415	1404	1356	1348
Depth, m	2.7	11.2	6.2	8.2	6.7	5.7	5.7	5.4	6	6.5	5.1	5.1
Coordinates												
Latitude												
degrees	39	39	39	39	39	39	39	39	39	39	39	39
minutes	13	14	15	14	13	13	13	13	13	13	12	12
seconds	40	10.2	23	59	29.2	38	36.7	4.5	8	3.2	35.9	12.5
Longitude												
degrees	76	76	76	76	76	76	76	76	76	76	76	76
minutes	31	32	32	33	32	32	33	32	33	34	34	34
seconds	15	34.9	10	5.5	34.6	51.5	18.8	33.8	40	35.5	42.2	47
Northing	173401.1	174322.6	176570.6	175823.8	173058.3	173327.6	173284.3	172296.7	172396.8	172242.5	171399.9	170677.8
Easting	441373.6	439452.6	440038.3	438711.3	439466.1	439059.4	438404.8	439489.1	437900.6	436570	436413.1	436301.3

Table 1. Location, depth and date of collection of BSM sediments.

Site	48	49	50	51	52	53	54	55	56	57	58	59
Description	Curtis Creek #2	Curtis Creek #3	Curtis Creek #4	Curtis Creek #5	Curtis Creek #6	BH1 Sample #45	Lazaretto Pt.	BH1 Sample #38	S. Ferry Bar #1	Benthic monitor #3	BH1 Sample #39	S. Ferry Bar #2
Date	June 5	June 5	June 5	June 5	June 5	June 4	June 4	June 4	June 4	June 4	June 4	June 4
Time	1337	1328	1312	1255	1250	1423	930	1415	1405	1348	1340	1331
Depth, m	4.5	4.5	3.3	4.5	3.3	5.4	7.6	7	7	5.1	4.2	3.3
Coordinates												
Latitude												
degrees	39	39	39	39	39	39	39	39	39	39	39	39
minutes	11	11	10	10	10	14	15	15	15	15	15	14
seconds	42	14	56	41	8	41.5	30	25.7	14	16	9.6	52
Longitude												
degrees	76	76	76	76	76	76	76	76	76	76	76	76
minutes	34	34	35	34	35	34	34	34	34	35	35	35
seconds	28	40	30	56	10	0.5	6	51.7	50	26	34.2	40.5
Northing	169739.4	168874.6	168314.1	167855.2	166836	175277.8	176772.8	176635.1	176274.5	176332.2	176134	175590.6
Easting	436761.5	436477.6	435280.2	436098.3	435766.9	437395.2	437256.2	436161.2	436203.6	435340.2	435144.5	434995.8

Table 1. Location, depth and date of collection of BSM sediments.

Site	60	61	62	63	64	65	66	67	68	69	70	71
Description	S. Ferry Bar #3	BH1 Sample #40	Benthic monitor #4	BH1 Sample #41	Hanover St. bridge	BH1 Sample #43	Gynns Falls	BH1 Sample #34	MDE change,BH1 Samp	Boston Street	Allied	BH1 Sample #36
Date	June 4	June 4	June 4	June 4	June 4	June 4	June 4	June 4	June 4	June 4	June 4	June 4
Time	1323	1315	1310	1300	1250	1241	shallow thro	947	955	1005	1023	1025
Depth, m	3.6	5.7	5.7	5.4	5.4	2.7		5.4	5.1	6.7	6.4	6.7
Coordinates												
Latitude												
degrees	39	39	39	39	39	39	39	39	39	39	39	39
minutes	15	15	15	15	15	15	16	16	16	16	16	16
seconds	10.5	27.2	19	24	25.5	29.8	0	0.9	40	53.5	40.5	29.8
Longitude												
degrees	76	76	76	76	76	76	76	76	76	76	76	76
minutes	35	35	36	36	36	37	37	34	35	35	35	35
seconds	52.5	43	0	16	53	15.9	25	44.5	0	10	45	50.9
Northing	176159.8	176675.8	176421.1	176573.6	176616.1	176746.4	177676.8	177721.4	178925.4	179340.7	178936	178605.4
Easting	434705.6	434931.1	434524.6	434140.3	433253.1	432703.5	432481.5	436328.8	435951.7	435710.2	434873.1	434733.2

Table 1. Location, depth and date of collection of BSM sediments.

Site	72	73	74	74J	75	76	77	78	79	80	81
Description	Jones Falls	BH1 Sample #37	Back River #1	Back River #1 revisited t	Back River #2	Back River #3	Back River #5	Back River #4	move per MDE,Back Riv	Back River #7	Back River #8
Date	June 4	June 4	June 5	June 5	June 5	June 5	June 5	June 5	June 5	June 5	June 5
Time	1045	1100	854	1116	912	924	930	947	959	1014	1033
Depth, m	7.6	8.5	5.4	5.4	2.7	2.7	1.8	2.4	2.1	2.4	1.5
Coordinates											
Latitude											
degrees	39	39	39	39	39	39	39	39	39	39	39
minutes	16	16	14	14	14	15	15	15	16	17	17
seconds	52	59	39	39	38	17.5	49	45	30	11	56
Longitude											
degrees	76	76	76	76	76	76	76	76	76	76	76
minutes	36	36	23	23	25	26	26	26	26	27	29
seconds	12	34	55	55	30	41	59	38	40	44	0
Northing	179287.8	179501.4	175283	175283	175237.5	176445	177413.8	177293.5	178680.9	179936	181313.2
Easting	434224.5	433696.3	451914.7	451914.7	449636.9	447927	447489.6	447993.8	447937.4	446396	444566.8

Table 2. Standard error of individual PAHs for replicates of randomly selected sites.

Compound	BSM 7	BSM 19	BSM 25	BSM 41	BSM 52	BSM 61	BSM 74
Napthalene	15.2	0.2	0.2	10.9	22.1	NA	NA
2MeNapthalene	25.0	27.4	27.4	35.2	45.8	NA	13.3
1MeNapthalene	21.3	35.2	35.2	46.6	61.8	NA	17.5
Acenapthylene	34.6	62.4	62.4	96.2	102.4	NA	54.1
Biphenyl	19.9	49.9	49.9	62.4	89.7	NA	28.1
Acenapthene	12.6	NA	NA	72.6	110.7	NA	41.2
Fluorene	5.0	10.7	10.7	2.8	12.6	20.4	4.9
Phenanthrene	23.9	NA	NA	15.8	20.0	42.0	8.3
Anthracene	25.4	72.2	72.2	17.8	9.6	33.7	10.4
1Mefluorene	27.2	6.0	6.0	15.9	14.8	37.7	12.6
4,5-Methylenephenanthrene	23.4	17.4	17.4	15.7	13.6	41.2	6.5
2Methylphenanthrene	32.2	2.8	2.8	24.2	23.0	32.2	3.2
2Methylanthracene	38.1	15.5	15.5	18.7	13.0	35.0	5.8
1Methylanthracene	19.6	16.7	16.7	10.1	0.8	38.1	5.5
1Methylphenanthrene	53.5	14.4	14.4	62.0	29.4	43.2	0.5
9Methylanthracene	72.5	52.1	52.1	19.8	9.8	19.9	48.3
Fluoranthene	11.8	15.9	15.9	15.6	4.9	21.1	7.8
Pyrene	13.1	15.3	15.3	12.0	5.9	17.8	6.1
3,6Dimethylphenanthrene	19.6	11.5	11.5	6.4	3.2	13.9	1.0
Benzo[a]fluorene	31.1	17.7	17.7	18.9	3.7	13.9	4.2
Benzo[b]fluorene	19.9	29.4	29.4	13.1	8.3	6.8	11.5
Benz[a]anthracene	36.5	16.1	16.1	12.3	1.7	4.1	8.8
Chrysene + Triphenylene	29.6	21.8	21.8	16.8	2.3	2.5	6.4
Napthacene	52.2	28.2	28.2	18.4	3.7	5.7	14.9
Benzo[b]fluoranthene	25.4	23.4	23.4	18.8	8.3	14.1	13.6
Benzo[k]fluoranthene	11.3	16.9	16.9	13.0	6.6	25.1	12.6
Benzo[e]pyrene	11.1	22.0	22.0	13.7	7.2	16.6	0.9
Benzo[a]pyrene	17.5	23.0	23.0	15.0	5.7	16.7	2.3
Perylene	12.8	14.2	14.2	13.5	1.0	18.4	7.0
Dimethylbenz[a]anthracene	22.8	31.7	31.7	18.2	0.4	26.5	4.4
3Methylcholanthrene	39.6	49.6	49.6	NA	20.2	50.9	32.1
Indeno[1,2,3-c,d]pyrene	55.7	19.5	19.5	17.3	7.9	22.6	3.8
Benzo[g,h,i]perylene	20.4	18.8	18.8	14.6	5.7	18.4	3.1
Anthanthrene	49.1	19.4	19.4	33.5	5.7	28.7	40.6
Dibenz[a,h+ac]anthracene	84.4	14.7	14.7	28.4	9.3	9.7	5.5
Coronene	2.3	8.8	8.8	8.6	1.1	10.5	15.4
Retene	29.8	17.0	17.0	8.1	86.9	10.9	1.9
Average Standard Error between Reps	28.2	22.1	22.1	22.8	21.0	18.9	12.5

Table 3. Detection limits (ng/sample) for PCB congeners based on matrix blanks.

Congener	Method Det Limit ng	Congener	Method Det Limit ng
1	0.577	97	0.008
3	3.000	81,87	0.007
4,10	0.111	85	0.012
7,9	0.012	136	0.007
6		77,110	0.013
8,5	0.158	82	0.009
19	0.013	151	0.011
12,13	0.018	134,144	0.009
18	0.072	107	0.011
17	0.016	123,149	0.012
24	0.023	118	0.033
16,32	0.020	134	0.246
29	0.111	146	0.016
26	0.021	132,153,105	0.022
25	0.029	141	0.009
31,28	0.027	137,130,176	0.039
33,21,53	0.023	163,138	0.018
51	0.062	158	0.026
22	0.035	129,178	0.017
45	0.011	187,182	0.014
46	0.053	183	0.019
52	0.014	128	0.012
49	0.014	185	0.012
48,47	0.238	174	0.018
44	0.247	177	0.014
37,42	0.019	202,171,156	0.078
41,64,71	0.050	172	0.027
40	0.015	197	0.087
100	0.019	180	2.384
63	0.066	193	0.032
74	0.064	191	0.024
70,76	0.030	199	0.009
66,95	0.201	170,190	0.029
91	0.019	198	0.020
56,60	0.034	201	0.025
92,84	0.057	203,196	0.014
89	0.002	189	0.033
101	0.012	208,195	0.082
99	0.006	207	0.019
119	0.014	194	0.020
83	0.007	205	0.025
		206	0.035
		TOTAL PCB (NG)	9.067

Table 4. Detection limits (ng/sample) for organochlorine pesticides based on matrix blanks.

Compound	*Detection Limit (ng)*
alpha-HCH	0.07
HCB	0.04
beta-HCH	0.07
heptachlor	0.07
heptachlor epoxide	0.06
trans-chlordane	0.06
2,4-DDE	0.10
Endosulfan I	0.07
cis-chlordane	0.06
t-nonachlor	0.06
Dieldrin	0.10
4,4-DDE	0.07
2,4-DDD	0.10
Endrin	0.10
Endosulfan II	0.08
4,4-DDD	0.10
cis-nonachlor	0.04

Table 5. Detection limits (ng/sample) for PAHs based on matrix blanks.

Compound	*Ave. Det. Limit (ng)*	*Std Dev*
Napthalene	23.70	13.94
2MeNapthalene	8.37	4.14
1MeNapthalene	4.04	1.37
Acenapthylene	0.32	0.18
Biphenyl	8.23	6.73
Acenapthene	1.70	0.64
Fluorene	1.94	0.25
Phenanthrene	3.76	0.37
Anthracene	0.50	0.30
1Mefluorene	1.82	1.12
4,5-Methylenephenanthrene	0.66	0.43
2Methylphenanthrene	1.00	0.93
2Methylanthracene	0.75	0.39
1Methylanthracene	1.34	0.61
1Methylphenanthrene	0.39	0.34
9Methylanthracene	1.04	0.65
Fluoranthene	3.46	0.95
Pyrene	2.39	0.74
3,6Dimethylphenanthrene	0.58	0.33
9,10,dimethylanthracene	0.30	0.22
Benzo[a]fluorene	0.38	0.23
Benzo[b]fluorene	1.34	1.23
Benz[a]anthracene	1.28	0.89
Chrysene + Triphenylene	4.90	0.51
Napthacene	0.71	0.48
Benzo[b]fluoranthene	5.25	2.24
Benzo[k]fluoranthene	0.83	0.53
Benzo[e]pyrene	0.77	0.55
Benzo[a]pyrene	4.68	1.98
Perylene	3.01	2.32
Dimethylbenz[a]anthracene	0.45	0.17
3Methylcholanthrene	0.85	0.59
Indeno[1,2,3-c,d]pyrene	0.85	0.52
Benzo[g,h,i]perylene	2.23	2.22
Anthanthrene	0.55	0.34
Dibenz[a,h+ac]anthracene	0.71	0.86
Coronene	0.13	0.04
Retene	1.30	0.17
Total	96.54	

Table 6. Results of nitrogen, carbon, and sulfur (% by wgt) analyses of NIST-SRM #1646 (Estuarine Sediment) compared to the certified or known values. MGS values were obtained by averaging the results of all SRM analyses run with the unknowns .

Element Analyzed	Certified Values*	MGS Results
Nitrogen	0.18	0.17 ±0.01
Carbon	1.72	1.69 ±0.08
Sulfur	0.96	1.04 ±0.08

* The value for carbon is certified by NIST. The sulfur value is the non-certified value reported by NIST. The value of nitrogen was obtained from repeated analyses in-house and by other laboratories (Haake Buchler Labs and U.S. Dept. of Agriculture).

Table 7. Average concentrations, certified SRM values and recoveries of the metals analyzed for this study.

Metal	CRC- PAC Ave.	CRC- PAC Cert.	CRC- PAC Rec.	NIST- Buffalo River Ave.	NIST- Buffalo River Cert.	NIST- Buffalo River Rec.
Cd	3.13	3.45	91	2.39	2.38	100
Cr	135.2	135	100	111.5	113	99
Cu	100.9	98.6	102	462	452	102
Fe	3.88	4.11	94	4.34	4.87	89
Mn	536	555	97	339	470	72
Ni	39	44.1	88	38.6	44.1	88
Pb	140	161	87	372	404	92
Zn	437.5	438	100	814	824	99

Table 8. Sediment properties and metal concentrations for BSM sediments.

Analysis	1	2	3	4	5	6	7	8	9	10	11	12
Grain Size (% dry weight)												
Gravel	0	0	0	0.68	0	0.19	0	0	0	8.18	0	0
Sand	99.23	5.75	98.29	44.50	97.39	6.75	16.75	14.18	7.06	32.50	4.59	7.64
Silt	0.20	33.12	0.75	25.66	1.01	35.94	46.47	55.70	61.33	22.24	38.83	36.63
Clay	0.57	61.13	0.96	29.16	1.60	57.12	36.78	30.12	31.61	37.07	56.58	55.73
water content, % (MGS)	27.18	66.72	22.71	49.22	22.39	67.84	60.33	63.47	70.28	67.23	69.41	67.75
water content, % (Baker)	27.5	74.9	28.9	53.9	32	69.5	62.5	59.8	66.5	66	70.4	69.2
Total Nitrogen (%)	0.01	0.29	0.02	0.17	0.02	0.30	0.24	0.23	0.29	0.23	0.31	0.29
Total Carbon (%)	0.10	3.44	0.33	2.97	0.33	4.51	5.38	6.06	5.42	3.77	3.73	3.66
Total Sulfur (%)	BDL	0.22	BDL	0.30	BDL	0.21	0.26	0.32	0.38	0.35	0.27	0.28
AVS	0	0	0	0	0	0.006	0	0.001	0.008	0	0	0
Metals (ug/g dry wgt)												
Cd	BDL	BDL	BDL	0.42	0.23	0.37	0.44	0.60	1.08	0.01	0.60	0.29
Cr	5.8	191.1	10.4	106.2	12.2	230.4	270.4	285.2	293.8	189.2	242.2	285.2
Cu	5.3	64.0	8.4	37.5	9.5	79.7	85.7	94.2	148.2	83.8	85.3	84.2
Fe	0.17	5.86	0.35	3.07	0.44	7.74	10.98	12.47	9.47	4.76	5.84	6.76
Mn	1054	3167	972	1586	1844	2831	2166	1331	1147	2260	3414	3072
Ni	7.6	72.6	11.9	38.3	16.8	71.5	61.0	49.6	48.0	56.2	81.3	74.5
Pb	5.5	77.8	10.1	36.3	5.1	125.1	260.4	265.9	244.2	66.6	95.6	93.8
Zn	48.2	440.5	69.4	225.5	78.9	652.3	1016.7	1204.1	1414.5	319.1	491.9	528.3
Hg (ng/g dry wgt)	3.92	243.81	46.83	123.19	9.47	414.27	562.23	324.42	703.56	186.88	470.41	151.03
Methyl-Hg (ng/g dry wgt)	0	5.53	0	0.78	0	--	1.31	--	--	1.15	--	--
% Methyl	--	2.27	--	0.63	--	--	0.23	--	--	0.62	--	--

Table 8. Sediment properties and metal concentrations for BSM sediments.

Analysis	13	14	15J	15	16	17	18	19	20	21	22	23
Grain Size (% dry weight)												
Gravel	0	0	0	0	0	2.84	0	0	0	0.00	0.00	0.00
Sand	1.15	5.41	4.71	10.06	3.73	69.17	3.07	1.19	3.14	1.58	48.41	3.27
Silt	35.72	41.60	28.40	28.66	21.22	12.90	41.92	26.70	33.29	28.60	24.18	38.70
Clay	63.13	53.00	66.89	61.28	75.05	15.10	55.02	72.11	63.57	69.82	27.41	58.03
water content, % (MGS)	70.51	66.50	75.52	70.34	81.23	48.81	69.86	79.97	79.57	80.01	62.40	66.59
water content, % (Baker)	71.5	68.7	0	73.1	82.2	47.8	70.8	79.8	80.5	80.4	57.4	68.1
Total Nitrogen (%)	0.33	0.28	0.40	0.37	0.53	0.13	0.34	0.46	0.48	0.47	0.19	0.33
Total Carbon (%)	4.01	3.56	4.33	4.13	5.32	2.48	4.25	4.60	4.82	4.42	2.56	4.57
Total Sulfur (%)	0.23	0.19	0.37	0.29	1.40	0.32	0.21	0.56	1.64	1.47	0.27	0.26
AVS	0	0	--	0	0.166	0	0	0.049	0.108	0.061	0	0.004
Metals (ug/g dry wgt)												
Cd	0.40	BDL	BDL	BDL	0.34	BDL	BDL	BDL	0.95	0.56	BDL	BDL
Cr	344.2	343.0	322.4	303.8	281.1	123.0	355.3	344.0	197.1	252.4	197.8	524.2
Cu	108.8	117.3	174.9	171.1	299.1	54.4	133.4	172.5	161.0	200.0	63.4	152.6
Fe	7.00	6.50	6.49	6.15	5.53	2.93	6.41	6.53	4.66	5.71	4.11	9.16
Mn	2610	2192	1276	1299	608	1053	2028	1154	405	466	1893	3381
Ni	80.7	68.6	75.6	74.3	84.3	32.0	68.8	85.0	67.3	73.9	57.7	69.7
Pb	91.6	121.4	128.8	129.0	147.2	20.2	110.0	154.4	111.7	113.9	52.0	157.0
Zn	570.7	525.0	574.0	559.7	630.4	170.8	476.9	554.3	458.2	499.4	280.1	715.0
Hg (ng/g dry wgt)	284.4	183.96	135.7	325.7	143.46	77.49	114.34	25.18	303.05	85.35	143.26	518.56
Methyl-Hg (ng/g dry wgt)	1.87	1.19	--	--	2.75	--	1.27	--	1.76	1.65	--	1.39
% Methyl	0.66	0.65	--	--	1.92	--	1.11	--	0.58	1.93	--	0.27

Table 8. Sediment properties and metal concentrations for BSM sediments.

