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Atmospheric Deposition of PCBs, PAHs, Trace Metals and Nitrogen to the Hudson River Estuary

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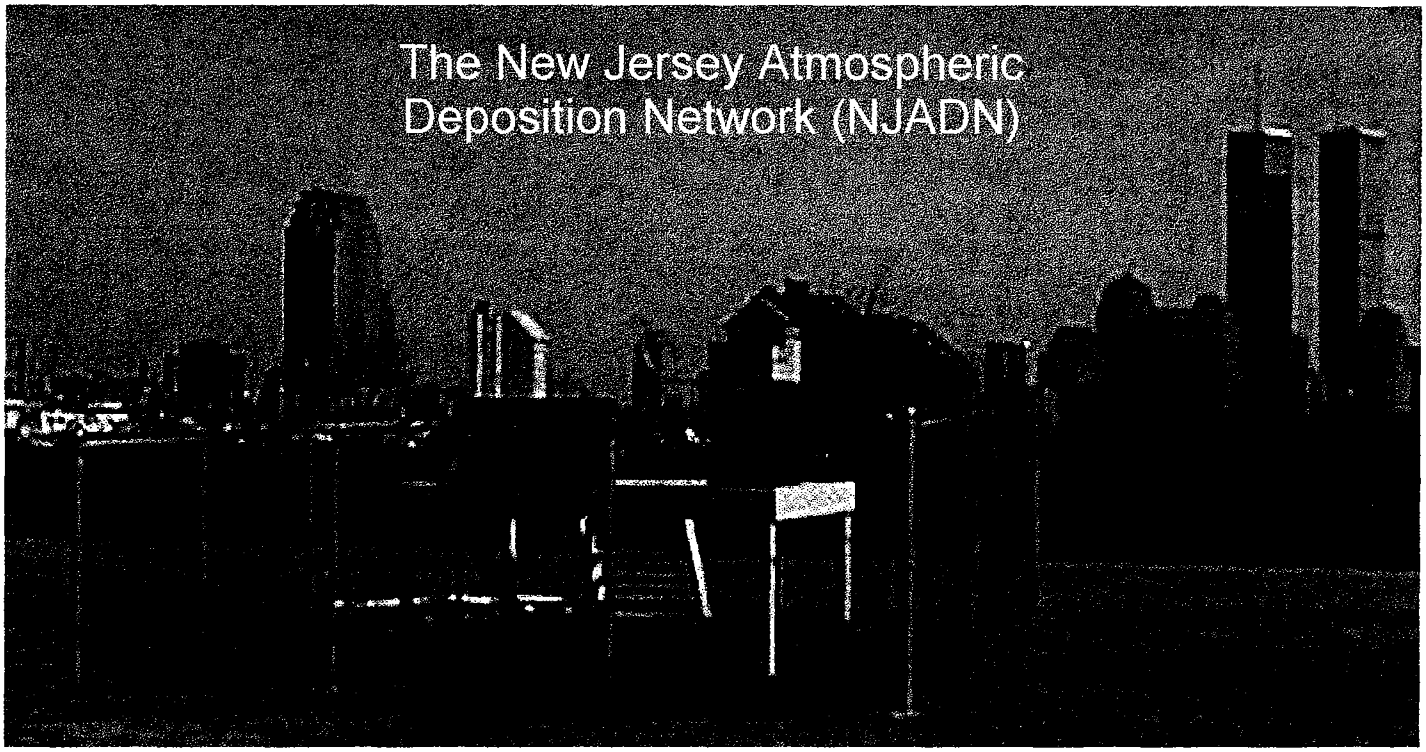

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* **Paul Brunciak** was killed in a swimming accident on November 20, 2000 in Australia within two months of the completion of his Ph.D. thesis. He assisted in the initial development of NJADN and its implementation.

Atmospheric Deposition of PCBs and PAHs to the NY-NJ Harbor Estuary

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Abstract

The first estimates of atmospheric deposition fluxes of PCBs and PAHs to the NY/NJ Hudson Estuary are presented. As part of the New Jersey Atmospheric Deposition Network, concentrations of PCBs and PAHs were measured at three sites near the estuary in air, aerosol, and precipitation at regular intervals from October, 1997 through December, 1999. Atmospheric deposition fluxes (combined gas absorption, dry particle deposition, and wet deposition) at the three sites ranged from 7.3-40 ug m^{-2} y^{-1} for ΣPCBs and from 1400-6400 ug m^{-2} y^{-1} for the sum of 36 individual PAHs. These depositional fluxes are at least 2-10 times those estimated for Great Waters similarly adjacent to urban areas, such as the Chesapeake Bay and Lake Michigan. Such high depositional fluxes are due the to location of the Harbor Estuary, within the urban/industrial complex of northern

New Jersey and New York City. Inputs of PCBs to the estuary from the Hudson River and from wastewater treatment plants are 8-18 times atmospheric inputs. In addition, volatilization of PCBs from the estuary exceeds atmospheric deposition by at least an order of magnitude.

Introduction

Wet deposition via rain and snow, dry deposition of fine/coarse particles, and gaseous air-water exchange are major pathways for persistent organic pollutant (POP) input to the Great Waters such as the Great Lakes and Chesapeake Bay *(1, 2)*. Such depositional processes are especially important for aquatic systems that have large surface areas relative to watershed areas (e.g., Great Lakes; coastal seas). Many urban/industrial centers are located on or near coastal estuaries (e.g., NY-NJ Harbor Estuary (HE) and NY Bight) and the Great Lakes (e.g., Chicago, IL and southern Lake Michigan). Emissions of pollutants into the urban atmosphere are reflected in elevated local and regional pollutant concentrations and localized intense atmospheric deposition that are *not* observed in the regional signal *(3, 4)*. The HE has been impacted by anthropogenic inputs of PCBs from wastewater discharges *(5)* and from historical contamination of the upper Hudson River *(6)*. Because of its long history of contamination and its economic and environmental importance, the fate and transport of POPs in the Harbor Estuary are areas of major study *(7-9)*. The New Jersey Atmospheric Deposition Network (NJADN) was implemented in 1997 as a research and monitoring network to assess the magnitude of atmospheric deposition of POPs, especially polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs).

Concentrations in the air, aerosol, and precipitation at three land-based sites surrounding the HE were measured from late 1997 through December 1999.

The NJADN design is based on the well-developed experience in the Great Lakes and Chesapeake Bay. The Integrated Atmospheric Deposition Network (IADN) operating in the Great Lakes *(3, 4)* and the Chesapeake Bay Atmospheric Deposition Study (CBADS) *(10)* were designed to capture the *regional* atmospheric signal, and thus sites were located in background areas away from local sources. However, many urban/industrial centers are located on or near water bodies. The southern basin of Lake Michigan and the Chesapeake Bay are two such locations subject to contamination by air pollutants such as PCBs and PAHs, Hg and trace metals *(1)* because of their proximity to industrialized and urbanized areas *(11-21)*. Based on this experience in the Great Lakes and Chesapeake Bay, NJADN was designed to capture both the urban and regional signals of air pollution in the vicinity of the LHRE by locating monitoring sites in urban, suburban, and coastal environments.

In additional to receiving atmospheric inputs of POPs, water bodies may be sources of contaminants to the local and regional atmosphere representing losses to the water column. This has been demonstrated in the HE for PCBs *(22)* and nonylphenols *(23)* and chlorinated dioxins and furans *(24)*. For this reason, the NJADN project also encompassed simultaneous measurements of POPs in the air and water of Raritan Bay (RB) and New York Harbor (NYH) in July of 1998 to estimate the dynamic air-water exchange fluxes of PAHs *(22)* and PCBs *(25)*.

The objectives of this work are to estimate the atmospheric wet, dry particle and gas absorptive fluxes of PCBs and PAHs to the HE, and to provide an initial assessment of their relative importance.

Methods

Three monitoring and research sites were established at New Brunswick (NB), Sandy Hook (SH), and Liberty Science Center (LS) in Jersey City, NJ (Figure 1). In October, 1997, sample collection was initiated at NB (40.48N,74.43W), which was designed as a suburban master site located near the New Brunswick meteorological station (Rutgers Gardens) of Rutgers University. Sample collection at SH (40.46N,74.00W), began in February, 1998. SH is located south of the NY area and Manhattan and reflected the coastal marine influence on atmospheric deposition. Sample collection at LS (40.71N,74.05W) was initiated in October 1998. LS is located in the heart of the urban/industrial area across the Hudson River from New York City. Meteorological data were obtained for the LS site from the National Oceanic and Atmospheric Administration (NOAA) meteorological station located at the Newark International Airport 10 km from Jersey City. For SH, data from the NOAA station at John F. Kennedy International Airport 15 km away was used, and for NB meteorological data was obtained from the station at Rutgers University. During July 1998, simultaneous air and water samples were taken aboard the *R/V Walford* over 5 days at a site in the Raritan Bay (RB) west of Sandy Hook (40.30°N/74.05°W) from 07/05-07/98, and in New York Harbor (NYH) at the mouth of the Hudson River (39.17°N/74.02°W) west of Manhattan.

Details of sample collection, preparation, extraction and analysis can be found elsewhere *(22, 24-27)* and will be summarized here. Air samples (24 hours) were collected at either 9 or 12 day frequencies using a modified high volume air sampler (Tisch Environmental, Village of Cleves, OH, USA) with a calibrated airflow of ~0.5 m^3 min^{-1}. Quartz fiber filters (QFFs; Whatman) were used to capture the particulate phase and polyurethane foam plugs (PUFs) were used to capture the gaseous phase. QFFs were weighed before and after sampling to determine total suspended particles (TSP). Water samples during the 1998 field experiment were collected *in situ* (1.5 m depth) using an Infiltrex 100 sampling system at a flow rate of ~400 mL min^{-1} yielding volumes of 23-49 L. Glass fiber filters (GFFs; Whatman) with a nominal pore size of 0.7 μm were used to capture total suspended matter (TSM) and XAD-2 resin (Amberlite) was used to capture the dissolved phase. Wet-only integrating precipitation samplers were employed (Meteorological Instrument Center, MIC, Richmond Hill, Ontario, Canada) to collect integrated precipitation samples over 12-24 days in a 0.212 m^2 stainless steel funnel that drained through a glass column containing XAD-2 resin.

Analytical Procedures. Samples were injected with surrogate standards before extraction. For PCBs the surrogates were 3,5 dichlorobiphenyl (#14), 2,3,5,6 tetrachlorobiphenyl (#65), 2,3,4,4',5,6 hexachlorobiphenyl (#166), and for PAHs the surrogates were d_{10}-anthracene, d_{10}-fluoranthene, and d_{12}-benzo[e]pyrene. Samples were extracted in Soxhlet apparati for 24 hours in petroleum ether (PUFs), dichloromethane (QFFs and GFFs), and 1:1 acetone:hexane (XAD). For XAD samples, the extracts were then liquid-liquid extracted in 60 mL Milli-Q® water. The aqueous fractions were back-extracted with 3 × 50 mL hexane in separatory funnels with 1 g sodium chloride. These extracts, as well as extracts from all other types of sampling media, were then reduced in volume by rotary evaporation and subsequently concentrated via N_2 evaporation. The samples were then fractionated on a column of 3% water-deactivated alumina. The PCB fraction was eluted with hexane, concentrated under a gentle stream of nitrogen gas, and injected with internal standard containing PCB #30 (2,4,6-trichlorobiphenyl) and #204 (2,2',3,4,4',5,6,6'-biphenyl) prior to analysis by gas chromatography (GC). PCBs were analyzed on an HP 5890 gas chromatograph equipped with a ^{63}Ni electron capture detector using a 60-m 0.25 mm i.d. DB-5 (5% diphenyl-dimethyl polysiloxane) capillary column with a film thickness of 0.25 μm *(27)*.

The PAH fraction was eluted with 2:1 dichloromethane:hexane, and injected with internal standard solution consisting of d_{10}-phenanthrene, d_{10}-pyrene, and d_{12}-benzo[a]pyrene. The PAHs were analyzed on a Hewlett Packard 6890 gas chromatograph (GC) coupled to a Hewlett Packard 5973 Mass Selective Detector (MSD) operated in selective ion monitoring (SIM) mode. The column used was a 30 m × 0.25mm i.d., J&W Scientific 122-5062 DB-5 (5% diphenyl-dimethylpolysiloxane) capillary column with a film thickness of 0.25 μm.

Quality Assurance Key quality assurance parameters are listed in Table 1. Recovery of surrogate standards, which were typically better than 90%, were used to correct individual compound concentrations for surrogate recoveries. Several PUFs were cut in half before deployment in the field in order to quantify gas phase break-through. The bottom half PUF contained on average (n=3) 13% and 12% of the total mass of PCBs and PAHs, respectively. For PCBs, the bottom half PUF contained on average less than 10%

of each individual congener (n=3), except for the trichloro PCBs, for which a maximum of 31% was found in the bottom half PUF.

Field blanks and matrix spikes were used for quality control purposes. Detection limits were determined from field blanks by taking the mean of the mass detected in all field blanks plus three times the standard deviation about the mean. The detection limit in mass units may be converted to concentration by dividing by the sample volume, which varies with each sample. Typical samples volumes are presented in Table 1. No significant differences were observed between masses of PCBs of PAHs measured in field blanks collected at the different sampling sites. Thus one detection limit was calculated which applies to all sites.

Because the concentrations of PCBs in the lab blanks were low, gas-phase PCB concentrations were corrected for surrogate recoveries but not for laboratory blanks. For PAHs, laboratory blank masses for PUFs and QFFs accounted for 0.2 to 9.3% of the total PAH (36 compounds) mass in air samples and 0.2 to 1.2% for GFFs and were subtracted from sample masses to remove the contribution of contamination occurring in the laboratory.

Framework for Deposition Calculations. Dry deposition describes the process of aerodynamic transport of a particle to the near-surface viscous sub-layer where diffusion, turbulent diffusion and gravitational settling deliver the particle to the surface. Water surfaces generally act as perfect receptors and no "bounce-off" occurs, whereas terrestrial surfaces are less efficient. Particle deposition depends on properties of the atmosphere (wind speed, humidity, stability, temperature), the water surface (waves, spray, salt content) or dry land surface, and the depositing particles (size, shape, density, reactivity, solubility, hygroscopicity). The last may be especially important as humidity nears 100% near water surfaces permitting particles to absorb water, increase in density and size, and achieve higher deposition velocities (V_d). Zufall et al. *(28)* provide convincing evidence that particle deposition is dominated by large particles although atmospheric particle size distributions are dominated by particles less than 1 um mass median diameter (mmd). Thus we selected a value for the V_d of 0.5 cm/s that reflects the disproportionate influence that large particles have on atmospheric deposition, especially in urbanized and industrialized regions *(15, 29, 30)*. Therefore, the dry deposition flux is calculated as:

$$F_{dry\ part} = V_d C_{part} \tag{1}$$

where F is the flux in ng m^{-2} d^{-1}, and C_{part} is the seasonal average particle concentration of the POP in ng m^{-3}.

Wet deposition describes the process by which gases and particles are scavenged from the atmosphere (in cloud or below cloud) by raindrops and delivered by falling hydrometeors to the ground. Deposition of gases and particles by rain may be estimated from the fraction of the chemical in the particle and gas phase (f_{part}, f_{gas}), the total atmospheric concentration (C_T), the precipitation intensity (P), Henry's law constant as a function of temperature (H), and the particle scavenging coefficient ($W_{particle}$ or W_{gas}):

$$F_{wet,gas} = W_{gas} f_{gas} C_T P \tag{2}$$

$$F_{wet,particle} = W_{particle} f_{particle} C_T P \tag{3}$$

where W_{gas} = RT/H and $W_{particle}$ varies from 10^2 to 10^5 *(31)*. Due to the uncertainties inherent in the magnitude of scavenging coefficients, wet deposition was quantified by collecting rainfall at the sites, measuring the contaminant concentrations, and calculating seasonal wet chemical deposition. Thus wet fluxes (F_{wet}) were estimated as seasonal deposition at each site as follows:

$$F_{wet} = C_{VWM}\, P \qquad (4)$$

where C_{VWM} is the seasonal volume-weighted mean concentration of the POP in precipitation.

Calculations of absorptive gas fluxes ($F_{gas,abs}$) are described in references *(18, 19, 22, 25, 32-34)* and will be summarized here. The modified two-layer model used assumes that the rate of gas transfer is controlled by the compound's ability to diffuse across the water and air layer on either side of the air-water interface. The molecular diffusivity of the compound (dependent on the amount of resistance encountered in the liquid and gas films) describes the rate of transfer while the concentration gradient drives the direction of transfer. The overall flux calculation is defined by:

$$F_{gas,net} = K_{OL}\left(C_d - \frac{C_a}{H'}\right) \qquad (5)$$

where $F_{gas,net}$ is the net flux (ng m^{-2} d^{-1}), K_{OL} (m d^{-1}) is the overall mass transfer coefficient, and (C_d-C_a/H') describes the concentration gradient (ng m^{-3}); C_d (ng m^{-3}) is the dissolved phase concentration of the compound in water; C_a (ng m^{-3}) is the gas phase concentration of the compound in air which is divided by the dimensionless Henry's Law Constant, H', H'= H/RT; R is the universal gas constant (8.315 Pa m^3 K^{-1} mol^{-1}); H is the temperature and salinity-corrected Henry's Law Constant (Pa m^3 mol^{-1}); and T is the temperature at the air-water interface (K). For PCBs, values for H and its temperature dependence (ΔH_H) were taken from Bamford et al. *(35, 36)*. For PAHs, H values were estimated based on correlations between boiling point and the H values of Bamford et al., *(37)*. These values are presented in ref *(22)*. The net flux is divided into volatilization and absorption terms as follows:

$$\text{Volatilization} = K_{OL}\, C_d \quad (6)$$

$$\text{Absorption} = K_{OL}\, C_a/H' \quad (7)$$

In this study, only the absorptive gas flux was calculated from gas-phase POP concentrations measured at the land-based sites, because C_d was not available.

The overall mass transfer coefficient, K_{OL}, comprises resistances to mass transfer in both the water (k_a) and air (k_w):

$$\frac{1}{K_{OL}} = \frac{1}{k_w} + \frac{1}{k_a H'} \quad (8)$$

The mass transfer coefficients (k_a and k_w) have been empirically defined based upon experimental studies using tracer gases such as CO_2, SF_6, and O_2 (see refs. *(38)* and *(39)* for a review). These tracer experiments identified the importance of increasing wind speed on gas exchange rates. The air-side mass transfer coefficient for water (k_a (H_2O) in cm s^{-1}) was calculated from the following relation (where u_{10} is the wind speed in m s^{-1} at 10 meters):

$$k_a(H_2O) = 0.2u_{10} + 0.3 \quad (9)$$

This relation, recommended by Schwarzenbach *et al. (39)*, has been used by many researchers in estimating air-water exchange fluxes *(18, 19, 32-34)*. The quadratic relationship of Wanninkhoff was used to predict k_w in this study *(38)*:

$$k_w(CO_2) = 0.45{u_{10}}^{1.64} \quad (10)$$

Differences in molecular diffusivity between these gases and PCBs and PAHs were then used to estimate k_a and k_w for PCBs and PAHs. Unlike dry particle and wet depositional fluxes, calculation of $F_{gas,abs}$ requires knowledge of air and water temperature and wind speed. For this reason, $F_{gas,abs}$ was calculated separately for each day of sample collection and the results averaged to yield a seasonal estimate of $F_{gas,abs}$.

Results and Discussion

Air Temperatures, Wind Speed, and Precipitation

Calculation of dry particle deposition, wet deposition and gas absorptive fluxes of target organic chemicals to the NY-NJ Harbor Estuary requires knowledge of the air temperatures and wind speeds at the three sites surrounding the HE (NB, SH, LS), and the mean surface skin temperature of the water body. The mean daily air temperatures ranged from approximately 0°C in the winter to 22-25 °C in the summer. Specific meteorological data for each site are given the Table 1 of Supporting Information. The mean daily surface skin temperature in the open estuary, determined by remote sensing in the IR band, follows the air temperature closely as expected due to coupling of the air and water *(40)*. For this reason, air temperatures were used to calculate gas absorption. The mean daily wind speeds at the SH and LS sites on the estuary were higher than at the land-locked NB site on all sampling days, yielding conservative estimates of exchange at the latter. Typical daily mean wind speeds at NB were generally ~ 2-4 m s^{-1} whereas wind speeds at the other sites ranged from 2 to as much as 12 m s^{-1} depending on storm activity, season, and sea breezes.

Precipitation intensity or volume was summed over the four seasons of winter (Dec-Feb), spring (March-May), summer (June-August), and fall (September-November) and are given in Table 2 of Supporting Information. The volume of collected precipitation per sampling interval varied from 0.04 to 67 L. The mean annual precipitation (30-year average) for the HE is ~1.1 m y^{-1} (http://climate.rutgers.edu/stateclim/ norms/precip.html). Precipitation intensity over the study period ranged from 0.9 m y^{-1} at NB to 1.68 m y^{-1} at the LS, the latter being mostly due to locally intense summer rains.

Polychlorinated Biphenyls (PCBs)

Tables 2-4 present seasonally-averaged PCB concentrations in the gas, particle, and precipitation phases at each of the three sites. Before presenting the estimates of atmospheric deposition derived from these data, trends in atmospheric concentrations of PCBs will be briefly examined.

Gaseous concentrations of ΣPCB at NB varied from 39 to 2,300 pg m^{-3} and from 80 to 1,000 pg m^{-3} at SH. These ranges are similar to those reported by Brunciak et al. *(27)* for the same sites over a shorter reporting period (ending April 1999, versus December 1999 for this report). The additional eight months of data included in this report allow a more comprehensive assessment of the dynamics of atmospheric PCB concentrations at LS, where gas-phase concentrations ranged from 96 to 3,500 pg m^{-3}. Gas-phase concentrations were lower at SH than at NB on 29 of 37 sampling days. Gas-phase concentrations were higher at LS than at NB on all sampling days. These concentrations are higher that those measured by other researchers at rural sites such in Hazelrigg, UK *(41)*, in the Great Lakes at IADN; refs *(3, 42, 43)*), and those measured over the water of the Chesapeake Bay *(19, 44)*. (See Brunciak et al. *(27)* for a summary). Gas-phase ΣPCB concentrations measured over water during July 1998 were highest at LS, lower over Raritan Bay and New York Harbor, and lowest at coastal SH *(25)*. Although the temporal trends of total concentrations were different at the three sites, Brunciak et al. *(27)* previously noted that the PCB congener profiles were similar, implicating a dominant emission type and/or process. The larger data set reported herein further supports this conclusion.

At NB, SH, and LS, temperature explained 35%, 56%, and 54% of the total variability in gas-phase PCB concentrations, respectively. The lesser importance of temperature on PCB concentrations at NB in this study is in contrast to the conclusion of Brunciak et al. *(27)* that temperature explained >50% of the total variability in gas-phase PCB concentrations at all sites *(27)*. This difference is largely due to the inclusion of 4 samples taken during the winter of 1998-1999 which displayed the lowest concentrations of PCBs measured at that site. These concentrations were significantly lower than would be predicted from the ln P vs. 1/T relationship. At each site, Brunciak et al. *(27)* used the following relation to investigate the influence of wind speed (u in m s^{-1}) and direction (wd in degrees) on gas-phase PCB concentrations (C_{gas}):

$$\ln C_{gas} = a_0 + a_1/T + a_2 \ln(1/u) + a_3 \sin(\mathrm{wd}) + a_4 \cos(\mathrm{wd}) \quad (11)$$

Where a_x values are fitting parameters. This multiple linear regression reveals that T alone is a significant predictor of gas-phase PCB concentrations at NB, LS, and SH at the 95% confidence level. This is in contrast to the previous reports of Brunciak et al. *(27)*, who noted that atmospheric PCB concentrations at NB increased when winds blew from an east-northeast vector, while increased wind speeds led to a 20-40% dilution.

Particle phase PCBs represent from 0.6 to 45% of the total concentration (gas + particle), with higher percentages occurring during colder sampling periods due to the decrease in vapor pressure of PCB congeners at lower temperatures increasing sorption onto airborne particles. As with gas phase concentrations, particulate concentrations of

ΣPCBs were highest at LS and lowest at SH on the majority of sampling days. Particulate concentrations ranged from 7.1 to 164 pg m^{-3} at LS, from 4.2 to 142 pg m^{-3} at NB, and from 0.66 to 44 pg m^{-3} at SH.

Concentrations of ΣPCBs in precipitation varied from 0.27 to 106 ng L^{-1} at the three sites. Highest concentrations were measured in the smallest (by volume) precipitation samples, as expected due to efficient scavenging of gases and particles at the onset of the precipitation event. Thus concentrations presented in Tables 2-4 are seasonal volume-weighted means. These range from 9.8 to 0.46 ng L^{-1} with highest concentrations typically occurring in winter.

Tables 2-4 also present a summary of the dry particle deposition, wet deposition and gas absorption of ΣPCBs and PCB homologues seasonally at LSC, NB and SH (ng m^{-2} d^{-1}). These are the first comprehensive estimates of atmospheric PCB deposition to the NY-NJ Harbor Estuary and the Lower Hudson River Estuary. The gaseous PCB concentrations at NB were included in the calculation of gas absorption into the HE because it is close to the Raritan River and is thus part of the estuary. However, lower wind speeds at NB when compared against open water sites result in lower apparent PCB gas absorptive fluxes at NB. All three depositional processes combined result in fluxes of 40, 7.3, and 15 ug m^{-2} y^{-1} at LS, NB, and SH, respectively. Gas absorption is by far the largest component of atmospheric deposition at LS and SH, but is similar to particle deposition at NB. Dry particle and wet deposition fluxes of PCBs are highest at LS and lowest at SH. Gas absorption fluxes, however, are lowest at NB, despite higher gas-phase PCB concentrations, due to lower winds speeds. No clear seasonal trends in deposition are evident. This lack of seasonality arises in part because low T during the winter has two effects which partially negate each other: Henry's law constants decrease with decreasing T *(35, 36)*, resulting in an increased tendency toward gas absorption, and gas-phase PCB concentrations are also lower during the cold winter months, with lower concentrations available for gas absorption.

The estimated fluxes of ΣPCBs to the HE may be compared with those estimated for other aquatic systems. The sum of wet and dry particle deposition of ΣPCBs to the Chesapeake Bay estimated from CBADS data *(1)* and for the Great Lakes from IADN data *(3, 4)* are 1.8-3.3 and 1.0-2.5 ug m^{-2} y^{-1}, respectively. Comparing only wet and dry particle deposition amongst the systems, the HE is loaded at a rate of approximately 2 to 10 times these aquatic systems. At LS and SH, gaseous deposition of ΣPCBs dominates the overall depositional flux. Lower air concentrations of ΣPCBs in the Great Lakes and Chesapeake Bay areas suggest that gas deposition fluxes to these waters are not likely to exceed those to the HE *(3, 11, 19, 42-44)*. Thus it is likely that the overall atmospheric deposition fluxes of PCBs to the HE are at least 2 – 10 times those experienced in the Great Lakes and Chesapeake Bay.

Compared with other inputs of PCBs to the HE, atmospheric deposition is small (Figure 2). Twenty-six water pollution control plants discharge 88 kg of PCBs per year to the HE *(5)*. Farley et al. *(7)* estimate that in 1997 at least 180 kg y^{-1} was advected into the estuary from the Hudson River. Assuming that the plume of atmospheric contamination extends throughout the Raritan Bay and the New York/New Jersey Harbor area, the current estimates of atmospheric deposition result in about 10 kg y^{-1} of ΣPCBs being deposited into the estuary.

The high concentrations of PCBs in the water column of the HE coming from upstream flow in the Hudson River, other tributary inputs, and discharges from waste water treatment facilities contribute to a large volatilization flux *(25)*. Totten et al. *(25)* report the absorptive, volatilization and net fluxes of PCBs from the HE for July 1998 based on simultaneously measured air and water concentrations of PCBs in Raritan Bay and New York Harbor. In Raritan Bay, the depositional flux (ΣPCBs) averaged –25 ng m^{-2} d^{-1}, similar to the gas deposition fluxes estimated for the LS and SH sites. However, the volatilization flux averaged +420 ng m^{-2} d^{-1}, swamping the depositional flux. Tri- and tetra-chlorinated PCBs constitute more than 85% of the volatilization signal. Congeners containing 6-9 chlorines were near equilibrium with respect to air-water exchange. It is difficult to extrapolate these results, based on a limited number of samples in one season, to obtain a larger picture of the cycling of PCBs in the HE. However, net air-water exchange fluxes of PCBs are expected to remain positive throughout the year due to the large water-air fugacity gradient and relatively constant seasonal water concentrations *(25)*. Volatilization of PCBs from the estuary is likely to remain greater than atmospheric deposition (wet, dry particle, and gaseous deposition) throughout the year, suggesting that the estuary acts as a net source of PCBs to the local atmosphere, consistent with the conclusions reached by Brunciak *(45)*.

Polycyclic Aromatic Hydrocarbons (PAHs)

Atmospheric concentrations were measured for 36 individual PAHs with molecular weights ranging from 166 (fluorene) to 300 g mol^{-1} (coronene). The seasonal average concentrations for the 36 PAH compounds in the gas and particle phases and precipitation are presented in Tables 2-4. Total gas phase PAHs, defined as the sum of the gas phase concentrations of the 36 measured PAHs, at the suburban NB site ranged from 3.2 to 84 ng m^{-3}. Total gas phase PAHs were higher at the urban/industrial LS site where concentrations ranged from 7.5 to 92 ng m^{-3}. Concentrations were lowest at the coastal SH site (ranging from 0.45 to 52 ng m^{-3}) due to its location away from the immediate impact of heavy traffic arteries, industry, and urbanization as seen at the other two sites. The majority of the discussion following will focus on three individual compounds (phenanthrene, pyrene, and benzo[a]pyrene) that span the wide range of physical and chemical properties and atmospheric speciation in the compound class PAH.

Concentrations of gas phase phenanthrene (MW = 178 g mol^{-1}) ranged from 0.49 to 21 ng m^{-3} at NB, from 0.14 to 14 ng m^{-3} at SH, and from 3.4 to 34 ng m^{-3} at LS. Gas phase pyrene (MW = 202 g mol^{-1}) concentrations ranged from 0.0048 to 2.3 ng m^{-3} at NB, 0.0080 to 2.3 ng m^{-3} at the SH, and from 0.16 to 4.3 ng m^{-3} at LS. Gas phase benzo[a]pyrene (MW = 252 g mol^{-1}) concentrations were below detection limits in 78% of samples at NB (n=135), 90% at SH (n=73), and 73% at LS (n=56), with maximum concentrations of 0.13 ng m^{-3} at NB, 0.017 ng m^{-3} at SH, and 0.014 ng m^{-3} at LS. In general, gas phase PAH concentrations were highest in the urban/industrial area (LS) and lower at NB and SH. Gas phase PAH concentrations at LS were higher than those at NB on 50 of 52 days, and higher than those at SH on 32 of 35 days. The ranges reported for NB and SH are similar to those reported by Gigliotti et al. *(26)* for the same sites over a shorter sampling period (October 1997 – December 1998).

Gas phase PAH concentrations measured at LS, while higher than those measured at SH and NB, are nevertheless lower than those measured in urban/industrial Chicago, IL as part of AEOLOS *(11)* but similar in magnitude to those measured in urban/industrial Baltimore, MD *(20)*. Concentrations measured at the coastal SH site are as much as an order of magnitude higher than concentrations measured as part of the IADN at remote sites in the Great Lakes region *(3)*, suggesting that coastal SH is impacted by significant PAH emissions from multiple directions. PAH concentrations measured over-water in the NY-NJ Harbor Estuary during a July 1998 intensive sampling campaign were found to be lower than those measured over-water in Lake Michigan *(11)* and the Chesapeake Bay *(19)*.

An investigation of the importance of meteorological parameters including wind speed, wind direction, and T on gas phase PAH concentrations was performed using equation 11. At NB, T is a significant ($p < 0.05$) predictor of gas-phase concentrations for phenanthrene ($R^2 = 0.22$), fluoranthene ($R^2 = 0.25$), and the methylated phenanthrenes ($R^2 = 0.12$), but is not significantly correlated with concentrations of any other PAHs. At SH, no significant correlations were observed between gas-phase PAH concentrations and T. The lack of correlation between T and PAH concentration at these two sites suggests that, in contrast to the PCBs, air-surface exchange processes are less important in controlling PAH concentrations, a conclusion reached by other researchers *(46)*. Concentrations of all PAH compounds were found to be independent of wind direction and wind speed at NB and SH suggesting that the region surrounding the NY-NJ Harbor Estuary is influenced by PAH emissions from all directions.

The situation at LS is more complicated. If the 4 samples from winter 1998-1999 discussed in the PCB section are excluded from the analysis via equation 11, concentrations of 3 of the 36 PAHs show significant correlations ($p < 0.05$) with T at LS: phenanthrene ($R^2 = 0.26$), fluoranthene ($R^2 = 0.37$) and pyrene ($R^2 = 0.26$). No significant correlation between any PAH concentrations and wind speed or wind direction was observed at LS when these samples are excluded. However, in these 4 samples, the wind was from a N-NW vector and the mean concentration for each of the 36 PAHs was significantly lower (t-test – 95% confidence level) than the mean for the rest of samples taken at LS. Because of the coupling of low PAH concentrations with low T and N-NW winds in these 4 samples, their inclusion improves the overall correlation, such that both T and wind direction become significant predictors of concentration for 5 PAHs (phenanthrene $R^2 = 0.40$; anthracene $R^2 = 0.38$; pyrene $R^2 = 0.50$; fluoranthene $R^2 = 0.54$; methylated phenanthrenes $R^2 = 0.37$), and wind direction alone becomes significant for benzo[a]pyrene ($R^2 = 0.21$).

Concentrations of total particle phase PAHs (36 compounds) ranged from 0.38 to 16 ng m^{-3}, 0.14 to 5.7 ng m^{-3}, and 0.24 to 32 ng m^{-3} at NB, SH, and LS, respectively. Particle phase phenanthrene concentrations ranged from below detection limits to 1.1 ng m^{-3} at NB, from 0.0065 to 1.1 ng m^{-3} at SH, and from 0.0022 to 1.2 ng m^{-3} at LS. Pyrene concentrations ranged from below detection limits to 1.4 ng m^{-3} at NB, from below detection limits to 0.39 ng m^{-3} at SH, and from 0.018 to 3.8 ng m^{-3} at LS. Benzo[a]pyrene ranged from below detection limits to 0.73 ng m^{-3} at NB, from below detection limits to 0.21 ng m^{-3} at SH, and from 0.0017 to 1.3 ng m^{-3} at LS. As with gas-phase PAHs, concentrations of total particle phase PAHs ($n = 36$) are higher at LS than NB on 42 of 52 days and higher than at SH on 29 of 32 days. The higher concentrations of PAHs measured at LS are consistent with its proximity to urban/industrial areas.

In precipitation, total PAH concentrations ($n = 36$) ranged from 38 to 1640 ng L^{-1}, from 22 to 3170 ng L^{-1} and from 31 to 1330 ng L^{-1} at NB, SH, and LS, respectively.

Phenanthrene concentrations ranged from 3.9 to 148 ng L^{-1} at NB, from 2 to 313 ng L^{-1} at SH, and from 5.5 to 133 ng L^{-1} at LS. Pyrene concentrations ranged from 0.14 to 140 ng L^{-1} at NB, 0.49 to 319 ng L^{-1} at SH, and 1.4 to 111 ng L^{-1} at LS. Benzo[a]pyrene concentrations ranged from below detection limits to 51 ng L^{-1} at NB, 0.53 to 161 ng L^{-1} at SH, and 1.2 to 61 ng L^{-1} at LS. As with PCBs, the highest PAH concentrations are associated with the smallest volumes of precipitation. Volume weighted mean concentrations (Tables 2-4) were thus used in the calculation of seasonal wet depositional fluxes.

Atmospheric PAH concentrations exhibit a distinct seasonality such that gas and particle phase concentrations are highest in the winter and lowest in the summer. This trend arises from increased fuel usage in winter leading to enhanced emission of PAHs *(47-49)*.

A comparison of the atmospheric depositional fluxes (dry particle deposition, wet deposition, and gas absorption) at all three sites is presented in Tables 2-4. Seasonal average total atmospheric depositional fluxes (dry particle + wet + gas absorption) of total PAHs (36 compounds) range from 2.1 $\mu g\ m^{-2}\ d^{-1}$ at NB in summer to 22 $\mu g\ m^{-2}\ d^{-1}$ at LS in spring. Gas absorption dominates the total flux of lower molecular weight compounds (166 to 234 g mol^{-1}) and is less important as MW increases.

Unlike PCBs, PAHs display distinct seasonal trends in dry particle depositional fluxes that are highest in winter and lowest in summer at all three sites, consistent with the trend in absolute concentrations. At both NB and LS, the largest wet depositional fluxes occur in winter. At SH, however, the largest wet fluxes occur in the spring. The lowest wet depositional fluxes occur in summer at all three sites, although at NB the fall and summer fluxes were equivalent.

The gas absorption flux is highest in the winter and lowest in the summer at both NB and SH, reflecting the higher gas phase concentrations in winter. At LS, the smallest flux also occurs in summer, but the highest flux occurs in spring, with the increased flux driven by higher wind speeds. Gas absorption fluxes are lower at NB than the other two sites, primarily due to the low winds speeds measured at NB. This analysis indicates that the largest total depositional loadings of PAHs to the NY-NJ Harbor Estuary region occur in winter and spring.

Annual depositional total-PAH (36 compounds) fluxes (gas absorption + dry particle deposition + wet deposition) to the HE region for NB, SH, and LS are 1400, 2300, 6400 μg m^{-2} y^{-1}. Dry particle depositional fluxes in this study at the three sites are higher than those reported by Hoff et al. *(3)*, over Lake Michigan near Chicago, IL and are higher than those reported over Chesapeake Bay adjacent to Baltimore, MD *(1)*. NB has the lowest wet and dry particle depositional fluxes for phenanthrene of the three NJADN sites, but even so, they are higher than the corresponding fluxes measured at Lake Michigan *(3)* by a factor of 1.9 to 10 (for wet and dry fluxes, respectively) and at the Chesapeake Bay *(1)* by a factor of 1.5 to 2. For pyrene, SH has the lowest wet and dry particle fluxes, yet the fluxes are still higher than those measured over Lake Michigan by a factor of 1.7 to 7 and higher than dry particle fluxes measured over the Chesapeake Bay by a factor of 1.5. In contrast, wet fluxes measured over the Chesapeake Bay *(1)* are comparable to those measured at NB and 2 times larger than those measured at SH. As with pyrene, wet and dry depositional fluxes of benzo[a]pyrene are lowest at SH. Wet fluxes measured over the Chesapeake Bay and Lake Michigan are comparable to those at SH *(1, 3)*. Dry depositional fluxes, however, are 2.2 to 7 times those at Chesapeake Bay and Lake Michigan, respectively. The absorptive input of gaseous PAHs dominates the atmospheric signal for the more volatile phenanthrene and pyrene but plays no significant role for the mostly particle-bound benzo[a]pyrene

The elevated atmospheric deposition of PAHs to the HE is consistent with its location in a highly urbanized/industrialized area. The importance of atmospheric loading of PAHs to the HE can be seen by comparing it to loadings via advection from the Hudson River. However, because of large gaps in existing information regarding inputs of PAHs to the Hudson River from WWTPs, tributaries, and other potentially important loading sources, this calculation represents at best a rough estimate of the total advection of PAHs into the HE from the Hudson River.

Assuming the PAH concentration measured in the water column at the New York Harbor site (126 ng/L = dissolved + particle phase in water) is representative of the concentrations typically present in the Hudson River, and assuming summer low flow conditions (4.3×10^5 L s^{-1}) *(7)*, then the estimated loading of total-PAHs to Raritan Bay via advection from the Hudson River is approximately 4.7 kg d^{-1}. The loading of total-PAHs to the HE from atmospheric deposition is estimated to be 8.4 kg d^{-1}. This number is derived by multiplying the maximum depositional loading of total-PAHs represented by winter deposition at LS (22 $\mu g\ m^{-2}\ d^{-1}$) times the surface area of Raritan Bay = $3.8 \times 10^8\ m^2$ *(7)*. These two inputs are thus of the same order of magnitude, and both processes are potentially important for the delivery of PAHs to the HE. Advective inputs of PAHs to the HE from tributaries other than the Hudson River are also likely important. Loss processes would include volatilization and advection out of the HE to the Atlantic Ocean. The data necessary to estimate these advection and volatilization terms are currently unavailable, so it is difficult to judge the importance of atmospheric deposition of PAHs to the HE relative to other processes. However, this analysis does suggest that atmospheric deposition may represent a significant loading of PAHs to the HE.

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Table 1: Method Detection Limits (MDL), Surrogate Recoveries, and Field Replicates for Gas-, Particulate-, and Precipitation-Phase PCBs[a] and PAHs[b]

	QFF		PUF		XAD	
Typical sample volume (m^3)	600		600		0.030	
MDL (pg)						
ΣPCBs	19		18		1.5	
Phenanthrene	13		7.5		110	
Pyrene	5.2		1.5		2.2	
Benzo[a]pyrene	2.5		1.0		0.92	
Sum 36 PAHs	75		69		180	
Surrogate recoveries	**mean**	**n**	**mean**	**n**	**mean**	**n**
PCB #65	88%	273	100%	320	84%	96
PCB #166	98%	273	95%	320	86%	96
d10-Anthracene	72%	324	84%	334	79%	123
d10-Fluoranthene	86%	324	88%	334	83%	123
d10-Benzo[e]pyrene	94%	324	90%	334	91%	123
Relative Percent Difference (RPD) between side-by-side field replicates (n=2)						
ΣPCBs	1%		10%			
Phenanthrene	56%		8%			
Pyrene	27%		8%			
Benzo[a]pyrene	74%					
Sum 36 PAHs	16%		8%			

[a] PCBs measured (congeners which co-elute and are quantified together are listed with a plus sign): 18, 17+15, 16+32, 31, 28, 21+33+53, 22, 45, 52+43, 49, 47+48, 44, 37+42, 41+71, 64, 40, 74, 70+76, 66+95, 91, 56+60+89, 92+84, 101, 83, 97, 87+81, 85+136, 110+77, 82, 151, 135+144+147+124, 149+123+107, 118, 146, 153+132, 105, 141+179, 137+176+130, 163+138, 178+129, 187+182, 183, 185, 174, 177, 202+171+156, 180, 199, 170+190, 198, 201, 203+196, 195+208, 194, 206

[b] PAHs measured: fluorene, phenanthrene, anthracene, 1-methylfluorene, dibenzothiophene, 4,5-methylenephenanthrene, methylphenanthrenes (5), methyldibenzothiophenes (3), fluoranthene, pyrene, 3,6-dimethylphenanthrene, benzo[a]fluorine, benzo[b]fluorine, retene, cyclopenta[cd]pyrene, benzo[b]naphtho[2,1-d]thiophene, benz[a]anthracene, chyrsene/triphenylene, naphthacene, benzo[b+k]fluoranthene, benzo[e]pyrene, benzo[a]pyrene, perylene, indeno[1,2,3-cd]pyrene, benzo[g,h,i]perylene, dibenzo[ac+ah]anthracene, coronene

Table 2: Average concentrations and seasonal deposition of PCBs and PAHs at Liberty Science Center (LS) from July, 1998 through December, 1999.

	Summer			Fall			Winter			Spring		
	gas	particle	precip.	gas	particle	precip.	gas	particle	precip.	gas	particle	precip.
Concentrations	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})
PCBs												
Sum	1995	41	1.8	1288	43	1.4	682	65	4.0	610	68	6.9
Trichloro	766	4.0	0.32	583	5.7	0.22	246	10	0.39	278	1.8	1.2
Tetrachloro	530	8.0	0.48	287	8.2	0.33	234	15	0.65	204	14	2.1
Pentachloro	287	7.0	0.31	191	8.7	0.27	96	15	0.84	91	18	1.4
Hexachloro	115	6.7	0.31	62	6.7	0.30	24	13	0.93	29	15	1.2
Heptachloro	29	7.7	0.21	13	7.1	0.19	4.6	6.8	0.65	6.8	11	0.63
Octachloro	10	4.8	0.14	5	5.0	0.13	1.1	4.1	0.44	1.8	6.3	0.36
Nonachloro	0	2.9	0.021	0	2.1	0.013	0.016	0.54	0.058	0.026	3.2	0.036
PAHs												
Phenanthrene	17	0.19	26	12	0.27	27	15	0.50	77	16	0.38	51
Pyrene	1.8	0.16	9.4	1.5	0.33	8.6	2.0	0.92	34	1.3	0.31	26
B[a]p	0.00010	0.065	3.7	0.0012	0.17	3.5	0.00073	0.39	6.9	0.00051	0.21	11
Sum 36 PAHs	47	2.4	135	43	4.8	131	56	11	399	47	5.2	335
Depositional Fluxes	ng m^{-2} d^{-1}											
PCBs												
Sum	73	18	3.0	86	19	3.0	62	28	20	90	29	8.3
Trichloro	35	1.7	0.53	46	2.5	0.45	36	4.5	2.0	49	0.78	1.5
Tetrachloro	26	3.5	0.79	22	3.5	0.67	17	6.6	3.3	25	6.1	2.5
Pentachloro	7.5	3.0	0.52	7.2	3.7	0.56	5.7	6.6	4.3	10	7.7	1.7
Hexachloro	2.8	2.9	0.52	3.2	2.9	0.61	2.2	5.5	4.8	4.3	6.6	1.4
Heptachloro	1.1	3.3	0.35	1.3	3.1	0.39	0.87	3.0	3.3	1.9	4.8	0.76
Octachloro	0.50	2.1	0.23	0.64	2.2	0.26	0.33	1.8	2.3	0.73	2.7	0.43
Nonachloro	0.033	1.2	0.035	0.032	0.90	0.026	0.0059	0.23	0.30	0.013	1.4	0.044
PAHs												
Phenanthrene	3908	82	61	3221	115	87	4389	217	237	6373	162	129
Pyrene	555	69	22	512	142	28	673	399	105	598	135	67
B[a]p	0.53	28	8.6	0.84	75	12	0.72	167	21	1.0	89	29
Sum 36 PAHs	11268	1033	315	11472	2080	429	15888	4786	1233	18716	2235	855

Table 3: Average concentrations and seasonal deposition of PCBs at New Brunswick (NB) from October 1997, through December, 1999.

	Summer			Fall			Winter			Spring		
	gas	particle	precip.	gas	particle	precip.	gas	particle	precip.	gas	particle	precip.
Concentrations	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})
PCBs												
Sum	527	14	0.76	434	12	0.72	272	14	0.73	384	10	1.8
Trichloro	316	12	0.33	185	3.3	0.18	149	2.3	0.42	219	3.5	0.33
Tetrachloro	267	14	0.23	142	4.8	0.14	114	6.4	0.33	228	4.5	0.24
Pentachloro	163	6.9	0.17	72	3.3	0.12	46	6.4	0.36	131	4.2	0.21
Hexachloro	47	4.1	0.088	22	2.6	0.06	12	5.0	0.24	32	3.3	0.13
Heptachloro	12	1.7	0.054	5.7	1.8	0.037	2.6	3.1	0.12	8.4	2.0	0.083
Octachloro	3.6	0.46	0.0044	1.8	0.91	0.0036	0.67	1.8	0.014	2.8	1.2	0.0070
Nonachloro	0.11	0.090	0	0.097	0.12	0	0.012	0.14	0	0.053	0.21	0
PAHs												
Phenanthrene	10	0.088	15	6.5	0.16	30	8.2	0.29	25	8.9	0.15	15
Pyrene	0.68	0.073	7.2	0.64	0.18	13	0.87	0.33	11	0.54	0.15	5.9
B[a]p	0.0040	0.032	2.8	0.0012	0.11	3.3	0.0025	0.22	3.4	0.0051	0.063	3.5
Sum 36 PAHs	24	1.2	95	20	3.0	164	32	5.7	153	24	2.2	122
Depositional Fluxes	ng m^{-2} d^{-1}											
PCBs												
Sum	28	6.2	2.2	32	5.2	0.95	38	6.0	2.6	35	4.1	4.2
Trichloro	2.9	5.0	0.93	3.2	1.4	0.34	0.96	1.0	1.1	4.6	1.5	0.80
Tetrachloro	2.0	6.0	0.64	1.7	2.1	0.28	0.50	2.8	0.85	2.8	1.9	0.59
Pentachloro	1.3	3.0	0.48	0.79	1.4	0.23	0.20	2.8	0.92	1.1	1.8	0.52
Hexachloro	0.27	1.8	0.24	0.49	1.1	0.11	0.088	2.2	0.61	0.44	1.4	0.32
Heptachloro	0.13	0.73	0.15	0.27	0.76	0.072	0.060	1.3	0.30	0.34	0.88	0.20
Octachloro	0.079	0.20	0.012	0.17	0.39	0.0071	0.029	0.76	0.037	0.21	0.52	0.017
Nonachloro	0.0034	0.039	0	0.0090	0.052	0	0.00049	0.062	0	0.0053	0.089	0
PAHs												
Phenanthrene	480	38	39	519	73	46	786	118	102	964	66	57
Pyrene	55	31	19	65	84	19	112	139	46	85	61	23
B[a]p	0.9	14	7.3	0.38	49	4.9	0.72	91	14	0.88	28	13
Sum 36 PAHs	1197	485	248	1473	1242	246	3056	2349	631	2746	919	463

Table 4: Average concentrations and seasonal deposition of PCBs at Sandy Hook (SH) from February 1998, through December, 1999.

	Summer			Fall			Winter			Spring		
	gas	particle	precip.	gas	particle	precip.	gas	particle	precip.	gas	particle	precip.
Concentrations	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})	(ng m^{-3})	(ng m^{-3})	(ng L^{-1})
PCBs												
Sum	527	14	0.76	434	12	0.72	272	14	0.73	384	10	1.8
Trichloro	241	4.4	0.27	172	2.8	0.15	106	1.4	0.20	154	2.0	0.39
Tetrachloro	237	4.2	0.16	169	3.1	0.17	110	3.1	0.18	148	1.8	0.44
Pentachloro	92	2.7	0.13	68	2.8	0.15	41	3.7	0.13	57	1.9	0.33
Hexachloro	30	1.8	0.10	20	1.9	0.13	12	2.8	0.13	19	1.8	0.30
Heptachloro	8.6	0.93	0.058	5.2	1.4	0.090	2.6	1.7	0.062	4.8	1.2	0.19
Octachloro	2.1	0.29	0.037	1.2	0.68	0.034	0.54	1.0	0.032	1.2	0.64	0.12
Nonachloro	0.073	0.070	0.00095	0.051	0.10	0.0032	0.0055	0.11	0.00081	0.0069	0.076	0.013
PAHs												
Phenanthrene	5.5	0.083	8.3	3.7	0.080	8.4	5.0	0.22	6.7	4.4	0.065	11
Pyrene	0.48	0.066	4.6	0.31	0.082	7.3	0.63	0.15	3.5	0.32	0.066	5.4
B[a]p	0.00015	0.025	2.1	0.00012	0.071	3.7	0.0015	0.061	1.1	0	0.029	2.8
Sum 36 PAHs	15	1.1	63	12	1.4	115	20	2.4	54	13	1.1	122
Depositional Fluxes	ng m^{-2} d^{-1}											
PCBs												
Sum	28	6.2	2.2	32	5.2	0.95	38	6.0	2.6	35	4.1	4.2
Trichloro	13	1.9	0.80	15	1.2	0.20	19	0.61	0.70	17	0.88	0.94
Tetrachloro	10	1.8	0.47	11	1.3	0.23	12	1.3	0.65	12	0.78	1.1
Pentachloro	3.2	1.2	0.38	3.5	1.2	0.19	3.9	1.6	0.48	3.8	0.84	0.79
Hexachloro	1.2	0.77	0.30	1.1	0.84	0.17	1.6	1.2	0.46	1.5	0.78	0.71
Heptachloro	0.48	0.40	0.17	0.36	0.61	0.12	0.69	0.72	0.22	0.78	0.51	0.45
Octachloro	0.26	0.12	0.11	0.13	0.29	0.046	0.28	0.44	0.11	0.30	0.28	0.28
Nonachloro	0.017	0.030	0.0028	0.0091	0.043	0.0042	0.0043	0.047	0.0029	0.0029	0.033	0.031
PAHs												
Phenanthrene	1369	36	13	1179	34	10	2253	94	27	1589	28	28
Pyrene	158	29	7	120	36	8.9	335	64	14	137	29	14
B[a]p	0.73	11	3.3	0.88	31	4.5	1.7	26	4.2	0.87	13	7.3
Sum 36 PAHs	3768	460	98	3812	588	139	9241	1034	216	4622	490	315

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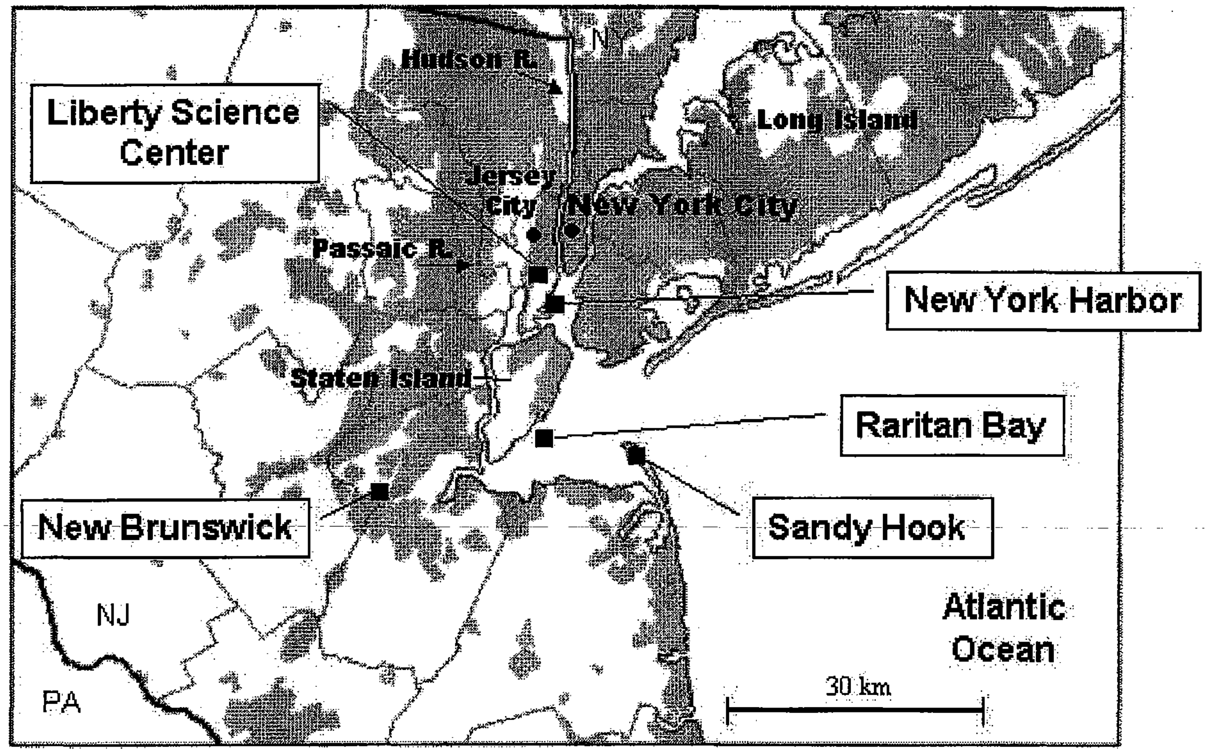

Figure 1: Map of NJADN sampling sites. Shaded regions indicate urban areas based upon population density. Map adapted from the USGS Web Atlas.

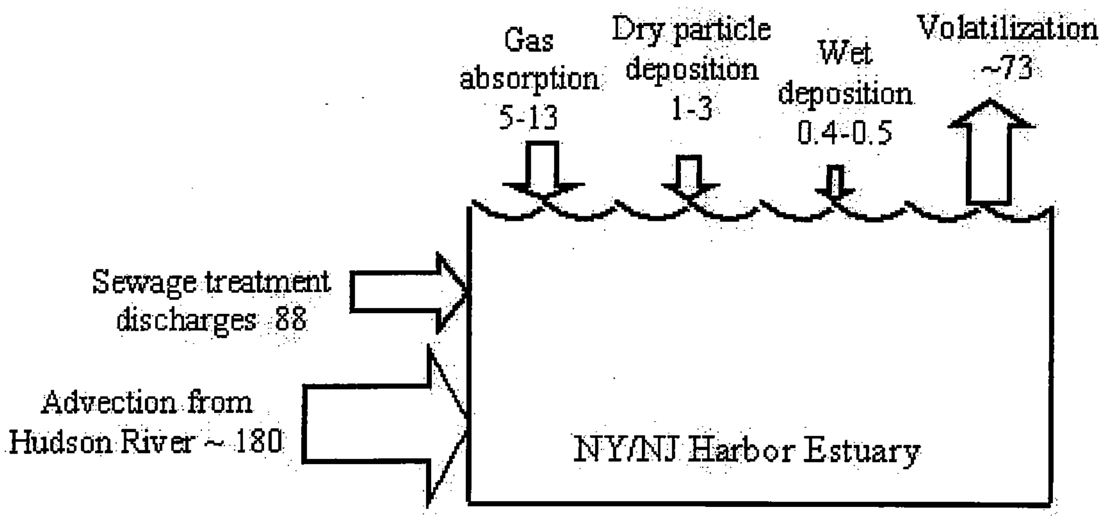

Figure 2: Inputs and outputs of ΣPCBs for the NY/NJ Harbor Estuary in kg y^{-1}. Advection estimate based on Farley et al. *(7)*; sewage treatment inputs taken from Durrell and Lizotte *(5)*.

CHARACTERIZATION OF ATMOSPHERIC TRACE ELEMENTS ON $PM_{2.5}$ PARTICULATE MATTER OVER THE NEW YORK-NEW JERSEY HARBOR ESTUARY

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ABSTRACT

The purpose of this work is to characterize trace elements associated with atmospheric particulate matter of 2.5 μm and smaller in size ($PM_{2.5}$) over the New York-New Jersey (NY-NJ) Harbor Bight. Using low-volume $PM_{2.5}$ samplers, aerosol particulate samples were simultaneously collected for the first time at three locations in the region, Sandy Hook in the coast, New Brunswick and Liberty Science Center in nearby urban areas, during January 1998 to January 1999. Sample analysis for trace elements was accomplished by inductively coupled plasma mass spectrometry. Many elements in ambient air exhibit strong spatial gradients from urban centers to the coast, and the concentrations of most elements at Liberty Science Center are significantly higher than at other two locations. Seasonal patterns are not apparent for most elements at all locations, suggesting continuous contributions from their sources. The elements, Pb, Cd, Zn, Cu, Ni, V, Sb, are highly enriched in fine particulate matter relative to their natural abundance in crustal soil. Major sources that contribute to the atmospheric loading of these elements include fossil fuel combustion, oil combustion, metal processing industry, and waste incineration. Atmospheric dry deposition of these trace elements associated with $PM_{2.5}$ to the coastal waters of the NY-NJ estuary may account for a significant portion of the total dry deposition fluxes.

INTRODUCTION

The coastal marine atmosphere adjacent to large urban and industrial centers can be strongly impacted by pollution emissions, resulting in high loading of pollutants in the ambient air (Baker et al., 1997; Chester et al., 1994; Eisenreich et al., 1997; Gao et al., 1996; Holsen et al., 1997; Ondov et al., 1997; Scudlask et al., 1994). Among airborne pollutants are trace elements such as Cd, Pb, Sb, Zn, etc. associated with suspended particulate matter from a variety of pollution emission sources. High concentrations of certain trace elements in aerosol particles in coastal air could not only result in enhanced air-to-sea deposition fluxes of the elements to coastal waters, consequently affecting the coastal ecosystem (Church et al., 1984; Wu et al., 1994; Yang et al., 1996), but they could also be transported over the open ocean, affecting the composition of the remote marine atmosphere (Kim et al., 1999; Arimoto et al., 1992; Ellis et al., 1993). Thus it is critical to obtain detailed information on the levels and chemical composition of airborne particulate matter containing trace elements in the source regions in order to quantitatively estimate the magnitude of their air-to-sea deposition and their effects on the remote marine atmosphere. On the other hand, high concentrations of airborne trace elements may seriously affect air quality, posing direct influences on human health (Chapman et al., 1997; Ghio et al., 1999). As pollution-derived elements are often concentrated on fine particles, they could remain suspended in air with relatively long residence times and could efficiently penetrate human lungs. Thus, trace metals associated with fine aerosol particles may contribute to particulate toxicity (Prahalad et al., 1999). However, understanding the mechanisms linking particulate air pollution and adverse health consequences remains a challenge, due in part to the lack of information on elemental composition of fine particles. In particular, detailed determination of toxic element concentrations on fine aerosol particles over the coastal regions directly downwind of intense pollution emission sources, such as the New York-New Jersey (NY-NJ) Metro area, are largely unknown.

The NY-NJ Harbor Bight is of special importance because it is surrounded by industrial sectors in New Jersey and the metropolitan complex of New York City, as well as many highways across the area, which act as continuous sources of many trace elements in fine particulate matter to the ambient air. On the other hand, air circulation along the coastline may dilute air pollution loading to some extent. Until recently, these issues have not been addressed in detail for this region. To investigate characteristics of airborne pollution-derived trace elements over the NY-NJ Harbor/Bight, we first focused on selected trace elements associated with particulate matter equal to and smaller than 2.5 μm diameter in size, known as $PM_{2.5}$, a size class that is more important than larger particles with respect to human health problems. The target elements in this study are Cd, Cr, Cu, Ni, Pb, Sb, V and Zn. For the purposes of data interpretation, elements Al and Fe were also included. We used a simultaneous and identical sampling approach to collect $PM_{2.5}$ particulate samples at three locations to determine the spatial and seasonal variations of these elements. We also applied enrichment factor and multivariate analyses to explore the sources and inter-element relationships. Data from this study should be useful to the evaluation of elemental composition of fine particulate matter over the NY-NJ Metro-coastal region. These results could further be used to study the linkage between particulate toxicity and health problems and to evaluate the atmospheric input of trace elements to the coastal waters. The results should be applicable to other coastal atmospheric environments that are strongly altered by human activities.

METHODOLOGY

1. SAMPLING:

Sampling of trace elements associated with $PM_{2.5}$ particulate matter was conducted at three sites around the NY-NJ Harbor-Bight during January 1998 – January 1999 period (Figure 1). These sites were chosen to represent different environmental characteristics: (1) Sandy Hook (SH, 40.46°N, 74.00°W), a coastal site located on a peninsula between Raritan Bay and the off-shore NY Bight; (2) New Brunswick (NB, 40.48°N, 74.43°W), an inland suburban site located in an agricultural/botanical area near several local highways; (3) the Liberty Science Center (LSC, Jersey City, 40.71°N, 74.05°W), located in the middle of the metropolitan New York and New Jersey industrial sectors. The SH site is considered to be the primary site in this study, with a complete 12-month sampling; the NB and LSC sites are considered as supporting sites mainly for the purpose of comparison. Considering all three sites located within the "source region," however, the elemental characteristics at these three sites were expected to show similarity.

Sample device was a modified Cal Tech type $PM_{2.5}$ low-volume aerosol sampler (anodized aluminum). During sampling, particles $\leq 2.5\mu m$ entered a mixing chamber in the sampler where they were split into two channels, with each having the same flowrate of ~ 9 l/min. One channel collects particulate matter for elemental/organic carbon analysis and the other collects particulate matter for trace element analysis. The mean volume filtered at the three sites ranged 9.6-12 (SD=1.0-2.5) m^3. Sample collections at the three sites took place every six days, with a sampling duration of ~ 24 hr (Table 1). The sampling media for trace elements was Millipore HA mixed cellulose filters (47 mm diameter, 0.45 μm pore size) (Millipore Corp., Bedford, MA) that were pre-cleaned with successive hydrofluoric and hydrochloric acids (Maring et al., 1989). Sample loading on and unloading from polycarbonate filter folders was exclusively restricted to clean-room procedures. All samples were kept refrigerated until analyses except for the period of shipment between sampling sites and the laboratory at Rutgers University.

2. CHEMICAL ANALYSIS:

The concentrations of Al, Cd, Cr, Cu, Fe, Ni, Pb, Sb, V and Zn associated with $PM_{2.5}$ particulate matter were determined on a magnetic sector inductively coupled plasma mass spectrometer (ELEMENT, Finnigan MAT, Bremen, Germany) at the Institute of Marine and Coastal Sciences, Rutgers University. Samples analyzed in the solution phase were digested using strong mineral acids. One quarter of each sample filter (total area of 4.3 cm^2) was placed in a 15-ml Teflon screw-cap vial (Savillex Corp., MN) and a mixture of Optima grade HNO_3/HF (Seastar Chemicals, Inc., British Columbia, Canada) was added to each vial. Complete dissolution of samples was achieved after a period of leach at room temperature and 4 hrs digestion on a hot plate at 140C followed with evaporation to near dryness in a Class 100 HEPA flow bench. Samples were then redissolved for analysis with 20 μL Optima HNO_3 and diluted with deionized/distilled water to a final acid strength of ~2% HNO_3.

The ELEMENT has three resolution ($R=M\ (\Delta M)^{-1}$) at 10% peak height) settings: low resolution (LR where R=300), medium resolution (MR where R=4300), and high resolution (HR where R=9300). For this application, which was similar to the analysis of digested filtered marine particulate samples, low- and medium- resolution settings were selected (Cullen et al., 2001). To calculate the concentrations of the target elements in unknown samples, before each analytical run, external calibration curves were constructed from serial dilutions of a multi-element standard (High Purity Standards, Charleston, SC). Raw intensities were normalized to the initial sensitivity for In in each resolution and corrected for instrument blank. Slopes (correlation coefficients of $r > 0.999$) for the external standard curve were computed for all elements (cps ppb^{-1}) and used to calculate the concentration in unknown samples. The final concentrations were corrected with combined reagent and filter blanks. To evaluate potential matrix effects 10 samples were spiked with a known concentration of the analytes of interest. Recovery of spiked elements ranged from 94 - 109 (± 6-14) %. The accuracy of the analytical procedure was further assessed using Urban Particulate Matter #1648, a Standard Reference Material of National Institute of Standards and Technology (NIST, Gaithersburg, MD). The recovery of the target elements ranged between 93-106%, and the average precision determined from sample splits and duplicate digest aliquots averaged from 1.3 - 2.9% for all target elements. The overall average uncertainty associated with air concentrations was ≤7%.

RESULTS AND DISCUSSIONS

1. SPATIAL VARIATIONS:

The ambient concentrations of pollution-derived trace elements at a specific location are largely dependent upon the distance from their sources, in general, reflecting the impacts of point-source emissions and the removal processes. However, it is not clear if such a spatial pattern holds for sites that are close to each other and are all located within the "source region." Figure 2 presents the comparisons of the average concentrations of selected trace elements associated with $PM_{2.5}$ aerosol particles at Sandy Hook, New Brunswick, and Liberty Science Center. Obvious spatial variations were observed in the ambient levels of trace elements, with higher concentrations at the Liberty Science Center site than at the other two sites, and the concentrations of trace elements at Sandy Hook in general appeared to be the lowest. For example, the average ambient concentrations (standard deviation in parentheses) of Pb were 7.9

(5.4) ng m^{-3} at the Liberty Science Center, 6.6 (6.5) ng m^{-3} at New Brunswick, and 4.9 (3.6) ng m^{-3} at Sandy Hook. In the case of Cu, the average concentrations were 17 (16) ng m^{-3} at the Liberty Science Center, 7.3 (4.0) ng m^{-3} at New Brunswick, and 4.7 (5.4) ng m^{-3} at Sandy Hook. A further analysis using Student-Newman-Keuls (SNK) test on three datasets reveals that the concentrations of most elements at Liberty Science Center are significantly higher than those at other two sites (Table 2), suggesting that the LSC site is more influenced by pollution emissions.

This spatial concentration gradient with a decrease toward the coast could be largely due to the dilution of the urban air with the clean marine. Using radionuclide tracers, Kim and colleagues found that the intrusion of pristine marine air could contribute to relatively low concentrations of ^{210}Pb and stable Pb relative to ^{7}Be as observed on the upper eastern shore of Chesapeake Bay (2000a). In addition, dry deposition of aerosol particles along the path of air masses moving away from point sources could also be an important mechanism for the removal of trace elements (Chester et al., 1994), which could contribute to the observed spatial concentration gradient.

Similar spatial patterns for aerosols were also found from other studies on coastal regions. Wu et al. (1994) measured the concentrations of trace elements in aerosols at two locations, the Wye site in northern Chesapeake Bay, and the Elms site in central Chesapeake Bay. They found that concentrations of most elements are more often significantly elevated at Wye than at Elms, attributed to the Wye site receiving greater influence of pollutant sources in Baltimore. This spatial concentration pattern may have direct effects on atmospheric deposition, resulting in a similar deposition gradient. Scudlark et al (1994) compared the results from precipitation measurements at the two sites and concluded that wet deposition fluxes of Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Se and Zn are higher at Wye than those at Elms. A recent study conducted in the same region by Kim et al. (2000b) shows that wet deposition fluxes at Stillpond in northern Chesapeake Bay are higher than at Lewes, a remote site on the mid-Atlantic coast. Over the North Sea, the observed average concentrations of Zn, Cu, and Pb in aerosols at a Kiel Bight site are higher than those at several southern sites in the same region, attributed to proximity to urban sources (Chester et al., 1994). These studies suggest that the general phenomenon of decreasing elemental concentrations with distance from a regional point source may be accentuated in coastal areas due to proximity of clean marine air masses. These spatial characteristics of trace elements in the ambient air would have direct impacts on the magnitudes and distributions of the fluxes of trace elements at different locations.

2. TEMPORAL VARIATION:

To investigate the temporal patterns of trace elements in $PM_{2.5}$ particulate matter in the area, we present the atmospheric concentrations of six elements (Sb, Ni, Cu, Cd, Pb, and Zn) as a function of time, focusing on samples collected at Sandy Hook, the primary site. The atmospheric concentrations of these elements varied dramatically on a weekly basis as indicated in Figure 3. The concentrations ranged from 0.85 - 36 ng m^{-3} for Cu, 0.26 – 18 ng m^{-3} for Ni, 0.080 – 2.6 ng m^{-3} for Sb, and 1.4 – 87 ng m^{-3} for Zn. Among a variety of factors affecting temporal concentration variations for aerosol trace elements at a specific location are wind direction, precipitation frequency which can drive removal fluxes, changes in source emission strength with time, as well as changes in aerosol particle-size distributions that affect their atmospheric residence time.

Despite the dramatic shifts in the weekly concentration levels of trace elements at this location, however, seasonal cycles were not clearly observed. This suggests that the atmospheric concentrations of these elements on $PM_{2.5}$ particles are not very sensitive to the seasonal variation of ambient conditions such as temperature. A similar result was obtained in the North Sea where trace element concentrations do not change dramatically during different sampling periods (Baeyens and Dedeurwaerder, 1991). However, the dramatic changes in daily concentrations could be affected by variation of emission rates, wind dynamics, precipitation episodes, etc. Over the North Sea, the atmospheric loading of particulate trace metals is affected by different wind sectors (Baeyens and Dedeurwaerder, 1991). Over Chesapeake Bay, precipitation scavenging could exponentially remove atmospheric ^{7}Be, ^{210}Pb, and to a lesser extent stable Pb (Kim et al., 2000a). Due to mixed influences of different processes on the loading of atmospheric trace elements, more intense sampling than the every-six-day sampling approach used in this study would be more appropriate to interpret temporal variation of trace elements with meteorological episodes.