Analysis	24	25	26	27	28	29	30	31	32	33	34	35
Grain Size (% dry weight)												
Gravel	0.00	0.00	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sand	3.15	8.60	90.13	95.56	2.69	3.63	2.69	3.94	2.31	10.11	7.14	3.47
Silt	33.69	41.71	3.75	3.05	37.33	42.45	37.96	42.76	44.26	40.23	55.81	44.26
Clay	63.16	49.69	5.02	1.40	59.98	53.92	59.35	53.31	53.43	49.67	37.05	52.27
water content, % (MGS)	70.93	70.71	24.21	32.08	79.82	85.75	82.27	86.56	83.59	81.69	76.64	83.65
water content, % (Baker)	73.8	68.1	65.6	28	82.3	86.7	83.6	87.4	85.2	83.7	78.2	83.4
Total Nitrogen (%)	0.35	0.33	0.07	0.04	0.52	0.58	0.61	0.72	0.62	0.60	0.55	0.66
Total Carbon (%)	4.68	5.34	2.28	0.64	11.30	7.83	7.54	7.86	6.84	6.31	5.72	6.64
Total Sulfur (%)	0.43	0.32	0.10	BDL	1.63	4.45	1.66	4.29	2.84	2.92	2.13	2.89
AVS	0.011	0	0.002	0	0.196	3.111	0.344	1.312	1.324	0.599	0.432	0.661
Metals (ug/g dry wgt)												
Cd	BDL	BDL	BDL	BDL	5.34	9.28	6.54	7.65	6.63	5.31	5.95	8.35
Cr	320.7	572.3	67.9	51.9	1831.1	1536.4	1046.7	1141.7	1027.5	719.4	678.5	841.3
Cu	115.5	129.2	25.4	12.7	228.3	242.6	207.6	233.2	204.0	190.5	153.3	221.3
Fe	6.79	8.19	0.01	0.86	14.74	9.55	10.25	7.51	7.88	6.77	5.78	7.18
Mn	2009	3965	452	426	1210	630	721	555	537	364	365	460
Ni	66.9	68.0	11.1	4.6	85.9	71.6	58.7	67.6	59.6	55.4	50.6	64.6
Pb	125.2	128.1	38.8	11.2	170.9	292.3	204.9	298.0	212.9	186.2	171.0	266.4
Zn	560.6	582.3	108.3	69.8	2105.4	2574.7	1762.6	2057.9	1720.2	1507.0	1786.0	2175.6
Hg (ng/g dry wgt)	53.75	531.37	54.47	19.08	35.34	779.99	258.51	1219.39	62.58	166.9	602.75	1576.51
Methyl-Hg (ng/g dry wgt)	--	1.85	--	0.07	--	1.39	--	1.02	--	2.29	--	1.52
% Methyl	--	0.35	--	0.37	--	0.18	--	0.08	--	1.37	--	0.1

Table 8. Sediment properties and metal concentrations for BSM sediments.

Analysis	36	37	38	39	40	41	42	43	44	45	46	47
Grain Size (% dry weight)												
Gravel	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sand	96.80	2.91	63.11	1.88	1.80	1.00	3.71	2.12	2.59	7.13	7.12	19.09
Silt	1.41	26.20	17.24	31.91	33.12	30.55	31.06	34.21	23.77	29.08	29.51	27.85
Clay	1.79	70.89	19.42	66.21	65.08	68.45	65.23	63.68	73.64	63.79	63.37	53.06
water content, % (MGS)	21.33	75.07	54.91	77.49	77.47	78.40	79.17	76.15	82.02	79.59	79.81	75.38
water content, % (Baker)	31.1	74.3	57	77.7	77.1	79.1	78.1	78.8	81.6	80	80	79.7
Total Nitrogen (%)	0.03	0.32	0.17	0.37	0.35	0.32	0.36	0.39	0.41	0.41	0.41	0.44
Total Carbon (%)	0.31	3.47	3.01	4.25	4.35	3.86	4.56	4.93	4.82	5.57	4.95	5.20
Total Sulfur (%)	0.04	1.08	0.85	0.81	0.47	0.69	0.75	0.41	1.00	1.05	0.97	0.70
AVS	0	0.078	0.079	0.110	0.001	0.007	0	0	0.021	0.073	0.054	0.026
Metals (ug/g dry wgt)												
Cd	BDL	0.93	17.60	1.68	0.74	0.65	1.35	1.33	0.48	1.73	1.56	1.49
Cr	34.3	283.6	235.9	271.1	276.1	277.0	377.7	458.2	414.0	324.8	281.2	264.4
Cu	8.6	138.5	331.3	155.1	123.7	120.8	192.1	158.4	275.9	311.2	270.8	353.7
Fe	0.43	6.00	2.55	5.70	5.88	6.03	6.36	7.43	7.88	7.99	7.41	7.41
Mn	449	1363	310	1015	2800	2551	1934	3518	861	912	886	910
Ni	3.2	58.0	42.5	80.2	78.5	75.1	80.1	67.3	75.6	77.3	67.6	62.5
Pb	1.0	116.0	179.2	96.6	97.7	102.1	127.2	136.2	163.2	258.0	228.0	245.2
Zn	40.0	459.5	565.9	449.6	432.6	414.1	505.7	509.6	678.8	623.0	586.0	606.0
Hg (ng/g dry wgt)	32.04	210.48	640.22	163.72	329.5	141.98	759.64	387.69	199.22	2340.32	526.67	968.88
Methyl-Hg (ng/g dry wgt)	--	--	2.45	5.88	--	1.51	--	2.66	4.17	--	2.11	3.555
% Methyl	--	--	0.38	3.59	--	1.06	--	0.69	2.09	--	0.4	0.37

Table 8. Sediment properties and metal concentrations for BSM sediments.

Analysis	48	49	50	51	52	53	54	55	56	57	58	59
Grain Size (% dry weight)												
Gravel	0.00	0.00	0.00	0.00	0.00	0.00	5.71	0.00	0.00	0.41	0.00	0.00
Sand	18.15	4.52	4.31	4.91	5.29	27.93	81.46	4.21	2.17	26.74	12.68	0.45
Silt	23.75	30.57	33.35	30.02	31.79	27.83	5.30	39.46	47.87	40.46	51.92	51.51
Clay	58.11	64.91	62.34	65.07	62.93	44.24	7.53	56.33	49.95	32.40	35.40	48.04
water content, % (MGS)	82.05	82.47	81.51	81.44	80.69	72.72	26.84	77.20	72.31	63.68	71.58	73.90
water content, % (Baker)	83.2	82	82.7	82.4	81.7	72.4	40	78.3	74	64.7	66	70.2
Total Nitrogen (%)	0.40	0.49	0.52	0.52	0.54	0.25	0.07	0.43	0.28	0.19	0.21	0.26
Total Carbon (%)	4.31	4.89	5.12	5.08	5.22	3.04	1.39	4.38	3.68	2.89	3.37	3.54
Total Sulfur (%)	2.65	1.25	1.57	1.29	1.38	0.56	0.29	0.46	0.37	0.38	0.37	0.28
AVS	0.724	0.163	0.268	0.151	0.149	0.001	0.005	0.011	0.005	0.008	0.004	0.003
Metals (ug/g dry wgt)												
Cd	2.06	0.66	1.79	1.95	1.84	0.44	0.93	2.08	0.48	0.96	1.31	1.01
Cr	288.7	226.5	138.6	160.4	132.2	270.7	129.0	216.1	193.8	179.5	185.5	187.2
Cu	438.2	294.7	184.4	215.3	175.9	138.3	77.8	113.9	131.4	127.4	129.4	148.5
Fe	8.28	6.37	4.10	4.50	3.82	4.90	2.56	4.64	5.12	4.17	4.72	5.05
Mn	928	488	357	392	313	1155	412	1333	1216	905	805	765
Ni	67.2	59.1	50.0	54.4	48.0	58.6	15.2	83.5	61.2	52.4	55.2	65.8
Pb	236.6	184.3	142.6	136.1	122.1	98.5	42.5	117.1	92.1	88.1	85.9	113.9
Zn	785.5	590.8	479.9	506.6	455.9	310.0	254.4	478.0	329.8	296.4	319.0	355.3
Hg (ng/g dry wgt)	867.1	842.89	119.98	185.86	200.7	370.54	20.15	450.96	557.1	413.41	436.23	398.78
Methyl-Hg (ng/g dry wgt)	3.45	2.81	1.41	1.46	1.45	1.04	0.42	2.345	--	--	--	1.33
% Methyl	0.4	0.33	1.18	0.79	0.72	0.28	0.21	0.52	--	--	--	0.33

Table 8. Sediment properties and metal concentrations for BSM sediments.

Analysis	60	61	62	63	64	65	66	67	68	69	70	71
Grain Size (% dry weight)												
Gravel	0.00	0.00	0.00	0.00	0.00	0.00	--	2.02	0.00	0.00	3.35	0.00
Sand	3.48	3.08	1.61	1.13	2.15	4.21	--	57.68	17.15	18.72	57.72	11.07
Silt	57.73	40.89	52.53	48.69	47.74	53.31	--	17.56	36.70	25.11	17.33	43.67
Clay	38.79	56.03	45.85	50.18	50.11	42.48	--	22.73	46.15	56.17	21.60	45.26
water content, % (MGS)	68.53	74.08	69.19	71.63	76.01	73.38	--	56.53	74.30	82.30	62.68	74.76
water content, % (Baker)	67.2	75.9	72.1	74.7	80.5	76.4	--	66.8	76.9	85.5	67.3	76.6
Total Nitrogen (%)	0.23	0.30	0.27	0.30	0.34	0.34	--	0.21	0.37	0.41	0.23	0.30
Total Carbon (%)	3.28	3.82	3.57	3.81	4.51	5.70	--	3.49	5.28	6.11	5.18	5.52
Total Sulfur (%)	0.21	0.52	0.24	0.30	0.44	0.58	--	0.66	1.83	2.72	0.95	2.17
AVS	0	0.015	0.004	0.011	0.007	0.010	--	0.002	0.837	0.011	0.006	0.570
Metals (ug/g dry wgt)												
Cd	0.82	1.42	BDL	0.89	BDL	2.40	--	1.11	3.18	3.60	1.75	3.97
Cr	171.8	228.1	171.5	162.2	188.5	205.9	--	283.9	385.6	672.5	408.3	1119.3
Cu	102.1	157.7	106.9	125.4	117.1	176.3	--	291.0	293.1	532.1	201.3	399.7
Fe	4.90	5.19	4.94	4.73	5.04	4.08	--	3.56	4.45	5.69	2.98	5.12
Mn	1035	1495	1335	1195	1253	1096	--	1681	737	638	815	650
Ni	61.1	62.5	63.3	58.0	69.7	85.9	--	36.3	59.6	68.5	37.7	83.2
Pb	79.1	100.9	70.9	79.0	77.8	167.4	--	154.7	227.9	1014.0	169.7	353.1
Zn	273.7	360.9	291.3	313.4	321.3	531.6	--	330.2	492.6	994.2	327.7	748.4
Hg (ng/g dry wgt)	339.15	386.64	245.37	414.36	368.2	333.76	--	761.74	595.76	766.34	4049.66\2201.87	--
Methyl-Hg (ng/g dry wgt)	1.1	--	1.42	--	--	2.68	--	--	4.68	--	4.91	--
% Methyl	0.32	--	0.58	--	--	0.8	--	--	0.8	--	0.22	--

Table 8. Sediment properties and metal concentrations for BSM sediments.

Analysis	72	73	74	74J	75	76	77	78	79	80	81
Grain Size (% dry weight)											
Gravel	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sand	10.97	2.09	8.04	--	1.09	1.14	1.28	1.76	1.17	1.34	16.00
Silt	53.72	37.36	42.54	--	50.87	41.96	42.31	46.87	43.61	39.10	49.98
Clay	35.32	60.55	49.43	--	48.03	56.90	56.41	51.38	55.22	59.57	34.01
water content, % (MGS)	76.44	81.30	73.61	--	75.91	81.92	81.23	79.53	79.96	81.54	70.27
water content, % (Baker)	80	84.3	74.7	76.6	79.1	83.4	82.5	83.4	82.3	84.5	72
Total Nitrogen (%)	0.46	0.37	0.36	--	0.36	0.59	0.60	0.55	0.56	0.58	0.33
Total Carbon (%)	8.75	5.86	3.96	--	3.80	5.47	5.60	5.39	5.49	5.87	4.87
Total Sulfur (%)	1.85	2.50	0.33	--	0.51	0.74	0.81	0.78	0.82	0.81	0.27
AVS	1.080	0.385	--	--	--	--	--	--	--	--	--
Metals (ug/g dry wgt)											
Cd	2.56	3.49	0.85	--	0.28	3.12	4.27	4.20	3.92	5.30	2.73
Cr	247.2	891.7	155.0	--	238.1	321.2	345.4	329.2	343.7	405.0	325.9
Cu	225.4	396.0	69.1	--	151.4	179.6	187.1	174.2	209.0	229.5	140.0
Fe	4.38	4.99	4.48	--	4.93	4.95	4.94	4.80	4.81	5.20	3.92
Mn	747	745	3205	--	2131	1124	989	1178	1081	1011	654
Ni	69.9	78.6	76.7	--	63.1	111.2	111.0	110.0	119.7	134.9	157.7
Pb	291.9	348.6	75.7	--	98.0	179.9	183.0	168.7	198.5	231.0	236.7
Zn	656.2	722.7	360.0	--	393.2	680.9	746.7	695.4	756.7	899.7	700.5
Hg (ng/g dry wgt)	716.42	1286.49	177.53	246.02	315.25	439.54	944.68	651.89	965.6	263.49	650.44
Methyl-Hg (ng/g dry wgt)	--	8.168	6.067	3.11	5.796	8.009	9.91	3.78	9.909	5.825	1.931
% Methyl	--	0.63	3.42	1.26	1.84	1.82	1.05	0.58	1.03	2.21	0.3

Table 9. Polycyclic aromatic hydrocarbon concentrations (ng/g dry).

PAHs (ng/g dry wgt)	1	2	3	4	5	6	7	8	9	10	11	12
Napthalene	14.1	937.2	73.3	--	80.8	1992.8	709.4	578.3	425.0	1078.6	1927.5	1172.5
Azulene	ND	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND
2MeNapthalene	3.6	453.6	16.1	--	35.9	578.2	331.4	293.6	247.6	336.0	659.4	703.4
1MeNapthalene	2.0	172.9	6.0	--	18.1	204.5	126.6	114.0	96.3	133.1	264.0	278.8
Acenapthylene	1.4	97.0	14.0	--	11.8	218.2	101.6	75.3	77.3	91.5	194.8	316.1
Biphenyl	1.8	99.0	6.2	--	29.0	139.7	96.3	88.3	69.8	76.0	151.7	217.1
Acenapthene	3.3	80.3	18.4	--	41.6	92.4	102.3	113.6	77.8	73.0	406.4	197.5
Fluorene	2.0	139.2	8.8	--	16.4	170.8	137.9	128.6	101.3	132.6	305.2	201.1
Phenanthrene	11.4	658.8	51.7	--	85.8	950.1	677.0	725.6	543.6	589.2	1727.0	903.7
Anthracene	3.4	230.9	28.4	--	29.6	448.9	278.3	309.4	229.3	215.4	654.5	401.0
1Mefluorene	0.7	45.1	3.4	--	5.1	60.7	44.9	5.5	48.0	73.8	77.2	64.3
4,5-Methylenephenanthrene	1.6	90.4	19.1	--	11.6	162.2	99.2	108.2	83.6	89.0	259.9	154.8
2Methylphenanthrene	1.1	141.0	8.7	--	14.1	227.4	156.8	213.5	151.3	169.2	291.3	203.5
2Methylanthracene	1.6	59.6	7.4	--	6.8	121.4	84.8	117.9	81.0	57.3	154.9	111.5
1Methylanthracene	1.0	112.4	12.9	--	9.4	198.6	157.6	168.2	138.6	130.8	227.8	192.0
1Methylphenanthrene	1.3	84.7	8.1	--	8.5	110.2	59.4	115.8	72.8	72.5	174.0	120.6
9Methylanthracene	BDL	4.0	0.7	--	0.9	7.7	3.6	5.9	4.2	4.4	10.4	5.2
Fluoranthene	10.9	681.6	175.6	--	95.7	131.1	971.2	1157.2	926.3	803.0	1848.7	842.3
Pyrene	12.1	652.3	177.6	--	79.0	1266.0	933.9	1136.5	930.7	769.3	1742.3	844.1
3,6Dimethylphenanthrene	0.2	23.5	2.0	--	1.7	38.6	34.7	47.3	35.7	33.0	41.8	28.7
9,10,dimethylanthracene	ND	ND	ND	--	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	BDL	135.9	27.5	--	17.3	355.9	226.9	287.6	232.2	176.3	359.5	197.6
Benzo[b]fluorene	0.6	97.2	25.4	--	15.2	344.6	216.2	224.1	189.1	141.7	350.0	190.5
Benz[a]anthracene	3.4	314.8	86.0	--	53.3	959.6	610.6	875.9	643.0	370.1	1072.8	540.7
Chrysene + Triphenylene	4.1	338.7	94.6	--	50.4	891.5	632.6	964.8	717.8	383.8	877.1	515.9
Napthacene	1.0	38.1	16.5	--	8.1	110.9	90.2	173.2	124.0	62.4	154.8	49.9
Benzo[b]fluoranthene	9.1	424.8	109.1	--	62.4	1174.7	982.1	1508.7	1109.7	591.2	1106.3	721.0
Benzo[k]fluoranthene	2.1	324.2	147.0	--	64.8	1027.7	698.3	933.0	757.2	509.9	843.5	BDL
Benzo[e]pyrene	7.1	248.8	86.1	--	40.0	656.1	591.5	869.7	652.1	372.5	655.3	421.5
Benzo[a]pyrene	5.8	391.1	142.4	--	60.6	1258.0	929.3	1410.9	955.7	631.1	1247.9	707.5
Perylene	2.4	343.6	36.0	--	19.8	452.8	297.6	393.1	262.5	296.4	670.5	454.5
Dimethylbenz[a]anthracene	BDL	7.1	1.6	--	1.4	20.7	22.1	28.9	27.7	12.0	17.9	9.8
3Methylcholanthrene	BDL	BDL	0.6	--	BDL	7.5	12.9	18.4	16.8	6.0	8.3	3.1
Indeno[1,2,3-c,d]pyrene	2.2	353.0	118.3	--	45.7	1415.7	766.2	1406.8	1171.3	651.0	1031.2	554.8
Benzo[g,h,i]perylene	4.2	268.0	79.6	--	30.7	761.3	658.0	1114.7	809.7	426.6	826.4	481.1
Anthanthrene	BDL	50.9	18.2	--	3.9	263.9	150.8	298.5	181.4	103.5	286.6	128.0
Dibenz[a,h+ac]anthracene	BDL	30.6	6.3	--	3.3	108.7	47.5	134.5	98.8	57.6	123.2	65.5
Coronene	BDL	48.6	5.4	--	7.4	186.8	195.1	233.4	161.8	78.2	187.5	143.9
Retene	BDL	42.2	6.3	--	14.5	44.1	35.3	50.6	40.8	119.0	156.2	56.0
Total PAHs (ng/g dry)	***115.6***	***8221.3***	***1645.1***	--	***1080.6***	***17160.1***	***12270.4***	***16429.3***	***12491.8***	***9916.9***	***21093.6***	***12199.7***

Table 9. Polycyclic aromatic hydrocarbon concentrations (ng/g dry).