Another feature revealed in Figure 3 is that the elemental concentrations were strongly covariant throughout the sampling period. For example, the concentration variations of Cd, Pb, and Zn are almost in phase. This co-varying weekly pattern suggests that their levels in the ambient air were controlled more or less by similar processes and certain elements are likely attributed to the same sources.

3. SOURCES OF TRACE ELEMENTS:

(1) Enrichment Factor:

The crustal enrichment factor method has commonly been used as a first step in attempting to evaluate the strength of the crustal and non-crustal sources (Gao et al., 1992). The enrichment factor for any element X relative to crustal material is defined by:

$$EF_{crust,X} = (X/Y)_{air} / (X/Y)_{crust}$$

Where $EF_{crust,X}$ is the enrichment factor of X, Y is a reference element for crustal material and $(X/Y)_{air}$ is the concentration ratio of X to Y in the aerosol sample, and $(X/Y)_{crust}$ is the average concentration ratio of X to Y in the crust. If $EF_{crust,X}$ approaches unity, crustal soils are likely the predominant source for element X. Operationally, given local variation in soil composition, if $EF_{crust,X}$ is > 5, the element X may have a significant fraction contributed by noncrustal sources.

To determine the strength of crustal and non-crustal sources for trace elements associated with PM2.5 particles, the enrichment factor was calculated for each element based on samples collected at three sites and presented in Figure 4. We use aluminum (Al) as the reference element in this study based on chemical composition of the earth crust (Taylor and McLennan, 1985), assuming minor contributions of pollutant Al. Figure 4 indicates that the atmospheric concentrations of Cd, Cr, Cu, Ni, Pb, Sb, V, and Zn in $PM_{2.5}$ fine particles are 50 to 10000 times higher than those expected from crustal soil. The high enrichment suggests that the dominant sources for these elements are non-crustal and a variety of pollution emissions may contribute to their loading in the ambient air. With very similar patterns for enrichment factors at all three locations (Fig. 4), pollution emissions clearly impact the entire NY-NJ harbor area. Most of the elements at the Sandy Hook site are relatively less enriched than at the other two sites, except for Cr and V. Noncrustal Cr likely reflects a variety of pollution sources, in particular coal combustion and sewage sludge incineration (Nriagu and Pacyna, 1988). Noncrustal V is primarily from the combustion of heavy fuel oil (Zoller et al., 1973; Rahn and Lowenthal, 1984). We speculate that there could be more oil industry and waste incineration activities occurring near Sandy Hook. On the other hand, the enrichment factors for Zn and Pb at Liberty Science Center are lower than at the other two locations, although the absolute concentrations of these two elements are higher. Simple calculations of the crustal fraction using the mean concentrations in Table 2 and mean crustal composition (Tayler and McLennan, 1985) indicate that crustal Pb only accounts for ~0.13% of the total and crustal Zn accounts for ~0.14% at all three sites. Therefore we cannot speculate that the crustal source could play even a minor role on the air loading of Pb and Zn in the area.

(2) Factor Analysis:

To further identify common sources for pollution-derived trace elements over the NY-NJ Harbor Bight, we applied factor analysis to the combined trace element concentration data obtained at Sandy Hook, Liberty Science Center, and New Brunswick. This analyses was conducted using Varimax rotated principal component analysis, with three factors or components being extracted which describe groups of trace elements with different sources (Table 3). We did not consider this analysis for individual sites because the reliability of the technique is dependent on sample size. The commonalties for individual elements range from 0.86 (for Zn) to over 0.9 for the remaining 9 elements considered (Sb, Cd, V, Ni, Pb, Cu, Al, Fe, Cr). This indicates the fact that the three component solutions are quite satisfactory, explaining 94% of the variance. These factors clearly indicate the different source components for trace elements over the region.

The first factor that explains the most of the variance (72%) has high loading of all elements investigated with the exception of Al and Fe. It represents the main types of the pollution sources in the region, most likely waste incinerators (Sb, Cd, Pb, Cr, Zn), oil burning (V, Ni), and pyrometallurgical non-ferrous metal production (Pb) (Nriagu and Pacyna, 1988). These sources could contribute significantly to the loadings of the elements in our study region. Chemical mass balance calculations suggest that over Chesapeake Bay, incinerators are the principal sources of air loadings of Cr (~80%), Cd (~80%), Sb (~60%) and Zn (~75%), oil combustion contributes to ~80% of the total V loading, and atmospheric Pb is primarily derived from incineration as well as motor vehicles (Wu et al., 1994). These sources not only affect the regional air loadings of the elements, their impacts can reach far over the ocean. Arimoto and colleagues (1995) reported that noncrustal V observed at Bermuda is primarily attributed to pollution emission from heavy fuel oil. However, the difficulties to separate this complex pollution into individual components are likely related to the timescales of variation in source emissions and underlying physical processes relative to the sampling intervals. For example, source variability and the meteorological processes likely have short characteristic time constants that are averaged over the 24 hr sampling intervals.

Interestingly, a high loading is found for Fe in Factor 2 associated with Zn. Atmospheric Fe is commonly considered as crustal element, and its current association with Zn suggests that pollution emissions, in particular incineration and fossil fuel combustion (Nriagu and Pacyna, 1988), may contribute to atmospheric Fe in the region, in addition to crustal soil. Results from the Mediterranean region suggest that atmospheric Fe is enriched relative to its crustal abundance due to the influence of pollution emissions in the region (Kubilay et al., 2000). Over the North Sea, Fe associated with aerosols is found to be moderately enriched relative to the average crustal composition (Baeyens and Dedeurwaerder, 1991). A recent study conducted at a coastal site in China also shows that atmospheric Fe is enriched in fine aerosol particles, attributed to either fly ash from coal combustion or natural origin (Gao and Anderson, 2001). Thus anthropogenic emissions may perturb the natural cycle of certain crustal elements such as Fe. However, it remains a challenge at present to quantitatively separate atmospheric Fe of pollution origin from that of crustal origin.

The third factor is solely related to Al. This is consistent with the lack of correlation found between Al and the rest of the elements in this study. This may suggest that crustal soil is the dominant source for Al in fine suspended particulate matter at this location, either due to episodic presence of crustal substances brought to the area from the distant sources or resuspended local soil. This is consistent with the estimate by Wu et al (1994) that about 80% of the atmospheric Al over Chesapeake Bay are derived from soil.

A correlation matrix for all elements combined from three locations is shown in Table 4. Results show that most elements measured in the fine fraction of the NY-NJ aerosols are highly correlated with each other, suggesting well mixed components clearly originating from different sources and or from multiple similar sources.

4. ESTIMATES OF DRY DEPOSITION FLUXES:

We used a dry deposition model to estimate the atmospheric input of trace elements through particle dry deposition. In this model, the dry deposition flux was calculated as the product of the measured atmospheric concentration of an element and a dry deposition velocity. We used the annual average atmospheric concentrations obtained at Sandy Hook to estimate the level of the annual dry deposition fluxes of the target elements. Based on considerations of dry deposition velocities used in several coastal regions (Baker et al., 1997; Chester et al., 1994; Church et al., 1984; Gao et al., 1992; Holsen et al., 1997; Yang et al., 1996; Quinn et al., 1992), we chose 0.1 cm/s and 0.5 cm/s as the lower and upper values for dry deposition velocities for pollution-derived elements (Table 5). However, due to the fact that the actual dry deposition velocities may vary dramatically under different meteorological conditions (Chester et al., 1994), the fluxes obtained using this approach should involve substantial uncertainties and could only serve as first approximates.

Results indicate that the magnitudes of the dry deposition fluxes of most elements to this area are comparable to those in nearby coastal regions, such as the Chesapeake Bay (Baker et al., 1997). For example, the dry deposition fluxes for Pb at SH ranged from 0.15 mg m^{-2} yr^{-1} to 0.76 mg m^{-2} yr^{-1}. In the Chesapeake Bay, the Pb flux averaged 0.69 mg m^{-2} yr^{-1}. In the case of Cu, the dry deposition fluxes at SH were from 0.15 mg m^{-2} yr^{-1} to 0.73 mg m^{-2} yr^{-1}, similar to the value of 0.34 mg m^{-2} yr^{-1} in the Chesapeake Bay. It is worth mentioning, however, that the results from the Chesapeake Bay were obtained during the period of 1990-1992, approximately 7 years earlier than this study. In addition, the dry deposition fluxes of trace elements in this work were derived from $PM_{2.5}$ samples only, a portion of the total particulate matter. Therefore further evaluation of the present levels of the total dry deposition fluxes of trace elements to the NY-NJ harbor estuary should be taken cautiously. Considering pollution-derived elements are primarily associated with submicrometer aerosol particles, dry deposition of trace elements associated with $PM_{2.5}$ from this study may represent a significant portion of the total atmospheric dry deposition to the NY-NJ harbor estuary.

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FIGURE CAPTIONS:

Figure 1. Map of the New York (NY) - New Jersey (NJ) Harbor Bight and the sampling sites, modified from The National Atlas, USGS.

Figure 2. Ambient concentrations of trace elements at three locations: (1) the Liberty Science Center (LSC), (2) New Brunswick (NB), and (3) Sandy Hook (SH). Number of samples analyzed for each location: LSC = 42; NB = 59; SH = 58. The results are presented by box plots. Each box encloses the 10^{th}, 25^{th}, 50^{th} (median), 75^{th}, and 90^{th} percentiles of the concentrations. The values above the 90^{th} and below the 10^{th} percentiles are plotted as outlying open circles.

Figure 3. Seasonal variations of selected trace elements in $PM_{2.5}$ samples at Sandy Hook collected during the period of 1998 - 1999.

Figure 4. Enrichment factors of selected trace elements relative to Al for the $PM_{2.5}$ samples collected at three locations during the period of 1998 - 1999.

Table 1. Sampling summary.

Table 2. Differences in the concentrations of trace elements in $PM_{2.5}$ among three sites by student-newman-keuls test.

Table 3. Factor loading for trace element data combined from three sites (Sandy Hook, Liberty Science Center, and New Brunswick).

Table 4. Correlation among trace elements for $PM_{2.5}$ particulate matter collected at Sandy Hook.

Table 5. Atmospheric dry deposition fluxes of pollution-derived trace elements associated with $PM_{2.5}$ to the New York-New Jersey Harbor Estuary.

TABLE 1. Sampling information at three locations.

Sites	Sampling Period*	# of Samples	Location Features
Sandy Hook	1/98 - 7/99	59	Coastal
Liberty Sci. Center	10/98 - 1/00	45	Urban
New Brunswick	1/98 - 12/99	62	Urban

* Sample collection was not continued for certain periods of time due to power failure.

Table 2. Differences in trace element concentrations among three sites by Student-Newman-Keuls test.

Element	Site	N	Mean (SD) (ng m^{-3})	SNK Grouping*	P-value
Al	LSC	45	39 (28)	A	0.2967
	NB	61	27 (29)	A	
	SH	59	32 (51)	A	
Cd	LSC	45	0.34 (0.37)	A	0.0001
	NB	60	0.15 (0.11)	B	
	SH	60	0.14 (0.14)	B	
Cr	LSC	45	2.7 (3.7)	A	0.0148
	NB	48	1.4 (2.0)	B	
	SH	44	1.3 (1.3)	B	
Cu	LSC	44	17 (16)	A	0.0001
	NB	62	7.3 (4.0)	B	
	SH	60	4.7 (5.4)	B	
Fe	LSC	41	160 (110)	A	0.0001
	NB	62	83 (49)	B	
	SH	60	55 (47)	C	
Ni	LSC	45	10 (9.0)	A	0.0001
	NB	60	4.0 (3.6)	B	
	SH	55	4.0 (3.8)	B	
Pb	LSC	44	7.9 (5.4)	A	0.0168
	NB	58	6.6 (6.5)	B, A	
	SH	60	4.9 (3.6)	B	
Sb	LSC	45	2.1 (2.5)	A	0.0001
	NB	61	0.88 (0.52)	B	
	SH	60	0.63 (0.52)	B	
V	LSC	45	9.2 (8.9)	A	0.0001
	NB	62	3.6 (3.5)	B	
	SH	60	5.4 (4.2)	B	
Zn	LSC	45	29 (19)	A	0.0003
	NB	62	18 (15)	B	
	SH	60	16 (15)	B	

* Means with the same letter are not significantly different.

Table 3. Factor Loadings of trace element data combined from three sites (Sandy Hook, Liberty Science Center, New Brunswick).

Element	Factor 1	Factor 2	Factor 3	Commonality
Sb	**0.98**	0.05	0.11	0.98
Cd	**0.99**	0.03	0.11	0.98
V	**0.95**	0.24	0.08	0.97
Pb	**0.93**	0.30	0.09	0.96
Ni	**0.93**	0.25	0.01	0.93
Cu	**0.92**	0.22	0.12	0.92
Zn	**0.56**	**0.74**	0.04	0.86
Al	0.14	0.19	**0.97**	0.99
Fe	0.00	**0.93**	0.19	0.90
Cr	**0.98**	0.03	0.10	0.98
% Variance	72.5	14.3	7.91	94.7

Table 5. Atmospheric Dry Deposition Fluxes of Pollution-Derived Trace Elements Associated with $PM_{2.5}$ to the New York-New Jersey Harbor Estuary

Element	Mean Concentrations (SD) ng m^{-3}	Dry deposition Fluxes mg m^{-2} yr^{-1}
Cd	0.14 (0.14)	0.0042 - 0.021
Cr	1.3 (1.3)	0.040 - 0.20
Cu	4.7 (5.4)	0.15 - 0.73
Ni	4.0 (3.8)	0.12 - 0.62
Pb	4.9 (3.6)	0.15- 0.76
Sb	0.63 (0.52)	0.020 - 0.10
V	5.4 (4.2)	0.17 - 0.84
Zn	16 (15)	0.50 - 2.5

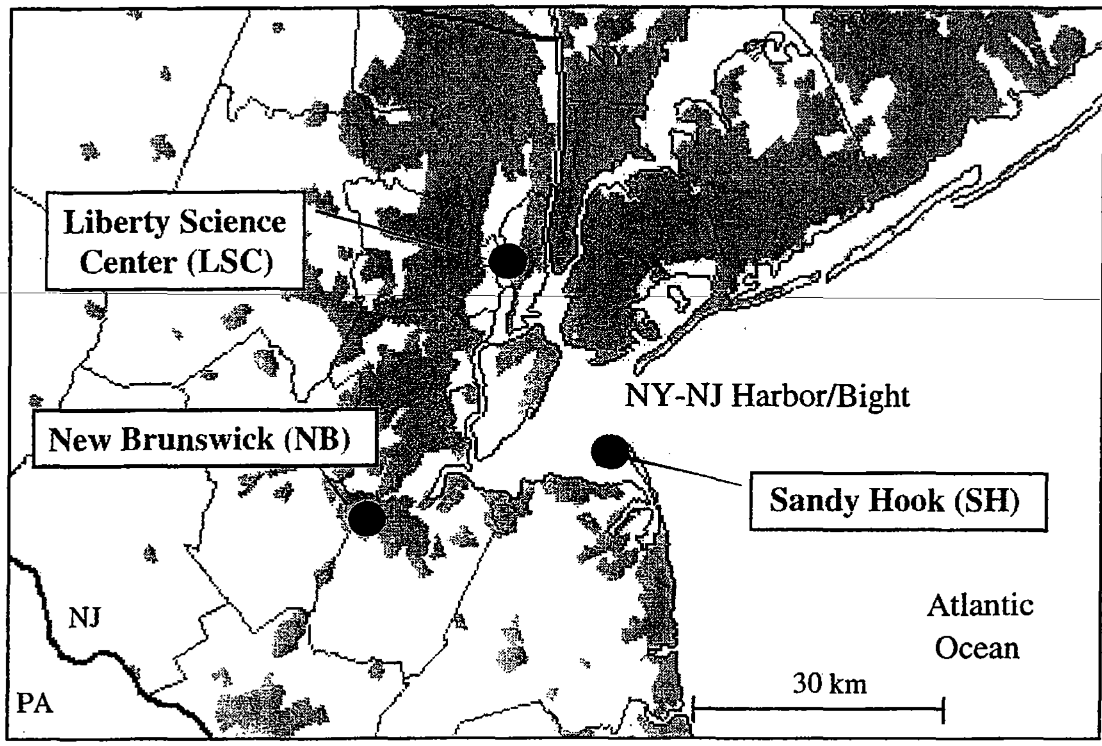

Liberty Science Center (LSC)
NY
NY-NJ Harbor/Bight
New Brunswick (NB)
Sandy Hook (SH)
NJ
PA
Atlantic Ocean
30 km

Figure 1

Table 4. Correlations among trace elements combined from three sites (Marked correlations are significanlt at p<0.05).

Element	Sb	Cd	V	Pb	Ni	Cu	Zn	Al	Fe	Cr
Sb	1.00	1.00	**0.95**	**0.94**	**0.92**	**0.94**	**0.56**	0.24	0.10	**0.99**
Cd		**1.00**	**0.94**	**0.93**	**0.91**	**0.93**	**0.55**	0.23	0.08	**0.99**
V			1.00	**0.95**	**0.96**	**0.92**	**0.73**	0.25	0.23	**0.94**
Pb				1.00	**0.93**	**0.92**	**0.77**	0.27	0.28	**0.92**
Ni					1.00	**0.90**	**0.70**	0.20	0.23	**0.91**
Cu						1.00	**0.66**	0.28	0.26	**0.92**
Zn							1.00	0.28	**0.58**	**0.56**
Al								1.00	0.33	0.23
Fe									1.00	0.08
Cr										1.00

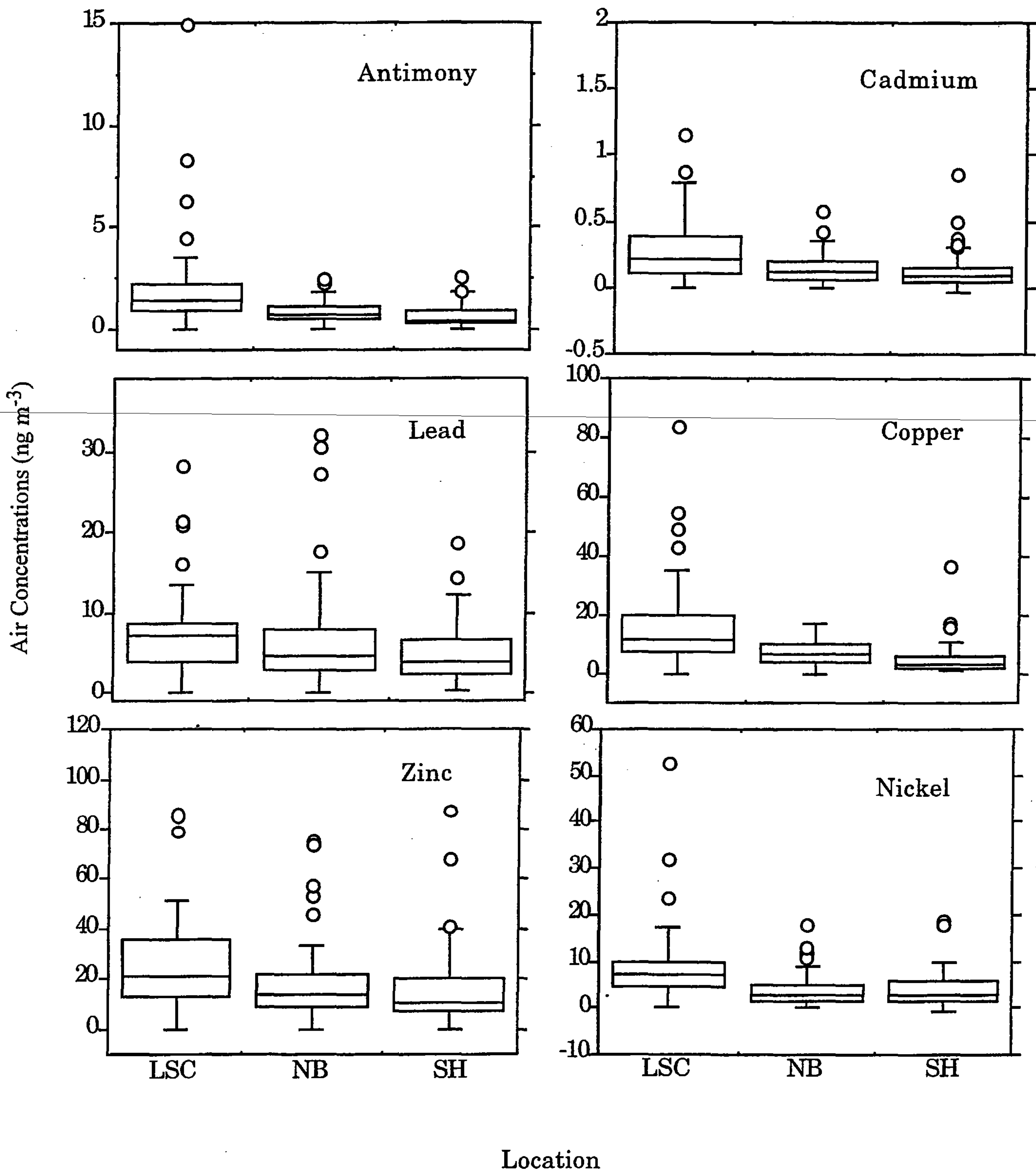
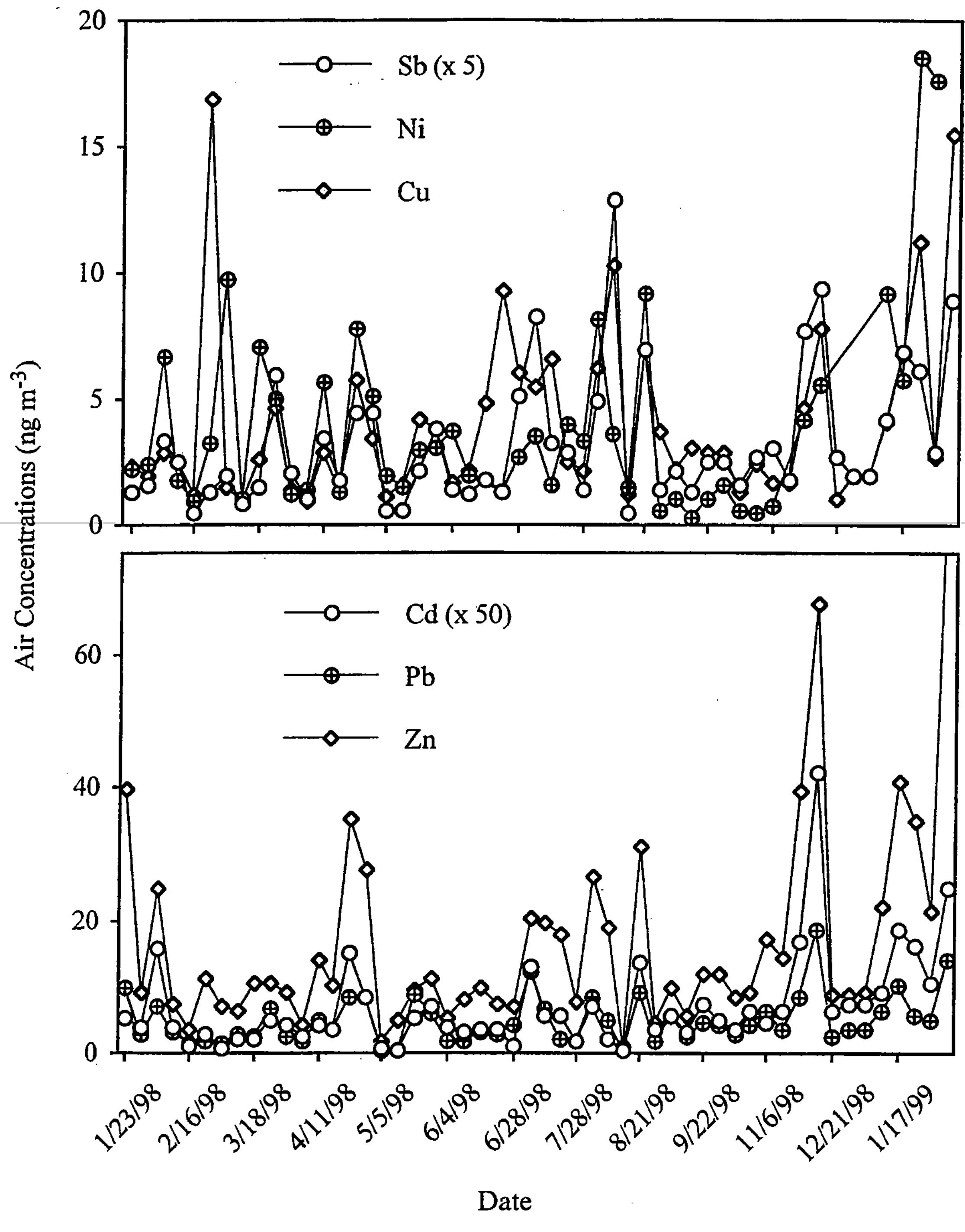
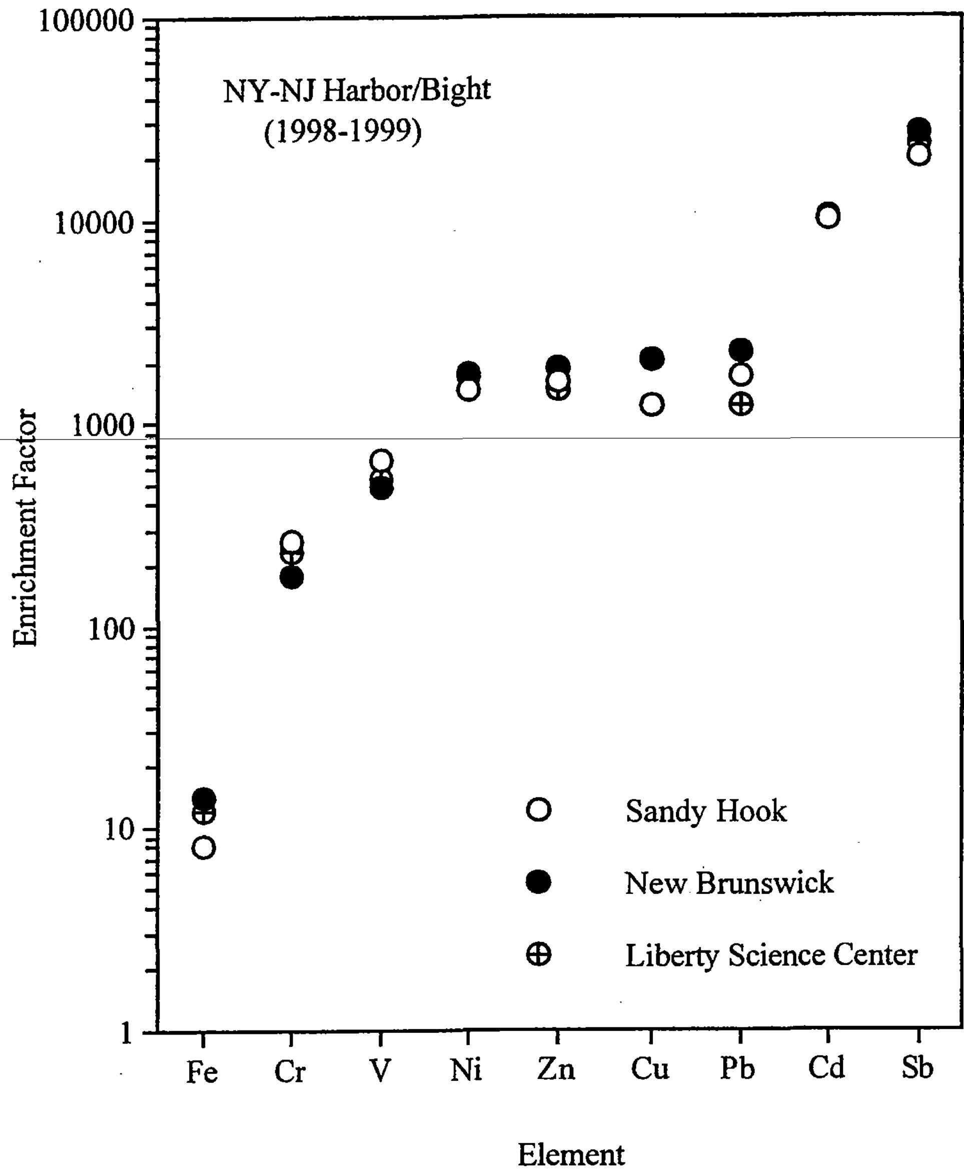

Antimony
Cadmium
Lead
Copper
Zinc
Nickel
Air Concentrations (ng m-3)
LSC
NB
SH
LSC
NB
SH
Location

Figure 2.



20
15
10
5
0
Sb (x 5)
Ni
Cu
60
40
20
0
Cd (x 50)
Pb
Zn
Air Concentrations (ng m-3)
1/23/98
2/16/98
3/18/98
4/11/98
5/5/98
6/4/98
6/28/98
7/28/98
8/21/98
9/22/98
11/6/98
12/21/98
1/17/99
Date

Figure 3



NY-NJ Harbor/Bight
(1998-1999)
100000
10000
1000
100
10
1
Enrichment Factor
Sandy Hook
New Brunswick
Liberty Science Center
Fe
Cr
V
Ni
Zn
Cu
Pb
Cd
Sb
Element

Figure 4

PERGAMON

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ATMOSPHERIC ENVIRONMENT

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Atmospheric polychlorinated biphenyl concentrations and apparent degradation in coastal New Jersey

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Abstract

To characterize the atmospheric dynamics and behavior of organic compounds in the NY–NJ Harbor Estuary, atmospheric concentrations of polychlorinated biphenyls (PCBs) were measured at coastal, suburban and urban sites in New Jersey in 1997–1999. $\sum$PCB concentrations at the suburban site varied from 86 to 2300 pg m^{-3} and from 84 to 1100 pg m^{-3} at the coastal site. Although the temporal trends of total concentrations were significantly different at the three sites ($p < 0.01$), PCB congener profiles revealed similar patterns ($r^2 > 0.90$, $p < 0.001$) implicating a dominant emission type and/or process. Temperature explained >50% of the total variability in ln[PCB] at both sites. Atmospheric concentrations at the suburban site increased when winds blew from an eastnortheast vector, while increased wind speeds led to a slight dilution. Wind speed and direction were not significantly correlated with the concentrations measured at the coastal site. Temporal changes in congener distribution at the suburban site are consistent with the preferential atmospheric removal of 3–5 Cl-biphenyls by hydroxyl radical attack with estimated half-lives of 0.7–1.8 years.

Keywords: PCBs; Sources; Atmosphere; Degradation

1. Introduction

Urban/industrial areas are major sources of atmospheric polychlorinated biphenyls (PCBs) to surrounding regions (Offenberg and Baker, 1997, 1999; Simcik et al., 1997). Atmospheric transport from major urban/industrial areas can lead to significant PCB loading to surrounding terrestrial and aquatic ecosystems (Hoff et al., 1996; Baker et al., 1997; Hillery et al., 1997; Bremle and Larsson, 1997; Offenberg and Baker, 1997; Franz et al., 1998; Zhang et al., 1999; Green et al., 2000). Loading of atmospheric PCBs to aquatic and terrestrial ecosystems occurs through diffusive air–water exchange, air–vegetation exchange, wet deposition (rain, snow), and dry particle deposition. Once delivered, PCBs may be remobilized to the regional atmosphere by air–surface exchange processes.

Measurements of atmospheric PCBs in the US Mid-Atlantic region are rare, with the exception of measurements made in the Chesapeake Bay area (e.g., Leister and Baker, 1994; Baker et al., 1997; Nelson et al., 1998; Bamford et al., 1999; Offenberg and Baker, 1999). PCB loading to the NY–NJ Harbor Estuary is reflected in the contamination of sediment and water column, and discharges from water pollution control plants (WPCPs) (Bopp et al., 1981, 1998; Brown et al., 1985; Iannuzzi et al., 1995; Achman et al., 1996; Huntley et al., 1997; Stackelberg, 1997; Durell and Lizotte, 1998; Feng et al., 1998). Durell and Lizotte (1998) reported total PCB influent concentrations from WPCPs ranging from 31 to

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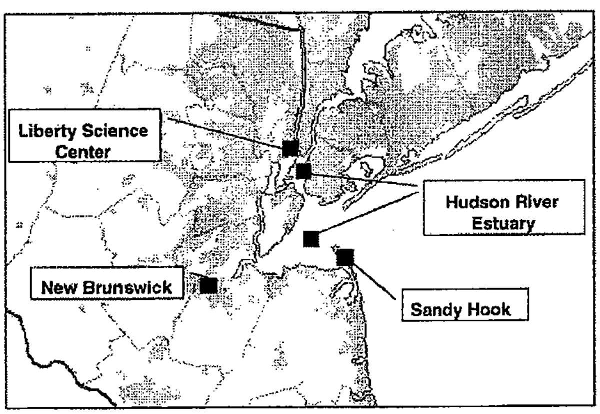
PII: S1352-2310(00)00485-4

625 ng l^{-1} during normal flow (110 ng l^{-1} average). With elevated concentrations in water and sediments, and based on the chemical–physical properties of these compounds, atmospheric exchange and transport must play a key role in the cycling of PCBs.

This research is part of the continuing New Jersey Atmospheric Deposition Network (NJADN) which has as objectives to characterize the regional atmosphere for hazardous air pollutants, estimate atmospheric loading to the aquatic and terrestrial ecosystems, identify and quantify regional versus local sources and sinks, and to identify environmental variables controlling atmospheric concentrations of PAHs, PCBs, chlorinated pesticides, trace metals, Hg and nutrients. This paper focuses on the temporal and spatial trends, and dynamics of atmospheric PCBs in the area of the NJ–NY Harbor Estuary.

2. Experimental

Atmospheric samples were taken at three sites: New Brunswick (40.48°N/74.43°W), Sandy Hook (40.46°N/74.00°W), and Liberty Science Center (Jersey City) (40.71°N/74.05°W), New Jersey (Fig. 1). The New Brunswick site, operated since October 1997, is located in a suburban area with major industry located 15 km to the north, and in the midst of major transportation corridors. The Sandy Hook site, operated since February 1998, is located on a sandy barrier reef separating Raritan Bay and the Atlantic Ocean and therefore surrounded by water. It is influenced by urban/industrial sources to the north and west, and any emissions from the surrounding water. The Liberty Science Center (LSC) site, operated since October 1998 and in summer 1998 during a field campaign, is located in a major urban/industrial setting 5 km west of New York City.



Shaded areas indicate urban areas by population density.
Adapted map courtesy of The National Atlas. USGS

Fig. 1. Location of the New Jersey Atmospheric Deposition Network (NJADN) sampling sites in the vicinity of the Hudson River Harbor Estuary.

Samples were collected mostly every 9th or 12th day after August 1998 using a modified organics high-volume air sampler (General Metal Works) for a duration of 24 h at a calibrated flow rate of ~ 0.5 m^3 min^{-1}. Quartz fiber filters (QFFs), precombusted at 450°C overnight, were used to capture the particulate phase and polyurethane foam plugs (PUFs) to capture the gas phase. The PUFs were precleaned with Alconox detergent and rinsed with Milli-Q water. After air drying, the PUFs were further cleaned by two consecutive 24-h Soxhlet extractions with acetone followed by a single 24-h extraction with petroleum ether. Subsequently, the PUFs were desiccated under vacuum to remove excess solvent and stored frozen in precombusted glass jars with an aluminum foil liner. Quartz fiber filters were injected with 3.75 ng and PUFs with 37.5 ng of 3,5-dichlorobiphenyl (#14), 2,3,5,6-tetrachlorobiphenyl (#65), and 2,3,4,4′,5,6-hexachlorobiphenyl (#166) prior to extraction as surrogates of extraction efficiency. Sample QFFs were Soxhlet extracted with dichloromethane (DCM) and PUFs were extracted each for 24 h with petroleum ether. The samples were rotary evaporated (Buchi rotary evaporator) to ~5 ml and reduced to ~1 ml under a gentle stream of purified (Florisil) N_2 gas. The samples were fractionated on a column containing 4.0 g of 3% water-deactivated precombusted alumina. The column was preconditioned with 5 ml of 2:1 dichloromethane:hexane, followed by 15 ml of hexane. PCBs were eluted with 13 ml of hexane, followed by 15 ml of 2:1 dichloromethane:hexane to elute PAHs and chlorinated pesticides. The samples were concentrated under a stream of purified N_2 gas to ~1 ml. Congeners 2,4,6-trichlorobiphenyl (#30) and 2,2′,3,4,4′,5,6,6′-octachlorobiphenyl (#204) were injected into the sample extract prior to instrumental analysis as internal standards. The samples were further concentrated under N_2 gas to a final volume of ~25 μl for the filter samples and ~300 μl for the PUF samples. Samples were analyzed on a 5890 Hewlett-Packard gas chromatograph with a ^{63}Ni electron capture detector equipped with a 60 m DB-5 Hewlett-Packard capillary column (0.25 μm thickness). The temperature program was as follows: starting at 100°C, 10°C min^{-1} to 180°C, 0.7°C min^{-1} to 230°C, and 3.0°C min^{-1} to 300°C where the temperature was held for 10.5 min. The inlet pressure was set constant at 185 kPa.

The averaged recovered masses of $\sum$PCBs from QFFs were 14 ± 16 ng ($n = 162$) for field samples, 0.55 ± 0.22 ng ($n = 9$) for field blanks, and 0.48 ± 0.75 ng ($n = 22$) for the laboratory blanks. Recoveries of surrogate congeners #14, #65, and #166 were 159 ± 119, 90 ± 13, 100 ± 14% for field samples, 100 ± 19, 91 ± 6, 95 ± 7% for field blanks, and 98 ± 19, 92 ± 13, 93 ± 11% for laboratory blanks, respectively.

The averaged recovered masses from PUF adsorbents were 330 ± 270 ng ($n = 174$) for field samples, 0.69 ± 0.58 ng ($n = 10$) for field blanks, and 0.51 ± 0.77 ng ($n = 23$) for laboratory blanks. Recoveries of surrogate congeners #65 and #166 were 109 ± 39 and $96 \pm 14\%$ for field samples, respectively. Surrogate #14 could not be applied to the field samples due to a co-eluting compound. Recoveries of surrogate congeners #14, #65, and #166 were 90 ± 11, 90 ± 5, $98 \pm 7\%$ for field blanks, and 92 ± 17, 91 ± 9, $97 \pm 8\%$ for laboratory blanks, respectively.

Split PUFs were collected to assess gas-phase breakthrough. The bottom half of the split PUF contained an average of 13% ($n = 3$) of the total mass. Samples were surrogate corrected using congener 65 for congeners eluting before congeners 110 + 77 and congener 166 was used for congeners eluting after congeners 110 + 77. Samples concentrations were not corrected for field blanks or laboratory blanks.

Method detection limits (MDLs) were defined as three times the mean recovered mass in respective field blanks. An instrument detection limit was defined by using an area count of 300 based on personal experience. The MDL for $\sum$PCBs was (at NB) was $\sim 3.7\,\mathrm{pg\,m^{-3}}$ in filter samples and $9.0\,\mathrm{pg\,m^{-3}}$ in PUF samples applying an average air volume of $500\,\mathrm{m^3}$.

The following congeners were quantified: IUPAC nos. 18, 17, 16 + 32, 31, 28, 21 + 33 + 53, 22, 45, 52 + 43, 49, 47 + 48, 44, 37 + 42, 41 + 71, 64, 40, 74, 70 + 76, 66 + 95, 91, 56 + 60 + 89, 92 + 84, 101, 83, 97, 87 + 81, 85 + 136, 110 + 77, 82, 151, 135 + 144 + 147 + 124, 149 + 123 + 107, 118, 146, 153 + 132, 141, 137 + 176 + 130, 163 + 138, 178 + 129, 187 + 182, 183, 185, 174, 177, 202 + 171 + 156, 180, 170 + 190, 201, 203 + 196, 195 + 208, 194, 206.

Meteorological data were obtained from Newark International Airport located 35 km north of the New Brunswick site and from John F. Kennedy Airport located 15 km north–northeast of the Sandy Hook site.

3. Discussion

3.1. Site comparisons

Fig. 2 shows the temporal variability in total $\sum$PCB concentrations (gas + particulate) for the suburban (NB), marine coastal (SH), and urban/industrial (LSC) sites along with a temperature profile from NB. $\sum$PCB concentrations at the New Brunswick site were $546 \pm 400\,\mathrm{pg\,m^{-3}}$ and generally higher than the $450 \pm 300\,\mathrm{pg\,m^{-3}}$ observed at SH. Comparing only common sampling dates, the average concentration at NB was $690 \pm 460\,\mathrm{pg\,m^{-3}}$. The average concentration at LSC was $1000 \pm 820\,\mathrm{pg\,m^{-3}}$ based on 31 samples.

The temporal distribution of $\sum$PCB concentrations was significantly different between the suburban and coastal-marine sites based on a paired t-test ($p < 0.01$), even though the mean concentrations are statistically similar. This indicates that site-specific meteorology, sources, and/or sinks influence local atmospheric concentrations. $\sum$PCBs at NB exhibit significant variability with concentrations varying from 63 to $2340\,\mathrm{pg\,m^{-3}}$. Likewise, $\sum$PCBs at SH exhibit variability with concentrations ranging from 91 to $1600\,\mathrm{pg\,m^{-3}}$. The variability observed at the sites is likely due to both being close to a source area (Junge, 1977). Simcik et al. (1997) reported that atmospheric concentrations over southern Lake Michigan increased by a factor of 4 when winds were blowing from the source area of Chicago. Greater variability in atmospheric concentrations are also expected in impacted regions based on the role of temperature expressed in Clausius–Clapeyron plots since impacted sites exhibit steeper slopes in ln P_L^0 versus $1/T$ plots (Wania et al., 1998; Hoff et al., 1998). A steeper slope results in a greater change in atmospheric concentration per unit change of temperature. The Sandy Hook site is impacted by nearby urban activities as mitigated by its proximity to the Bay and air–water exchange.

Table 1 shows comparisons of atmospheric concentrations from this and other recent studies. $\sum$PCB concentrations in the New Jersey atmosphere are two to seven times higher than those reported at comparable sites. However, $\sum$PCB concentrations are less than reported by Simcik (1998) for Chicago, IL (mean, $3100\,\mathrm{pg\,m^{-3}}$). Elevated atmospheric concentrations of $\sum$PCBs were expected in coastal NJ due to the major urbanization and industrialization in this region as well as historical inputs to proximate rivers and estuaries. Rather unexpectedly, the coastal site also showed elevated mean atmospheric concentrations that are statistically similar to the mean concentrations in New Brunswick. Concentrations are elevated at SH due to the relative closeness of major urban/industrial centers to the north and west, as well as volatilization from the Raritan Bay, despite ventilation by clean marine air.

Individual gas-phase PCB congener concentrations in Table 1 show that the highest values were measured at LSC site in the midst of the industrial zone. Concentrations at NB and SH were identical for many congeners, perhaps driven by the larger number of winter samples averaged for NB.

The particulate phase (Table 1) constituted 0.2–44% of the total PCB mass based on all samples. Samples with a large percentage in the particulate phase were collected during winter when atmospheric concentrations and temperatures were low, and back trajectories indicated air masses from Canada. Particulate PCBs were highest at LSC at $58 \pm 40\,\mathrm{pg\,m^{-3}}$ followed by NB $20 \pm 16\,\mathrm{pg\,m^{-3}}$ and SH $12 \pm 8\,\mathrm{pg\,m^{-3}}$, in the approximate relationship to gas-phase concentrations. These

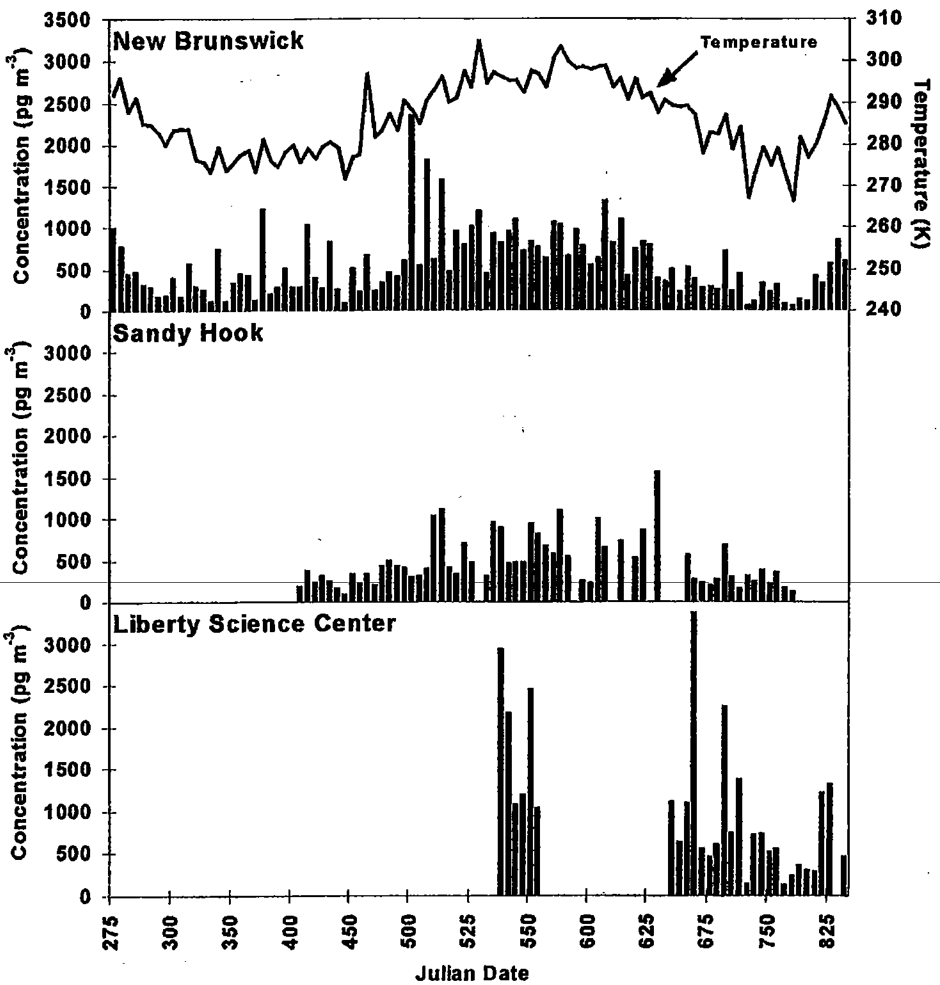


Fig. 2. Atmospheric $\sum$PCB concentrations (gas + particulate) at New Brunswick, Sandy Hook, and Liberty Science Center starting October 1997.

concentrations are lower than values reported by Simcik et al. (1997) for Chicago (116 pg m^{-3}), but greater than concentrations reported in the Great Lakes area (4.7–8.8 pg m^{-3}) (Hoff et al., 1996).

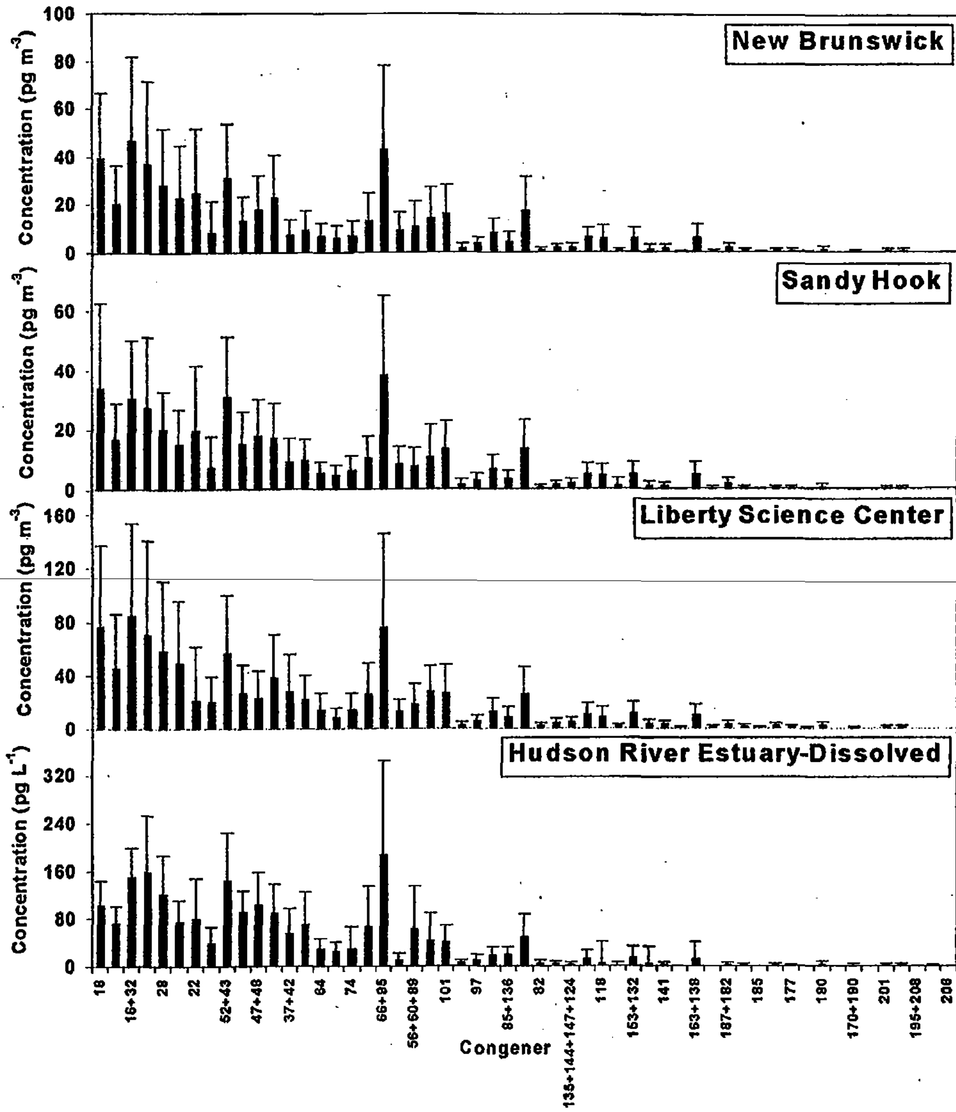
3.2. *Congener profiles*

Fig. 3 shows the average congener profiles of the atmospheric gas phase and composite profile ($n = 4$) dissolved phase PCBs taken during a July 1998 field campaign (see Lohmann et al., 2000; Brunciak et al., 2000) in the NY–NJ Harbor Estuary (Fig. 1). Each bar represents the mean concentration ± 1 SD of a PCB congener for all samples. The New Brunswick profile includes samples from October 1997 to May 1999, the Sandy Hook profile includes samples from February 1998 to February 1999, and the Liberty Science Center profile includes data from July 1998, and from October 1998 to May 1999. PCB congener concentrations amongst the sites are statistically similar ($r^2 \geq 0.92$; $p < 0.001$) even though the temporal distributions of concentrations between the sites are significantly different as mentioned above (Table 1, Fig. 2). These results are consistent with the hypothesis that atmospheric PCBs derive from a dominant source type/area and process(es) in the region, and that temperature, wind direction and speed, and distance from the source(s) are forcing the absolute concentrations. The congener profiles may change seasonally due to differences in source profiles. New Brunswick atmospheric concentrations may reflect a greater contribution from air–terrestrial exchange, whereas air–water exchange may be more important at Sandy Hook. However, profiles of $\sum$PCB air concentrations at New Brunswick and Sandy Hook based on seasonal averages are statistically the same indicating a dominant source(s) type and/or set of environmental processes.

Table 1
Comparison of atmospheric ∑PCB concentrations[a]

Concentrations ($pg\,m^{-3}$)	New Brunswick (gas) ($n = 92$)	New Brunswick (particle) ($n = 90$)	Sandy Hook (gas) ($n = 52$)	Sandy Hook (particle) ($n = 50$)	Liberty Science Center (gas) ($n = 31$)	Liberty Science Center (particle) ($n = 27$)	Hazelrigg, UK[b]	Northern Chesapeake Bay (gas)[c]	Chicago, IL[d]	Alert, Canada (May–Sep)[e]	Sturgeon Pt., NY[f]	Southern Chesapeake Bay (gas)[g]	Egbert, ON, Canada[h]
18	39.2	0.9	33.8	0.7	75.5	1.5		19.9	191	5.1	20	4.5	6.6
16 + 32	46.3	1.1	30.2	0.6	83.8	1.7		25.4	204	0.8		5.9	8.8
28	28.3	0.5	20.1	0.5	57.8	1.7	24.7	62.9[a]	432[a]	1.3		6.0	16
52 + 43	30.9	0.8	30.6	0.8	56.0	2.7	18.4	15.8	95.7	1.8	16	7.7	16
41 + 71	9.1	0.3	9.6	0.3	21.8	1.0		19.3	111	0.3		5.2	2.3
66 + 95	42.9	2.1	38.2	1.2	75.4	3.9		33.3	303	1.6		7.8	6.5
101	16.1	0.8	13.5	0.5	26.5	1.8	6.5	6.8	51.4	0.89	10	4.8	6.4
87 + 81	8.1	0.5	6.6	0.4	12.6	1.3		3.7	29.1	0.27		3.8	2
110 + 77	17.3	1.1	13.5	0.6	25.0	2.6		7.9	90.7	0.65		7.1	4
149 + 123 + 107	5.9	0.6	5.2	0.4	10.2	1.8		7.1	28.7	0.90		6.6	2.8
153 + 132	5.4	0.9	5.2	0.5	10.4	2.5	1.7	10.1	70.9	0.77		10.2	3.2
163 + 138	6.0	1.3	5.0	0.9	9.9	3.9	1.5	4.4	42.8	0.47		5.9	2.8
187 + 182	2.0	0.3	2.1	0.2	2.6	0.8		2.3	7.8	0.39		2.7	1.7
174	0.9	0.4	0.7	0.2	1.7	0.8		1.8	4.9	0.14		1.7	0.92
180	1.2	0.6	1.0	0.4	2.1	2.0	11		44.4	0.55		2.7	1.1
Sum	526 ± 395	20 ± 16	439 ± 303	12 ± 8	960 ± 802	58 ± 40	164	510	3100	33	370	210	200

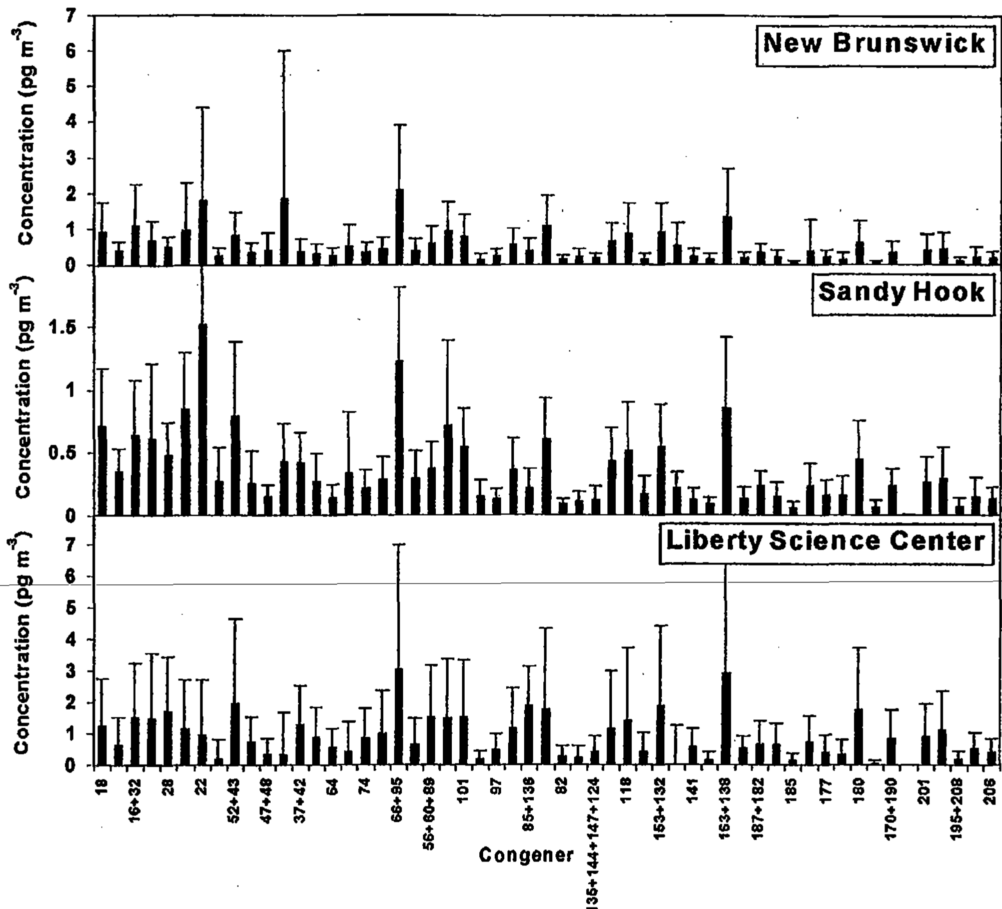
[a] Includes #31.
[b] Lee and Jones (1999).
[c] Nelson (1998).
[d] Simcik (1998).
[e] Stern et al. (1997).
[f] Hoff et al. (1996).
[g] Leister (1993).
[h] Hoff et al. (1992).



Comparison:	r^2
New Brunswick vs. Sandy Hook	0.97
New Brunswick vs. Liberty Science Center	0.95
Sandy Hook vs. Liberty Science Center	0.92
New Brunswick vs. Hudson River Estuary	0.90
Sandy Hook vs. Hudson River Estuary	0.92
Liberty Science Center vs. Hudson River Estuary	0.88

Fig. 3. Gas-phase congener profiles from New Brunswick, Sandy Hook, and Liberty Science Center. Dissolved phase congener profile from Hudson River Estuary also shown (Brunciak et al., 2000). Each bar represents an averaged concentration measured over the sampling period.

The correlations between the atmospheric gas phase and the aquatic dissolved phase profiles reveal the potential importance of air–water exchange. The Hudson River and several surrounding rivers have high sediment and water column concentrations of $\sum$PCBs (Bopp et al., 1981, 1982; Brown et al., 1985; Iannuzzi et al., 1995; Achman et al., 1996; Stackelberg, 1997). Volatilization from these rivers and the lower estuary are likely important sources to the atmosphere (Farley et al., 1999; Brunciak et al., 2000).



Comparison:	r^2
New Brunswick vs. Sandy Hook	0.79
New Brunswick vs. Liberty Science Center	0.65
Sandy Hook vs. Liberty Science Center	0.66

Fig. 4. Same as Fig. 3 except particulate phase congener profile comparison.

Particulate phase congener profiles exhibited considerable variability both between sampling days and between sampling sites. This is likely due to the heterogeneity of sources of atmospheric particles as well as frequent non-detection of PCB congeners. However, the congener patterns are well correlated with each other ($r^2 \geqslant 0.65$, $p < 0.001$) (Fig. 4). This indicates that PCBs are being similarly sorbed onto particles even though the chemical and physical properties of the particles may be different from site to site.

Congener profiles revealed similar patterns among the three sites. However, the congener profiles change over time as a result of loss processes (discussed later). Grouping PCBs according to homologues and examining temporal trends provide an easier alternative compared to examining congener specific temporal trends.

3.3. *Temporal trends of homologue profiles*

The PCB homologue profiles normalized to total PCB mass are shown in Fig. 5, where each bar represents a homologue fraction of the total mass for a single gas-phase sample. The trichlorobiphenyls and tetrachlorobiphenyls constituted 70–90% of the total PCB mass in all samples. Fig. 5 shows that at NB, the fraction of trichlorobiphenyls decreases over time, but the fraction of pentachlorobiphenyls increases over time, a phenomenon not observed in the Sandy Hook data. Fig. 6 quantifies homologue trends at New Brunswick as a function of time and temperature.

Fig. 6 shows the trends of PCB homologue fractions as a function of time and temperature at the New Brunswick site for which the most data exist. The plots

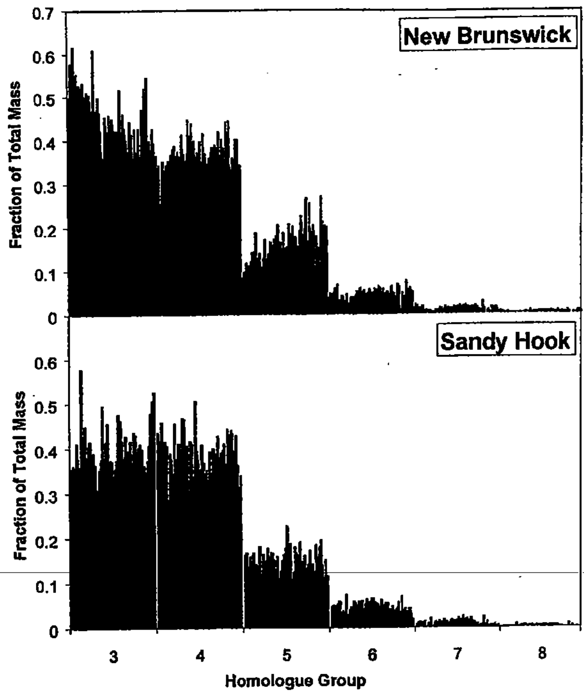


Fig. 5. Mass normalized total PCB homologue distributions at the New Brunswick and Sandy Hook sites. Each bar represents the contribution to a homologue group from a single sample.

show that the fraction of trichlorobiphenyls decrease on a relative basis as a function of time while the fraction of pentachlorobiphenyls increase with time. This can be viewed as a "teeter-totter" effect whereby a decrease in one fraction of the total mass (in this case the fraction of trichlorobiphenyls), must be balanced by an increase in another fraction (in this case the fraction of pentachlorobiphenyls). This trend was not observed in the Sandy Hook data. Fig. 6 also shows that the fractions of hexa- through octachlorobiphenyls are highly correlated with temperature, but not with time. These data suggest that the PCB congener pattern with time changes by a process that affects primarily the lower molecular weight congeners, but not the higher molecular weight congeners. Table 2 lists the change in homologue profiles during the sampling periods at New Brunswick. The fraction of trichlorobiphenyls decreased by 14% and the fraction of pentachlorobiphenyls increased by 8% from October 1997 to May 1999, a change in homologue distribution that cannot be attributed to temperature variations. To simulate the effects of temperature on the fraction of homologue distributions, sub-cooled liquid vapor pressures (P_L^0) of PCB homologues were calculated at 273 and 300 K and converted into relative concentrations (Falconer and Bidleman, 1994) (Table 2). The changes in fractions of total mass due to temperature alone are relatively small compared to the results in this study (6% for the fraction of trichlorobiphenyls based on temperature versus 14% found in this study) and provides further evidence that temperature changes cannot reproduce the observed profile trends for the tri- through pentachlorobiphenyls.

Another method was used to delineate the temporal trend of homologue distributions by removing the effects of temperature on homologue profiles. Homologue concentrations were converted to partial pressures then normalized to a baseline temperature of 288 K as in other studies (Cortes et al., 1998, Simcik et al., 1999) using the equation

$$P_{288} = P\exp\left[\frac{-\Delta H}{R}\left(\frac{1}{288}-\frac{1}{T}\right)\right], \qquad (1)$$

where P_{288} is the partial pressure of the PCB congener at 288 K (Pa), P is the measured partial pressure (Pa), ΔH is the enthalpy of vaporization from Falconer and Bidleman (1994) (kJ mol^{-1}), R is the gas constant (0.0083145 kJ mol^{-1} K^{-1}), and T is the average temperature over the sampling period (K). The resultant slopes of the fraction of trichlorobiphenyls versus time and fraction of pentachlorobiphenyls versus time were -2.3×10^{-4} and 1.3×10^{-4}, respectively, and are comparable to the slopes in Fig. 6 (-2.3×10^{-4} and 1.4×10^{-4}, respectively). Again, temperature cannot explain the observed trend.

The observations above suggest that there is a removal and/or degradation process that preferentially acts on the lower chlorinated congeners relative to the higher chlorinated PCBs. Each homologue group has a specific removal/degradation rate. There must also be an input of PCBs to the atmosphere dominated by the lower chlorinated PCBs as would be expected by surface–air exchange to maintain nearly constant total PCB concentrations. The input must come from reservoirs such as aquatic and terrestrial surfaces.

A model describing the atmospheric transformation/degradation of PCBs can be described according to Eq. (1):

$$\sum_{i=1}^{N} C_{i,t} = \sum_{i=1}^{N} (C_{i,t-1} - C_{i,t-1}k_{\text{obs},i} + C_{i,t=0}f_{\text{obs},t-1}), \qquad (2)$$

where $C_{i,t}$ is the gas-phase concentration of PCB congener i through N (pg m^{-3}), $C_{i,t-1}$ is the gas-phase concentrations of PCB congeners from the previous day (pg m^{-3}), $k_{\text{obs},i}$ is the fraction of $C_{i,t-1}$ that is lost per day, $C_{i,t=0}$ is the gas-phase concentration from a source region (pg m^{-3}), and $f_{\text{obs},t-1}$ is the fraction of PCBs delivered to the atmosphere. This model assumes an initial congener distribution based on the regressions of Fig. 6 at $t = 1$. The concentration of the current day ($C_{i,t}$) is a function of the concentration of the previous day

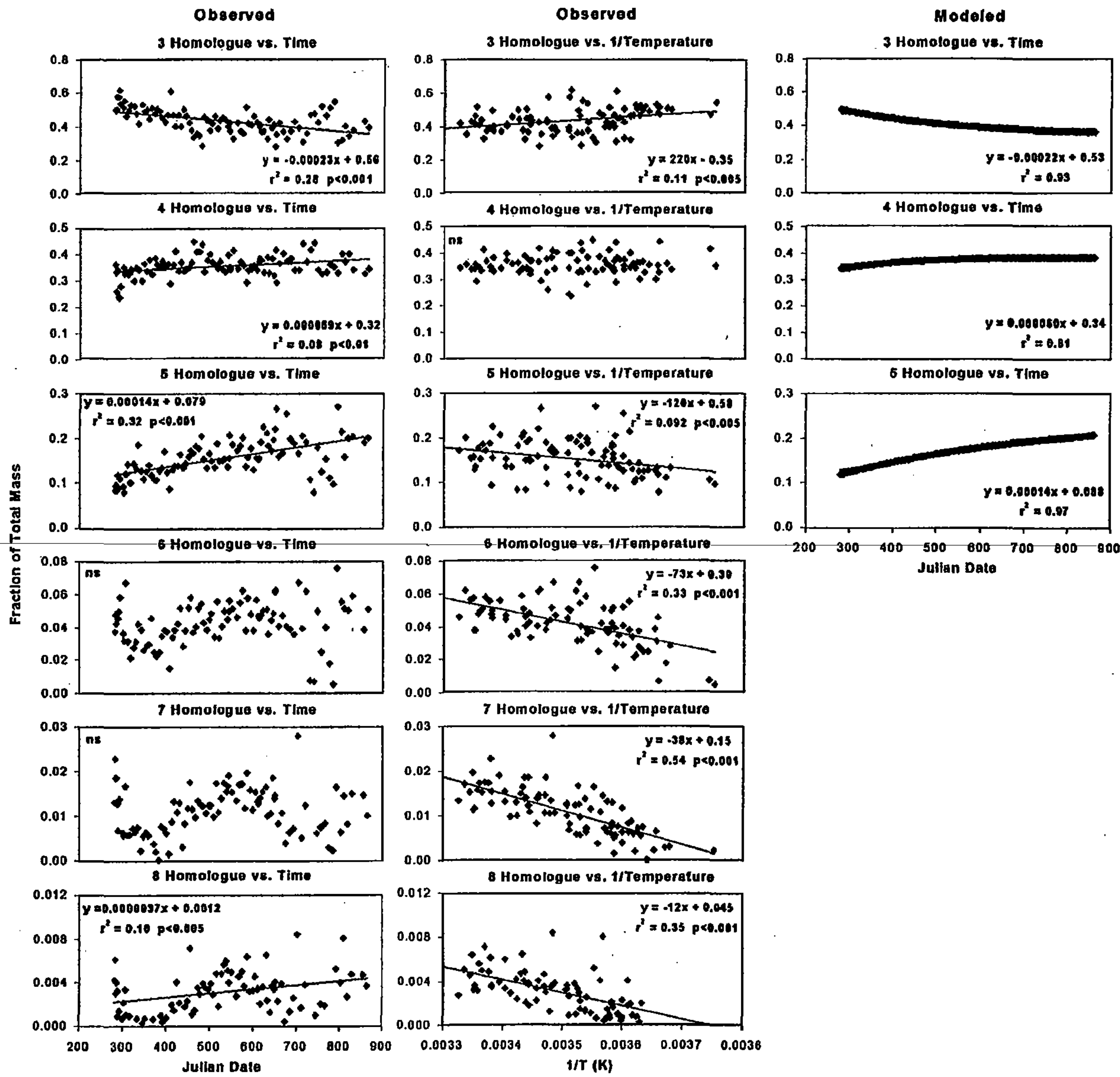


Fig. 6. PCB homologue distribution as a function of time and temperature at the New Brunswick site.

($C_{i,t-1}$) minus a fraction of the previous day's concentration based on preferential degradation of lower molecular weight PCBs based on the observations ($C_{i,t-1}k_{\mathrm{obs},i}$) plus an additional fraction from a source region ($C_{i,t=0}f_{\mathrm{obs},t-1}$). The vector parameter $k_{\mathrm{obs},i}$ is adjusted until the model matches the observed temporal trend. This model also contributes a fraction of atmospheric PCBs that is richer in the lower molecular weight compounds such as would be expected by volatilization through the scalar parameter $f_{\mathrm{obs},t-1}$. This parameter was found by adjusting the value until the modeled concentrations remained constant. This was done because the absolute decrease of atmospheric concentrations is unknown. Degradation can be observed based on homologue profiles without knowing the absolute decrease in concentrations.

The model was used to simulate the temporal trend of homologue distributions in this study. PCB concentrations were maintained constant for calculating model parameters because decrease in atmospheric $\sum$PCBs were undetectable. Atmospheric lifetimes of PCBs reported in the literature range from 2 to 6 years. This has been attributed to OH radical attack on gas-phase PCB congeners and the buffering of atmospheric levels by emissions from soils, vegetation and surface waters (Hillery et al., 1997; Simcik et al., 1999; Sweetman and

Table 2
Comparison of normalized PCB homologue distributions (fractions of total mass) at the New Brunswick site based on observations, vapor pressure, and modeling efforts

Homologue	Observed change		Based on vapor pressure[a]		Modeled change		Modeled parameters k_{obs}	Atmospheric half-life (days)
	Start	End	273 K	300 K	Start	End		
3	0.492	0.357	0.670	0.614	0.497	0.362	0.0047	145
4	0.338	0.379	0.265	0.293	0.342	0.384	0.0029	235
5	0.119	0.203	0.049	0.067	0.119	0.206	0.0015	460
						$f_{obs,t-1}$	0.0032	

[a] Falconer and Bidleman (1994).

Jones, 2000). The high variability in $\sum$PCB concentrations and relatively short sampling time-span limit the delineation of any temporal change in this study. The total concentrations were maintained constant by adjusting the input parameter $f_{obs,t-1}$. For the sake of convenience, the tri- to hexa-homologue groups were used instead of individual congeners for i through N. The initial homologue profile was used for the contribution term $C_{i,t=0}$. The parameters $k_{obs,i}$ (homologue specific removal/degradation rates), and $f_{obs,t-1}$ (atmospheric contribution) are listed in Table 2 as well as the results from the model. The results of the model are plotted in Fig. 6 and agree with the observed trends of fractions of homologue groups. The observed slopes for the fractions of tri- and pentachlorobiphenyls were -2.3×10^{-4} and 1.4×10^{-4} as compared the modeled results of -2.2×10^{-4} and 1.4×10^{-4}, respectively. The atmospheric half-lives of PCBs were calculated by setting $f_{obs,t-1}$ equal to 0.

The results of the model show that atmospheric half-lives for PCB homologues ranged from 145 days for the trichlorobiphenyls to 460 days for the pentachlorobiphenyls (Table 2). The model also showed that a daily input of ~0.32% per day of "lighter" molecular weight PCBs is needed in order to maintain $\sum$PCB concentrations constant. This contribution to atmospheric PCBs may be advected from long-range transport which is dominated by lower chlorinated PCBs (Agrell et al., 1999) or derived regionally from "weathered" sources such as soil/vegetation–air exchange.

Kwok et al. (1995) calculated atmospheric lifetimes of tri- through pentachlorobiphenyls between 7 and 48 days assuming a 24-h average atmospheric OH radical concentrations of 8×10^5 molecules cm^{-3}. These calculations were based on experiments of biphenyl through dichlorobiphenyls at 297 K using Teflon chambers irradiated with black lamps (Kwok et al., 1995). Anderson and Hites (1996) calculated atmospheric lifetimes between 9 and 34 days for tri- through pentachlorobiphenyls at 298 K assuming a 24-h average OH radical concentration of 9.7×10^5 molecules cm^{-3}. Their experiments were conducted at 323–364 K using a quartz reaction chamber irradiated with a Hg lamp. More recently, Totten et al. (2000) used observed day/night differences in gas-phase concentrations in urban areas to determine atmospheric lifetimes of 3–10 days. The estimated atmospheric lifetimes in this study of 0.6–1.6 years for tri- through pentachlorobiphenyls are more than an order of magnitude higher than values based on laboratory measurements and free energy relationships, but similar to the atmospheric half-lives reported by Hillery et al. (1997) and Simcik et al. (1999). These differences are due to remobilization of PCBs from various environmental compartments, and differences in temperature and concentrations of OH radicals in the atmosphere over time and space (Anderson and Hites, 1996; Sweetman and Jones, 2000).

4. Temperature

The temperature dependence of atmospheric PCB concentrations is well documented (Hoff et al., 1992a, b, 1998; Hornbuckle and Eisenreich, 1996; Hillery et al., 1997; Honrath et al., 1997; Wania et al., 1998; Haugen et al., 1999; Lee and Jones, 1999; Simcik et al., 1999; Currado and Harrad, 2000). The following Clausius—Clapeyron-type expression was used to interrogate the data

$$\ln P = a_0 + a_1/T, \quad (3)$$

where P is the partial pressure of PCBs (Pa), T is the temperature (K), and a_0 and a_1 are fitting parameters. Temperature explained 61% of the total variability of ln PCB concentrations in the atmosphere at NB and 53% of the total variability at SH (Fig. 7, Table 3). Proximate sources yield a steeper slope of the $\ln P_{\sum PCBs}$ versus $1/T$ plots (Wania et al., 1998; Hoff et al., 1998). In this study, regression of $\ln P_{\sum PCBs}$ versus $1/T$ yielded a slope of -6200 ± 530 which is within the range of

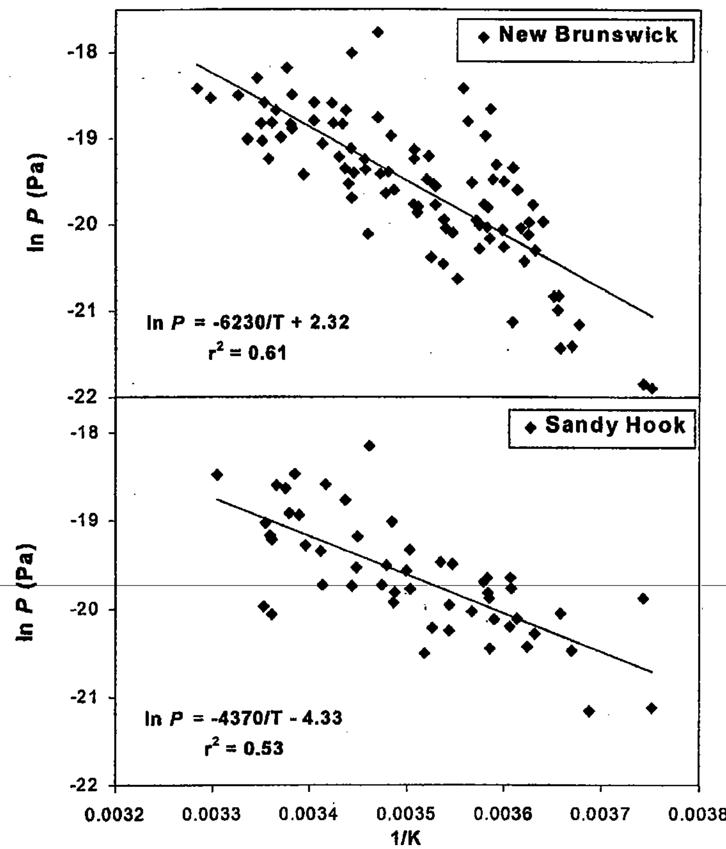


Fig. 7. Clausius–Clapeyron plots for ∑PCBs for the New Brunswick and Sandy Hook data.

slopes reported for urban–industrial Bloomington, IN (−7000 to −6000) (Wania et al., 1998). The Sandy Hook regression produced a slope of -4370 ± 580, which is within the range of values reported for the rural/Great Lakes, and Minnesota area (−5000 to −4000) (Wania et al., 1998). Based on the available samples from Liberty Science Center ($n = 31$), the regression produced a slope of -6640 ± 910 which is indicative of emissions from local surface sources.

Table 3 lists ΔH_{sa} (enthalpy of surface–air exchange) values of individual congeners for the New Brunswick and Sandy Hook sites. The values of ΔH_{sa} for ∑PCBs from New Brunswick ($52 \pm 4\,kJ\,mol^{-1}$) are statistically higher than at Sandy Hook ($36 \pm 5\,kJ\,mol^{-1}$), but identical to values from Chicago ($51 \pm 2\,kJ\,mol^{-1}$) (Simcik et al., 1999) and Birmingham, UK ($53 \pm 11\,kJ\,mol^{-1}$) (Currado and Harrad, 2000). Both Chicago and Birmingham are major urban areas and the results of ΔH_{sa} for ∑PCBs dictate that New Brunswick is impacted by proximate urban centers. The ΔH_{sa} for ∑PCBs at Sandy Hook are the same as the values reported for sites located in or near bodies of water such as: Lake Superior over water ($35 \pm 1\,kJ\,mol^{-1}$) (Simcik et al., 1999), Hazelrigg, UK ($36 \pm 5\,kJ\,mol^{-1}$) (Lee and Jones, 1999), and Norrbyn, Sweden ($38\,kJ\,mol^{-1}$) (Agrell et al., 1999). The higher values of ΔH_{sa} at New Brunswick versus Sandy Hook may be due to the large seasonal temperature change over land versus a mediated seasonal temperature change over water. By regressing atmospheric ln[PCBs] against $1/T$ at coastal sites, one is biasing ΔH_{sa} values low. This is because land temperatures may change by 35°C while surface water temperatures may change by only 20°C. By using land temperatures, the change in atmospheric concentration based on land temperatures would not be as great if surface water temperatures were used. The regression temperature that should be used would be a weighted mean between the air and surface water temperature.

Table 3 also shows that enthalpies of surface–air exchange increase with increasing degree of congener chlorination as reported by others (Hornbuckle and Eisenreich, 1996; Wania et al., 1998; Simcik et al., 1999; Currado and Harrad, 2000). Regression of ΔH_{sa} versus chlorine number gives a slope of $7.9 \pm 1.5\,kJ\,mol^{-1}$ per chlorine atom ($r^2 = 0.68$, $p < 0.001$) for New Brunswick and $10.5 \pm 1.3\,kJ\,mol^{-1}$ per chlorine atom ($r^2 = 0.83$, $p < 0.001$) for Sandy Hook (15 congeners). Statistically, these slopes are identical.

Table 3
Enthalpies of surface–air exchange (ΔH_{sa}) values from this and other studies

Congener	New Brunswick ΔH_{sa} (kJ mol^{-1})	r^2	p	Sandy Hook ΔH_{sa} (kJ mol^{-1})	r^2	p	Chicago, IL (over water)[a] ΔH_{sa} (kJ mol^{-1})	Birmingham, UK[b] ΔH_{sa} (kJ mol^{-1})	Hazelrigg, UK[c] ΔH_{sa} (kJ mol^{-1})	Norrbyn, Sweden[d] ΔH_{sa} (kJ mol^{-1})
18	42 ± 4	0.52	< 0.001	34 ± 5	0.44	< 0.001	22 ± 9.2	57 ± 13	28 ± 7	
16 + 32	42 ± 5	0.42	< 0.001	19 ± 6	0.21	< 0.001	40 ± 12	44 ± 12		
28	51 ± 5	0.55	< 0.001	26 ± 5	0.31	< 0.001	64 ± 21[e]	52 ± 12[e]		
52 + 43	45 ± 5	0.52	< 0.001	31 ± 5	0.44	< 0.001	53 ± 16[f]	46 ± 12[f]	39 ± 6[f]	
41 + 71	55 ± 5	0.58	< 0.001	32 ± 5	0.42	< 0.001	42 ± 9.1	44 ± 11[g]		33[g]
66 + 95	52 ± 6	0.50	< 0.001	41 ± 5	0.54	< 0.001	49 ± 10[h]	48 ± 13[h]	57 ± 7[h]	
101	56 ± 5	0.60	< 0.001	36 ± 6	0.46	< 0.001	43 ± 7.4	64 ± 12[i]	21 ± 7	55
87 + 81	45 ± 5	0.52	< 0.001	40 ± 5	0.54	< 0.001	51 ± 8.9[j]	65 ± 13[j]		
110 + 77	63 ± 5	0.64	< 0.001	39 ± 5	0.51	< 0.001	67 ± 20[k]	67 ± 13[k]	19 ± 6	
149 + 123 + 107	67 ± 5	0.69	< 0.001	46 ± 5	0.60	< 0.001		77 ± 13[l]		
153 + 132	64 ± 6	0.55	< 0.001	52 ± 6	0.63	< 0.001	55 ± 12[m]	90 ± 21[n]		63[n]
163 + 138	79 ± 5	0.70	< 0.001	60 ± 6	0.67	< 0.001	59 ± 13	58 ± 15		73[o]
187 + 182	60 ± 6	0.59	< 0.001	65 ± 8	0.61	< 0.001	78 ± 16	106 ± 18		
174	77 ± 6	0.71	< 0.001	64 ± 6	0.69	< 0.001	62 ± 5	94 ± 15		
180	87 ± 6	0.69	< 0.001	81 ± 8	0.71	< 0.001	66 ± 20	112 ± 18		52
Total	52 ± 4	0.61	< 0.001	36 ± 5	0.53	< 0.001	51 ± 1.9	53 ± 11	36 ± 5	38

[a] Simcik et al. (1999).
[b] Currado and Harrad (2000).
[c] Lee and Jones (1999).
[d] Agrell et al. (1999).
[e] Includes #31.
[f] Not including #43.
[g] Includes #64, not including 71.
[h] Not including #95.
[i] Includes #90.
[j] Not including #81.
[k] Not including #77.
[l] Not including #123 + 107.
[m] Includes #105.
[n] Not including #132.
[o] Not including #163.

4.1. Wind speed and wind direction

Increasing wind speed causes a dilution of atmospheric concentrations (Haugen et al., 1999; Lee and Jones, 1999). Regression of the ln gas-phase PCBs versus the ln wind speed gave a r^2 of 0.15 ($p < 0.001$) at the New Brunswick site. The regression of wind speed against concentration was not significant for the Sandy Hook data ($r^2 = 0.028$, $p = 0.23$). Increased wind speed leads to greater atmospheric mixing (Arya, 1988). For example, low mixing heights such as those associated with an inversion layer reflect lower wind speeds and lead to higher ground concentrations. As the wind speed increases, there is greater shear and turbulence (Leahey et al., 1996) also leading to a greater mixing of the atmosphere. During periods of convective mixing, such as on warm summer days, turbulence caused by warm "bubbles" of air rising from the ground lead to diluted concentrations.

Air masses flowing across a PCB source area lead to emissions and subsequently higher atmospheric concentrations. The importance of wind direction on atmospheric concentrations has been observed in several studies (Hornbuckle et al., 1993; Simcik et al., 1997; Offenberg and Baker, 1999; Zhang et al., 1999; Currado and Harrad, 2000). For example, Simcik et al. (1997) reported a four-fold increase in atmospheric PCBs over Southern Lake Michigan when winds were blowing from a vector between Evanston, IL and Gary, IN. A similar four-fold increase in atmospheric concentrations was observed in the Chesapeake Bay (Offenberg and Baker, 1999) when winds blew from Baltimore. A multiple linear regression of the form below may describe the effect of wind speed:

$$\ln C_{\text{gas}} = a_0 + a_1/T + a_2 \ln(1/u) + a_3 \sin(\text{wd}) + a_4 \cos(\text{wd}), \qquad (4)$$

where C_{gas} is the gas-phase $\sum$PCB concentration (pg m^{-3}), T is the temperature, u is the wind speed (m s^{-1}), and wd is the wind direction. For NB, the regression gave an r^2 of 0.68 ($p < 0.001$) at the NB site. The coefficients were found to be $a_0 = 27.6 \pm 1.7$ ($p < 0.001$), $a_1 = -5967 \pm 492$ ($p < 0.001$), $a_2 = 0.452 \pm 0.147$ ($p < 0.005$), and $a_3 = 0.219 \pm 0.078$ ($p < 0.01$). The a_4 coefficient was found not to be significant.

The regression of the NB atmospheric PCBs with meteorological variables indicates that atmospheric concentrations increased when the winds were blowing from the east. Adjusting the phase angle of the wind direction (wd + 25°) so that the sine of wind direction would be 1 at 65°, increased the correlation slightly, and indicated that the greatest influence was from an east–northeast direction. Concentrations increase when winds derive from the New York Metropolitan area (northeast) since this area is significantly impacted by PCBs (Bopp et al., 1981; Iannuzzi et al., 1995; Huntley et al., 1997; Durell and Lizotte, 1998). The elevated concentrations found at the Liberty Science Center site also support this hypothesis.

Using Eq. (3) for the regression of the Sandy Hook data revealed that temperature was the only significant variable influencing the concentrations at this site. Local meteorological conditions that are not reflected in the meteorological data may be important. Complex interactions such as sea breezes, marine aerosols, and air–water exchange may influence total atmospheric concentrations, but the present lack of information on these effects limits further analysis. At Liberty Science Center, temperature was the only significant meteorological variable.

Further work is needed to determine long-term trends of atmospheric PCB concentrations in this region. Simcik et al. (1999) have reported total atmospheric PCBs half-lives ranging from 2.8 to 3.3 years. Due to the great variability in concentrations and relatively short sampling time scale, no decrease in atmospheric concentrations was observable. However, a shift in homologue distributions was observed which is indicative of hydroxyl radical attack. Future data from the Liberty Science Center site will provide valuable information on possible sources and sinks.

4.2. Other possible atmospheric sources

The sediments and water of the lower Hudson River Estuary are contaminated with PCBs from the upper Hudson River, wastewater discharges and riverine inflows. Sediments can be a significant source of $\sum$PCBs to the atmosphere (Chiarenzelli et al., 1996; Bremle and Larsson, 1998; Bushart et al., 1998) and contaminated sediments volatilize PCBs to a greater extent when wet compared to when dry (Chiarenzelli et al., 1997; Bushart et al., 1998). Contaminated sediments exposed during a tidal cycle may contribute to atmospheric concentrations. Bremle and Larsson (1997) found that decreasing river discharge was positively correlated with increasing water concentration. These signals suggest there may be a correlation between river discharge and atmospheric concentrations. Notwithstanding the general similarity of the atmospheric variability of $\sum$PCBs, statistical analysis of the flow and heights of several rivers in the region with atmospheric $\sum$PCBs concentrations produced no significant correlations.

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Polycyclic Aromatic Hydrocarbons in the New Jersey Coastal Atmosphere

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Concentrations of polycyclic aromatic hydrocarbons (PAHs) were measured in the coastal New Jersey atmosphere as part of the New Jersey Atmospheric Deposition Network (NJADN). PAH results from the first year of atmospheric sampling (Oct 1997–Oct 1998) at a suburban site near New Brunswick, NJ and a coastal site at Sandy Hook, NJ are presented. PAHs (*36*) were analyzed at both sites including phenanthrene and benzo[*a*]pyrene whose concentrations ranged from 0.74 to 20.9 ng/m^3 and 0.0020 to 0.62 ng/m^3, respectively. PAH concentrations at the suburban site were 2× higher than concentrations measured at the coastal site, consistent with the closer proximity of NB to urban/industrial regions than SH. The seasonal trends of particulate PAH concentrations indicate that PAH sources such as fuel consumption for domestic heating and vehicular traffic drive their seasonal occurrence. While gaseous concentrations of methylated phenanthrenes and pyrene were higher during the winter and similar to high molecular weight PAHs, phenanthrene and fluoranthene show the opposite seasonal trend with concentrations peaking in the summer months. Because temperature accounted for less than 25% of the variability in atmospheric concentrations, seasonal variability could not be attributed to temperature-controlled air-surface exchange. PAH concentrations in the New Jersey coastal atmosphere indicate the importance of local and regional sources originating from urban/industrial areas to the N, NE, and to the SW.

Introduction

Polycyclic aromatic hydrocarbons (PAHs) are ubiquitous compounds containing two to eight rings that arise from the incomplete combustion of fossil fuels and wood. Forest fires and volcanoes contribute to the PAH burden, but by far, anthropogenic sources are responsible for the majority of the PAH input to the atmosphere, which in turn contributes to depositional loadings to aquatic and terrestrial systems (*1–6*). The largest anthropogenic sources of PAHs are vehicular emissions from both gasoline and diesel powered vehicles, coal and oil combustion, petroleum refining, natural gas consumption, and municipal and industrial incinerators (*7, 8*). Once they enter the atmosphere, PAHs redistribute between the gas and particle phases (*9–11*) and are subject to removal mechanisms such as oxidative and photolytic reactions and wet and dry deposition (*3, 7, 12–14*).

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The carcinogenic nature of PAHs in conjunction with their continual and widespread atmospheric emission has led to intense study of these compounds particularly in urban and/or industrial areas (*1–3, 5–7, 15, 16*). Because the NY/NJ metropolitan area lacks a comprehensive database for PAH concentrations as well as other hazardous air pollutants (HAPs), the New Jersey Atmospheric Deposition Network (NJADN) was founded in 1997. NJADN was established to quantify the occurrence and fluxes of PAHs and other HAPs to the lower Hudson River Estuary and to apportion source contributions where possible. The objectives of this paper are (*1*) to assess the spatial and temporal variability of PAH concentrations in the New Jersey coastal atmosphere as part of NJADN and (*2*) to study the influence of environmental parameters such as temperature and air mass movement on PAH concentrations in the New Jersey coastal atmosphere of the Mid-Atlantic region.

Methodology

Sampling and Site Characterization. Air samples were collected at New Brunswick, NJ (40.48°N/74.43°W) beginning October 1997 and at Sandy Hook, NJ (40.46°N/74.00°W) beginning February 1998 (Figure 1). New Brunswick is a suburban site in close proximity to major traffic arteries including the New Jersey Turnpike and the Garden State Parkway. Sandy Hook is located at the tip of a peninsula extending into the Lower Hudson River Estuary/Atlantic Ocean approximately 10 km south of New York City and 30 km southeast of the Newark/Jersey City urban/industrial complex.

Sampling occurred for 24 h every sixth day from October 1997 to August 1998 (77 samples) and every ninth day thereafter (8 samples). At each site, Modified General Metal Works Hi-volume air samplers operated at a calibrated airflow rate of ~500 L/min. The particulate phase was captured on precombusted (20.3 × 25.4 cm) quartz fiber filters (QFF), and the gas phase was captured on 10 cm medium-density polyurethane foam (PUF).

Sample Processing. Prior to sampling, the PUFs were hand-washed with Alconox detergent and rinsed with Milli-Q water followed by acetone. The prewashed PUFs were extracted in Soxhlet units for 24 h in acetone followed by 24 h in petroleum ether after which they were placed into vacuum desiccators for approximately 48 h to evaporate any residual solvent. The PUFs were then transferred to precleaned glass jars covered with aluminum foil, sealed, and stored at 4 °C until sampling.

The QFFs were individually wrapped in aluminum foil and precombusted at 450 °C for 6 h. The QFFs were preweighed in a temperature and humidity controlled room, wrapped securely in aluminum foil envelopes, and stored in plastic bags at 4 °C until sampling. After sampling, the QFFs were folded and sealed in aluminum foil envelopes until weighing for determination of total suspended particulate mass (TSP).

All samples were spiked with 100 μL of surrogate standard containing anthracene-d_{10}, fluoranthene-d_{10}, and benzo[*e*]pyrene-d_{12} and extracted in Soxhlet apparati for 24 h, the PUFs in petroleum ether and the QFFs in dichloromethane. The sample extracts were concentrated by rotary evaporation (Büchi Model RotoEvaporator111) to ~2 mL, and the solvent was exchanged to hexane. Further concentration to ~0.5 mL was carried out under a gentle stream of purified N_2.

Extracts were fractionated on 10 mL glass columns containing 4 g of 3% water deactivated alumina (Neutral Alumina, Brockman Activity I, A950-500, 60–325 mesh:

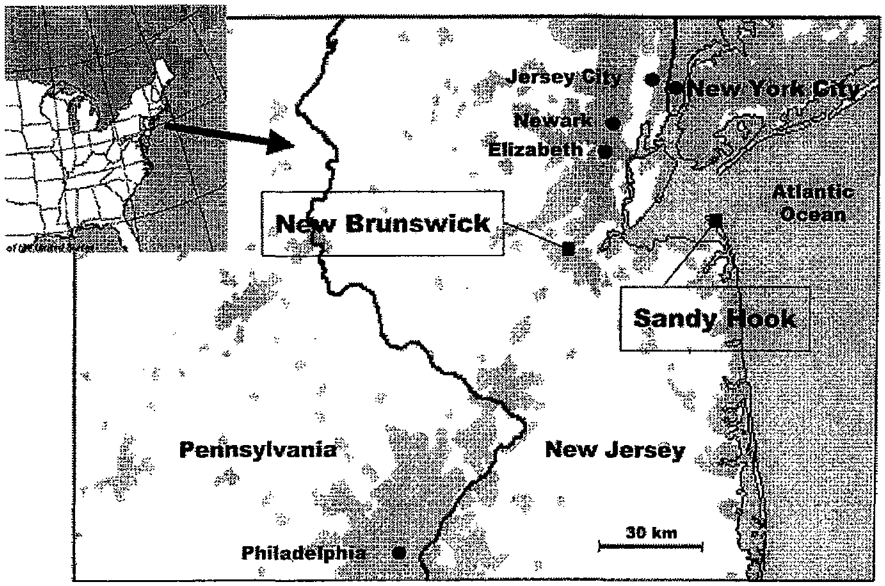

FIGURE 1. Locations of New Jersey atmospheric deposition network sites in the New Jersey coastal atmosphere—shaded regions indicate urban areas based upon population density. Map adapted from the USGS Web Atlas.

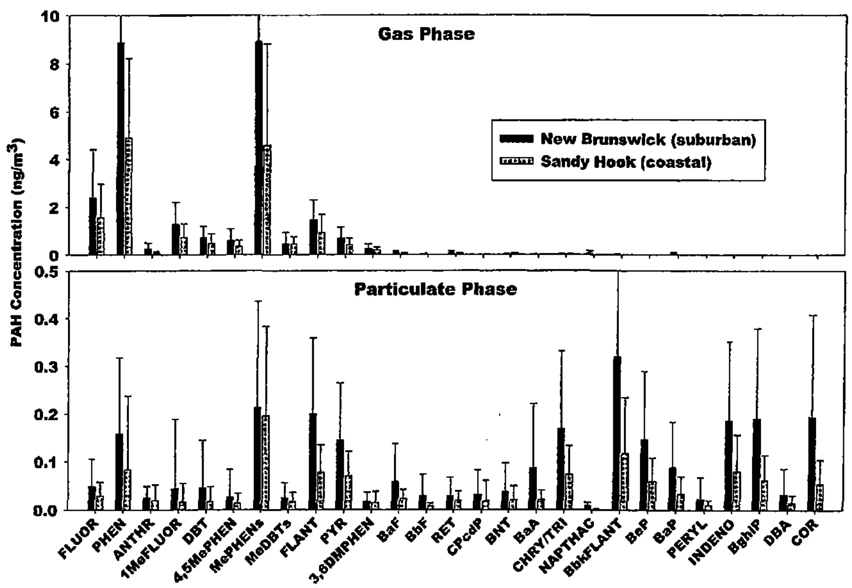

FIGURE 2. Site comparison of annual average gas and particulate PAH concentrations at the New Brunswick and Sandy Hook sampling sites: ** coelutes with triphenylene.

Fischer Scientific). Fraction 1, containing polychlorinated biphenyls (PCBs) and some chlorinated pesticides, was eluted with 13 mL of hexane (HEX). Fraction 2, containing PAHs and some chlorinated pesticides, was eluted with 15 mL of 2:1 dichloromethane–hexane (DCM–HEX). Fraction 2 was reduced in volume to ~0.5 mL under purified N_2 gas and spiked with 100 μL of internal standard consisting of phenanthrene-d_{10}, pyrene-d_{10}, and benzo[a]pyrene-d_{12}.

The PAHs were analyzed on a Hewlett-Packard 6890 gas chromatograph (GC) coupled to a Hewlett-Packard 5973 mass selective detector (MSD) operated in selective ion monitoring (SIM) mode. The column used was a 30 m × 0.25 mm i.d., J&W Scientific 122-5062 DB-5 (5% diphenyl-dimethylpolysiloxane) capillary column with a film thickness of 0.25 μm. Helium was used as the carrier gas and was regulated using a ramped flow rate program. The initial flow rate of 1.2 mL/min was held for 20 min, then decreased to 0.3 mL/min, held for 10.5 min, and increased again to 2.1 mL/min for the remainder of the run. The injection volume was 1.0 μL and was a pulsed splitless injection. The temperature program began at 50 °C, held for 1.10 min, increased to 125 °C at 25 °C/min, increased again to 260 °C at 8 °C/min, finally increased to 300 °C at 5 °C/min, and was held for 14 min. The identity and subsequent retention time of each PAH was confirmed by the use of a calibration standard which contained known concentrations of the surrogate compounds, internal standard compounds, and all of the PAH compounds of interest in this study. Samples were quantified by isotopic dilution and corrected for surrogate recoveries.

Quality Assurance/Quality Control of the Method. Quality assurance and the quality control were determined using laboratory blanks, field blanks, split PUFs, and matrix spikes. All sample and field blank masses were corrected for laboratory contamination by subtraction of the laboratory

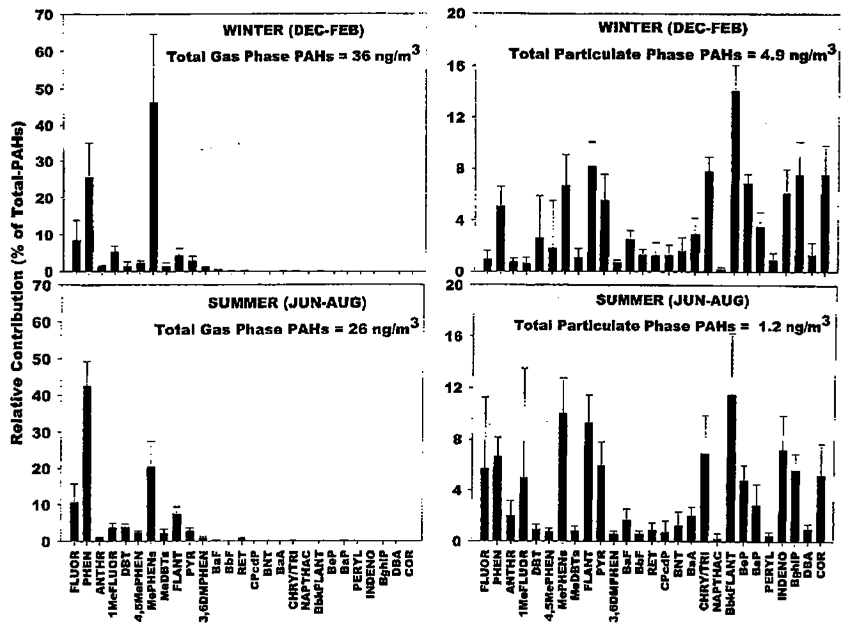

FIGURE 3. Seasonal distribution patterns of the 36 PAHs analyzed reported as the relative contribution of the individual PAH compound to total gas-phase and total particulate phase PAHs.

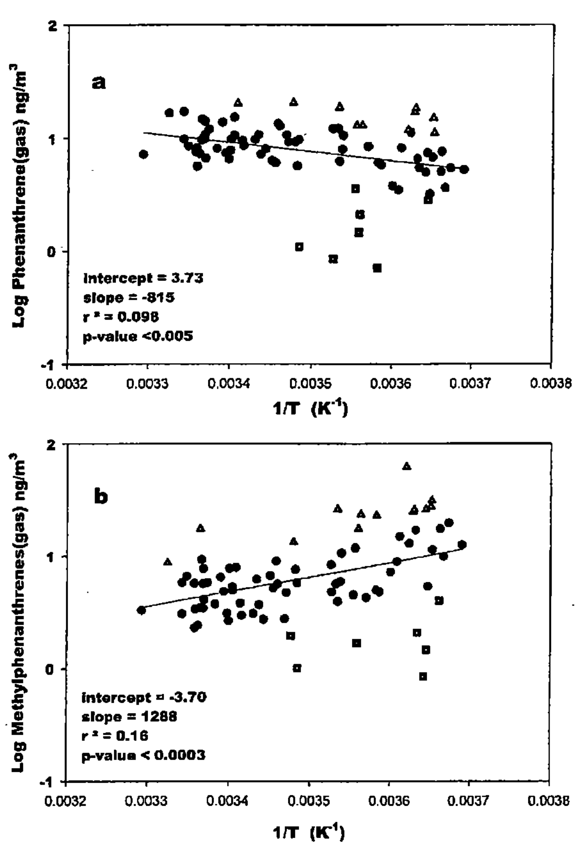

FIGURE 4. The log of PAH concentration as a function of inverse temperature for phenanthrene and methylphenanthrenes. All data points above or below 1 SD of the least squares regression line are identified by triangles and squares, respectively.

blank mass. PAH masses in the laboratory blanks were low relative to the masses in the samples. The laboratory blanks accounted for approximately 0.11% and 0.47% of the total PAH mass in PUF and QFF samples, respectively. Field blanks, used to determine PAH detection limits, were QFFs and PUFs placed into the samplers with air flowing for 1–3 min during calibration of the sampler. The method detection limits, defined as three times the standard deviation of the mass in the matrix-specific and site-specific field blank, were as follows: 0.00002 (perylene) to 0.034 ng/m³ (indeno[1,2,3-*cd*]pyrene) for gas-phase PUFs at New Brunswick ($n = 7$) and 0.0001 (indeno[1,2,3-*cd*]pyrene) to 0.017 ng/m³ (phenanthrene) for Sandy Hook ($n = 5$). Individual QFF method detection limits ranged from 0.0001 (naphthacene) to 0.039 ng/m³ (fluorene) for New Brunswick ($n = 8$) and from 0.001 (naphthacene) to 0.090 ng/m³ (fluoranthene) for Sandy Hook ($n = 5$). Average QFF field blank masses accounted for 1.5% and 3.8% of the total sample masses for New Brunswick and Sandy Hook, respectively. Average PUF field blank masses accounted for 0.17% and 3.3% of the total sample masses.

Split PUFs were used to quantify potential breakthrough of gas-phase PAHs into the second half of the PUF. The second half of the split PUF accounted for 12 ± 5% ($n = 3$) of the total mass collected on the whole PUF with the greatest breakthrough by the lower molecular weight PAHs: fluorene (21%), 1-methylfluorene (25%), phenanthrene (33%), and methylphenanthrenes (30%). Surrogate recoveries were 79 ± 19% for anthracene-d_{10}, 92 ± 18% for fluoranthene-d_{10}, and 96 ± 17% for benzo[*e*]pyrene-d_{10}.

Results and Discussion

Occurrence and Temporal Trends. Annual average PAH measurements (total-PAHs) are defined as the sum of the concentrations of 36 PAHs. Figure 2 shows that the suburban New Brunswick total gas-phase PAH concentrations ranged from 3.5 to 84 ng/m³ and were on average 2.4 times higher than the values at coastal Sandy Hook which ranged from 2.8 to 42 ng/m³. Total particulate phase PAH concentrations were on average 2.5 times higher at New Brunswick where concentrations ranged from 0.38 to 11.6 ng/m³ than at Sandy Hook where total particulate PAH concentrations ranged from 0.15 to 4.0 ng/m³. Sandy Hook is less impacted than the New Brunswick site by PAHs due to its location on a peninsula away from the immediate impact of heavy traffic arteries, industry, or urbanization as seen at the New Brunswick site.

TABLE 1. Site Comparisons for Select Gas and Particulate PAH Concentration Data[a]

site location	ref	phenanthrene (ng/m³)		pyrene (ng/m³)		benzo[b+k]fluoranthene (ng/m³)		benzo[a]pyrene (ng/m³)	
		gas	part	gas	part	gas	part	gas	part
New Brunswick, NJ	this study	8.9(4.6)	0.16(0.16)	0.69(0.46)	0.14(0.12)	0.012(0.012)	0.32(0.30)	0.037(0.064)	0.088(0.096)
Sandy Hook, NJ	this study	4.8(3.3)	0.083(0.052)	0.41(0.28)	0.070(0.052)	0.0027(0.0019)	0.12(0.12)	0.0023(0.00087)	0.033(0.035)
Eagle Harbor, MI[b]	(*3*)	0.86(0.12)	0.019(0.069)	0.19(0.17)	0.022(0.016)	0.019(0.034)	0.022(0.016)	0.0093(0.023)	0.011(0.047)
Sturgeon Point, NY[b]	(*3*)	4.0(0.068)	0.0060(0.077)	0.51(0.10)	0.074(0.071)	0.019(0.034)	0.074(0.071)	0.013(0.062)	0.044(0.076)
Wye, MD	(*17*)	3.0(1.5)	0.061(0.062)	0.64(0.78)	0.063(0.064)	0.0044(0.0036)	0.18(0.29)	0.00050(0.00029)	0.056(0.099)
Elms, MD	(*17*)	3.7(3.2)	0.075(0.078)	0.58(0.60)	0.070(0.077)	0.10(0.38)	0.25(0.41)	0.0024(0.084)	0.069(0.12)
Haven Beach, VA	(*17*)	2.9(3.3)	0.041(0.031)	1.2(1.4)	0.039(0.033)	0.0086(0.013)	0.11(0.16)	0.0044(0.0062)	0.032(0.072)
Chicago, IL	(*1*)	64(46)	3.7(7.4)	9.0(8.4)	5.9(11)	0.29(0.38)	6.6(2.4)	0.080(0.082)	3.0(5.9)
Lake Michigan	(*1*)	9.9(9.6)	0.14(0.15)	1.6(1.8)	0.21(0.17)	0.12(0.23)	0.59(0.74)	0.014(0.030)	0.13(0.14)
Baltimore, MD	(*19*)	13(11)	0.089(0.034)	2.1(1.3)	0.14(0.070)	0.0011(0.0029)	0.16(0.071)	0.00015(0.00055)	0.071(0.041)
Chesapeake Bay	(*19*)	5.6(4.3)	0.051(0.057)	0.55(0.46)	0.067(0.14)	ND[c]	0.085(0.054)	ND[c]	0.019(0.015)

[a] All concentration data reported as mean (SD). [b] Only benzo[*k*]fluoranthene is reported, not benzo[*b*+*k*]fluoranthene. [c] ND = nondetectable.

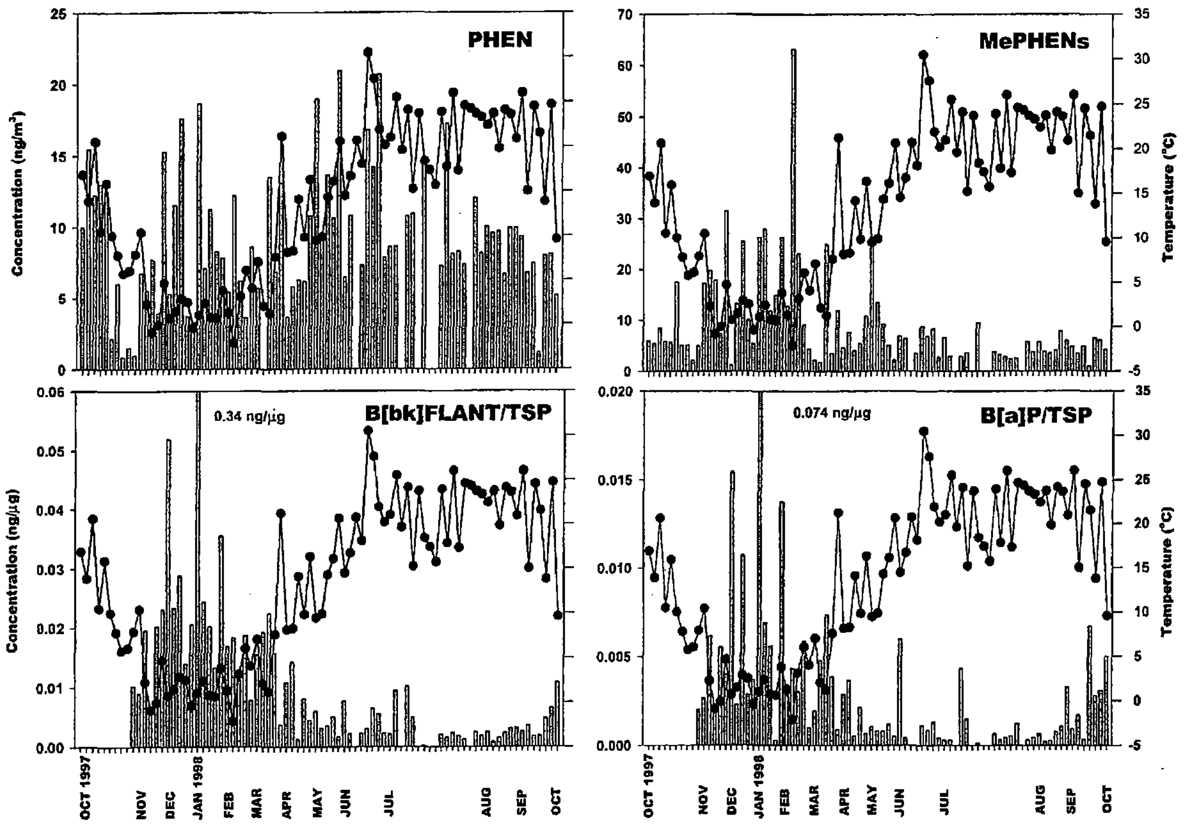

FIGURE 5. Time series of PAH concentrations at New brunswick and Sandy Hook over 1 year. Bars are PAH concentrations; the dotted-line represents the average temperature over the sampling period for the data presented.

Gas and particulate phase PAH data from NJADN are compared with data from other recent studies in Table 1. PAH concentrations at Sandy Hook are 2–10 times those reported at a remote site located at Eagle Harbor on Lake Superior for the Integrated Atmospheric Deposition Network (IADN), indicating that Sandy Hook should not be classified as a rural or remote site (*3*). PAH concentrations at Sandy Hook are comparable to those measured at the IADN Sturgeon Point (NY) site located on the eastern shore of Lake Erie ~80 km from Buffalo, NY and Erie, PA (*3*). Similarly, Sandy Hook is influenced by emissions from local sources: New York City to the north, the New Jersey urban/industrial complex to the northwest, and the heavily populated New Jersey coast to the west, south, and southwest. Sandy Hook is impacted by a mixture of PAH loadings from these areas, diluted by marine air and depositional losses during atmospheric transport.

PAH concentrations measured during the Chesapeake Bay Atmospheric Deposition Study (CBADS) at Wye and Elms, MD and Haven Beach, VA were similar to Sandy Hook (*17*). The Wye site is located 45 km southeast of Baltimore, generally downwind of the Washington, DC/Baltimore Corridor. The Elms site is within 5 km of a naval air station and a coal-fired power plant. The Haven Beach site is located approximately 100 km east of Richmond, VA.

Gas-phase phenanthrene and pyrene concentrations at the New Brunswick site were not statistically different from those measured during two of the AEOLOS (Atmospheric

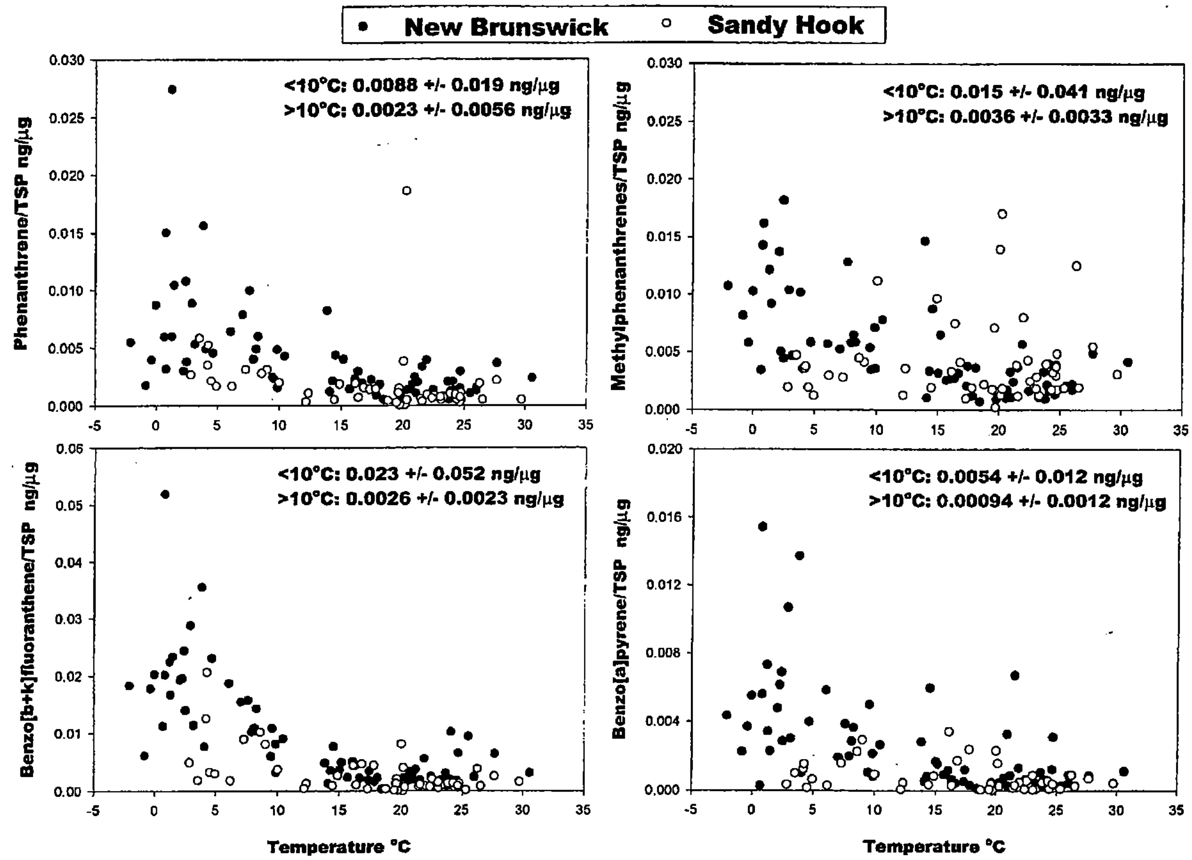

FIGURE 6. Two-site comparison of particulate phase PAH concentrations normalized by total suspended particulate (TSP) concentration as a function of temperature.

Exchange Over Lakes and Oceans) campaigns, one on Lake Michigan near urban Chicago, IL and industrial Gary, IN *(1)* and the other in Chesapeake Bay near Baltimore, MD *(6, 18, 19)*. The New Brunswick, Chesapeake Bay, and Lake Michigan sites are considered "impacted" due to their location within or in close proximity to large urban/industrial source regions and observed concentrations. Air samples taken in Chicago, IL exhibited PAH concentrations significantly higher than those measured at New Brunswick *(1)*.

The seasonal distributions of gas and particulate phase PAHs at New Brunswick are presented in Figure 3. The gas-phase distribution for all seasons was dominated by low molecular weight species with the largest relative contributions to total-PAHs from phenanthrene and the methylated phenanthrenes followed by fluorene and fluoranthene. The most apparent difference between the summer and winter distributions was the relative contributions of phenanthrene and the methylated phenanthrenes to total-PAHs. In the winter there was a larger relative contribution to total-PAHs by methylated phenanthrenes (46% of total-PAHs) than by phenanthrene (26%). In contrast, the opposite is true in the summer, with a higher relative contribution to total-PAHs by phenanthrene (44%) than by methylated phenanthrenes (21%), indicating different dominant sources in each season. Gas-phase fluoranthene and phenanthrene concentrations were found to be higher in the summer months, similar to other studies *(1, 20)*. Gas-phase pyrene concentrations behaved similarly to the methylated phenanthrenes with the winter season having the highest concentrations, although other studies have reported pyrene concentrations to be highest during the summer *(1, 20)*.

Particulate phase PAH concentrations at New Brunswick are often more than an order of magnitude lower than the gas-phase concentrations. The seasonal profiles show that particle-bound PAH concentrations are generally higher in the winter than in any other season. The winter particulate phase PAH distribution is dominated by high molecular weight compounds typically associated with atmospheric soot particles of combustion origin *(21–23)*. Contributing to higher wintertime concentrations are lower atmospheric mixing heights, lower temperatures, and decreased photolytic oxidation. Previous studies have also suggested that increased fossil fuel usage causes elevated particulate PAH concentrations in the winter *(24–26)*. The influence of temperature was examined to determine if increased particulate PAH concentrations during the winter is a function of emissions rather than purely enhanced partitioning from the gas to the particulate phase at lower temperatures.

Temperature Dependence. The importance of temperature on atmospheric PAH concentrations was assessed by examining the log $[PAH]_{gas}$, ng/m^3, versus inverse temperature ($1/T$), K^{-1}

$$\log\,[SOC]_{gas} = a + \frac{m}{T} \qquad (1)$$

where a and m are the intercept and slope obtained by a least squares linear regression. This technique has been applied to polychlorinated biphenyls (PCBs), hexachlorocyclohexanes (HCHs), and other HAPs *(10, 27–29)*.

The relationships of log $[PAH]_{gas}$ versus $1/T$ for this study are plotted in Figure 4 for phenanthrene (PHEN) and methylated phenanthrenes (MePHENs). The difference in sign of the slope of the regression line (m) demonstrates that the way in which the two compounds vary with temperature is quite different. The plot of log $[PHEN]_{gas}$ versus $1/T$ has

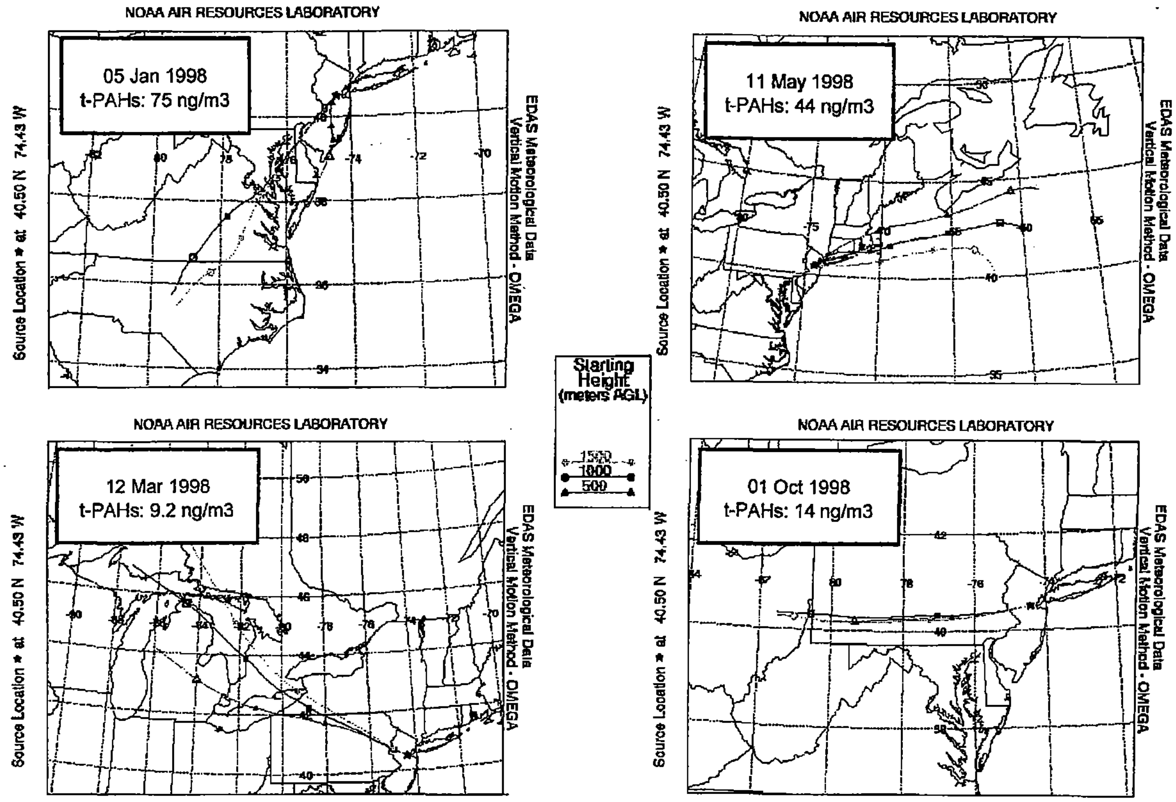

FIGURE 7. Back trajectory analysis plots A (SW air mass origin) and B (N, NE) show the directions which led to the highest PAH concentrations. Plots C (NW) and D (W) show the directions which led to the lowest PAH concentrations. All back trajectory plots were obtained from http://www.arl.noaa.gov/ready/hysplit4.html.

a significant negative slope ($m = -815$, $p < 0.005$), demonstrating that concentrations decrease with decreasing temperatures. Methylated phenanthrenes, in contrast, have a significant positive slope ($m = 1288$, $p < 0.001$), and thus concentrations increase with decreasing temperature. The seasonal difference in the direction of the slope between methylated phenanthrenes and phenanthrene suggests that the relative contribution of sources to these two compounds is different and varies with season.

Temperature accounts for 10% ($p < 0.005$) and 16% ($p < 0.001$) of the variability in phenanthrene and methylated phenanthrenes concentrations, respectively, at the New Brunswick site. At Sandy Hook, temperature accounts for 10% ($p = 0.025$) and 1% ($p = 0.57$, not significant) of the variability for phenanthrene and methylated phenanthrenes, respectively. Because the slopes of log $[SOC]_{gas}$ vs $1/T$ vary between positive and negative values for different PAHs, there is not a clear seasonal trend of increasing concentrations with increasing temperatures that applies universally to all PAHs. This indicates that gas-phase PAH concentrations are not driven by air-surface exchange as are PCBs whose slopes are consistently negative *(29–31)*. Although the slopes for the majority of gas-phase PAHs at Sandy Hook are negative suggesting an influence on PAH concentrations by air–water or air-terrestrial exchange, the low correlations with temperature for both sites shows that temperature explains less than 25% (range: $r^2 = 0.001$ (benzo[*a*]fluorene) to 0.24 (dibenzothiophene)) of the variability in gas-phase concentrations. Concentrations of PAHs are determined to a greater extent by the emissions from combustion-related activities than by air-surface exchange *(19, 29)*.

To better elucidate source-related seasonal differences, the time series of air concentrations are presented for four PAHs (gas + particulate phase): phenanthrene (PHEN), methylated phenanthrenes (MePHENs), benzo[*b*+*k*]fluoranthene (B[*bk*]FLANT), and benzo[*a*]pyrene (B[a]P) at the New Brunswick site (Figure 5). The latter two PAHs are predominately found in the particulate phase and as such are normalized in Figure 5 by total suspended particulate (TSP) to eliminate the effect of particle mass *(11, 22, 32)*. TSP concentrations averaged $39 \pm 19\ \mu g/m^3$ (range: 1.8–88) and $51 \pm 28\ \mu g/m^3$ (range: 11–220) at the New Brunswick and Sandy Hook sites, respectively. During the summer, methylated phenanthrenes concentrations decrease with increasing temperature, and unlike phenanthrene, the majority of the days with high methylated phenathrenes concentrations occurred during the coldest days of the year. Because the rates of oxidative and photolytic reaction of phenanthrene and methylated phenanthrenes are not appreciably different *(23)*, changes in sources must account for this opposing seasonal trend between the two species rather than atmospheric transformations.

Seasonal data from over-water samples taken on the Chesapeake Bay were compared to data from New Brunswick to determine if a similar increase in methylated phenanthrenes occurred in the winter in Chesapeake Bay *(18)*. In the Chesapeake Bay and New Brunswick, the ratios of the concentrations of methylated compounds to their parent homologues were higher in the winter than in the summer. The ratios of MePHENs/PHEN and MeDBTs/DBT are 2.1 and 1.9, respectively, for Chesapeake Bay in the winter. The ratios of MePHENs/PHEN and MeDBTs/DBT for the New Brunswick site are 1.9 and 1.0, respectively, in the winter. In contrast, the ratios drop to 0.99 and 1.1 in the summer for Chesapeake Bay and 0.5 and 0.48 for New Brunswick. The increase in the concentrations of methylated compounds relative to their parent homologues is indicative of uncombusted fuel hydrocarbons and fossil fuel residues *(23, 33)*.

The increased fossil fuel demand and subsequent consumption for home heating in the cold winter months likely accounts for the elevated relative contribution of methylated PAH concentration to total-PAH concentration seen in the Baltimore/Chesapeake Bay and New Jersey coastal atmosphere.

The increase in methylated compounds in the winter follows a temporal trend similar to that for high molecular weight PAHs suggests that the source(s) of methylated and high molecular weight particulate PAHs are the same. Figure 5 demonstrates how the concentrations of two PAHs enriched in the particulate phase (B[*bk*]FLANT and B[*a*]P) increase with colder temperatures at the New Brunswick site. To assess if this trend applies to other high molecular weight particulate species, Figure 6 depicts the concentrations of four particulate PAHs normalized by TSP ($[SOC]_{part/TSP}$) for phenanthrene, methylated phenanthrenes, benzo[*b*+*k*]fluoranthene, and benzo[*a*]pyrene versus temperature. For days with temperatures >10 °C at the New Brunswick site, there is little variability in particulate PAH concentrations. When temperatures drop below ~10 °C at the NB site, a statistically significant ($p < 0.001$) increase in the PAH concentrations occurs. During low temperature periods, increased fossil fuel consumption for home heating is the likely major contribution source to this winter particulate PAH burden and may account for the increase in the number of high concentration days observed in the winter months. The observed winter increase in particulate PAH concentrations is consistent with observations in other urban areas *(24, 25, 34)*.

At Sandy Hook, there is increased variability in PAH concentrations during colder temperatures for benzo[*b*+*k*]-fluoranthene/TSP and phenanthrene/TSP concentrations, though not for methylated phenanthrenes/TSP and benzo-[*a*]pyrene/TSP concentrations. The proposed "winter influence" at New Brunswick by home heating is not observed to the same extent at Sandy Hook. This can likely be accounted for by dilution of the PAH signal due to dispersion/mixing and depositional losses during transport. On 4 days at Sandy Hook, the benzo[*b*+*k*]fluoranthene/TSP and phenanthrene/TSP concentrations cause the data to resemble the New Brunswick trend. On those days, local winds came directly from the heavily populated New York City and Long Island area located to the N, NE of Sandy Hook.

Influence of Large-Scale Air Mass Movement. Because the log $[SOC]_{gas} = a + m/T$ relationship does not take into account all of the variables that determine SOC concentration, the variability in PAH concentration that is not explained by temperature may be attributed to emissions from local or regional source areas. To determine which source vectors influence PAH concentrations in New Jersey's coastal atmosphere, back trajectory analyses were performed *(35)*.

Figure 4 reveals that temperature accounted for only a small portion of the variability in PAH concentrations ($r^2 =$ 10%: PHEN; $r^2 = 16\%$: MePHENs). We focused on those days with observed gaseous PAH concentrations that significantly deviated from the predicted concentrations based upon the partitioning model for air/surface exchange. A number of "outliers" were identified as occurring ±1 SD from the least squares regression line of the equilibrium model in eq 1. Subhash et al. *(35)* found that back trajectory analysis of similar "outlier" days with extreme high or low concentrations lead to a determination of important transport vectors. In a similar manner, all data points with relative standard residuals ($\log [PAH]_{observed} - \log [PAH]_{predicted\ by\ eq\ 1})/\sigma$ greater than 1 or less than −1 were considered "outliers".

Back trajectories were available for 16 out of 23 days. The highest gas-phase concentrations of phenanthrene and methyl phenathrenes occurred when air masses came from the SW (12 days) and the N/NE (4 days). The heavily urban/industrialized Interstate-95 corridor through Baltimore, MD, Wilmington, DE, Philadelphia, PA, and Camden, NJ is located to the SW of the New Brunswick site. Air masses from the N/NE of New Brunswick derive from New York City and the central NJ urban/industrial complex (see Figure 7). On three of the days with wind speeds less than 2 m/s, the back trajectories show that the air masses came from the N/NE. The high PAH concentrations measured at New Brunswick resulted from minimal dilution at low wind speeds. The results suggest that the New Brunswick site is impacted by local urban/industrial areas to the NE and to the SW. New Brunswick may also be subject to longer-range transport from the urban/industrial areas along the Interstate-95 corridor. Although the back trajectories target specific vectors leading to high or low concentrations, it should not be inferred that every day that the back trajectories derive from a specific vector will correspond to high or low concentrations since PAH concentrations are strongly influenced by anthropogenic activities.

With the back trajectory data available for 8 of 14 days, the lowest PAH concentrations at New Brunswick occurred when the back trajectories showed the air masses came from the NW (7 days) and the W (1 day) (Figure 7). Less densely populated areas may account for the lower concentrations observed when trajectories came from the NW and W of New Brunswick.

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Supporting Information Available

Raw PAH concentration data for the first year of atmospheric sampling at two sites in New Jersey as part of the New Jersey Atmospheric Deposition Network (NJADN). Section I, New Brunswick PAH raw concentration data; Part A, gas-phase PAH concentration data (ng m^{-3}); Part B, particle phase PAH concentration data (ng m^{-3}). Section II, Sandy Hook PAH raw concentration data; Part A, gas-phase PAH concentration data (ng m^{-3}); Part B, particle phase PAH concentration data (ng m^{-3}). This material is available free of charge via the Internet at http://pubs.acs.org.

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Occurrence of Estrogenic Nonylphenols in the Urban and Coastal Atmosphere of the Lower Hudson River Estuary

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Nonylphenol polyethoxylates (NPEOs) have been widely used as surfactants in many industrial and household applications. However, NPEOs biodegradation in water leads to the formation of estrogenic nonylphenols (NPs). To date, NPs have only been reported in aquatic environments. In this paper, the occurrence of NPs in coastal and urban atmospheres is reported for the first time. Water-to-air volatilization of NPs from estuarine waters is a source of NPs to the estuarine atmosphere. Furthermore, the high concentrations found in the coastal atmosphere of the New York–New Jersey Bight (2.2–70 ng m^{-3}) suggests that the NPs occurrence in the atmosphere may be an important human and ecosystem health issue in urban, industrial, and coastal-impacted areas receiving treated sewage effluents.

Introduction

The environmental fate of surfactants has been an issue of concern due to potential adverse impact on ecosystems (*1–3*). Nonylphenol polyethoxylates (NPEOs) have been widely used as nonionic surfactants in many industrial and household applications. Either aerobic or anaerobic biotransformation of NPEOs leads to the formation of nonylphenols (NPs) in water (*4*). Both NPEOs and NPs are introduced to the environment through wastewater discharges (*4–6*). However, NPs are persistent, bioaccumulative, toxic to aquatic organisms, and estrogenic (*7–12*). To date, NPs have been reported only in aquatic environments (*13, 14*). Here we report for the first time the occurrence of NPs in the atmosphere. The objectives of this paper are to document the occurrence of NPs in the atmosphere, to determine the range of air concentrations in the atmosphere of the lower Hudson River Estuary, and to assess the potential role of the estuarine waters as a source of NPs to the regional atmosphere.

Methods

Atmospheric particulate and gas-phase samples were obtained with modified Hi-Vols (flow rate of ~0.5 m^3 min^{-1}) using quartz fiber filters and Polyurethane Foam (PUF), respectively. Water dissolved and particulate samples were obtained using an Infiltrex 100 in-situ sampler with a glass fiber filter and XAD-2 adsorbent as generally described elsewhere (*15*). PUFs and quartz fiber filters were extracted in a Soxhlet apparatus with petroleum ether and dichloromethane, respectively. The extracts were concentrated down to 0.5 mL and fractionated on a 3% H_2O-deactivated alumina (4 g) column. The third fraction containing the nonylphenols was obtained by eluting with 15 mL of dichloromethane:methanol (1:2). Nonylphenols were identified and quantified by GC-MSD-EI in SIM mode using the ions 135 and 149 as reported by Kannan et al. (*16*). The identification of nonylphenols in atmospheric samples was shown unequivocally by the complete match of the 11 isomers in chromatographic profiles between samples and the NPs technical mixture (Figure 1). Quantification was performed using the internal standard 1-phenyldodecane, whereas 2,4,6-trimethylphenol or 4-*n*-hepthylphenol were used as surrogate compounds. Matrix spikes for all the matrixes were processed together with the field samples. Matrix spike recoveries were from 72 to 90%, and sample concentrations were not corrected for surrogate recovery. Detection limits were 4 and 3 ng for aerosol and PUF samples, respectively. Nonylphenol concentrations were above detection limits in all the samples analyzed ($n = 112$). The NPs concentrations reported are the sum of 11 isomers. Procedural and field blanks were processed for all the sampling sites and all the matrixes. The mass of NPs recovered from field blanks ranged between 0 and 84 ng, while the mass recovered from samples ranged from 670 to 32 300 ng. Blanks were always below 5% of field values.

Results and Discussion

Gas and aerosol phase samples were obtained at two sampling sites located in the urban–industrial (Liberty Science Center, LSC) and coastal (Sandy Hook, SH) zones of the Lower Hudson River Estuary (HRE; Figure 2). A 24-h sample was taken at these sites every 6 or 9 days from June 28 to October 30, 1998. Furthermore, during an intensive sampling campaign from July 5 to July 11, 1998, water samples (dissolved + particulate) were taken simultaneously with overwater atmospheric samples (gas + aerosol) in two locations in the Lower Hudson River Estuary (Figure 2). Consecutive 12-h air samples were also taken concurrently during the intensive sampling period at the land-based sites (LSC and SH).

Concentrations of NPs in water from the lower HRE ranged from 11.6 to 94.5 ng L^{-1} in the dissolved phase and from 2.6 to 21.6 ng L^{-1} in total suspended matter (Table 1). These concentrations are 10 to 100× higher than water concentrations of priority pollutants such as polychlorinated biphenyls (PCBs) and DDTs found in this and other urban-impacted estuaries, rivers, and coastal waters (*15, 17–19*). It is well-known that water bodies can be an important source of semivolatile organic pollutants to the atmosphere (*15, 18, 20*). The Henry's Law constants (*H*) for the NPs, estimated as the ratio of the subcooled liquid vapor pressure and aqueous solubility, were 3 to 4 × 10^{-5} atm m^3 mol^{-1} (*21, 22*). These values of *H* are sufficient to support gaseous air–water exchange of NPs to the atmosphere.

Nonylphenols were detected in all atmospheric samples analyzed ($n = 112$). Table 1 shows the average and range of NPs concentrations in the air phases (gas and particulate) for each of the sampling sites. Atmospheric NPs concentrations range from 0.2 to 68.6 ng m^{-3} for the gas phase and

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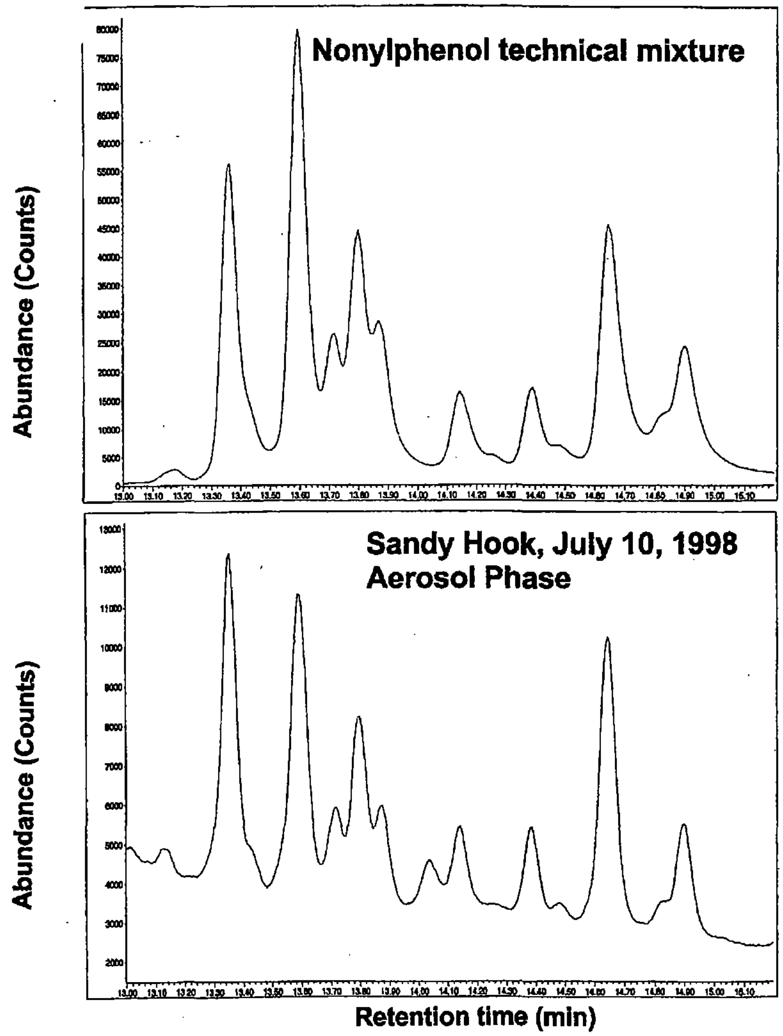

FIGURE 1. Chromatographic profiles obtained by GC-MS in the EI/SIM mode (ions 135–149) of nonylphenols from a representative atmospheric particulate sample and the nonylphenol technical mixture.

TABLE 1: Concentrations of Nonylphenols in the New Jersey–New York Urban and Coastal Atmosphere and Water[a]

	air samples (ng m^{-3})		water samples (ng L^{-1})		air–water exchange
	gas	aerosol	dissolved	particulate	f_W/f_G
Hudson River Estuary ($n = 5$)	19.2 (1.5–69)	6.1 (0.1–14)	48.0 (12–95)	7.9 (2.6–22)	18.3 (1.3–69)
Sandy Hook ($n = 30$)	10.2 (0.9–56)	9.8 (0.3–51)			
Liberty Science Center ($n = 21$)	2.5 (0.2–8.1)	5.6 (1.8–23)			

[a] NPs concentrations are reported as the sum of 11 isomers. The average and ranges were calculated taking into account all the samples analyzed from the regular and intensive sampling campaigns.

from 0.1 to 51.4 ng m^{-3} for the aerosol phase. These concentrations are surprisingly high for a pollutant whose occurrence in the atmosphere has never been previously reported. For example, NPs concentrations are even higher than those of polycyclic aromatic hydrocarbons (PAHs) and up to 2 orders of magnitude higher than PCB concentrations in impacted urban–industrial areas (*18, 23*). Figure 3 shows the NPs concentrations in the gas and aerosol phases at the LSC, SH, and overwater sites in the lower HRE corresponding to the intensive sampling period of July 1998. The aerosol-phase concentrations of NPs that were measured at the LSC site were usually higher than those in the gas phase, but the gas phase is more enriched in NPs (Table 1 and Figure 3) for the other two water-dominated sites (Sandy Hook and lower HRE). The relative contributions of the gaseous and aerosol phases to the total concentrations of NPs in the atmosphere are explained by the greater influence of direct water-to-air exchange from surrounding water bodies at SH and over the estuary than at LSC. Indeed, even though the SH site is on land, it is located on a narrow peninsula surrounded by the Atlantic Ocean and the Hudson-Raritan Bay (Figure 2).

Direct evidence of volatilization of NPs from the lower HRE was obtained by calculating their fugacities in the water (f_W) and gas phase (f_G) for which the ratio is indicative of the

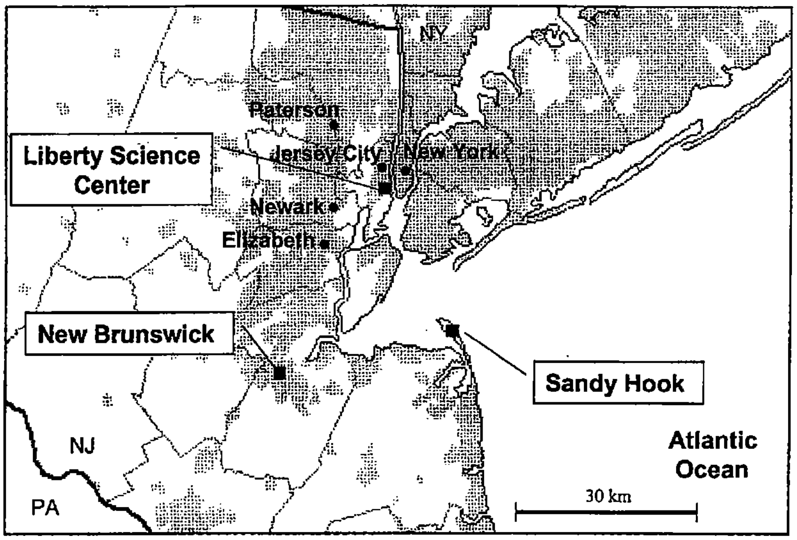

FIGURE 2. Map of the New Jersey—New York urban and coastal area and the lower Hudson River Estuary with the sampling site locations. Shadow zones indicate the location of urban and suburban areas. Map adapted from the USGS Web atlas.

net direction of transfer

$$f_W = C_W H \quad (1)$$

$$f_G = C_G RT \quad (2)$$

where C_W (mol L^{-1}) and C_G (mol L^{-1}) are the NPs concentrations in the water (dissolved) and atmospheric gas phases, respectively; R is the gas constant (atm L mol^{-1} K^{-1}); and T is the temperature (K) (*24*). Henry's Law constants were not corrected for temperature since the surface water temperatures ranged only from 20 to 23 °C, and the H value above was reported at 25 °C. Due to the proximity of water temperatures to 298 K, this assumption exerts a negligible effect on the calculated fugacities. The water/air fugacity ratios (f_W/f_G) ranged from 1.3 to 69 with an average value of 18 (Table 1). These ratios are higher than unity in all cases and provide conclusive evidence that *net* volatilization from the estuarine waters is a source of NPs to the regional atmosphere.