PAHs (ng/g dry wgt)	13	14	15J	15	16	17	18	19	20	21	22	23
Napthalene	1374.0	1015.6	1003.0	582.1	970.7	369.9	883.8	986.2	378.9	563.9	612.2	1358.1
Azulene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2MeNapthalene	482.5	489.9	614.7	256.1	416.1	134.9	418.4	679.1	181.1	260.3	308.1	480.4
1MeNapthalene	194.6	229.0	272.2	100.9	159.1	61.9	180.2	298.5	75.6	109.1	142.4	188.7
Acenapthylene	137.8	213.7	387.9	79.0	215.0	55.0	145.3	673.3	168.4	98.9	234.6	129.3
Biphenyl	111.0	137.8	272.5	62.3	106.2	72.4	100.8	445.9	72.0	66.0	121.9	109.6
Acenapthene	124.1	271.0	322.1	63.7	93.5	69.3	101.1	391.2	40.1	55.0	134.9	85.6
Fluorene	154.5	141.0	195.3	131.7	188.6	66.4	127.8	168.0	66.1	107.9	90.2	132.8
Phenanthrene	559.1	898.6	1156.1	579.2	1285.2	385.2	688.9	1145.8	384.2	450.8	698.6	672.9
Anthracene	351.1	385.3	478.0	249.6	607.3	161.1	290.5	480.7	269.3	204.2	289.7	302.7
1Mefluorene	51.1	60.7	85.5	40.9	70.8	42.1	49.1	89.8	30.8	38.8	46.3	52.3
4,5-Methylenephenanthrene	136.3	160.4	186.2	101.3	302.7	63.5	120.8	225.8	94.0	88.4	125.6	113.7
2Methylphenanthrene	188.1	204.6	258.0	131.1	351.7	81.5	171.6	295.7	120.1	100.6	187.9	163.8
2Methylanthracene	94.0	101.8	107.1	58.8	155.5	38.7	76.5	129.2	71.9	43.0	94.4	85.4
1Methylanthracene	158.4	174.6	164.2	117.2	284.8	65.8	131.8	228.2	118.2	78.9	140.4	141.7
1Methylphenanthrene	136.9	167.9	198.7	81.5	221.0	61.7	120.5	191.7	94.6	81.2	120.5	90.3
9Methylanthracene	6.6	4.6	6.9	3.4	22.9	4.1	6.1	15.9	15.5	6.7	5.5	3.9
Fluoranthene	1041.5	1134.0	952.1	570.8	2050.6	319.4	1017.9	1306.4	772.3	843.1	669.4	989.6
Pyrene	1002.8	1125.2	861.5	539.6	1749.1	332.6	1007.9	1231.8	722.8	702.9	627.7	1045.0
3,6Dimethylphenanthrene	30.3	28.1	26.4	16.7	37.6	10.0	28.8	31.6	18.4	22.3	18.4	33.1
9,10,dimethylanthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	208.3	214.1	178.8	111.2	355.8	68.1	212.6	261.0	161.0	139.5	158.7	230.4
Benzo[b]fluorene	183.4	190.0	139.1	107.0	307.9	51.8	179.3	193.4	125.4	115.8	129.4	209.2
Benz[a]anthracene	540.7	553.9	476.3	302.5	1035.1	180.2	640.0	630.6	407.1	328.2	406.4	619.4
Chrysene + Triphenylene	583.0	603.6	540.6	326.5	1212.0	198.6	643.9	711.8	496.9	438.3	388.3	620.0
Napthacene	71.4	79.1	78.8	33.6	170.7	31.4	78.1	88.3	68.8	49.2	59.3	71.3
Benzo[b]fluoranthene	744.8	749.0	690.0	444.3	1533.2	190.1	763.1	1136.4	741.4	569.5	497.2	944.4
Benzo[k]fluoranthene	661.9	614.6	571.4	308.5	1011.4	191.1	588.5	894.6	535.9	439.8	387.0	658.3
Benzo[e]pyrene	462.9	466.5	401.4	253.8	767.5	131.5	467.5	637.9	404.1	341.5	275.3	536.8
Benzo[a]pyrene	762.5	738.6	624.9	378.6	1141.9	214.8	706.5	881.1	512.8	472.5	472.1	861.3
Perylene	459.8	370.7	307.4	192.3	421.7	126.0	340.8	385.1	182.3	206.2	233.6	387.6
Dimethylbenz[a]anthracene	10.7	14.7	9.1	6.5	16.9	5.7	12.0	18.1	12.0	6.0	8.0	13.9
3Methylcholanthrene	5.9	3.2	BDL	1.4	11.0	BDL	5.9	BDL	7.7	4.0	0.2	4.7
Indeno[1,2,3-c,d]pyrene	640.8	627.1	842.9	368.5	1324.5	261.3	669.6	974.3	648.3	467.7	443.3	773.6
Benzo[g,h,i]perylene	502.1	489.1	464.4	281.4	891.8	149.0	503.9	580.4	407.5	363.8	293.1	576.9
Anthanthrene	118.1	103.0	84.3	57.5	165.9	26.5	100.5	67.2	40.7	60.7	65.8	148.9
Dibenz[a,h+ac]anthracene	51.8	48.3	44.1	36.5	102.4	14.0	71.6	66.2	35.2	34.6	40.3	74.2
Coronene	112.0	78.0	58.2	20.1	162.4	10.8	101.9	41.4	73.8	77.9	47.1	139.9
Retene	59.3	114.5	69.1	42.5	64.8	29.5	59.2	87.5	32.5	37.6	40.5	64.4
Total PAHs (ng/g dry)	***12514.0***	***13001.8***	***13129.2***	***7038.6***	***19985.0***	***4276.0***	***11812.4***	***16670.0***	***8587.4***	***8074.9***	***8614.1***	***13114.2***

Table 9. Polycyclic aromatic hydrocarbon concentrations (ng/g dry).

PAHs (ng/g dry wgt)	24	25	26	27	28	29	30	31	32	33	34	35
Napthalene	7726.9	1150.0	434.9	113.8	--	1402.2	1921.8	1119.8	1089.1	726.0	390.8	825.3
Azulene	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND	ND
2MeNapthalene	944.9	384.4	100.7	32.1	--	438.6	408.6	474.6	381.3	278.3	187.9	434.9
1MeNapthalene	360.0	152.1	42.7	13.4	--	176.0	150.6	215.2	148.9	122.4	91.4	194.3
Acenapthylene	453.7	101.8	77.8	14.6	--	264.4	235.3	287.0	357.5	211.3	185.3	171.0
Biphenyl	377.2	82.8	34.0	10.3	--	142.8	138.1	154.8	132.2	101.3	65.4	267.6
Acenapthene	257.8	78.9	21.3	6.4	--	76.7	79.3	98.1	90.3	75.0	76.8	58.8
Fluorene	388.9	121.4	54.2	9.2	--	128.9	138.5	111.8	96.2	82.8	80.7	53.1
Phenanthrene	2042.3	122.1	324.8	52.3	--	619.6	673.3	560.0	658.2	491.6	544.5	406.8
Anthracene	1118.7	667.9	240.5	23.1	--	325.7	358.6	253.3	355.5	182.6	204.5	146.8
1Mefluorene	146.0	45.9	22.4	4.3	--	93.9	76.8	68.6	71.6	45.6	48.5	32.0
4,5-Methylenephenanthrene	360.1	108.4	112.1	8.5	--	221.6	147.3	177.9	215.8	122.4	135.9	82.0
2Methylphenanthrene	420.4	161.1	93.7	11.0	--	153.5	159.3	139.9	155.9	99.9	111.5	86.2
2Methylanthracene	255.2	80.9	71.0	6.2	--	90.9	91.8	71.2	90.6	55.1	61.4	40.8
1Methylanthracene	288.3	127.6	87.4	10.5	--	153.9	135.6	114.0	166.1	79.0	106.5	63.6
1Methylphenanthrene	320.7	93.6	59.1	9.4	--	79.8	102.6	110.7	74.6	84.2	92.6	46.0
9Methylanthracene	14.5	3.0	2.9	0.3	--	43.4	0.0	3.3	34.6	3.3	4.3	6.0
Fluoranthene	2484.1	997.3	1347.2	84.4	--	2333.4	1527.9	2158.8	1886.0	1546.3	1128.1	1007.6
Pyrene	2309.2	1040.7	1091.4	77.6	--	2125.6	1327.0	1843.1	1603.9	1360.8	918.6	873.5
3,6Dimethylphenanthrene	66.3	36.8	17.8	2.4	--	78.9	51.5	57.7	42.2	37.4	25.8	23.8
9,10,dimethylanthracene	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	584.2	218.4	295.2	16.7	--	387.8	328.8	312.8	320.7	230.7	150.4	155.2
Benzo[b]fluorene	636.6	179.0	330.9	14.8	--	391.7	334.9	326.1	348.1	235.7	149.3	143.6
Benz[a]anthracene	1595.1	613.3	827.6	45.7	--	907.5	948.6	828.1	813.3	582.6	441.4	429.4
Chrysene + Triphenylene	1506.5	617.4	667.3	48.8	--	939.4	970.9	941.7	881.7	732.3	487.1	540.5
Napthacene	222.4	68.8	125.3	6.6	--	103.9	129.6	141.1	131.1	108.0	61.4	82.0
Benzo[b]fluoranthene	2557.8	857.0	754.8	66.2	--	1584.5	1604.6	1345.0	1541.6	1119.1	791.1	694.1
Benzo[k]fluoranthene	1808.0	632.7	674.1	52.1	--	1311.3	1040.8	1138.7	1005.2	779.0	56.8	533.3
Benzo[e]pyrene	1302.1	504.0	418.2	39.6	--	945.9	815.1	840.5	757.4	605.2	431.6	409.1
Benzo[a]pyrene	2569.9	769.5	821.5	59.3	--	1424.9	1283.7	1256.5	1195.0	855.1	609.0	551.1
Perylene	845.3	384.1	214.5	26.0	--	440.3	443.9	397.4	361.7	252.3	172.1	175.7
Dimethylbenz[a]anthracene	28.3	14.2	12.2	0.9	--	41.6	31.9	18.5	93.4	18.8	14.3	9.5
3Methylcholanthrene	13.1	5.9	5.6	0.4	--	17.6	12.6	15.6	21.7	10.8	7.7	7.8
Indeno[1,2,3-c,d]pyrene	3458.8	735.5	838.8	63.8	--	1366.8	1312.2	1456.9	1698.2	1085.8	613.5	674.6
Benzo[g,h,i]perylene	1741.4	547.4	438.4	45.7	--	1125.9	1090.5	1057.8	1032.3	768.5	496.8	465.1
Anthanthrene	734.7	110.8	148.9	7.7	--	277.7	299.9	245.7	281.1	156.7	90.8	83.4
Dibenz[a,h+ac]anthracene	237.0	78.0	57.8	5.9	--	174.6	167.1	127.2	29.6	97.8	65.4	51.3
Coronene	287.8	126.8	55.6	6.8	--	315.7	253.5	242.2	247.1	165.4	126.4	101.4
Retene	68.7	72.5	21.3	2.4	--	29.0	32.7	33.0	74.4	28.8	14.0	24.4
Total PAHs (ng/g dry)	*40532.9*	*12092.0*	*10943.9*	*999.0*	--	*20736.1*	*18825.1*	*18744.7*	*18484.1*	*13537.7*	*9239.7*	*9951.6*

Table 9. Polycyclic aromatic hydrocarbon concentrations (ng/g dry).

PAHs (ng/g dry wgt)	36	37	38	39	40	41	42	43	44	45	46	47
Napthalene	30.8	330.9	165.7	583.3	570.5	510.1	491.3	845.8	564.0	741.6	554.0	260.9
Azulene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2MeNapthalene	33.4	141.8	199.0	375.6	284.3	239.1	405.2	437.4	345.8	522.3	1052.3	182.4
1MeNapthalene	16.8	59.0	86.1	159.9	120.5	95.4	180.0	182.1	138.3	245.6	461.3	82.2
Acenapthylene	32.2	66.3	88.3	100.8	118.7	76.5	236.5	179.0	81.2	91.1	568.6	114.6
Biphenyl	12.2	39.5	47.3	85.8	72.0	54.3	155.3	125.2	76.2	100.4	337.0	53.2
Acenapthene	6.7	51.7	68.0	84.3	64.3	53.5	128.0	134.4	58.2	113.4	548.9	63.8
Fluorene	3.7	60.3	73.0	99.2	83.9	88.1	85.4	202.0	128.9	165.5	115.1	68.8
Phenanthrene	23.5	309.4	460.2	573.1	576.8	412.1	530.0	1053.7	583.0	797.5	672.4	525.5
Anthracene	9.7	139.9	154.0	214.6	213.5	149.4	211.3	445.5	231.3	289.9	221.2	198.8
1Mefluorene	2.5	31.4	43.4	48.9	43.3	33.8	49.3	90.4	67.0	90.1	61.5	42.3
4,5-Methylenephenanthrene	3.5	72.2	106.2	99.9	100.9	68.5	91.1	172.0	107.3	127.2	104.7	88.6
2Methylphenanthrene	6.5	72.2	96.9	146.5	163.3	92.6	151.0	268.9	146.4	228.6	191.8	133.4
2Methylanthracene	2.7	40.9	56.0	73.1	66.7	41.5	66.7	123.5	77.8	77.4	69.5	61.4
1Methylanthracene	5.0	69.5	103.6	132.3	121.9	106.5	112.8	171.0	14.8	176.0	161.1	95.8
1Methylphenanthrene	4.4	52.4	83.8	96.0	98.9	35.6	90.7	202.2	112.2	117.7	79.3	72.8
9Methylanthracene	0.5	2.6	4.7	5.3	4.9	3.4	5.0	12.2	4.5	5.2	2.6	6.2
Fluoranthene	20.0	373.6	920.7	783.8	665.5	563.8	598.4	927.3	740.6	1237.2	1204.8	862.0
Pyrene	20.6	382.5	845.3	741.0	657.3	552.8	617.4	910.5	717.3	1118.0	1055.8	785.7
3,6Dimethylphenanthrene	1.0	17.0	50.8	35.2	24.8	23.8	32.5	37.0	41.4	71.1	60.5	28.9
9,10,dimethylanthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	4.7	76.8	167.1	173.6	141.2	109.4	136.0	208.7	152.8	251.6	214.1	162.2
Benzo[b]fluorene	3.8	74.6	153.4	137.3	100.0	93.3	93.9	161.4	138.7	187.9	153.5	135.2
Benz[a]anthracene	12.2	172.3	381.2	386.6	329.9	266.4	323.9	504.7	347.5	498.0	484.0	371.6
Chrysene + Triphenylene	14.6	175.8	452.6	384.8	355.4	300.1	359.6	546.0	347.2	623.3	608.4	461.5
Napthacene	1.9	24.5	63.2	71.7	51.3	33.1	60.4	97.2	36.1	81.9	88.0	61.2
Benzo[b]fluoranthene	20.2	201.1	561.4	565.7	479.4	367.1	467.1	675.5	545.4	705.3	673.9	576.6
Benzo[k]fluoranthene	14.0	159.0	357.5	416.7	346.7	288.6	339.3	497.3	382.0	522.2	498.8	447.7
Benzo[e]pyrene	12.0	128.5	323.9	303.6	266.5	227.6	266.9	389.7	323.5	419.3	399.0	365.8
Benzo[a]pyrene	16.1	212.6	425.8	476.3	439.7	355.8	404.0	621.1	459.7	598.5	568.2	478.7
Perylene	9.9	231.7	164.7	349.6	243.8	292.3	262.6	321.4	312.8	329.2	296.7	181.0
Dimethylbenz[a]anthracene	BDL	5.2	14.4	12.7	7.5	7.3	9.6	15.5	14.4	20.2	19.3	21.5
3Methylcholanthrene	BDL	1.6	7.1	9.2	5.5	3.7	7.8	10.0	7.9	9.6	8.2	15.6
Indeno[1,2,3-c,d]pyrene	18.4	175.8	419.7	588.0	450.9	305.2	433.1	839.7	404.3	532.0	509.7	523.5
Benzo[g,h,i]perylene	13.6	141.6	333.1	335.3	317.0	250.5	308.1	459.2	346.1	431.5	403.6	356.1
Anthanthrene	1.7	36.6	49.8	77.4	66.8	45.8	60.4	102.6	65.2	76.2	64.2	55.3
Dibenz[a,h+ac]anthracene	1.9	17.9	42.7	36.7	37.3	29.4	38.7	57.3	55.4	56.5	51.4	42.6
Coronene	1.6	35.0	76.8	65.3	54.5	66.9	53.3	61.5	83.3	87.2	77.7	51.0
Retene	1.0	31.6	65.7	39.5	42.5	28.6	40.8	95.8	48.2	86.4	67.5	51.9
Total PAHs (ng/g dry)	*383.2*	*4215.0*	*7713.0*	*8868.7*	*7787.7*	*6272.0*	*7903.8*	*12184.7*	*8306.8*	*11832.4*	*12708.8*	*8086.3*

Table 9. Polycyclic aromatic hydrocarbon concentrations (ng/g dry).

PAHs (ng/g dry wgt)	48	49	50	51	52	53	54	55	56	57	58	59
Napthalene	369.2	217.4	101.9	115.4	60.4	245.8	122.5	413.0	270.8	279.7	133.8	134.4
Azulene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2MeNapthalene	246.2	224.4	66.7	70.8	47.6	149.2	123.6	317.1	209.4	163.2	193.8	94.9
1MeNapthalene	94.5	100.3	30.0	32.3	23.1	63.9	64.8	144.2	102.8	72.6	104.1	47.8
Acenapthylene	123.5	121.6	28.5	49.7	39.1	63.3	18.7	185.9	255.4	61.6	221.8	72.0
Biphenyl	84.3	95.5	21.4	25.4	14.0	53.8	23.4	89.4	111.8	33.6	210.8	45.5
Acenapthene	72.7	89.9	22.2	23.0	17.5	45.4	77.0	107.6	185.7	56.8	163.8	40.3
Fluorene	106.2	79.8	35.4	36.1	24.0	72.6	43.3	161.5	69.8	66.7	21.2	38.5
Phenanthrene	108.5	487.3	362.9	251.9	244.9	427.1	357.6	1028.4	452.7	417.8	194.2	461.8
Anthracene	271.0	183.7	94.8	81.3	60.8	195.9	105.4	385.5	174.6	169.7	61.9	139.5
1Mefluorene	68.4	49.7	17.7	19.6	11.5	39.7	21.8	61.0	25.9	31.0	13.6	19.8
4,5-Methylenephenanthrene	165.4	99.5	69.6	49.8	43.8	74.3	11.8	132.7	81.3	88.3	37.8	84.0
2Methylphenanthrene	147.8	112.5	60.4	50.7	40.3	107.4	94.7	206.9	88.5	105.4	47.2	117.8
2Methylanthracene	98.3	45.8	14.5	18.1	12.3	58.3	37.0	102.3	46.1	56.8	24.1	42.7
1Methylanthracene	142.1	73.5	50.6	36.7	38.1	70.7	88.7	167.7	63.7	95.9	42.2	80.4
1Methylphenanthrene	105.5	91.5	41.6	41.6	23.8	87.6	53.4	123.9	66.2	66.5	33.0	69.5
9Methylanthracene	12.5	4.5	2.7	2.6	2.5	8.0	4.1	6.4	4.0	6.8	3.5	4.8
Fluoranthene	1770.9	827.4	1169.0	701.1	777.7	500.6	354.7	698.2	921.5	584.6	344.3	789.8
Pyrene	1795.5	777.1	983.5	617.4	657.1	531.0	395.4	690.4	794.3	701.9	388.8	724.3
3,6Dimethylphenanthrene	63.4	21.6	16.9	14.0	10.6	22.2	24.3	26.9	22.8	22.2	12.4	16.0
9,10,dimethylanthracene	20.1	6.0	ND	ND	ND	3.9	ND	11.5	22.5	ND	ND	ND
Benzo[a]fluorene	374.2	125.6	145.9	90.6	89.7	114.8	87.3	142.2	150.7	134.5	75.8	127.4
Benzo[b]fluorene	372.2	101.1	122.4	73.0	62.0	69.1	73.3	116.3	126.7	96.4	51.1	69.4
Benz[a]anthracene	828.0	296.6	352.1	224.8	227.6	250.8	152.9	328.7	344.7	305.2	157.2	311.1
Chrysene + Triphenylene	958.6	396.9	510.1	354.2	371.0	340.1	143.2	420.4	455.3	341.1	188.3	415.6
Napthacene	222.6	67.1	85.2	43.9	41.7	47.3	38.8	60.9	73.4	51.8	36.7	65.5
Benzo[b]fluoranthene	1305.2	680.5	919.2	483.6	567.7	349.9	115.6	520.5	513.6	446.6	248.8	561.5
Benzo[k]fluoranthene	922.0	486.3	614.2	345.6	419.5	260.4	101.8	314.7	376.8	352.5	192.8	451.7
Benzo[e]pyrene	684.3	361.1	469.0	281.0	330.6	231.9	88.8	288.7	300.1	291.9	152.0	331.0
Benzo[a]pyrene	896.3	445.1	596.2	343.6	390.0	331.0	136.5	427.7	451.9	450.5	199.4	466.8
Perylene	404.9	171.1	145.2	97.9	104.4	270.9	49.1	245.0	191.0	184.7	101.9	155.4
Dimethylbenz[a]anthracene	24.1	8.2	8.8	5.3	7.0	15.6	6.3	10.2	9.0	12.2	6.8	10.3
3Methylcholanthrene	14.4	11.7	10.8	4.1	4.5	12.7	5.2	7.5	7.8	6.2	3.6	7.1
Indeno[1,2,3-c,d]pyrene	1142.1	804.9	1001.3	452.8	483.6	417.4	110.3	386.4	428.8	356.2	268.1	565.9
Benzo[g,h,i]perylene	658.7	434.0	580.8	329.2	396.9	258.5	81.7	338.7	317.4	309.9	164.1	400.5
Anthanthrene	100.0	53.0	84.2	39.4	47.7	43.4	17.5	59.7	57.7	65.5	28.6	51.3
Dibenz[a,h+ac]anthracene	70.0	46.0	54.3	36.6	38.1	28.0	9.9	51.3	41.9	44.0	16.6	44.0
Coronene	105.8	70.2	152.9	79.1	98.1	37.7	11.7	66.3	64.4	73.0	35.7	74.9
Retene	76.0	28.2	19.8	14.4	30.9	51.0	42.8	37.2	30.3	37.7	12.9	22.9
Total PAHs (ng/g dry)	*15025.5*	*8296.4*	*9062.8*	*5536.5*	*5860.3*	*5950.9*	*3294.9*	*8882.9*	*7911.3*	*6640.6*	*4192.7*	*7156.1*

Table 9. Polycyclic aromatic hydrocarbon concentrations (ng/g dry).