Therefore, the scenario that explains the NPs occurrence and trends observed in the New York–New Jersey urban and coastal atmosphere is that the moderately high NPs concentrations in the estuarine waters drive water to air fluxes. Indeed, over the estuary and at SH, the gas phase is enriched in NPs due to direct NPs volatilization from the water. Once NPs are emitted into the atmospheric gas phase, they quickly sorb to the atmospheric aerosols (TSP ~30–50 $\mu g\ m^{-3}$), thus increasing the relative proportion of NPs in the aerosol phase as observed at the LSC. Furthermore, aerosol-associated NPs are subject to removal processes such as dry deposition, reducing their residence time in the atmosphere but still loaded to proximate aquatic and terrestrial ecosystems.

The NPs water concentrations reported in other rivers, estuaries, and coastal zones of the world are often much higher than in the Hudson River estuary. For example, NPs concentrations reported for the Glatt River in Switzerland or the Krka River Estuary in Croatia are 1–2 orders of magnitude higher than in the Hudson River estuary (*13, 25*). Therefore, the occurrence of NPs in the air must be ubiquitous and perhaps even more important in other urban, industrial, and coastal regions of the world where NPEOs and NPs are discharged to surface waters. The atmospheric occurrence of NPs in highly populated areas raises concern regarding new routes of exposure to NPs and the extent of exposure to humans of NPs in the gas and aerosol phases. A corollary to this study is that rivers and estuaries containing high concentrations of organic chemicals with appropriate Henry's Law constants will contribute to the contamination of the local and regional atmosphere.

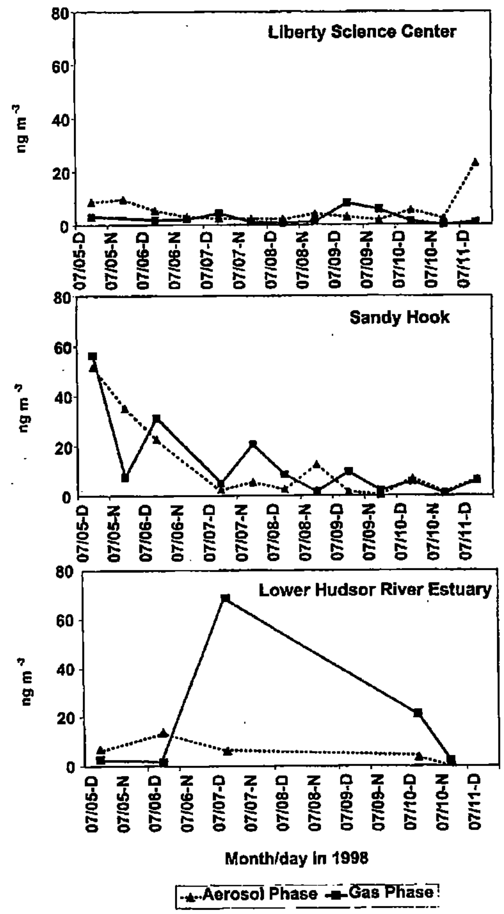

FIGURE 3. Time series of gaseous and aerosol-phase concentrations of NPs at the Liberty Science Center (urban–industrial), Sandy Hook (marine), and the Lower Hudson River Estuary for the samples corresponding to the intensive sampling period July 1998.

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Atmospheric Seasonal Trends and Environmental Fate of Alkylphenols in the Lower Hudson River Estuary

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The atmospheric occurrence of nonylphenols and *tert*-octylphenol has been assessed at three sites in the lower Hudson River Estuary (LHRE). The samples (n = 186) were taken from June to December of 1998. Gas-phase nonylphenol (NP) concentrations at a coastal site (Sandy Hook) ranged from below the detection limit (DL) to 56.3 ng m^{-3}, while concentrations at a suburban site (New Brunswick) ranged from 0.13 to 81 ng m^{-3}. Gas-phase concentrations of *tert*-octylphenol (tOP) ranged from <DL to 1.0 ng m^{-3} at Sandy Hook and from 0.01 to 2.5 ng m^{-3} at New Brunswick. NPs and tOP exhibited seasonal dependence with higher gas-phase concentrations during summer than during fall and early winter. Temperature explained 40–62% of the variability in the log (gas phase) NP and tOP concentrations. Assessment of the influence of local wind direction on atmospheric NP concentrations provided evidence for the predominance of local sources rather than long-range transport. Based on simultaneous water and over-water gas-phase samples and subsequent estimation of air–water exchange fluxes, volatilization and advection to the Atlantic Ocean accounted for 40 and 26% of the removal of NPs from the water column of the LHRE, respectively. The estimated half-life of NPs in the water column of the LHRE was 9 days.

Introduction

Alkylphenol polyethoxylates (APEOs) are widely used as nonionic surfactants in industrial, commercial, and household detergent formulations (*1, 2*). They are also used as bulking agents in some paints and pesticides (*1, 3*). Worldwide, about 500 000 tons of APEOs are produced annually, with nonylphenol polyethoxylates (NPEOs) being the primary constituents (80%) of this class of surfactants (*1*). Biological transformations by progressive shortening of the APEO ethoxylate chain under aerobic and anaerobic conditions results in the formation of alkylphenol mono- and diethoxylates (*2, 4, 5*). However, it has been suggested that the final transformation to alkylphenols (APs) occurs primarily under anaerobic conditions (*2–4, 6–9*). Though most degradation studies have been performed in wastewater treatment systems (*2–4*), similar in situ transformations in natural aquatic environments are also feasible (*6, 10*). Nonylphenols (NPs) and *tert*-octylphenol (tOP), the main alkylphenols produced by this process, are persistent in the environment with half-lives of NPs and NPEOs in marine sediments on the order of 30–60 years (*11–13*). Due to their persistence and hydrophobicity, these APs bioaccumulate in aquatic food chains with bioaccumulation factors of ~10^4 (*14–17*). Furthermore, alkylphenols are toxic to aquatic organisms (*12, 16, 18–23*) and to vascular plants (*24, 25*). NPs and tOP have been shown to disrupt estrogen function at the receptor site (*26–28*) and to effect sex determination in populations of aquatic fauna (*19, 29*). For example, NPs have been reported to be three times more estrogenic than DDT (*26*).

The ubiquitous occurrence of APs in industrial and urban wastewaters has suggested that discharges from wastewater treatment plants may be an important source of NP and tOP to the environment (*2–4, 9, 30–32*). Research on the environmental fate of APEOs and their metabolites has mainly focused on rivers (*3, 33–37*), estuaries (*33, 34, 37–41*), groundwater (*31, 42*), marine systems (*43*), and the Laurentian Great Lakes (*36*). High concentrations of NP and tOP have been reported for estuaries located in urban and industrial areas. For example, NP concentrations range from 5 to 42 ug g^{-1} in sediments from the Venice Lagoon (Italy) (*41*) and from 3 to 30 μg L^{-1} in the water column of the Aire Estuary (U.K.). Water column concentrations are significantly lower in other estuaries such as the Krka River Estuary (20–1200 ng L^{-1}, Croatia) (*39*), the Tee estuary (ca. 130 ng L^{-1}, U.K.) (*44*), and the Lower Hudson River Estuary (15–120 ng L^{-1}, U.S.A.) (*38*). Recently, the occurrence of NPs in the atmosphere was reported for the first time in the New Jersey urban and coastal atmosphere (*38*). Volatilization of NPs from the lower Hudson River Estuary (LHRE) was found to be a source of NPs to the regional atmosphere. However, there is insufficient knowledge about the primary mechanisms that drive the environmental fate of APs. For example, the seasonal dependence of atmospheric AP concentrations and the relative importance of depositional processes and air–water exchange to the fate and transport of APs are unknown.

The results reported are a research component within the framework of the New Jersey Atmospheric Deposition Network (NJADN). NJADN is a research and monitoring network created to study the local, regional, and long-range transport of persistent organic pollutants (POPs) in the New York/New Jersey urban and coastal area and to evaluate the role of the LHRE in these processes. The specific objectives of the present paper are the following: (i) to assess the occurrence of tOP and NPs in the atmosphere, (ii) to study the seasonal trends of NPs and tOP in the atmosphere of the LHRE, (iii) to determine the influence of meteorological conditions such as temperature and wind direction on atmospheric NP and tOP concentrations, and (iv) to assess the relative importance of volatilization as a removal mechanism of NPs from the water column of the lower Hudson River Estuary.

Experimental Section

Site Characterization and Sampling Strategy. The lower Hudson River Estuary is a tidal estuary surrounded by the New York/New Jersey metropolitan area, one of the most densely populated regions in North America with a heavy concentration of industry and wastewater treatment facilities. However, the impact of the urban and industrial activities on the occurrence of NP in the LHRE has not been thoroughly assessed (*38*). Atmospheric research and monitoring stations were established at three locations surrounding the LHRE (Figure 1). Sandy Hook (SH, 40.46°N,74.00°W) is a coastal site located on a peninsula that extends into the LHRE region and is bordered on the east by the Atlantic Ocean. Liberty

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TABLE 1. Atmospheric Alkylphenol Concentrations (ng m^{-3}) at NJADN Sampling Sites[a]

AP (r.t.)[b]	Sandy Hook gas	Sandy Hook aerosol	Liberty Science Center gas	Liberty Science Center aerosol	New Brunswick gas	New Brunswick aerosol
tOP (12.20)	0.21 (nd−1.0)	0.038 (nd−0.63)	0.19 (0.012−0.74)	0.034 (0.0−0.073)	0.40 (0.0091−2.5)	0.022 (0.0011−0.18)
n[c]	22	21	10	10	26	26
NP1 (15.03)	1.0 (nd−9.2)	0.78 (0.012−2.9)	0.41 (nd−2.7)	0.50 (0.043−3.0)	0.81 (0.018−3.5)	0.15 (0.0047−0.94)
NP2 (15.29)	1.5 (nd−13)	1.1 (0.0012−1.5)	0.55 (nd−3.6)	0.79 (0.067−5.3)	2.4 (0.026−11.8)	0.11 (nd−1.3)
NP3 (15.45)	0.63 (nd−5.1)	0.39 (nd−0.62)	0.26 (nd−1.5)	0.28 (nd−2.0)	1.1 (0.011−5.1)	0.044 (nd−0.45)
NP4 (15.53)	0.56 (nd−5.3)	0.41 (0.0047−1.3)	0.18 (nd−1.2)	0.30 (0.011−2.2)	0.4 (0.0082−1.8)	0.041 (nd−0.51)
NP5 (15.64)	0.63 (nd−5.1)	0.38 (nd−0.58)	0.249 (nd−1.5)	0.28 (0.017−2.2)	1.1 (0.011−5.4)	0.040 (nd−0.46)
NP6 (15.94)	0.31 (nd−3.0)	0.24 (nd−0.79)	0.12 (nd−0.77)	0.17 (0.0080−1.2)	0.34 (0.0067−1.4)	0.026 (nd−0.38)
NP7 (16.23)	0.57 (nd−4.2)	0.39 (nd−0.59)	0.27 (nd−1.4)	0.32 (0.017−1.5)	1.1 (0.014−4.5)	0.049 (nd−0.53)
NP8 (16.34)	0.13 (nd−1.1)	0.30 (nd−0.32)	0.086 (nd−0.84)	0.16 (nd−0.81)	0.78 (nd−10)	0.022 (nd−0.33)
NP9 (16.52)	0.72 (nd−6.7)	0.59 (0.0062−1.7)	0.20 (nd−1.3)	0.41 (0.020−2.7)	0.53 (0.013−2.5)	0.064 (0.0023−0.74)
NP10+11 (16.72, 16.82)	0.85 (nd−5.9)	0.79 (nd−0.53)	0.35 (nd−1.8)	0.57 (0.014−2.4)	4.7 (0.014−48)	0.053 (nd−0.70)
ΣNPs	6.9 (nd−56)	5.4 (0.067−51)	2.6 (nd−17)	3.8 (0.23−23)	13 (0.13−81)	0.55 (0.020−6.4)
n[c]	38	38	23	23	27	27

[a] Given are the average concentrations and (range). nd, not detectable. [b] Retention time (min), r.t. [c] *n* is the number of samples analyzed for the respective alkylphenol.

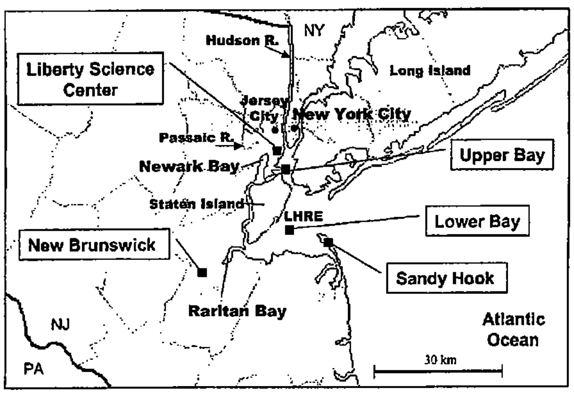

FIGURE 1. Map of the lower Hudson River Estuary region showing NJ Atmospheric Deposition Network sampling stations. Shaded areas indicate the location of urban and suburban areas. Map adapted from the USGS web atlas.

Science Center (LSC, Jersey City, NJ, 40.71°N,74.05°W) is an urban/industrial site located about 0.5 km west of the Hudson River across from New York City and about 4 km east of Newark Bay and the mouths of the Passiac and Hackensack Rivers. These two water bodies receive effluents from municipal waste treatment facilities and are contaminated with persistent organic pollutants (*45*). New Brunswick (NB, 40.48°N,74.43°W), a suburban site located in an agricultural/botanical research area maintained by Rutgers University, is located about 1 km from the Upper Raritan River Estuary, which is also known to receive municipal wastewater treatment effluents.

This paper presents data from two complimentary sampling efforts. To study the seasonal behavior of NPs and tOP, 24 h integrated air samples were taken every 6 (June−August, 1998) or 9 days (September−December, 1998) at the three sites. Analysis of APs at the LSC site began in October 1998, and tOP analysis began at Sandy Hook in July 1998. Additional samples were taken during an intensive sampling campaign that took place from July 5−11, 1998, wherein, consecutive 12-h air samples (8:00 to 20:00 and 20:00 to 08:00 EST) were obtained at LSC and Sandy Hook. Furthermore, simultaneous air and water samples were taken onboard the R/V *Walford* in the LHRE during four of these sampling days. On July 5−7, the samples were taken at locations in Raritan Bay (lower bay), 2−4 km off Staten Island, while two samples (A, morning and B, afternoon) were collected on July 10, 1998 in the upper bay (see Figure 1). The samples from the LSC site during the intensive sampling campaign were taken from the top of a 40-m building, whereas the 24-h integrated samples, taken on a 9-day schedule, were collected from a 1-m high platform.

Air and Water Sampling. Atmospheric particulate and gas-phase samples were obtained with modified high volume air samplers (calibrated flow rate of ~0.3−0.5 m^3 min^{-1}) using quartz fiber filters (QFFs, Whatman) and polyurethane foam (PUFs), respectively. Water particulate and dissolved samples (23−49 L) were obtained using an "Infiltrex 100" in-situ sampler (Axys Environmental Systems, Canada) fitted with glass fiber filters (GFFs, Whatman) and XAD-2 adsorbent (Suppelco), respectively, as generally described elsewhere (*46*). PUFs were precleaned in a Soxhlet apparatus for two periods of 24 h with acetone and petroleum ether, respectively. XAD-2 was precleaned in a Soxhlet apparatus by systematic 24-h extractions using hexane, acetone, and methanol and then rinsed with Milli-Q water. QFFs and GFFs were preweighed in a laboratory with controlled humidity and temperature after being baked at 450 °C for 4 h.

Analytical Procedure. PUFs and QFFs were extracted in a Soxhlet apparatus with petroleum ether and dichloromethane (DCM), respectively. XAD-2 and GFFs were extracted with 1:1 acetone:hexane, followed by liquid−liquid extractions with Milli-Q water (3 × 60 mL) and treatment with an excess of anhydrous sodium sulfate. All extracts were concentrated to ~0.5 mL by rotoevaporation and reduction under a gentle stream of N_2. Samples were fractionated on a 3% H_2O-deactivated alumina (4 g) column prerinsed with 5 mL of 2:1 DCM:hexane and 15 mL of hexane. The first fraction, eluted with 13 mL of hexane, contained PCBs and chlorinated pesticides (CPs). The second fraction, eluted with 15 mL of 2:1 DCM:hexane, contained PAHs and CPs. The third fraction containing the APs was obtained by eluting with 15 mL of dichloromethane:methanol (2:1).

Alkylphenols were identified and quantified by gas chromatography mass spectrometry with electron impact (HP 5890 GC-HP5972 MSD-EI) in selective ion monitoring mode using the ions 135 and 149, as reported by Kannan et al. (*43*), and employing a DB-5 GC column (J&W Scientific; 0.25 mm ID × ~30 m; 0.25 μm film thickness). The oven temperature program, starting with an initial temperature of 70 °C, was as follows: 25 °C min^{-1} to 150 °C; 2 °C min^{-1} to 175 °C; 10 °C min^{-1} to 315 °C. The retention times for the 11 most abundant NP isomers in the technical mixture (Fluka, Germany) were from 14.20 to 15.92 min for this temperature program as shown in Table 1 and were used to calculate the sum of NPs (ΣNPs) (*38*). Isomeric NP concentrations were calculated by accounting for the relative contribution of ions 135 and 149 to the total spectra for each individual isomer. Separation between the peaks of isomers NP10 and NP11 during gas chromatography was poor for some samples. Therefore, the concentrations of these isomers are reported as the sum of the two (NP10+11). *tert*-Octylphenol (Aldrich) was quantified using the 135 ion and had a retention time of 11.40 min. NPs were derivatized in the water particulate samples using bis(trimethylsilyl)trifluoroacetamide (TMS, Sigma) to improve resolution during chromatographic analysis of a polar fraction with high organic matter content (*47*). Quantification was performed using the internal standard 1-phenyldodecane (Aldrich), whereas 2,4,6-trimethylphenol (Aldrich) or 4-*n*-heptylphenol (Avocado) were used as surrogate compounds.

Matrix spikes for all the matrices, where known amounts of APs were spiked onto sample media, were processed together with the field samples. Matrix spike recoveries were from 45 to 98% for NPs and 47 to 71% for tOP. Sample concentrations were not corrected for surrogate recovery. Method detection limits (MDL) for both NPs and tOP were 4 and 1 ng for aerosol and PUF samples, respectively. Nonylphenol concentrations were detectable in all except one of the air samples analyzed ($n = 186$) and all of the water samples ($n = 9$). Concentrations of tOP were above detection limits in all but five air samples analyzed ($n = 115$). Procedural blanks ($n = 19$) and field blanks ($n = 10$) were processed for all of the sampling sites and all of the matrixes. The mass of ΣNPs measured in field blanks ranged from <MDL to 84 ng, while the mass measured in samples ranged from <MDL to 94 900 ng. The mass of tOP measured in field blanks ranged from <MDL to 1.6 ng, while the mass in samples ranged from < MDL to 2900 ng. The mass of APs in blanks was always below 5% of corresponding field values, and, therefore, no correction of samples was made.

Meteorological Data. Meteorological data for LSC and Sandy Hook sites was obtained from the National Oceanographic and Atmospheric Administration (NOAA) observation stations located at nearby Newark and John F. Kennedy airports, respectively. Meteorological data used for New Brunswick was collected onsite on a 10-m tower. All temperature measurements were arithmetically averaged using weighted hourly observations taken during the sampling period. Predominant local wind directions for each sampling period were estimated by vector addition of hourly observations with wind speed as the vector's magnitude as described by Zhang et al. (*48*).

Results and Discussion

Atmospheric Spatial Variability and Seasonal Trends. Occurrence of NPs and tOP in the NJ Coastal Atmosphere. Averages and ranges of gas- and aerosol-phase concentrations of the NP isomers and ΣNPs at each of the sampling sites are reported in Table 1. The occurrence of tOP in the atmosphere is shown for the first time. At the coastal Sandy Hook site, gas-phase concentrations of ΣNPs averaged 6.9 ng m^{-3} and ranged from <MDL in one sample to 56 ng m^{-3}. The aerosol-phase concentration of ΣNPs averaged 5.4 ng m^{-3} and ranged from 0.067 to 51 ng m^{-3}. The average tOP gas-phase concentration was 0.21 ng m^{-3} and ranged <MDL in one sample to 1.0 ng m^{-3}. Aerosol tOP ranged from <MDL to 0.63 ng m^{-3} and had a mean of 0.038 ng m^{-3}. Since both NPs and tOP were usually enriched in the gas phase, and since the Sandy Hook site is surrounded by the LHRE and the Atlantic Ocean, volatilization from proximate waters is likely an important source of NPs and tOP to the local atmosphere (*38*). However, for samples enriched in the particle phase, regional advective transport may also be important.

The LSC site is located amidst an urban-industrial area about 0.5 km from the Hudson River. The mean gas-phase concentration of ΣNPs was 2.6 ng m^{-3} and ranged from <MDL in one sample to 17 ng m^{-3}, while the aerosol phase had an average concentration of 3.8 ng m^{-3} and ranged from 0.23 to 23 ng m^{-3}. The mean tOP gas-phase concentration was 0.19 ng m^{-3} and ranged from 0.012 to 0.74 ng m^{-3}. Aerosol tOP concentrations ranged from <MDL in one sample to 0.073 ng m^{-3} and had a mean of 0.034 ng m^{-3}.

New Brunswick is a suburban site situated within a small agricultural and botanical research area and is located less than a kilometer from the Upper Raritan River Estuary. The average ΣNPs concentration in the gas phase was 13 ng m^{-3} and ranged from 0.13 to 81 ng m^{-3}, while the aerosol-phase ΣNPs concentrations ranged from 0.020 to 6.4 ng m^{-3} and had a mean of 0.55 ng m^{-3}. The average gas-phase tOP concentration was 0.4 ng m^{-3} and ranged from 0.0091 to 2.5 ng m^{-3}, while aerosol bound tOP concentrations ranged from 0.0011 to 0.18 ng m^{-3} and averaged 0.024 ng m^{-3}. Concentrations of APs at New Brunswick were *highly* enriched in the gas phase in comparison to the other sites, which suggests local evaporative sources (*38*).

The mean gas-phase concentrations of ΣNPs at New Brunswick, Sandy Hook, and LSC were not statistically different from each other. However, aerosol-phase ΣNP concentrations at Sandy Hook and LSC were statistically higher than at New Brunswick ($p < 0.05$). The similar gas-phase NP concentrations at each of the sampling sites suggest that sources of NPs may be ubiquitous in the region surrounding the LHRE. This result was surprising for the New Brunswick site, which is not near water. APs and APEOs have been used in agricultural products (*22, 25, 28, 49, 50*), suggesting that land applied sources may also contribute to the atmospheric occurrence of APs. No other data for atmospheric NPs/tOP have been reported so comparisons to other fields studies was not possible. ΣNP concentrations in the gas phase, however, often exceed phenanthrene and pyrene concentrations for the same samples (*51*). Furthermore, ΣNP concentrations exceeded total PCB concentrations for the same samples by 2 orders of magnitude (*51*).

Temporal trends of gas- and aerosol-phase concentrations of ΣNPs and tOP at the three sampling sites are shown in Figure 2. At both the Sandy Hook and New Brunswick sites, gas-phase NPs and tOP concentrations were significantly higher ($p < 0.05$) during the summer (June–September) than during the fall and early winter (October–December). At the New Brunswick site, gas-phase tOP concentrations showed a trend similar to NP concentrations. For example, the four highest gas-phase concentrations of tOP and NPs at the New Brunswick site occurred on the same sampling days. At LSC, gas-phase NPs and tOP concentrations followed similar seasonal trends with significantly lower concentrations during late autumn and early winter ($p < 0.05$), while the aerosol-phase NP and tOP concentrations showed less variability throughout the entire sampling period. The observation of higher gas-phase AP concentrations during the summer than during the fall/early winter at all the sampling sites is consistent with the notion that temperature is a driving factor of the atmospheric occurrence of APs.

Influence of Temperature. The effect of temperature on atmospheric concentrations of persistent organic pollutants has been reported (*48, 52–57*). These studies have shown that a large fraction of the seasonal variability of gas-phase concentrations of semivolatile organic compounds can be explained by temperature using a Clausius–Clapeyron equation of the type

$$\log C_g = b + m/T \qquad (1)$$

where C_g is the gas-phase concentration (ng m^{-3}), T is the average temperature (K) during the sampling period, m is the slope, and b is a constant. Air temperatures ranged from

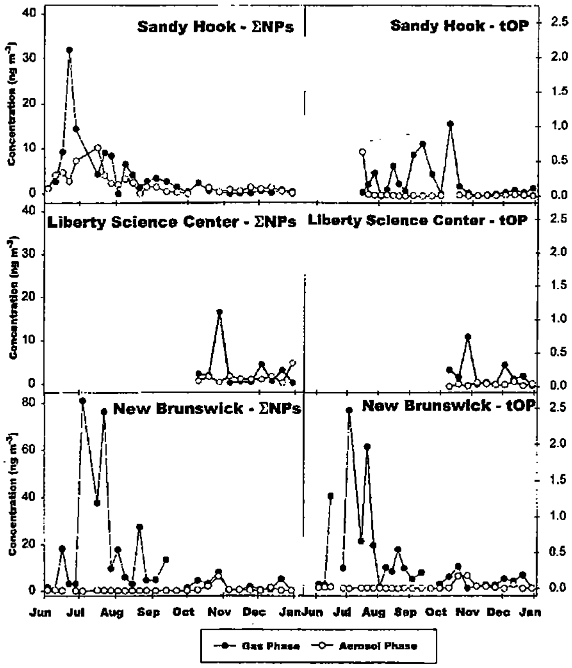

FIGURE 2. Atmospheric concentrations of ΣNPs and tOP (ng m^{-3}) obtained from June 4 to Dec 30, 1998 in 6- or 9-day intervals. Given separately are the gas-phase (filled circles) and aerosol-phase (open circles) concentrations.

TABLE 2. Temperature Regression Parameters for tOP, NP Isomers, and ΣNPs at the New Brunswick Site[a]

	slope	SE[b]	r^2	p
tOP	−4100	940	0.45	<0.001
NP1	−5100	960	0.53	<0.001
NP2	−5400	840	0.63	<0.001
NP3	−5500	900	0.60	<0.001
NP4	−5700	870	0.63	<0.001
NP5	−5700	820	0.66	<0.001
NP6	−5600	870	0.62	<0.001
NP7	−5500	870	0.61	<0.001
NP9	−5700	890	0.62	<0.001
ENPs	−5500	900	0.60	<0.001

[a] Isomers NP8 and NP10+11 were excluded because concentrations were frequently below the limit of detection. [b] Standard error.

−7 to 31 °C during the sampling period (June to Dec 1998). Table 2 reports the values of m, the standard error of m, the regression coefficients (r^2), and p-values obtained from the regressions for gas-phase concentrations of tOP and the individual NP isomers at the New Brunswick site. All regressions were statistically significant ($p < 0.001$). Although, there were slight differences between the slopes (−5700 to −5100) for the individual NP isomers, the differences were not statistically significant ($p > 0.05$). Thus, the temperature dependence of NP concentrations was investigated using the sum of NP isomers.

Figure 3 shows the results obtained from applying eq 1 to gas-phase NP and tOP concentrations at each of the sampling sites. Statistically significant correlations (95% confidence level) between log C_g and $1/T$ were obtained at each of the sampling sites for both ΣNPs and tOP. Temperature explains about 62% of the variability of the log of gas-phase NP concentrations at Sandy Hook ($r^2 = 0.62$, $p < 0.001$, extreme outlier removed). ΣNP gas-phase concentrations at Liberty Science Center ($r^2 = 0.56$, $p < 0.001$) and New Brunswick ($r^2 = 0.60$, $p < 0.001$) showed slightly lower

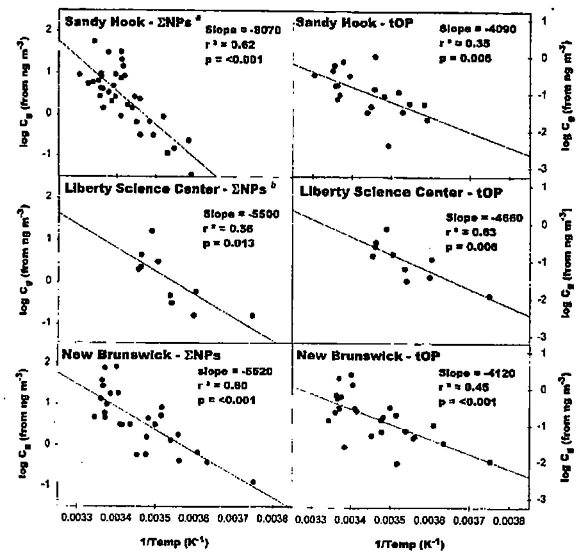

FIGURE 3. Regressions of the log gas-phase concentrations (C_g) of NPs and tOP verses reciprocal temperature (T) at each of the sampling sites (log $C_g = m/T + b$). [a]Extreme outlier removed. [b]Plot contains samples taken in 9-day intervals.

correlations with temperature. For tOP, the log gas-phase concentrations showed significant correlations with $1/T$ for all the sampling sites ($p < 0.01$, see Figure 3) with regression coefficients of 0.35 and 0.63 for the Sandy Hook and LSC sites, respectively.

Slopes of smaller absolute magnitude should correspond to compounds with lower heats of air-surface exchange and thus with higher vapor pressures at a given temperature (*58*). This is consistent with the slopes obtained for tOP and ΣNPs. Indeed, at all the sampling sites, the slopes m for tOP (−4090 to −4660) were shallow compared to the slopes for ΣNPs (−5500 to −8070). Equation 1 describes an air-surface partitioning process. Therefore, a high correlation between the log C_g and $1/T$ indicates that atmospheric NP and tOP concentrations are driven by air-surface exchange. Wania et al. (*54*) concluded that steep slopes can be associated with local sources. Therefore, the very steep slope obtained from Sandy Hook data (−8070) is consistent with the proximate waters being the source of NPs to the local atmosphere. Dachs et al. (*38*) suggest that concentrations of atmospheric NPs at Sandy Hook and LSC are likely the result of volatilization from the LHRE and its composite water bodies such as Newark Bay. The dependence of NP concentrations on temperature demonstrated here gives further evidence for this scenario.

Gas-phase NP concentrations at New Brunswick were not only temperature dependent but also higher than Sandy Hook and LSC for some sampling periods in July 1998. These high concentrations at New Brunswick must not be exclusively the result of volatilization from the nearby Upper Raritan River Estuary (RRE). Given its size, concentrations in the RRE would need to be several orders of magnitude higher than the in the LHRE (*38*) to support such high gas-phase concentrations. Therefore, it is reasonable to suspect that volatilization of APs from sources other than RRE may be important. Since APs have been used as adjuvants in agricultural products (*22, 25, 28, 49, 50*), terrestrial sources could explain a portion of the occurrence of NPs and tOP at the New Brunswick site. Higher temperatures during the summer could lead to enhanced volatilization of applied APs from these terrestrial surfaces. However, further research on these mechanisms is needed.

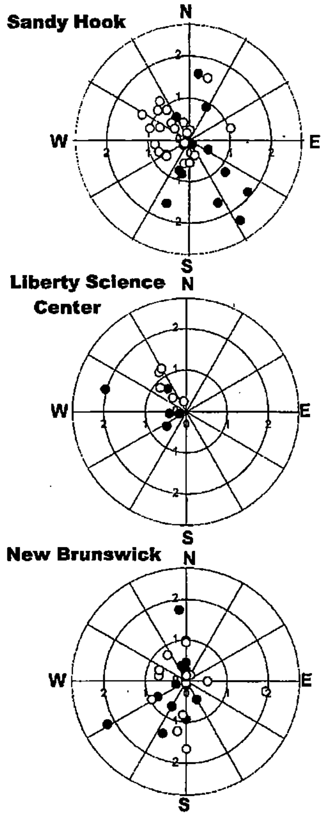

FIGURE 4. Polar plots of wind direction (angular data) vs the absolute magnitude of positive (filled circles) and negative (open circles) standardized residuals (radial data) from the temperature regressions for ΣNPs at each site presented in Figure 3.

Influence of Wind Direction. A systematic analysis of the effects of local wind direction was carried out to further evaluate the influence of meteorological variables and potential sources on the atmospheric occurrence of NPs and tOP. Removing the influence of temperature is useful when trying to determine the effects of wind direction (*59*). Standardized residuals were obtained from the application of eq 1 to gas-phase ΣNP concentrations at the three sampling sites (Figure 3). Standardized residuals are the residuals (*predicted* − *observed* log C_g) normalized by the standard error of the linear regression. These values represent the relative distance a particular data point lies from the value predicted by the log C_g-$1/T$ regression line (eq 1 and Figure 3) and provide the fraction of the variability of gas-phase NP concentrations not explained by temperature. Positive standard residuals correspond to NP concentrations that fall above the prediction line (i.e., uncharacteristically high concentrations for a given temperature), while negative standard residuals refer to gas-phase NP concentrations that fall below the regression line (low concentrations). Figure 4 shows polar plots of each sample data point using predominant wind direction and standardized residuals as the angles and radii, respectively.

At the Sandy Hook site, larger positive residuals occurred when local winds were from the south, while a greater proportion of negative residuals occurred when winds were from the NW. However, all residuals from the NW were below or close to unity, indicating that temperature is a good predictor of NP concentrations when winds are derived from over the estuary. Larger positive residuals associated with air masses coming from the south are consistent with local advective transport of NPs, presumably from sources along the NJ coastline or coastal terrestrial sources. At the New Brunswick site, the polar plot of standardized residuals (Figure 4) suggests that no particular wind direction was more important than another for determining the effects of temperature. The Raritan River is located to the north of the New Brunswick site. If it was a significant source of NP to the local atmosphere, local winds from that direction should give high positive residuals; this trend was not observed. This provides further evidence for the occurrence of surface related sources other than volatilization from the Raritan River. At the LSC site, winds were almost always from the NW corridor. Therefore, the influence of wind direction could not be elucidated. Nevertheless, air masses coming from this direction may be influenced by volatilization from Newark Bay and the Passaic and Hackensack River watersheds as well as other terrestrial sources. In fact, the relatively aerosol-enriched concentrations of NPs at LSC are consistent with regional transport.

A complementary analytical tool to evaluate the influence of wind direction is multiple linear regression (*48, 53*) of the gas-phase ΣNP concentrations against temperature and wind direction

$$\log C_g = a_0 + a_1/T + a_2\sin(\mathrm{wd}) + a_3\cos(\mathrm{wd}) \quad (2)$$

where a_0, a_1, a_2, and a_3 are fitting parameters and wd is the predominant wind direction for the sampling period (degrees). The results of applying eq 2 to gas-phase NP concentrations for the Sandy Hook site were

$$\log C_g = 19.5 - 6993/T + 0.33\sin(\mathrm{wd}) - 0.18\cos(\mathrm{wd}) \quad (3)$$

The regression coefficient was 0.74, where temperature explained 62% of the variability and wind direction explained the remaining 12%. All the fitting coefficients were statistically significant at the 95% confidence level ($p < 0.001$ to < 0.05). These results confirm that wind direction is important at Sandy Hook, and air masses approaching from the south are generally associated with higher concentrations of NPs. At the New Brunswick site, temperature was the only statistically significant parameter. Wind direction did not correlate with the log of gas-phase concentrations, confirming that sources of AP are probably local. Since winds at LSC were almost always from the NW corridor, no significant correlation between the wind direction parameters and concentration could be attained.

The study of the influence of temperature and wind direction has shown that surface-air exchange processes drive air concentrations of NPs and tOP and explained the importance of local sources versus long-range atmospheric transport. This is consistent with short atmospheric half-lives (<1 day) of NP and tOP as suggested by the behavior of other phenols in the atmosphere (*60*). Therefore, inputs from aquatic and, perhaps, terrestrial environments are important in supporting the atmospheric occurrence of NPs and tOP. However, it remains unclear how important volatilization is as a removal process of NPs from aquatic environments.

Fate of Alkylphenols in the Lower Hudson River Estuary. Mass Balance Approach. To assess the relative importance of volatilization as a removal process of NP from the water column, a budget of input and removal processes was constructed. A box-model was devised to estimate the input and removal fluxes of NPs from the water column of the lower Bay of the Hudson River estuary during the July 1998 sampling campaign. The input boundary for the box model was assumed to be the mouth of the Hudson River, close to the sampling position corresponding to the upper bay site. The output boundary to the Atlantic Ocean was an imaginary

TABLE 3. Aquatic Concentrations, Over-Water Atmospheric Concentrations, and Air–Water Exchange Fluxes of ΣNPs in the Lower Hudson River Estuary 1998

sample date	Lower Bay 7/5/98	Lower Bay 7/6/98	Lower Bay 7/7/98	Lower Bay av	Upper Bay 07/10/98 A	Upper Bay 07/10/98 B	Upper Bay av
dissolved (ng L^{-1})	12	24	49	28	61	94	78
water particulate (ng L^{-1})	3.9	2.6	3.4	3.3	22	na	22
TSM (mg L^{-1})[a]	5.4	5.7	4.2	5.1	5.5	na	5.5
f_{oc} (%)[b]	34	35	32	34	12	na	12
gas phase (ng m^{-3})	2.6	1.5	69	24	21	2.2	12
aerosol phase (ng m^{-3})	6.9	14	6.3	9.0	3.6	0.50	2.0
wind speed (m s^{-1})	1.7	3.3	2.3	2.4	4.1	5.6	4.8
k_{ol} (m day^{-1})[c]	0.22	0.42	0.29	0.31	0.52	0.72	0.62
air–water flux (ng m^{-2} day^{-1})[d]	2100	9500	1200	4300	25000	66700	46000

[a] Total suspended matter. [b] Fraction of organic carbon on suspended aquatic particles. [c] Air–water mass transfer coeffecient. [d] Positive values indicate volatilization.

line between Sandy Hook and Long Island (Figure 1). The total control volume (2.5×10^9 m^3), total surface area (A_S, 3.8×10^8 m^2), and the net dry season river flow rate of water (Q) through the entire bay for a typical year (7.1×10^7 m^3 day^{-1}, 1987) were obtained from Farley et al. (*45*). Loadings of NPs to the NY/NJ bay are advection in, diffusive absorption, and dry and wet atmospheric deposition, whereas removal processes are advection out, volatilization, sedimentation, and degradation.

Advection Inputs and Outputs. The Hudson River accounts for about 50% of the advective water flow into the control volume (*45*). Since concentrations were not available for the other rivers entering the study area (mainly the Passiac, Hackensack, Raritan, and East Rivers), the total concentrations of NPs in the upper bay ($C_{T,up}$, July 10, see Figure 1), near the mouth of the Hudson River, were assumed to be typical of all water entering by advection. Furthermore, the lower bay was assumed to be a completely mixed system, and concentrations obtained at the lower bay sampling site ($C_{T,low}$, July 5–7, see Figure 1) were assumed to be those transferred by advection to the Atlantic Ocean.

Table 3 reports the dissolved and particulate phase concentrations of ΣNPs in the upper and lower bay water samples (see Figure 1). The average water (dissolved + particulate) ΣNPs concentration in the lower bay was 31 ng L^{-1} and ranged from 15 to 53 ng L^{-1}. In the upper bay, the average water concentration of ΣNPs was 100 ng L^{-1}. The higher concentrations at the upper bay sampling site are consistent with proximity to the location of wastewater treatment facilities that discharge to the Hudson and Passaic Rivers and Newark Bay. Therefore, inputs (I) and outputs (O) of NPs by advection (g day^{-1}) are estimated by

$$I = QC_{T,\,up} \times 10^{-9} \qquad (4)$$

and

$$O = QC_{T,\,low} \times 10^{-9} \qquad (5)$$

where $C_{T,up}$ and $C_{T,\,low}$ are the water total NP concentrations (ng m^{-3}) in the upper and lower bay, respectively.

Air–Water Exchange. Air–water diffusive fluxes of NPs in the lower bay were calculated using a modified two-layer resistance model (*46, 61–63*). Volatilization and absorption fluxes were treated separately in the mass balance model and are given by

$$\text{volatilization} = k_{ol}\,(C_d) \qquad (6)$$

$$\text{absorption} = k_{ol}(C_g/H') \qquad (7)$$

where C_d and C_g (ng m^{-3}) are the dissolved and gas-phase concentrations, respectively, H' is the dimensionless Henry's Law constant for ΣNPs, and k_{ol} is the mass transfer coefficient (m day^{-1}). H' (1.5×10^{-3} at 25 °C) was not corrected for temperature since water temperatures ranged from 20 to 23 °C during sampling and exerted negligible influence on the flux calculations (*64*). Details on methods to estimate k_{ol} are described elsewhere (*48, 61*). The estimated values of k_{ol} and air–water fluxes are given in Table 3. All *net* air–water fluxes calculated (volatilization − absorption) were positive, indicating net volatilization. Net fluxes in the upper bay ranged from 25 to 67 μg m^{-2} day^{-1} (average = 46 μg m^{-2} day^{-1}) and were nearly an order of magnitude greater than the average net flux in the lower bay (4.3, range 1.2–9.5 μg m^{-2} day^{-1}). The difference in net fluxes between the two sampling areas was not only the result of a shift in the air–water concentration gradient but also because higher wind speeds during the sampling periods in the upper bay enhanced k_{ol} (*46*). Volatilization and absorption fluxes used in the box model correspond to those calculated for the lower bay.

Dry and Wet Deposition. The dry deposition flux of NPs to the lower bay was estimated by (*65, 66*)

$$\text{dry deposition} = C_{a,p}v_d A_S \times 10^{-9} \qquad (8)$$

where $C_{a,p}$ (ng m^{-3}) is the concentration of NPs in the aerosol phase and v_d is the particle deposition velocity. The average concentration of NPs on aerosols above the water column of the lower bay was 2 ng m^{-3} (Table 3). A range for v_d of 0.2–0.5 cm s^{-1} was chosen as representative of over water areas with urban influence (*65*). Concentrations of NPs in rainwater were not available so the wet deposition flux of NPs was estimated by (*67, 68*)

$$\text{wet deposition} = (PA_s) \times (W_g C_g + W_{a,p} C_{a,p}) \times 10^{-9} \qquad (9)$$

where P is the seasonal average precipitation rate (2.44×10^{-3} m day^{-1}), and W_g and $W_{a,p}$ are washout coefficients for the gas and aerosol phases, respectively. W_g is defined as the reciprocal of the dimensionless Henry's Law constant ($1/H'$, 645), whereas $W_{a,p}$ was assumed to be 10^4 based on literature values (*67*).

Sedimentation. The average particle sedimentation rate (w_s) for the estuary, calculated from Adams et al. (*69*), is 3.6 g m^{-2} day^{-1}. Sediment resuspension is a common process in the LHRE (*69*), and, therefore, the water column particles were likely to have similar NP concentrations to the surficial sediments. Assuming that water column particulate concentrations are representative of those in the sediments, the sedimentation rate for NPs can be estimated as

$$\text{sedimentation rate of NP} = w_s A_S C_{w,p} \times 10^{-9} \qquad (10)$$

where $C_{w,p}$ (ng m^{-3}) is the average aquatic particle concentration of NPs in the lower bay.

Relative Contributions of Loadings and Removal Processes. Degradation of nonylphenol polyethoxylates to NPs in the sediments with subsequent resuspension is a potential input of NP to the water column. On the other hand, in situ degradation of NPs may also be an important removal mechanism (*70*). The *net* degradation rate (*formation* − *degradation*) of NPs (D, g day^{-1}) can be estimated by closing the mass balance as given by

$$[(QC_{T,up}) + (C_{a,p}v_dA_S) + (A_SK_{ol}C_g/H)] \times 10^{-9} = [(QC_{T,low}) + (w_sA_SC_{wp,low}) + (A_SK_{ol}C_d)] \times 10^{-9} + D \quad (11)$$

and is assumed to be all the NP mass not accountable by the summation of the other removal processes. Since concentrations of NPs to the atmosphere are temperature dependent, and samples were taken only for a 1-week period, the results obtained should be viewed as a preliminary approach to assessing the predominant mechanisms driving the fate of NPs in the shallow aquatic environment of the LHRE during the summer.

The total loading of NPs to the lower bay was 9100 g day^{-1}. Advection accounted for 69% of this input (6300 g day^{-1}), while gaseous absorption and dry deposition accounted for 19% (1700 g day^{-1}) and 11% (1000 g day^{-1}), respectively. The estimated wet deposition accounted for less than 1% of the total loading. Removal from the estuary was dominated by volatilization (37%, 3400 g day^{-1}). In fact, actual volatilization fluxes may be significantly higher than those estimated with the available data set since the average wind speed during the summer season (4.5 m s^{-1}) is significantly higher than the wind speeds during the sampling periods (2.4 m s^{-1}) in the lower bay. Advection (2200 g day^{-1}) and degradation (2600 g day^{-1}) accounted for 24 and 29% of the total removal of NPs from the water column. Some processes have not been taken into account, therefore adding to the uncertainty of the mass balance. For example, removal of NPs from the water column to the atmosphere due to formation of marine aerosol could not be estimated with the data available and was omitted in the present budget for the lower bay.

The total inventory of NPs in the control volume was approximately 78 kg. Therefore, the overall residence time (R_t) of NPs in the water column of the lower bay can be estimated as

$$R_t = \text{(total inventory)/loadings} = \text{(total inventory)/removal} \quad (12)$$

The calculated R_t is approximately 9 days, which was significantly lower than the residence time of the water in the bay (35 days) (*45*). Short residence times (0.9–2.7 days) have also been observed for NPs in the shallow Krka River estuary in Croatia (*40*).

The results obtained from the budget of NP in the lower bay shows that the biogeochemical cycling of NP is a very dynamic process where inputs are dominated by advection and outputs by volatilization to the local atmosphere. Degradation may also be an important loss mechanism, but its relative importance is difficult to assess due to the fact that the values obtained were estimated indirectly by closing the mass balance for NPs in the lower bay.

The present study demonstrates the necessity to study the environmental fate of semivolatile persistent organic pollutants using a multicompartment approach. This is not only because the atmospheric occurrence and fate of POPs is influenced by the adjacent aquatic and terrestrial environments but also because the atmosphere may be an important sink for POPs in shallow aquatic environments.

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Air-Water Exchange of Polycyclic Aromatic Hydrocarbons in the New York-New Jersey Harbor Estuary, USA

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Abstract

Polycyclic aromatic hydrocarbons (PAHs, n=36) were measured in the gas and particle phases in the atmosphere and the dissolved and particle phases in the waters of the New York-New Jersey Harbor Estuary, USA during a week-long intensive field campaign in July 1998. Mean total (gas + particulate) phenanthrene and pyrene concentrations were 3.3 and 0.33 ng m^{-3}, respectively, over the Raritan Bay, and 14 and 1.1 ng m^{-3}, respectively, over New York Harbor. Similar PAH profiles (p-values < 0.01) in the atmospheric gas phase and the dissolved phase in water demonstrate the close coupling of the air and water compartments. Air-water exchange fluxes of PAHs estimated using shore-based air data lead to erroneous flux estimates when compared to those derived using over-water air samples. The gross absorptive air-water flux dominates atmospheric loadings (wet, dry particle, gas absorption) to the estuary for PAHs of molecular weight, MW< 234 g mol^{-1}. Dry particle deposition is increasingly more important for the higher molecular weight, particle-bound PAH species. Gross volatilization dominates gross absorption for the majority of PAHs in the New York-New Jersey Harbor Estuary.

Keywords- PAHs, Air-water exchange, Estuaries

INTRODUCTION

Urban and industrial activity in coastal zones contributes to increased chemical loading of semi-volatile organic compounds (SOCs) [1-4]. Proximity of urban/industrial areas increases atmospheric deposition of SOCs to adjacent coastal waters [1-4], while SOCs emitted from aquatic systems also act as sources to coastal atmospheres [4-9]. Much of this type of work was focused on the Great Lakes [1,3,5,6,10-12] and the Chesapeake Bay [2,7,13-16], but considerably less work has been done on other shallow estuaries such as the Lower Hudson River Estuary and the heavily impacted New York-New Jersey Harbor Estuary (HE).

The objectives of this paper are to assess the occurrence, speciation, and spatial variability of PAHs in the atmosphere and water of the HE during an intensive field experiment in July 1998 and to assess the magnitude of summertime air-water exchange fluxes relative to atmospheric deposition to the HE within the framework of the New Jersey Atmospheric Deposition Network (NJADN). NJADN is a research and monitoring network with sites in the urban and coastal New York/New Jersey region to provide concentrations and dynamics of SOCs, and to determine the relative role of the atmosphere to inputs from all sources [17-19].

METHODOLOGY

Sampling and Site Characterization. From July 5-11, 1998, intensive air and water sampling was conducted with consecutive 12-hour air samples (0800-2000 hours, 2000-0800 hours) taken simultaneously over-water and at two land locations in New Jersey, USA representing different geographical locations surrounding HE (Fig. 1). The coastal Sandy Hook (SH) site (40.46°N/74.00°W) is located 10 km south of New York City on a peninsula that divides the estuary from the Atlantic Ocean. The urban Liberty Science Center (LS) site (40.71°N/74.05°W) is located in Jersey City, in the midst of the urban/industrial sector of New Jersey and across the Hudson River from Manhattan.

Simultaneous air and water samples were taken aboard the R/V *Walford* at two locations in the HE. From July 5-7, 1998, sampling occurred in Raritan Bay (40.30°N/74.05°W) west of SH. Samples were also taken in New York Harbor at the mouth of the Hudson River (39.17°N/74.02°W) west of Manhattan in the morning and afternoon of 10 July 1998.

Atmospheric samples were collected using modified high volume air samplers (Tisch Environmental, Village of Cleves, OH, USA) which were operated at a calibrated flow rate of approximately 0.5 m^3 min^{-1}. The gas phase was captured on polyurethane foam adsorbents (PUF) and the particulate phase was collected on quartz fiber filters (QFF 0.7μm pore size, Whatman, Maidstone, UK).

Meteorological data for the land sites were obtained from the National Oceanic and Atmospheric Administration meteorological stations located at the Newark International Airport 10 km from LS and at John F. Kennedy International Airport 15 km from SH.

Surface water samples were collected at a depth of 1.5 m with an Infiltrex 100 water sampler (Axys Environmental Systems Ltd., Sydney, British Columbia, Canada) at a flow rate of approximately 400mL min^{-1}. The sampler was equipped with a glass fiber filter (GFF 0.7μm pore size, Whatman, Maidstone, UK) to isolate particles and XAD-2 resin packed in a Teflon column to isolate the operationally-defined dissolved phase. Surface water temperature, salinity, and wind speed data were recorded at the time of sampling. Additional water samples were collected to quantify total suspended matter, dissolved organic carbon, and particulate organic carbon. These samples were analyzed by the Analytical Services Division of the Chesapeake Biological Laboratory (Solomons, Maryland).

Wet-only integrating rain samplers were employed (Meteorological Instrument Center, MIC, Richmond Hill, Ontario, Canada) as part of the regular sampling regime of the NJADN to assess the magnitude of the wet depositional flux of PAHs. Twelve-day integrated precipitation samples were collected in a 0.212 m^2 stainless steel funnel that drained through a glass column containing XAD-2 resin. The volume of collected rain over the 12-day sampling periods varied from 2.7 to 20 L from June to August 1998.

Analytical Procedures. The QFFs were weighed prior to and after sampling for the determination of total suspended particulate mass. The PUFs and QFFs were spiked in the laboratory with deuterated PAH surrogate standards (d_{10}-anthracene, d_{10}-fluoranthene, d_{12}-benzo[e]pyrene) and extracted in Soxhlet apparati for 24 hours in petroleum ether and dichloromethane, respectively. The extracts were concentrated by rotary-evaporation, the solvent exchanged to hexane, and were further concentrated via N_2 evaporation. The samples were then fractionated on a column of 3% water-deactivated alumina. The PAH fraction was eluted with 2:1 dichloromethane:hexane, concentrated under a gentle stream of nitrogen gas, and injected with internal standard prior to analysis by gas chromatography-mass spectrometry. Air samples were processed as described in Gigliotti et al. [18].

Glass fiber filters (GFFs) were combusted at 400°C for 4 hours. XAD-2 resin for both water and precipitation sampling was prepared by successive 24-hour Soxhlet extractions in methanol, acetone, hexane, acetone, and methanol, and then finally rinsed with Milli-Q® water. Field samples of XAD-2 resin were extracted in acetone:hexane (1:1 by volume) in Soxhlet apparati for 24 hours after the addition of surrogates to assess analytical recoveries. The extracts were liquid-liquid extracted in 60 mL Milli-Q water. The aqueous fractions were back-extracted with 3 × 50 mL hexane in separatory funnels with 1 g sodium chloride. The samples were then concentrated by rotary evaporation and treated in the same manner as air samples as described above.

All samples (air, water, and rain) were analyzed on a Hewlett Packard 6890 Gas Chromatograph coupled to a Hewlett Packard 5973 Mass Selective Detector operating in Selective Ion Monitoring mode. A 30m × 0.25mm i.d., J&W Scientific 122-5062 DB-5 (5% diphenyl-dimethylpolysiloxane) capillary column with a film thickness of 0.25 μm was used.

Helium was used as the carrier gas and was regulated using a ramped flow rate program. The identity and subsequent retention time of each PAH was confirmed by the use of a calibration standard which contained known concentrations of the surrogate compounds, internal standard compounds, and all of the PAH compounds of interest in this study. The mass of each PAH was determined by isotopic dilution with a series of internal standards added to the samples prior to instrumental analysis. Other details can be found in Gigliotti et al. [18].

Quality Assurance. Deuterated PAH surrogate standards were added to XAD-2 (water) samples in the field prior to sampling and added to QFF, PUF, XAD-2 (precipitation) and GFF samples prior to extraction in the laboratory. D_{10}-anthracene (average recovery 82 %; range: 59 – 96%) was used to correct all concentrations of PAHs with molecular weights from 166 (fluorene) to 198 g mol^{-1} (methyldibenzothiophenes) for surrogate recoveries. D_{10}-fluoranthene (average recovery 78%; range: 53 – 89%) was used to correct all concentrations of PAHs from molecular weight of 202 (fluoranthene) to 252 g mol^{-1} (benzo[*b*+*k*]fluoranthene). D_{10}-benzo[*e*]pyrene (average recovery 86%; range: 52 – 100%) was used to correct all concentrations of PAHs from 252 (benzo[*e*]pyrene) to 300 g mol^{-1} (coronene).

Laboratory blank masses for PUFs and QFFs accounted for only 0.2 to 9.3% of the total PAH (36 compounds) mass in air samples and only 0.2 to 1.2% for GFFs. Laboratory blank masses were subtracted from sample masses to remove the contribution of contamination occurring in the laboratory. There was no laboratory blank mass correction for the XAD-2 samples.

Method detection limits were defined as the average mass in the site-specific field blanks plus three standard deviations and are reported as follows: 0.0002 (cyclopenta[*cd*]pyrene) to 0.092 ng m^{-3} (benz[*a*]anthracene) for gas phase PUFs at LS, and 0.0003 (cyclopenta[*cd*]pyrene) to 0.016 ng m^{-3} (phenanthrene) for SH. Individual QFF method detection limits ranged from 0.0002 (naphthacene) to 0.036 ng m^{-3} (phenanthrene) for LS and from 0.0005 (benzo[*b*]naphtho[*2,1-d*]thiophene) to 0.0077 ng m^{-3} (phenanthrene) for SH. Method detection limits for the HE water samples ranged from: 0.0006 (naphthacene) to 0.22 ng L^{-1} (fluorene) for XAD-2 samples and 0.0002 (naphthacene) to 0.063 ng L^{-1} (1-methylfluorene) for GFFs.

Calculations. Air-water exchange. The direction and magnitude of the gas transfer of PAHs across the air –water interface of the HE were calculated using a modified [20] two-layer resistance model. This model as previously described in [7,21,22] is applied here.

The overall flux calculation is defined by:

$$F = K_{OL}\left(C_{diss} - \frac{C_{gas}}{H'}\right) \tag{1}$$

where F is the flux (ng m^{-2} day^{-1}), K_{OL} (m day^{-1}) is the overall mass transfer coefficient and (C_{diss}-C_{gas}/H') describes the concentration gradient (ng m^{-3}) The concentration gradient is calculated as C_{diss} (ng m^{-3}), the dissolved phase concentration of the compound in water, subtracted by C_{gas} (ng m^{-3}), the gas phase concentration of the compound in air, which is divided by the dimensionless Henry's Law Constant, H'. The H' value is calculated as H/RT, where R is the universal gas constant (8.314 Pa m^3 K^{-1} mol^{-1}), H is the temperature and salinity-corrected Henry's Law Constant (Pa m^3 mol^{-1}), and T is the absolute temperature at the air-water interface (K).

The overall mass transfer coefficient, K_{OL}, is calculated as the resistance to transfer across the water layer and the air layer and quantified as:

$$\frac{1}{K_{OL}} = \frac{1}{k_{water}} + \frac{1}{k_{air}H'} \tag{2}$$

The mass transfer coefficients (k_{water} and k_{air}) have been empirically defined based upon experimental studies using tracer gases [23-30] and converted to values for PAHs using differences in diffusivities. The magnitude of K_{OL} for individual PAHs ranges from 0.05 to 0.7 m day^{-1} in this study.

Wanninkhof and McGillis [31] recently established a cubic relationship for describing the effect of wind speed on k_{water}, an update of the relationships established by [32] and [33]. The cubic relationship is a better predictor of field data from [31] for higher wind speed conditions

(>6 m s^{-2}). Because wind speeds were consistently less than 6 m s^{-1} in this study, the quadratic relationship shown in Equation 3 was applied here.

$$k_{water,PAH} = 0.45 u_{10}^{1.64} \left(\frac{SC_{PAH}}{600} \right)^{-0.5} \quad (3)$$

In this relation, u_{10} is the wind speed (m s^{-1}) taken at a height of 10 meters, SC is the Schmidt number for each PAH, and 600 represents the Schmidt number for CO_2 at 20°C. The calculations of k_{water} and k_{air} are further discussed in [22] and [21].

Henry's Law constants. The Henry's law constants and ΔH_H values of Bamford et al. [34] for 8 PAHs were used. The ΔH_H reported were greater than ΔH_{vap} for benz[*a*]anthracene and chrysene which seems anomalous. Thus for these two PAHs, as well as all of the other PAHs not investigated by Bamford et al. [34], ΔH_H was calculated as the difference between the enthalpy of vaporization (ΔH_{vap}) and the excess free enthalpy of dissolution (ΔH_{excess}) of the compound [35]. ΔH_{vap} was calculated from boiling point and the entropy of vaporization (ΔS_{vap}) which is calculated using the Kistiakowsky relationship [35]. ΔH_{excess} is calculated from the enthalpy of dissolution (ΔH_{sol}) by subtracting the enthalpy of fusion (melting) (ΔH_F). ΔH_{sol} measured for 12 PAHs [36] were used to develop a correlation between ΔH_{sol} and boiling point ($r^2 = 0.91$) which was then used to estimate ΔH_{sol} for the other PAHs. The PAH Henry's Law constants at 25°C (corrected for salinity via the Setschenow relationship [35]) and their temperature dependencies are presented in Table 1.

Colloidal influence. Partitioning between the dissolved and the particulate phases in water is modeled as:

$$K_p = \frac{C_{part}}{C_{diss} TSM} \quad (4)$$

where C_{part} is the concentration of PAH on aquatic particles (ng L^{-1}), C_{diss} is the concentration of PAH in the dissolved phase (ng L^{-1}), and TSM represents the total suspended particulate matter in the water column (kg L^{-1}). Colloidal organic matter can by-pass the GFF to be captured by the XAD-2 resin where the PAHs associated with colloids are therefore incorrectly quantified as part of C_{diss} [37-39]. To determine the extent to which colloidal matter affects PAH partitioning in the water column, log K_{ow} was plotted against log K_{oc} for all water samples (Fig. 2). Normalizing K_p to the fraction of organic carbon (f_{oc}) gives the organic carbon normalized partition coefficient K_{oc}. The relationship of K_{ow} and K_{oc} is described by:

$$\log K_{oc} = \log \frac{K_p}{f_{oc}} = a \log K_{ow} + b \qquad (5)$$

Theoretically, the slope of Equation 5 should be approximately equal to 1 if partitioning is at equilibrium [40-42]. In Figure 2, the regression line based upon the relationship proposed by Karickhoff [43] for the estimation of K_{oc} is also shown. The values of log K_{ow} were taken from references [44,45]. The Karickhoff relationship underpredicts the observed K_{oc} values by approximately one order of magnitude in some cases. The measured slopes are not statistically different from 1 ($p < 0.05$) showing that the dissolved – particle interactions for PAHs in the water column are apparently at or near equilibrium and a correction is unwarranted.

Sorption of PAHs to soot particles is stronger than with natural organic matter [46]. The inherent assumption regarding the approach in Equation 5 is that PAHs are bound only to the natural OC. PAH partitioning in the water may also be affected by the soot fraction of the solid matrix (f_{sc}). If sorption to soot carbon (*SC*) is important, K_d must be modified to incorporate the fraction of SC (f_{sc}) and the soot carbon-normalized partition coefficient (K_{sc}) [46]:

$$K_d = f_{oc} K_{oc} + f_{sc} K_{sc} \qquad (6)$$

Because the fractional content of *SC* on aquatic particles in the HE was not measured, this modified K_d cannot be quantified. Some qualitative judgements can be made, however. Analogous to the analysis done by Dachs and Eisenreich [47], where the ratio $f_{sc}K_{sc}/f_{oc}K_{oc}$ is lower than five, organic matter predominates as the sorption phase. Since K_{sc} values for PAHs are more than one order of magnitude higher than K_{oc} [46], this can only happen when f_{oc} is much higher than f_{sc}. The high organic matter content in the water column that was measured during July 5-7 may be consistent with this scenario. In effect, during this period of time, the correlations found between log K_{oc} and log K_{ow}, in addition to giving a slope close to unity, provide intercepts close to zero. This is consistent with sorption to organic matter dominating the water-particle partitioning.

Atmospheric loading estimates. A comparison of the magnitudes of the dry particle depositional, wet depositional, and air-water diffusive gas fluxes was performed to assess their relative importance to the total atmospheric loading to the water.

Dry deposition. Dry deposition flux, F_{dry} (ng m^{-2} day^{-1}), was calculated by multiplying the concentration of PAHs on atmospheric particles, $C_{a,part}$ (ng m^{-3}) by a particle settling velocity, υ_d (cm day^{-1}).

$$F_{dry} = C_{a,part}\upsilon_d \times 10^{-2} \quad (7)$$

Particle settling velocities depend on a number of factors including wind speed, atmospheric stability, relative humidity, particle characteristics (diameter, shape, and density), and receptor surface characteristics [3,12,48,49]. Recent studies on dry particle deposition to surrogate surfaces and derived from atmospheric particle size distributions and micrometeorology suggest that a υ_d equal to about 0.5 cm s^{-1} is applicable to urban-industrial regions such as the HE [3,50-52].

Wet deposition. Wet deposition flux, F_{wet} (ng m^{-2} day^{-1}) is calculated by multiplying the volume weighted mean concentration of the PAH compound in rainwater, C_R (ng L^{-1}), by the precipitation flux, P (2.14 L m^{-2} day^{-1}).

$$F_{wet} = \Sigma C_R \times P \quad (8)$$

The volume weighted mean PAH concentrations of all 12-day integrated rain samples (n=6) taken in summer 1998 (June, July, and August) at the coastal SH site were chosen to represent the summer signal.

Volatilization and Absorptive air-water fluxes. The gross volatilization (F_{vol}) and gross absorption (F_{abs}) fluxes (ng m^{-2} day^{-1}) are calculated as:

$$F_{vol} = K_{OL} C_w \tag{9}$$

$$F_{abs} = K_{OL} \frac{C_a}{H'} \tag{10}$$

The net diffusive gas exchange flux is then calculated by subtracting the gross absorption flux from the gross volatilization flux. A positive (+) flux indicates net volatilization out of the water column and negative (-) flux indicates net absorption into the water column.

RESULTS AND DISCUSSION

Spatial variability of atmospheric PAH concentrations. The average and range of 36 gaseous and particulate phase PAH concentrations at each of the sampling sites for the July field experiment are presented in Tables 2 and 3, respectively. The highest gas phase PAH concentrations were measured at the urban LS (Jersey City, New Jersey) where concentrations were about 2x those observed at the SH coastal site. Paired *t*-tests for individual gas-phase PAHs (MW:166-300 g mol^{-1}), showed that concentrations at SH were statistically lower than those at LS ($p<0.05$) with the exception of the high molecular weight (>234 g mol^{-1}) PAHs: benzo[*e*]pyrene, benzo[*a*]pyrene, benzo[*b*+*k*]fluoranthene and benzo[*b*]naphtho[*2,1-d*]thiophene, which were comparable.

There was no significant statistical difference between the particulate PAH concentrations at the LS and the SH sites (paired *t*-test, $p<0.05$). However, the PAHs with the largest difference in concentration between the urban and coastal sites were those PAHs associated predominantly with the particle phase. These may be preferentially lost by dry deposition during transport away from urban areas. Comparative statistical analyses for the two over-water sites were not performed due to the small number of samples available.

The highest PAH concentrations at SH occurred on the nights of 5 July and 7 July when winds blew from the N and N/NE from the heavily populated Long Island and New York City area. The high concentrations on 7 July corresponded to winds from the S/SW along the local residential coastal area and regional transport from the Mid-Atlantic Corridor. Concentrations on 10 July were lower than expected, because the winds came directly from the urban/industrial area (LS) approximately 25 km NW of SH. Wind speeds measured on 10 July were the highest of all previous days during the intensive affecting the magnitude of air-water exchange and dry depositional fluxes as well as diluting emissions.

Spatial variability of aquatic PAH concentrations. Both the dissolved and particulate phase PAH concentrations in water were higher in New York Harbor than in Raritan Bay (Table 4). Dissolved phase PAH concentrations ranged from below detection limits at both sites for the higher molecular weight compounds (>234 g mol^{-1}) to 16 ng L^{-1} for pyrene in the New York Harbor. Particulate phase PAH concentrations ranged from 0.021 ng L^{-1} for benzo[*b*]naphtho[*2,1-d*]thiophene in Raritan Bay to 11 ng L^{-1} for benzo[*b*+*k*]fluoranthene in New York Harbor. This is primarily due to the closer proximity of New York Harbor to the New Jersey urban/industrial complex and metropolitan New York City. Although both water bodies are impacted by PAH emissions from urban-industrial activities in the New York-New Jersey metropolitan area, the higher atmospheric concentrations measured at the LS in Jersey City provides a larger atmospheric loading source to the adjacent New York Harbor than to the Raritan Bay, located further southeast.

PAH profile distributions. PAH concentration profiles of the air particulate and gas phases, the water particulate and dissolved phases, and sediments [53] (Fig. 3) are compared to assess the linkages between compartments. The PAH profiles represent the mean PAH concentrations of the 3 days of simultaneous air and water samples taken aboard the R/V *Walford* in the Raritan Bay.

The gas and dissolved phase concentration profiles were statistically similar (r^2=0.90, *p*-value<0.01) suggesting that the air and water compartments are closely coupled. The air and water particulate phase concentration profiles (all PAHs: r^2=0.70, p<0.01) were also statistically similar for the low and medium (MW= 166 to 234 g mol^{-1}) molecular weight PAHs (r^2=0.86, p<0.01). However, the higher molecular weight (MW >234 g mol^{-1}) PAHs displayed less similarity (r^2=0.58, p<0.01) suggesting that additional sources beyond dry particle deposition of high molecular weight PAHs contribute to the water column inventory.

The sediment profile [53] and the water particulate phase profile exhibited relatively higher contributions of perylene than the atmospheric particulate phase profile. Particulate perylene represents 5.0% of ΣPAHs in the water column, whereas it accounted for only 0.12% in the air particulate phase. Removing the influence of perylene, the r^2 between the air and water particulate profiles increases to 0.75 (p<0.01). Atmospheric deposition of perylene alone therefore could not support the measured concentrations in the water column and the sediment is suggested as a source.

Venkatesan et al. [54] and Dachs et al. [55] attribute higher relative concentrations of perylene in estuarine and marine sediments rich in biological activity such as the HE to in-situ diagenetic processes. Resuspension of perylene-rich sediment likely accounts for the high concentrations of perylene measured in the water column. The relative abundances of other high molecular weight PAHs in the sediments are consistent with atmospheric deposition as a major contributor.

Air-Water Exchange. To test the applicability of applying coastal air data to the calculation of air-water exchange fluxes [4,6,14], a direct comparison of using shore-based versus over-water air samples was performed, applying the same water concentrations in both calculations.

Atmospheric samples were collected simultaneously over-water and over-land at nearby coastal sites. The atmospheric gas phase PAH profiles over-land at SH and over-water in the Raritan Bay are statistically similar for all days (p<0.05); however the magnitude of the concentrations are different. All medium molecular weight PAHs (MW: 200-234 g mol^{-1}) exhibit concentrations that are greater over-land than over-water by as much as an order of magnitude.

Conversely, the majority of the lower molecular weight PAHs (MW: < 200 g mol^{-1}) are higher over-water than over-land implicating a water contribution. The air-water exchange fluxes corresponding to use of over-land air data at SH and over-water air data on 7 July 1998 are weakly correlated (r^2=0.27, p>0.01). (Fig. 4A). The use of the over-land air data yielded a reversal in the direction of the actual flux (obtained using over-water air samples) for some PAHs. Application of coastal air data also led to an over-estimation of the magnitude of the phenanthrene, pyrene, and benzo[*a*]pyrene fluxes by approximately 2x and by more than a factor of 6 for the methylphenanthrenes.

The over-land air concentrations at the LS site were higher than those measured over-water in New York Harbor by a factor of 2 for most PAHs with the exception of the thiophenic PAHs and fluorene for the morning of 10 July 1998. In the afternoon, concentrations over-water were higher than those measured over-land for all PAHs except cyclopenta[*cd*]pyrene. Overall, the flux profile (Fig. 4B) using shore-based data from LS showed differences from over-water measurements from the ship stationed in New York Harbor for the 10 July 1998 afternoon (r^2=0.46; p<0.01) sample. The calculation of air-water exchange fluxes using the shore-based air data yielded a net volatilization flux for phenanthrene and the methylphenanthrenes, whereas the direction of flux based on over-water measurements was net depositional.

Although coastal data agreed with the air-water fluxes for a few PAHs, the discrepancies for other PAHs preclude any potential predictive ability. The same conclusion was reached in a study of PCBs performed in Green Bay, Lake Michigan [56]. Because shore-based air concentrations cannot yield accurate air-water exchange fluxes, simultaneous air and water samples taken over-water are used exclusively for the estimation of air-water exchange fluxes in this study.

Table 5 shows the air-water exchange fluxes for three air and water sample pairs taken simultaneously in Raritan Bay on July 5- 7 and a morning and afternoon sample taken in New York Harbor on July 10. The larger magnitudes of the air-water fluxes from New York Harbor samples are driven by both higher PAH concentrations in the air and water and higher wind speeds. In both the New York Harbor and Raritan Bay samples, the majority of PAHs have a net volatilization flux, showing that the HE acts as a source of PAHs to the air in the summer. Other studies confirm that the water column contributes to the PAH burden in the atmosphere particularly during the summer months [7,8,57]. However, four of the five samples from the HE have net absorptive fluxes for phenanthrene and the methylated phenanthrenes. The high atmospheric phenanthrene and methylphenanthrenes concentrations in the New York/ New Jersey coastal region drive the direction of the flux from the air to the water.

Table 5 also compares the summer air-water exchange fluxes calculated for the HE (July, 1998) to those in Chesapeake Bay (June, 1993) [7] and in the Patapsco River, a sub-estuary of the Chesapeake Bay (June, 1996) [58]. Similar to New York Harbor, these systems exhibit net absorptive fluxes for phenanthrene. The magnitudes of the net phenanthrene fluxes are also similar between the three locations. In contrast to these data sets, Chesapeake Bay exhibits net absorptive fluxes for all of the PAHs listed.