PAHs (ng/g dry wgt)	60	61	62	63	64	65	66	67	68	69	70	71
Napthalene	514.6	--	124.5	150.1	213.8	240.8	--	276.8	883.5	530.0	409.4	411.0
Azulene	ND	--	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
2MeNapthalene	263.2	--	89.1	118.6	130.0	152.0	--	176.4	1506.9	481.0	366.6	465.9
1MeNapthalene	112.1	--	43.0	52.8	57.1	66.7	--	76.9	695.6	143.7	159.0	191.5
Acenapthylene	51.6	--	48.3	47.3	82.8	176.0	--	160.3	1787.8	177.2	255.0	320.3
Biphenyl	65.6	--	35.3	25.4	32.4	44.3	--	56.3	788.7	115.1	94.2	120.6
Acenapthene	47.4	--	30.7	34.4	37.7	97.5	--	79.9	3742.0	164.2	258.1	252.4
Fluorene	56.6	--	34.1	53.2	51.5	72.5	--	64.9	133.7	248.4	130.5	181.5
Phenanthrene	517.1	--	289.0	437.2	442.6	963.4	--	561.9	1023.8	1166.0	1104.3	1099.9
Anthracene	114.2	--	83.7	123.0	137.8	224.5	--	208.5	506.4	1577.6	422.2	539.6
1Mefluorene	25.5	--	15.5	24.1	23.5	35.2	--	35.5	59.8	106.4	94.8	178.3
4,5-Methylenephenanthrene	69.4	--	44.9	71.6	77.1	158.4	--	91.4	200.7	396.5	235.4	329.8
2Methylphenanthrene	107.3	--	60.9	95.6	97.4	168.8	--	134.1	181.7	284.1	287.2	302.1
2Methylanthracene	34.2	--	20.6	34.5	39.6	59.0	--	112.8	134.0	273.5	173.2	238.9
1Methylanthracene	74.8	--	44.6	79.0	79.6	140.4	--	95.3	176.4	333.5	256.8	294.0
1Methylphenanthrene	52.5	--	39.5	59.7	57.9	87.7	--	89.3	122.5	161.4	164.9	247.3
9Methylanthracene	3.3	--	2.6	3.2	6.7	5.5	--	8.2	9.6	29.2	20.7	24.7
Fluoranthene	889.6	--	568.3	701.0	1008.8	2030.4	--	1126.0	1660.3	2983.1	1950.7	2937.9
Pyrene	873.1	--	533.1	645.1	955.7	1851.2	--	1077.8	1882.8	2941.7	2120.0	2902.1
3,6Dimethylphenanthrene	20.1	--	14.3	17.6	24.0	48.5	--	55.4	81.1	194.7	114.9	244.8
9,10,dimethylanthracene	ND	--	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
Benzo[a]fluorene	147.4	--	89.1	103.6	178.6	304.1	--	261.9	304.9	650.7	443.7	600.6
Benzo[b]fluorene	94.7	--	64.8	71.6	114.8	207.9	--	209.4	257.2	703.9	329.8	529.2
Benz[a]anthracene	413.6	--	237.9	272.8	469.6	844.4	--	617.2	739.8	1664.5	1039.3	1295.7
Chrysene + Triphenylene	521.1	--	340.0	369.3	579.9	1035.0	--	806.1	775.1	1214.8	1186.2	1319.7
Napthacene	79.0	--	49.1	43.3	83.2	149.0	--	138.0	187.8	353.2	231.3	241.6
Benzo[b]fluoranthene	609.2	--	365.3	478.0	682.8	1301.1	--	799.1	1103.5	2131.6	1775.6	1716.0
Benzo[k]fluoranthene	473.6	--	273.7	350.0	539.9	1049.4	--	558.0	742.8	1175.3	970.6	1245.7
Benzo[e]pyrene	373.7	--	244.1	290.3	446.6	836.4	--	479.4	637.8	1037.0	898.1	1008.5
Benzo[a]pyrene	538.3	--	318.0	398.6	641.3	1176.7	--	725.4	1026.5	1737.7	1277.3	1475.8
Perylene	197.5	--	139.4	151.9	189.5	262.1	--	194.9	383.6	482.8	398.4	492.0
Dimethylbenz[a]anthracene	10.2	--	7.1	8.2	13.4	23.0	--	24.2	34.9	67.3	56.1	75.5
3Methylcholanthrene	9.7	--	BDL	5.9	10.1	21.3	--	13.1	24.6	57.0	42.5	31.5
Indeno[1,2,3-c,d]pyrene	628.7	--	372.2	357.9	735.0	1428.8	--	578.5	1316.2	2043.5	1865.9	1397.8
Benzo[g,h,i]perylene	439.8	--	296.0	314.5	527.1	999.3	--	486.6	824.0	1311.2	1385.7	1152.1
Anthanthrene	68.9	--	41.6	45.0	92.9	153.3	--	82.9	208.8	347.1	218.5	199.3
Dibenz[a,h+ac]anthracene	50.1	--	30.5	37.3	58.4	119.7	--	69.8	84.6	242.7	204.7	41.2
Coronene	90.4	--	64.3	0.0	118.7	237.2	--	98.3	170.2	308.7	460.2	246.0
Retene	21.5	--	17.6	30.2	369.8	502.6	--	66.5	164.9	306.4	204.4	545.0
Total PAHs (ng/g dry)	*8659.6*	--	*5072.8*	*6101.6*	*9407.7*	*17274.2*	--	*10697.0*	*24564.3*	*28142.6*	*21606.4*	*24895.8*

Table 9. Polycyclic aromatic hydrocarbon concentrations (ng/g dry).

PAHs (ng/g dry wgt)	72	73	74	74J	75	76	77	78	79	80	81
Napthalene	222.6	694.5	260.5	224.8	175.9	217.7	341.7	184.8	181.8	159.7	75.0
Azulene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2MeNapthalene	215.5	498.3	217.9	187.1	167.9	184.1	287.6	253.1	192.8	151.3	70.4
1MeNapthalene	113.7	194.0	78.8	69.3	63.2	66.0	107.8	108.7	66.2	56.3	32.2
Acenapthylene	179.1	200.6	56.0	47.7	57.7	36.6	96.6	280.0	80.0	72.1	71.3
Biphenyl	67.6	114.5	42.7	38.1	53.5	44.8	81.9	104.0	61.1	44.8	19.3
Acenapthene	265.1	211.4	27.8	22.7	32.6	24.8	51.2	105.3	39.6	33.9	37.4
Fluorene	346.9	272.3	61.4	68.3	60.3	64.5	67.7	53.6	60.9	54.8	46.7
Phenanthrene	4398.8	2152.9	338.9	357.5	294.8	335.1	370.5	397.3	308.1	316.0	625.6
Anthracene	732.2	710.1	105.8	113.5	105.8	95.8	121.8	117.1	85.7	88.1	138.5
1Mefluorene	221.0	119.1	23.1	26.5	25.2	27.5	28.7	27.7	26.1	26.1	19.5
4,5-Methylenephenanthrene	571.6	481.4	47.1	50.2	50.7	63.1	67.0	82.4	60.6	78.3	113.9
2Methylphenanthrene	916.3	430.9	84.6	85.5	67.0	76.8	85.0	98.8	70.0	70.4	128.2
2Methylanthracene	213.5	232.5	31.2	31.9	27.8	21.0	31.0	39.3	26.6	27.3	37.4
1Methylanthracene	493.4	402.0	72.4	69.2	53.5	68.6	65.5	73.4	46.3	61.9	97.9
1Methylphenanthrene	628.2	216.6	49.4	69.5	47.1	52.3	47.5	62.2	52.7	42.3	69.7
9Methylanthracene	12.5	21.7	2.1	2.2	1.8	2.4	3.1	3.7	2.8	2.8	4.3
Fluoranthene	5698.9	4526.5	339.8	329.6	257.1	576.1	599.0	595.2	602.9	846.2	1658.6
Pyrene	4798.2	4323.1	332.1	320.8	254.2	562.9	581.0	570.9	593.5	857.9	1548.1
3,6Dimethylphenanthrene	186.6	220.0	14.0	12.7	10.5	20.2	20.0	16.8	20.1	29.5	40.0
9,10,dimethylanthracene	46.2	98.1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo[a]fluorene	871.4	837.1	67.0	60.6	51.1	113.7	107.0	109.0	105.3	145.6	243.3
Benzo[b]fluorene	628.6	760.7	42.8	41.8	33.9	82.1	79.1	72.3	80.5	103.5	162.7
Benz[a]anthracene	2576.3	2015.1	133.4	127.8	111.5	265.2	269.4	262.1	261.3	356.8	635.3
Chrysene + Triphenylene	3148.9	2021.7	175.8	177.5	132.0	296.4	326.3	329.3	369.1	485.7	885.2
Napthacene	488.9	407.8	18.1	17.7	19.5	45.5	43.6	49.6	43.3	66.2	105.4
Benzo[b]fluoranthene	3690.2	2962.6	226.6	195.9	180.6	521.4	438.4	443.7	394.0	640.1	1030.7
Benzo[k]fluoranthene	2174.7	2096.4	194.0	166.3	129.9	284.1	286.7	319.6	330.1	403.1	789.1
Benzo[e]pyrene	1857.1	1716.9	145.1	124.9	103.0	239.9	246.7	241.4	251.4	366.1	615.8
Benzo[a]pyrene	2766.2	2479.3	185.2	166.9	122.2	312.1	305.1	318.2	300.2	446.9	863.4
Perylene	563.9	706.2	181.1	171.5	126.9	186.9	179.9	149.8	162.3	178.0	199.7
Dimethylbenz[a]anthracene	65.0	92.9	4.4	4.1	4.4	6.7	8.7	7.0	8.5	9.5	20.2
3Methylcholanthrene	68.9	57.5	2.8	2.3	2.8	6.5	6.7	4.6	6.2	11.8	126.5
Indeno[1,2,3-c,d]pyrene	3999.1	2601.9	223.9	173.0	244.4	519.0	399.1	412.0	390.3	593.6	873.9
Benzo[g,h,i]perylene	2477.6	1976.6	155.1	138.1	136.9	304.7	283.9	293.9	301.0	430.1	725.8
Anthanthrene	465.0	369.8	15.0	16.0	17.4	44.1	34.9	31.0	36.7	51.4	107.6
Dibenz[a,h+ac]anthracene	303.2	261.4	18.7	16.2	17.4	34.0	30.5	30.0	34.8	48.5	83.6
Coronene	579.4	443.0	7.2	37.4	34.3	76.2	59.6	59.2	80.8	98.5	193.4
Retene	206.1	572.8	17.2	15.8	19.3	28.4	29.0	25.6	28.5	54.3	45.3
Total PAHs (ng/g dry)	*47258.5*	*38500.1*	*3998.9*	*3780.8*	*3294.3*	*5907.6*	*6189.1*	*6332.5*	*5762.4*	*7509.2*	*12541.0*

Table 10. Polychlorinated biphenyl concentrations (ng/g dry wgt).

PCBs (ng/g dry wgt)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15J	15	16	17	18	19	20
1	–	1.807	BDL	BDL	–	BDL	BDL	3.053	BDL	BDL	BDL	BDL	1.043	0.723	BDL	0.772	1.004	2.102	0.771	0.802	BDL
4,10	–	BDL	0.402	BDL	–	BDL	BDL	BDL	0.116	0.779	0.189	0.114	0.390	0.328	0.169	0.221	0.266	0.117	0.350	BDL	0.178
7,9	–	0.049	0.028	BDL	–	0.028	0.029	0.029	0.055	0.902	0.049	0.022	0.033	0.043	0.026	0.032	0.046	0.024	0.040	0.023	BDL
6	–	BDL	0.033	BDL	–	0.087	0.059	0.053	0.086	0.087	0.086	BDL	0.037	BDL	0.042	0.102	0.061	BDL	0.110	0.034	0.021
8,5	–	0.662	10.606	0.401	–	0.708	0.736	0.780	1.425	1.082	0.953	0.699	1.166	1.035	0.648	0.946	0.834	0.368	0.901	0.232	0.517
19	–	BDL	0.031	BDL	–	BDL	BDL	BDL	BDL	0.410	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12,13	–	BDL	BDL	BDL	–	BDL	0.047	BDL	0.128	0.073	BDL	BDL	BDL	0.035	BDL	BDL	BDL	BDL	BDL	0.025	BDL
18	–	0.377	BDL	0.144	–	0.504	0.448	0.424	0.918	3.526	0.484	0.379	0.672	0.511	0.312	0.516	0.598	0.258	0.526	0.142	0.330
17	–	BDL	0.047	0.107	–	0.421	0.379	0.372	0.679	3.034	0.376	0.330	0.500	0.381	0.244	0.517	0.655	0.125	0.329	0.117	0.181
24	–	0.055	0.055	0.027	–	0.048	0.039	0.031	0.028	0.061	0.064	0.047	0.128	0.113	0.052	0.032	0.053	BDL	0.041	BDL	0.027
16,32	–	0.282	0.035	0.155	–	0.493	0.415	0.376	0.733	5.371	0.524	0.422	0.632	0.606	0.330	0.606	0.509	0.146	0.476	0.122	0.254
29	–	BDL	BDL	BDL	–	BDL	BDL	0.361	0.145	BDL	BDL	BDL	0.217	0.172	BDL	BDL	BDL	BDL	BDL	BDL	0.147
26	–	0.285	0.059	0.054	–	0.342	0.267	0.318	0.481	0.943	0.269	0.253	0.279	0.344	0.188	0.476	0.356	0.130	0.328	0.086	1.131
25	–	0.229	BDL	0.185	–	0.250	0.312	0.356	1.128	0.410	0.276	0.227	0.295	0.305	0.165	0.485	0.448	0.115	0.197	0.104	1.810
31,28	–	2.221	0.271	1.611	–	3.705	4.411	5.268	13.969	15.580	3.633	3.226	4.715	4.481	2.629	10.352	5.827	2.057	4.142	1.550	9.304
33,21,53	–	0.505	BDL	0.187	–	0.909	1.273	1.021	2.315	8.532	1.071	0.890	1.429	1.290	0.703	1.311	1.515	0.424	1.086	0.343	2.750
51	–	BDL	BDL	BDL	–	BDL	BDL	BDL	0.112	0.275	BDL	BDL	0.090	0.077	BDL	0.082	0.069	BDL	0.066	BDL	0.198
22	–	0.392	BDL	0.236	–	0.536	0.579	0.518	1.446	4.510	0.485	0.514	0.788	0.694	0.467	0.934	0.972	0.258	0.677	0.212	1.382
45	–	0.080	0.023	BDL	–	0.163	0.420	0.429	0.511	0.036	0.146	0.178	0.194	0.153	0.119	0.214	0.204	0.059	0.124	0.044	0.409
46	–	0.079	BDL	0.155	–	0.213	0.304	0.410	0.609	0.089	0.089	0.093	0.279	0.157	BDL	0.095	BDL	0.058	BDL	BDL	0.102
52	–	0.916	0.041	0.478	–	1.122	2.102	1.696	3.388	4.920	1.294	1.117	1.635	1.486	0.921	1.843	2.734	0.556	1.411	0.488	1.211
49	–	0.740	0.030	0.184	–	0.803	1.294	1.149	2.559	3.690	1.070	0.907	1.236	1.125	0.768	1.555	2.070	0.443	1.049	0.442	1.068
48,47	–	0.912	1.518	0.546	–	1.008	1.116	BDL	2.250	3.690	BDL	0.910	1.979	1.226	0.797	1.393	BDL	0.569	0.856	0.468	BDL
44	–	BDL	2.001	0.287	–	1.310	1.755	1.817	3.203	6.150	1.532	1.287	1.580	1.443	0.895	1.831	2.901	0.507	1.454	0.567	1.132
37,42	–	0.638	0.043	0.424	–	0.892	1.164	1.126	2.185	3.608	1.170	0.989	1.322	1.266	0.758	1.449	2.411	0.440	1.068	0.372	0.827
41,64,71	–	1.031	0.127	0.742	–	1.295	1.761	1.946	3.400	6.683	2.301	1.392	2.571	2.137	1.268	1.988	2.453	0.600	1.679	0.580	1.273
40	–	0.093	0.017	BDL	–	0.252	0.402	0.510	0.470	0.096	0.190	0.223	0.417	0.248	0.249	0.196	0.262	0.048	0.209	0.121	0.058
100	–	0.080	0.356	0.058	–	0.074	0.132	0.186	0.051	0.672	0.193	0.093	0.142	0.137	0.073	0.040	0.308	0.021	0.201	0.101	0.141
63	–	0.237	BDL	BDL	–	BDL	0.152	0.356	0.443	0.114	0.131	0.169	BDL	BDL	BDL	0.520	BDL	BDL	BDL	BDL	0.178
74	–	0.677	BDL	0.371	–	0.939	1.434	1.431	2.690	3.362	0.884	0.823	1.258	1.152	0.744	1.453	1.711	0.474	1.004	0.382	0.860
70,76	–	2.053	0.081	0.939	–	2.716	4.100	3.865	7.181	8.610	2.596	2.292	3.482	3.183	2.133	4.117	5.536	1.348	2.984	1.093	2.656
66,95	–	4.422	6.583	1.996	–	5.622	10.069	9.177	13.517	11.152	5.894	5.413	8.040	7.399	4.739	8.446	11.421	2.872	6.537	2.395	5.985
91	–	0.405	0.022	0.181	–	0.437	0.802	0.600	0.855	0.574	0.571	0.496	0.656	0.585	0.410	0.727	0.999	0.273	0.533	0.226	0.566
56,60	–	3.122	0.231	1.136	–	3.210	3.775	3.785	5.948	7.380	2.501	2.698	4.788	4.346	2.624	4.218	5.237	1.497	3.276	1.172	1.520
92,84	–	1.408	0.107	0.814	–	1.985	3.810	3.264	4.389	1.763	1.837	1.883	3.264	3.196	2.025	3.090	5.288	1.012	2.571	1.034	1.871
89	–	0.072	0.004	0.042	–	0.082	0.136	0.100	0.136	0.123	0.068	0.081	0.126	0.114	0.081	0.118	0.199	0.038	0.101	0.053	0.085
101	–	1.546	0.069	0.670	–	1.737	3.184	2.742	3.893	1.968	1.805	1.743	2.629	2.397	1.659	2.651	4.069	0.867	2.081	0.918	2.998
99	–	1.135	0.030	0.507	–	0.876	1.542	1.413	2.347	0.943	1.168	1.097	1.370	1.294	0.889	1.551	2.257	0.452	1.269	0.366	1.005
119	–	BDL	BDL	BDL	–	0.038	0.084	0.076	BDL	0.074	0.103	0.094	BDL	0.142	0.048	BDL	BDL	BDL	0.111	0.037	BDL
83	–	BDL	0.015	BDL	–	0.062	0.176	0.246	0.344	0.064	0.102	0.101	0.100	0.087	0.088	0.172	0.297	0.030	0.145	0.041	0.183
97	–	0.546	0.009	0.147	–	0.428	0.877	0.852	13.580	0.410	0.533	0.500	0.615	0.587	0.382	7.214	0.846	1.957	0.604	0.180	4.708
81,87	–	1.229	0.765	0.465	–	0.663	1.169	1.123	1.896	1.361	1.029	0.811	1.780	1.512	0.812	0.990	1.475	0.560	0.844	0.270	1.069
85	–	3.164	0.106	0.571	–	1.766	2.043	2.345	3.813	0.861	1.907	1.812	2.145	1.883	1.206	2.452	3.026	0.783	1.720	0.613	2.113
136	–	0.476	0.020	0.041	–	0.228	0.364	0.400	0.570	0.574	0.309	0.316	0.370	0.316	0.230	0.384	0.587	0.137	0.323	0.127	0.386
77,110	–	3.616	1.427	0.987	–	2.670	5.101	4.997	7.298	2.911	3.035	3.101	3.803	3.579	2.431	4.407	6.125	1.287	3.555	1.197	3.489
82	–	0.170	0.017	0.079	–	0.238	0.391	0.383	0.640	0.533	0.168	0.213	0.339	0.276	0.181	0.309	0.444	0.066	0.255	0.083	0.254
151	–	0.788	0.026	0.195	–	0.586	0.900	0.915	1.385	2.337	0.658	0.747	0.950	0.817	0.472	0.874	1.153	0.273	0.802	0.249	0.720
134,144	–	0.651	0.021	0.161	–	0.426	0.755	0.741	1.135	0.902	0.475	0.535	0.638	0.565	0.356	0.690	0.971	0.187	0.563	0.214	0.595
107	–	0.404	0.022	BDL	–	0.323	0.500	0.390	0.058	0.135	0.258	0.354	0.458	0.422	0.253	0.045	0.580	0.014	0.322	0.141	0.396
123,149	–	3.035	0.081	0.638	–	1.977	3.284	3.248	4.641	4.510	2.575	2.693	3.287	3.011	1.782	3.059	4.106	1.008	2.876	0.981	2.741
118	–	2.142	0.071	0.477	–	1.784	3.333	3.447	5.064	1.435	1.758	1.822	2.350	2.186	1.573	2.920	3.996	0.745	2.125	0.800	2.122
134	–	0.756	BDL	0.363	–	0.457	0.357	0.456	0.455	0.348	BDL	0.455	0.514	0.550	BDL	0.370	0.596	0.488	0.431	BDL	0.638
146	–	1.327	0.064	0.277	–	0.782	1.149	1.049	1.420	0.656	0.806	0.996	1.233	1.018	0.681	0.958	1.451	0.491	1.010	0.391	0.849
132,153,105	–	10.037	1.513	1.749	–	5.649	9.702	9.615	7.798	8.856	5.839	6.674	8.333	7.667	3.494	8.354	11.417	2.823	7.245	2.477	4.412
141	–	0.526	0.262	0.267	–	0.344	0.460	0.503	0.718	2.132	0.833	0.456	0.580	0.530	0.289	0.491	0.606	0.186	0.469	0.147	0.418
137,130,176	–	BDL	0.774	BDL	–	BDL	BDL	BDL	3.323	2.747	BDL	BDL	2.231	BDL	1.321	BDL	6.334	BDL	BDL	BDL	BDL
163,138	–	4.603	1.961	1.129	–	4.151	7.098	6.819	9.848	4.018	3.617	4.705	5.578	4.771	3.307	5.863	8.723	1.880	5.181	1.833	5.221
158	–	0.489	0.065	0.099	–	0.622	1.055	0.778	1.119	0.492	0.354	0.583	0.555	0.603	0.399	0.552	0.892	0.163	0.459	0.177	0.401
129,178	–	0.399	BDL	0.109	–	0.408	0.480	0.493	0.718	1.517	0.499	0.448	0.590	0.488	0.292	0.517	0.823	0.174	0.503	0.191	0.360
187,182	–	2.117	0.117	0.490	–	1.503	2.025	2.123	3.014	6.150	1.663	1.889	2.481	2.214	1.373	2.017	3.002	0.718	2.116	0.782	1.421
183	–	1.249	BDL	0.218	–	0.764	1.057	1.142	1.560	3.136	0.769	0.975	1.200	0.982	0.649	1.080	1.826	0.341	0.983	0.305	0.586
128	–	0.611	0.025	0.152	–	0.530	0.906	1.153	1.322	0.193	0.417	0.545	0.587	0.651	0.491	0.911	2.116	0.165	0.700	BDL	1.261
185	–	0.185	BDL	0.042	–	0.103	0.151	0.152	0.260	0.168	0.090	0.130	0.226	0.230	0.093	0.164	0.279	0.054	0.138	0.041	0.120
174	–	1.142	0.070	0.318	–	0.914	1.348	1.304	1.894	4.510	0.840	1.062	1.332	1.163	0.693	1.123	1.552	0.422	1.266	0.394	0.868
177	–	0.982	0.036	0.231	–	0.696	0.920	0.910	1.254	2.337	0.715	0.809	0.970	0.848	0.559	0.865	1.447	0.280	0.850	0.403	1.065
202,171,156	–	1.060	BDL	0.265	–	0.910	0.696	0.641	1.233	1.640	0.842	0.914	1.157	0.978	0.627	0.783	0.931	0.249	0.971	0.375	0.803
172	–	0.357	BDL	0.107	–	0.367	0.461	0.470	0.688	0.877	0.261	0.328	0.451	0.349	0.259	0.464	0.561	0.501	0.373	0.137	0.382
197	–	0.574	BDL	0.169	–	0.352	0.289	0.302	0.491	0.765	0.320	0.398	0.557	0.408	0.299	0.237	0.487	0.828	0.348	0.136	BDL
180	–	23.988	3.965	BDL	–	6.104	5.081	4.478	6.225	10.328	3.012	4.167	6.358	6.407	3.104	4.383	5.051	2.422	4.436	BDL	3.885
193	–	0.287	BDL	0.077	–	0.337	0.379	0.335	0.519	BDL	0.258	0.388	0.344	0.364	0.215	0.322	0.470	0.099	0.308	0.178	0.318
191	–	0.183	0.026	0.033	–	0.075	0.077	0.213	0.135	0.136	0.106	0.075	0.107	0.085	0.064	0.079	0.291	0.055	0.176	0.119	0.124
199	–	0.120	0.123	0.018	–	0.058	0.079	0.099	0.143	0.410	0.082	0.076	0.088	0.118	0.055	0.076	0.144	0.030	0.089	0.053	0.065
170,190	–	2.394	0.179	0.588	–	2.087	2.886	2.768	3.802	2.001	1.770	2.373	2.818	2.298	1.463	2.453	3.135	1.111	2.090	1.309	BDL
198	–	0.177	0.035	0.034	–	0.091	0.091	0.091	BDL	0.189	0.362	0.065	0.087	0.065	0.055	0.099	0.113	0.037	0.128	BDL	BDL
201	–	2.144	0.110	0.562	–	1.950	2.184	2.042	3.856	5.537	1.657	1.817	2.210	1.905	1.136	1.794	2.103	0.646	1.599	0.876	1.244
203,196	–	1.032	0.025	0.248	–	0.853	1.042	1.012	2.046	3.321	0.688	0.847	1.025	0.872	0.545	0.967	1.306	0.281	0.857	0.256	1.561
189	–	BDL	BDL	0.033	–	0.158	0.124	0.044	0.067	BDL	BDL	0.104	0.136	0.147	0.071	BDL	0.118	BDL	0.081	BDL	BDL
208,195	–	4.364	0.225	0.797	–	2.612	2.065	2.435	3.454	3.626	2.697	2.147	2.332	2.106	1.323	2.772	3.726	1.228	2.684	0.857	1.647
207	–	0.396	BDL	BDL	–	BDL	BDL	BDL	0.092	0.355	0.293	BDL	BDL	BDL	BDL	0.075	0.377	0.029	0.286	0.102	BDL
194	–	0.766	1.482	0.285	–	0.779	0.885	0.920	1.624	1.300	0.713	0.780	1.114	0.859	0.559	0.744	1.380	0.644	0.898	0.254	0.864
205	–	0.191	0.785	BDL	–	0.178	0.121	0.130	BDL	BDL	BDL	0.090	0.199	0.278	0.118	BDL	BDL	BDL	0.167	BDL	BDL
206	–	5.072	0.038	1.346	–	4.280	3.057	3.673	7.041	0.488	3.330	3.181	4.079	2.832	1.889	4.040	4.568	1.760	3.851	1.136	2.094
TOTAL PCB (ng/g dry)	–	110.256	37.305	26.405	–	82.069	113.648	114.275	190.334	214.954	79.644	81.585	115.686	101.353	62.365	120.948	152.705	43.412	93.382	32.476	91.561

Table 10. Polychlorinated biphenyl concentrations (ng/g dry wgt).

PCBs (ng/g dry wgt)	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
1	BDL	0.730	1.395	3.872	BDL	BDL	BDL	–	0.698	1.101	BDL	BDL	BDL	7.043	1.194	BDL	BDL	BDL	BDL	1.103	BDL
4,10	0.369	BDL	0.425	0.301	1.118	0.175	BDL	–	BDL	0.129	0.361	0.229	0.194	0.411	BDL	BDL	BDL	0.203	0.120	0.171	0.163
7,9	BDL	0.024	0.069	0.082	0.070	BDL	BDL	–	0.037	0.066	0.121	BDL	0.103	0.229	0.058	BDL	0.013	0.056	0.023	0.014	0.034
6	0.107	0.007	0.140	0.297	0.206	BDL	BDL	–	0.096	0.135	0.227	0.090	0.208	0.546	0.129	BDL	0.052	0.132	0.067	0.076	0.097
8,5	1.069	0.360	1.363	1.701	1.592	0.420	BDL	–	0.800	1.848	2.515	1.247	2.118	7.307	1.487	BDL	0.616	0.787	0.704	0.926	1.172
19	BDL	BDL	BDL	BDL	BDL	BDL	BDL	–	BDL	BDL	0.116	BDL	0.041	0.371	0.029	0.046	BDL	0.114	BDL	BDL	BDL
12,13	0.105	BDL	BDL	0.066	BDL	0.032	BDL	–	0.056	BDL	BDL	0.141	0.173	0.096	0.079	BDL	0.052	0.097	0.247	0.075	0.146
18	0.594	0.329	0.929	0.899	1.105	0.147	BDL	–	0.454	2.283	2.621	1.649	2.318	4.304	1.499	BDL	0.409	0.854	0.608	0.511	0.627
17	0.425	0.188	0.681	0.690	0.957	0.110	0.053	–	0.424	1.516	1.644	1.186	1.445	2.571	0.931	BDL	0.296	0.563	0.444	0.350	0.513
24	0.087	BDL	0.055	0.038	0.050	0.047	BDL	–	0.037	0.034	0.034	0.026	0.029	0.043	BDL	BDL	0.025	0.035	0.033	BDL	0.042
16,32	0.524	0.308	0.857	0.886	1.299	0.186	0.047	–	0.454	2.143	2.590	1.626	2.267	4.719	1.426	BDL	0.443	0.964	0.530	0.484	0.805
29	BDL	BDL	BDL	BDL	BDL	BDL	BDL	–	0.111	0.120	0.153	BDL	0.162	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	0.252	0.293	0.671	0.549	1.367	0.061	0.040	–	0.406	0.942	1.091	0.583	0.872	1.201	0.570	0.031	0.217	0.409	0.432	0.358	0.396
25	0.319	0.244	0.520	0.617	0.793	0.089	0.035	–	0.404	2.180	2.983	BDL	2.030	1.695	1.581	0.030	0.198	1.336	0.711	0.608	0.616
31,28	8.039	2.985	6.944	12.015	9.318	1.935	0.407	–	4.623	15.399	28.297	10.538	26.927	11.139	16.111	BDL	2.041	2.917	7.711	3.752	4.222
33,21,53	1.649	0.759	2.097	1.905	2.869	0.442	0.108	–	1.558	4.719	2.622	3.286	4.846	7.967	2.717	0.037	0.727	0.742	1.434	0.616	0.684
51	0.086	0.075	0.090	0.140	0.282	0.075	BDL	–	0.064	0.308	0.248	0.170	0.272	0.328	0.131	BDL	0.099	0.461	0.154	0.127	0.135
22	0.718	0.486	1.285	1.280	1.706	0.229	0.049	–	0.666	3.114	3.320	1.968	2.866	4.837	1.742	BDL	0.396	0.643	BDL	0.584	0.756
45	0.165	0.113	0.389	0.316	0.519	0.065	0.037	–	0.437	0.782	0.749	0.322	0.721	1.189	0.409	BDL	0.135	BDL	0.171	0.158	0.196
46	0.147	BDL	0.217	0.197	0.261	0.080	BDL	–	0.297	0.304	0.458	0.255	0.336	0.727	0.234	BDL	0.087	0.177	0.164	0.150	0.141
52	1.934	1.000	2.595	2.442	3.456	0.489	0.116	–	1.860	6.805	6.775	4.722	6.759	27.260	4.040	0.064	0.916	3.366	1.619	1.573	1.470
49	1.817	0.751	1.916	1.986	2.696	0.384	0.081	–	1.360	5.206	5.201	3.466	5.019	11.720	2.912	0.043	0.740	2.725	1.449	1.275	1.262
48,47	BDL	0.896	1.805	1.745	2.706	BDL	BDL	–	1.219	4.936	4.528	2.950	4.470	6.215	2.455	BDL	0.726	2.383	BDL	BDL	1.191
44	1.883	1.119	2.575	2.328	3.683	0.480	BDL	–	1.615	7.197	6.872	4.571	6.935	22.046	3.889	20.814	0.903	2.571	1.644	1.410	1.650
37,42	1.306	0.804	2.076	1.727	2.736	0.379	0.064	–	1.268	4.957	4.575	3.052	4.528	6.719	2.596	0.039	0.583	1.375	1.092	0.970	0.878
41,64,71	2.517	1.285	2.748	2.359	4.016	0.807	0.166	–	1.769	7.720	8.536	5.368	7.992	15.557	4.460	BDL	0.815	2.465	2.068	1.353	1.638
40	0.175	0.231	0.600	0.461	0.845	0.090	0.035	–	0.459	1.354	1.144	0.996	1.187	2.984	0.747	0.015	0.137	0.301	0.186	0.118	0.190
100	0.319	0.113	0.177	0.050	0.464	0.060	BDL	–	0.163	0.420	0.309	0.172	0.097	0.563	0.043	BDL	0.066	0.468	0.185	0.200	0.141
63	0.323	BDL	BDL	0.402	2.480	BDL	BDL	–	0.165	0.630	0.628	0.171	0.718	0.595	0.306	BDL	BDL	0.081	0.269	0.124	0.068
74	1.629	0.781	1.767	1.623	2.373	0.366	0.095	–	1.460	4.464	5.048	2.872	4.942	11.802	2.739	BDL	0.456	1.132	1.011	0.927	0.800
70,76	4.600	2.197	4.773	4.571	6.600	0.986	0.254	–	3.761	11.415	13.253	7.530	12.769	44.601	7.155	0.138	1.602	4.018	3.248	2.882	2.631
66,95	9.520	4.832	11.195	9.270	15.089	2.543	0.663	–	9.426	21.236	25.880	BDL	24.098	103.827	14.280	0.374	3.426	11.007	6.739	6.116	5.690
91	0.893	0.374	0.871	0.752	1.266	0.212	0.052	–	0.741	1.652	2.634	1.478	2.115	8.961	1.463	0.022	0.296	1.471	0.556	0.473	0.523
56,60	4.010	2.639	5.138	4.445	6.150	1.113	0.276	–	3.965	9.467	11.739	6.047	10.695	17.093	6.115	0.141	1.488	2.795	3.001	1.958	2.430
92,84	4.409	1.794	4.236	3.182	5.659	0.876	0.204	–	3.331	6.114	7.886	4.723	7.918	51.590	5.055	BDL	1.294	4.619	2.259	2.167	2.173
89	0.156	0.076	0.171	0.126	0.223	0.037	0.010	–	0.114	0.278	0.319	0.211	0.307	2.233	0.207	0.011	0.056	0.145	0.093	0.103	0.091
101	4.837	1.450	3.350	2.754	4.402	1.031	0.199	–	2.844	5.353	9.636	4.227	6.884	39.413	4.306	0.146	1.105	3.621	4.010	2.006	1.920
99	1.911	0.767	1.738	1.676	2.325	0.345	0.096	–	1.604	5.217	3.749	3.770	4.016	19.994	2.664	0.051	0.598	1.905	1.157	0.995	1.071
119	0.125	BDL	0.150	BDL	0.274	0.035	BDL	–	0.092	BDL	BDL	2.239	BDL	1.065	BDL	BDL	BDL	1.461	0.187	BDL	BDL
83	0.189	0.101	0.189	0.270	0.268	0.028	BDL	–	0.203	1.028	0.561	0.528	0.482	3.271	0.393	BDL	0.043	0.115	0.180	0.128	0.064
97	6.560	0.377	0.929	8.072	1.223	1.713	0.048	–	0.826	3.003	21.691	1.964	23.396	15.835	14.418	0.040	0.267	0.780	5.244	0.481	0.441
81,87	1.505	0.550	1.135	1.036	1.326	0.563	0.184	–	1.075	4.543	3.053	2.710	3.341	24.994	2.095	0.127	0.567	0.911	0.839	0.715	0.743
85	2.361	1.199	2.406	3.002	3.190	0.598	0.175	–	2.274	7.562	6.248	4.691	6.376	15.837	3.964	0.164	0.937	2.251	1.936	1.744	1.489
136	0.475	0.158	0.506	0.534	0.738	0.112	0.037	–	0.364	1.753	1.193	1.013	1.081	6.115	0.723	0.035	0.202	0.809	0.494	0.406	0.370
77,110	4.594	1.899	5.413	4.948	7.149	1.049	0.317	–	4.981	15.980	11.316	9.743	11.606	83.266	7.254	0.258	1.614	4.853	3.207	2.748	2.707
82	0.324	0.173	0.446	0.335	0.544	0.099	0.027	–	0.392	2.391	1.218	0.947	1.048	8.587	0.732	0.018	0.100	0.239	0.228	0.203	0.173
151	0.878	0.591	1.375	1.231	1.883	0.280	0.094	–	0.955	4.710	2.336	2.177	2.165	11.764	1.402	0.065	0.401	1.799	1.186	0.976	0.847
134,144	0.714	0.392	0.950	0.883	1.275	0.196	0.062	–	0.742	3.768	2.141	1.823	2.012	13.303	1.318	0.050	0.262	1.319	0.754	0.605	0.539
107	0.532	0.219	0.635	0.050	0.891	BDL	0.037	–	0.474	2.100	1.341	0.963	0.100	7.924	0.066	0.024	0.138	0.661	0.388	0.297	0.312
123,149	3.334	1.935	4.273	3.978	5.687	0.991	0.317	–	3.470	10.649	8.430	7.186	8.240	39.136	5.147	0.240	1.382	6.464	3.759	2.901	2.746
118	2.893	1.377	3.275	3.045	4.250	0.594	0.173	–	3.257	8.985	8.116	6.437	7.646	55.760	5.016	0.152	0.821	2.895	1.961	1.765	1.688
134	0.518	0.408	0.491	1.029	0.873	BDL	BDL	–	0.373	1.247	1.931	0.472	1.268	5.441	0.886	BDL	BDL	0.788	0.448	0.646	0.541
146	0.993	0.657	1.449	1.365	2.098	0.283	0.105	–	1.167	2.143	2.211	1.841	2.381	13.020	1.598	0.208	0.328	2.243	0.926	0.999	1.015
132,153,105	5.402	4.918	11.165	9.985	14.414	2.532	0.803	–	9.850	23.932	13.604	18.967	13.087	56.162	8.690	0.842	2.416	14.114	8.972	6.982	6.888
141	0.500	0.335	0.785	0.700	1.056	0.174	0.062	–	0.504	1.655	1.397	1.128	1.156	4.468	0.779	0.043	0.305	1.231	0.732	0.591	0.548
137,130,176	BDL	BDL	2.027	1.627	2.595	BDL	BDL	–	2.783	8.477	2.062	BDL	BDL	28.753	3.790	78.037	BDL	4.410	BDL	2.052	BDL
163,138	6.323	3.461	7.816	7.009	9.888	1.759	0.523	–	7.162	16.809	17.376	12.102	16.270	100.117	11.138	0.364	2.129	9.970	6.508	5.369	4.576
158	0.499	0.277	1.021	0.708	1.258	0.155	BDL	–	1.039	1.888	1.822	2.215	1.991	23.158	1.478	0.031	0.256	1.517	0.518	0.473	0.666
129,178	0.637	BDL	0.763	0.699	0.999	0.186	0.056	–	0.589	1.261	1.275	0.859	1.127	4.031	0.855	0.029	0.074	1.058	0.553	0.495	0.541
187,182	2.624	1.106	3.091	2.573	4.032	0.916	0.244	–	2.300	5.255	4.776	3.714	4.206	14.103	2.993	0.173	0.628	4.542	2.692	2.177	1.990
183	1.064	0.708	1.651	1.377	2.207	0.389	0.102	–	1.101	3.072	3.291	2.274	2.610	11.637	2.025	0.067	0.813	2.678	1.514	1.156	1.169
128	0.706	0.500	0.993	0.902	1.220	0.155	0.064	–	0.865	2.708	2.668	1.581	2.377	22.825	1.909	0.189	0.173	0.901	0.502	1.201	0.556
185	BDL	0.097	0.225	0.283	0.303	0.071	0.025	–	0.178	0.504	0.509	0.318	0.383	2.040	0.459	BDL	BDL	0.363	0.257	0.153	0.137
174	1.205	0.779	1.961	1.756	2.636	0.438	0.149	–	1.355	3.227	3.572	2.468	2.847	13.011	2.398	0.096	0.418	3.234	1.919	1.283	1.189
177	1.071	0.564	1.395	1.160	1.818	0.335	0.101	–	0.965	2.406	2.584	1.706	1.917	8.526	1.583	0.059	0.660	2.152	1.405	0.905	0.883
202,171,156	0.817	0.712	1.692	0.971	2.104	0.333	0.099	–	1.164	2.568	2.801	1.678	1.782	5.845	1.370	0.040	4.001	1.986	1.250	0.996	0.896
172	0.358	0.213	0.723	0.676	1.024	0.090	0.048	–	0.479	0.993	1.221	0.751	1.082	4.781	0.895	BDL	1.704	0.916	0.383	0.427	0.377
197	BDL	0.175	0.631	0.447	1.060	BDL	BDL	–	0.693	0.516	BDL	0.506	0.421	3.438	0.679	BDL	BDL	0.836	BDL	0.149	0.322
180	5.337	4.298	7.416	5.610	9.550	BDL	BDL	–	5.132	10.040	10.908	7.652	8.893	30.710	5.981	3.813	3.711	9.941	6.596	5.351	4.877
193	0.524	0.152	0.725	0.492	0.848	0.084	0.055	–	0.299	0.748	0.783	0.612	0.336	4.035	0.261	0.058	BDL	1.541	1.077	0.284	0.340
191	0.226	0.108	0.132	0.097	0.208	0.042	BDL	–	0.112	0.245	0.230	0.182	0.140	0.850	0.149	BDL	BDL	0.920	0.124	0.166	0.116
199	0.114	0.058	0.131	0.132	0.190	0.053	0.011	–	0.127	0.230	0.177	0.141	0.154	0.732	0.110	BDL	BDL	0.391	0.142	0.100	0.100
170,190	2.675	1.604	4.988	3.344	4.911	0.906	0.237	–	3.018	6.855	8.386	5.201	6.468	30.860	4.732	BDL	6.676	7.499	4.135	1.658	2.351
198	0.161	0.083	0.172	0.126	0.222	BDL	BDL	–	0.116	0.221	0.239	0.115	0.149	0.652	0.106	BDL	12.258	0.135	0.158	0.084	0.072
201	1.896	1.190	3.069	2.493	4.017	0.823	0.208	–	2.478	4.036	4.378	2.937	3.463	11.253	2.420	BDL	BDL	4.810	2.277	1.807	1.774
203,196	1.741	0.595	1.496	1.186	2.072	0.662	0.099	–	1.109	2.449	4.903	1.630	1.861	6.675	1.374	0.040	0.404	2.796	1.927	0.952	0.852
189	0.254	0.042	0.151	0.051	0.264	BDL	BDL	–	0.130	0.109	0.442	0.204	0.095	0.945	0.053	BDL	8.827	0.214	0.551	0.037	0.076
208,195	2.261	2.056	2.839	4.199	3.180	1.043	0.206	–	2.321	4.704	4.956	2.164	3.430	5.308	2.737	0.168	2.171	2.926	1.929	3.152	1.456
207	0.249	0.213	BDL	0.088	BDL	BDL	BDL	–	BDL	0.417	0.302	BDL	0.034	BDL	0.044	0.021	BDL	BDL	0.215	0.252	BDL
194	1.113	0.537	1.552	1.119	1.827	0.309	0.097	–	1.058	2.605	2.532	1.477	1.855	6.984	1.459	0.057	BDL	2.345	1.161	1.035	0.862
205	BDL	0.111	0.422	BDL	0.528	BDL	0.035	–	0.206	0.241	0.147	0.232	BDL	0.809	BDL	0.033	BDL	0.259	0.304	BDL	0.150
206	3.322	2.217	3.528	6.632	3.952	1.550	0.310	–	3.731	6.122	5.282	3.949	5.786	5.934	4.375	0.179	3.001	3.978	3.361	4.201	2.183
TOTAL PCB (ng/g dry)	123.97	65.154	152.034	153.967	200.731	33.837	8.197	–	120.257	325.695	343.274	201.139	314.434	1163.856	205.613	176.851	97.433	172.19	117.036	92.814	86.19