Comparison of atmospheric depositional processes. Figure 5 shows that gas phase absorption dominates the total PAH inputs to the Harbor Estuary for the low to medium molecular weight PAHs (MW: < 234 g mol^{-1}) in summer. As molecular weight increases, wet and dry depositional fluxes contribute proportionately more, reflecting the higher proportion of PAHs on particles. The wet flux also increases with molecular weight, because rain droplets are efficient scavengers of particles. Particle scavenging is especially important for PAHs with 4 or more rings [59].

The importance of volatilization as a removal process relative to advection of PAHs out of the water column of the HE can be assessed by comparing the residence times of dissolved phase PAHs in the water column reflecting only air-water fluxes versus the residence time of water in the estuary. The residence time of PAHs in the water column ($\tau_{A/W}$) considering only dissolved phase PAHs that are subject to air-water exchange is given by:

$$\tau_{A/W} = \frac{Inventory}{VolatilizationFlux} = \frac{C_{water} \times V_{water}}{F_{vol} \times A} \tag{11}$$

where the inventory is represented by, C_{water} which is the concentration of PAH in water and the volume (m^3) of water in the HE (V_{water}) and the volatilization flux in ng m^{-2} day^{-1} is extrapolated over the surface area (m^2) of the HE (A). The residence time of the water in the summer months calculated as total volume of the HE divided by the average summer freshwater advective flow rate is about 35 days [60]. For individual PAHs, $\tau_{A/W}$ ranges from 19 to 136 days suggesting that advection of PAHs is at least as important a removal mechanism as volatilization. Degradation in the water column may be also a significant sink of PAHs in the HE.

Although volatilization out of the water column is a source of PAHs to the air in the summer, the magnitude of PAH volatilization in the HE is overwhelmed by continuous anthropogenic emissions in the New York-New Jersey metropolitan area as evidenced by the higher PAH concentrations measured over land.

Impact of over-water volatilization on downwind sites. To assess the impact of the over-water volatilization fluxes of PAHs, an analysis of three PAH atmospheric profiles from simultaneous samples was performed: one taken over-water in New York Harbor, one taken upwind in the urban/industrial area (LS, Jersey City), and one at the coastal SH site downwind. On the morning of 10 July 1998, the winds came out of the NW bringing air masses from over urban/industrial site toward the ship and finally toward the coastal SH site.

If volatilization of PAHs represents a significant loading to the air over the HE, then the over-water profile should demonstrate a proportionate increase in the concentrations of low to medium molecular weight PAHs in the gas phase. However, the relative PAH profiles are statistically identical ($r^2 > 0.96$) between the three sites, suggesting that the downwind profiles represent a dilution of the urban/industrial signal at LS. No increase in low to medium molecular weight PAHs is observed. PAH concentrations in the air over the estuary are controlled by emissions from urban/industrial areas, not dominated by volatilization from the water in the summer. In the winter months, conditions such as lower temperatures and increased PAH emissions may cause a change in the direction of the flux such that the air may support the dissolved phase concentrations in the HE. Anthropogenic emissions dominate PAH loading to the regional atmosphere throughout the year.

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FIGURE LEGENDS

Figure 1. Map of the New Jersey Atmospheric Deposition Network (NJADN) sampling sites, USA. Squares represent NJADN sampling stations.

Figure 2. Relationship between the log octanol-water partition coefficient (K_{ow}) and log organic carbon-water partition coefficient (K_{oc}) for polycyclic aromatic hydrocarbons (PAHs) in the New York-New Jersey Harbor Estuary, USA by date.

Figure 3. Mean polycyclic aromatic hydrocarbon (PAH) concentration profiles in the air (gas, ng/m^3, and particle phases, ng/g), water (dissolved, ng/L, and particle phases, ng/g), and sediment [53], ng/g, of Raritan Bay, USA. Error bars represent ± 1 SD. Asterisks represent unavailable data.

Abbreviations are as follows: fluorene (FLUOR), phenanthrene (PHEN), anthracene (ANTHRAC), 1-methylfluorene (1MeFLUOR), dibenzothiophene (DBT), 4,5-methylenephenanthrene (4,5MePHEN), methylphenanthrenes (MePHENs), methyldibenzothiophenes (MeDBTs), fluoranthene (FLANT), pyrene (PYR), 3,6-dimethylphenanthrene (3,6DMPHEN), benzo[*a*]fluorene (B[a]FLUOR), benzo[*b*]fluorene (B[b]FLUOR), retene (RET), benzo[*b*]naphtho[*2,1-d*]thiophene (BNT), cyclopenta[*cd*]pyrene (CPcdP), benz[*a*]anthracene (B[a]A), chrysene (CHRY), napthacene (NAPTHA), benzo[*b+k*] fluoranthene (B[bk]FLANT), benzo[*e*]pyrene (B[e]P), benzo[*a*]pyrene (B[a]P), perylene (PERYL), indeno[*1,2,3cd*]pyrene (INDENO), benzo[*g,h,i*]perylene (B[ghi]P), dibenzo[*ah+ac*]anthracene (DBA), coronene (COR).

Figure 4. Comparison of polycyclic aromatic hydrocarbon (PAH) net air-water exchange fluxes based on either over-land or over-water air concentrations. A: Fluxes (ng/m^2 day) using Sandy Hook, USA (shore-based) air data compared to (over-water) air data for Raritan Bay, USA. B:

Fluxes (ng/m^2 day) using Liberty Science Center (shore-based) air data to (over-water) air data from New York Harbor, USA.

Figure 5. The relative importance of dry particle deposition, wet deposition, and gross absorption of polycyclic aromatic hydrocarbons (PAHs) to total atmospheric deposition in the New York-New Jersey Harbor Estuary, USA.

Table 1. Henry's Law constant values at 25°C (298K) and corresponding temperature dependencies (ΔH_H)[a]
($\ln H_2 = \ln H_{298K} + (1/298 - 1/T_2) * \Delta H/R$)

PAH	*Henry's Law Constant (H_{298K}) ($Pa\ m^3\ mol^{-1}$) at 25°C*	*Temperature Dependency (ΔH_H) ($kJ\ mol^{-1}$)*
Fluorene	9.8	48.8
Phenanthrene	4.3	47.3
Anthracene	5.6	46.8
1Methylfluorene	7.3	34.8[b]
Dibenzothiophene	5.7	34.6[b]
4,5-Methylenephenanthrene	4.1	34.2[b]
Methylphenanthrenes	2.2	33.6[b]
Methyldibenzothiophenes	4.6	34.3
Fluoranthene	2.0	38.7
Pyrene	1.7	42.9
3,6-Dimethylphenanthrene	4.2	34.2[b]
Benzo[a]fluorene	2.7	34.2
Benzo[b]fluorene	1.8	33.4[b]
Retene	2.1	33.5[b]
Benzo[b]naphtho[2,1-d]thiophene	1.7	33.3[b]
Cyclopenta[cd]pyrene	1.4	33.1[b]
Benz[a]anthracene	1.2	30.9[b]
Chrysene/Triphenylene	0.53	35.1[b]

a. all values from [34] except where noted
b. calculated

Table 2. Gas phase PAH concentrations (ng m^{-3}) measured in the New York-New Jersey coastal atmosphere during the summer field experiment July 1998.

PAH	*Liberty Science Center (Over-Land) (n=12) average (range)*	*Sandy Hook (Over-Land) (n=13) average (range)*	*Raritan Bay (Over-Water) (n=3) average (range)*	*New York Harbor (Over-Water) (n=2) average (range)*
Fluorene	3.7 (0.45 - 11)	1.9 (0.10 - 6.3)	0.61 (0.37 - 0.99)	3.2 (1.8 - 4.7)
Phenanthrene	16 (3.4 - 34)	5.3 (0.74 - 13)	3.3 (2.3 - 4.1)	14 (14 - 15)
Anthracene	0.54 (0.038 - 1.4)	0.067 (0.023 - 0.17)	0.050 (0.0007 - 0.12)	0.55 (0.45 - 0.64)
1Methylfluorene	1.6 (0.19 - 3.7)	0.67 (0.16 - 1.7)	1.2 (0.48 - 2.5)	0.98 (0.69 - 1.3)
Dibenzothiophene	1.3 (0.20 - 3.7)	0.54 (0.069 - 1.4)	0.37 (0.32 - 0.41)	1.8 (1.5 - 2.0)
4,5-Methylenephenanthrene	1.3 (0.21 - 2.3)	0.31 (0.056 - 0.66)	0.36 (0.27 - 0.50)	1.2 (1.0 - 1.3)
Methylphenanthrenes	12 (1.7 - 25)	5.0 (0.74 - 19)	5.5 (2.8 - 11)	9.8 (9.4 - 10)
Methyldibenzothiophenes	0.86 (0.24 - 1.6)	0.65 (0.26 - 2.1)	0.45 (0.26 - 0.78)	1.4 (1.1 - 1.7)
Fluoranthene	3.6 (0.59 - 10)	0.80 (0.12 - 1.8)	0.52 (0.30 - 0.82)	2.5 (2.3 - 2.6)
Pyrene	1.6 (0.33 - 4.3)	0.41 (0.13 - 0.71)	0.33 (0.25 - 0.47)	1.1 (0.88 - 1.2)
3,6-Dimethylphenanthrene	0.77 (0.096 - 1.6)	0.19 (0.050 - 0.39)	0.51 (0.10 - 1.3)	0.43 (0.31 - 0.55)
Benzo[a]fluorene	0.18 (0.030 - 0.64)	0.033 (0.0044 - 0.068)	0.056 (0.018 - 0.12)	0.055 (0.037 - 0.073)
Benzo[b]fluorene	0.049 (0.0047 - 0.21)	0.0063 (0.0014 - 0.014)	0.013 (0.0016 - 0.028)	0.036 (0.012 - 0.061)
Retene	0.067 (0.014 - 0.12)	0.051 (0.013 - 0.11)	0.042 (0.011 - 0.091)	0.052 (0.044 - 0.059)
Benzo[b]naphtho[2,1-d]thiophene	0.0003 (det limit)	0.017 (0.0007 - 0.081)	0.010 (0.0091 - 0.011)	0.091 (0.026 - 0.16)
Cyclopenta[cd]pyrene	0.022 (0.0018 - 0.052)	0.0003 (det limit)	0.0007 (det limit)	0.0007 (det limit)
Benz[a]anthracene	0.092 (det limit)	0.0016 (det limit)	0.0024 (0.0016 - 0.0040)	0.0016 (det limit)
Chrysene/Triphenylene	0.034 (0.0013 - 0.086)	0.011 (det limit)	0.035 (0.0098 - 0.072)	0.043 (0.021 -0.065)
Naphthacene	0.0005 (det limit)	0.0013 (det limit)	0.0013 (det limit)	0.0013 (det limit)
Benzo[b+k]fluoranthene	0.0015 (0.0014 - 0.0017)	0.0024 (0.0016 - 0.0068)	0.0029 (0.0016 - 0.0056)	0.0016 (det limit)
Benzo[e]pyrene	0.0016 (det limit)	0.0033 (0.0024 - 0.0098)	0.0022 (0.0018 - 0.0024)	0.0024 (det limit)
Benzo[a]pyrene	0.0016 (det limit)	0.0019 (0.0019 - 0.0020)	0.0018 (0.0016 - 0.0019)	0.0019 (det limit)
Perylene	0.0019 (det limit)	0.0016 (det limit)	0.0016 (det limit)	0.0016 (det limit)
Indeno[1,2,3-cd]pyrene	0.0025 (det limit)	0.0015 (det limit)	0.0015 (det limit)	0.0015 (det limit)
Benzo[g,h,i]perylene	0.0019 (det limit)	0.0011 (0.0010 - 0.0013)	0.0010 (det limit)	0.0010 (det limit)
Dibenzo[a,h+a,c]anthracene	0.0023 (det limit)	0.0017 (det limit)	0.0017 (det limit)	0.0017 (det limit)
Coronene	0.0026 (det limit)	0.0013 (det limit)	0.0013 (det limit)	0.0013 (det limit)

Table 3. Particle phase PAH concentrations (ng m^{-3}) measured in the New York-New Jersey coastal atmosphere during the summer field experiment July 1998.

PAH	*Liberty Science Center (Over-Land) (n=12) average (range)*	*Sandy Hook (Over-Land) (n=13) average (range)*	*Raritan Bay (Over-Water) (n=3) average (range)*	*New York Harbor (Over-Water) (n=2) average (range)*
Fluorene	0.033 (0.010-0.066)	0.030 (0.0028 - 0.14)	0.010 (0.0049 - 0.018)	0.014 (0.013 - 0.015)
Phenanthrene	0.18 (0.036 - 0.49)	0.14 (0.010 - 1.1)	0.062 (0.027 - 0.11)	0.14 (0.11 - 0.17)
Anthracene	0.029 (0.022 - 0.076)	0.038 (0.0025 - 0.21)	0.0098 (0.0055 - 0.015)	0.024 (0.024 - 0.024)
1Methylfluorene	0.019 (0.011 - 0.040)	0.018 (0.0033 - 0.076)	0.018 (0.0085 - 0.025)	0.030 (0.029 - 0.030)
Dibenzothiophene	0.017 (0.018 - 0.041)	0.019 (0.0013 - 0.14)	0.0066 (0.0053 - 0.0074)	0.014 (0.012 - 0.015)
4,5-Methylenephenanthrene	0.024 (0.018 - 0.058)	0.023 (0.0016 - 0.14)	0.0082 (0.0038 - 0.015)	0.018 (0.014 - 0.022)
Methylphenanthrenes	0.29 (0.077 - 0.74)	0.37 (0.058 - 1.0)	0.11 (0.076 - 0.14)	0.17 (0.12 - 0.23)
Methyldibenzothiophenes	0.018 (0.0038 - 0.036)	0.029 (0.0048 - 0.094)	0.015 (0.0069 - 0.027)	0.018 (0.012 - 0.024)
Fluoranthene	0.18 (0.013 - 0.42)	0.086 (0.0070 - 0.26)	0.074 (0.025 - 0.14)	0.15 (0.11 - 0.20)
Pyrene	0.14 (0.021 - 0.34)	0.098 (0.014 - 0.23)	0.060 (0.029 - 0.098)	0.10 (0.063 - 0.14)
3,6-Dimethylphenanthrene	0.028 (0.0088 - 0.072)	0.036 (0.0076 - 0.11)	0.0095 (0.0079 - 0.011)	0.016 (0.014 - 0.017)
Benzo[a]fluorene	0.052 (0.0057 - 0.12)	0.033 (0.0051 - 0.090)	0.015 (0.0059 - 0.023)	0.027 (0.021 - 0.033)
Benzo[b]fluorene	0.015 (0.0001 - 0.030)	0.010 (0.0015 - 0.029)	0.0045 (0.0023 - 0.0072)	0.0091 (0.0052 - 0.013)
Retene	0.022 (0.010 - 0.033)	0.030 (0.0055 - 0.098)	0.021 (0.014 - 0.031)	0.022 (0.021 - 0.023)
Benzo[b]naphtho[2,1-d]thiophene	0.039 (0.0009 - 0.16)	0.026 (0.0005 - 0.27)	0.014 (0.011 - 0.018)	0.099 (0.019 - 0.18)
Cyclopenta[cd]pyrene	0.020 (0.010 - 0.040)	0.044 (0.0044 - 0.15)	0.0023 (0.0005 - 0.0053)	0.022 (0.010 - 0.034)
Benz[a]anthracene	0.84 (0.0014 - 0.21)	0.021 (0.0015 - 0.087)	0.013 (0.0059 - 0.025)	0.033 (0.020 - 0.046)
Chrysene/Triphenylene	0.19 (0.014 - 0.55)	0.11 (0.0017 - 0.27)	0.060 (0.018 - 0.089)	0.092 (0.048 - 0.14)
Naphthacene	0.0002 (det limit)	0.0022 (det limit)	0.0022 (det limit)	0.0022 (det limit)
Benzo[b+k]fluoranthene	0.22 (0.0052 - 0.50)	0.10 (0.0047 - 0.33)	0.11 (0.033 - 0.19)	0.13 (0.065 - 0.19)
Benzo[e]pyrene	0.12 (0.012 - 0.22)	0.080 (0.012 - 0.23)	0.078 (0.025 - 0.13)	0.090 (0.060 - 0.12)
Benzo[a]pyrene	0.056 (0.0018 - 0.17)	0.030 (0.0027 - 0.093)	0.021 (0.0085 - 0.035)	0.043 (0.032 - 0.054)
Perylene	0.015 (0.0011 - 0.057)	0.012 (0.0009 - 0.033)	0.0013 (0.0009 - 0.0019)	0.0009 (det limit)
Indeno[1,2,3-cd]pyrene	0.16 (0.0095 - 0.34)	0.095 (0.0021 - 0.31)	0.063 (0.011 - 0.098)	0.050 (0.046 - 0.053)
Benzo[g,h,i]perylene	0.15 (0.0052 - 0.26)	0.077 (0.0042 - 0.24)	0.048 (0.016 - 0.078)	0.056 (0.031 - 0.082)
Dibenzo[a,h+a,c]anthracene	0.025 (0.0025 - 0.073)	0.018 (0.0024 - 0.063)	0.0054 (0.0032 - 0.0082)	0.017 (0.0056 - 0.028)
Coronene	0.13 (0.0042 - 0.27)	0.066 (0.0035 - 0.22)	0.023 (0.0065 - 0.038)	0.029 (0.017 - 0.040)

Table 4. Dissolved and particulate phase PAH concentrations (ng L^{-1}) measured in the NY-NJ Harbor estuary during the summer field experiment July 1998.

Dissolved Phase PAHs *- indicates below detection limit	*Raritan Bay 7/5/98*	*Raritan Bay 7/6/98*	*Raritan Bay 7/7/98*	*New York Harbor 7/10/98 morning*	*New York Harbor 7/10/98 afternoon*
Fluorene	0.76	0.80	0.59	2.2	2.6
Phenanthrene	0.92	2.4	1.9	5.6	5.5
Anthracene	0.21	0.23	0.20	0.86	1.6
1Methylfluorene	0.65	0.65	0.65	1.2	1.3
Dibenzothiophene	0.14	0.33	0.26	0.77	0.76
4,5-Methylenephenanthrene	0.65	0.96	0.58	4.3	6.2
Methylphenanthrenes	0.99	4.3	3.4	9.4	9.0
Methyldibenzothiophenes	0.24	0.92	0.55	1.9	0.99
Fluoranthene	0.45	1.7	0.78	9.7	14
Pyrene	0.40	1.4	0.73	10	16
3,6-Dimethylphenanthrene	0.099	0.43	0.25	1.0	1.0
Benzo[a]fluorene	0.11	0.40	0.19	3.4	5.6
Benzo[b]fluorene	0.029	0.12	0.048	1.2	2.0
Retene	0.083	0.26	0.19	0.64	0.62
Benzo[b]naphtho[2,1-d]thiophene	0.0057*	0.0057*	0.0057*	0.0057*	0.0057*
Cyclopenta[cd]pyrene	0.0040*	0.0040*	0.0040*	0.012	0.080
Benz[a]anthracene	0.019	0.065	0.030	0.83	1.6
Chrysene/Triphenylene	0.097	0.24	0.13	1.5	2.4
Naphthacene	0.0007*	0.0007*	0.0007*	0.0007*	0.0007*
Benzo[b+k]fluoranthene	0.063*	0.063*	0.063*	0.49	0.80
Benzo[e]pyrene	0.066*	0.066*	0.066*	0.066*	0.066*
Benzo[a]pyrene	0.011*	0.011*	0.011*	0.011*	0.011*
Perylene	0.018*	0.018*	0.018*	0.018*	0.018*
Indeno[1,2,3-cd]pyrene	0.017*	0.017*	0.017*	0.017*	0.017*
Benzo[g,h,i]perylene	0.0032*	0.0032*	0.0032*	0.0032*	0.0032*
Dibenzo[a,h+a,c]anthracene	0.0083*	0.0083*	0.0083*	0.0083*	0.0083*
Coronene	0.0027*	0.0027*	0.0027*	0.0027*	0.0027*

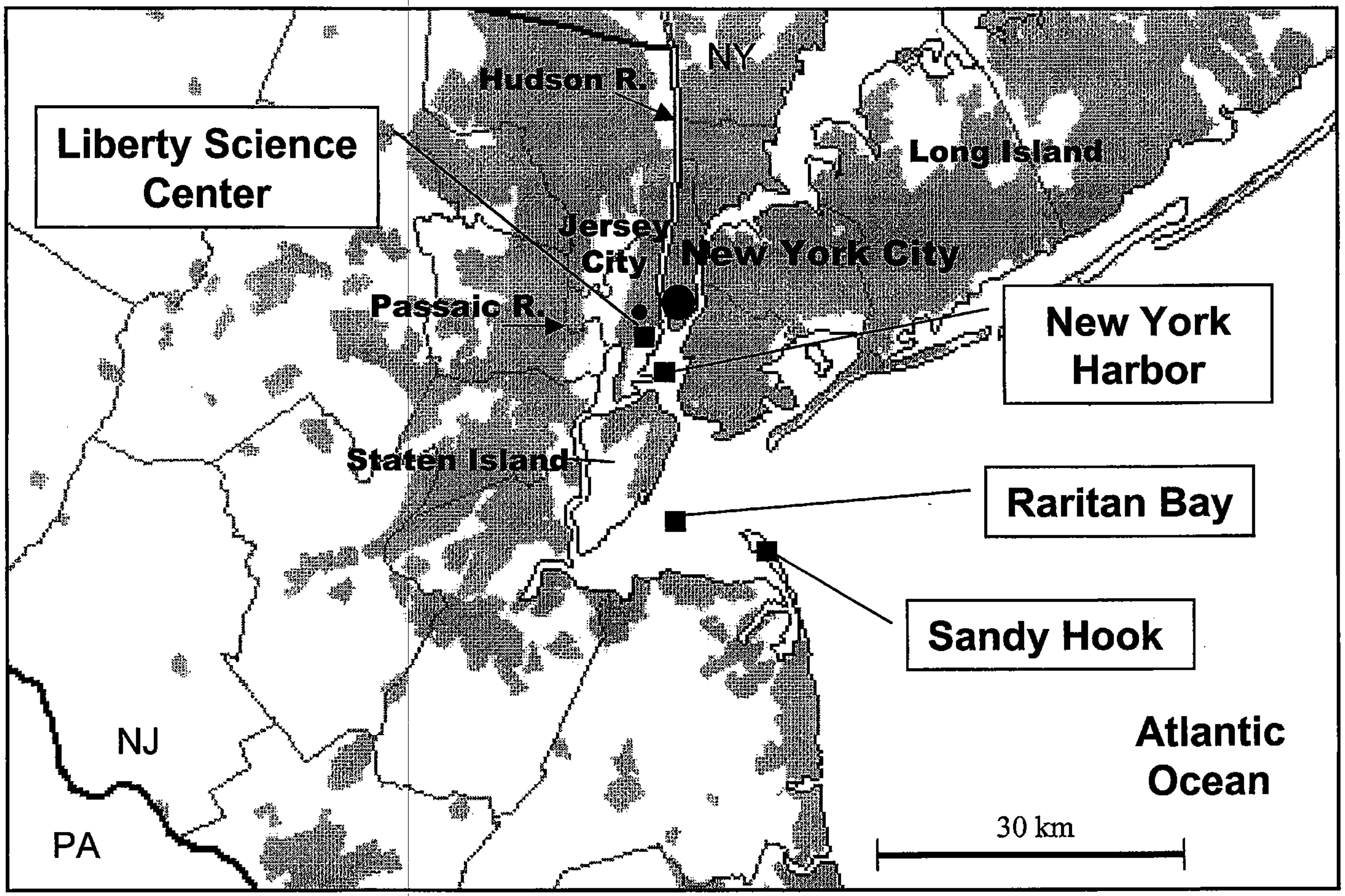
Particulate Phase PAHs	*Raritan Bay 7/5/98*	*Raritan Bay 7/6/98*	*Raritan Bay 7/7/98*	*New York Harbor 7/10/98 morning*	*New York Harbor 7/10/98 afternoon*
Fluorene	0.092	0.10	0.089	0.21	0.65
Phenanthrene	0.37	0.33	0.27	0.94	3.3
Anthracene	0.17	0.17	0.12	0.57	2.3
1Methylfluorene	0.10	0.11	0.11	0.16	0.43
Dibenzothiophene	0.056	0.052	0.040	0.15	0.52
4,5-Methylenephenanthrene	0.18	0.13	0.079	0.40	1.4
Methylphenanthrenes	0.82	0.76	0.61	1.5	6.8
Methyldibenzothiophenes	0.083	0.072	0.057	0.20	0.67
Fluoranthene	0.67	0.62	0.37	2.1	6.2
Pyrene	0.62	0.58	0.35	2.3	7.6
3,6-Dimethylphenanthrene	0.068	0.069	0.041	0.21	0.60
Benzo[a]fluorene	0.36	0.38	0.23	1.5	5.5
Benzo[b]fluorene	0.13	0.15	0.080	0.52	2.2
Retene	0.073	0.079	0.12	0.39	1.3
Benzo[b]naphtho[2,1-d]thiophene	0.021	0.045	0.032	0.13	0.45
Cyclopenta[cd]pyrene	0.042	0.062	0.028	0.23	1.0
Benz[a]anthracene	0.27	0.30	0.17	1.2	4.8
Chrysene/Triphenylene	0.42	0.41	0.24	1.6	5.7
Naphthacene	0.024	0.054	0.033	0.066	0.24
Benzo[b+k]fluoranthene	0.85	0.84	0.52	1.7	11
Benzo[e]pyrene	0.48	0.47	0.30	1.7	5.2
Benzo[a]pyrene	0.39	0.40	0.27	1.6	5.5
Perylene	0.43	0.46	0.26	1.5	4.3
Indeno[1,2,3-cd]pyrene	0.94	1.0	0.66	2.8	9.3
Benzo[g,h,i]perylene	0.46	0.51	0.35	1.3	4.4
Dibenzo[a,h+a,c]anthracene	0.24	0.25	0.18	0.75	2.2
Coronene	0.24	0.25	0.16	0.75	2.7

Table 5. A comparison of net air-water exchange fluxes (ng m^{-2} d^{-1}) of PAHs from the NY-NJ Harbor Estuary and other studies

PAH	*Raritan Bay 7/5/98 [this study]*	*Raritan Bay 7/6/98 [this study]*	*Raritan Bay 7/7/98 [this study]*	*NY Harbor 7/10/98 (am) [this study]*	*NY Harbor 7/10/98 (pm) [this study]*	*Chesapeake Bay 6/1-4/93 [7]*	*Patapsco River 6/4-9/96 [58]*
Fluorene	139	198	162	921	860		127
Phenanthrene	-290	171	-84	-1142	-2009	-1699	-1940
Anthracene	49	55	40	287	660	-86	184
1Methylfluorene	39	116	-134	496	494		
Dibenzothiophene	4	41	22	61	-88		
4,5-Methylenephenanthrene	77	177	91	1427	2487		206
Methylphenanthrenes	-307	123	-1670	-275	-916		
Methyldibenzothiophenes	24	175	27	534	14		
Fluoranthene	-74	155	60	1531	2918	-459	291
Pyrene	7	124	-6	1875	3464	-232	551
3,6-Dimethylphenanthrene	9	79	-140	265	381		
Benzo[a]fluorene	16	66	15	1004	1895		67
Benzo[b]fluorene	4	15	1	265	500		
Retene	11	37	13	152	165		
Benzo[b]naphtho[2,1-d]thiophene	1	1	1	1	1		
Cyclopenta[cd]pyrene	-1	-2	-1	-48	7		
Benz[a]anthracene	2	6	3	142	308		
Chrysene/Triphenylene	3	7	-14	103	213	-14	8.8

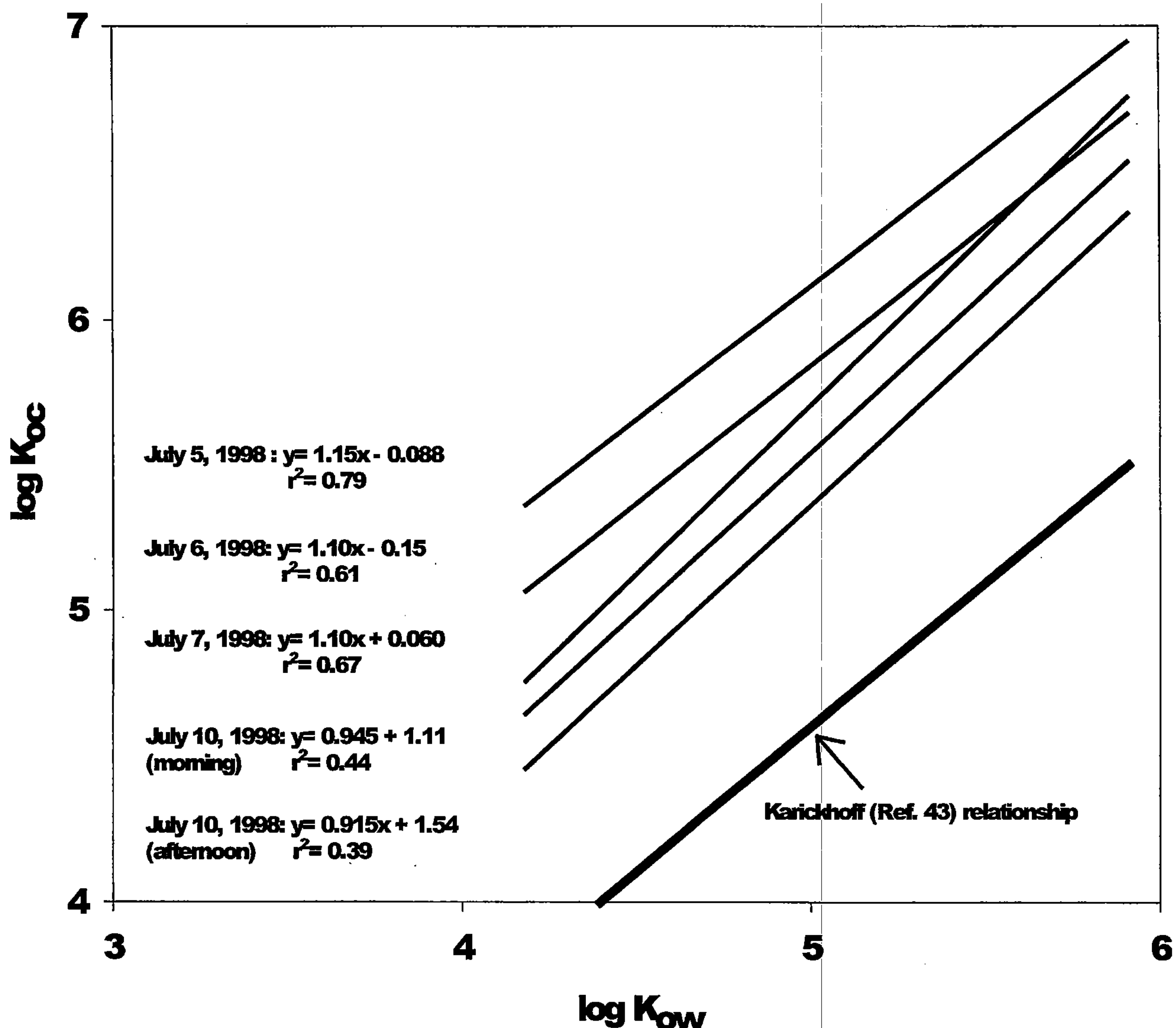
Negative Values = Net absorption
Positive Values = Net volatilization

Figure 1.



Hudson R.
NY
Liberty Science Center
Long Island
Jersey City
New York City
Passaic R.
New York Harbor
Staten Island
Raritan Bay
Sandy Hook
Atlantic Ocean
NJ
30 km
PA

Figure 2.



7
6
5
4
3
4
5
6
log K_{oc}
log K_{ow}
July 5, 1998 : y= 1.15x - 0.088
r²= 0.79
July 6, 1998: y= 1.10x - 0.15
r²= 0.61
July 7, 1998: y= 1.10x + 0.060
r²= 0.67
July 10, 1998: y= 0.945 + 1.11
(morning) r²= 0.44
July 10, 1998: y= 0.915x + 1.54
(afternoon) r²= 0.39
Karickhoff (Ref. 43) relationship

Figure 3.

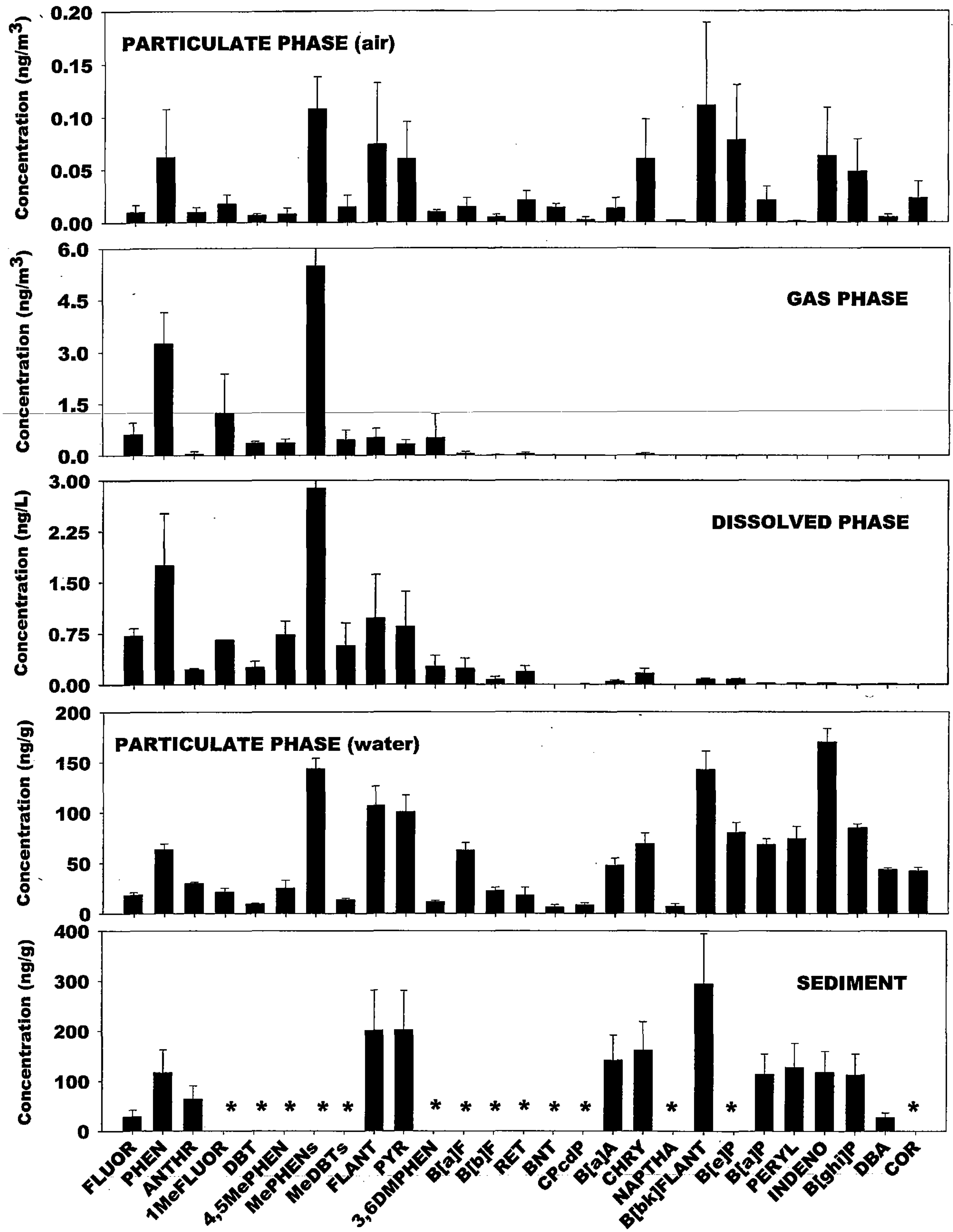

PARTICULATE PHASE (air)
Concentration (ng/m3)
0.00
0.05
0.10
0.15
0.20
GAS PHASE
Concentration (ng/m3)
0.0
1.5
3.0
4.5
6.0
DISSOLVED PHASE
Concentration (ng/L)
0.00
0.75
1.50
2.25
3.00
PARTICULATE PHASE (water)
Concentration (ng/g)
0
50
100
150
200
SEDIMENT
Concentration (ng/g)
0
100
200
300
400
FLUOR
PHEN
ANTHR
1MeFLUOR
DBT
4,5MePHEN
MePHENs
MeDBTs
FLANT
PYR
3,6DMPHEN
B[a]F
B[b]F
RET
BNT
CPcdP
B[a]A
CHRY
NAPTHA
B[bk]FLANT
B[e]P
B[a]P
PERYL
INDENO
B[ghi]P
DBA
COR

Figure 4A and B.

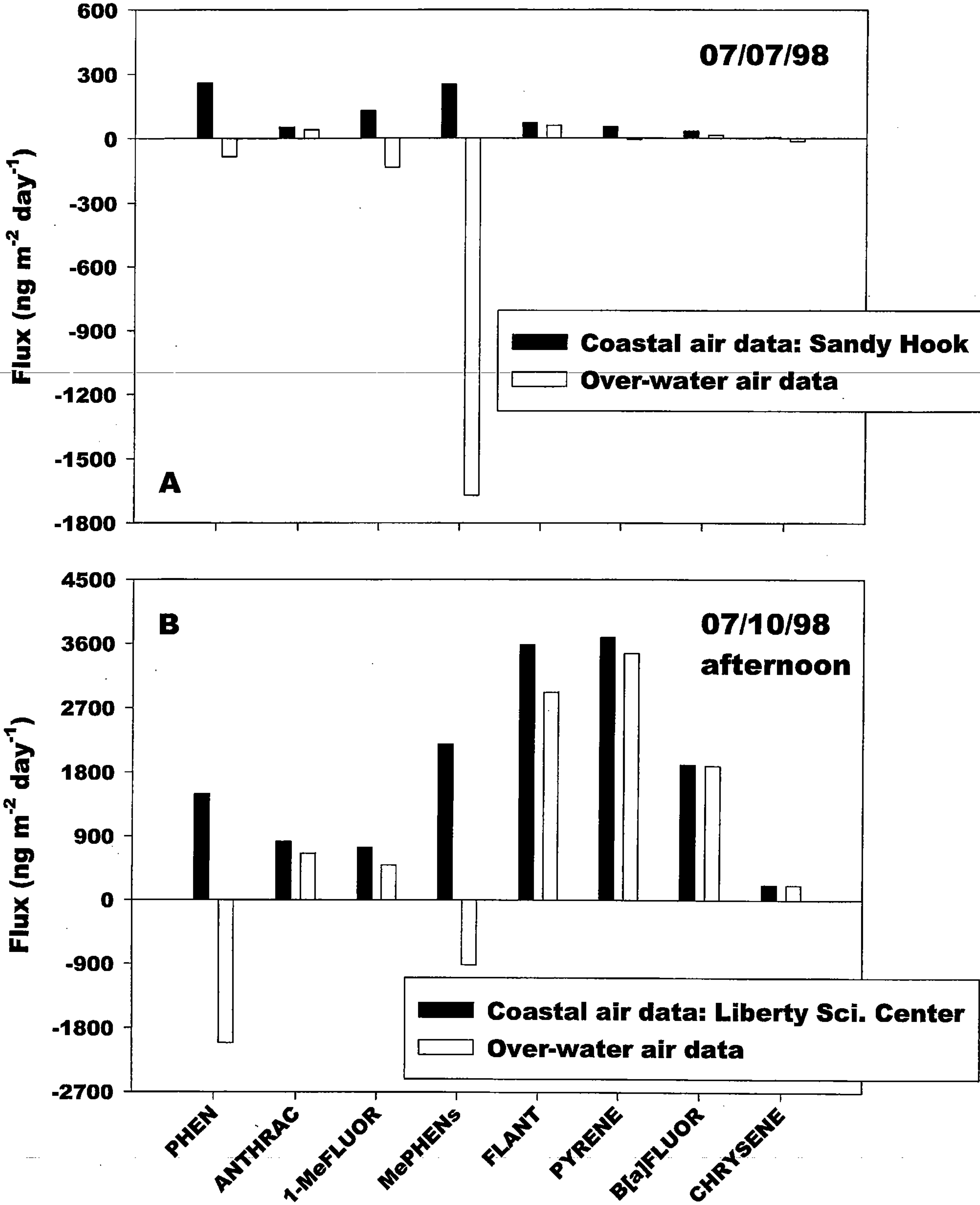
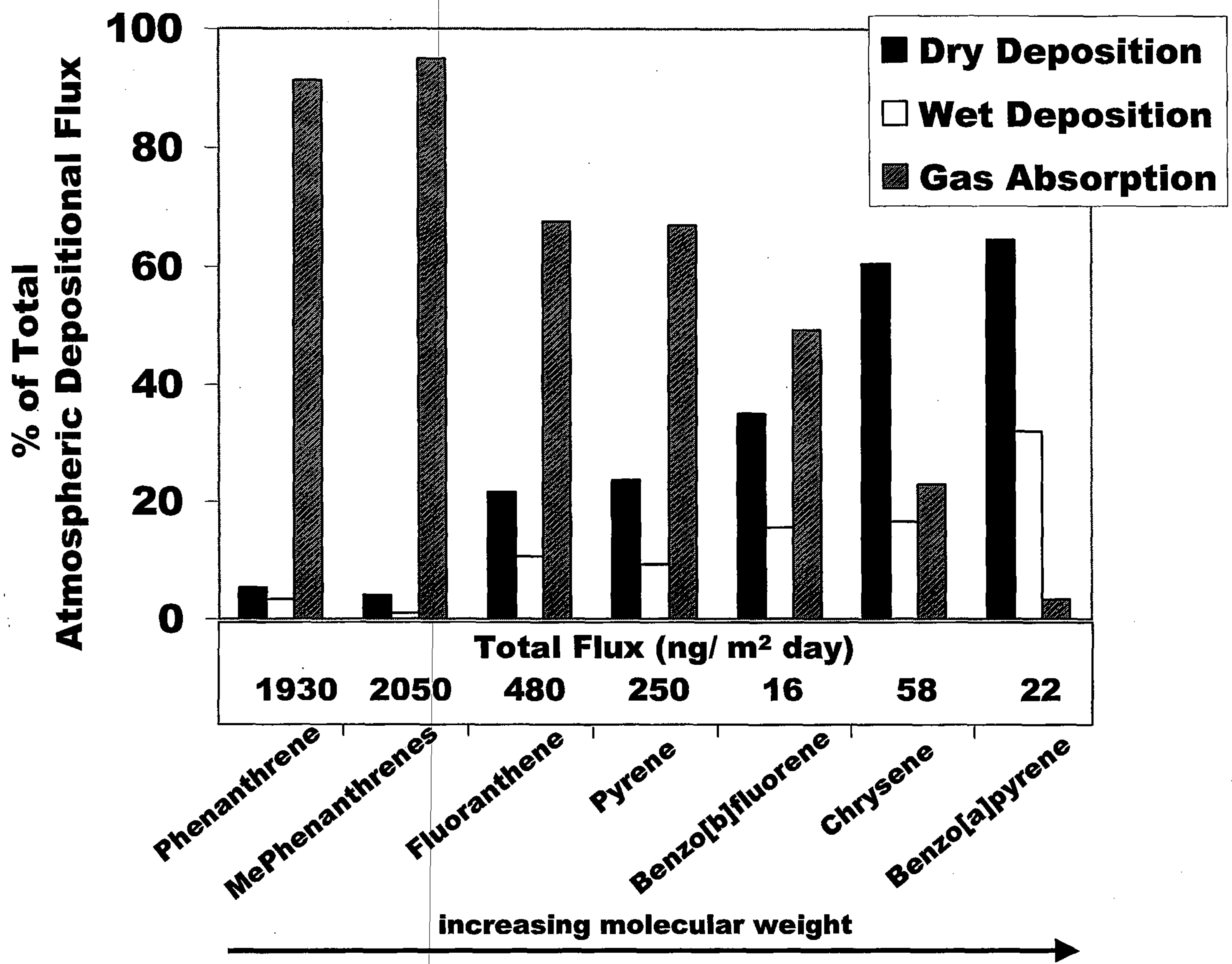


Figure 5.



100
80
60
40
20
0
% of Total
Atmospheric Depositional Flux
Dry Deposition
Wet Deposition
Gas Absorption
Total Flux (ng/ m² day)
1930
2050
480
250
16
58
22
Phenanthrene
MePhenanthrenes
Fluoranthene
Pyrene
Benzo[b]fluorene
Chrysene
Benzo[a]pyrene
increasing molecular weight

Dynamic Air–Water Exchange of Polychlorinated Biphenyls in the New York–New Jersey Harbor Estuary

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Simultaneous measurements of polychlorinated biphenyls (PCBs) in the air and water over Raritan Bay and New York Harbor were taken in July 1998, allowing the first determinations of air–water exchange fluxes for this heavily impacted system. Average gas-phase concentrations of ΣPCBs were 1.0 ng m^{-3} above Raritan Bay and 3.1 ng m^{-3} above New York Harbor. A similar gradient was observed for dissolved water concentrations (1.6 and 3.8 ng L^{-1}, respectively). Shallow slopes of log K_{OC} vs log K_{OW} plots indicated a colloidal contribution to the dissolved concentrations, and a three-phase partitioning model was therefore applied. PCBs associated with colloids ranged from 6% to 93% for trichloro- to nonachlorobiphenyls, respectively. Air–water gas exchange fluxes of ΣPCBs exhibited net volatilization for both Raritan Bay at +400 ng m^{-2} day^{-1} and New York Harbor at +2100 ng m^{-2} day^{-1}. The correction for the colloidal interactions decreased the volatilization flux of ΣPCBs by about 15%. Net air–water exchange fluxes of PCBs are expected to remain positive throughout the year due to the large water–air fugacity gradient and relatively constant seasonal water concentrations. The volatilization fluxes are approximately 40 times greater than atmospheric deposition of PCBs via both wet and dry particle deposition, suggesting that the estuary acts as a net source of PCBs to the atmosphere year-round.

Introduction

Major urban and industrial centers increase loadings of semivolatile organic compounds (SOCs) to proximate waters through direct and sewage discharges and through atmospheric deposition via dry particle deposition, wet deposition, and air–water gas exchange (*1–4*). In addition, aquatic systems can act as sources of SOCs to coastal atmospheres (*5–9*). The New York–New Jersey Harbor Estuary (HE) and the Lower Hudson River Estuary have been greatly impacted by anthropogenic inputs of SOCs from the adjoining metropolitan area and, in the case of polychlorinated biphenyls (PCBs), from the Upper Hudson River (*10*). Elevated levels of PCBs have been found in the biota, sediments, and water column of the Hudson River Estuary (*10–17*). Achman et al. (*14*) determined that there was a positive flux of PCBs from the sediments to the overlying water in the Hudson River Estuary, leading in turn to enhanced fluxes of PCBs from the water column into the air. The HE might thus act as a major source of PCBs to the atmosphere, as suggested by Brunciak et al. (*18*).

To quantify the magnitude and direction of air–water exchange, air and water samples must be collected simultaneously (*4, 19, 20*). Thus, despite the large number of studies (*21–23*) that have investigated the fate and transport of PCBs in the Hudson River and the potential importance of water-to-air exchange, air–water exchange fluxes have not been previously reported. This study evaluates data from a 5-day period of intensive sampling of air and water in the New York–New Jersey Harbor Estuary in July 1998. This study was performed in conjunction with the New Jersey Atmospheric Deposition Network (NJADN), which normally conducts integrated 24-h sampling of air (gas and particulate phases) at several land-based sites throughout New Jersey. The objective of this research is to provide the first estimates of air–water exchange fluxes of PCBs in this heavily impacted system, to examine their potential importance relative to other mechanisms of atmospheric deposition to the estuary, and to examine the role of the HE as a source or sink of PCBs in the New York–New Jersey region.

Experimental Methods

Methodology. Simultaneous air and water samples were taken aboard the R/V *Walford* at a site in the Raritan Bay (RB) west of Sandy Hook (SH) (40.30° N, 74.05° W) on July 5–7, 1998, and in New York Harbor (NYH) at the mouth of the Hudson River (39.17° N, 74.02° W) west of Manhattan in the morning and afternoon of July 10, 1998 (see ref *18* for a map of the sampling area). Surface water temperature, salinity, and wind speed data were recorded on the R/V *Walford* at the time of sampling. Air samples were also collected at three locations on land: New Brunswick (40.48° N, 74.43° W), SH (40.46° N, 74.00° W), and Liberty Science Center/Jersey City (LSC) (40.71° N, 74.05° W).

Air samples were collected using a modified high-volume air sampler (Graseby) with a calibrated airflow of ~0.5 m^3 min^{-1}. Quartz fiber filters (QFFs; Whatman) were used to capture the particulate phase, and polyurethane foam plugs (PUFs) were used to capture the gas phase. Water samples were collected in situ (1.5 m depth) using an Infiltrex 100 sampling system at a flow rate of ~400 mL min^{-1} yielding volumes of 23–49 L. Glass fiber filters (GFFs; Whatman) with a pore size of 0.7 μm were used to capture total suspended matter (TSM), and XAD-2 resin (Amberlite) was used to capture the dissolved phase. Before being deployed in the field, 30 g of XAD-2 resin was wet-packed into 2.5 × 30 cm Teflon columns and injected with surrogate standards.

Additional water samples were collected for total suspended solids, dissolved organic carbon (DOC), and particulate organic carbon. DOC and inorganic/organic carbon and nitrogen were analyzed by Analytical Services of the Chesapeake Biological Laboratory, University of Maryland.

Analytical Procedures. Details of sample preparation, extraction, and analysis can be found elsewhere (*18, 24, 25*) and will be summarized here. The gas phase was captured by polyurethane foam adsorbents (PUF), and the particulate phase was collected on QFFs. QFFs were precombusted at

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450 °C for 24 h. PUFs were prepared by successive 24-h Soxhlet extractions in acetone and petroleum ether and then were dried in a vacuum aspirator for 48 h. The QFFs were weighed prior to and after sampling for the determination of total suspended particulate mass. Samples were injected with surrogate standards [3,5-dichlorobiphenyl (congener 14), 2,3,5,6-tetrachlorobiphenyl (congener 65), and 2,3,4,4′,5,6-hexachlorobiphenyl (congener 166)] prior to extraction. The PUFs and QFFs were extracted in Soxhlet apparatuses for 24 h in petroleum ether and dichloromethane, respectively. The extracts were concentrated by rotary evaporation and subsequently concentrated via N_2 evaporation. The samples were then fractionated on a column of 3% water-deactivated alumina. The PCB fraction was eluted with hexane, concentrated under a gentle stream of nitrogen gas, and injected with an internal standard containing PCB 30 (2,4,6-trichlorobiphenyl) and PCB 204 (2,2′,3,4,4′,5,6,6′-biphenyl) prior to analysis by gas chromatography.

Preparation for water sampling involved combusting GFFs at 400 °C for 4 h. XAD resin for both water sampling and precipitation sampling was prepared by successive 24-h Soxhlet extractions in methanol, acetone, hexane, acetone, and then methanol and finally rinsed with Milli-Q water. XAD samples were extracted in acetone:hexane (1:1 by volume) in Soxhlet apparatuses for 24 h after the addition of surrogates to assess analytical recoveries. The extracts were liquid–liquid extracted in 60 mL of Milli-Q water. The aqueous fractions were back-extracted with 3 × 50 mL of hexane in separatory funnels with 1 g of sodium chloride. The samples were then concentrated by rotary evaporation and treated in the same manner as the air samples as described above.

PCBs were analyzed on an HP 5890 gas chromatograph equipped with a ^{63}Ni electron capture detector using a 60 m by 0.25 mm i.d. DB-5 (5% diphenyl dimethyl polysiloxane) capillary column with a film thickness of 0.25 μm. See Brunciak et al. (*18*) for further details.

Quality Assurance. Congeners 65 and 166 were used to correct individual PCB congener concentrations for surrogate recoveries due to interference with congener 14. Surrogate recoveries for PCBs 65 and 166 were as follows: PUF samples, 103 ± 14% and 102 ± 5%, respectively; QFF samples, 91 ± 9% and 105 ± 10%, respectively; XAD-2 water samples, 94 ± 8% and 92 ± 18%, respectively; GFF, 74 ± 7% and 86 ± 7%, respectively. Several PUFs were cut in half before deployment in the field in order to quantify gas-phase breakthrough. The bottom half of the PUFs contained 13% of the total mass (ΣPCBs) on average ($n = 3$). Field blanks and matrix spikes were used for quality control purposes. Because the concentrations of PCBs in the field blanks were low, gas-phase PCB concentrations were corrected for surrogate recoveries but not for field blanks. Method detection limits for ΣPCBs (defined as 3× the average mass from site-specific field blanks) were 13 pg m^{-3} for the gas phase, 49 pg m^{-3} for the particulate air phase, 0.13 ng L^{-1} for the dissolved phase, and 0.04 ng L^{-1} for the particulate water phase.

Results

Sampling Conditions. Meteorological data for the July 1998 samples may be found in ref *26*. Air temperature ranged from 18 to 28 °C, with relative humidity of 60–80%. Mean wind speeds were 2–4 m s^{-1}, except on July 10, when the average wind speed reached 5.6 m s^{-1}. According to the Climate Diagnostic Center at the National Oceanic and Atmospheric Administration (www.cdc.noaa.gov), average summer conditions at Newark, NJ (the closest weather station for which data are available), are characterized by temperatures ranging from about 15 °C (daily low) to about 30 °C (daily high) and wind speeds of approximately 5 m s^{-1}. Thus, while temperatures were normal for this time of year, wind

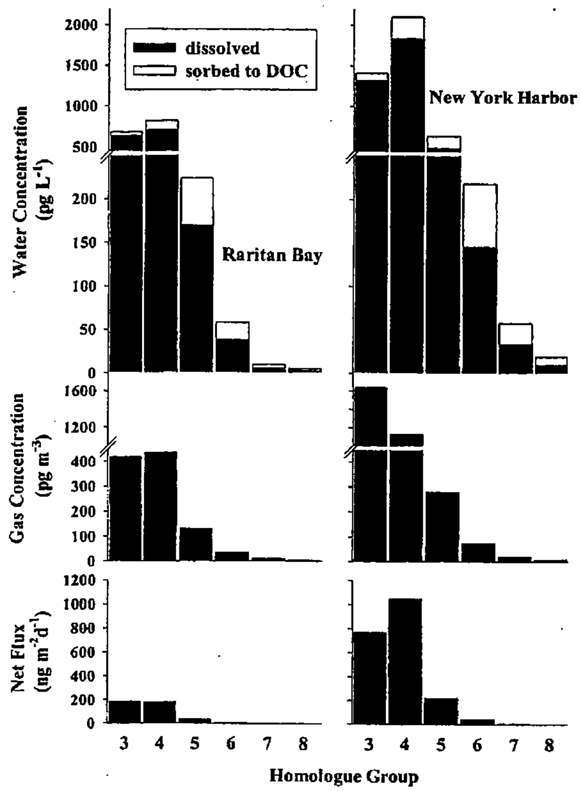

FIGURE 1. Water column concentrations (pg L^{-1}), gas-phase concentrations (pg m^{-3}), and calculated net air–water exchange fluxes (ng m^{-2} day^{-1}) for PCBs by homologue group in the Raritan Bay and New York Harbor during July 5–10, 1998.

speeds were generally lower than normal. It should also be noted that the Newark weather station is based on land and that wind speeds are likely to be higher over water. Water temperature ranged from 19.9 to 22.9 °C, and the salinity ranged from 20.0 to 21.7 PSU (0.343–0.365 M). TSM ranged from 4.2 to 5.7 mg L^{-1} in RB, with the fraction of organic carbon (f_{oc}) ranging from 0.32 to 0.35. In NYH, TSM was 3.4 mg L^{-1} ($f_{oc} = 0.14$) in the morning sample and 9.6 mg L^{-1} ($f_{oc} = 0.07$) in the afternoon sample.

Dissolved Water Concentrations. Dissolved water concentrations of ΣPCBs ranged from 1.4 to 1.8 ng L^{-1} in RB and from 3.5 to 4.2 ng L^{-1} in NYH (Figure 1, Table 1). Achman et al. (*14*) measured a dissolved water concentration of 7.2 ng L^{-1} (ΣPCB) in May 1993 for a sample taken in the northern portion of the HE (1 m above the sediments) in the same region as the NYH samples taken in this study. The present measured concentrations are much lower than the 10–20 ng L^{-1} reported earlier in this area (*21*) but are similar to the model predictions of Farley et al. (*21*). Other waters proximate to urban areas have displayed lower dissolved PCB concentrations, including the Chesapeake Bay (0.92 ng L^{-1}) (*6*) and southern Lake Michigan (0.08–0.48 ng L^{-1}) (*4*).

Water Column Partitioning. PCBs in the water column partition into three compartments: the truly dissolved phase, the particulate phase, and the colloidal phase (*27, 28*). In these water samples, 47–67% of the total PCBs occurred in the particle phase. Partitioning in the water column between the apparent dissolved and particulate phase is

$$K_P = \frac{C_P}{C_{d,a} \times TSM} \quad (1)$$

where K_P is the partition coefficient (L kg^{-1}), C_P is the

TABLE 1. Concentrations (pg L^{-1}) of Dissolved and Particle-Bound PCBs Measured in the Waters of the New York–New Jersey Harbor Estuary, July 1998

PCB congener	dissolved phase					particle phase				
	Raritan Bay			New York Harbor		Raritan Bay			New York Harbor	
	day 7/5/98	day 7/6/98	day 7/7/98	morning 7/10/98	afternoon 7/10/98	day 7/5/98	day 7/6/98	day 7/7/98	morning 7/10/98	afternoon 7/10/98
18	97	89	83	157	162	51	50	42	84	274
16+32	121	121	151	225	183	68	68	53	61	189
28	63	103	102	223	158	111	116	86	155	289
52+43	105	135	111	237	275	149	134	118	136	162
41+71	41	61	55	132	163	105	104	85	102	157
66+95	133	91	165	369	447	357	426	326	385	548
101	29	27	38	70	91	100	101	92	102	135
87+81	15	8.9	21	32	41	33	33	31	37	54
110+77	27	48	37	87	115	127	108	90	122	190
149+123+107	7.8	10	13	21	39	50	49	39	58	84
153+132	9.7	15	9.7	23	53	66	69	56	83	108
163+138	9.0	9.5	10	25	72	92	94	71	111	168
187+182	3.0	0	1.8	6.3	11	21	20	19	27	38
174	0.58	1.4	0.89	2.2	7.5	13	13	10.0	16	24
180	1.7	1.7	0	5.2	16	33	31	24	43	72
ΣPCBs	1360	1540	1790	3530	4160	2770	2890	2330	3160	5240

concentration of PCBs associated with the particulate phase (ng L^{-1}), $C_{d,a}$ is the concentration in the apparent dissolved phase (ng L^{-1}), and TSM is the concentration of total suspended matter (kg L^{-1}). Normalizing K_P to the f_{oc} gives the organic carbon-normalized partition coefficient (K_{OC}):

$$K_{OC} = \frac{K_P}{f_{oc}} \quad (2)$$

The partition coefficient K_{OC} may be approximated as a linear function of the octanol–water partition coefficient (K_{OW}):

$$K_{OC} = aK_{OW} + b \quad (3)$$

where a and b are fitting parameters.

Hansen et al. (*29*) have developed a predictive model for K_{OW} of PCBs based on total surface area of each congener (from ref *30*) and the number of chlorines in the 2 or 2′ position. The model was calibrated using values of K_{OW} derived experimentally by the generator column method. Because Hansen et al. report K_{OW} values for all 209 congeners resulting from a predictive model that is based on the best available experimental data and a careful evaluation of the statistical validity of the results, we concluded that their values were the most appropriate for use in the present study. Because the temperature dependence of K_{OW} for PCBs is small (*31–33*) and the temperature of the water varied by at most 3 °C in this study, K_{OW} was not corrected for temperature.

Log K_{OC} is well-correlated with log K_{OW} for PCBs (Figure 2; $r^2 = 0.58–0.88$; $p < 0.01$). The correlation is lowest for the sample taken on July 10 in the afternoon ($r^2 = 0.58$) and results in a smaller slope (at the 95% confidence level) than that of the other samples. The average slope for the other four samples (0.68 ± 0.07) is similar to those reported by others (*34, 35*) for sorption of nonpolar organic compounds to natural sorbents containing organic carbon fractions >0.001. Researchers have suggested that the slope of the log K_{OC}/log K_{OW} relation should be 1 when partitioning is at equilibrium (*36*). Significant deviation from 1 suggests that partitioning is not at equilibrium and/or that a significant fraction of the compound is sorbed to colloids (*37*).

The shift in slope for the July 10 afternoon sample is due primarily to the high K_{OC} values calculated for congeners having the lowest K_{OW} values. If these eight congeners are removed from the regression, the resulting slope is not statistically different from those observed for the other four samples (Figure 2). ΣPCBs in the apparent dissolved and particle-bound phase increased 25% and 56%, respectively, from the morning to the afternoon sample on this day. Although the salinity and water temperature remained constant, TSM increased significantly (from 3.4 to 9.6 mg L^{-1}), while f_{oc} decreased from 0.14 to 0.07. The tide reversed between collection of the morning sample (from 1020 to 1340 h) and collection of the afternoon sample (from 1410 to 1700 h). Thus, we suspect that tidal currents resuspended bottom sediment that was low in organic matter but rich in sorbed PCBs. The shallower slope of the log K_{OC}/log K_{OW} relation for the July 10 afternoon sample suggests that PCBs sorbed to the resuspended sediment were not at sorptive equilibrium. Congeners with the lowest K_{OW} values must undergo the greatest amount of desorption in order to reach equilibrium. Thus, it is not surprising that they display the greatest deviation from the log K_{OC}/log K_{OW} relationship observed on the other days.

The similar slope of the log K_{OC}/log K_{OW} relation for the other samples (95% confidence limit) suggests that water column partitioning was at or near equilibrium, but partitioning of PCBs to colloidal matter (DOC) may be significant. A three-phase partitioning model was used to estimate the fraction of PCB mass, which was sorbed to DOC. The total concentration of PCBs (C_T) is equal to the sum of the concentrations in the truly dissolved, colloidal, and particulate phases (C_d, C_{DOC}, and C_P, respectively, in pg L^{-1}):

$$C_T = C_d + C_{DOC} + C_P = C_d(1 + K_{DOC} \times \mathrm{DOC} + K_{OC} \times \mathrm{TSM} \times f_{oc}) \quad (4)$$

where DOC is the concentration of DOC (kg L^{-1}) and K_{DOC} (L kg^{-1}) is the equilibrium constant for partitioning of the chemical to DOC. As in other studies (*38*), K_{OC} was estimated from the relationship observed by Karickhoff (*39*):

$$\log K_{OC} = 1.00 \log K_{OW} - 0.21 \quad (5)$$

and K_{DOC} was assumed to equal $0.1K_{OW}$ (*21*). At the DOC concentrations observed in this study (3.3–3.9 mg L^{-1}), the fractions of PCBs sorbed to the colloidal phase predicted by this model are 6%, 14%, 31%, 52%, 70%, 81%, and 93% for the tri-, tetra-, penta-, hexa-, hepta-, octa-, and nona-chlorobiphenyls, respectively. These results agree with those

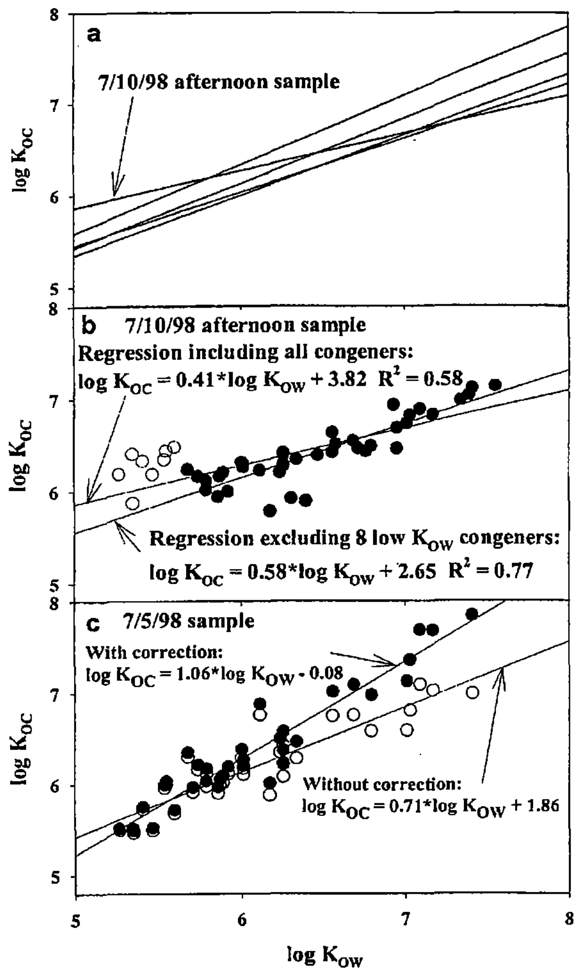

FIGURE 2. Log K_{OC} versus log K_{OW} for PCB congeners in the waters of the Raritan Bay and New York Harbor during July 5–10, 1998. (a) Note that the slope of this relation is smaller for the July 10, 1998, afternoon sample (0.41 ± 0.10) than for the other four samples (0.68 ± 0.07), but (b) when the eight congeners having the lowest K_{OW} values are removed from the regression, the slope (0.58 ± 0.11) is not statistically different from that observed for the other four samples. (c) K_{OC} calculated based on apparent dissolved concentration without correction for sorption to colloids (open symbols) and based on truly dissolved concentration, corrected for sorption to colloids (filled symbols). When this correction is made, the slope of the relation is not statistically different from 1.

of Baker et al. (*40*), which suggest that at commonly encountered DOC and TSM concentrations, substantial fractions of moderately hydrophobic compounds are sorbed to colloids. This is in contrast, however, to Butcher et al. (*28*), who suggest that less than 10% of PCBs containing three or more chlorines are sorbed to the colloidal phase in the Hudson River. When colloidal interactions are considered and K_{OC} is calculated based on the truly dissolved concentration of PCBs (C_d), the plots of log K_{OC} vs log K_{OW} exhibit slopes that are not statistically different from one (ranging from 0.96 to 1.10; R^2 ranges from 0.89 to 0.92; see Figure 2) for all but the July 10 afternoon sample (slope = 0.77, R^2 = 0.75). In addition, the intercepts, which ranged from 1.8 to 2.6 in the absence of the DOC correction, now range from −0.11 to +0.43, much closer to the value predicted by Karickoff (*39*) (eq 5).

Gas-Phase Concentrations. Atmospheric gas-phase ΣPCB concentrations averaged 1000 pg m^{-3} in the RB and 3100 pg m^{-3} in NYH (Figure 1, Table 2). These concentrations are generally higher than those observed by other researchers over water. For example, average atmospheric gas-phase PCB concentrations of 560 and 750 pg m^{-3} have been reported for the northern (*41*) and southern (*6*) Chesapeake Bay, respectively. Zhang et al. (*4*) reported a range of 132–1120 pg m^{-3} over southern Lake Michigan. During this intensive sampling period, ΣPCB concentrations at SH and LSC averaged 650 and 1800 pg m^{-3}, respectively. Similar gas-phase ΣPCB concentrations have been measured at these sites year-round as part of the NJADN (*18*). Concentrations at LSC were thus much greater (often by a factor of 2) than those measured in RB and much smaller (also by a factor of 2) than those measured in NYH. Concentrations of PCBs at SH were 20–40 times lower than those measured in RB and 200–350 times lower than those measured in NYH. Clearly, calculating air–water exchange fluxes for these water bodies based on the gas-phase PCB concentrations measured simultaneously at land-based sites is inappropriate.

Atmospheric PCB concentrations did not increase with increasing water column concentrations in the RB, even though PCB concentrations in the water column were high, suggesting that volatilization from the New York–New Jersey Harbor Estuary is not the only important source of gas-phase PCBs in this region. For example, during the first three days of sampling, dissolved water column PCBs increased 13%, while gas-phase atmospheric PCBs decreased 75%. When winds were blowing from the north (New York City area), the atmospheric ΣPCB concentration was 1900 pg m^{-3}. In contrast, when winds shifted to the southwest direction (suburban New Jersey), the atmospheric concentration fell to 470 pg m^{-3}. This 4-fold increase in atmospheric PCB concentrations is similar to that observed by Simcik et al. (*42*) in southern Lake Michigan when winds were blowing from the source area of Chicago.

Air–Water Exchange Model. A modified two-layer model used here assumes that the rate of gas transfer is controlled by the compound's ability to diffuse across the water and air layer on either side of the air–water interface. The molecular diffusivity of the compound (dependent on the amount of resistance encountered in the liquid and gas films) describes the rate of transfer while the concentration gradient drives the direction of transfer. The model is applied here as previously described (*4, 6, 14, 43, 44*). The overall flux calculation is defined by

$$F = K_{OL}\left(C_d - \frac{C_a}{H'}\right) \tag{6}$$

where F is the flux (ng m^{-2} day^{-1}), K_{OL} (m day^{-1}) is the overall mass transfer coefficient, and ($C_d - C_a/H'$) describes the concentration gradient (ng m^{-3}) where C_d (ng m^{-3}) is the dissolved phase concentration of the compound in water, C_a (ng m^{-3}) is the gas-phase concentration of the compound in air that is divided by the dimensionless Henry's law constant (H') with $H' = H/RT$ where R is the universal gas constant (8.315 Pa m^3 K^{-1} mol^{-1}), H is the temperature and salinity-corrected Henry's law constant (Pa m^3 mol^{-1}), and T is the temperature at the air–water interface (K). The volatilization and absorption fluxes (ng m^{-2} day^{-1}) are calculated as

$$\text{volatilization} = K_{OL} C_d \tag{7}$$

$$\text{absorption} = K_{OL} C_a / H' \tag{8}$$

The net diffusive gas exchange flux is then calculated by subtracting the volatilization flux from the absorption flux. A positive (+) flux indicates net volatilization out of the water column, and a negative (−) flux indicates net absorption into the water column.