Table 10. Polychlorinated biphenyl concentrations (ng/g dry wgt).

PCBs (ng/g dry wgt)	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62
1	0.592	1.170	0.952	1.261	BDL	1.215	BDL	2.787	BDL	BDL	BDL	1.561	1.107	0.824	BDL	1.085	BDL	0.690	0.990	BDL	0.982
4,10	0.164	0.375	BDL	0.203	0.180	BDL	0.426	0.245	0.188	BDL	BDL	0.185	BDL	BDL	0.118	BDL	0.179	0.114	0.150	BDL	0.164
7,9	0.026	0.083	0.191	0.226	0.122	0.086	0.125	0.082	0.046	0.048	0.033	0.013	0.020	0.022	0.044	0.043	0.048	0.035	0.050	0.053	0.055
6	0.094	0.140	0.072	0.456	0.431	0.161	0.266	0.174	0.080	0.074	0.066	0.079	0.067	0.093	0.132	0.149	0.076	0.091	0.157	0.423	0.165
8,5	1.234	1.152	1.852	3.226	3.610	1.775	3.404	2.205	0.822	0.993	0.385	0.696	0.681	1.432	1.665	1.635	1.056	0.758	1.756	2.535	1.440
19	BDL	BDL	0.055	0.170	0.225	0.083	0.284	0.128	0.114	0.042	0.055	BDL	0.029	BDL	BDL	0.137	0.051	0.059	0.113	0.195	0.108
12,13	0.131	BDL	0.136	0.306	0.336	0.092	0.354	0.116	0.076	0.040	0.025	0.563	BDL	0.034	BDL	BDL	0.109	0.044	0.187	0.196	0.079
18	0.906	0.837	1.139	1.741	1.988	1.085	2.851	1.189	0.862	0.617	0.419	0.796	0.790	0.744	0.950	1.199	1.073	0.816	1.328	1.560	0.938
17	0.719	0.666	0.951	1.349	1.478	0.759	2.014	0.876	0.530	0.439	0.323	0.578	0.428	0.573	0.625	0.823	0.657	0.550	0.885	1.339	0.633
24	0.028	0.029	0.040	0.035	0.035	BDL	0.043	0.043	0.030	BDL	BDL	0.036	BDL	0.025	0.025	0.028	0.052	0.025	0.048	0.037	0.041
16,32	0.832	0.914	1.360	2.195	2.364	1.064	2.717	1.223	0.687	0.633	0.383	0.632	0.506	0.733	0.887	1.254	0.920	0.757	1.365	1.620	0.841
29	BDL	BDL	BDL	BDL	0.120	BDL	0.132	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.129	BDL	BDL
26	0.585	0.890	0.843	1.538	1.933	0.831	1.636	0.748	0.469	0.517	0.264	0.412	0.334	0.417	0.453	0.491	0.364	0.332	0.661	1.107	0.331
25	0.881	0.808	0.980	2.109	2.547	1.153	2.109	1.251	1.232	1.078	0.898	0.567	0.207	0.555	0.707	0.628	0.492	0.725	1.326	0.998	0.677
31,28	6.126	12.500	9.299	12.693	8.377	14.716	28.117	13.413	8.298	8.659	2.794	6.138	1.748	4.006	4.757	6.814	8.900	4.581	11.753	4.852	4.286
33,21,53	1.953	2.189	2.892	2.056	BDL	1.382	3.549	1.294	1.806	BDL	0.237	0.506	0.318	1.171	0.723	2.044	1.581	1.059	0.974	2.092	1.149
51	0.187	0.279	0.309	1.105	1.646	0.561	0.737	0.459	0.280	0.281	0.172	0.313	0.098	0.131	0.137	0.182	0.173	0.108	0.192	0.212	0.114
22	1.229	1.333	1.793	2.227	2.171	1.431	2.895	1.326	0.765	0.788	0.439	0.836	0.373	0.726	0.797	1.350	0.855	0.920	1.230	1.370	0.742
45	0.308	0.328	0.455	BDL	BDL	0.299	0.923	0.350	BDL	BDL	BDL	0.255	0.107	0.178	0.244	0.366	0.261	0.234	0.332	0.328	0.183
46	0.187	0.306	0.155	0.411	0.471	0.195	0.527	0.257	0.204	0.118	0.078	0.095	0.076	0.058	0.186	0.186	0.132	0.159	0.199	0.117	0.092
52	2.635	2.593	4.173	6.880	8.000	4.412	10.383	4.493	2.678	2.766	1.767	1.416	1.555	1.516	1.851	2.649	1.955	1.924	2.316	2.325	1.368
49	2.079	2.257	4.615	8.277	9.632	5.087	10.665	5.148	2.452	2.570	1.613	1.205	0.870	1.284	1.447	2.121	2.105	1.530	1.919	2.175	1.087
48,47	BDL	2.164	3.120	6.964	8.615	4.049	BDL	4.071	BDL	2.473	1.518	1.301	0.543	1.509	1.328	1.848	BDL	BDL	1.870	1.965	1.061
44	2.482	2.758	73.173	5.181	5.432	3.433	8.979	3.705	2.081	2.208	1.456	1.317	1.155	1.606	1.662	2.395	1.869	1.812	2.139	40.937	1.323
37,42	1.664	1.807	2.617	3.803	3.968	2.465	5.787	2.631	1.322	1.468	0.895	0.854	0.489	1.040	1.051	1.834	1.225	1.314	1.634	1.784	0.883
41,64,71	2.500	2.573	4.313	3.041	2.950	3.515	5.823	4.417	0.706	1.521	1.358	1.527	0.998	1.484	1.637	2.767	2.076	1.849	2.522	2.672	1.409
40	0.357	0.331	0.572	0.829	0.713	0.401	0.597	0.373	0.216	0.169	0.144	0.112	0.152	0.240	0.065	0.660	0.155	0.246	0.450	0.378	0.178
100	0.324	0.110	0.458	1.386	1.997	0.207	1.236	0.137	0.257	0.087	0.136	0.081	BDL	0.171	0.034	0.232	0.140	0.179	0.063	0.156	0.023
63	BDL	BDL	2.136	0.336	0.362	0.322	0.830	0.226	0.203	0.245	BDL	BDL	BDL	0.117	0.094	0.087	0.157	BDL	0.300	0.864	0.077
74	1.577	1.415	2.520	3.041	3.235	2.204	5.001	2.114	1.231	1.529	0.739	0.669	0.453	0.917	0.877	1.421	1.078	1.084	1.473	1.550	0.733
70,76	4.791	4.531	8.529	13.009	13.582	7.761	17.437	6.962	4.023	4.646	2.471	2.330	1.800	2.782	2.632	4.047	3.129	3.174	3.641	3.907	2.056
66,95	10.715	10.054	19.042	29.353	30.958	22.052	49.149	20.406	11.283	12.694	7.165	6.015	4.343	6.075	5.831	9.114	6.535	7.563	8.599	7.351	4.680
91	0.849	0.853	1.781	3.358	3.661	1.886	4.549	1.916	1.176	1.213	0.704	0.570	0.307	0.467	0.463	0.829	0.525	0.548	0.746	0.570	0.354
56,60	4.085	4.294	6.104	6.297	6.106	4.861	9.662	4.330	2.481	2.825	1.536	2.276	0.865	2.592	1.992	3.796	2.571	2.703	3.321	3.015	1.611
92,84	4.248	4.132	9.395	17.701	18.116	11.634	21.722	9.271	4.540	5.992	3.182	2.504	1.706	2.242	2.054	3.265	1.905	2.711	3.291	2.326	1.464
89	0.178	0.162	0.354	0.522	0.511	0.295	0.654	0.273	0.145	0.170	0.124	0.090	0.080	0.096	0.075	0.127	0.067	0.105	0.122	0.095	0.061
101	3.683	3.332	6.873	10.787	11.133	8.354	23.811	6.849	4.154	4.272	2.506	2.252	1.557	2.045	1.849	2.736	2.136	2.385	2.715	2.043	1.419
99	1.997	2.152	5.831	6.308	7.038	4.016	8.993	4.238	1.839	2.263	1.743	1.109	0.708	1.030	1.039	1.415	0.774	1.221	1.560	1.673	0.810
119	BDL	BDL	1.470	1.128	1.363	0.545	1.725	0.555	BDL	BDL	BDL	BDL	BDL	0.076	BDL	0.135	BDL	BDL	BDL	BDL	BDL
83	0.314	0.239	0.846	0.648	0.620	0.623	1.067	0.494	0.305	0.254	0.127	0.063	0.110	0.089	0.151	0.128	0.123	0.147	0.163	0.202	0.084
97	1.097	9.248	2.678	2.214	2.357	16.093	36.778	16.325	7.553	7.678	0.497	4.222	4.728	0.469	5.124	0.620	3.804	0.627	6.956	0.845	4.220
81,87	1.406	1.189	3.125	2.078	2.253	1.837	3.094	1.926	1.055	1.071	0.912	0.949	0.909	0.753	0.858	0.876	0.826	1.004	1.353	1.332	0.907
85	2.616	3.140	8.073	5.693	5.537	4.549	9.438	4.396	2.445	2.878	1.634	1.552	0.675	1.617	1.720	1.895	1.337	2.087	2.592	2.816	1.743
136	0.885	0.742	2.178	2.375	2.754	2.595	4.410	1.973	0.815	0.956	0.578	0.536	0.216	0.367	0.388	0.480	0.282	0.432	0.607	0.576	0.380
77,110	5.907	5.556	15.126	13.977	14.935	11.713	24.304	10.689	5.108	5.585	3.728	3.030	2.729	2.741	3.017	3.919	2.410	3.666	4.452	4.439	2.618
82	0.467	0.444	0.950	0.726	0.738	0.469	0.908	0.519	0.323	0.276	0.238	0.178	0.228	0.202	0.205	0.306	0.148	0.245	0.342	0.292	0.188
151	2.275	1.916	5.799	5.748	6.364	6.867	9.853	4.369	1.730	2.093	1.356	1.233	0.415	0.964	0.934	1.181	0.675	1.090	1.709	1.346	0.809
134,144	1.356	1.209	3.773	4.207	4.709	4.558	6.871	3.160	1.314	1.587	1.004	0.753	0.393	0.627	0.648	0.817	0.483	0.781	1.092	0.937	0.553
107	0.573	0.067	1.939	2.825	3.140	0.159	3.991	0.135	0.731	0.071	0.472	0.029	0.019	0.272	0.025	0.417	0.250	0.290	0.041	0.407	0.020
123,149	6.155	5.832	15.997	17.407	19.440	18.895	30.132	13.636	5.843	6.708	4.665	3.827	1.611	3.023	2.948	4.064	2.474	3.491	5.076	4.289	2.542
118	3.687	3.463	9.113	9.467	10.038	5.742	13.095	5.969	2.701	3.345	2.227	1.471	1.511	1.749	1.753	2.044	1.203	2.071	2.342	2.635	1.424
134	1.101	1.515	2.710	3.409	3.400	3.077	5.282	2.378	1.041	1.300	0.605	0.779	0.290	0.731	0.791	0.690	0.344	0.882	1.381	0.805	0.746
146	1.933	1.887	6.023	7.783	8.473	6.416	8.848	4.445	1.691	2.281	1.612	1.337	0.425	1.063	0.888	1.393	0.678	1.196	1.717	1.639	0.792
132,153,105	15.292	13.498	42.935	40.314	44.412	41.434	45.647	30.240	13.289	15.285	10.568	8.900	2.314	7.578	7.053	9.347	5.633	8.742	12.345	12.434	4.073
141	1.509	1.205	3.821	4.585	4.761	4.461	6.848	2.917	1.085	1.427	0.901	0.698	0.177	0.560	0.519	0.655	0.365	0.654	0.986	0.728	0.444
137,130,176	8.485	2.318	13.948	14.374	11.113	11.445	6.417	6.988	0.702	4.252	BDL	2.442	BDL	BDL	1.099	BDL	BDL	2.998	2.166	2.000	0.747
163,138	11.013	9.403	22.854	27.141	29.340	31.997	49.116	20.903	10.212	11.112	7.189	6.087	3.070	5.618	5.261	6.638	4.127	6.927	9.204	7.123	4.533
158	1.117	1.269	3.725	3.678	4.017	3.389	4.248	2.013	0.977	1.304	0.834	0.515	0.379	0.629	0.805	1.092	0.317	0.756	1.409	1.266	0.467
129,178	1.263	1.191	5.002	4.234	4.323	5.561	5.756	2.424	1.173	1.482	0.880	0.626	0.173	0.560	0.724	0.849	0.402	0.655	1.424	0.853	0.359
187,182	5.145	4.072	11.907	15.795	15.282	15.690	22.042	9.050	4.031	4.744	3.172	2.571	0.779	2.174	2.152	2.937	1.770	2.752	4.075	2.822	1.556
183	2.997	2.094	7.593	9.669	9.674	10.490	14.423	4.788	2.535	3.008	2.077	1.624	0.564	1.268	1.241	1.689	0.993	1.698	2.429	1.688	0.734
128	1.592	0.955	2.310	3.234	3.315	2.958	4.355	2.069	1.255	1.286	1.318	0.582	0.614	0.879	0.754	0.923	0.591	1.254	1.498	0.804	0.517
185	0.408	0.294	0.871	1.329	1.514	2.016	2.368	0.950	0.443	0.491	0.214	0.220	0.054	0.203	0.221	0.223	0.185	0.208	0.497	0.267	0.163
174	3.460	2.715	7.887	10.351	10.927	13.213	18.023	7.276	2.608	3.130	2.142	1.960	0.455	1.373	1.329	1.746	1.108	1.757	2.470	1.836	1.186
177	2.329	2.068	5.153	7.409	8.004	8.869	12.680	5.675	2.262	2.358	1.614	1.454	0.342	1.015	0.886	1.345	0.900	1.275	1.771	1.341	0.895
202,171,156	2.374	1.589	5.285	7.410	6.812	5.411	10.276	4.067	1.968	1.610	1.251	0.973	0.180	1.005	0.678	1.151	0.804	1.244	1.159	1.331	0.612
172	0.985	1.728	2.513	3.986	4.095	5.979	6.516	3.866	1.000	1.497	0.568	0.683	0.210	0.445	0.464	0.674	0.192	0.558	0.932	0.563	0.430
197	0.586	2.443	1.859	4.268	3.361	3.710	BDL	4.052	BDL	1.087	0.340	0.414	BDL	0.450	0.205	0.394	BDL	0.315	0.344	0.262	0.228
180	11.657	11.352	100.402	30.105	31.822	35.338	50.261	20.452	9.925	9.794	6.003	5.905	BDL	5.027	4.541	6.418	3.971	6.247	8.373	28.730	4.360
193	1.288	1.056	2.083	4.002	4.050	4.598	6.172	2.664	1.094	1.129	0.575	0.295	0.084	0.372	0.200	0.619	0.155	0.493	0.760	0.495	0.175
191	0.239	0.451	0.416	0.626	0.680	1.047	1.365	0.650	0.230	0.224	0.122	0.151	0.038	0.243	0.088	0.258	0.106	0.232	0.175	0.127	0.088
199	0.261	0.221	0.638	1.093	0.865	0.967	1.175	0.500	0.161	0.206	0.097	0.117	0.026	0.101	0.080	0.111	0.091	0.116	0.137	0.107	0.074
170,190	6.670	5.067	12.822	22.965	24.010	29.762	42.201	15.304	7.245	7.432	3.132	3.935	0.859	2.460	2.659	3.887	2.881	3.667	5.531	3.594	2.690
198	0.248	0.239	0.454	0.861	0.832	0.683	1.013	0.339	0.210	0.166	0.050	0.083	0.031	0.163	0.060	0.130	0.091	0.204	0.124	0.112	0.065
201	4.716	3.821	10.518	17.898	14.340	14.422	22.263	8.016	3.240	3.734	1.603	1.945	0.422	1.542	2.012	2.230	1.338	2.307	2.533	2.121	1.764
203,196	2.632	2.090	5.829	10.433	8.647	8.678	26.249	4.805	4.011	2.245	1.074	1.067	0.221	1.015	1.020	1.408	1.588	1.378	1.424	1.128	0.684
189	0.121	0.153	0.550	0.558	0.590	0.287	1.627	0.134	0.242	0.067	0.143	0.071	BDL	0.056	0.050	0.122	0.163	0.100	0.113	0.140	BDL
208,195	4.339	6.771	7.665	8.635	7.556	12.071	16.778	6.527	2.540	3.685	0.926	2.293	0.450	1.964	2.103	1.401	1.275	2.205	2.475	2.448	1.251
207	0.384	0.149	0.636	BDL	BDL	0.183	1.148	0.117	0.142	0.068	BDL	0.048	BDL	0.130	0.039	BDL	0.052	0.184	0.050	0.174	0.046
194	2.630	1.975	5.135	9.035	8.905	9.069	14.274	4.887	2.180	2.400	0.980	1.355	0.274	0.844	0.961	1.997	0.841	1.272	1.381	1.023	0.730
205	0.194	BDL	0.518	0.605	0.635	BDL	0.794	BDL	BDL	BDL	0.195	BDL	BDL	BDL	BDL	0.939	BDL	BDL	BDL	0.230	BDL
206	4.117	8.074	7.096	8.486	7.681	12.136	16.530	8.129	2.794	4.604	1.245	3.869	1.039	2.213	4.419	1.870	1.854	2.860	3.123	2.377	1.446
TOTAL PCB (ng/g dry)	188.17	194.227	551.302	513.142	521.533	493.852	808.748	360.499	167.485	189.347	104.5	111.724	51.483	93.565	99.508	129.774	92.21	113.471	161.238	448.807	80.458

Table 10. Polychlorinated biphenyl concentrations (ng/g dry wgt).

PCBs (ng/g dry wgt)	63	64	65	66	67	68	69	70	71	72	73	74	74J	75	76	77	78	79	80	81
1	0.636	1.904	2.034	–	BDL	BDL	1.002	3.678	1.051	0.861	BDL	BDL	BDL	2.628	0.766	2.570	0.790	BDL	0.698	BDL
4,10	0.114	1.504	0.880	–	BDL	0.295	BDL	0.148	0.265	BDL	2.341	0.259	BDL	0.672	BDL	0.852	BDL	BDL	0.458	BDL
7,9	0.035	BDL	0.289	–	0.044	0.089	0.043	0.075	0.173	0.120	0.931	0.458	0.013	BDL	0.040	BDL	BDL	0.037	BDL	0.046
6	0.219	0.502	0.258	–	0.067	0.088	0.163	0.112	1.023	0.163	0.329	0.137	BDL	0.117	0.094	0.484	0.098	0.284	0.301	0.378
8,5	1.409	9.908	11.952	–	1.773	1.192	1.753	1.492	6.979	2.704	33.526	4.955	0.335	4.373	0.739	6.262	0.373	1.132	1.987	1.187
19	0.133	BDL	2.251	–	0.499	BDL	0.506	0.383	0.853	0.093	5.118	0.343	BDL	0.512	BDL	0.857	0.045	0.033	0.438	0.102
12,13	0.059	0.118	0.246	–	0.082	0.180	BDL	0.071	0.369	BDL	0.528	0.046	0.028	0.098	BDL	0.320	BDL	0.128	0.181	0.197
18	0.983	18.390	23.467	–	1.515	0.874	1.428	1.359	4.465	1.729	43.330	2.331	0.208	3.107	0.762	8.077	0.544	0.891	5.046	1.122
17	0.710	10.690	13.010	–	1.153	0.596	1.083	0.999	3.660	0.916	27.329	1.889	0.188	1.863	0.564	5.260	0.325	0.729	2.759	0.804
24	0.029	0.038	0.040	–	0.084	0.036	0.060	0.043	0.091	0.048	0.072	0.024	BDL	0.030	0.025	0.028	BDL	BDL	BDL	BDL
16,32	0.875	15.987	24.130	–	1.849	0.959	1.704	1.799	10.107	2.330	43.709	1.723	0.156	2.729	0.557	5.980	0.720	0.826	3.618	1.246
29	BDL	BDL	BDL	–	BDL	0.132	BDL	0.154	0.185	0.134	0.167	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
26	0.497	3.628	3.281	–	0.660	0.520	0.661	0.771	3.688	0.626	6.625	0.925	0.929	1.420	1.037	4.406	0.764	1.295	2.539	0.841
25	0.766	1.638	3.413	–	1.500	1.275	BDL	2.064	6.362	8.442	8.433	0.631	0.502	0.939	2.469	3.505	2.373	3.436	2.461	5.084
31,28	4.541	66.989	79.235	–	8.109	10.149	9.130	5.788	25.347	5.280	149.133	15.394	2.601	24.173	12.869	53.684	4.918	13.677	25.327	6.721
33,21,53	0.723	33.838	48.796	–	2.478	0.927	1.518	0.852	BDL	2.389	51.475	5.973	0.814	9.979	1.770	26.599	0.662	1.822	5.786	0.970
51	0.137	2.161	3.203	–	0.242	0.272	0.472	1.494	18.042	BDL	11.945	0.083	BDL	0.377	0.088	0.462	0.086	0.067	0.321	0.165
22	0.855	26.096	39.945	–	1.641	0.954	1.700	1.390	BDL	2.280	61.729	3.765	0.489	6.151	1.045	18.131	0.789	1.175	7.386	1.301
45	0.199	0.539	0.811	–	0.664	0.225	BDL	BDL	BDL	BDL	0.998	0.085	BDL	0.067	BDL	0.310	0.194	0.209	0.165	BDL
46	0.087	0.318	0.509	–	0.275	0.204	0.416	0.313	1.469	0.297	0.853	0.465	0.349	0.839	0.763	0.933	0.300	0.386	0.577	0.236
52	1.538	15.304	21.781	–	4.576	2.822	4.858	6.351	27.074	3.675	62.671	5.831	0.842	7.821	3.242	19.413	2.603	3.689	10.965	3.264
49	1.279	12.964	16.193	–	2.878	2.130	3.200	5.342	30.170	BDL	46.926	4.530	0.656	6.188	2.642	15.185	1.961	2.819	8.299	2.313
48,47	1.381	12.581	17.713	–	2.976	BDL	3.322	7.091	43.032	3.103	45.109	4.915	0.654	5.979	BDL	9.945	BDL	2.024	6.373	2.005
44	1.460	20.994	29.162	–	BDL	2.452	4.594	4.076	8.316	78.644	60.294	7.250	0.795	9.577	2.695	18.030	2.947	3.179	11.270	3.324
37,42	1.142	13.482	17.961	–	2.588	1.558	2.822	2.607	6.419	3.209	33.251	4.783	0.584	4.217	1.823	9.762	1.716	2.110	6.733	2.321
41,64,71	1.495	22.880	30.114	–	4.503	2.805	4.504	4.712	BDL	3.989	57.520	3.242	0.809	6.105	2.868	20.844	2.352	3.443	13.647	4.042
40	0.430	1.005	1.192	–	1.799	0.148	0.961	0.763	BDL	0.314	0.922	0.114	0.128	0.211	0.276	0.749	0.535	0.911	0.402	1.188
100	BDL	5.787	4.783	–	0.506	0.320	0.457	2.259	15.738	0.256	14.533	1.245	0.066	1.702	0.365	11.922	0.370	0.094	6.242	0.642
63	0.090	0.407	0.340	–	1.871	0.250	0.295	0.194	0.550	0.919	0.587	BDL	BDL	BDL	BDL	0.754	BDL	0.669	0.271	0.216
74	1.000	10.414	12.587	–	3.460	1.544	2.505	2.588	4.578	2.330	27.026	3.376	0.526	3.940	1.742	15.111	1.105	2.727	6.055	2.120
70,76	2.443	22.630	28.641	–	7.614	4.637	7.811	7.653	15.123	6.316	80.841	9.452	1.858	12.182	5.835	32.948	5.082	6.678	14.639	4.743
66,95	5.484	30.832	45.528	–	19.987	11.357	2.002	BDL	62.732	14.487	126.111	11.452	3.898	16.613	12.092	42.704	10.167	13.356	20.355	11.241
91	0.425	1.139	1.916	–	1.777	0.984	1.947	4.180	19.490	1.579	7.017	0.861	0.546	0.910	1.517	3.400	1.371	1.765	1.650	1.401
56,60	2.136	27.239	32.863	–	6.276	4.081	5.851	5.719	10.092	4.540	73.369	7.618	1.427	14.008	5.449	36.561	3.282	4.523	15.046	3.195
92,84	1.892	5.398	7.679	–	8.170	4.720	8.958	14.031	42.159	5.253	25.748	2.607	1.955	3.446	5.651	9.549	4.584	5.621	4.866	5.175
89	0.083	0.362	0.555	–	0.369	0.156	0.353	0.369	0.730	0.331	1.594	0.163	0.068	0.205	0.192	0.513	0.174	0.242	0.266	0.233
101	1.667	5.829	8.395	–	6.363	3.633	6.871	10.001	23.299	4.470	26.690	2.567	1.434	3.618	4.721	8.388	3.591	4.233	4.350	3.944
99	0.966	2.326	3.687	–	6.609	1.560	6.156	6.150	14.056	5.926	11.033	1.376	0.825	1.876	2.314	4.357	2.171	3.405	1.378	2.488
119	BDL	0.466	1.038	–	BDL	BDL	BDL	1.003	5.208	BDL	1.695	0.165	BDL	0.117	BDL	0.481	BDL	BDL	0.154	BDL
83	0.040	0.234	0.525	–	1.323	0.202	0.938	0.365	0.767	0.609	1.457	0.230	0.113	0.248	0.520	1.023	0.331	0.511	0.321	0.214
97	0.417	1.215	1.790	–	3.058	7.793	3.518	2.186	3.062	2.942	6.146	0.698	0.407	0.938	13.244	2.346	0.972	13.846	0.781	1.027
81,87	0.721	2.272	3.473	–	6.778	1.153	5.071	3.175	4.290	5.766	9.946	1.389	0.658	1.755	1.664	3.648	1.220	2.195	1.206	1.676
85	1.411	1.697	2.533	–	7.811	3.159	8.836	6.011	9.518	20.356	7.566	1.500	1.918	2.015	6.360	4.398	5.178	7.613	1.584	4.344
136	0.330	2.064	3.602	–	1.808	0.662	2.351	2.958	7.281	1.980	10.380	0.851	0.219	1.144	0.728	2.760	0.637	0.932	0.952	0.623
77,110	2.560	8.082	12.734	–	16.566	5.203	19.564	14.223	24.206	16.872	43.243	4.192	2.045	5.877	7.168	13.020	5.942	8.491	4.668	6.622
82	0.200	1.453	2.397	–	1.706	0.311	1.511	0.936	1.056	1.363	6.940	1.257	0.178	1.250	0.669	3.111	0.520	0.840	1.027	0.512
151	0.877	8.802	15.849	–	3.917	1.578	5.020	6.557	14.791	4.513	40.787	2.943	0.495	3.962	1.621	9.895	1.462	1.987	3.542	1.574
134,144	0.595	3.400	6.196	–	3.212	1.120	4.104	4.669	9.144	3.593	17.172	1.348	0.400	1.851	1.363	4.807	1.213	1.693	1.738	1.300
107	0.281	0.320	0.551	–	1.510	0.673	2.169	2.814	9.397	1.471	2.214	0.183	0.237	0.225	0.846	0.614	0.488	0.077	0.204	0.623
123,149	2.697	14.865	24.708	–	11.188	5.049	14.582	20.935	43.985	13.713	68.419	5.866	1.784	8.556	5.705	18.989	5.128	6.733	6.975	5.265
118	1.488	3.604	5.471	–	9.148	3.187	11.747	9.774	12.776	9.157	21.239	2.149	1.497	3.107	4.846	6.556	3.530	4.992	2.211	3.848
134	0.532	1.066	1.593	–	4.105	0.840	1.455	3.140	5.985	5.096	2.010	0.270	0.420	0.256	0.945	0.516	0.388	0.979	BDL	0.953
146	0.932	2.064	2.874	–	4.069	1.400	4.413	7.862	18.459	4.831	8.544	0.836	0.681	0.986	1.586	2.395	1.500	2.041	0.832	1.626
132,153,105	6.792	31.043	28.883	–	36.298	13.178	20.689	49.897	81.826	40.959	80.907	12.631	5.096	17.542	9.477	39.487	8.128	10.520	8.801	13.954
141	0.501	8.830	15.300	–	1.507	0.874	2.278	3.448	8.172	2.113	40.243	2.661	0.339	2.945	0.961	7.667	0.892	1.135	2.884	0.858
137,130,176	1.099	10.670	4.124	–	6.079	1.152	BDL	16.446	19.470	302.825	BDL	4.712	BDL	1.034	0.765	BDL	8.728	4.259	0.719	4.473
163,138	5.077	14.558	22.229	–	21.202	10.189	26.274	36.763	52.952	22.079	60.671	5.634	3.821	7.591	12.079	17.702	10.341	12.738	6.480	10.747
158	0.914	1.667	2.729	–	4.321	1.053	4.884	5.994	7.647	3.875	7.447	0.578	0.638	0.652	1.144	2.005	1.179	1.669	0.736	2.121
129,178	0.686	4.378	6.453	–	BDL	0.926	1.968	3.318	8.451	BDL	15.373	1.621	0.471	1.767	0.931	4.374	0.807	1.176	1.480	1.181
187,182	2.089	19.178	26.409	–	5.285	3.574	7.033	12.136	28.318	7.639	72.127	7.126	1.462	9.620	3.848	21.112	3.397	4.172	7.582	3.742
183	1.277	14.429	20.600	–	3.835	2.244	4.842	7.499	15.600	3.637	52.747	4.978	0.920	6.265	2.586	16.154	2.283	2.847	6.095	2.668
128	0.756	1.040	1.784	–	2.938	1.157	3.968	5.850	5.364	2.782	4.380	0.451	0.617	0.506	1.795	1.446	2.100	2.248	0.550	2.078
185	0.183	0.758	1.221	–	0.747	0.380	0.786	0.970	2.704	0.700	3.006	0.228	0.109	BDL	0.282	0.578	0.252	0.503	0.262	0.512
174	1.294	19.051	28.590	–	4.544	2.673	5.780	8.969	18.709	5.120	80.915	5.869	0.905	8.656	2.750	20.472	2.557	3.554	8.266	2.716
177	1.024	10.168	14.812	–	3.025	1.969	3.761	6.002	13.670	3.476	38.010	2.495	0.669	3.443	2.156	9.536	1.414	1.858	3.183	1.416
202,171,156	0.883	5.869	8.687	–	1.863	1.948	2.389	3.467	10.478	4.086	23.774	2.028	0.733	2.749	2.133	7.168	1.664	1.670	2.588	1.567
172	0.417	3.815	5.302	–	1.513	1.030	1.649	2.811	6.877	1.380	14.522	1.277	0.338	1.296	0.874	3.494	0.608	1.089	1.249	0.623
197	0.266	BDL	BDL	–	0.756	BDL	0.853	1.886	5.559	0.618	4.813	1.019	0.373	1.023	BDL	2.527	0.819	1.302	1.052	0.460
180	4.201	36.121	46.056	–	63.260	8.782	14.424	24.211	48.857	71.816	112.343	11.103	3.112	16.142	7.857	30.382	6.437	8.377	11.675	6.892
193	0.231	1.629	2.339	–	1.121	0.809	1.457	2.652	9.896	0.748	6.418	0.242	0.140	0.431	0.539	1.341	0.426	0.524	0.486	0.569
191	0.101	0.385	0.631	–	0.285	0.252	0.335	0.536	1.210	0.545	1.690	0.106	0.055	0.155	0.161	0.417	0.177	0.157	0.147	0.223
199	0.076	0.794	3.052	–	0.202	0.182	0.314	0.436	1.302	0.279	0.016	0.180	0.059	0.021	0.185	BDL	0.141	0.155	BDL	0.151
170,190	2.873	16.612	9.867	–	8.823	6.689	11.576	17.790	36.998	8.637	34.058	2.867	1.682	3.535	6.072	8.202	4.239	5.705	3.302	4.738
198	BDL	1.151	0.140	–	0.232	0.196	0.213	0.638	0.827	0.342	0.514	0.119	0.090	BDL	0.235	0.335	0.104	0.133	BDL	0.131
201	1.458	15.415	11.359	–	3.815	3.345	4.561	7.392	18.209	4.393	43.859	6.613	1.374	7.987	2.977	14.986	2.233	3.187	6.222	2.183
203,196	0.809	10.705	11.523	–	2.136	3.844	2.675	4.264	12.010	2.376	35.720	3.781	0.711	4.942	3.692	10.695	1.449	1.847	4.475	1.321
189	0.139	0.178	0.175	–	0.364	0.439	0.315	0.640	1.102	0.145	0.428	0.068	0.126	0.206	BDL	0.227	0.093	0.103	0.088	0.284
208,195	1.002	4.376	3.837	–	3.526	3.176	2.480	3.746	10.491	3.815	12.359	3.486	1.769	3.420	4.052	6.040	3.048	4.182	1.919	2.197
207	BDL	0.191	0.187	–	0.169	0.157	BDL	BDL	BDL	0.270	0.481	0.287	BDL	0.358	0.637	0.657	0.367	0.149	0.206	BDL
194	0.880	BDL	1.954	–	2.051	1.972	2.521	4.100	13.563	2.211	2.812	1.209	0.629	9.181	1.579	4.863	1.235	1.704	3.315	1.171
205	0.149	0.073	0.039	–	0.366	BDL	0.547	0.530	1.068	1.130	0.130	BDL	0.119	BDL	0.258	0.074	0.118	BDL	0.040	0.479
208	1.437	0.365	0.281	–	2.654	4.071	1.865	5.068	7.055	2.715	0.909	0.485	2.884	0.477	3.990	0.565	2.924	7.740	0.234	3.115
TOTAL PCB (ng/g dry)	87.591	690.872	902.734	–	364.076	172.717	304.923	431.137	1025.995	760.73	2148.244	218.598	63.972	302.901	198.293	705.941	153.659	225.246	303.087	177.03

Table 11. Organochlorine pesticides concentrations (ng/g dry wgt).