TABLE 2. Concentrations (pg m^{-3}) of Gas- and Particle-Phase PCBs Measured in the Air over the New York–New Jersey Harbor Estuary, July 1998

	gas phase					particle phase				
	Raritan Bay			New York Harbor		Raritan Bay			New York Harbor	
PCB congener	day 7/5/98	day 7/6/98	day 7/7/98	morning 7/10/98	afternoon 7/10/98	day 7/5/98	day 7/6/98	day 7/7/98	morning 7/10/98	afternoon 7/10/98
18	88	49	36	218	291	0.48	0.38	0.70	3.0	2.6
16+32	127	60	37	251	322	0.61	0.48	0.53	2.1	11
28	75	35	23	168	218	0.25	0.34	0.11	1.1	0
52+43	108	58	27	164	205	0.95	1.0	0.90	2.8	4.4
41+71	54	23	12	76	94	0.74	0	0.22	1.7	3.2
66+95	201	48	41	208	244	1.7	2.2	1.7	5.3	9.3
101	39	18	9.7	49	55	0.80	0.44	0.53	2.2	3.3
87+81	21	9.6	6.4	23	26	0.43	0.26	0.29	0.95	1.2
110+77	51	19	11	53	60	0.92	0.37	0.22	3.2	4.3
149+123+107	14	6.4	3.7	17	19	0.58	0.27	0.40	1.7	1.7
153+132	15	6.6	3.7	17	20	0.85	0.30	0.24	2.3	2.5
163+138	17	6.9	3.8	16	19	1.1	0.61	0.24	4.4	4.2
187+182	3.9	6.5	3	7.0	7.9	0.35	0.24	0	0.73	0.85
174	2	0.76	0.52	2.2	2.4	0.22	0.069	0.024	0.66	0.63
180	3.3	1.0	0.53	3.4	3.4	0.66	0	0.14	1.9	1.8
ΣPCBs	1865	772	472	2789	3502	22	16	12	68	106

The overall mass transfer coefficient (K_{OL}) comprises resistances to mass transfer in both water (k_a) and air (k_w):

$$\frac{1}{K_{OL}} = \frac{1}{k_w} + \frac{1}{k_a H} \qquad (9)$$

The mass transfer coefficients (k_a and k_w) have been empirically defined based upon experimental studies using tracer gases such as CO_2, SF_6, and O_2 (see refs *45* and *46* for a review). Differences in diffusivity between these gases and PCBs were then used to estimate k_a and k_w for PCB congeners. These tracer experiments identified the importance of increasing wind speed on gas exchange rates. The air-side mass transfer coefficient for water ($k_a(H_2O)$ in cm s^{-1}) was calculated from the following relation (where u_{10} is the wind speed in m s^{-1} at 10 m):

$$k_a(H_2O) = 0.2u_{10} + 0.3 \qquad (10)$$

This relation is recommended by Schwarzenbach et al. (*46*) and has been used previously by many researchers in calculations of air–water exchange (*4, 6, 14, 43, 44*). Several relations are available for the prediction of k_w. Wanninkhof and McGillis (*47*) have established a new relationship for the effect of wind speed on k_w. This cubic relationship is an update of the most commonly applied semi-quadratic relationship established by Liss and Merlivat (*48*) and the quadratic relationship of Wanninkhoff (*45*). The cubic relationship is a better predictor of field data from *47*, particularly for higher wind speed conditions (>6 m s^{-1}). However, the cubic relationship tends to underpredict field measurements of k_{CO_2} (the mass transfer coefficient for CO_2) at low wind speeds, such as those observed in this study. Wanninkhoff's quadratic relationship was thus used in this study (*45*):

$$k_{w,PCB} = 0.45u_{10}^{1.64}\left(\frac{Sc_{PCB}}{600}\right)^{-0.5} \qquad (11)$$

where Sc_{PCB} is the Schmidt number of the PCB congener. Because the molar volumes of PCBs are assumed to be constant for PCBs with the same molecular weight, k_a and k_w are constant for each homologue group and are presented in Table 3. The calculations of k_w and k_a are further discussed in Achman et al. (*14*) and Eisenreich et al. (*43*).

Henry's Law Constants. Calculation of air–water exchange fluxes requires accurate values for H of each PCB congener as well as the temperature dependence of H (ΔH_H) so that H may be calculated at any temperature (T in Kelvin):

$$\ln H_{T_2} = \ln H_{T_1} - \left[\frac{\Delta H_H}{R}\right]\left(\frac{1}{T_1} - \frac{1}{T_2}\right) \qquad (12)$$

Measurement of H for strongly hydrophobic compounds with very low aqueous solubilities is quite difficult. For this reason, H is often estimated as the ratio of the vapor pressure of the compound to its aqueous solubility (*46*). This method has been widely used for PCBs (*49, 50*). A few experimentally determined H values are available for select congeners (*51–53*). Bamford et al. (*53*) recently measured H and its temperature dependence (ΔH_H) for 26 PCB congeners. In unpublished work, Bamford et al. (*54*) also measured H for 61 congeners at a single temperature and used extrathermodynamic relationships to estimate H and ΔH_H for the

TABLE 3. Calculated Mass Transfer Coefficients[a] for Air (k_a) and Water (k_w) Phases As Well As Surface Skin Temperature[b] and Wind Speed[c] for Each Sampling Period

	Raritan Bay			New York Harbor	
	day 7/5/98	day 7/6/98	day 7/7/98	morning 7/10/98	afternoon 7/10/98
u	2.7	3.1	3.3	4.7	5.6
T	295	291	292	294	292
k_a					
di	296	325	336	432	496
tri	288	316	327	420	483
tetra	281	308	319	410	472
penta	275	301	312	401	461
hexa	269	295	306	393	452
hepta	264	289	300	385	443
octa	259	284	294	378	435
nona	296	325	336	432	496
k_w					
di	0.31	0.39	0.43	0.75	1.01
tri	0.30	0.38	0.42	0.73	0.99
tetra	0.30	0.37	0.41	0.72	0.97
penta	0.29	0.37	0.40	0.70	0.95
hexa	0.29	0.36	0.39	0.69	0.93
hepta	0.28	0.35	0.38	0.68	0.91
octa	0.28	0.35	0.38	0.67	0.90
nona	0.31	0.39	0.43	0.75	1.01

[a] In m day^{-1}. [b] T in Kelvin. [c] u in m s^{-1}.

remaining congeners. These values were kindly provided by Bamford et al. and were used in the present work.

H was also corrected for the effects of dissolved salts on the aqueous solubility of the compound via the use of the Setschenow constant, K_S, which was assumed to equal 0.3 for all congeners (*55*), resulting in an increase in *H* of 28% for all PCBs.

Gas Exchange Fluxes. In RB, where mean wind speeds were 2.7–3.3 m s^{-1}, calculated K_{OL} values range from 0.03 for the highest MW PCB to 0.37 for the trichloro PCBs. In NYH, K_{OL} ranged from 0.05 to 0.81 at wind speeds of 4.7–5.6 m s^{-1} in this area. Gas exchange was dominated by the tri- and tetrachloro congeners. K_{OL} values for these compounds ranged from 0.27 to 0.89 and are determined largely by the water-side resistance to mass transfer (k_w), which comprises 75–95% of the total resistance.

Instantaneous fluxes of ΣPCBs were calculated as the sum of fluxes of individual congeners. ΣPCB fluxes averaged +400 ng m^{-2} day^{-1} in the RB and +2100 ng m^{-2} day^{-1} in NYH. The tri- and tetrachlorobiphenyls account for more than 85% of the total flux. Fluxes were positive (net volatilization) for congeners containing 3–7 chlorines and slightly negative for the higher MW congeners (those containing 8–9 chlorines) (Figure 2). The calculated fraction sorbed to DOC was used to correct the apparent dissolved concentrations, so that calculations of air–water exchange were based on the concentrations of truly dissolved PCBs and do not include contributions from the fraction of PCBs sorbed to DOC, which are not available for air–water exchange. This correction decreased the estimated volatilization flux of ΣPCBs by about 15%. The correction is smallest on a percent basis for the low molecular weight congeners, but because they constitute >85% of the total flux, the correction results in the largest change in flux (*mass* per unit area) for these compounds.

Since the total flux is the sum of the volatilization and depositional fluxes, it is important to compare these fluxes individually in order to determine the magnitude of the air–water gradient. The volatilization flux for ΣPCBs ranged from +310 to +2700 ng m^{-2} day^{-1}, while the depositional (absorptive) flux ranged from −14 to −260 ng m^{-2} day^{-1}. The depositional flux therefore constituted 2.8–14% of the volatilization flux, illustrating the dominance of the water-side gradient.

During the days of July 5–7, mean daytime wind speeds were low as compared to July 10 (Table 3). The meteorological data gathered as part of the NJADN suggests that an average wind speed of 5 m s^{-1} is more common for the area. Since wind speed has a nonlinear effect on the water-side mass transfer coefficient, normalizing the fluxes to a constant wind speed would give a better estimate of the air–water PCB gradient in RB versus NYH. Normalized to a wind speed of 5 m s^{-1}, net fluxes were 835 (± 150) ng m^{-2} day^{-1} in RB and 1898 (± 87) ng m^{-2} day^{-1} in NYH. Thus under typical summertime meteorological conditions, the volatilization flux from NYH is about twice that of RB, driven by higher water concentrations.

Total PCB fluxes in both RB and NYH were higher than fluxes calculated for Lake Superior (*56*). In the Chesapeake Bay, Nelson et al. (*6*) reported an annual mean flux of +96 ng m^{-2} day^{-1} with a range of −63 to +800 ng m^{-2} day^{-1}. Zhang et al. (*4*) reported fluxes of +30 (± 17) ng m^{-2} day^{-1} of PCBs out of southern Lake Michigan during July 1994 when winds were blowing from the north, resulting in low concentrations of gas-phase PCBs (regional background). When winds carried air masses from Chicago, higher gas-phase PCB concentrations caused the fluxes to reverse direction, resulting in net deposition of PCBs, averaging −13 ± 9 ng m^{-2} day^{-1}.

Achman et al. (*27*) have measured dissolved ΣPCB concentrations in the range of 5.8–8.7 ng L^{-1} near Governor's Island in NYH that remain largely constant throughout the year. Assuming that dissolved PCB concentrations also remain constant in RB, our calculations suggest that net air–water exchange fluxes would remain positive year-round in both NYH and RB even at low temperatures (0 °C) and at the high gas-phase PCB concentrations typically observed in this area (*18*).

Importance of Air–Water Exchange. The importance of air–water exchange is evaluated by comparing it to wet and dry particle depositional fluxes. Wet deposition fluxes average −6 ng m^{-2} day^{-1} at LSC and −2 ng m^{-2} day^{-1} at SH, based on precipitation samples collected during the summer (June–August) of 1998 (*57*). Dry deposition fluxes were −37 and −7.2 ng m^{-2} day^{-1} in NYH and RB, respectively (calculated from particulate concentrations multiplied by a deposition velocity of 0.5 cm s^{-1}; *58*). Both the wet and dry particle deposition fluxes calculated here are higher than those observed in similar systems, such as the Chesapeake Bay (*59*) and Lake Superior (*56*). For Lake Michigan, Franz et al. (*1*) estimate an annual dry deposition flux of −79 ng m^{-2} day^{-1}.

Despite these high depositional fluxes, volatilization of PCBs from the NY–NJ HE far exceeds the inputs to the estuary from wet and dry particle deposition, suggesting that the estuary acts as a net source of PCBs to the surrounding atmosphere, at least during the summer months. Because air–water exchange of PCBs probably results in net volatilization throughout the year and wet and dry particle deposition rates change little over seasons (*57*), this conclusion is likely true throughout the year.

To examine the relative importance of air–water exchange in RB, it is useful to consider the residence time that would be experienced by PCBs if air–water exchange was the sole loss process ($\tau_{A/W}$) and to compare it to the residence time of water in the system. $\tau_{A/W}$ is given by the ratio of the total mass of PCBs contained in the waters of the HE divided by the total mass of PCBs that are lost due to volatilization:

$$\tau_{A/W} = \frac{C_T V}{FA} \qquad (13)$$

where *V* is the volume (m^3), *A* is the surface area (m^2) of RB, and *F* is the net air–water exchange flux (ng m^{-2} d^{-1}). Calculated in this way, $\tau_{A/W}$ ranges from 26 to 185 days for the tri- and tetrachlorobiphenyls in RB in the summertime. This is a very rough estimate of $\tau_{A/W}$ for several reasons. First, significant variations in PCB concentration may exist in the estuary. Due to shallow depths and tidal mixing, RB is likely to be a well-mixed system. In addition, measurement of dissolved oxygen, salinity, and water temperature as a function of depth during this study revealed virtually no stratification, another indication that RB is well-mixed. Nonetheless, the possibility remains that the measured PCB concentrations are not representative of the Bay as a whole. Second, the wind speeds during the sampling periods were significantly slower than winds frequently observed in this area. At a more typical wind speed of 5 m s^{-1}, $\tau_{A/W}$ would range from 14 to 87 days for the tri- and tetrachloro congeners. In comparison, the residence time of the water in the summer months calculated as total volume of the estuary divided by the average summer low freshwater flow rate (*21*) is 35 days. Again, this calculation represents a rough estimate of the water residence time due to the possibility of horizontal mixing and tidal pumping. Considering the large degree of uncertainty in these calculations, the residence times obtained for volatilization and advection are of comparable magnitude, suggesting that both processes are important in removing tri- and tetrachlorobiphenyls from the estuary during the summer.

Acknowledgments

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Evidence for Dynamic Air–Water Exchange of PCDD/Fs: A Study in the Raritan Bay/Hudson River Estuary

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The first detailed evidence for dynamic air–water exchange of polychlorinated dibenzo-*p*-dioxins and furans (PCDD/Fs) is presented. Samples of air (340–380 m^3) and water (33–60 L) were taken simultaneously during July 1998 at two sites in the lower Hudson River Estuary, NY. The atmospheric gas and particulate phases and the aqueous dissolved and particulate phases were analyzed for di- to octa-CDD/Fs. All the homologue groups were routinely detected by HRGC-HRMS, with detection limits for the homologue groups ~1 pg/sample. Cl_2DDs, OCDD, and Cl_2DFs were the most abundant homologues in the water, and the Cl_2DDs were the most abundant in the air (4.3–7.6 pg/m^3). The Cl_2DD/Fs and $Cl_{7/8}$DD/Fs were 25–53% and 78–99% associated with the water particulate phase, respectively. The likelihood of sampling artifacts influencing the apparent dissolved/particulate partitioning of the higher chlorinated congeners is discussed. Water concentrations were constant over the sampling period, while atmospheric concentrations varied with air mass origin. The fugacity ratios between the dissolved phase in water and the gas phase in air were usually >1, implying a net volatilization flux. Evidence for outgassing of the lower chlorinated homologues, obtained by the simultaneous measurement of air over adjacent land and water, provided further support for the outgassing of the lower chlorinated homologues from the water body.

Introduction

Polychlorinated dibenzo-*p*-dioxins and furans (PCDD/Fs) are ubiquitous contaminants that are released into the environment as byproducts of incomplete combustion or as chemical impurities. Atmospheric transport is believed to be the major pathway for their distribution away from sources (*1, 2*). Municipal, medical, and chemical waste incinerators were identified as the major sources of PCDD/Fs to the contemporary environment and have since been regulated with regard to their emissions or shut down in many industrialized countries, such as Germany, the U.K., and the U.S.A. (*3–5*). As these major sources have been reduced, diffuse sources of PCDD/Fs, such as domestic burning and vehicular traffic, have become proportionally more important to the current emissions to the atmosphere (*6*). Unclear as yet is the extent to which previously deposited PCDD/Fs present in the key environmental compartments of soils and sediments are now subject to recycling into the atmosphere. Discussions have also centered around possible natural sources of PCDD/Fs (e.g. refs *7–10*). The role of air–water diffusive exchange in large aquatic systems as a source or sink for PCDD/Fs has not been investigated to our knowledge, although this process is important for other semivolatile compounds, such as polychlorinated biphenyls (PCBs) (*11–15*), polynuclear aromatic hydrocarbons (PAHs) (*15, 16*), and nonylphenols (*17*). Hence the extent to which current ambient air levels are maintained by air-surface exchange is clearly of considerable significance.

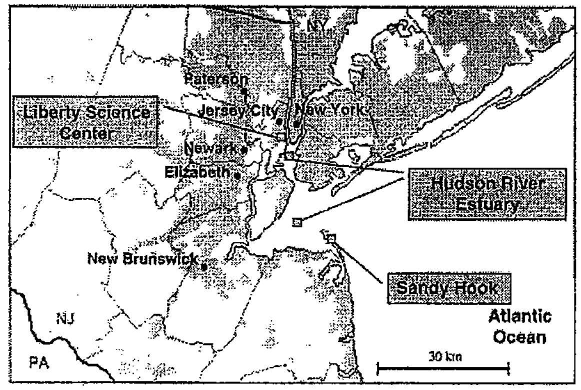

FIGURE 1. Map of the lower Hudson River Estuary. Shaded areas indicate urban areas by population density. Adapted map courtesy of *The National Atlas, USGS.*

The lower Hudson River Estuary and Raritan Bay (HRE/RB) near the New York–New Jersey area in the U.S. (NY–NJ) receives freshwater input mainly from the Hudson, Hackensack, and Passaic rivers; it remains a brackish water body (see Figure 1). The concentrations of many contaminants in samples from within the HRE have consistently been among the highest measured at U.S. sites (*18*). Dioxin contamination of the Newark Bay, associated with discharges from the Lister Avenue Superfund site, occurred in the 1960/1970s and stimulated measurements of 2,3,7,8-TCDD in animals and sediments of the area (e.g. refs *19* and *20*). The importance of wastewater treatment discharges, combined sewer overflows, and atmospheric deposition to the overall contamination of the HRE/RB have been discussed (*21–24*). Recent studies comparing concentrations of OCDD and 2,3,7,8-TCDD in sediments found a strong decrease over time with levels of 2,3,7,8-TCDD in the mid-1980s lower by a factor of 3–15 compared to the mid-1960s (*25*).

This study of air–water exchange in the HRE/RB establishes fugacity ratios for PCDD/Fs across a water surface. The sampling site was chosen because of its contamination history, proximity to major urban and industrial centers, and the support offered by an in-place air toxics network (*26*). Simultaneous air and water samples were analyzed for a full range of PCDD/Fs, including $Cl_{2/3}$DD/Fs. The magnitude of Henry's Law constants (1–7 Pa*m^3/mol) and octanol–water coefficients (log K_{ow} 4.9–6.4) for $Cl_{2/3}$DD/Fs makes them susceptible to water–air exchange (*27, 28*), similar to the 1–4 Cl-substituted PCBs for which air–water exchange

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TABLE 1. Summary of Four Sampling Events in the Raritan Bay/Hudson River Estuary

date	July 5	July 6	July 7	July 10
position	40°30.308′N, 74°05.802′W	40°30.396′N, 74°05.771′W	40°30.550′N, 74°05.720′W	40°39.174′N, 74°02.327′W
surface temp (°C)	20.3–22.6	19.9–22.0	21.4–22.9	20.0–20.3
mean SPM (mg/L)	5.59	6.40	4.17	7.87
(f_{oc})	(0.34)	(0.34)	(0.32)	(0.09)
mean DOC (mg/L)	4.04	4.41	3.71	4.90
water vol (L)	39	33	51	60
amount SPM (mg)	218	211	213	472
air temp (°C)	21.7–27.0	20.3–24.9	20.9–24.8	23.6–26.1
air mass origin	Northwest (Canada)	Northeast (Canada)	local (still air)	Northwest (Canada)
air vol (m^3)	384	342	352	370

processes have been quantified (*14*). Recently, the air–water exchange of nonylphenols has been studied for the lower HRE, depicting net volatilization from the water surface (*17*). Broman et al. (*29*) estimated fugacity ratios for PCDD/Fs in waters of the Baltic Sea based on coastal air and water column measurements and derived a net gaseous flux into the Baltic Sea. In this study, measurements in the HRE/RB indicate that outgassing from the Bay can act as a source of some PCDD/Fs to the atmosphere.

Uncertainties remain over the amount of PCDD/Fs in the "truly dissolved phase", since it is difficult to assess the importance of binding to dissolved organic carbon (DOC) for these compounds. Only the "truly" dissolved phase participates in the approach to air–water equilibrium. However, the observed changes in PCDD/F concentrations of an air mass sampled prior to and after passage over the lower Bay provides strong evidence that volatilization of some PCDD/Fs from the water body occurs.

Materials and Methods

The Hudson River drainage area above the New York metropolitan area covers 34 300 km^2. The lower Hudson River (Albany to New York City) is 240 km long and consists of a mixed estuary, in part because of marine infusion and tidal influences. The salt front limit can extend up the river 110 km, depending on the freshwater flow (*30*). The HRE is bordered by the densely urbanized and industrialized areas of New York City, CT, and northern NJ, and in prevailing transport regime downwind of other large atmospheric emission sources: Philadelphia, PA, Wilmington, DE, and the Baltimore–Washington complex. Except for Chesapeake Bay (see 31), there is little information on atmospheric concentrations, deposition, and fate of persistent organic pollutants (POPs) in the Mid-Atlantic States.

Simultaneous air and water sampling on the HRE/RB was performed aboard the RV *Walford* in July 1998. Air and water samples were taken simultaneously, while the boat was anchored at the sampling station, with the bow facing into the wind. The first three samples were taken in the Raritan Bay, and the fourth one was taken in the New York Harbor area (see Figure 1 and Table 1 for details). Samples were processed at Rutgers University immediately following collection and later analyzed at Lancaster University.

Air samples were collected from the bow, with a modified organics Hi-Vol sampler (Graseby) equipped with quartz fiber filter (20 × 24 cm) and polyurethane foam (10 × 8 cm diameter). Each sample consisted of ca. 350 m^3 of air sampled at calibrated flow rates of ~0.8 m^3/min. Filters were precombusted at 400 °C for 4 h, equilibrated in constant humidity before and after deployment in the field, and weighed. PUFs were cleaned by successive 24 h extraction in acetone and petroleum ether and dried in glass vacuum desiccators.

Water samples were collected using an Infiltrex 100 in situ water sampler operating at ~400 mL/min and equipped with a glass fiber filter followed by a XAD-2 resin column. In total, 40–60 L water were sampled, yielding between 200 and 400 mg of suspended particulate matter. GFFs were precombusted at 400 °C for 4 h, and XAD was cleaned by successive 24 h extractions with methanol, acetone, hexane, acetone, and methanol in a Soxhlet and rinsed several times with deionized water. Additional details can be found in Zhang et al. (*14*).

Additional water samples were taken for total suspended particulate material (SPM), dissolved organic carbon (DOC), and particulate organic carbon (POC) determination. SPM samples were analyzed for inorganic and organic carbon and nitrogen (CHN). Analysis of DOC and CHN were performed by Analytical Services of the Chesapeake Biological Laboratory, University of Maryland. Air and water temperature, wind speed, and direction were recorded throughout the sampling interval (see Table 1). Further meteorological information was obtained from Newark airport, ca. 20 km from the coast.

Additional air samples (consecutive 12-h day–night) were taken at two land-based sites during the sampling campaign, while the over-water samples were being collected. The sites were chosen to represent the coastal environment and the urban NJ–NY area. Sandy Hook is located on a barrier spit separating Raritan Bay from the Atlantic Ocean, and the "Liberty Science Center" (LSC) is in the heart of the metropolitan NY and NJ industrial region (see Figure 1).

Analytical Procedure. For the air samples the GFFs were extracted with toluene and the PUFs in DCM in a Soxhlet apparatus. The extracts were reduced to ~1 mL, transferred into gas chromatographic (GC) vials, and transported to Lancaster University. They were cleaned-up on a mixed silica-column and fractionated on a basic alumina column. Water GFFs were extracted in acetone–hexane (1:1) followed by toluene, while the XAD resins were extracted in acetone–hexane (1:1) and partitioned against water. The extracts were cleaned-up as described above. $^{13}C_{12}$-labeled PCDD/Fs standards (Promochem, Welwyn Garden City, AL7 1EP, U.K.) were added to the XAD-resin before deployment in the water; GFFs and PUFs were spiked prior to extraction in the laboratory. Field and laboratory blanks were routinely included (one in 10 each) and treated as the other samples.

All samples were analyzed by HRGC/HRMS on a Micromass Autospec Ultima, operated at a resolving power of ~10 000 (for details see ref *32*). Homologue groups were quantified relative to a full suite of $^{13}C_{12}$-labeled congeners on a 30m, DB-5 column; the 2,3,7,8-substituted congeners were separated and quantified on a 60 m SP-2331 column. Mean recoveries of the various $^{13}C_{12}$-labeled congeners were generally 50–100% but were 50–65% in the first three XAD-samples. At detection limits of ~0.1–0.6 pg/sample for the 2,3,7,8-substituted congeners (based on the noise of the baseline), only trace amounts of $Cl_{7/8}$DDs were detected in the blanks. Method detection limits for the homologue groups, expressed as the mean blank level plus three times its standard deviation, were generally ~1–2 pg/sample but

TABLE 2. Mean Concentrations in the Suspended Particulate Matter (SPM) and Apparent Dissolved Phase for the Raritan Bay ($n = 3$), Hudson River, and Field Blank (F.Bl.)

homologue groups	SPM (pg/g SPM)				dissolved phase (fg/L)			
	Raritan Bay				Raritan Bay			
	mean	SD (%)	Hudson	F.Bl.	mean	SD (%)	Hudson	F.Bl.
Cl_2DFs	430	28	800	26	3200	14	5900	270
Cl_3DFs	27	23	600	2.9	940	14	2900	84
Cl_4DFs	130	17	310	0.9	230	6	560	23
Cl_5DFs	80	13	160	1.2	200	24	100	4.1
Cl_6DFs	74	14	150	1.5	88	22	38	3.3
Cl_7DFs	110	9	240	1.0	27	35	nd[a]	0.2
OCDF	80	23	180	2.3	38	22	16	7.7
Cl_2DDs	3600	5	1900	7.6	27000	37	44000	170
Cl_3DDs	87	11	140	0.9	400	26	1400	7.8
Cl_4DDs	61	12	130	0.7	79	19	360	4.6
Cl_5DDs	20	24	47	0.4	42	18	88	4.2
Cl_6DDs	150	12	280	0.7	250	36	350	2.5
Cl_7DDs	410	12	860	5.2	540	28	830	45
OCDD	1900	12	3600	21.8	1500	39	1400	132
ΣTEQ[b]	23	17	33	1.7	25	37	17	0.4

[a] Not detected, nd. [b] I-TEQ, ref *33*.

TABLE 3. Measurements of PCDD/Fs in Water Samples

location	particle-fraction		dissolved phase, fg/L		sample volume, L	amount SPM, g
	$\Sigma Cl_{4-8}DD/Fs$	ΣI-TEQ	$\Sigma Cl_{4-8}DD/Fs$	ΣI-TEQ		
River Elbe, Germany[a]	3000–6400 pg/g	41–73 pg/g	210–280	4–17	~390	~29–43
Fraser River, Canada[b]				14–33	100	
Baltic Sea, Sweden[c]	27–61 pg/g DOC	0.1–0.6 pg/g DOC	36–260	0.4–3.6	~2000	~12
Japanese coastal sea[d]	1.2–2.9 pg/L		100		~1000	
Raritan Bay[e]	2970 pg/g	23 pg/g	2940	25	~40	~0.2
Hudson River[e]	5430 pg/g	33 pg/g	2350	17	~60	~0.4

[a] Reference *33*. [b] Reference *34*. [c] Reference *28*. [d] Reference *36*. [e] This study.

higher for OCDD (13 pg/sample) and $Cl_{1/2}DFs$ (6 and 60 pg/sample).

Results and Discussion

Water Samples. In the SPM of the Raritan Bay water samples (ca. 210–470 mg/sample), virtually all PCDD/F homologue groups and 2,3,7,8-substituted congeners were measured at above detection limits with good reproducibility ($n = 3$). Average standard deviations were ±15% for the homologue groups and ±17% for the individual 2,3,7,8-substituted congeners. Concentrations ranged from 20 pg/g SPM for Cl_5-DDs to >3000 pg/g SPM for Cl_2DDs (see Table 2). Expressed in pg/L, concentrations in the solid-phase ranged from 0.08 to 0.15 pg/L for Cl_5DDs up to 15–24 pg/L for Cl_2DDs. Concentrations in the apparent dissolved phase were lower, ranging from 40 fg/L for Cl_5DDs to greater than 40 000 fg/L for Cl_2DDs. Figure 2 shows the mean concentrations (in pg/L) for the Raritan Bay samples, with error bars representing single standard deviations. The apparent dissolved and particulate phases were dominated by Cl_2DDs. Both phases had similar concentrations for the lower chlorinated CDFs, while the higher chlorinated PCDD/Fs were found mostly in the particulate phase.

Toxic Equivalents (ΣTEQ) in the Water Samples. The concept of ΣTEQ was derived for the biological/biochemical responses to 2,3,7,8-TCDD and similar pollutants. It is now common practice to calculate the ΣTEQ in abiotic matrices to compare the contamination of samples. Concentrations of ΣTEQ (I-TEQ, ref *33*) associated with the SPM ranged from 20 to 33 pg/g SPM (85–160 fg ΣTEQ/L). Contributions to the ΣTEQ in the SPM were dominated by 2,3,7,8-TCDD and 2,3,4,7,8-PeCDF, both accounting for ~20%. Interestingly, similar concentrations were reported for a sediment sample (in pg/g dry weight) from the main stem of the Hudson River taken in 1996 (site 8 in ref *25*, courtesy of R. Bopp). 2,3,4,7,8-PeCDF was more abundant in the sediment (43 pg/g compared to 12 pg/g SPM in the water), while all the other 2,3,7,8-substituted congeners agreed well, with an average 24% difference between the two samples (*34*). Concentrations in the apparent dissolved phase were lower with 17–25 fg ΣTEQ/L. 2,3,7,8-TCDF, 2,3,4,7,8-PeCDF, and, when detected, 2,3,7,8-TCDD were the major contributors to the ΣTEQ in the apparent dissolved phase.

There are limited data with which to compare PCDD/F concentrations in water (see Table 3). Homologue and ΣTEQ concentrations (per g SPM) were similar to those found in the River Elbe and the Fraser River. Concentrations of homologue groups in the dissolved phase exceeded those for the Elbe by factors of ~2–10 for the homologue groups, while the ΣTEQ was similar (*35, 36*). Concentration per g SPM were higher in the Hudson River by a factor of ~2, with concentrations of PCDD/Fs in the apparent dissolved phase being higher in the Raritan Bay by ~2 times (see Table 2). Enhanced analytical sensitivity enabled us to work with substantially smaller sample volumes and mass of particulate matter than many others (see Table 3).

Apparent Distribution in the Water Column. The average percent particulate phase followed the sequence (%PCDDs/%PCDFs) Cl_1DFs (26) < Cl_2DD/Fs (38/47) < Cl_3DD/Fs (52/62) < Cl_4DD/Fs (80/76) < Cl_5DD/Fs (75/84) < Cl_6DD/Fs (79/86) < Cl_7DD/Fs (83/96) < OCDD/F (90/96). For the same number of chlorines per group, PCDDs were generally less associated with the particulate fraction, with the exception of Cl_4DD/Fs.

Air Samples. Atmospheric concentrations of PCDD/Fs varied strongly over the course of the sampling campaign,

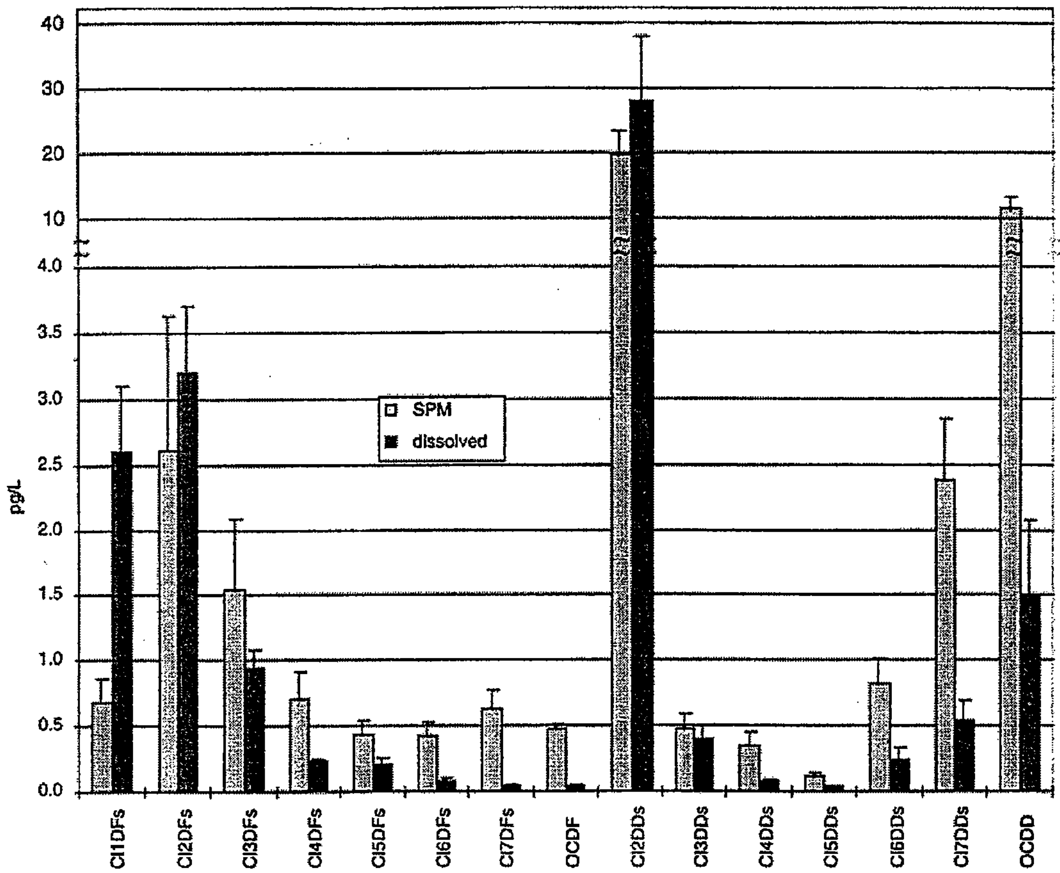

FIGURE 2. Mean PCDD/F homologue group concentrations in the particle and apparent dissolved phase in the Raritan Bay (in pg/L; note: broken *y*-axis).

TABLE 4: Atmospheric PCDD/F Concentrations and Field Blank (F.Bl.) Data in the Gaseous and the Particle-Bound Phase over Water on the Raritan Bay and the Hudson River (fg/m³)

homologue groups	gaseous phase					particle-bound phase				
	Raritan Bay			Hudson		Raritan Bay			Hudson	
	July 5	July 6	July 7	July 10	F.Bl.	July 5	July 6	July 7	July 10	F.Bl.
Cl_1DFs	1100	2000	750	890	9.1	21	18	16	19	13
Cl_2DFs	2000	2800	620	1400	10	36	26	20	23	19
Cl_3DFs	540	2100	190	820	0.9	20	29	9.2	19	1.7
Cl_4DFs	120	1400	57	170	0.6	21	53	7.4	19	1.0
Cl_5DFs	42	370	25	65	0.2	18	57	6.5	24	0.2
Cl_6DFs	13	50	7.8	24	0.5	18	58	10	39	0.6
Cl_7DFs	0.5	1.8	0.5	2.7	0.1	13	21	6.1	40	0.9
OCDF	1.2	1.4	1.3	2.5	0.4	7.4	5.1	2.2	40	0.9
Cl_2DDs	7300	6500	4200	7500	1.8	110	80	74	34	9.3
Cl_3DDs	90	230	33	160	0.6	9.0	4.4	5.7	3.6	0.4
Cl_4DDs	27	300	12	46	0.4	10	14	2.6	5.7	0.5
Cl_5DDs	5.4	140	2.7	4.2	1.0	5.4	23	1.8	4.2	0.1
Cl_6DDs	2.0	23	1.0	8.6	0.0	17	62	5.2	14	0.0
Cl_7DDs	2.1	2.0	2.3	2.1	0.9	34	36	9.0	41	1.2
OCDD	8.5	10	9.3	8.8	5.2	99	72	19	130	6.1
ΣTEQ	1.0	13	0.4	3.0	~0.1	2.5	7.2	1.1	3.4	~0.1

with $\Sigma Cl_{1-8}DD/Fs$ occurring at 12, 17, 6.1, and 12 pg/m³ (ΣTEQ 4.0, 21, 2.1, and 6.1 fg/m³), for the samples taken on July 5, 6, 7, and 10, respectively (see Table 4). The first and last sample were characterized by northwesterly winds from the heart of the urban-industrial area. The highest atmospheric concentrations derived from the NY metropolitan region (NE) on July 6, and the lowest concentration occurred under calm atmospheric conditions. Over-water ambient PCDD/F concentrations were dominated by the gaseous Cl_2DDs (4.2–7.6 pg/m³) and $Cl_{1-3}DFs$ (0.2–2.8 pg/m³). Concentrations of Cl_2-DDs were consistently high, regardless of the wind direction, whereas $Cl_{1-3}DFs$ varied strongly with wind direction (see Table 4). Compared to measurements in the U.K. and Ireland, the over-water samples in this study showed slightly higher concentrations of Cl_3DD/Fs, but Cl_2DDs were higher by a factor of ~50 (*32*). $Cl_{4-8}DD/Fs$ were low for samples taken close to a major urban/industrial conglomeration; similar concentrations have been reported for rural areas in the

United States (see ref *38* and references therein) at the end of the 1980s. The contribution to ΣTEQ was similar to that found in the apparent dissolved phase: Two congeners, namely 2,3,4,7,8-PeCDF and 2,3,7,8-TCDF, each contributed >10% to the ΣTEQ for all samples; 2,3,7,8-TCDD contributed >10% for the first and third sampling event.

Ambient Gas-Particle Distribution. Cl_{1-4}DD/Fs were <30% particle-associated, with Cl_{6-8}DD/Fs >50% in the apparent particle phase, consistent with other distribution studies reported for such warm periods (*38*) (%PCDDs/%PCDFs): Cl_1DFs (2) ~ Cl_2DD/Fs (2/2) < Cl_3DD/Fs (7/3) < Cl_4DD/Fs (15/10) < Cl_5DD/Fs (39/23) < Cl_6DD/Fs (77/58) < Cl_7DD/Fs (91/94) < OCDD/F (85/80). In contrast to their distribution in the water column, atmospheric PCDD/Fs were predominantly in the gaseous phase, and PCDDs had a higher particulate-bound fraction than PCDFs. The ambient ΣTEQ was evenly distributed between the two phases, with 35–61% occurring in the particle-bound fraction.

Partitioning in the Water Column. The calculation of net air–water exchange ratios for PCDD/Fs requires water concentrations in the truly dissolved phase. Differences between truly and "apparent" dissolved phase may be due to the passage of colloids/dissolved organic carbon through the GFF onto the XAD-column. Measurements of PCDD/Fs in the dissolved phase are also complicated because of the low levels of PCDD/Fs in water, in general, and low water solubilities, especially of the higher chlorinated PCDD/Fs. The extent to which the "dissolved" phase in the water is affected by partitioning to DOC is uncertain. The few studies on the aquatic fate of PCDD/Fs do not report detection of OCDD in the truly dissolved fraction, only associated with DOC (*39*). PCDD/Fs bound to DOC were not bioavailable (*40*) and would not be readily available for air–water exchange processes.

It is appropriate to first consider the potential importance of sampling artifacts. As expected, the fraction of particle-bound PCDD/Fs increased with increasing degree of chlorination (with the exception of Cl_4DDs, see above), pointing toward a good separation of the phases. Apparent (organic C normalized) partition coefficients ($K_{oc}{}^{app}$, in L/g) were calculated for the water samples using eq 1

$$K_{oc}{}^{app} = C_{SPM}/C^{app}{}_{diss}/f_{oc} \qquad (1)$$

where C_{SPM} is the PCDD/F particulate concentration (fg/g SPM), $C^{app}{}_{diss}$ is the apparent dissolved concentration of PCDD/Fs (fg/L), and f_{oc} is the fractional organic carbon content in the SPM.

Investigations of the sorption of hydrophobic organic compounds onto natural sediments as summarized by Schwarzenbach et al. (*41* and references therein) demonstrate a linear relationship between K_{oc} and K_{ow} in the water column:

$$\log K_{oc} = \log K_{ow} - 0.21 \qquad (2)$$

Calculated $K_{oc}{}^{app}$ values agreed within a factor of 2–5 with K_{oc} values predicted from eq 2 for the Cl_{1-4}DD/Fs. However, the $K_{oc}{}^{app}$ values for the Cl_{5-8}DD/Fs were lower by an order of magnitude than the predicted values. We interpret this observation as suggestive of a sampling artifact for the Cl_{5-8}DD/Fs in the operational separation of dissolved and particulate phases.

A partitioning coefficient for PCDD/Fs onto DOC (K_{DOC}) is defined as

$$K_{DOC} = C_{DOC}/C_{diss} \qquad (3)$$

with C_{DOC} the concentration of PCDD/Fs bound to DOC (fg/g DOC) and C_{diss} the PCDD/F concentration in the truly dissolved phase (fg/L). Correcting for the amount of PCDD/Fs bound to DOC is problematic since there are no literature data available for PCDD/F-K_{DOC} values. However, K_{DOC} is about 5–10 times lower than K_{oc} values (*42, 43*). Freidig et al. reports a linear relationship between log K_{ow} and log K_{DOC} (*42*), with

$$\log K_{DOC} = 0.67 * \log K_{ow} + 1.46 \qquad (4)$$

Based on reported log K_{ow} values and our measured concentrations of [POC], [DOC], and apparent dissolved PCDD/F concentrations, the theoretical partitioning onto DOC, POC, and truly dissolved phase may be calculated. Thus c_{diss} and c_{DOC} were calculated and compared to $c^{app}{}_{diss}$. There was good agreement between the predicted and measured apparent dissolved phase for the higher chlorinated PCDFs, while $c^{app}{}_{diss}$ were lower than predicted for Cl_{1-2}DFs by a factor of ~2–3 (see Figure 3). Cl_{2-4}DDs showed good agreement with the predicted concentrations, while Cl_{5-8}DDs had a ~50% higher concentration than predicted in $c^{app}{}_{diss}$. Clearly, the linear relationship between K_{DOC} and K_{ow} derived in eq 4 does not satisfactorily explain the partitioning of PCDD/Fs in the water column, as the calculated partitioning to DOC accounted for only ~50% of the Cl_{5-8}DDs detected in the $c^{app}{}_{diss}$. In particular, the high concentrations of OCDD in $c^{app}{}_{diss}$ point toward a sampling artifact.

Air–Water Exchange. The direction of net air–water exchange may be determined by calculating dissolved/gas-phase fugacity ratios

$$fw/fa = \alpha = C_{diss} * H / C_{gas} * R * T \qquad (5)$$

where α is the fugacity ratio, *fw* and *fa* are the fugacities in water and air, respectively, *H* is Henry's law constant (HLC), *T* the temperature (K), and *R* the universal gas constant. Equilibrium between the atmospheric and dissolved phase yields α = 1. Net volatilization occurs when α >1 and deposition (i.e. absorption) when α < 1. HLCs at 298 K were used since air and water temperatures during the sampling campaign ranged only from 20 to 27 °C.

With few exceptions the calculated fugacity ratio values were >1, indicating net volatilization of PCDD/Fs from the HRE/RB (Figure 4). The exception was the second sampling event, characterized by high ambient air concentrations, when xa6w/xa6a ratios were <1 for the Cl_{3-6}DFs and Cl_{4-5}DDs. Fugacity ratios were highest for Cl_{6-8}DDs and OCDF with α >5–10, while Cl_{2-5}DD/Fs had α of up to 5–7.

Uncertainties in the calculation of the fugacity ratios stem from (i) the analytical precision in determining C_{diss} and C_{gas}; (ii) the operational separation of the dissolved phase; and (iii) the uncertainty in HLC values and their temperature-dependency. Our analytical precision was ~15% SD for the three water samples taken in Raritan Bay and comparable to what we presented earlier for five air samples taken concurrently (SD of ~10% for 700 m^3 each, ref *32*). We employed the appropriate HLC-values reported by Govers and Krop (*28*). However, there is on average a factor of 2 difference between values by Govers and Krop (*28*) and those recommended by Mackay et al. (*27*); the dominating quantifiable uncertainty for α stems from the HLCs. Hence, the uncertainty in the fugacity ratios will be on the order of ~2, as indicated by a gray shaded background in Figure 4. However, most fugacity ratios exceeded that uncertainty range, indicating net water-to-air exchange.

Evidence of the real importance of air-to-water exchange was the dominance of Cl_2DDs in both the apparent dissolved and gas phases and the high concentrations of lower chlorinated furans (and by direct evidence discussed in the next section). This is consistent with the types of chemical profiles observed for PCBs (*10, 14*) and PAHs (*15*). We note, however, that PCDD/Fs bound to particles undergo a net,

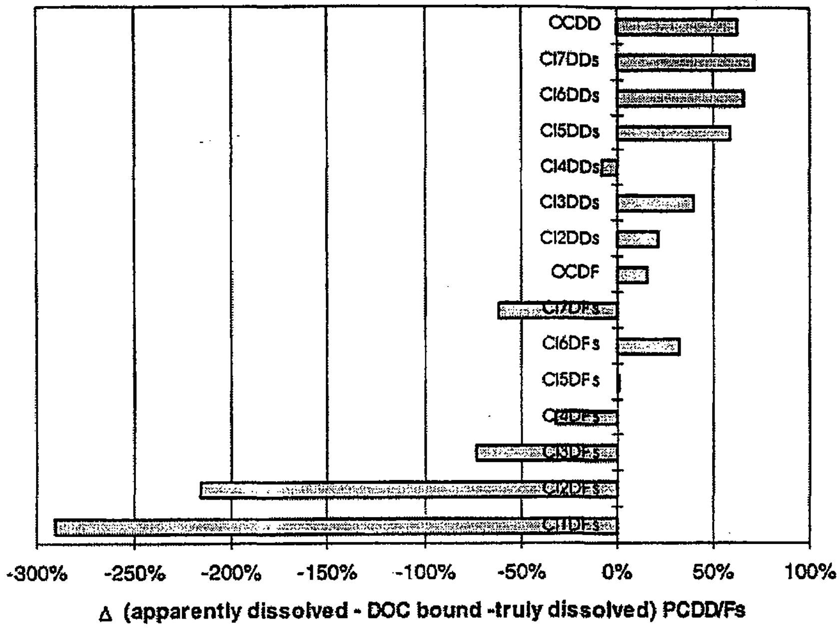

FIGURE 3. Difference between apparent dissolved PCDD/Fs and calculated truly dissolved and [DOC]-bound PCDD/Fs. A negative Δ value means that the calculated distribution accounted for more PCDD/Fs in the truly dissolved phase and [DOC]-bound than was detected in the apparent dissolved phase. A positive balance, e.g., for OCDD, means that the calculated distribution of PCDD/Fs in the truly dissolved phase and [DOC]-bound accounted for roughly half the amount of OCDD detected in the apparent dissolved phase.

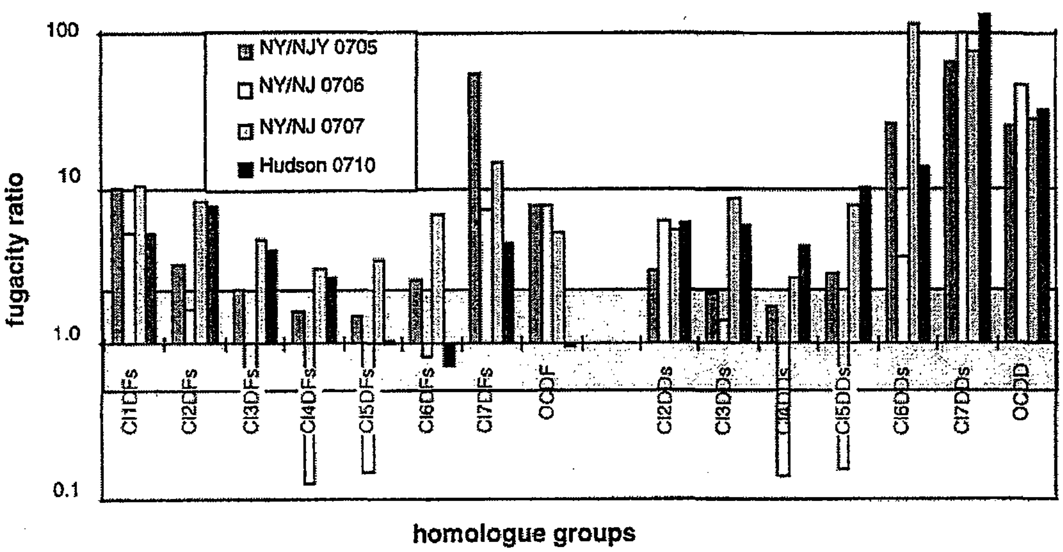

FIGURE 4. Water–air fugacity ratios for PCDD/F homologue groups for the Raritan Bay/Hudson River Estuary (gray shaded background indicates estimated uncertainty range for equilibrium, i.e., ± 100%).

one-dimensional flux into the water by means of wet and dry deposition.

Evidence for Net Outgassing from Measured Changes in the Gas Phase over the Raritan Bay. The fugacity ratios presented are strong evidence that lower chlorinated PCDD/Fs undergo a net gas-phase flux out of the water column during the study period. Further direct evidence comes from the air measurement program. Three sampling events are of interest in this discussion, taken on the day (0800–2000 h), night (2000–0800 h), and day (0800–2000 h) of July 10 and 11, 1999. With winds from the NW the air mass passed consecutively over the urban site, the lower Bay and the coastal site. We were therefore able to measure the changes in PCDD/F concentrations prior to (at LSC) and after crossing over the Bay (Sandy Hook). Back-trajectories showed the air mass moving to New York from the northwest and local wind readings were consistent at ~340°. The distance between the two land sites is ca. 30 km, which combined with wind speeds of 7.5, 5.0, and 7.6 m/s on the different events gave an average travel time of 1.1–1.6 h for the air masses between the sites. Comparing the PCDD/F profiles at the two sites relative to air–water exchange is valid if the following assumptions hold: (i) A well mixed air mass arrived at the urban sampling site. PCDD/F concentrations at the LSC site depended on the wind direction, suggestive that the site was not surrounded by major sources. (ii) PCDD/F air emissions were dominated locally by air–water exchange. Ambient air concentrations were generally low for the vicinity to the urban/industrial NY–NJ area, suggesting that even though additional sources cannot be ruled out they were minimal

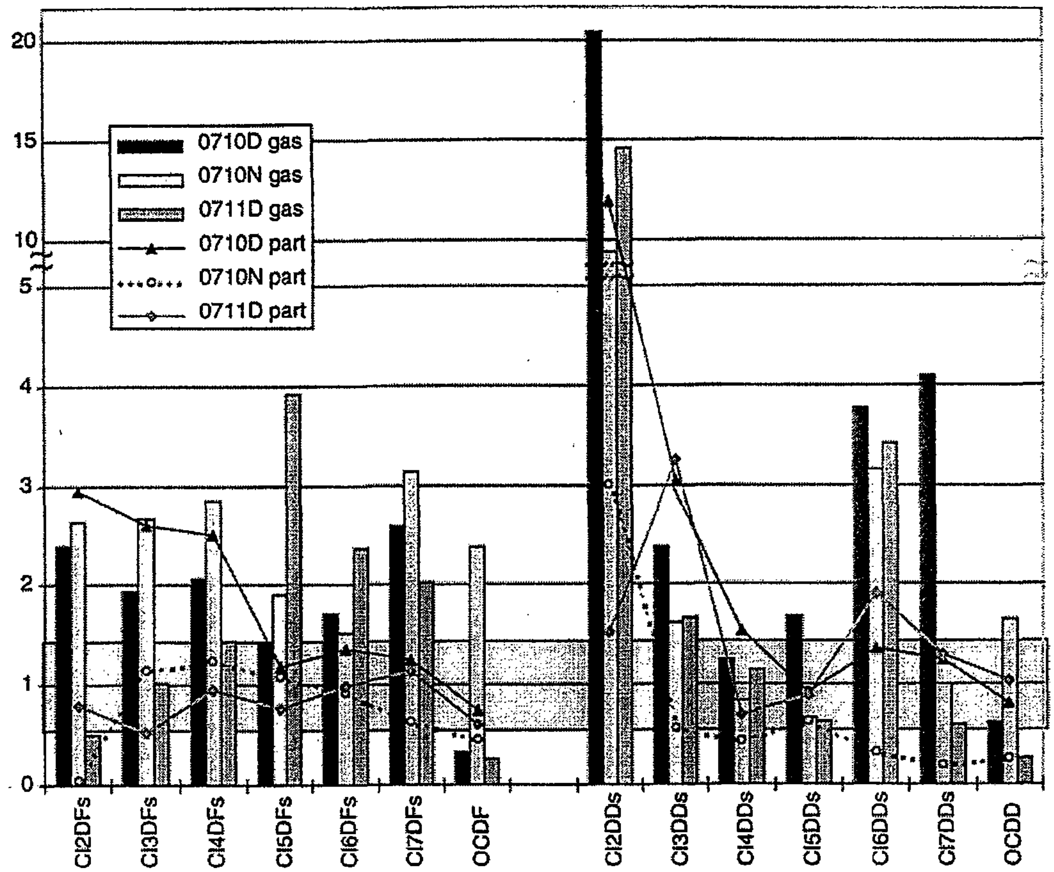

FIGURE 5. Ratios of observed changes in the gas phase and PCDD/Fs on particles at the coastal site over concentrations at the urban/industrial site (shaded gray area indicates estimated analytical uncertainty range, i.e., ± 40%; note: broken *y*-axis).

(*34*). (iii) The signal received at the coastal site reflects the air mass derived from the urban/industrial site following transport across the water. The coastal site was affected by a diurnal sea-breeze as a function of the relative temperature changes of land and ocean during the course of a day. This may have the effect of diluting the signal coming from the NY/NJ area with air from the ocean. (iv) Degradation/depletion reactions in the gas phase were negligible compared to the air–water exchange.

What would we expect to observe if our assumptions were true? It is hypothesized that (i) PCDD/Fs in the gas phase of the air mass would reflect the air–water exchange with the lower Bay, with increasing concentrations for the lower chlorinated congeners; (ii) total suspended particle (TSP) concentrations in the air would decrease due to deposition over the Bay; and (iii) particle-bound PCDD/F concentrations per g TSP would not be likely to vary significantly, depending on the kinetics of exchange from a modified gas phase.

The observed changes, expressed as the ratio of the concentrations measured at the coastal site over the urban/industrial site, are shown in Figure 5. Whereas most gas-phase PCDD/Fs ratios are >1, the predominantly particle-bound PCDD/Fs did not change much (ratios of ~1). The uncertainty in the ratios (±40%) is included as a gray shaded background which arises from the analytical uncertainty in determining ambient PCDD/Fs (estimated as a SD = 25%).

The key observations are as follows: (i) Highest Cl_2DD concentrations were found over water. This, together with the fugacity ratios, indicates net volatilization from the water surface. (ii) On the three events on July 10/11, gas-phase concentrations of $Cl_{2-7}DFs$ and $Cl_{2-6}DDs$ increased from the industrial to the coastal site. The $Cl_{4-5}DDs$ on the night of July 10, and Cl_5DDs and Cl_2DFs on the day of July 11, were exceptions to this (see Figure 5). (iii) TSP concentrations decreased from the urban to the coastal site, probably due to deposition of particles during transport across the Bay (data not shown). (iv) Concentrations of PCDD/Fs per g TSP increased for $Cl_{2-4}DD/Fs$ for the day time sample on July 10; for the other homologue groups and the other samples concentrations per g TSP remained roughly constant (see Figure 5). A priori the change in PCDD/F concentrations on particles in equilibrium with the gas depended on kinetic constraints. Based on our observations, wind speeds of 5–7.5 m/s were not sufficient to create significant marine aerosol, so that only deposition should have affected the TSP (see also ref *44*). If, however, there was sufficient enrichment of PCDD/Fs in the gas phase during the passage over the water, there would be a tendency for PCDD/Fs to partition onto particles to reach gas-particle equilibrium. (v) The Cl_2DDs were the homologue group with the greatest increases in the gas phase *and* the only homologue group with increasing concentrations in the particulate phase per g TSP for the three samples.

Together this provides support for the hypothesis that Raritan Bay acted as a net source of lower chlorinated PCDD/Fs to the local atmosphere during this sampling period. Particularly strong evidence stems from (i) the Cl_2DDs being most abundant over the water itself; (ii) the calculated fugacity ratios; (iii) the observed changes in the gas phase; and (iv) increasing concentrations on particles. Fugacities and observed changes point toward evaporation of a full range of PCDFs and many PCDDs as well, similar to the story for PCBs (*13–15*). However, uncertainties remain over the effective partitioning of PCDD/Fs in the water column and therefore about the "real" fugacities for mainly the higher chlorinated PCDD/Fs. If our observed changes in the gas phase reflect a true picture, then evaporation is a key process influencing PCDD/Fs up to $Cl_{6/7}$DD/F homologues. This is of course only part of the story, as dry and wet particle deposition of PCDD/Fs into the Bay also occurs. What is unknown at present is the origin of the PCDD/Fs in the water. Key possibilities are remobilization of PCDD/Fs from sediments or discharges into the Hudson–Raritan Bay area. Similarly the cause of the elevated concentrations of Cl_2DDs in the water and the atmosphere is unknown.

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Appendix – Polycyclic Aromatic Hydrocarbons (PAHs)

I. PAH Concentrations: Air, Precipitation, and Water
   A. New Brunswick
      A.1. Air Samples– Particulate Phase (QFFs)
      A.2. Air Samples – Gas Phase (PUFs)
      A.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   B. Sandy Hook
      B.1. Air Samples– Particulate Phase (QFFs)
      B.2. Air Samples – Gas Phase (PUFs)
      B.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   C. Liberty Science Center
      C.1. Air Samples– Particulate Phase (QFFs)
      C.2. Air Samples – Gas Phase (PUFs)
      C.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   D. Lower Hudson River Estuary
      D.1. Air Samples– Particulate Phase (QFFs)
      D.2. Air Samples – Gas Phase (PUFs)
      D.3. Water Samples – Particulate Phase (GF/Fs)
      D.4. Water Samples – Gas Phase (XAD)

II. Laboratory Quality Assurance
   A. Laboratory Blanks
      A.1. Laboratory QFF Blanks – Air Particulate Phase
      A.2. Laboratory PUF Blanks – Air Gas Phase
      A.3. Laboratory XAD Blanks – Precipitation Particulate + Dissolved
      A.4. Laboratory GF/F Blank – Water Particulate Phase
      A.5. Laboratory XAD Blank – Water Dissolved Phase
   B. Matrix Spikes – Performance Standards
      B.1 Matrix Spikes – QFF media
      B.2. Matrix Spikes – PUF media
      B.3. Matrix Spike – GF/F media
      B.4. Matrix Spike – XAD media
   C. Field Blanks
      C.1. Field QFF Blanks – Air Particulate Phase
      C.2. Field PUF Blanks – Air Gas Phase
      C.3. Field GF/F Blank – Water Particulate Phase
      C.4. Field XAD Blank – Water Dissolved Phase

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 10/5/97	NB-QFF 10/8/97	NB-QFF 10/9/97	NB-QFF 10/12/97	NB-QFF 10/13/97	NB-QFF 10/15/97	NB-QFF 10/16/97	NB-QFF 10/21/97	NB-QFF 10/28/97	duplicate NB-QFF 10/29/97	duplicate NB-QFF 10/29/97	duplicate NB-QFF 11/2/97	duplicate NB-QFF 11/2/97	NB-QFF 11/6/97
Fluorene	0.025	0.042	0.017	0.025	0.022	0.12	0.0034	0.025	0.015	0.0054	0.0053	0.012	0.015	0.020
Phenanthrene	0.25	0.19	0.084	0.21	0.13	0.0020	0.031	0.24	0.15	0.055	0.055	0.094	0.026	0.19
Anthracene	0.022	0.012	0.012	0.017	0.011	0.014	0.0024	0.015	0.0095	0.0022	0.0026	0.017	0.016	0.023
1Methylfluorene	0.038	0.025	0.017	0.019	0.017	0.0008	0.0053	0.027	0.019	0.0068	0.0069	0.015	0.019	0.020
Dibenzothiophene	0.0023	0.0025	0.0001	0.0001	0.0005	0.012	0.0023	0.020	0.016	0.0023	0.0017	0.0073	0.0040	0.079
4,5-Methylenephenanthrene	0.023	0.011	0.0055	0.014	0.010	0.0020	0.0041	0.022	0.024	0.0074	0.0073	0.010	0.015	0.027
Methylphenanthrenes	0.22	0.13	0.082	0.19	0.047	0.010	0.0049	0.26	0.17	0.42	0.38	0.16	0.22	0.34
Methyldibenzothiophenes	NQ	NQ	NQ	NQ	NQ	0.0024	0.0043	0.038	0.021	0.0040	0.0040	0.013	0.016	0.036
Fluoranthene	0.35	0.36	0.25	0.27	0.26	0.0036	0.052	0.31	0.058	0.066	0.052	0.10	0.019	0.26
Pyrene	0.27	0.31	0.24	0.23	0.21	0.0048	0.051	0.027	0.050	0.057	0.046	0.096	0.13	0.22
3,6-Dimethylphenanthrene	0.011	0.018	0.010	0.019	0.013	0	0.0042	0.013	0.0031	0.0057	0.0037	0.027	0.073	0.023
Benzo[a]fluorene	0.034	0.046	0.032	0.035	0.028	0.0018	0.013	0.044	0.016	0.085	0.025	0.029	0.14	0.063
Benzo[b]fluorene	0.028	0.036	0.019	0.047	0.021	0.0013	0.0072	0.036	0.010	0.010	0.015	0.018	0.013	0.032
Retene	NQ	NQ	NQ	NQ	NQ	0.0010	0.0083	0.045	0.0071	0.0047	0.0047	0.032	0.015	0.044
Benzo[b]naphtho[2,1-d]thiophene	NQ	NQ	NQ	NQ	NQ	0.0063	0.013	0.011	0.012	0.0099	0.0094	0.020	0.021	0.044
Cyclopenta[cd]pyrene	0.0028	0.0025	0.0022	0.0012	0.0056	0.0033	0.0089	0.0035	0.0054	0.010	0.012	0.015	0.019	0.044
Benz[a]anthracene	0.10	0.20	0.13	0.13	0.087	0.010	0.025	0.13	0.023	0.031	0.131	0.049	0.16	0.097
Chrysene/Triphenylene	0.22	0.25	0.18	0.20	0.16	0.032	0.068	0.20	0.051	0.025	0.068	0.11	0.18	0.23
Naphthacene	0.0040	0	0.0009	0	0.0019	0	0	0	0	0	0	0.004	0.028	0.0025
Benzo[b+k]fluoranthene	0.79	0.57	0.30	0.41	0.23	0.20	0.17	0.45	0.11	0.14	0.24	0.24	0.35	0.40
Benzo[e]pyrene	0.16	0.21	0.094	0.14	0.093	0.042	0.067	0.16	0.038	0.091	0.078	0.11	0.17	0.20
Benzo[a]pyrene	0.11	0.13	0.092	0.099	0.054	0.015	0.024	0.13	0.019	0.042	0.064	0.055	0.017	0.12
Perylene	0.013	0.010	0.011	0.011	0.0046	0.0040	0.0061	0.019	0.0060	0.011	0.012	0.028	0.014	0.034
Indeno[1,2,3-cd]pyrene	0.25	0.31	0.27	0.19	0.11	0.056	0.048	0.36	0.033	0.080	0.090	0.066	0.016	0.17
Benzo[g,h,i]perylene	0.29	0.41	0.15	0.31	0.14	0.068	0.073	0.31	0.037	0.10	0.101	0.17	0.19	0.24
Dibenzo[a,h+a,c]anthracene	0.022	0.017	0.019	0.0014	0.013	0.010	0.0060	0.018	0.0058	0.011	0.012	0.017	0.011	0.030
Coronene	0.16	0.33	0.12	0.17	0.073	0.075	0.063	0.18	0.029	0.16	0.19	0.12	0.10	0.20
Total PAHs	3.4	3.6	2.1	2.7	1.7	0.69	0.76	3.1	0.93	1.4	1.6	1.6	2.0	3.2
Sample Volume (m^3)	754	903	886	815	834	856	856	857	981	1017	1017	636	636	508
Corresponding Laboratory Blank	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	3/5/98	3/5/98	2/16/98
Total Suspended Particulate (mg/m^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22.9	21.7	43.7
Surrogate Recoveries (%)														
d10-Anthracene	47%	100%	76%	94%	88%	87%	96%	89%	89%	88%	88%	89%	85%	86%
d10-Fluoranthene	82%	86%	85%	99%	96%	92%	100%	94%	100%	100%	94%	92%	93%	95%
d12-Benzo[e]Pyrene	104%	81%	92%	101%	101%	97%	100%	98%	100%	96%	98%	100%	100%	100%

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 11/12/97	NB-QFF 11/18/97	NB-QFF 11/24/97	NB-QFF 11/30/97	NB-QFF 12/6/97	NB-QFF 12/12/97	NB-QFF 12/18/97	NB-QFF 12/24/97	NB-QFF 12/30/97	NB-QFF 1/5/98	NB-QFF 1/11/98	NB-QFF 1/17/98	NB-QFF 1/23/98	NB-QFF 1/29/98
Fluorene	0.0081	0.017	0.016	0.030	0.027	0.031	0.035	0.0071	0.0063	0.020	0.031	0.032	0.059	0.080
Phenanthrene	0.11	0.101	0.14	0.24	0.30	0.31	0.51	0.094	0.048	0.23	0.32	0.10	0.043	0.46
Anthracene	0.0082	0.059	0.018	0.030	0.034	0.038	0.10	0.036	0.0074	0.020	0.032	0.053	0.024	0.064
1Methylfluorene	0.018	0.060	0.033	0.040	0.031	0.038	0.035	0.0069	0.0050	0.025	0.024	0.14	0.028	0.034
Dibenzothiophene	0.046	0.056	0.15	0.054	0.006	0.13	0.15	0.019	0.012	0.052	0.20	0.79	0.061	0.13
4,5-Methylenephenanthrene	0.022	0.061	0.024	0.041	0.046	0.049	0.088	0.016	0.0072	0.033	0.058	0.041	0.016	0.066
Methylphenanthrenes	0.18	0.45	0.16	0.31	0.29	0.27	0.60	0.11	0.069	0.48	0.55	0.51	0.025	0.30
Methyldibenzothiophenes	0.048	0.016	0.032	0.023	0.013	0.063	0.050	0.016	0.0041	0.026	0.067	0.18	0.0040	0.067
Fluoranthene	0.011	0.40	0.22	0.23	0.52	0.40	0.75	0.27	0.13	0.25	0.48	0.37	0.033	0.61
Pyrene	0.11	0.28	0.16	0.26	0.34	0.29	0.64	0.19	0.070	0.21	0.002	0.25	0.027	0.53
3,6-Dimethylphenanthrene	0.037	0.094	0.017	0.031	0.064	0.028	0.053	0.012	0.008	0.028	0.048	0.028	0.0087	0.049
Benzo[a]fluorene	0.0028	0.55	0.069	0.10	0.26	0.11	0.24	0.043	0.048	0.11	0.15	0.12	0.016	0.18
Benzo[b]fluorene	0.0071	0.28	0.046	0.061	0.20	0.057	0.17	0.023	0.0094	0.066	0.076	0.070	0	0.11
Retene	0.095	0.050	0.034	0.065	0.026	0.035	0.17	0.023	0.0067	0.17	0.054	0.011	0.049	0.085
Benzo[b]naphtho[2,1-d]thiophene	0.053	0.30	0.066	0.15	0.33	0.055	0.21	0.030	0.0079	0.081	0.055	0.037	0.19	0.069
Cyclopenta[cd]pyrene	0.036	0.086	0.036	0.24	0.21	0.041	0.24	0.022	0.010	0.071	0.11	0.057	0.23	0.088
Benz[a]anthracene	0.062	0.99	0.075	0.23	0.26	0.12	0.54	0.052	0.034	0.21	0.17	0.15	0	0.31
Chrysene/Triphenylene	0.24	1.2	0.22	0.57	0.53	0.40	0.96	0.19	0.093	0.45	0.41	0.37	0.034	0.52
Naphthacene	0	0	0.0069	0.0093	0.0048	0.0047	0.0090	0.0065	0.0016	0.0039	0.024	0.021	0	0.004
Benzo[b+k]fluoranthene	0.69	3.1	0.32	1.2	1.0	0.69	1.7	0.35	0.21	0.63	0.73	0.64	0.081	1.0
Benzo[e]pyrene	0.32	0.91	0.16	0.52	0.49	0.34	0.80	0.17	0.062	0.30	0.35	0.38	0.047	0.56
Benzo[a]pyrene	0.22	0.73	0.087	0.21	0.31	0.068	0.62	0.071	0.045	0.14	0.21	0.18	0.0022	0.40
Perylene	0.015	0.32	0.0021	0.059	0.17	0.0074	0.15	0.015	0.013	0.027	0.049	0.025	0.015	0.092
Indeno[1,2,3-cd]pyrene	0.68	2.3	0.18	0.54	0.68	0.19	0.76	0.099	0.10	0.28	0.44	0.48	0.068	0.34
Benzo[g,h,i]perylene	0.59	1.5	0.16	0.74	0.45	0.33	0.98	0.17	0.060	0.014	0.40	0.53	0.105	0.65
Dibenzo[a,h+a,c]anthracene	0.14	0.61	0.021	0.057	0.32	0.059	0.13	0.035	0.0094	0.038	0.049	0.041	0	0.084
Coronene	0.72	1.8	0.140	0.90	0.43	0.26	0.87	0.16	0.028	0.47	0.37	0.49	0.11	0.58
Total PAHs	4.5	16	2.6	6.9	7.4	4.4	12	2.2	1.1	4.4	5.4	6.1	1.3	7.5
Sample Volume (m^3)	429	444	1099	468	597	593	509	576	451	489	520	541	512	572
Corresponding Laboratory Blank	3/27/98	3/27/98	3/5/98	2/16/98	3/27/98	3/5/98	2/16/98	3/5/98	3/5/98	2/16/98	3/5/98	3/5/98	3/25/98	3/11/98
Total Suspended Particulate (mg/m^3)	35.4	55.4	15.7	52.2	19.9	29.5	57.8	24.8	12.0	1.8	30.0	31.5	7.2	29.4
Surrogate Recoveries (%)														
d10-Anthracene	100%	88%	88%	56%	55%	79%	80%	83%	101%	84%	89%	79%	100%	83%
d10-Fluoranthene	94%	85%	95%	60%	52%	90%	88%	83%	93%	90%	89%	89%	98%	99%
d12-Benzo[e]Pyrene	96%	95%	100%	79%	51%	96%	99%	96%	97%	100%	96%	96%	101%	99%

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 2/4/98	NB-QFF 2/10/98	NB-QFF 2/16/98	NB-QFF 2/22/98	NB-QFF 2/28/98	NB-QFF 3/6/98	NB-QFF 3/12/98	NB-QFF 3/18/98	NB-QFF 3/24/98	NB-QFF 3/30/98	NB-QFF 4/5/98	NB-QFF 4/11/98	NB-QFF 4/17/98	NB-QFF 4/23/98
Fluorene	0.059	0.20	0.029	0.035	0.031	0.034	0.037	0.093	0.069	0.029	0.011	0.032	0.015	0.019
Phenanthrene	0.15	0.38	0.16	0.15	0.11	0.17	0	0.52	0.30	0.13	0.069	0.14	0.035	0.12
Anthracene	0.023	0.052	0.016	0.018	0.010	0.016	0.014	0.055	0.021	0.031	0.0069	0.013	0.004	0.023
1Methylfluorene	0.012	0.045	0.009	0.011	0.009	0.010	0.014	0.069	0.021	0.011	0.0075	0.025	0.020	0.018
Dibenzothiophene	0.11	0.25	0.032	0.052	0.018	0.063	0.106	0.091	0.13	0.010	0.043	0.032	0.0054	0.015
4,5-Methylenephenanthrene	0.032	0.061	0.019	0.50	0.016	0.021	0.030	0.094	0.034	0.016	0.0092	0.014	0.0029	0.018
Methylphenanthrenes	0.30	0.73	0.14	0.13	0.081	0.11	0.27	1.6	0.38	0.15	0.091	0.14	0.030	0.181
Methyldibenzothiophenes	0.020	0.10	0.035	0.045	0.018	0.035	0.011	0.11	0.047	0.010	0.010	0.013	0.002	0.015
Fluoranthene	0.27	0.66	0.22	0.21	0.11	0.23	0.30	0.27	0.32	0.15	0.097	0.18	0.049	0.14
Pyrene	0.19	0.35	0.18	0.19	0.082	0.17	0.22	0.29	0.25	0.11	0.078	0.13	0.035	0.12
3,6-Dimethylphenanthrene	0.022	0.090	0.015	0.024	0.0081	0.0093	0.019	0.049	0.018	0.0095	0.010	0.011	0.0028	0.013
Benzo[a]fluorene	0.068	0.26	0.051	0.060	0.024	0.035	0.021	0.11	0.065	0.033	0.029	0.035	0.0065	0.045
Benzo[b]fluorene	0.033	0.096	0.026	0.033	0.012	0.017	0.030	0.060	0.031	0.013	0.010	0.013	0.0021	0.023
Retene	0.027	0.14	0.028	0.024	0.0065	0.028	0.031	0.051	0.025	0.012	0.016	0.015	0.0023	0.008
Benzo[b]naphtho[2,1-d]thiophene	0.034	0.17	0.028	0.0063	0.035	0.025	0.023	0.027	0.034	0.038	0.0078	0.031	0.0040	0.011
Cyclopenta[cd]pyrene	0.0087	0.18	0.024	0.0028	0.013	0.017	0.024	0.044	0.037	0.014	0.027	0.055	0.0027	0.022
Benz[a]anthracene	0.077	0.33	0.074	0.097	0.026	0.048	0.022	0.15	0.028	0.057	0.033	0.045	0.0064	0.062
Chrysene/Triphenylene	0.25	0.67	0.20	0.21	0.090	0.18	0.071	0.29	0.088	0.13	0.091	0.15	0.027	0.13
Naphthacene	0	0.0024	0.0019	0.016	0.0028	0.0014	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.41	1.2	0.33	0.43	0.17	0.33	0.38	0.42	0.47	0.23	0.15	0.33	0.037	0.21
Benzo[e]pyrene	0.21	0.50	0.20	0.23	0.10	0.17	0.18	0.28	0.24	0.091	0.071	0.17	0.025	0.11
Benzo[a]pyrene	0.08	0.30	0.088	0.13	0.023	0.042	0.094	0.14	0.12	0.054	0.040	0.084	0.015	0.054
Perylene	0.014	0.076	0.023	0.031	0.0034	0.0055	0.023	0.030	0.026	0.012	0.0092	0.019	0.0028	0.013
Indeno[1,2,3-cd]pyrene	0.19	0.43	0.11	0.15	0.062	0.10	0.17	0.29	0.22	0.16	0.14	0.28	0.029	0.17
Benzo[g,h,i]perylene	0.21	0.68	0.21	0.33	0.17	0.18	0.18	0.51	0.28	0.094	0.090	0.21	0.019	0.15
Dibenzo[a,h+a,c]anthracene	0.031	0.085	0.033	0.032	0.010	0.031	0.0090	0.015	0.030	0.022	0.018	0.031	0.0029	0.020
Coronene	0.17	0.80	0.18	0.29	0.17	0.13	0.16	0.51	0.26	0.074	0.098	0.22	0.010	0.14
Total PAHs	3.0	8.9	2.4	3.4	1.4	2.2	2.4	6.1	3.5	1.7	1.3	2.4	0.39	1.8
Sample Volume (m^3)	587	287	593	609	597	568	612	597	473	546	554	568	532	549
Corresponding Laboratory Blank	2/16/98	3/11/98	3/11/98	3/11/98	3/11/98	3/11/98	3/27/98	3/27/98	3/27/98	5/27/98	6/1/98	6/29/98	5/27/98	6/1/98
Total Suspended Particulate (mg/m^3)	24.5	68.0	29.2	23.0	22.8	21.5	19.6	18.8	30.0	60.9	13.9	22.9	27.4	25.3
Surrogate Recoveries (%)														
d10-Anthracene	87%	77%	78%	66%	62%	86%	62%	54%	72%	88%	78%	76%	86%	51%
d10-Fluoranthene	88%	89%	91%	85%	90%	88%	85%	84%	95%	90%	88%	86%	84%	55%
d12-Benzo[e]Pyrene	98%	100%	96%	94%	99%	101%	90%	88%	96%	97%	95%	94%	97%	58%

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 4/29/98	NB-QFF 5/5/98	NB-QFF 5/11/98	NB-QFF 5/17/98	NB-QFF 5/23/98	NB-QFF 5/29/98	NB-QFF 6/4/98	NB-QFF 6/10/98	NB-QFF 6/16/98	NB-QFF 6/22/98	NB-QFF 6/25/98	day NB-QFF 6/26/98	night NB-QFF 6/26/98	NB-QFF 6/28/98
Fluorene	0.024	0.020	0.018	0.028	0.017	0.28	0.064	0.057	0.047	0.058	0.016	0.056	0.085	0.0055
Phenanthrene	0.26	0.16	0.077	0.15	0.091	0.28	0.11	0.10	0.11	0.11	0.099	0.16	0.13	0.040
Anthracene	0.034	0.039	0.016	0.024	0.015	0.047	0.016	0.028	0.0088	0.010	0.041	0.055	0.086	0.016
1Methylfluorene	0.032	0.032	0.020	0.005	0.014	0.026	0.038	0.027	0.016	0.012	0.017	0.013	0.035	0.0086
Dibenzothiophene	0.021	0.016	0.022	0.012	0.010	0.019	0.023	0.016	0.0074	0.014	0.018	0.017	0.011	0.0047
4,5-Methylenephenanthrene	0.031	0.024	0.011	0.017	0.010	0.024	0.015	0.011	0.0086	0.012	0.012	0.017	0.015	0.0054
Methylphenanthrenes	0.24	0.35	0.17	0.23	0.11	0.21	0.21	0.17	0.10	0.22	0.17	0.21	0.21	0.052
Methyldibenzothiophenes	0.020	0.025	0.020	0.012	0.010	0.015	0.020	0.0071	0.0025	0.017	0.018	0.017	0.023	0.0046
Fluoranthene	0.30	0.20	0.095	0.18	0.14	0.30	0.14	0.14	0.19	0.16	0.12	0.19	0.13	0.065
Pyrene	0.21	0.17	0.082	0.13	0.10	0.23	0.11	0.097	0.11	0.10	0.065	0.11	0.073	0.044
3,6-Dimethylphenanthrene	0.014	0.030	0.013	0.015	0.0063	0.0091	0.016	0.012	0.0052	0.011	0.0069	0.006	0.0073	0.0037
Benzo[a]fluorene	0.047	0.093	0.029	0.032	0.020	0.045	0.048	0.039	0.024	0.033	0.019	0.029	0.019	0.310
Benzo[b]fluorene	0.020	0.027	0.012	0.013	0.0072	0.013	0.016	0.012	0.0072	0.0065	0.0079	0.012	0.0064	0.0075
Retene	0.011	0.023	0.0057	0.0092	0.0086	0.015	0.013	0.013	0.0030	0.0088	0.021	0.0074	0.0077	0.030
Benzo[b]naphtho[2,1-d]thiophene	0.023	0.010	0.0066	0.013	0.0070	0.042	0.0004	0.012	0.031	0.0051	0.017	0.029	0.015	0.038
Cyclopenta[cd]pyrene	0.012	0.10	0.021	0.022	0.039	0	0.0076	0.0037	0.0049	0	0.0052	0.0090	0.0040	0.0024
Benz[a]anthracene	0.074	0.11	0.041	0.052	0.031	0.059	0.043	0.031	0.027	0.022	0.024	0.047	0.021	0.011
Chrysene/Triphenylene	0.22	0.27	0.095	0.15	0.10	0.20	0.11	0.10	0.12	0.087	0.093	0.16	0.075	0.0078
Naphthacene	0	0.0006	0	0	0	0	0	0	0	0	0	0	0	0.31
Benzo[b+k]fluoranthene	0.40	0.39	0.16	0.25	0.20	0.35	0.19	0.12	0.19	0.14	0.13	0.28	0.13	0
Benzo[e]pyrene	0.17	0.16	0.077	0.12	0.087	0.17	0.096	0.050	0.096	0.044	0.062	0.094	0.058	0.035
Benzo[a]pyrene	0.060	0.068	0.040	0.057	0.047	0.099	0.15	0.023	0.045	0	0.048	0.039	0.059	0.012
Perylene	0.0038	0.011	0.009	0.011	0.011	0	0.017	0	0.0065	0	0.011	0.0093	0.011	0.0019
Indeno[1,2,3-cd]pyrene	0.28	0.34	0.18	0.20	0.14	0.25	0.18	0.072	0.13	0.076	0.10	0.15	0.10	0.048
Benzo[g,h,i]perylene	0.19	0.29	0.17	0.17	0.11	0.15	0.18	0.054	0.094	0.042	0.074	0.091	0.063	0.033
Dibenzo[a,h+a,c]anthracene	0.043	0.031	0.017	0.023	0.017	0.030	0.015	0.0080	0.020	0.011	0.011	0.024	0.0072	0.0045
Coronene	0.14	0.36	0.24	0.22	0.15	0.068	0.15	0.037	0.050	0.029	0.064	0.058	0.039	0.014
Total PAHs	2.9	3.3	1.6	2.1	1.5	2.9	2.0	1.2	1.5	1.2	1.3	1.9	1.4	1.1
Sample Volume (m^3)	496	516	544	461	618	136	583	563	494	569	331	329	307	613
Corresponding Laboratory Blank	5/27/98	5/27/98	6/1/98	5/27/98	6/1/98	6/29/98	6/29/98	6/29/98	7/1/98	7/1/98	7/1/98	7/1/98	7/1/98	8/6/98
Total Suspended Particulate (mg/m^3)	88.1	64.9	48.5	69.0	39.1	196.1	24.4	51.8	58.3	58.9	41.4	86.2	73.2	28.7
Surrogate Recoveries (%)														
d10-Anthracene	72%	56%	84%	78%	80%	21%	70%	45%	38%	85%	78%	89%	83%	87%
d10-Fluoranthene	90%	63%	85%	88%	88%	23%	85%	54%	53%	88%	111%	96%	95%	96%
d12-Benzo[e]Pyrene	98%	80%	98%	97%	99%	32%	98%	80%	80%	98%	105%	98%	99%	99%

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 7/4/98	10% day NB-QFF 7/5/98	10% night NB-QFF 7/5/98	10% day NB-QFF 7/6/98	10% night NB-QFF 7/6/98	10% day NB-QFF 7/7/98	10% night NB-QFF 7/7/98	10% day NB-QFF 7/8/98	10% night NB-QFF 7/8/98	10% day NB-QFF 7/9/98	10% night NB-QFF 7/9/98	10% day NB-QFF 7/10/98	10% night NB-QFF 7/10/98	10% day NB-QFF 7/11/98
Fluorene	0.0068	0.051	Too Little	0.051	0.15	0.075	0.35	0.033	0.046	0.091	0.16	0.044	0.017	0.020
Phenanthrene	0.062	0.030	Mass to	0.075	0.14	0.048	0.20	0.079	0.053	0.059	0.066	0.079	0.045	0.059
Anthracene	0.0060	0.010	Quantify	0.022	0.020	0.019	0.060	0.017	0.018	0.0081	0.015	0.020	0.022	0.014
1Methylfluorene	0.0047	0.042		0.066	0.078	0.15	1.3	0.069	0.066	0.017	0.12	0.047	0.19	0.068
Dibenzothiophene	0.0037	0.0027		0.0073	0.024	0.0044	0.051	0.0090	0.011	0.0071	0.0074	0.010	0.022	0.0070
4,5-Methylenephenanthrene	0.0079	0.0018		0.0079	0.010	0.0040	0.015	0.0072	0.0047	0.0056	0.0053	0.0086	0.0052	0.0073
Methylphenanthrenes	0.063	0.059		0.14	0.22	0.060	0.27	0.13	0.095	0.100	0.093	0.11	0.066	0.060
Methyldibenzothiophenes	0.0052	0.0029		0.0089	0.022	0.0034	0.050	0.0072	0.0066	0.0088	0.0063	0.0074	0.011	0.0055
Fluoranthene	0.065	0.041		0.10	0.17	0.074	0.25	0.13	0.078	0.081	0.076	0.095	0.058	0.064
Pyrene	0.048	0.026		0.067	0.13	0.055	0	0.094	0.047	0.052	0.050	0.072	0.036	0.046
3,6-Dimethylphenanthrene	0.0036	0.0015		0.0061	0.010	0.0050	0	0.011	0.0066	0.0019	0.0066	0.0064	0.0034	0.0040
Benzo[a]fluorene	0.014	0.021		0.017	0.043	0.016	0	0.035	0.016	0	0.019	0.023	0.0056	0
Benzo[b]fluorene	0.0046	0		0.013	0.019	0.0021	0.014	0.011	0.0062	0.0069	0.0047	0.0067	0.0040	0.0027
Retene	0.011	0.0069		0.013	0.016	0.010	0.087	0.0075	0.0079	0.0075	0.0055	0.010	0.0092	0.017
Benzo[b]naphtho[2,1-d]thiophene	0.011	0.0045		0.014	0.028	0.012	0.018	0.0027	0.0093	0.015	0.0094	0.016	0.0068	0.0074
Cyclopenta[cd]pyrene	0.0015	0.0050		0.034	0.055	0.0044	0.015	0.0064	0.0032	0.0017	0.0035	0.033	0.033	0.0003
Benz[a]anthracene	0.014	0.031		0.063	0.056	0.0075	0	0.030	0.014	0.016	0.017	0.025	0.012	0.0068
Chrysene/Triphenylene	0.048	0.052		0.11	0.12	0.052	0.080	0.093	0.051	0.058	0.056	0.080	0.035	0.038
Naphthacene	0	0.010		0.024	0.013	0	0	0	0	0.0070	0	0.018	0	0
Benzo[b+k]fluoranthene	0.12	0.26		0.37	0.17	0.083	0.12	0.12	0.087	0.097	0.12	0.12	0.059	0.054
Benzo[e]pyrene	0.044	0.059		0.074	0.076	0.052	0.059	0.050	0.032	0.043	0.038	0.058	0.032	0.035
Benzo[a]pyrene	0.015	0.0088		0.023	0.052	0.038	0.046	0.043	0.034	0.030	0.024	0.022	0.017	0.049
Perylene	0.0036	0.0010		0.0054	0.012	0.0038	0.019	0.0084	0.0056	0.0040	0.0033	0.013	0.0054	0.0028
Indeno[1,2,3-cd]pyrene	0.088	0.072		0.17	0.12	0.049	0.047	0.11	0.028	0.067	0.11	0.11	0.067	0.0088
Benzo[g,h,i]perylene	0.054	0.045		0.085	0.096	0.029	0.082	0.076	0.050	0.046	0.061	0.086	0.058	0.039
Dibenzo[a,h+a,c]anthracene	0.011	0.0092		0.029	0.020	0	0.014	0.020	0.013	0.012	0.017	0.010	0.0051	0
Coronene	0.034	0.043		0.22	0.14	0.018	0.089	0.050	0.053	0.054	0.078	0.100	0.091	0.028
Total PAHs	0.75	0.90		1.8	2.0	0.88	3.2	1.3	0.84	0.90	1.2	1.2	0.91	0.64
Sample Volume (m^3)	579	363		337	344	345	23	331	353	377	337	336	342	344
Corresponding Laboratory Blank	8/6/98	7/15/98		7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98
Total Suspended Particulate (mg/m^3)	NA	27.8		35.9	33.7	46.4	349.8	35.0	36.3	45.4	75.0	50.5	31.0	39.2
Surrogate Recoveries (%)														
d10-Anthracene	89%	83%		85%	76%	26%	56%	76%	59%	70%	104%	60%	56%	35%
d10-Fluoranthene	97%	95%		89%	78%	22%	52%	73%	70%	74%	121%	75%	69%	32%
d12-Benzo[e]Pyrene	100%	98%		89%	76%	17%	50%	62%	63%	70%	111%	85%	84%	33%

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 7/16/98	NB-QFF 7/22/98	NB-QFF 7/28/98	NB-QFF 8/3/98	NB-QFF 8/9/98	NB-QFF 8/15/98	NB-QFF 8/21/98	NB-QFF 8/27/98	NB-QFF 9/2/98	NB-QFF 9/4/98	NB-QFF 9/8/98	NB-QFF 9/13/98	NB-QFF 9/19/98	NB-QFF 9/22/98
Fluorene	Vial Broke	0.11	0.038	0.099	0.016	0.023	0.046	0.024	0.025	0.032	0.068	0.092	0.029	0.047
Phenanthrene	Sample	0.017	0.060	0.081	0.031	0.030	0.038	0.099	0.12	0.074	1.1	0.036	0.050	0.43
Anthracene	Lost	0.0057	0.025	0.025	0.0061	0.014	0.020	0.029	0.012	0.019	0.014	0.019	0.0046	0.034
1Methylfluorene		0.0039	0.0069	0.013	0.0053	0.0036	0.0068	0.014	0.023	0.0069	0.019	0.0076	0.014	0.039
Dibenzothiophene		0.0037	0.0042	0.0069	0.0015	0.0033	0.0078	0.011	0.012	0.0051	0.010	0.0038	0.0068	0.021
4,5-Methylenephenanthrene		0	0.011	0.015	0.0036	0.0005	0.0045	0.012	0.013	0.0094	0.0059	0.0057	0.0045	0.052
Methylphenanthrenes		0.031	0.080	0.097	0.050	0.034	0.046	0.15	0.16	0.094	0.078	0.057	0.053	0.77
Methyldibenzothiophenes		0	0.0077	0.0081	0.0042	0.001	0.0041	0.012	0.015	0.0048	0.0068	0.0052	0.0072	0.13
Fluoranthene		0.030	0.105	0.13	0.047	0.040	0.068	0.125	0.14	0.10	0.072	0.070	0.017	0.71
Pyrene		0.019	0.071	0.095	0.029	0.024	0.048	0.091	0.13	0.081	0.056	0.044	0.017	0.53
3,6-Dimethylphenanthrene		0.0017	0.0042	0.010	0.0027	0.0032	0.0041	0.011	0.017	0.0075	0.0085	0.0054	0.0045	0.075
Benzo[a]fluorene		0.0053	0.018	0.028	0.0068	0.0078	0.016	0.022	0.047	0.030	0.022	0.013	0.0046	0.19
Benzo[b]fluorene		0.0011	0.0042	0.0093	0.0025	0.0019	0.0053	0.013	0.013	0.0063	0.0065	0.0038	0.0007	0.047
Retene		0.0022	0.0036	0.017	0.0031	0.0039	0.0025	0.0072	0.015	0.023	0.010	0.0046	0.0089	0.13
Benzo[b]naphtho[2,1-d]thiophene		0.0021	0.014	0.017	0.0082	0	0.0022	0.026	0.0027	0.0083	0.0064	0.013	0.0016	0.018
Cyclopenta[cd]pyrene		0.0015	0.0007	0.010	0.0007	0.0010	0.0028	0.0047	0.052	0.0049	0.027	0.0033	0.0075	0.037
Benz[a]anthracene		0.0063	0.023	0.035	0.0073	0.0065	0.013	0.034	0.045	0.023	0.018	0.0093	0.0028	0.077
Chrysene/Triphenylene		0.019	0.074	0.090	0.032	0.029	0.038	0.096	0.083	0.081	0.049	0.039	0.011	0.13
Naphthacene		0	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene		0.034	0.133	0.15	0.044	0.058	0.053	0.15	0.15	0.13	0.089	0.076	0.028	0.25
Benzo[e]pyrene		0.016	0.061	0.069	0.026	0.023	0.029	0.077	0.073	0.081	0.045	0.044	0.011	0.10
Benzo[a]pyrene		0.0088	0.031	0.039	0.010	0.010	0.018	0.050	0.15	0.050	0.041	0.015	0.098	0.15
Perylene		0.0018	0.0063	0.012	0	0.0014	0.0026	0.0085	0.017	0.0080	0.020	0.0021	0.0076	0.018
Indeno[1,2,3-cd]pyrene		0.031	0.110	0.12	0.012	0.037	0.037	0.045	0.25	0.12	0.098	0.040	0.017	0.11
Benzo[g,h,i]perylene		0.016	0.062	0.081	0.021	0.027	0.030	0.084	0.20	0.11	0.096	0.029	0.012	0.14
Dibenzo[a,h+a,c]anthracene		0.0035	0.0092	0.015	0.0052	0.0038	0.0036	0.013	0.022	0.017	0.010	0.0034	ND	0.013
Coronene		0.0084	0.041	0.077	0.011	0.030	0.027	0.081	0.33	0.073	0.086	0.019	0.011	0.044
Total PAHs		0.38	1.0	1.3	0.39	0.42	0.57	1.3	2.1	1.2	2.1	0.66	0.43	4.3
Sample Volume (m^3)		670	616	611	613	673	662	666	596	697	652	536	682	626
Corresponding Laboratory Blank		9/14/98	9/14/98	9/14/98	9/18/98	9/24/98	9/24/98	9/18/98	10/15/98	9/24/98	9/24/98	9/24/98	10/15/98	10/15/98
Total Suspended Particulate (mg/m^3)		27.6	70.3	58.1	51.3	36.9	27.7	46.9	47.2	54.1	24.4	42.0	14.5	52.4
Surrogate Recoveries (%)														
d10-Anthracene		90%	84%	89%	89%	27%	61%	93%	101%	62%	89%	85%	106%	98%
d10-Fluoranthene		98%	95%	97%	94%	35%	68%	98%	99%	68%	89%	97%	97%	95%
d12-Benzo[e]Pyrene		104%	101%	99%	99%	54%	75%	100%	106%	66%	97%	101%	100%	99%

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m³)

PAH	NB-QFF 9/25/98	NB-QFF 10/1/98	NB-QFF 10/7/98	NB-QFF 10/10/98	NB-QFF 10/13/98	NB-QFF 10/19/98	NB-QFF 10/28/98	NB-QFF 11/6/98	NB-QFF 11/15/98	NB-QFF 11/24/98	NB-QFF 12/3/98	NB-QFF 12/12/98	NB-QFF 12/21/98	NB-QFF 12/30/98
Fluorene	0.062	0.040	0.060	0.035	0.059	0.028	0.020	0.018	0.032	0.034	0.028	0.11	0.021	0.034
Phenanthrene	0.14	0.11	0.028	0.027	0.078	0.019	0.067	0.16	0.12	0.11	0.22	0.19	0.20	0.39
Anthracene	0.017	0.020	0.012	0.0080	0.0089	0.030	0.011	0.021	0.016	0.013	0.032	0.039	0.034	0.025
1Methylfluorene	0.024	0.015	0.0012	0.00048	0.098	0.011	0.013	0.021	0.0087	0.016	0.036	0.017	0.027	0.040
Dibenzothiophene	0.012	0.030	0.011	0.0027	0.0074	0.23	0.0084	0.091	0.050	0.042	0.016	0.019	0.014	0.062
4,5-Methylenephenanthrene	0.013	0.017	0.0048	0.0024	0.0071	0.019	0.0078	0.024	0.018	0.015	0.026	0.045	0.027	0.070
Methylphenanthrenes	0.19	0.16	0.10	0.028	0.13	0.21	0.10	0.19	0.093	0.17	0.34	0.49	0.28	0.53
Methyldibenzothiophenes	0.018	0.013	0.010	0.012	0.0092	0.45	0.012	0.044	0.031	0.020	0.039	0.11	0.020	0.033
Fluoranthene	0.12	0.20	0.084	0.035	0.11	1.6	0.066	0.19	0.14	0.13	0.21	0.32	0.22	0.57
Pyrene	0.10	0.18	0.064	0.026	0.081	1.4	0.055	0.18	0.12	0.10	0.19	0.27	0.17	0.44
3,6-Dimethylphenanthrene	0.014	0.020	0.0066	0.0020	0.0063	0.14	0.0071	0.018	0.015	0.018	0.019	0.038	0.023	0.073
Benzo[a]fluorene	0.038	0.11	0.021	0.0080	0.015	0.34	0.015	0.059	0.037	0.026	0.054	0.13	0.055	0.15
Benzo[b]fluorene	0.010	0.029	0.0071	0.0019	0.0055	0.17	0.0073	0.0012	0.020	0.012	0.028	0.090	0.029	0.079
Retene	0.016	0.025	0.0082	0.0027	0.011	0.19	0.011	0.13	0.037	0.015	0.12	0.045	0.031	0.090
Benzo[b]naphtho[2,1-d]thiophene	0.087	0.039	0.020	0.0082	0.010	0.29	0.012	0.016	0.016	0.018	0.047	0.052	0.0028	0.025
Cyclopenta[cd]pyrene	0.020	0.047	0.011	0.0020	0	0.32	0.0064	0.050	0.026	0.070	0.025	0.204	0	0.054
Benz[a]anthracene	0.065	0.19	0.023	0.0076	0.022	0.75	0.024	0.13	0.071	0.040	0.12	0.33	0.092	0.16
Chrysene/Triphenylene	0.13	0.19	0.073	0.042	0.072	1.5	0.058	0.25	0.17	0.087	0.26	0.63	0.21	0.34
Naphthacene	0	0	0	0	0.0084	0.30	0.0089	0	0.020	0.018	0.029	0.075	0	0
Benzo[b+k]fluoranthene	0.31	0.49	0.13	0.13	0.12	2.9	0.11	0.58	0.42	0.14	0.54	1.8	0.36	0.55
Benzo[e]pyrene	0.14	0.15	0.086	0.084	0.056	0.16	0.054	0.26	0.17	0.072	0.26	0.40	0.15	0.22
Benzo[a]pyrene	0.15	0.23	0.030	0.020	0.027	0.10	0.027	0.18	0.10	0.048	0.15	0.31	0.070	0.15
Perylene	0.015	0.039	0.0055	0.0044	0.0050	0.026	0.0074	0.042	0.023	0.012	0.033	0.069	0.014	0.036
Indeno[1,2,3-cd]pyrene	0.46	0.59	0.10	0.074	0.11	0.24	0.074	0.51	0.34	0.094	0.40	0.68	0.21	0.31
Benzo[g,h,i]perylene	0.29	0.35	0.17	0.083	0.076	0.27	0.068	0.40	0.27	0.087	0.37	0.60	0.16	0.25
Dibenzo[a,h+a,c]anthracene	0.038	0.074	0.011	0.011	0.0057	0.024	0.0093	0.051	0.039	0.014	0.047	0.078	0.033	0.043
Coronene	0.49	0.60	0.17	0.070	0.090	0.29	0.073	0.50	0.34	0.076	0.41	0.72	0.17	0.24
Total PAHs	3.0	3.9	1.2	0.73	1.2	12.0	0.93	4.1	2.8	1.5	4.0	7.9	2.6	5.0
Sample Volume (m³)	680	621	649	615	655	668	1176	613	659	635	750	642	622	666
Corresponding Laboratory Blank	10/15/98	10/15/98	10/19/98	10/19/98	1/4/99	2/9/99	2/9/99	1/4/99	1/4/99	2/17/99	2/17/99	2/17/99	3/2/99	3/2/99
Total Suspended Particulate (mg/m³)	47.9	45.1	44.2	18.5	33.9	55.4	35.0	40.4	34.1	21.9	58.8	42.9	77.5	24.0
Surrogate Recoveries (%)														
d10-Anthracene	86%	113%	51%	70%	57%	57%	62%	65%	65%	58%	63%	23%	60%	81%
d10-Fluoranthene	94%	97%	86%	85%	81%	9%	94%	85%	87%	82%	91%	40%	89%	90%
d12-Benzo[e]Pyrene	99%	100%	92%	93%	87%	94%	100%	89%	92%	92%	99%	89%	88%	99%

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 1/8/99	NB-QFF 1/17/99	NB-QFF 1/26/99	NB-QFF 2/4/99	NB-QFF 2/13/99	NB-QFF 2/22/99	NB-QFF 3/3/99	NB-QFF 3/12/99	NB-QFF 3/21/99	NB-QFF 3/30/99	NB-QFF 4/8/99	NB-QFF 4/16/99	NB-QFF 4/26/99	NB-QFF 5/5/99
Fluorene	0.045	0.048	0.049	0.027	0.019	0.073	0.056	0.027	0.043	0.016	0.054	0.024	0.050	0.047
Phenanthrene	0.36	0.53	0.50	0.35	0.20	0.91	0.13	0.091	0.070	0.090	0.28	0.038	0.18	0.19
Anthracene	0.037	0.043	0.049	0.031	0.015	0.039	0.016	0.0082	0.017	0.012	0.044	0.0034	0.019	0.025
1Methylfluorene	0.066	0.022	0.054	1.2	0.089	0.070	0.015	0.010	0.016	0.020	0.048	0.0086	0.012	0.016
Dibenzothiophene	0.051	0.033	0.094	0.058	0.032	0.10	0.012	0.0036	0.0098	0.032	0.058	0.0049	0.031	0.012
4,5-Methylenephenanthrene	0.068	0.051	0.088	0.046	0.031	0.14	0.015	0.011	0.010	0.013	0.040	0.0031	0.022	0.021
Methylphenanthrenes	0.91	0.53	0.88	0.39	0.17	1.2	0.096	0.087	0.099	0.13	0.43	0.050	0.16	0.22
Methyldibenzothiophenes	0.098	0.049	0.054	0.035	0.018	0.052	0.010	0.0090	0.0076	0.013	0.039	0.0015	0.012	0.014
Fluoranthene	0.50	0.83	0.74	0.36	0.29	1.1	0.17	0.12	0.12	0.13	0.46	0.042	0.31	0.23
Pyrene	0.51	0.63	0.77	0.27	0.21	0.87	0.11	0.074	0.077	0.10	0.36	0.026	0.26	0.16
3,6-Dimethylphenanthrene	0.13	0.051	0.11	0.025	0.016	0.13	0.0086	0.0059	0.0053	0.013	0.035	0.0025	0.011	0.014
Benzo[a]fluorene	0.33	0.12	0.22	0.065	0.067	0.24	0.024	0.015	0.018	0.027	0.13	0.0071	0.050	0.030
Benzo[b]fluorene	0.22	0.050	0.0051	0.032	0.023	0.10	0.0082	0.0063	0.010	0.015	0.047	0.0039	0.024	0.015
Retene	0.39	0.064	0.095	0.022	0.034	0.082	0.010	0.0029	0.010	0.021	0.030	0.0049	0.015	0.013
Benzo[b]naphtho[2,1-d]thiophene	0.079	0.066	0.058	0.048	0.013	0.025	0.019	0.0092	0.014	0.018	0.132	0.0045	0.039	0.028
Cyclopenta[cd]pyrene	0.017	0.0045	0.43	0.038	0.032	0.12	0.0017	0.0082	0.0074	0.043	0.071	0.0008	0.0083	0.0050
Benz[a]anthracene	0.57	0.17	0.48	0.12	0.072	0.21	0.0078	0.020	0.035	0.053	0.12	0.013	0.079	0.043
Chrysene/Triphenylene	0.99	0.55	0.79	0.29	0.21	0.64	0.022	0.075	0.11	0.11	0.32	0.036	0.21	0.13
Naphthacene	0	0	0	0	0	0	0	0.037	0.040	0	0	0	0	0
Benzo[b+k]fluoranthene	1.7	1.2	1.6	0.53	0.37	1.0	0.16	0.12	0.17	0.21	0.55	0.071	0.35	0.19
Benzo[e]pyrene	0.76	0.50	0.67	0.25	0.15	0.41	0.075	0.057	0.069	0.10	0.23	0.037	0.18	0.11
Benzo[a]pyrene	0.43	0.24	0.59	0.12	0.094	0.22	0.016	0.037	0.037	0.070	0.14	0.0065	0.11	0.056
Perylene	0.074	0.033	0.14	0.031	0.022	0.044	0.0010	0.010	0.0090	0.019	0.036	0.0004	0.029	0.013
Indeno[1,2,3-cd]pyrene	1.2	0.68	0.71	0.27	0.16	0.34	0.069	0.063	0.079	0.13	0.24	0.040	0.18	0.11
Benzo[g,h,i]perylene	1.1	0.52	0.84	0.28	0.27	0.62	0.10	0.053	0.067	0.12	0.17	0.046	0.16	0.11
Dibenzo[a,h+a,c]anthracene	0.12	0.083	0.062	0.029	0.0089	0.52	0.0038	0.0063	0.0074	0.013	0.031	0.0035	0.022	0.013
Coronene	1.3	0.40	0.61	0.0049	0.11	0.25	0.30	0.033	0.049	0.12	0.15	0.041	0.10	0.076
Total PAHs	12	7.5	11	5.0	2.7	9.5	1.5	1.0	1.2	1.7	4.2	0.52	2.6	1.9
Sample Volume (m^3)	578	581	579	512	770	713	709	596	541	594	644	617	614	626
Corresponding Laboratory Blank	3/2/99	3/2/99	4/12/99	4/12/99	4/21/99	4/21/99	4/21/99	5/18/99	5/18/99	5/18/99	5/18/99	5/23/99	5/23/99	5/23/99
Total Suspended Particulate (mg/m^3)	78.2	55.4	45.6	39.7	26.1	34.6	33.0	16.9	45.5	28.1	70.0	37.6	61.0	106.6
Surrogate Recoveries (%)														
d10-Anthracene	70%	70%	58%	50%	74%	87%	67%	66%	61%	81%	79%	64%	81%	63%
d10-Fluoranthene	81%	89%	79%	92%	84%	88%	92%	84%	88%	90%	86%	90%	91%	92%
d12-Benzo[e]Pyrene	82%	88%	94%	95%	89%	99%	97%	90%	88%	99%	88%	93%	95%	91%

A.1.
New Brunswick Particulate Phase PAHs (NB-QFF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 5/14/99	NB-QFF 5/23/99	NB-QFF 6/1/99	NB-QFF 6/10/99	NB-QFF 6/19/99	NB-QFF 6/28/99	NB-QFF 7/7/99	NB-QFF 7/16/99	NB-QFF 7/25/99	NB-QFF 8/3/99	NB-QFF 8/30/99	NB-QFF 9/8/99	NB-QFF 9/15/99
Fluorene	0.005	0.025	0.0092	0.015	0.0092	0.0075	0.0080	0.075	0.061	0.050	0.021	0.017	0.016
Phenanthrene	0.15	0.074	0.15	0.19	0.11	0.071	0.11	0.12	0.068	0.13	0.10	0.086	0.11
Anthracene	0.021	0.0082	0.021	0.033	0.025	0.017	0.050	0.024	0.021	0.024	0.032	0.0052	0.013
1Methylfluorene	0.006	0.0073	0.018	0.075	0.013	0.0076	0.018	0.012	0.012	0.0093	0.0093	0.010	0.014
Dibenzothiophene	0.026	0.0036	0.0089	0.0084	0.0076	0.0030	0.0062	0.0060	0.0055	0.0093	0.012	0.0044	0.010
4,5-Methylenephenanthrene	0.016	0.0076	0.017	0.028	0.014	0.0090	0.014	0.017	0.011	0.012	0.016	0.0084	0.012
Methylphenanthrenes	0.15	0.10	0.18	0.41	0.14	0.086	0.16	0.14	0.083	0.13	0.079	0.11	0.17
Methyldibenzothiophenes	0.008	0.0022	0.0081	0.0094	0.013	0.0032	0.0087	0.0077	0.0027	0.009	0.0036	0.0020	0.0028
Fluoranthene	0.25	0.077	0.16	0.020	0.14	0.091	0.14	0.15	0.088	0.15	0.16	0.12	0.013
Pyrene	0.17	0.048	0.11	0.15	0.091	0.065	0.094	0.11	0.055	0.10	0.13	0.070	0.089
3,6-Dimethylphenanthrene	0.010	0.0061	0.010	0.013	0.0066	0.0033	0.0077	0.0089	0.0057	0.010	0.0092	0.010	0.019
Benzo[a]fluorene	0.030	0.014	0.017	0.038	0.020	0.0081	0.020	0.028	0.012	0.024	0.035	0.023	0.031
Benzo[b]fluorene	0.016	0.0039	0.0090	0.018	0.010	0.0041	0.011	0.0063	0.0017	0.012	0.0048	0.010	0.0046
Retene	0.014	0.0085	0.019	0.023	0.013	0.011	0.030	0.028	0.017	0.016	0.011	0.017	0.013
Benzo[b]naphtho[2,1-d]thiophene	0.035	0.014	0.021	0.029	0.022	0.014	0.044	0.068	0.010	0.017	0.023	0.015	0.020
Cyclopenta[cd]pyrene	0.026	0.0005	0.0016	0.0014	0.0083	0.0019	0.0031	0.0013	0.0005	0.0068	0.015	0.0025	0.014
Benz[a]anthracene	0.063	0.019	0.033	0.055	0.033	0.015	0.030	0.036	0.017	0.033	0.054	0.014	0.039
Chrysene/Triphenylene	0.18	0.059	0.10	0.14	0.095	0.055	0.10	0.10	0.051	0.081	0.11	0.057	0.094
Naphthacene	0	0	0.0064	0	0	0	0.027	0	0.0066	0.0084	0	0	0
Benzo[b+k]fluoranthene	0.33	0.072	0.14	0.20	0.20	0.10	0.16	0.16	0.068	0.10	0.23	0.077	0.16
Benzo[e]pyrene	0.19	0.043	0.080	0.10	0.079	0.041	0.051	0.095	0.040	0.060	0.096	0.032	0.063
Benzo[a]pyrene	0.094	0.016	0.037	0.024	0.034	0.021	0.019	0.029	0.016	0.027	0.043	0.0091	0.018
Perylene	0.024	0.0031	0.0083	0.0002	0.0081	0.0047	0.0053	0.0051	0.0028	0.0059	0.012	0.0019	0.0038
Indeno[1,2,3-cd]pyrene	0.19	0.050	0.065	0.082	0.075	0.038	0.043	0.14	0.055	0.076	0.054	0.016	0.039
Benzo[g,h,i]perylene	0.27	0.082	0.0056	0.12	0.079	0.030	0.039	0.091	0.043	0.067	0.14	0.038	0.11
Dibenzo[a,h+a,c]anthracene	0.017	0.0047	0.012	0.010	0.0089	0.0058	0.0069	0.021	0.0051	0.0064	0.012	0.0044	0.0061
Coronene	0.26	0.10	0.059	0.11	0.081	0.017	0.035	0.053	0.038	0.058	0.16	0.045	0.17
Total PAHs	2.5	0.85	1.3	1.9	1.3	0.73	1.3	1.5	0.79	1.2	1.6	0.80	1.2
Sample Volume (m^3)	526	864	712	740	667	609	680	614	770	752	869	751	795
Corresponding Laboratory Blank	5/23/99	5/23/99	7/28/99	7/28/99	8/3/99	8/3/99	8/3/99	9/24/99	9/24/99	9/24/99	10/12/99	10/12/99	10/12/99
Total Suspended Particulate (mg/m^3)	54.2	68.0	89.2	67.1	44.8	52.1	50.3	102.1	43.9	33.0	35.2	69.3	50.0
Surrogate Recoveries (%)													
d10-Anthracene	80%	55%	58%	28%	62%	53%	57%	65%	77%	75%	83%	68%	73%
d10-Fluoranthene	93%	87%	86%	70%	88%	89%	85%	93%	95%	93%	78%	87%	76%
d12-Benzo[e]Pyrene	96%	87%	94%	88%	108%	94%	120%	102%	104%	101%	117%	132%	107%

A.1.

New Brunswick Particulate Phase PAHs (NB-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-QFF 9/27/99 SAMPLE LOST	NB-QFF 10/9/99 NO POWER	NB-QFF 10/21/99	NB-QFF 11/2/99	NB-QFF 11/14/99	NB-QFF 11/26/99 DRY ON EXTRACT	NB-QFF 12/8/99
Fluorene			0.016		0.063	0.0039	0.047
Phenanthrene			0.15		0.64	0.18	0.46
Anthracene			0.016		0.17	0.0061	0.067
1Methylfluorene			0.016		0.027	0.011	0.028
Dibenzothiophene			0.021		0.049	0.0012	0.052
4,5-Methylenephenanthrene			0.020		0.10	0.0046	0.067
Methylphenanthrenes			0.28		0.50	0.085	0.35
Methyldibenzothiophenes			0.0049		0.011	0.0012	0.027
Fluoranthene			0.19		0.95	0.029	0.71
Pyrene			0.17		0.72	0.017	0.87
3,6-Dimethylphenanthrene			0.031		0.032	0.0016	0.059
Benzo[a]fluorene			0.048		0.16	0.0036	0.12
Benzo[b]fluorene			0.013		0.037	0.0022	0.14
Retene			0.020		0.094	0.0073	0.067
Benzo[b]naphtho[2,1-d]thiophene			0.027		0.100	0.0072	0.094
Cyclopenta[cd]pyrene			0.032		0.024	0.0005	0.28
Benz[a]anthracene			0.078		0.34	0.0083	0.51
Chrysene/Triphenylene			0.16		0.60	0.034	0.62
Naphthacene			0.014		0.091	0	0
Benzo[b+k]fluoranthene			0.30		1.0	0.058	1.5
Benzo[e]pyrene			0.15		0.55	0.026	0.79
Benzo[a]pyrene			0.093		0.35	0.0040	0.70
Perylene			0.016		0.12	0.0002	0.18
Indeno[1,2,3-cd]pyrene			0.14		0.50	0.024	1.4
Benzo[g,h,i]perylene			0.18		0.50	0.032	1.3
Dibenzo[a,h+a,c]anthracene			0.010		0.042	0.0018	0.049
Coronene			0.15		0.38	0.028	1.3
Total PAHs			2.3		8.2	0.57	12
Sample Volume (m^3)			713		625	733	624
Corresponding Laboratory Blank			12/1/99		1/13/00	1/13/00	2/9/00
Total Suspended Particulate (mg/m^3)			26.8		47.5	19.9	39.1
Surrogate Recoveries (%)							
d10-Anthracene			68%		70%	12%	71%
d10-Fluoranthene			83%		79%	59%	75%
d12-Benzo[e]Pyrene			94%		76%	75%	81%

A.2.

New Brunswick Gas Phase PAHs (NB-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 10/5/97	NB-PUF 10/8/97	NB-PUF 10/9/97	NB-PUF 10/12/97	NB-PUF 10/13/97	NB-PUF 10/15/97	NB-PUF 10/16/97	Split PUF top NB-PUF 10/21/97	Split PUF bottom NB-PUF 10/21/97	NB-PUF 10/28/97	Duplicate Samples NB-PUF 10/29/97	Duplicate Samples NB-PUF 10/29/97
Fluorene	0.77	2.0	1.0	2.1	1.5	2.3	0.24	1.7	0.15	0.42	0.25	0.69
Phenanthrene	9.7	15	12	13	12	9.1	2.1	5.3	0.49	0.71	1.5	1.4
Anthracene	0.26	0.65	0.040	0.46	0.42	0.54	0.17	0.23	0.012	0.028	0.091	0.084
1Methylfluorene	2.9	1.9	1.1	1.8	1.3	1.3	0.67	1.0	0.33	0.24	0.48	0.46
Dibenzothiophene	NQ	NQ	NQ	NQ	NQ	NQ	0.14	0	0	0.088	0.20	0.17
4,5-Methylenephenanthrene	0.48	0.55	0.56	0.39	0.43	0.40	0	0.24	0.0	0.05	0.10	0.10
Methylphenanthrenes	5.8	5.3	8.4	5.6	5.7	5.4	17	2.7	2.2	5.0	9.7	9.1
Methyldibenzothiophenes	0	0	0	0	0	0	0.18	0	0	0	0.17	0.13
Fluoranthene	2.2	1.9	2.8	1.6	1.7	1.6	0.24	0.93	0.0087	0.12	0.17	0.17
Pyrene	1.1	0.54	1.3	0.84	0.92	1.1	0.19	0.62	0.0049	0.080	0.12	0.13
3,6-Dimethylphenanthrene	0.22	0.23	0.26	0.22	0.24	0.29	0.093	0.11	0.0012	0.028	0.048	0.054
Benzo[a]fluorene	0.073	0.054	0.098	0.054	0.047	0.076	0.046	0.033	0	0.0082	0.015	0.015
Benzo[b]fluorene	0.041	0.033	0.053	0.031	0.017	0.050	0.00038	0.019	0	0.0035	0.007	0.007
Retene	NQ	NQ	NQ	NQ	NQ	NQ	0.012	0	0	0	0.010	0.010
Benzo[b]naphtho[2,1-d]thiophene	NQ	NQ	NQ	NQ	NQ	NQ	0	0	0	0	0.0004	0.0006
Cyclopenta[cd]pyrene	NQ	NQ	NQ	NQ	NQ	NQ	0.0010	0.0007	0.0001	0.0006	0.0014	n/a
Benz[a]anthracene	0.066	0.018	0.020	0.025	0.0054	0.026	0.013	0.0015	0	0	0	0.0011
Chrysene/Triphenylene	0.081	0.035	0.053	0	0.017	0	0.034	0.0075	0	0	0	0.0040
Naphthacene	0	0	0	0	0	0	0.012	0	0	0	0	0
Benzo[b+k]fluoranthene	0.0060	0.017	0.0034	0	0	0	0.029	0	0	0	0	0.0002
Benzo[e]pyrene	0	0.0068	0.0014	0	0	0	0	0	0	0	0	0.0001
Benzo[a]pyrene	0	0.0065	0	0	0	0	0	0	0	0	0	0
Perylene	0	0.0008	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0.018	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	24	29	28	26	24	22	22	13	3	7	13	13
Sample Volume (m^3)	754	903	886	815	834	856	856	857	857	981	1017	1017
Corresponding Laboratory Blank	10/14/97	10/2/97	10/22/97	10/28/97	10/22/97	10/28/97	10/28/97	10/22/97	10/22/97	11/9/97	11/9/97	11/9/97
Surrogate Recoveries (%)												
d10-Anthracene	42%	96%	90%	95%	97%	88%	75%	91%	62%	97%	91%	97%
d10-Fluoranthene	92%	81%	98%	103%	107%	100%	129%	68%	58%	92%	100%	89%
d12-Benzo[e]Pyrene	92%	104%	91%	100%	124%	97%	108%	93%	65%	101%	100%	100%

A.2.

New Brunswick Gas Phase PAHs (NB-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	Duplicate Samples NB-PUF 11/2/97	NB-PUF 11/2/97	NB-PUF 11/6/97	NB-PUF 11/12/97	NB-PUF 11/18/97	NB-PUF 11/24/97	NB-PUF 11/30/97	NB-PUF 12/6/97	NB-PUF 12/12/97	NB-PUF 12/18/97	NB-PUF 12/24/97	NB-PUF 12/30/97
Fluorene	0.19	0.23	3.1	0.54	6.9	1.7	2.6	1.7	5.6	11	0.16	0.59
Phenanthrene	0.85	0.74	6.6	5.4	7.6	3.8	15	5.0	11	17	3.6	3.2
Anthracene	0.038	0.033	0.30	0.51	0.72	0.13	1.3	0.077	0.74	1.4	0.10	0.10
1Methylfluorene	0.21	0.17	2.4	1.8	3.0	0.88	3.2	0.68	0.65	4.1	1.2	0.64
Dibenzothiophene	0.10	0.09	0.49	0.007	0.45	0.26	0.25	0.13	1.2	1.9	0.0080	0.10
4,5-Methylenephenanthrene	0.051	0.045	0.63	4.1	0.71	0.34	1.5	0.37	1.0	1.3	0.53	0.28
Methylphenanthrenes	4.8	4.1	17	20	17	7.2	31	0.85	13	25	9.9	5.4
Methyldibenzothiophenes	0.071	0.059	0.53	0.13	0.40	0.25	0.12	0.16	1.0	1.5	0.058	0.10
Fluoranthene	0.12	0.10	1.4	1.2	1.5	1.0	2.8	0.91	1.8	2.5	1.1	0.65
Pyrene	0.079	0.071	1.0	0.91	1.3	0.68	2.7	0.45	1.5	1.9	0.69	0.44
3,6-Dimethylphenanthrene	0.024	0.023	0.39	0.27	0.38	0.15	0.53	0.10	0.44	0.61	0.20	0.11
Benzo[a]fluorene	0.010	0.010	0.093	0.062	0.16	0.11	0.37	0.055	0.13	0.18	0.056	0.068
Benzo[b]fluorene	0.0043	0.0040	0.043	0.032	0.067	0.043	0.17	0.022	0.069	0.070	0.024	0.027
Retene	0.0092	0.0082	0.061	0.0088	0.10	0.073	0.054	0.020	0.079	0.072	0.010	0.041
Benzo[b]naphtho[2,1-d]thiophene	0.0003	0.0004	0.0013	0.0003	0.0032	0.0009	0.028	0.0001	0.0021	0.0002	0.0004	0.0077
Cyclopenta[cd]pyrene	0.0064	0.0087	0.012	0.0040	0.0089	0.0043	0.021	0.002	0.0066	0.0059	0.0021	0.0099
Benz[a]anthracene	0.0008	0.0011	0	0	0	0	0.041	0.00092	0	0	0	0.014
Chrysene/Triphenylene	0.0039	0.0042	0.018	0.0068	0.020	0.026	0.099	0.011	0.024	0.027	0.0069	0.035
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0	0.000	0	0	0	0	0	0	0	0	0	0.033
Benzo[e]pyrene	0	0.000	0	0	0	0	0	0	0	0	0.0022	0
Benzo[a]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Perylene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	7	6	34	34	41	17	62	10	38	69	18	12
Sample Volume (m^3)	636	636	508	429	444	1099	468	597	593	509	576	451
Corresponding Laboratory Blank	11/9/97	11/9/97	3/5/98	3/5/98	3/5/98	3/5/98	3/17/98	3/5/98	3/10/98	3/5/98	2/16/98	3/10/98
Surrogate Recoveries (%)												
d10-Anthracene	51%	99%	82%	62%	77%	66%	33%	88%	83%	88%	63%	85%
d10-Fluoranthene	54%	93%	88%	92%	78%	89%	44%	93%	86%	93%	93%	97%
d12-Benzo[e]Pyrene	52%	107%	98%	92%	83%	87%	64%	94%	95%	98%	93%	100%

A.2.

New Brunswick Gas Phase PAHs (NB-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 1/5/98	NB-PUF 1/11/98	NB-PUF 1/17/98	NB-PUF 1/23/98	NB-PUF 1/29/98	NB-PUF 2/4/98	NB-PUF 2/10/98	NB-PUF 2/16/98	NB-PUF 2/22/98	NB-PUF 2/28/98	NB-PUF 3/6/98	NB-PUF 3/12/98
Fluorene	8.3	1.5	3.1	3.8	1.2	0.6	3.8	1.0	2.9	1.5	3.0	0.73
Phenanthrene	18	6.8	11	8.2	7.4	5.2	12	6.0	3.47	8.4	5.5	2.8
Anthracene	1.0	0.21	0.65	0.36	0.43	0.21	0.51	0.17	0.0	0.15	0.088	0.0087
1Methylfluorene	5.0	1.6	2.4	1.6	2.1	1.2	2.7	1.4	0.83	1.5	1.1	0.70
Dibenzothiophene	2.3	0.10	0.33	0.92	0.14	0.12	0.33	0.19	0.55	0.25	0.60	0
4,5-Methylenephenanthrene	1.4	0.49	1.0	0.62	0.66	0.56	0.81	0.50	0.2	0.58	0.31	0.24
Methylphenanthrenes	26	27	11	15	26	12	62	23	8.92	4.3	2.1	1.5
Methyldibenzothiophenes	2.4	0.23	0.66	0.65	0.17	0.13	0.67	0.32	0.3	0.44	0.43	0.050
Fluoranthene	2.5	0.88	1.6	1.2	1.3	1.1	0.37	1.0	0.54	1.3	0.89	0.34
Pyrene	1.9	0.55	1.3	1.0	0.95	0.83	0.060	0.70	0.23	0.81	0.43	0.13
3,6-Dimethylphenanthrene	0.86	0.20	0.40	0.38	0.28	0.25	0.099	0.29	0.122	0.29	0.15	0.080
Benzo[a]fluorene	0.20	0.042	0.097	0.14	0.10	0.089	0.017	0.075	0.039	0.077	0.047	0
Benzo[b]fluorene	0.079	0.015	0.045	0.053	0.035	0.031	0.0049	0.027	0.011	0.031	0.010	0
Retene	0.16	0.014	0.033	0.094	0.023	0.024	0.0075	0.056	0.020	0.051	0.022	0.12
Benzo[b]naphtho[2,1-d]thiophene	0.0048	0	0.0001	0.011	0	0.0005	0	0.0003	0	0.0004	0	0
Cyclopenta[cd]pyrene	0.013	0.0019	0.0035	0.032	0.016	0.0090	0.0010	0.0037	0.0022	0.0074	0.0018	0.084
Benz[a]anthracene	0.0067	0.00078	0.0017	0.011	0.0035	0.0011	0	0.00046	0	0.0024	0	0
Chrysene/Triphenylene	0.039	0.0086	0.013	0.033	0.018	0.012	0.0012	0.019	0	0.030	0.010	0
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0.16
Benzo[b+k]fluoranthene	0	0.00043	0.0006	0.015	0	0.0024	0	0	0	0.0034	0	0
Benzo[e]pyrene	0	0	0	0	0	0.0014	0	0	0	0	0	0
Benzo[a]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Perylene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	71	40	34	34	41	23	84	35	18	20	15	7
Sample Volume (m^3)	489	520	541	512	572	587	287	593	609	597	568	612
Corresponding Laboratory Blank	3/17/98	3/17/98	2/16/98	2/16/98	2/16/98	3/17/98	3/17/98	3/10/98	3/17/98	3/10/98	3/17/98	3/17/98
Surrogate Recoveries (%)												
d10-Anthracene	91%	81%	85%	87%	73%	80%	77%	91%	95%	86%	81%	98%
d10-Fluoranthene	90%	87%	92%	88%	93%	90%	87%	95%	97%	87%	87%	98%
d12-Benzo[e]Pyrene	65%	86%	90%	89%	95%	89%	92%	94%	51%	86%	50%	98%

A.2.
New Brunswick Gas Phase PAHs (NB-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 3/18/98	NB-PUF 3/24/98	NB-PUF 3/30/98	NB-PUF 4/5/98	NB-PUF 4/11/98	NB-PUF 4/17/98	NB-PUF 4/23/98	NB-PUF 4/29/98	NB-PUF 5/5/98	NB-PUF 5/11/98	NB-PUF 5/17/98	NB-PUF 5/23/98
Fluorene	2.1	3.2	1.0	1.8	4.4	1.3	2.4	1.9	2.6	2.5	1.2	4.4
Phenanthrene	13	6.5	13	3.6	5.7	6.2	6.1	11	19	9.2	13	11
Anthracene	0.69	0.13	0.14	0.070	0.12	0.10	0.06	0.16	0.58	0.30	0.28	0.11
1Methylfluorene	3.8	1.4	0.52	0.82	0.98	0.84	1.1	1.7	3.7	2.0	1.3	1.0
Dibenzothiophene	0.19	0.35	0.94	0.19	0.35	0.59	0.58	1.0	1.5	0.84	1.1	0.76
4,5-Methylenephenanthrene	1.2	0	0.53	0.23	0.26	0.26	0.37	0.42	1.5	0.73	0.72	0.44
Methylphenanthrenes	23	3.1	12	4.5	7.6	4.0	5.2	11	26	13	9.0	5.0
Methyldibenzothiophenes	2.6	0.34	0.46	0.12	0.15	0.35	0.45	0.55	1.5	0.72	0.61	0.31
Fluoranthene	1.5	0.88	1.9	0.43	0.54	0.82	0.72	1.4	2.5	1.4	1.9	1.4
Pyrene	1.3	0.47	0.42	0.18	0.20	0.42	0.29	0.42	1.6	0.95	0.77	0.43
3,6-Dimethylphenanthrene	0.56	0.18	0.23	0.15	0.11	0.14	0.21	0.11	1.4	0.49	0.36	0.15
Benzo[a]fluorene	0.11	0.043	0.036	0.017	0.019	0.037	0.023	0.042	0.21	0.072	0.071	0.021
Benzo[b]fluorene	0.049	0.012	0.0030	0.0010	0.0010	0.0051	0.00109	0.0040	0.055	0.0091	0.010	0.0020
Retene	0.046	0.012	0.032	0	0.0047	0.027	0.0055	0.023	0.16	0.042	0.060	0.0095
Benzo[b]naphtho[2,1-d]thiophene	0	0	0	0	0	0	0	0	0	0	0	0
Cyclopenta[cd]pyrene	0.13	0.0019	0.0049	0.0003	0.0003	0.015	0.0014	0.0045	0.0085	0.0048	0.0054	0.0010
Benz[a]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Chrysene/Triphenylene	0.0071	0.010	0.036	0	0	0.013	0	0.022	0.026	0.0043	0.012	0.0051
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[e]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[a]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Perylene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	50	17	31	12	20	15	17	29	62	33	31	25
Sample Volume (m^3)	597	473	546	554	568	532	549	496	516	544	461	618
Corresponding Laboratory Blank	5/23/98	5/26/98	5/26/98	5/26/98	5/23/98	5/23/98	5/26/98	5/26/98	5/23/98	5/23/98	6/15/98	6/15/98
Surrogate Recoveries (%)												
d10-Anthracene	79%	91%	97%	83%	85%	79%	85%	85%	107%	84%	97%	91%
d10-Fluoranthene	99%	97%	100%	94%	90%	86%	95%	88%	100%	95%	95%	98%
d12-Benzo[e]Pyrene	101%	96%	113%	100%	122%	95%	103%	96%	109%	93%	93%	109%

A.2.
New Brunswick Gas Phase PAHs (NB-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 5/29/98	NB-PUF 6/4/98	NB-PUF 6/10/98	NB-PUF 6/16/98	NB-PUF 6/22/98	NB-PUF 6/25/98	Split PUF day-top NB-PUF 6/26/98	Split PUF day-bottom NB-PUF 6/26/98	night NB-PUF 6/26/98	NB-PUF 6/28/98	NB-PUF 7/4/98	10% day NB-PUF 7/5/98
Fluorene	6.3	2.8	1.7	Sample	1.9	6.5	1.7	0.51	4.1	0.59	0.68	1.9
Phenanthrene	21	6.3	11	Missing	7.2	17	10	3.8	20	7.8	8.5	8.6
Anthracene	0.09	0.13	0.13		0.07	0.14	0.10	0.055	0.23	0.10	0.090	0.16
1Methylfluorene	0.94	1.1	1.4		1.0	1.6	0.49	0.43	2.0	0.32	0.59	0.34
Dibenzothiophene	1.1	0.24	0.84		0.72	1.8	0.83	0.49	1.7	0.62	0.83	0.86
4,5-Methylenephenanthrene	0.67	0.36	0.43		0.41	0.88	0.72	0.17	1.1	0.41	0.82	0.44
Methylphenanthrenes	2.0	6.7	6.2		3.3	8.7	5.5	0.97	7.9	2.7	6.6	3.0
Methyldibenzothiophenes	0.45	0.19	0.51		0.45	0.045	0.0046	0.0023	0.78	0.32	1.2	0.50
Fluoranthene	2.7	0.76	1.3		1.1	3.7	3.5	0.028	3.8	1.5	2.1	1.5
Pyrene	0.48	0.29	0.44		0.38	1.1	0.91	0.0048	1.2	0.38	1.2	0.60
3,6-Dimethylphenanthrene	0.17	0.15	0.31		0.21	0.35	0.31	0.011	0.50	0.13	0.40	0.12
Benzo[a]fluorene	0.035	0.018	0.049		0.046	0.079	0.11	0	0.18	0.031	0.093	0.069
Benzo[b]fluorene	0.0021	0.0030	0.0031		0.0101	0.017	0.011	0	0.019	0.0028	0.023	0.0060
Retene	0.019	0.0075	0.093		0.082	0.19	0.15	0.016	0.18	0.025	0.36	0.16
Benzo[b]naphtho[2,1-d]thiophene	0	0	0		0	0	0	0	0	0	0	0
Cyclopenta[cd]pyrene	0.0045	0.0011	0.0022		0.0006	0	0.0070	0.0021	0.0035	0.0037	0.027	0.0076
Benz[a]anthracene	0	0	0		0	0	0	0	0	0	0.0032	0
Chrysene/Triphenylene	0.024	0.0031	0.0083		0.0061	0.033	0.024	0	0.016	0.011	0.039	0
Naphthacene	0	0	0		0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0	0	0		0	0	0	0	0	0.0010	0.010	0
Benzo[e]pyrene	0	0	0		0	0	0	0	0	0	0.0069	0
Benzo[a]pyrene	0	0	0		0	0	0	0	0	0	0.0034	0
Perylene	0	0	0		0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0		0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0		0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0		0	0	0	0	0	0	0	0
Coronene	0	0	0		0	0	0	0	0	0	0	0
Total PAHs	36	19	24	0	17	42	24	7	44	15	24	18
Sample Volume (m^3)	136	583	563	494	569	331	329	329	307	613	579	363
Corresponding Laboratory Blank	6/15/98	6/15/98	7/2/98		7/2/98	7/2/98	7/2/98	7/2/98	8/20/98	8/20/98	7/15/98	7/15/98
Surrogate Recoveries (%)												
d10-Anthracene	69%	76%	32%		78%	77%	70%	58%	89%	77%	97%	80%
d10-Fluoranthene	73%	76%	27%		87%	87%	87%	87%	73%	79%	102%	77%
d12-Benzo[e]Pyrene	95%	88%	62%		95%	95%	106%	101%	100%	84%	100%	56%

A.2.

New Brunswick Gas Phase PAHs (NB-PUF) Surrogate Corrected Concentrations (ng/m^3) PAH	10% night NB-PUF 7/5/98	10% day NB-PUF 7/6/98	10% night NB-PUF 7/6/98	10% day NB-PUF 7/7/98	10% night NB-PUF 7/7/98	10% day NB-PUF 7/8/98	10% night NB-PUF 7/8/98	10% day NB-PUF 7/9/98	10% night NB-PUF 7/9/98	10% day NB-PUF 7/10/98	10% night NB-PUF 7/10/98	10% day NB-PUF 7/11/98
Fluorene	5.7	1.7	4.0	2.1	7.3	Too Little	Too Little	1.1	6.1	1.3	4.3	1.3
Phenanthrene	15	11	11	9.8	15	Sample to	Sample to	7.2	17	8.0	8.2	7.3
Anthracene	0.19	0.20	0.27	0.19	0.17	Quantify	Quantify	0.13	0.25	0.21	0.11	0.17
1Methylfluorene	1.7	0.66	1.5	0.61	1.0			0.47	1.9	0.40	0.78	0.24
Dibenzothiophene	1.4	1.2	1.0	0.95	1.1			0.70	1.7	0.76	0.72	0.65
4,5-Methylenephenanthrene	0.64	0.55	0.45	0.49	0.61			0.36	0.61	0.46	0.40	0.42
Methylphenanthrenes	17	2.8	3.4	3.1	9.7			3.7	3.1	2.7	2.3	2.4
Methyldibenzothiophenes	0.67	0.75	0.57	0.64	0.44			0.59	0.84	0.59	0.31	0.40
Fluoranthene	1.9	1.7	1.5	1.6	1.5			1.4	2.0	1.6	0.97	1.5
Pyrene	0.83	0.65	0.62	0.59	0.53			0.60	0.72	0.72	0.42	0.57
3,6-Dimethylphenanthrene	0.18	0.16	0.16	0.10	0.13			0.15	0.22	0.15	0.084	0.10
Benzo[a]fluorene	0.082	0.092	0.057	0.031	0.021			0.077	0.068	0.075	0.016	0.058
Benzo[b]fluorene	0.0030	0.0090	0.0060	0.0030	0.012			0.0060	0.0050	0.0020	0.0020	0.0050
Retene	0.13	0.14	0.12	0.14	0			0.16	0.14	0.13	0.047	0.077
Benzo[b]naphtho[2,1-d]thiophene	0	0	0	0	0			0	0	0	0	0
Cyclopenta[cd]pyrene	0.0034	0.0029	0.0098	0.0046	0.028			0.0072	0.0100	0.0079	0.0054	0.0059
Benz[a]anthracene	0	0	0	0	0.023			0	0	0	0	0
Chrysene/Triphenylene	0	0.017	0	0	0			0	0	0	0	0
Naphthacene	0	0	0	0	0.026			0	0	0	0	0
Benzo[b+k]fluoranthene	0	0	0	0	0			0	0	0	0	0
Benzo[e]pyrene	0	0	0	0	0			0	0	0	0	0
Benzo[a]pyrene	0	0.13	0	0	0			0	0	0	0	0
Perylene	0	0	0	0	0			0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0			0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0			0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0			0	0	0	0	0
Coronene	0	0	0	0	0			0	0	0	0	0
Total PAHs	46	21	24	20	37	0	0	17	35	17	19	15
Sample Volume (m^3)	341	337	344	345	23	331	353	377	337	336	342	344
Corresponding Laboratory Blank	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98			7/15/98	7/15/98	7/15/98	7/15/98	7/15/98
Surrogate Recoveries (%)												
d10-Anthracene	60%	120%	57%	80%	73%	5%	10%	74%	86%	81%	78%	63%
d10-Fluoranthene	52%	107%	46%	80%	80%	2%	3%	67%	76%	72%	74%	60%
d12-Benzo[e]Pyrene	49%	99%	30%	71%	95%	0%	0%	70%	71%	77%	74%	78%

A.2.
New Brunswick Gas Phase PAHs (NB-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 7/16/98	NB-PUF 7/22/98	NB-PUF 7/28/98	NB-PUF 8/3/98	NB-PUF 8/9/98	NB-PUF 8/15/98	NB-PUF 8/21/98	NB-PUF 8/27/98	NB-PUF 9/2/98	NB-PUF 9/4/98	NB-PUF 9/8/98	NB-PUF 9/13/98
Fluorene	2.3	2.3	1.3	3.3	1.0	2.1	3.0	1.8	2.8	1.3	1.7	1.0
Phenanthrene	14	12	8.1	9.9	9.5	9.6	6.6	9.8	9.8	9.3	5.6	7.4
Anthracene	0.23	0.18	0.08	0.23	0.24	0.21	0.13	0.21	0.31	0.16	0.17	0.14
1Methylfluorene	1.0	0.90	0.43	1.1	0.48	0.65	1.1	1.2	1.1	0.73	0.68	0.57
Dibenzothiophene	1.3	1.2	0.65	0.87	0.88	0.96	0.65	0.84	0.80	1.0	0.45	0.31
4,5-Methylenephenanthrene	0.84	0.75	0.47	0.56	0.59	0.50	0.37	0.85	1.1	0.57	0.32	0.44
Methylphenanthrenes	7.7	5.8	3.8	5.7	3.8	3.5	4.1	7.8	5.8	4.7	3.4	4.9
Methyldibenzothiophenes	0.84	0.71	0.40	0.43	0.0094	0.0036	0.48	0.62	0.45	0.014	0.27	0.24
Fluoranthene	2.4	2.6	1.8	1.8	2.1	1.7	1.0	2.2	1.6	1.7	0.82	1.5
Pyrene	0.79	1.1	0.55	0.56	0.67	0.49	0.55	0.89	0.67	0.64	0.39	0.48
3,6-Dimethylphenanthrene	0.40	0.34	0.23	0.26	0.20	0.18	0.26	0.53	0.34	0.25	0.20	0.18
Benzo[a]fluorene	0.086	0.11	0.051	0.081	0.073	0.049	0.064	0.11	0.044	0.087	0.032	0.045
Benzo[b]fluorene	0.013	0.018	0.0070	0.012	0.026	0.017	0.019	0.020	0.013	0.024	0.0075	0.0080
Retene	0.075	0.13	0.037	0.076	0.10	0.074	0.14	0.091	0.073	0.40	0.021	0.028
Benzo[b]naphtho[2,1-d]thiophene	0	0.0040	0	0	0	0	0	0	0	0	0	0
Cyclopenta[cd]pyrene	0.010	0.029	0.031	0.0042	0.0074	0.0043	0.0036	0.013	0.010	0.0099	0.0018	0.0060
Benz[a]anthracene	0	0.012	0	0	0	0	0.0031	0	0	0.0031	0	0.008
Chrysene/Triphenylene	0.023	0.069	0.063	0.016	0.023	0.014	0.0070	0.0053	0.0092	0.033	0.0031	0.012
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0	0.036	0	0	0	0	0.012	0	0	0.0071	0	0
Benzo[e]pyrene	0	0	0	0	0	0	0.0079	0	0	0.0038	0	0
Benzo[a]pyrene	0	0	0	0	0	0	0.0042	0	0	0	0	0
Perylene	0.0034	0.0028	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	32	28	18	25	20	20	18	27	25	21	14	17
Sample Volume (m^3)	629	670	616	611	613	673	662	666	596	697	652	536
Corresponding Laboratory Blank	8/20/98	8/31/98	8/31/98	8/31/98	9/8/98	9/8/98	9/8/98	9/8/98	9/8/98	9/30/98	9/30/98	9/30/98
Surrogate Recoveries (%)												
d10-Anthracene	88%	94%	105%	100%	81%	79%	96%	98%	93%	87%	95%	92%
d10-Fluoranthene	88%	89%	88%	85%	81%	80%	83%	90%	86%	90%	88%	85%
d12-Benzo[e]Pyrene	94%	90%	92%	99%	101%	97%	92%	95%	96%	93%	88%	83%

A.2.