Organochlorines (ng/g dry)	1	2	3	4	5	6	7	8	9	10	11	12
alpha-HCH	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--
hexachlorobenzene	--	0.67	--	--	--	0.71	--	--	0.49	--	--	--
beta-HCH	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--
heptachlor	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--
heptachlor epoxide	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--
trans-chlordane	--	0.74	--	--	--	0.70	--	--	BDL	--	--	--
2,4-DDE	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--
Endosulfan I	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--
cis-chlordane	--	BDL	--	--	--	1.28	--	--	BDL	--	--	--
trans-nonachlor	--	BDL	--	--	--	0.22	--	--	0.55	--	--	--
Dieldrin	--	3.63	--	--	--	1.04	--	--	BDL	--	--	--
4,4-DDE	--	1.27	--	--	--	2.39	--	--	4.83	--	--	--
2,4-DDD	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--
Endrin	--	BDL	--	--	--	0.71	--	--	BDL	--	--	--
Endosulfan II	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--
4,4-DDD	--	1.44	--	--	--	1.59	--	--	BDL	--	--	--
cis-nonachlor	--	BDL	--	--	--	BDL	--	--	BDL	--	--	--

Table 11. Organochlorine pesticides concentrations (ng/g dry wgt).

Organochlorines (ng/g dry)	13	14	15J	15	16	17	18	19	20	21	22	23
alpha-HCH	BDL	--	--	BDL	--	--	--	--	--	--	--	BDL
hexachlorobenzene	3.40	--	--	BDL	--	--	--	--	--	--	--	8.23
beta-HCH	BDL	--	--	BDL	--	--	--	--	--	--	--	BDL
heptachlor	BDL	--	--	BDL	--	--	--	--	--	--	--	BDL
heptachlor epoxide	0.68	--	--	BDL	--	--	--	--	--	--	--	BDL
trans-chlordane	BDL	--	--	0.66	--	--	--	--	--	--	--	1.69
2,4-DDE	BDL	--	--	BDL	--	--	--	--	--	--	--	BDL
Endosulfan I	BDL	--	--	BDL	--	--	--	--	--	--	--	BDL
cis-chlordane	2.24	--	--	0.87	--	--	--	--	--	--	--	2.05
trans-nonachlor	0.39	--	--	0.12	--	--	--	--	--	--	--	BDL
Dieldrin	BDL	--	--	0.53	--	--	--	--	--	--	--	1.65
4,4-DDE	3.04	--	--	0.74	--	--	--	--	--	--	--	4.27
2,4-DDD	BDL	--	--	BDL	--	--	--	--	--	--	--	BDL
Endrin	11.10	--	--	BDL	--	--	--	--	--	--	--	BDL
Endosulfan II	BDL	--	--	BDL	--	--	--	--	--	--	--	BDL
4,4-DDD	BDL	--	--	BDL	--	--	--	--	--	--	--	2.48
cis-nonachlor	BDL	--	--	0.20	--	--	--	--	--	--	--	BDL

Table 11. Organochlorine pesticides concentrations (ng/g dry wgt).

Organochlorines (ng/g dry)	24	25	26	27	28	29	30	31	32	33	34	35
alpha-HCH	BDL	--	--	--	--	--	--	BDL	BDL	--	--	BDL
hexachlorobenzene	2.23	--	--	--	--	--	--	5.72	0.45	--	--	0.57
beta-HCH	BDL	--	--	--	--	--	--	BDL	BDL	--	--	BDL
heptachlor	BDL	--	--	--	--	--	--	2.16	BDL	--	--	BDL
heptachlor epoxide	BDL	--	--	--	--	--	--	BDL	BDL	--	--	BDL
trans-chlordane	1.91	--	--	--	--	--	--	9.53	4.65	--	--	4.38
2,4-DDE	BDL	--	--	--	--	--	--	4.94	BDL	--	--	BDL
Endosulfan I	BDL	--	--	--	--	--	--	BDL	BDL	--	--	BDL
cis-chlordane	2.06	--	--	--	--	--	--	11.17	4.03	--	--	3.90
trans-nonachlor	0.45	--	--	--	--	--	--	2.32	0.98	--	--	2.09
Dieldrin	2.36	--	--	--	--	--	--	3.64	2.02	--	--	BDL
4,4-DDE	3.78	--	--	--	--	--	--	8.45	2.87	--	--	BDL
2,4-DDD	BDL	--	--	--	--	--	--	BDL	BDL	--	--	BDL
Endrin	2.90	--	--	--	--	--	--	BDL	BDL	--	--	BDL
Endosulfan II	BDL	--	--	--	--	--	--	BDL	BDL	--	--	BDL
4,4-DDD	4.27	--	--	--	--	--	--	12.22	6.91	--	--	4.85
cis-nonachlor	BDL	--	--	--	--	--	--	BDL	BDL	--	--	BDL

Table 11. Organochlorine pesticides concentrations (ng/g dry wgt).

Organochlorines (ng/g dry)	36	37	38	39	40	41	42	43	44	45	46	47
alpha-HCH	--	BDL	BDL	--	--	--	--	--	BDL	--	BDL	--
hexachlorobenzene	--	0.37	0.14	--	--	--	--	--	2.53	--	3.44	--
beta-HCH	--	BDL	BDL	--	--	--	--	--	BDL	--	BDL	--
heptachlor	--	BDL	BDL	--	--	--	--	--	BDL	--	3.27	--
heptachlor epoxide	--	BDL	BDL	--	--	--	--	--	BDL	--	BDL	--
trans-chlordane	--	0.78	BDL	--	--	--	--	--	3.58	--	8.75	--
2,4-DDE	--	BDL	BDL	--	--	--	--	--	4.35	--	BDL	--
Endosulfan I	--	BDL	BDL	--	--	--	--	--	BDL	--	BDL	--
cis-chlordane	--	0.32	1.45	--	--	--	--	--	2.89	--	3.80	--
trans-nonachlor	--	BDL	0.70	--	--	--	--	--	0.82	--	BDL	--
Dieldrin	--	BDL	BDL	--	--	--	--	--	2.46	--	4.68	--
4,4-DDE	--	1.00	BDL	--	--	--	--	--	6.49	--	5.99	--
2,4-DDD	--	BDL	BDL	--	--	--	--	--	2.10	--	5.75	--
Endrin	--	BDL	BDL	--	--	--	--	--	BDL	--	2.21	--
Endosulfan II	--	BDL	BDL	--	--	--	--	--	BDL	--	2.08	--
4,4-DDD	--	1.14	1.96	--	--	--	--	--	6.35	--	6.31	--
cis-nonachlor	--	BDL	BDL	--	--	--	--	--	BDL	--	1.31	--

Table 11. Organochlorine pesticides concentrations (ng/g dry wgt).

Organochlorines (ng/g dry)	48	49	50	51	52	53	54	55	56	57	58	59
alpha-HCH	--	BDL	--	--	BDL	--	BDL	--	--	--	--	--
hexachlorobenzene	--	0.75	--	--	0.45	--	0.09	--	--	--	--	--
beta-HCH	--	BDL	--	--	BDL	--	BDL	--	--	--	--	--
heptachlor	--	1.19	--	--	BDL	--	BDL	--	--	--	--	--
heptachlor epoxide	--	BDL	--	--	BDL	--	BDL	--	--	--	--	--
trans-chlordane	--	5.47	--	--	2.05	--	0.88	--	--	--	--	--
2,4-DDE	--	BDL	--	--	BDL	--	1.12	--	--	--	--	--
Endosulfan I	--	BDL	--	--	0.23	--	BDL	--	--	--	--	--
cis-chlordane	--	4.16	--	--	BDL	--	0.87	--	--	--	--	--
trans-nonachlor	--	0.99	--	--	BDL	--	BDL	--	--	--	--	--
Dieldrin	--	BDL	--	--	BDL	--	BDL	--	--	--	--	--
4,4-DDE	--	BDL	--	--	1.56	--	0.83	--	--	--	--	--
2,4-DDD	--	2.18	--	--	BDL	--	BDL	--	--	--	--	--
Endrin	--	BDL	--	--	BDL	--	1.48	--	--	--	--	--
Endosulfan II	--	0.53	--	--	BDL	--	2.11	--	--	--	--	--
4,4-DDD	--	6.50	--	--	1.56	--	1.71	--	--	--	--	--
cis-nonachlor	--	BDL	--	--	0.32	--	BDL	--	--	--	--	--

Table 11. Organochlorine pesticides concentrations (ng/g dry wgt).

Organochlorines (ng/g dry)	60	61	62	63	64	65	66	67	68	69	70	71
alpha-HCH	--	--	BDL	--	--	--	--	BDL	--	--	--	--
hexachlorobenzene	--	--	0.41	--	--	--	--	BDL	--	--	--	--
beta-HCH	--	--	BDL	--	--	--	--	BDL	--	--	--	--
heptachlor	--	--	BDL	--	--	--	--	BDL	--	--	--	--
heptachlor epoxide	--	--	0.69	--	--	--	--	BDL	--	--	--	--
trans-chlordane	--	--	BDL	--	--	--	--	0.57	--	--	--	--
2,4-DDE	--	--	BDL	--	--	--	--	BDL	--	--	--	--
Endosulfan I	--	--	BDL	--	--	--	--	BDL	--	--	--	--
cis-chlordane	--	--	BDL	--	--	--	--	BDL	--	--	--	--
trans-nonachlor	--	--	1.55	--	--	--	--	1.51	--	--	--	--
Dieldrin	--	--	BDL	--	--	--	--	0.47	--	--	--	--
4,4-DDE	--	--	2.52	--	--	--	--	BDL	--	--	--	--
2,4-DDD	--	--	BDL	--	--	--	--	BDL	--	--	--	--
Endrin	--	--	BDL	--	--	--	--	BDL	--	--	--	--
Endosulfan II	--	--	BDL	--	--	--	--	BDL	--	--	--	--
4,4-DDD	--	--	BDL	--	--	--	--	0.89	--	--	--	--
cis-nonachlor	--	--	BDL	--	--	--	--	1.38	--	--	--	--

Table 11. Organochlorine pesticides concentrations (ng/g dry wgt).

Organochlorines (ng/g dry)	72	73	74	74J	75	76	77	78	79	80	81
alpha-HCH	BDL	--	BDL	--	--	--	--	--	BDL	--	BDL
hexachlorobenzene	0.79	--	BDL	--	--	--	--	--	0.23	--	0.28
beta-HCH	BDL	--	BDL	--	--	--	--	--	BDL	--	BDL
heptachlor	21.99	--	BDL	--	--	--	--	--	BDL	--	BDL
heptachlor epoxide	BDL	--	BDL	--	--	--	--	--	1.32	--	BDL
trans-chlordane	2.17	--	BDL	--	--	--	--	--	0.45	--	BDL
2,4-DDE	BDL	--	BDL	--	--	--	--	--	BDL	--	BDL
Endosulfan I	BDL	--	BDL	--	--	--	--	--	BDL	--	BDL
cis-chlordane	BDL	--	BDL	--	--	--	--	--	1.74	--	1.07
trans-nonachlor	9.15	--	0.51	--	--	--	--	--	BDL	--	1.04
Dieldrin	BDL	--	0.97	--	--	--	--	--	BDL	--	BDL
4,4-DDE	9.81	--	2.88	--	--	--	--	--	9.21	--	1.69
2,4-DDD	BDL	--	BDL	--	--	--	--	--	BDL	--	BDL
Endrin	BDL	--	BDL	--	--	--	--	--	1.15	--	BDL
Endosulfan II	BDL	--	BDL	--	--	--	--	--	1.33	--	BDL
4,4-DDD	BDL	--	1.89	--	--	--	--	--	BDL	--	BDL
cis-nonachlor	0.31	--	BDL	--	--	--	--	--	0.34	--	BDL

Table 12. Mean values and ranges of concentrations for organic compounds and metals.

Compound	Mean	Lowest Value	Highest Value
Polycyclic Aromatic Hydrocarbons (ppb dry weight)			
Napthalene	640.4	14.1	7727
Azulene	Not Detect.		
2MeNapthalene	313.3	3.6	1507
1MeNapthalene	131.1	2.0	696
Acenapthylene	169.3	1.4	1788
Biphenyl	103.5	1.8	789
Acenapthene	148.7	3.3	3742
Fluorene	105.0	2.0	389
Phenanthrene	647.3	11.4	4399
Anthracene	272.5	3.4	1578
1Mefluorene	49.3	0.7	221
4,5-Methylenephenanthrene	125.5	1.6	572
2Methylphenanthrene	153.6	1.1	916
2Methylanthracene	75.0	1.6	273
1Methylanthracene	123.9	1.0	493
1Methylphenanthrene	97.9	1.3	628
9Methylanthracene	7.2	0.3	43
Fluoranthene	1089.1	10.9	5699
Pyrene	1038.6	12.1	4798
3,6Dimethylphenanthrene	39.7	0.2	245
9,10,dimethylanthracene	29.8	3.9	98
Benzo[a]fluorene	212.4	4.7	871
Benzo[b]fluorene	180.4	0.6	761
Benz[a]anthracene	533.6	3.4	2576
Chrysene + Triphenylene	589.7	4.1	3149
Napthacene	91.8	1.0	489
Benzo[b]fluoranthene	809.6	9.1	3690
Benzo[k]fluoranthene	575.2	2.1	2175
Benzo[e]pyrene	458.4	7.1	1857
Benzo[a]pyrene	692.1	5.8	2766
Perylene	270.5	2.4	845
Dimethylbenz[a]anthracene	18.0	0.9	93
3Methylcholanthrene	13.1	0.2	127
Indeno[1,2,3-c,d]pyrene	780.2	2.2	3999
Benzo[g,h,i]perylene	540.5	4.2	2478
Anthanthrene	114.9	1.7	735
Dibenz[a,h+ac]anthracene	66.1	1.9	303
Coronene	118.8	1.6	579
Retene	76.2	1.0	573
Total PAHs (ppb dry wgt)	11457	116	47259
Total PCBs (ppb dry weight)	262	8	2148

Compound	Mean	Lowest Value	Highest Value
Metals (ppm dry weight)			
Cd	2.24	0.01	18
Cr	357	6	1831
Cu	168	5	532
Fe	5.58	0.01	15
Mn	1312	310	3965
Ni	64.8	3.2	158
Pb	154	1	1014
Zn	644	40	2575
Hg (ppb)	451	4	3125
Organochlorines (ppb dry weight)			
alpha-HCH	Not Detect.		
hexachlorobenzene	1.60	0.09	8.2
beta-HCH	Not Detect.		
heptachlor	7.15	1.19	22.0
heptachlor epoxide	0.90	0.68	1.3
trans-chlordane	2.88	0.45	9.5
2,4-DDE	3.47	1.12	4.9
Endosulfan I	0.23	0.23	0.2
cis-chlordane	2.74	0.32	11.2
trans-nonachlor	1.46	0.12	9.2
Dieldrin	2.13	0.47	4.7
4,4-DDE	3.87	0.74	9.8
2,4-DDD	3.34	2.10	5.8
Endrin	3.26	0.71	11.1
Endosulfan II	1.51	0.53	2.1
4,4-DDD	3.88	0.89	12.2
cis-nonachlor	0.64	0.20	1.4

Table 13. Frequency (out of a possible of 23 sites) of detection of organochlorine pesticides

Compound	*Frequency*	*Detection Limit (ng)*
alpha-HCH	0	0.07
HCB	20	0.04
beta-HCH	0	0.07
heptachlor	4	0.07
heptachlor epoxide	3	0.06
trans-chlordane	17	0.06
2,4-DDE	3	0.10
Endosulfan I	1	0.07
cis-chlordane	16	0.06
t-nonachlor	16	0.06
Dieldrin	11	0.10
4,4-DDE	19	0.07
2,4-DDD	3	0.10
Endrin	6	0.10
Endosulfan II	4	0.08
4,4-DDD	16	0.10
cis-nonachlor	6	0.04

Table 14. Mean concentration values and ranges from this study (1996) and those summarized in MDE's 1994 Report on Contaminants in Chesapeake Bay Sediments (1984-1991)

Compound	BSM Study		MDE-1991	
	Mean	Range	Mean	Range
Metals				
	ppm dry wgt	*ppm dry wgt*	*ppm dry wgt*	*ppm dry wgt*
Cadmium	2.24	0.01-17.6	1.3	0.7-4
Chromium	357	6-1830	297	162-520
Copper	168	5-532	121	65-191
Lead	154	1-1014	124	78-194
Mercury	0.45	0.004-3.13	0.4	0.3-0.6
Nickel	64.8	3-157	56	42-113
Zinc	644	40-2580	476	353-681
Polycyclic Aromatic Hydrocarbons				
	ppb dry wgt	*ppb dry wgt*	*ppb dry wgt*	*ppb dry wgt*
Anthracene	273	3-1580	200	80-930
Benzo[a]Anthracene	533	3-2580	470	230-1900
Benzo[b]Fluoranthene	810	10-3690	700	310-3000
Benzo[k]Fluoranthene	575	2-2170	440	90-1350
Benzo[g,h,i]Perylene	541	4-2480	800	100-4000
Benzo[a]Pyrene	692	7-2770	610	150-3000
Chrysene	590	4-3148	250	180-370
Fluoranthene	1090	11-5700	900	200-4000
Indeno[1,2,3-cd]Pyrene	780	2-4000	240	70-610
Naphthalene	640	14-7730	220	130-350
Phenanthrene	647	11-4400	160	110-320
Pyrene	1040	12-4800	2200	200-7000
Organochlorines				
	ppb dry wgt	*ppb dry wgt*	*ppb dry wgt*	*ppb dry wgt*
Hexachlorobenzene	1.38	0.1-8.22	not avail.	2.4-68.9
Cis-Chlordane	2.74	0.32-11.2	not avail.	1.4-12.2
Dieldrin	2.13	0.47-4.68	not avail.	5.7-6.1
Trans-Chlordane	2.88	0.45-9.53	not avail.	10.2
Heptachlor	7.15	1.2-22	not avail.	3.3

Table 15. Comparison of t-PCB and t-PAH concentration ranges from this study to those from previous studies in Baltimore Harbor and other estuarine waters.

Location	PCBs ng/g dw	PAHs ng/g dw	Reference
Baltimore Harbor	8-2150	100-50000	This Study
Baltimore Harbor	4-80000	No Data	US EPA (1987)
Baltimore Harbor	140-670	6000-27000	Nakanishi (1996)
Washington, D.C.	68-2200	4000-29000	Wade et al. (1994)
Mainstem Chesapeake Bay	0.4-60	1.2-4500	Nakanishi (1996)
Casco Bay, Maine	0.4-485	16-20800	Kennicutt et al. (1994)
Biscayne Bay, Florida	4-203	0.5-43.5	Gassman et al. (1994)

Table 16. ER-L and ER-M concentrations for selected PAHs, t-PCB, selected metals and organochlorine pesticides.

Compound	ER-L	Percent of Sites Exceeding ER-L	ER-M	Percent of Sites Exceeding ER-M
Polycyclic Aromatic Hydrocarbons (ppb dry weight)				
Napthalene	160.0	81	2100	4
2MeNapthalene	70.0	92	670	9
Acenapthylene	44.0	76	640	3
Acenapthene	16.0	95	500	5
Fluorene	19.0	94	540	0
Phenanthrene	240.0	90	1500	8
Anthracene	85.3	87	1100	5
Fluoranthene	600.0	76	5100	3
Pyrene	665.0	70	2600	8
Benz[a]anthracene	261.0	81	1600	6
Chrysene + Triphenylene	384.0	66	2800	3
Benzo[a]pyrene	430.0	67	1600	8
average		*81*		*5*
Total PCBs (ppb dry weight)	23	99	180	40
Metals (ppm dry weight)				
Cd	1.2	44	9.6	1
Cr	81	94	370	24
Cu	34	93	270	15
Ni	20.9	94	52	21
Pb	47	89	218	21
Zn	150	93	410	70
Hg	0.15	76	0.71	19
Organochlorines (ppb dry weight)				
4,4-DDE	2.20	56	27.0	0
Chlordanes (cis and trans)	0.5	91	6	22
Dieldrin	0.02	52	20	0