New Brunswick Gas Phase PAHs (NB-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 9/19/98	NB-PUF 9/22/98	NB-PUF 9/25/98	NB-PUF 10/1/98	NB-PUF 10/7/98	NB-PUF 10/10/98	NB-PUF 10/13/98	NB-PUF 10/19/98	NB-PUF 10/28/98	NB-PUF 11/6/98	NB-PUF 11/15/98	NB-PUF 11/24/98
Fluorene	0.9	1.0	1.0	2.6	1.4	0.78		4.9	1.1	0.81	3.6	0.18
Phenanthrene	1.1	7.5	7.9	5.0	8.1	5.4		9.3	5.9	4.7	5.7	2.0
Anthracene	0.049	0.30	0.43	0.19	0.31	0.28		0.48	0.17	0.28	0.20	0.13
1Methylfluorene	0.18	0.85	1.5	0.81	1.1	0.60		1.6	1.0	1.4	1.0	0.76
Dibenzothiophene	0.060	0.65	0.19	0.59	1.2	0.72		1.2	0.81	0.52	0.49	0.045
4,5-Methylenephenanthrene	0.054	0.59	0.57	0.33	0.58	0.43		0.56	0.40	0.50	0.34	0.27
Methylphenanthrenes	1.0	5.7	5.9	4.0	6.5	4.7		5.0	5.0	5.3	3.3	3.6
Methyldibenzothiophenes	0.041	0.56	0.26	0.36	0.69	0.50		0.67	0.83	0.10	0.81	0.050
Fluoranthene	0.10	0.82	1.5	0.73	1.4	1.3		1.2	0.85	0.83	0.63	0.49
Pyrene	0.051	0.48	0.72	0.47	0.82	0.75		0.63	0.58	0.62	0.37	0.33
3,6-Dimethylphenanthrene	0.032	0.40	0.43	0.14	0.29	0.21		0.27	0.31	0.24	0.13	0.12
Benzo[a]fluorene	0.0039	0.032	0.090	0.036	0.075	0.085		0.049	0.051	0.037	0.044	0.032
Benzo[b]fluorene	0	0	0.021	0.0062	0.023	0.033		0.018	0.019	0.017	0.0069	0.016
Retene	0.0017	0.22	0.056	0.0058	0.048	0.060		0.042	0.065	0.024	0.019	0.015
Benzo[b]naphtho[2,1-d]thiophene	0	0	0.015	0	0.0012	0		0.012	0.045	0.036	0	0
Cyclopenta[cd]pyrene	0.0002	0.0034	0.0094	0.0009	0.0058	0.0090			0.0076	0.011	0.0014	0.0013
Benz[a]anthracene	0	0	0.0041	0	0.0019	0.0039		0.0030	0.0069	0.0017	0.00058	0.014
Chrysene/Triphenylene	0	0	0.015	0.0028	0.017	0.035		0.018	0.025	0.0092	0.0072	0.032
Naphthacene	0	0	0	0	0	0		0	0.0078	0	0	0.013
Benzo[b+k]fluoranthene	0	0	0	0	0.0006	0		0.0056	0.017	0.0057	0.0016	0.034
Benzo[e]pyrene	0	0	0	0	0.0002	0		0.0046	0.011	0.0046	0	0.020
Benzo[a]pyrene	0	0	0	0	0	0		0.0027	0.0092	0.0033	0	0.016
Perylene	0	0	0	0	0	0		0	0.0027	0	0	0.0045
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0		0.0092	0.019	0.0084	0	0.047
Benzo[g,h,i]perylene	0	0	0	0	0	0		0.0049	0.010	0.0036	0	0.025
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0		0	0.0016	0	0	0.0062
Coronene	0	0	0	0	0	0		0	0.0055	0	0	0.022
Total PAHs	4	19	21	15	23	16		26	17	16	17	8
Sample Volume (m^3)	682	626	680	621	649	615		655	668	1176	613	659
Corresponding Laboratory Blank	9/30/98	9/30/98	10/21/98	10/21/98	10/21/98	11/24/98		11/24/98	11/24/98	1/5/99	1/5/99	1/5/99
Surrogate Recoveries (%)												
d10-Anthracene	87%	103%	101%	85%	83%	91%		92%	83%	73%	76%	81%
d10-Fluoranthene	83%	81%	79%	85%	82%	87%		94%	87%	80%	92%	101%
d12-Benzo[e]Pyrene	85%	66%	85%	86%	89%	89%		99%	78%	67%	94%	89%

A.2.
New Brunswick Gas Phase PAHs (NB-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 12/3/98	NB-PUF 12/12/98	NB-PUF 12/21/98	NB-PUF 12/30/98	NB-PUF 1/8/99	NB-PUF 1/17/99	NB-PUF 1/26/99	NB-PUF 2/4/99	NB-PUF 2/13/99	NB-PUF 2/22/99	NB-PUF 3/3/99	NB-PUF 3/12/99
Fluorene	4.3	5.6	1.5	1.9	2.1	5.5	5.8	3.5	1.3	2.2	1.1	1.4
Phenanthrene	13	9.6	10	3.3	3.1	8.2	7.3	9.8	2.6	3.6	4.5	2.3
Anthracene	0.73	0.51	0.39	0.035	0.0075	0.32	7.2	0.61	0.0039	0.013	0.056	0.081
1Methylfluorene	4.8	2.1	1.8	0.68	0.80	2.1	1.9	2.2	0.39	0.79	0.55	0.42
Dibenzothiophene	1.8	0.73	1.1	0.17	0.22	1.1	0.66	0.55	0.12	0.13	0.29	0.11
4,5-Methylenephenanthrene	1.0	0.81	0.80	0.25	0.17	0.69	0.64	0.73	0.16	0.24	0.22	0.16
Methylphenanthrenes	21	7.9	13	4.1	2.3	6.2	5.4	4.5	1.3	1.8	2.6	1.6
Methyldibenzothiophenes	1.2	0.60	0.97	0.095	0.12	0.80	0.48	0.70	0.074	0.036	0.24	0.086
Fluoranthene	1.9	1.3	1.7	0.37	0.27	1.6	1.1	1.5	0.37	0.33	0.81	0.37
Pyrene	1.2	0.98	1.1	0.12	0.045	1.0	0.83	1.1	0.13	0.059	0.29	0.22
3,6-Dimethylphenanthrene	0.55	0.30	0.55	0.046	0.046	0.48	0.24	0.45	0.034	0.030	0.11	0.052
Benzo[a]fluorene	0.13	0.087	0.13	0.0071	0.0064	0.057	0.067	0.088	0.0026	0.0022	0.033	0.024
Benzo[b]fluorene	0.054	0.035	0.056	0	0	0.029	0.027	0.036	0.00022	0.00036	0.0068	0.010
Retene	0.12	0.052	0.18	0	0	0.090	0.028	0.081	0.00065	0.00050	0.013	0.0033
Benzo[b]naphtho[2,1-d]thiophene	0.031	0	0.020	0	0	0	0	0.043	0.0044	0.00004	0.00014	0.0010
Cyclopenta[cd]pyrene	0.0078	0.014	0.0021	0.011	0.00032	0.00042	0.0047	0.0090	0.016	0.00032	n/a	0.0043
Benz[a]anthracene	0.0077	0.0050	0.0070	0.00039	0.0005	0.0039	0.021	0.020	0	0.00042	0.0012	0.0097
Chrysene/Triphenylene	0.040	0.024	0.039	0.0024	0.0024	0.021	0.047	0.066	0.00046	0.0026	0.0060	0.038
Naphthacene	0	0	0	0	0	0	0.013	0	0	0	0	0.035
Benzo[b+k]fluoranthene	0.0021	0.0085	0.0070	0	0	0.0066	0.046	0.046	0	0	0.0040	0.053
Benzo[e]pyrene	0.0018	0.0058	0.0046	0	0	0	0.028	0.030	0	0	0	0.034
Benzo[a]pyrene	0.0010	0.0042	0.0029	0	0	0	0.028	0.024	0	0	0	0.028
Perylene	0	0	0.0039	0	0	0	0.0073	0.0061	0	0	0	0.0071
Indeno[1,2,3-cd]pyrene	0	0.0068	0.0098	0	0	0	0	0.033	0	0	0	0
Benzo[g,h,i]perylene	0	0.0055	0.0045	0	0	0	0.035	0.026	0	0	0	0.031
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0.0086	0	0	0	0
Coronene	0	0	0	0	0	0	0.031	0.014	0	0	0	0.014
Total PAHs	52	31	33	11	9	28	32	26	7	9	11	7
Sample Volume (m^3)	635	750	642	622	666	578	581	579	512	770	713	709
Corresponding Laboratory Blank	2/8/99	2/8/99	2/8/99	2/15/99	2/15/99	2/15/99	2/15/99	2/24/99	2/24/99	3/8/99	4/14/99	4/14/99
Surrogate Recoveries (%)												
d10-Anthracene	63%	75%	73%	80%	81%	62%	88%	79%	76%	80%	75%	91%
d10-Fluoranthene	94%	85%	91%	92%	76%	71%	90%	80%	83%	94%	82%	98%
d12-Benzo[e]Pyrene	89%	80%	84%	84%	87%	85%	99%	89%	86%	89%	82%	87%

A.2.
New Brunswick Gas Phase PAHs (NB-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 3/21/99	NB-PUF 3/30/99	NB-PUF 4/9/99	NB-PUF 4/16/99	NB-PUF 4/26/99	NB-PUF 5/5/99	NB-PUF 5/14/99	NB-PUF 5/23/99	NB-PUF 6/1/99	NB-PUF 6/10/99	NB-PUF 6/19/99	NB-PUF 6/28/99
Fluorene	2.3	6.6	3.4	3.4	1.5	2.6	4.3	1.3	0.25	1.8	3.4	1.1
Phenanthrene	6.0	8.0	10	6.7	6.4	11	12	9.5	11	11	11	8.7
Anthracene	0.14	0.42	0.13	0.22	0.084	0.21	0.25	0.14	0.26	0.10	0.18	0.11
1Methylfluorene	0.75	1.8	2.4	1.3	0.57	1.2	1.4	0.90	1.0	0.58	0.75	0.39
Dibenzothiophene	0.51	0.83	1.0	0.71	0.57	1.5	0.84	0.87	1.5	1.4	1.2	0.82
4,5-Methylenephenanthrene	0.37	0.49	0.68	0.41	0.35	0.68	0.64	0.68	0.68	0.59	0.50	0.52
Methylphenanthrenes	3.3	5.3	6.9	4.4	4.0	7.7	5.5	5.5	5.4	5.5	3.9	3.7
Methyldibenzothiophenes	0.31	0.55	0.72	0.52	0.31	0.96	0.52	0.70	0.85	0.83	0.60	0.59
Fluoranthene	1.2	0.98	1.8	0.89	1.0	1.8	0.14	0.18	2.0	2.6	1.6	2.0
Pyrene	0.49	0.66	0.63	0.46	0.29	0.69	0.52	0.87	0.70	0.65	0.45	0.64
3,6-Dimethylphenanthrene	0.14	0.25	0.30	0.22	0.12	0.32	0.19	0.28	0.26	0.20	0.16	0.22
Benzo[a]fluorene	0.036	0.085	0.065	0.082	0.012	0.095	0.031	0.066	0.041	0.032	0.020	0.076
Benzo[b]fluorene	0.014	0.036	0.012	0.024	0.0011	0.021	0.018	0.027	0.015	0.013	0.0072	0.0050
Retene	0.044	0.048	0.036	0.11	0.0041	0.096	0.040	0.086	0.052	0.090	0.041	0.20
Benzo[b]naphtho[2,1-d]thiophene	0.0040	0.00093	0.050	0.00031	0.0083	0.00022	0.0050	0.0004	0.0002	0.0008	0.0002	0.0004
Cyclopenta[cd]pyrene	0.0061	0.0058	0.025	0.0078	0.012	0.0010	0.010	0.010	0.0092	0.012	0.0032	0.020
Benz[a]anthracene	0.0012	0.043	0.0019	0.012	0.00032	0.0071	0.014	0.0007	0.0007	0.00	0.0003	0.0054
Chrysene/Triphenylene	0.020	0.090	0.031	0.039	0.010	0.049	0.057	0.023	0.021	0.043	0.016	0.065
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0.0085
Benzo[b+k]fluoranthene	0.0066	0.11	0.0094	0.030	0.0036	0.024	0.056	0.0023	0.0033	0.0080	0	0.019
Benzo[e]pyrene	0	0.065	0.0060	0.020	0	0.015	0.030	0	0	0	0	0.010
Benzo[a]pyrene	0	0.055	0.0037	0.015	0	0.012	0.014	0	0	0	0	0.0050
Perylene	0	0.014	0	0.0041	0	0	0.0048	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0.0025	0.022	0	0	0.026	0	0	0	0	0
Benzo[g,h,i]perylene	0	0.067	0	0.023	0	0.010	0.032	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0.0010	0	0	0	0	0	0	0	0	0
Coronene	0	0.047	0.00094	0.015	0	0.0026	0.024	0	0	0	0	0
Total PAHs	16	27	28	20	15	30	26	21	24	25	24	19
Sample Volume (m^3)	596	541	594	644	617	614	626	864	712	740	667	609
Corresponding Laboratory Blank	4/14/99	4/14/99	6/15/99	6/15/99	6/15/99	6/15/99	6/15/99	7/12/99	7/12/99	7/12/99	7/12/99	7/27/99
Surrogate Recoveries (%)												
d10-Anthracene	82%	87%	95%	93%	96%	86%	86%	86%	88%	95%	86%	101%
d10-Fluoranthene	93%	92%	94%	95%	94%	91%	87%	95%	92%	104%	92%	98%
d12-Benzo[e]Pyrene	83%	89%	87%	86%	89%	90%	89%	80%	85%	91%	84%	86%

A.2.
New Brunswick Gas Phase PAHs (NB-PUF)
Surrogate Corrected Concentrations (ng/m³)

PAH	NB-PUF 7/7/99	NB-PUF 7/16/99	NB-PUF 7/25/99	NB-PUF 8/3/99	NB-PUF 8/30/99	NB-PUF 9/8/99	NB-PUF 9/15/99	NB-PUF 9/27/99	NB-PUF 10/9/99	NB-PUF 10/21/99	NB-PUF 11/2/99	NB-PUF 11/14/99
Fluorene	1.3	0.38	0.15	2.2	0.75	0.37	1.3	1.7	No	3.0	1.1	1.0
Phenanthrene	12	16	11	8.02	6.6	5.5	12	10	Sample	4.7	5.6	5.5
Anthracene	0.23	0.098	0.20	0.19	0.19	0.14	0.74	0.20	taken	0.26	0.15	0.14
1Methylfluorene	0.59	0.72	0.41	0.71	0.64	0.38	1.1	0.80		1.2	0.52	0.52
Dibenzothiophene	1.4	1.4	1.1	0.67	0.83	0.20	1.7	1.2		0.52	0.58	0.51
4,5-Methylenephenanthrene	0.97	0.81	0.78	0.41	0.47	0.37	1.1	0.61		0.32	0.30	0.30
Methylphenanthrenes	5.6	6.1	5.5	2.80	3.9	3.4	11	5.6		5.4	2.9	3.1
Methyldibenzothiophenes	0.79	0.36	0.35	0.38	0.57	0.25	1.6	0.38		0.18	0.16	0.15
Fluoranthene	4.0	3.3	3.1	1.7	1.3	1.5	2.6	1.6		0.54	1.0	1.0
Pyrene	1.3	0.82	1.1	0.51	0.65	0.54	1.3	0.66		0.36	0.42	0.41
3,6-Dimethylphenanthrene	0.30	0.22	0.26	0.16	0.24	0.24	0.75	0.33		0.19	0.16	0.16
Benzo[a]fluorene	0.12	0.059	0.072	0.057	0.066	0.044	0.19	0.082		0.040	0.026	0.038
Benzo[b]fluorene	0.0024	0.019	0.015	0.019	0.010	0.0075	0.035	0.029		0.014	0.012	0.0042
Retene	0.12	0.14	0.14	0.086	0.045	0.074	0.13	0.111		0.031	0.034	0.036
Benzo[b]naphtho[2,1-d]thiophene	0.0001	0.0006	0.0003	0.036	0.0054	0.010	0.024	0.014		0.0043	0.0045	0.0052
Cyclopenta[cd]pyrene	0.015	0.033	0.014	0.012	0.0001	0.0012	0.0024	0.0006		0.0059	0.0001	0.0001
Benz[a]anthracene	0.0014	0.0014	0.0011	0.0032	0.0006	0.0026	0.0092	0.0034		0.0062	0.0002	0.0007
Chrysene/Triphenylene	0.049	0.43	0.041	0.023	0.012	0.014	0.027	0.024		0.012	0.0051	0.0081
Naphthacene	0	0	0	0	0	0	0	0		0	0	0
Benzo[b+k]fluoranthene	0.004	0.0001	2.4E-05	0.0076	0.0004	0.0024	0.0030	0.0085		0.015	0.0001	0.0009
Benzo[e]pyrene	0	5.1E-05	1.2E-05	0.0055	3.4E-05	0.0019	0.0009	0.0045		0.0068	0.0004	0.0003
Benzo[a]pyrene	0	7.0E-05	1.22E-05	0.0034	1.7E-05	0.0016	0.0009	0.0026		0.0053	0.0003	0.0001
Perylene	0	5.2E-05	5.39E-06	0.00019	0	0.0004	0.0002	0.0009		0.0015	0.0001	0.0001
Indeno[1,2,3-cd]pyrene	0	5.5E-05	9.44E-06	0.018	0	0.0010	0.0010	0.0016		0.0052	0.0001	0.0001
Benzo[g,h,i]perylene	0	8.6E-05	1.31E-05	0.072	0	0.0010	0.0011	0.0026		0.0066	2.9E-05	0.0001
Dibenzo[a,h+a,c]anthracene	0	4.7E-05	9.01E-06	0.011	0	0.0002	0.0001	0.0003		0.00057	4.0E-05	1.2E-05
Coronene	0	0.00011	2.02E-05	0.0011	0	0.0004	0.0006	0.0008		0.0017	0.0001	3.3E-05
Total PAHs	29	31	24	18	16	13	36	24		17	13	13
Sample Volume (m³)	680	614	770	9/7/99	9/7/99	9/29/99	9/29/99	10/25/99		10/25/99	11/22/99	11/22/99
Corresponding Laboratory Blank	7/27/99	8/16/99	8/16/99	752	869	751	795	613		713	619	625
Surrogate Recoveries (%)												
d10-Anthracene	100%	15%	92%	101%	100%	106%	110%	95%		94%	87%	87%
d10-Fluoranthene	96%	18%	95%	92%	91%	91%	103%	92%		92%	88%	91%
d12-Benzo[e]Pyrene	81%	16%	95%	95%	97%	88%	88%	97%		97%	74%	97%

A.2.
New Brunswick Gas Phase PAHs (NB-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	NB-PUF 11/26/99	NB-PUF 12/8/99
Fluorene	Sample	6.1
Phenanthrene	Spilled	8.1
Anthracene		1.0
1Methylfluorene		2.3
Dibenzothiophene		0.69
4,5-Methylenephenanthrene		0.87
Methylphenanthrenes		6.3
Methyldibenzothiophenes		0.54
Fluoranthene		1.2
Pyrene		1.2
3,6-Dimethylphenanthrene		0.32
Benzo[a]fluorene		0.095
Benzo[b]fluorene		0.013
Retene		0.020
Benzo[b]naphtho[2,1-d]thiophene		0.005
Cyclopenta[cd]pyrene		0.021
Benz[a]anthracene		0.010
Chrysene/Triphenylene		0.021
Naphthacene		0
Benzo[b+k]fluoranthene		0.013
Benzo[e]pyrene		0.0072
Benzo[a]pyrene		0.0059
Perylene		0.0008
Indeno[1,2,3-cd]pyrene		0.0073
Benzo[g,h,i]perylene		0.0037
Dibenzo[a,h+a,c]anthracene		0.0006
Coronene		0.0028
Total PAHs	0	29
Sample Volume (m^3)		
Corresponding Laboratory Blank		
Surrogate Recoveries (%)		
d10-Anthracene		90%
d10-Fluoranthene		85%
d12-Benzo[e]Pyrene		90%

A.3.
New Brunswick PAHs in Precipitation (NB-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	NB-Precip 1/24/98	NB-Precip 2/3/98	NB-Precip 2/11/98	NB-Precip 2/16/98	NB-Precip 2/28/98	NB-Precip 3/12/98	NB-Precip 3/24/98	NB-Precip 4/5/98	NB-Precip 4/17/98	NB-Precip 4/29/98	NB-Precip 5/12/98
Fluorene	11	1.1	13	4.3	2.8	1.2	2.0	4.6	1.3	Sample	18
Phenanthrene	56	42	115	23	14	11	11	3.9	11	Lost	148
Anthracene	4.6	4.7	4.3	0.87	0.53	1.9	7.6	8.3	1.8		14
1Methylfluorene	29	4.2	7.4	2.2	1.4	0.42	4.7	3.9	2.3		84
Dibenzothiophene	4.3	1.6	8.6	2.5	0.98	6.2	5.0	14	1.2		7.6
4,5-Methylenephenanthrene	4.6	11	10	2.6	1.3	3.0	2.1	0.35	1.6		9.9
Methylphenanthrenes	39	75	77	19	8.8	43	26	13	16		105.0
Methyldibenzothiophenes	1.5	1.1	6.9	1.9	0.76	0.50	0.86	5.1	0.93		6.0
Fluoranthene	46	79	44	16	11	14	8.6	4.6	11		214
Pyrene	36	59	27	10	7.2	5.1	2.5	0.65	4.3		140
3,6-Dimethylphenanthrene	3.3	4.4	2.5	1.5	0.61	0.97	0.28	0.10	0.56		8.8
Benzo[a]fluorene	10	22	4.7	2.5	1.5	2.2	2.5	1.5	2.7		29
Benzo[b]fluorene	7.9	8.4	1.7	1.1	0.69	0.96	0.82	0.53	0.81		6.6
Retene	4.7	1.3	1.1	0.68	0.39	0.078	0.059	0.014	0.16		8.9
Benzo[b]naphtho[2,1-d]thiophene	0	2.4	0.37	0.41	0	0.78	1.4	0.35	0.79		4.8
Cyclopenta[cd]pyrene	6.2	7.9	0.61	2.5	1.9	1.0	1.1	0.45	1.3		27
Benz[a]anthracene	11	25	25	3.0	1.9	1.5	2.2	0.80	2.1		24
Chrysene/Triphenylene	31	47	21	7.7	6.0	4.0	5.5	2.7	5.9		85
Naphthacene	5.3	18	4.5	2.7	1.3	0.90	0.21	0.081	0.26		3.5
Benzo[b+k]fluoranthene	47	99	31	12	6.9	7.1	11	4.6	12		158
Benzo[e]pyrene	25	33	11	4.1	2.5	2.7	3.0	1.0	3.8		105
Benzo[a]pyrene	12	25	3.9	2.5	1.2	1.6	2.2	0.64	2.3		51
Perylene	36	8.3	1.9	1.0	0.91	1.0	1.4	0.64	1.5		104
Indeno[1,2,3-cd]pyrene	21	76	12	5.7	2.9	5.8	7.2	2.5	8.8		148
Benzo[g,h,i]perylene	10	33	8.0	3.0	1.5	2.9	3.3	1.1	4.2		75
Dibenzo[a,h+a,c]anthracene	1.9	13	2.1	1.1	0.46	0.91	0.88	0.28	0.96		2.7
Coronene	6.9	36	6.0	2.5	0.75	2.9	3.4	1.2	4.6		49
Total PAHs	471	738	450	138	80	123	116	77	104		1638
Volume of Precip. (L)	0.13	6.2	3.6	17	8.7	13	8.6	13	7.7		0.050
Corresponding Laboratory Blank	6/10/98	9/1/98	6/10/98	6/10/98	6/10/98	9/1/98	9/1/98	9/1/98	9/1/98		9/28/98
Surrogate Recoveries (%)											
d10-Anthracene	68%	51%	29%	77%	74%	62%	45%	32%	40%		59%
d10-Fluoranthene	74%	84%	71%	74%	77%	71%	56%	44%	71%		55%
d12-Benzo[e]Pyrene	98%	91%	88%	57%	93%	82%	80%	74%	83%		73%

A.3.
New Brunswick PAHs in Precipitation (NB-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	NB-Precip 5/23/98	NB-Precip 6/4/98	NB-Precip 6/17/98	NB-Precip 6/28/98	NB-Precip 7/9/98	NB-Precip 7/22/98	NB-Precip 8/3/98	NB-Precip 8/15/98	NB-Precip 8/21/98	NB-Precip 9/4/98	NB-Precip 9/22/98
Fluorene	3.7	1.7	3.3	2.4	6.2	3.2	2.8	1.9	2.6	3.8	2.5
Phenanthrene	17	6.5	15	11	40	16	15	7.3	12	15	12
Anthracene	0.91	0.32	1.0	1.0	4.3	1.4	1.9	0.82	0.68	0.92	1.0
1Methylfluorene	0.90	0.48	1.1	0.87	4.9	2.5	3.0	0.84	0.86	0.69	0.73
Dibenzothiophene	1.4	0.46	1.3	0.78	2.9	1.4	1.1	0.55	1.0	1.4	0.70
4,5-Methylenephenanthrene	0.93	0.39	1.0	0.77	3.6	1.1	1.4	0.26	0.73	1.0	1.2
Methylphenanthrenes	6.4	2.9	5.8	5.1	23	7.9	9.1	3.2	4.1	6.4	8.2
Methyldibenzothiophenes	0.82	0.30	0.56	0.39	1.8	0.86	0.81	0.34	0.54	0.77	0.59
Fluoranthene	11	4.9	12	11	57	11	23	4.5	9.4	9.5	12
Pyrene	6.2	2.6	7.7	7.0	43	6.8	18	2.7	6.1	6.1	8.4
3,6-Dimethylphenanthrene	0.41	2.2	0.36	0.32	1.6	0.48	0.56	0.21	0.34	0.39	0.65
Benzo[a]fluorene	1.8	0.79	2.4	2.5	11	2.0	4.8	0.58	2.0	1.9	3.7
Benzo[b]fluorene	0.48	0.16	0.65	0.59	2.7	0.47	1.1	0.073	0.59	0.53	0.95
Retene	0.63	0.13	0.26	0.20	0.80	0.20	0.42	0.090	0.31	0.32	0.39
Benzo[b]naphtho[2,1-d]thiophene	0.26	0.13	1.3	1.2	3.5	0.77	0.59	0.57	1.7	0.80	2.8
Cyclopenta[cd]pyrene	1.5	0.53	2.4	3.0	9.6	0.99	3.3	0.20	0.85	0.90	1.1
Benz[a]anthracene	1.6	0.71	2.7	3.1	13	1.5	4.7	0.24	2.0	2.1	5.4
Chrysene/Triphenylene	5.1	2.1	6.4	5.6	31	4.3	15	1.6	5.2	4.1	6.5
Naphthacene	1.1	0.71	0.18	0.85	1.5	3.1	1.9	0.13	0.16	0.064	0.92
Benzo[b+k]fluoranthene	8.7	4.5	13	13	66	8.7	28	3.2	9.9	7.4	16
Benzo[e]pyrene	3.5	1.5	5.1	4.4	29	4.5	13	2.1	3.8	3.2	4.9
Benzo[a]pyrene	2.4	1.0	3.9	3.3	21	2.4	9.3	0.80	2.6	2.4	3.9
Perylene	1.4	0.62	1.9	1.4	9.3	3.2	8.6	1.5	1.2	1.2	1.2
Indeno[1,2,3-cd]pyrene	5.2	4.5	15	6.1	78	2.7	24	2.2	11	8.2	8.7
Benzo[g,h,i]perylene	3.2	1.6	6.1	6.1	35	4.2	12	1.2	3.4	3.7	5.9
Dibenzo[a,h+a,c]anthracene	0.64	0.34	0.83	0.70	5.9	0.13	1.6	0.027	0.72	0.75	2.5
Coronene	2.6	1.9	3.2	3.5	19	2.9	6.1	1.1	2.7	2.2	8.2
Total PAHs	89	44	114	96	524	96	211	38	86	86	121
Volume of Precip. (L)	9.5	22	4.4	5.4	0.77	2.3	1.4	4.0	9.2	10	10
Corresponding Laboratory Blank	9/28/98	9/28/98	10/8/98	10/8/98	10/8/98	10/8/98	10/8/98	11/11/98	11/11/98	11/11/98	11/11/98
Surrogate Recoveries (%)											
d10-Anthracene	50%	63%	91%	101%	91%	87%	84%	86%	84%	99%	110%
d10-Fluoranthene	45%	54%	88%	89%	83%	88%	83%	88%	77%	95%	92%
d12-Benzo[e]Pyrene	55%	66%	98%	95%	100%	96%	100%	102%	94%	101%	93%

A.3.
New Brunswick PAHs in Precipitation (NB-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	NB-Precip 10/10/98	NB-Precip 10/28/98	NB-Precip 11/15/98	NB-Precip 12/3/98	NB-Precip 12/21/98	NB-Precip 1/8/99	NB-Precip 1/26/99	NB-Precip 2/13/99	NB-Precip 3/3/99	NB-Precip 3/21/99	NB-Precip 4/6/99
Fluorene	1.5	3.0	3.0	0.77	Column	7.4	4.2	Sample	2.8	3.4	2.8
Phenanthrene	8.2	23	23	6.2	Broke	47	24	Combined	25	35	15
Anthracene	0.54	3.1	2.2	0.61		1.3	1.3	with other	2.5	6.1	1.2
1Methylfluorene	1.8	293	36	0.72		6.1	2.4	Sample	3.0	2.8	1.7
Dibenzothiophene	0.54	0.94	15	0.29		3.7	1.8		1.1	1.7	0.92
4,5-Methylenephenanthrene	0.63	0	1.9	0.56		5.4	2.4		1.9	2.5	1.4
Methylphenanthrenes	4.6	19	13	3.8		48	15		15	15	11
Methyldibenzothiophenes	0	0	1.4	0.44		4.1	1.8		0.98	1.3	0.90
Fluoranthene	5.9	63	20	6.7		23	18		24	59	12
Pyrene	4.1	13	12	4.6		15	12		0.14	36	7.4
3,6-Dimethylphenanthrene	0.66	0	1.2	0.32		4.1	1.4		0.51	0.61	0.63
Benzo[a]fluorene	0.80	3.2	2.6	0.87		3.1	2.0		2.9	4.2	1.6
Benzo[b]fluorene	0.32	1.7	1.2	0.38		1.6	0.91		1.7	2.4	0.85
Retene	0.43	1.6	1.6	0.27		2.3	1.6		0.73	2.0	0.42
Benzo[b]naphtho[2,1-d]thiophene	0.16	1.9	0.71	0.10		1.0	0.71		0.45	0.7	0.45
Cyclopenta[cd]pyrene	0.49	0.10	1.8	0.71		NA	NA		2.2	5.4	0.95
Benz[a]anthracene	1.1	2.9	3.6	1.5		2.7	2.7		2.9	7.0	1.7
Chrysene/Triphenylene	2.9	13	12	3.6		8.8	7.5		14	30	4.8
Naphthacene	1.0	0	2.0	0.65		0	0		0	0	0
Benzo[b+k]fluoranthene	4.5	40	17	6.5		14	13		16	50	8.5
Benzo[e]pyrene	2.6	0	2.6	3.3		6.8	6.5		7.5	24	4.4
Benzo[a]pyrene	1.8	0	4.7	2.1		3.5	4.7		5.1	17	3.1
Perylene	3.8	0	3.6	1.3		0.69	3.0		1.5	7.3	1.1
Indeno[1,2,3-cd]pyrene	2.9	14	8.0	3.2		5.8	5.4		11	32	7.1
Benzo[g,h,i]perylene	2.1	9.3	5.8	2.4		5.0	4.5		5.9	17	4.1
Dibenzo[a,h+a,c]anthracene	0.28	0	1.1	0.46		0.94	0.51		1.3	3.5	0.69
Coronene	1.6	8.7	5.1	1.5		4.0	2.3		3.9	8.7	3.2
Total PAHs	55	515	200	54		224	139		154	374	98
Volume of Precip. (L)	2.0	2.1	4.0	15		29	8.3		14	2	11
Corresponding Laboratory Blank	3/30/99	3/30/99	3/30/99	3/30/99		4/27/99	4/27/99		6/21/99	6/21/99	6/21/99
Surrogate Recoveries (%)											
d10-Anthracene	86%	52%	79%	79%		83%	84%		78%	87%	79%
d10-Fluoranthene	91%	100%	84%	82%		88%	90%		91%	83%	90%
d12-Benzo[e]Pyrene	92%	93%	82%	82%		84%	100%		82%	76%	82%

A.3.

New Brunswick PAHs in Precipitation (NB-Precip)

Surrogate Corrected Concentrations (ng/L)

PAH	NB-Precip 4/26/99	NB-Precip 5/14/99	NB-Precip 6/1/99	NB-Precip 6/19/99	NB-Precip 7/7/99	Dry Roto NB-Precip 7/25/99	NB-Precip 8/12/99	NB-Precip 8/30/99	NB-Precip 9/15/99	NB-Precip 10/9/99	NB-Precip 11/2/99
Fluorene	6.3	2.3	4.2	4.9	13	0.98	1.9	2.8	14	4.5	9.9
Phenanthrene	69	13	43	25	34	9.6	16	17	82	24	129
Anthracene	16	0.51	5.0	1.4	2.1	0.56	0.99	0.97	4.3	1.4	16
1Methylfluorene	4.8	0.88	4.6	5.4	7.8	1.3	1.0	1.1	4.6	5.6	10
Dibenzothiophene	2.6	0.94	2.3	2.0	4.0	0.89	1.1	1.6	7.7	2.1	5.8
4,5-Methylenephenanthrene	7.6	0.98	4.7	1.8	3.0	0.44	1.2	1.5	7.5	1.8	5.8
Methylphenanthrenes	42	6.3	17	21	83	4.7	6.3	9.5	44	12	41
Methyldibenzothiophenes	3.2	0.25	0.72	1.2	3.5	0.98	0.49	0.34	2.6	0.43	1.9
Fluoranthene	95	9.9	50	20	17	4.0	16	12	48	14	196
Pyrene	70	6.3	36	14	11	3.1	11	6.7	28	7.2	98
3,6-Dimethylphenanthrene	2.2	0.37	0.96	0.62	2.2	0.27	0.40	0.57	2.8	0.66	0.38
Benzo[a]fluorene	15	1.1	7.1	2.7	3.0	0.49	2.4	1.1	5.1	0.93	12
Benzo[b]fluorene	12	0.33	3.3	0.50	1.6	0.16	0.39	0.18	0.91	0.20	2.3
Retene	1.2	1.7	16	0.36	1.9	0.47	0.29	0.063	0.62	0.24	2.1
Benzo[b]naphtho[2,1-d]thiophene	1.7	0.70	0.33	2.0	2.4	0.42	1.8	0.76	0.24	0.89	13
Cyclopenta[cd]pyrene	1.0	0.14	0.44	0.44	2.0	0.55	0.24	0.25	1.8	0.17	1.6
Benz[a]anthracene	27	0.87	4.8	4.4	3.2	0.79	3.7	1.1	6.5	0.64	16
Chrysene/Triphenylene	54	4.6	24	9.4	7.3	2.0	8.5	3.9	11	5.7	81
Naphthacene	0	0	0	0	3.0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	96	7.9	40	18	11	2.7	16	6.5	17	7.2	115
Benzo[e]pyrene	47	3.9	19	7.2	6.0	1.6	9.0	3.2	8.4	4.3	62
Benzo[a]pyrene	42	2.7	17	5.7	4.3	0.82	5.9	1.7	5.9	1.1	21
Perylene	14	0.95	5.0	2.7	2.1	0.40	3.1	0.46	1.8	0.20	5.7
Indeno[1,2,3-cd]pyrene	78	3.5	17	13	8.2	0.80	8.8	3.2	9.4	2.3	41
Benzo[g,h,i]perylene	40	3.3	14	6.9	5.5	0.75	6.8	2.3	6.7	1.6	26
Dibenzo[a,h+a,c]anthracene	11	0.53	2.8	1.0	1.6	0.14	0.81	0.31	1.1	0.063	2.5
Coronene	30	0.27	5.2	3.3	6.8	0.29	3.0	1.3	0.56	0.32	5.7
Total PAHs	789	74	346	175	252	39	127	81	324	100	919
Volume of Precip. (L)	1.8	18	1.6	5.56	3.60	8.12	10.00	33.45	13.30	9.20	0.60
Corresponding Laboratory Blank	6/21/99	7/13/99	7/13/99	08/19/99	08/19/99	09/14/99	09/14/99	11/03/99	11/03/99	01/04/00	01/04/00
Surrogate Recoveries (%)											
d10-Anthracene	78%	80%	77%	81%	87%	5%	83%	82%	83%	75%	79%
d10-Fluoranthene	81%	87%	86%	81%	86%	5%	87%	83%	80%	84%	89%
d12-Benzo[e]Pyrene	67%	96%	97%	103%	94%	1%	85%	83%	81%	85%	93%

A.3.
New Brunswick PAHs in Precipitation (NB-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	NB-Precip 11/26/99	NB-Precip 12/20/99
Fluorene	3.7	3.8
Phenanthrene	21	31
Anthracene	1.3	2.8
1Methylfluorene	2.0	2.0
Dibenzothiophene	2.0	2.3
4,5-Methylenephenanthrene	2.5	2.9
Methylphenanthrenes	17	20
Methyldibenzothiophenes	0.83	0.70
Fluoranthene	14	34
Pyrene	9.5	21
3,6-Dimethylphenanthrene	1.3	1.2
Benzo[a]fluorene	2.3	4.0
Benzo[b]fluorene	1.2	1.4
Retene	0.43	1.1
Benzo[b]naphtho[2,1-d]thiophene	0.91	2.8
Cyclopenta[cd]pyrene	0.40	0.82
Benz[a]anthracene	2.4	6.4
Chrysene/Triphenylene	4.7	16
Naphthacene	0	0
Benzo[b+k]fluoranthene	7.6	27
Benzo[e]pyrene	3.8	10.4
Benzo[a]pyrene	2.5	6.4
Perylene	1.0	3.0
Indeno[1,2,3-cd]pyrene	4.5	18
Benzo[g,h,i]perylene	3.0	7.6
Dibenzo[a,h+a,c]anthracene	0.66	0.99
Coronene	2.2	3.4
Total PAHs	112	232
Volume of Precip. (L)	26.30	7.80
Corresponding Laboratory Blank	01/04/00	03/06/00
Surrogate Recoveries (%)		
d10-Anthracene	89%	70%
d10-Fluoranthene	88%	73%
d12-Benzo[e]Pyrene	88%	91%

B.1.
Sandy Hook Particulate Phase PAHs (SH-QFF)
Surrogate Corrected Concentrations (ng/m³)

PAH	SH-QFF 2/4/98	SH-QFF 2/10/98	SH-QFF 2/16/98	SH-QFF 2/22/98	SH-QFF 2/28/98	SH-QFF 3/6/98	SH-QFF 3/12/98	SH-QFF 3/18/98	SH-QFF 3/24/98	SH-QFF 3/30/98	SH-QFF 4/5/98	SH-QFF 4/11/98
Fluorene	0.088	0.030	0.027	0.019	0.020	0.04	0.32	0.018	0.022	0.030	0.0090	0.024
Phenanthrene	0.13	0.078	0.18	0.070	0.10	0.0520	0.051	0.13	0.14	0.052	0.053	0.084
Anthracene	0.014	0.0071	0.016	0.0058	0.012	0.007	0.082	0.0081	0.010	0.015	0.0080	0.014
1Methylfluorene	0.013	0.0083	0.0022	0.0071	0.0066	0.0115	0	0.010	0.010	0.0058	0.0056	0.0062
Dibenzothiophene	0.053	0.010	0.0051	0.0034	0.0072	0.003	0.11	0.092	0.13	0.0027	0.013	0.024
4,5-Methylenephenanthrene	0.024	0.0095	0.018	0.010	0.015	0.0066	0	0.017	0.017	0.0077	0.010	0.011
Methylphenanthrenes	0.10	0.071	0.16	0.15	0.089	0.038	0.099	0.13	0.10	0.26	0.069	0.13
Methyldibenzothiophenes	0.0082	0.012	0.0091	0.014	0.016	0.0046	0.014	0.032	0.049	0.0020	0.0036	0.017
Fluoranthene	0.18	0.076	0.16	0.055	0.12	0.0665	0.064	0.15	0.13	0.075	0.092	0.13
Pyrene	0.13	0.052	0.039	0.046	0.10	0.0503	0.030	0.094	0.10	0.064	0.079	0.11
3,6-Dimethylphenanthrene	0.016	0.010	0.0057	0.011	0.012	0	0	0.011	0.011	0.0083	0.0063	0.011
Benzo[a]fluorene	0.031	0.013	0.044	0.012	0.031	0.013	0.022	0.029	0.025	0.016	0.023	0.030
Benzo[b]fluorene	0.014	0.0052	0.010	0.0037	0.016	0.0056	0.011	0.015	0.0025	0.0050	0.0076	0.012
Retene	0.016	0.0086	0.013	0.0078	0.016	0.0053	0	0.050	0.039	0.025	0.014	0.017
Benzo[b]naphtho[2,1-d]thiophene	0.022	0.0073	0.0029	0.0070	0.0092	0.0036	0.015	0.031	0.042	0.0068	0.0048	0.015
Cyclopenta[cd]pyrene	0.0024	0.0055	0.0054	0.0035	0.015	0.0067	0	0.035	0.036	0.0054	0.010	0.048
Benz[a]anthracene	0.036	0.013	0.043	0.0079	0.037	0.013	0.027	0.036	0.031	0.017	0.032	0.041
Chrysene/Triphenylene	0.13	0.063	0.10	0.037	0.12	0.047	0.094	0.11	0.11	0.049	0.070	0.14
Naphthacene	0	0	0	0	0.0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.23	0.12	0.060	0.067	0.28	0.091	0.27	0.45	0.55	0.073	0.13	0.30
Benzo[e]pyrene	0.12	0.061	0.080	0.053	0.14	0.046	0.045	0.072	0.086	0.041	0.063	0.13
Benzo[a]pyrene	0.017	0.0059	0.032	0.0083	0.050	0.020	0	0.045	0.041	0.023	0.049	0.067
Perylene	0.0023	0	0.018	0.0010	0.014	0.0041	0	0.010	0.0067	0.0042	0.015	0.012
Indeno[1,2,3-cd]pyrene	0.098	0.034	0.013	0.053	0.092	0.036	0.084	0.065	0.084	0.063	0.12	0.081
Benzo[g,h,i]perylene	0.091	0.063	0.037	0.095	0.14	0.060	0.110	0.063	0.083	0.039	0.0061	0.17
Dibenzo[a,h+a,c]anthracene	0.017	0.0068	0.050	0.0060	0.032	0.012	0.0063	0.0090	0.016	0.0078	0.019	0.019
Coronene	0.084	0.071	0.046	0.080	0.13	0.053	0.29	0.051	0.084	0.018	0.039	0.16
Total PAHs	1.7	0.84	1.2	0.83	1.6	0.70	1.7	1.8	2.0	0.92	0.95	1.8
Sample Volume (m³)	608	586	517	615	624	584	562	580	553	499	530	603
Corresponding Laboratory Blank	2/16/98	3/11/98	3/11/98	3/11/98	3/11/98	3/11/98	3/27/98	3/27/98	5/27/98	5/27/98	6/1/98	5/27/98
Total Suspended Particulate (μg/m³)	49.0	36.2	30.9	30.7	31.4	30.3	11.2	35.9	26.8	57.1	16.6	29.5
Surrogate Recoveries (%)												
d10-Anthracene	51%	57%	67%	87%	72%	87%	3%	75%	76%	84%	75%	91%
d10-Fluoranthene	90%	98%	65%	99%	92%	90%	15%	82%	89%	85%	83%	91%
d12-Benzo[e]Pyrene	97%	98%	71%	90%	98%	100%	34%	89%	90%	94%	88%	100%

B.1.

Sandy Hook Particulate Phase PAHs (SH-QFF)

Surrogate Corrected Concentrations (ng/m³)

PAH	SH-QFF 4/17/98	SH-QFF 4/23/98	SH-QFF 4/29/98	SH-QFF 5/5/98	SH-QFF 5/11/98	SH-QFF 5/17/98	SH-QFF 5/23/98	SH-QFF 5/29/98	SH-QFF 6/4/98	SH-QFF 6/10/98	SH-QFF 6/16/98	SH-QFF 6/22/98
Fluorene	0.073	0.046	0.0057	0.0020	0.0034	0.014	0.097	0.062	0.043	0.047	0.071	0.057
Phenanthrene	0.041	0.045	0.053	0.0090	0.022	0.041	0.15	0.062	0.072	0.053	0.031	0.0065
Anthracene	0.014	0.012	0.0078	0.0012	0.0036	0.013	0.026	0.034	0.016	0.0021	0.0041	0.0004
1Methylfluorene	0.0068	0.014	0.0035	0.0009	0.0036	0.014	0.052	0.0079	0.0075	0	0.0045	0.0016
Dibenzothiophene	0.0076	0.039	0.0035	0.0005	0.0051	0.0066	0.0013	0.0024	0.012	0.0011	0.0025	0
4,5-Methylenephenanthrene	0.0082	0.0094	0.0084	0.0011	0.0032	0.017	0.0042	0.011	0.017	0	0.0032	0.0006
Methylphenanthrenes	0.14	0.25	0.19	0.025	0.081	0.42	0.17	0.18	0.19	0.038	0.20	0.083
Methyldibenzothiophenes	0.012	0.015	0.0046	0.0005	0.0067	0.014	0.012	0.0077	0.0068	0.0055	0.0054	0.0023
Fluoranthene	0.058	0.051	0.075	0.0086	0.023	0.065	0.12	0.087	0.13	0.0009	0.04	0.0090
Pyrene	0.044	0.056	0.062	0.0056	0.019	0.080	0.083	0.076	0.12	0	0.023	0.0053
3,6-Dimethylphenanthrene	0.0034	0.0058	0.0057	0.0016	0.0029	0.0047	0.0040	0.010	0.015	0	0.0032	0
Benzo[a]fluorene	0.013	0.016	0.017	0.0018	0.0060	0.017	0.031	0.033	0.035	0.0014	0.0094	0.0008
Benzo[b]fluorene	0.0046	0.0049	0.0058	0.0007	0.0019	0.019	0.010	0.0072	0.011	0	0.0036	0.0002
Retene	0.017	0.034	0.013	0.0021	0.0090	0.069	0.013	0.021	0.016	0.0066	0.015	0.0068
Benzo[b]naphtho[2,1-d]thiophene	0.010	0.0011	0.0050	0.0006	0.0021	0.068	0.023	0.024	0.031	0.0019	0.0098	0.0016
Cyclopenta[cd]pyrene	0.0041	0.017	0.0042	0.0008	0.0024	0.069	0.0090	0.012	0.012	0	0.0003	0
Benz[a]anthracene	0.013	0.012	0.021	0.0018	0.0044	0.012	0.039	0.036	0.051	0	0.0073	0.0005
Chrysene/Triphenylene	0.032	0.050	0.046	0.0066	0.018	0.047	0.11	0.071	0.11	0.0073	0.028	0.0031
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.052	0.083	0.090	0.011	0.029	0.058	0.20	0.15	0.22	0.014	0.042	0.0036
Benzo[e]pyrene	0.026	0.043	0.047	0.0061	0.018	0.031	0.086	0.065	0.11	0.0071	0.019	0.0033
Benzo[a]pyrene	0.017	0.021	0.032	0.0014	0.0048	0.017	0.046	0.042	0.081	0	0.0087	0.0008
Perylene	0.0034	0.0051	0.0090	0	0	0.0032	0.013	0.013	0.027	0	0.0021	0
Indeno[1,2,3-cd]pyrene	0.045	0.065	0.077	0.016	0.038	0.047	0.14	0.10	0.18	0.011	0.030	0.0031
Benzo[g,h,i]perylene	0.029	0.055	0.048	0.013	0.029	0.026	0.10	0.061	0.11	0.0051	0.021	0.0019
Dibenzo[a,h+a,c]anthracene	0.0056	0.0067	0.014	0.0019	0.0028	0.0065	0.024	0.017	0.027	0	0.0036	0
Coronene	0.015	0.056	0.021	0.022	0.029	0.015	0.093	0.070	0.057	0.0046	0.016	0.0024
Total PAHs	0.69	1.0	0.87	0.14	0.37	1.2	1.6	1.3	1.7	0.21	0.60	0.19
Sample Volume (m³)	573	511	512	3019	654	331	333	569	512	524	474	569
Corresponding Laboratory Blank	6/29/98	6/1/98	5/27/98	6/1/98	6/1/98	5/27/98	6/29/98	6/29/98	6/29/98	6/29/98	7/1/98	7/1/98
Total Suspended Particulate (μg/m³)	38.2	22.3	96.3	26.9	62.0	55.0	96.5	72.4	46.5	37.2	63.0	43.6
Surrogate Recoveries (%)												
d10-Anthracene	85%	78%	77%	75%	63%	81%	83%	66%	87%	74%	77%	78%
d10-Fluoranthene	83%	69%	88%	87%	83%	79%	83%	89%	94%	88%	72%	88%
d12-Benzo[e]Pyrene	82%	79%	90%	97%	96%	93%	87%	95%	98%	98%	98%	92%

B.1.

Sandy Hook Particulate Phase PAHs (SH-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-QFF 6/28/98	SH-QFF 7/4/98	day SH-QFF 7/5/98	night SH-QFF 7/5/98	day SH-QFF 7/6/98	night SH-QFF 7/6/98	day SH-QFF 7/7/98	night SH-QFF 7/7/98	day SH-QFF 7/8/98	night SH-QFF 7/8/98	day SH-QFF 7/9/98	night SH-QFF 7/9/98
Fluorene	0.021	0.036	0.012	0.14	0.011	0.018	0.0030	0.093	0.0015	0.0080	0.029	0.028
Phenanthrene	0.014	0.052	0.12	1.1	0.029	0.093	0.041	0.15	0.010	0.032	0.081	0.053
Anthracene	0.0047	0.0044	0.010	0.21	0.0029	0.0064	0.0025	0.12	0.0055	0.0083	0.037	0.023
1Methylfluorene	0.0030	0.0064	0.040	0.076	0.010	0.026	0.013	0.014	0.0033	0.0073	0.013	0.0092
Dibenzothiophene	0.0016	0.0048	0.022	0.14	0.0041	0.022	0.0047	0.018	0.0013	0.0080	0.0085	0.0044
4,5-Methylenephenanthrene	0.0026	0.0072	0.027	0.14	0.0042	0.019	0.012	0.04	0.0016	0.0044	0.015	0.010
Methylphenanthrenes	0.056	0.095	0.74	1.0	0.15	0.60	0.34	0.56	0.057	0.15	0.36	0.34
Methyldibenzothiophenes	0.0034	0.0093	0.094	0.090	0.019	0.053	0.026	0.029	0.0048	0.015	0.015	0.0065
Fluoranthene	0.018	0.047	0.086	0.26	0.022	0.063	0.037	0.24	0.0070	0.030	0.10	0.077
Pyrene	0.016	0.032	0.23	0.20	0.046	0.17	0.087	0.20	0.014	0.031	0.075	0.051
3,6-Dimethylphenanthrene	0.0024	0.0051	0.11	0.021	0.024	0.10	0.038	0.081	0.0076	0.016	0.012	0.014
Benzo[a]fluorene	0.0054	0.0097	0.090	0.060	0.014	0.064	0.034	0.061	0.0051	0.013	0.018	0.016
Benzo[b]fluorene	0.0009	0.0023	0	0.018	0.003	0.017	0.010	0.022	0.0015	0.0031	0.0072	0.0044
Retene	0.0057	0.013	0.098	0.046	0.023	0.074	0.040	0.023	0.0074	0.015	0.022	0.010
Benzo[b]naphtho[2,1-d]thiophene	0.0061	0.0087	0.15	0.042	0.021	0.10	0.083	0.051	0.0044	0.021	0.021	0.019
Cyclopenta[cd]pyrene	0.0034	0.0015	0.006	0.020	0.0007	0.030	0.0018	0.27	0	0.0022	0	0
Benz[a]anthracene	0.0038	0.0079	0	0.087	0.004	0.014	0.0038	0.069	0.0007	0.013	0.016	0.010
Chrysene/Triphenylene	0.011	0.035	0.27	0.16	0.033	0.18	0.21	0.19	0	0.10	0.059	0.053
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.019	0.063	0.23	0.24	0.026	0.11	0.039	0.33	0.0047	0.024	0.070	0.059
Benzo[e]pyrene	0.010	0.034	0.23	0.13	0.026	0.14	0.061	0.20	0.012	0.020	0.044	0.039
Benzo[a]pyrene	0.0044	0.0056	0.053	0.093	0.0032	0.033	0.021	0.093	0.0027	0.0035	0.013	0.0083
Perylene	0.0013	0	0.033	0.032	0	0.022	0.015	0.024	0	0.0014	0.0019	0.0010
Indeno[1,2,3-cd]pyrene	0.016	0.066	0.19	0.26	0.029	0.18	0.044	0.31	0	0.040	0.036	0.031
Benzo[g,h,i]perylene	0.012	0.041	0.18	0.14	0.028	0.11	0.047	0.24	0.0042	0.026	0.044	0.036
Dibenzo[a,h+a,c]anthracene	0.0018	0.010	0	0.028	0.0038	0.058	0.014	0.023	0	0.0036	0.0092	0.0088
Coronene	0.011	0.034	0.17	0.10	0.013	0.12	0.045	0.22	0.0035	0.022	0.034	0.032
Total PAHs	0.25	0.63	3.3	4.8	0.55	2.4	1.3	3.7	0.16	0.61	1.1	0.94
Sample Volume (m^3)	654	583	280	292	337	292	332	300	318	325	326	383
Corresponding Laboratory Blank	8/6/98	8/6/98	8/6/98	7/19/98	8/6/98	7/15/98	7/24/98	7/24/98	7/19/98	8/6/98	7/17/98	7/17/98
Total Suspended Particulate (μg/m^3)	219.1	74.5	59.3	58.6	52.7	83.8	42.1	40.0	31.8	65.8	73.0	78.9
Surrogate Recoveries (%)												
d10-Anthracene	73%	46%	81%	81%	83%	87%	87%	82%	88%	82%	54%	57%
d10-Fluoranthene	88%	85%	83%	81%	88%	86%	87%	89%	94%	88%	93%	90%
d12-Benzo[e]Pyrene	98%	84%	91%	88%	98%	89%	90%	93%	101%	82%	99%	93%

B.1.

Sandy Hook Particulate Phase PAHs (SH-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	day SH-QFF 7/10/98	night SH-QFF 7/10/98	day SH-QFF 7/11/98	SH-QFF 7/16/98	SH-QFF 7/22/98	SH-QFF 7/28/98	SH-QFF 8/3/98	SH-QFF 8/9/98	SH-QFF 8/15/98	SH-QFF 8/21/98	SH-QFF 8/27/98	SH-QFF 9/4/98
Fluorene	0.025	0.010	0.012	0.017	0.0085	0.011	0.012	0.016	0.0043	0.0077	0.0042	0.014
Phenanthrene	0.11	0.026	0.035	0.028	0.039	0.020	0.060	0.0082	0.016	0.075	0.022	0.056
Anthracene	0.032	0.017	0.021	0.025	0.024	0.012	0.023	0.0043	0.0041	0.025	0.010	0.022
1Methylfluorene	0.012	0.0060	0.0066	0.0049	0.0058	0.0045	0.0081	0.0009	0.0026	0.0062	0.0023	0.0041
Dibenzothiophene	0.0045	0.0040	0.0063	0.0012	0.0015	0.0023	0.0094	0	0.0009	0.0055	0.0022	0.0043
4,5-Methylenephenanthrene	0.016	0.0043	0.0056	0.0068	0.0079	0.0025	0.010	0.0011	0.0026	0.010	0.0033	0.011
Methylphenanthrenes	0.26	0.089	0.12	0.092	0.22	0.18	0.22	0.073	0.087	0.13	0.10	0.13
Methyldibenzothiophenes	0.015	0.0061	0.010	0.0009	0.0042	0.0040	0.010	0.0015	0.0036	0.0081	0.0023	0.0059
Fluoranthene	0.12	0.033	0.041	0.055	0.068	0.025	0.063	0.0086	0.019	0.096	0.024	0.11
Pyrene	0.11	0.032	0.037	0.038	0.057	0.023	0.054	0.0082	0.017	0.075	0.021	0.095
3,6-Dimethylphenanthrene	0.025	0.010	0.010	0.0063	0.012	0.0043	0.008	0.0024	0.0037	0.0081	0.0033	0.0051
Benzo[a]fluorene	0.028	0.011	0.014	0.016	0.022	0.0070	0.017	0.0023	0.0038	0.023	0.031	0.026
Benzo[b]fluorene	0.011	0.0025	0.0036	0.0047	0.0059	0.0016	0.0047	0.0003	0.0015	0.0053	0.0020	0.0066
Retene	0.023	0.0059	0.0055	0.0019	0.0036	0.0093	0.014	0.0066	0.0027	0.012	0.010	0.015
Benzo[b]naphtho[2,1-d]thiophene	0.032	0.013	0.015	0.010	0.018	0.0034	0.018	0.0010	0.013	0.012	0.0024	0.010
Cyclopenta[cd]pyrene	0.0059	0.0041	0	0.0033	0.0091	0.0001	0.0006	0.0001	0.0003	0.004	0.0049	0.0045
Benz[a]anthracene	0.026	0.0056	0.0077	0.018	0.021	0.0039	0.015	0.0007	0.0031	0.016	0.0019	0.024
Chrysene/Triphenylene	0.091	0.027	0.038	0.044	0.054	0.022	0.044	0.0048	0.012	0.057	0.0072	0.061
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.12	0.033	0.052	0.066	0.11	0.036	0.077	0.0073	0.018	0.10	0.025	0.11
Benzo[e]pyrene	0.077	0.031	0.037	0.035	0.054	0.031	0.045	0.0048	0.010	0.063	0.015	0.054
Benzo[a]pyrene	0.034	0.014	0.016	0.018	0.031	0.019	0.028	0.0039	0.0029	0.042	0.010	0.064
Perylene	0.011	0.0024	0.0057	0.0045	0.0078	0.0023	0.0061	0	0.0005	0.0061	0.011	0.022
Indeno[1,2,3-cd]pyrene	0.057	0.035	0.028	0.067	0.14	0.017	0.043	0.0030	0.0049	0.095	0.013	0.091
Benzo[g,h,i]perylene	0.065	0.029	0.043	0.040	0.073	0.026	0.045	0.0028	0.0066	0.087	0.014	0.073
Dibenzo[a,h+a,c]anthracene	0.016	0.0012	0.0057	0.0068	0.013	0.0037	0.0049	0	0.0025	0.011	0	0.013
Coronene	0.046	0.022	0.033	0.043	0.084	0.015	0.023	0	0.0038	0.057	0.0048	0.029
Total PAHs	1.4	0.47	0.61	0.65	1.1	0.49	0.86	0.16	0.25	1.0	0.35	1.1
Sample Volume (m^3)	341	348	335	631	621	633	635	672	877	628	706	685
Corresponding Laboratory Blank	7/17/98	7/17/98	8/6/98	9/14/98	9/14/98	9/14/98	9/18/98	9/14/98	9/18/98	9/24/98	9/18/98	9/24/98
Total Suspended Particulate (μg/m^3)	47.2	47.7	61.4	52.5	70.2	51.7	56.2	38.3	29.6	75.8	26.9	71.6
Surrogate Recoveries (%)												
d10-Anthracene	79%	63%	76%	82%	86%	87%	78%	66%	67%	65%	52%	74%
d10-Fluoranthene	86%	86%	88%	105%	105%	90%	74%	73%	84%	81%	63%	79%
d12-Benzo[e]Pyrene	90%	89%	91%	103%	99%	94%	79%	83%	92%	76%	68%	80%

B.1.
Sandy Hook Particulate Phase PAHs (SH-QFF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-QFF 9/13/98	SH-QFF 9/22/98	SH-QFF 10/1/98	SH-QFF 10/10/98	SH-QFF 10/19/98	SH-QFF 10/28/98	SH-QFF 11/6/98	SH-QFF 11/15/98	SH-QFF 11/24/98	SH-QFF 12/3/98	SH-QFF 12/12/98	SH-QFF 12/21/98
Fluorene	0.015	0.012	0.017	Power	0.011	0.01	0.013	Sample	0.012	0.021	0.028	0.011
Phenanthrene	0.018	0.074	0.11	Outage	0.086	0.057	0.13	Missing	0.12	0.19	0.34	0.058
Anthracene	0.0073	0.022	0.016		0.020	0.013	0.020		0.021	0.026	0.029	0.0055
1Methylfluorene	0.0020	0.015	0.022		0.0060	0.0045	0.0076		0.026	0.019	0.014	0.018
Dibenzothiophene	0.0015	0.0075	0.033		0.019	0.015	0.051		0.040	0.046	0.10	0.0080
4,5-Methylenephenanthrene	0.0028	0.0091	0.016		0.010	0.0069	0.019		0.016	0.025	0.041	0.0050
Methylphenanthrenes	0.052	0.096	0.18		0.17	0.11	0.16		0.17	0.22	0.411	0.060
Methyldibenzothiophenes	0.0019	0.013	0.042		0.059	0.023	0.027		0.043	0.022	0.082	0.015
Fluoranthene	0.024	0.077	0.14		0.096	0.062	0.15		0.12	0.20	0.38	0.034
Pyrene	0.022	0.069	0.13		0.077	0.047	0.12		0.096	0.096	0.28	0.025
3,6-Dimethylphenanthrene	0.0017	0.010	0.023		0.0080	0.0049	0.0078		0.0066	0.0083	0.026	0.0044
Benzo[a]fluorene	0.0061	0.040	0.063		0.019	0.012	0.031		0.024	0.034	0.086	0.0057
Benzo[b]fluorene	0.0015	0.010	0.016		0.0086	0.0048	0.013		0.010	0.015	0.044	0.0025
Retene	0.0074	0.011	0.026		0.013	0.0091	0.019		0.011	0.0076	0.053	0.0056
Benzo[b]naphtho[2,1-d]thiophene	0.0022	0.0028	0.0028		0.011	0.0077	0.020		0.015	0.047	0.060	0.0029
Cyclopenta[cd]pyrene	0.0007	0.014	0.059		0.0076	0	0.010		0	0.025	0.037	0
Benz[a]anthracene	0.0023	0.048	0.068		0.028	0.015	0.052		0.040	0.068	0.11	0.0084
Chrysene/Triphenylene	0.018	0.091	0.11		0.074	0.054	0.12		0.085	0.15	0.36	0.022
Naphthacene	0	0	0		0.017	0.014	0.020		0.018	0.015	0.021	0
Benzo[b+k]fluoranthene	0.048	0.22	0.24		0.14	0.098	0.24		0.15	0.27	0.69	0.037
Benzo[e]pyrene	0.031	0.082	0.092		0.075	0.051	0.12		0.074	0.12	0.30	0.019
Benzo[a]pyrene	0.014	0.12	0.19		0.041	0.026	0.075		0.040	0.041	0.13	0.012
Perylene	0.0016	0.015	0.030		0.010	0.007	0.022		0.0090	0.0079	0.030	0.0030
Indeno[1,2,3-cd]pyrene	0.037	0.21	0.33		0.14	0.083	0.18		0.13	0.19	0.46	0.027
Benzo[g,h,i]perylene	0.021	0.12	0.14		0.12	0.058	0.13		0.082	0.11	0.34	0.019
Dibenzo[a,h+a,c]anthracene	0.0007	0.032	0.034		0.019	0.012	0.029		0.023	0.029	0.053	0.0051
Coronene	0.0090	0.13	0.14		0.16	0.068	0.12		0.076	0.099	0.41	0.015
Total PAHs	0.35	1.6	2.3		1.4	0.9	1.9		1.4	2.1	4.9	0.4
Sample Volume (m^3)	684	683	638		674	666	703		658	659	699	688
Corresponding Laboratory Blank	9/24/98	10/15/98	10/15/98		1/4/99	1/4/99	2/9/99		1/4/99	2/17/99	2/17/99	3/2/99
Total Suspended Particulate (μg/m^3)	43.4	50.0	54.5		42.0	43.5	38.7		49.2	65.4	54.1	35.2
Surrogate Recoveries (%)												
d10-Anthracene	60%	115%	88%		62%	58%	63%		62%	58%	59%	60%
d10-Fluoranthene	75%	101%	87%		88%	93%	90%		94%	91%	84%	89%
d12-Benzo[e]Pyrene	69%	94%	96%		94%	98%	94%		98%	92%	85%	90%

B.1.
Sandy Hook Particulate Phase PAHs (SH-QFF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-QFF 12/30/98	SH-QFF 1/8/99	SH-QFF 1/17/99	SH-QFF 1/26/99	SH-QFF 2/4/99	SH-QFF 2/13/99	SH-QFF 2/22/99	SH-QFF 3/3/99	SH-QFF 3/12/99	SH-QFF 3/21/99	SH-QFF 3/30/99	SH-QFF 4/8/99
Fluorene	0.035	0.018	0.034	0.023	0.025	0.043	Vial Broke	Power	Power	Power	Power	Power
Phenanthrene	0.31	0.14	0.40	0.24	0.30	0.53	Sample	Outage	Outage	Outage	Outage	Outage
Anthracene	0.072	0.016	0.030	0.021	0.035	0.056	Lost					
1Methylfluorene	0.030	0.044	0.027	0.041	0.014	0.030						
Dibenzothiophene	0.029	0.0086	0.031	0.12	0.026	0.022						
4,5-Methylenephenanthrene	0.053	0.018	0.049	0.047	0.037	0.061						
Methylphenanthrenes	0.38	0.26	0.29	0.64	0.44	0.49						
Methyldibenzothiophenes	0.036	0.019	0.062	0.077	0.042	0.022						
Fluoranthene	0.48	0.079	0.27	0.31	0.23	0.34						
Pyrene	0.39	0.055	0.19	0.32	0.16	0.22						
3,6-Dimethylphenanthrene	0.053	0.011	0.026	0.098	0.016	0.020						
Benzo[a]fluorene	0.12	0.011	0.048	0.10	0.035	0.045						
Benzo[b]fluorene	0.067	0.0048	0.024	0.060	0.017	0.022						
Retene	0.025	0.0076	0.022	0.096	0.0075	0.0074						
Benzo[b]naphtho[2,1-d]thiophene	0.057	0.0073	0.032	0.035	0.028	0.037						
Cyclopenta[cd]pyrene	0.0058	0.0012	0.016	0.078	0.0073	0.0055						
Benz[a]anthracene	0.25	0.015	0.062	0.16	0.062	0.071						
Chrysene/Triphenylene	0.42	0.039	0.23	0.33	0.14	0.24						
Naphthacene	0	0	0	0.041	0	0						
Benzo[b+k]fluoranthene	0.82	0.067	0.44	0.060	0.25	0.37						
Benzo[e]pyrene	0.36	0.039	0.20	0.28	0.12	0.18						
Benzo[a]pyrene	0.21	0.015	0.041	0.19	0.061	0.032						
Perylene	0.052	0.0033	0.0062	0.046	0.018	0.0049						
Indeno[1,2,3-cd]pyrene	0.52	0.048	0.25	0.28	0.12	0.16						
Benzo[g,h,i]perylene	0.45	0.041	0.25	0.32	0.10	0.13						
Dibenzo[a,h+a,c]anthracene	0.039	0.011	0.035	0.037	0.010	0.013						
Coronene	0.46	0.041	0.25	0.20	0.073	0.10						
Total PAHs	5.7	1.0	3.3	4.3	2.4	3.3						
Sample Volume (m^3)	714	693	625	690	701	647						
Corresponding Laboratory Blank	3/2/99	4/12/99	4/12/99	4/12/99	4/12/99	4/12/99						
Total Suspended Particulate (μg/m^3)	49.0	62.0	64.8	33.6	63.6	68.5						
Surrogate Recoveries (%)												
d10-Anthracene	72%	41%	43%	61%	50%	38%						
d10-Fluoranthene	86%	96%	95%	87%	103%	88%						
d12-Benzo[e]Pyrene	86%	98%	94%	98%	105%	89%						

B.1.

Sandy Hook Particulate Phase PAHs (SH-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-QFF 4/17/99	SH-QFF 4/26/99	SH-QFF 5/5/99	SH-QFF 5/14/99	SH-QFF 5/23/99	SH-QFF 6/1/99	SH-QFF 6/10/99	SH-QFF 6/19/99	SH-QFF 6/28/99	SH-QFF 7/7/99	SH-QFF 7/16/99	NO POWER 7/17/99-1/13/00
Fluorene	Power	Power	Power	0.0050	0.0075	0.0014	0.0010	0.0020	0.0009	0.0084	0.0064	
Phenanthrene	Outage	Outage	Outage	0.080	0.055	0.096	0.045	0.057	0.027	0.064	0.073	
Anthracene				0.0081	0.010	0.017	0.0083	0.0089	0.0081	0.040	0.028	
1Methylfluorene				0.037	0.0029	0.0039	0.0038	0.0033	0.0054	0.016	0.014	
Dibenzothiophene				0.011	0.0045	0.0066	0.0041	0.0032	0.0016	0.0055	0.0040	
4,5-Methylenephenanthrene				0.011	0.010	0.016	0.0069	0.0079	0.0043	0.010	0.012	
Methylphenanthrenes				0.15	0.11	0.18	0.11	0.11	0.084	0.16	0.18	
Methyldibenzothiophenes				0.012	0.0024	0.0034	0.0024	0.0026	0.0002	0.0085	0.0040	
Fluoranthene				0.13	0.085	0.174	0.052	0.072	0.035	0.069	0.12	
Pyrene				0.093	0.074	0.138	0.047	0.062	0.028	0.054	0.097	
3,6-Dimethylphenanthrene				0.011	0.0039	0.0057	0.0025	0.0036	0.0012	0.0050	0.0062	
Benzo[a]fluorene				0.020	0.018	0.022	0.010	0.012	0.0062	0.0071	0.024	
Benzo[b]fluorene				0.0085	0.0078	0.011	0.0044	0.0056	0.0034	0.0078	0.0037	
Retene				0.021	0.032	0.050	0.020	0.020	0.0067	0.017	0.037	
Benzo[b]naphtho[2,1-d]thiophene				0.0015	0.0034	0.0032	0.0009	0.0020	0.0033	0.0062	0.0035	
Cyclopenta[cd]pyrene				0.019	0.0084	0.0058	0.0083	0.0029	0.0087	0.016	0.0083	
Benz[a]anthracene				0.022	0.012	0.021	0.0074	0.010	0.0061	0.044	0.017	
Chrysene/Triphenylene				0.093	0.055	0.10	0.034	0.046	0.020	0.048	0.078	
Naphthacene				0	0	0	0	0	0	0	0	
Benzo[b+k]fluoranthene				0.18	0.11	0.18	0.063	0.081	0.038	0.074	0.13	
Benzo[e]pyrene				0.11	0.065	0.10	0.035	0.052	0.019	0.037	0.075	
Benzo[a]pyrene				0.019	0.053	0.072	0.017	0.030	0.0090	0.019	0.038	
Perylene				0.0033	0.023	0.022	0.0043	0.0077	0.0025	0.0060	0.010	
Indeno[1,2,3-cd]pyrene				0.094	0.085	0.091	0.031	0.051	0.017	0.037	0.099	
Benzo[g,h,i]perylene				0.080	0.067	0.083	0.029	0.053	0.018	0.038	0.076	
Dibenzo[a,h+a,c]anthracene				0.0084	0.013	0.014	0.0060	0.0071	0.0028	0.0060	0.015	
Coronene				0.061	0.027	0.039	0.011	0.036	0.017	0.033	0.042	
Total PAHs				1.3	0.94	1.5	0.57	0.75	0.37	0.83	1.2	
Sample Volume (m^3)				648	687	626	692	707	702	639	632	
Corresponding Laboratory Blank				7/18/99	7/18/99	7/28/99	7/28/99	7/28/99	8/3/99	8/3/99	9/24/99	
Total Suspended Particulate (μg/m^3)				118.2	78.4	96.4	65.7	69.2	64.8	48.2	88.8	
Surrogate Recoveries (%)												
d10-Anthracene				66%	79%	69%	51%	69%	68%	69%	60%	
d10-Fluoranthene				91%	96%	91%	79%	99%	90%	93%	83%	
d12-Benzo[e]Pyrene				91%	97%	94%	89%	97%	104%	92%	96%	

B.2.
Sandy Hook Gas Phase PAHs (SH-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-PUF 2/4/98	SH-PUF 2/10/98	SH-PUF 2/16/98	SH-PUF 2/22/98	SH-PUF 2/28/98	SH-PUF 3/6/98	SH-PUF 3/12/98	SH-PUF 3/18/98	SH-PUF 3/24/98	SH-PUF 3/30/98	SH-PUF 4/5/98	SH-PUF 4/11/98
Fluorene	0.42	2.2	0.61	4.5	0.68	0.48	0.36	1.4	2.2	0.99	1.2	2.7
Phenanthrene	2.6	3.4	0.90	7.0	2.8	1.5	1.2	6.1	3.2	6.1	1.8	4.7
Anthracene	0.0087	0.055	0.014	0.24	0.036	0.017	0.022	0.33	0.016	0.0036	0	0.058
1Methylfluorene	0.58	0.96	0.23	1.7	0.63	0.33	0.30	1.9	1.0	0.48	0.46	1.27
Dibenzothiophene	0.033	0.50	0.13	0.87	0.096	0.031	0.0	0.14	0.35	0.49	0.14	0.23
4,5-Methylenephenanthrene	0.052	0.29	0.086	0.50	0.24	0.13	0.059	0.68	0.22	0.24	0.12	0.28
Methylphenanthrenes	9.4	7.9	0.64	21	2.0	0.55	0.60	12	0.58	2.7	1.3	3.4
Methyldibenzothiophenes	0.082	0.59	0.19	0.73	0.23	0.14	0.059	0.37	0.40	0.29	0.089	0.36
Fluoranthene	0.62	0.70	0.28	1.00	0.48	0.40	0.13	1.1	0.54	1.0	0.21	0.63
Pyrene	0.32	0.32	0.14	0.74	0.34	0.18	0.020	0.95	0.20	0.28	0.065	0.23
3,6-Dimethylphenanthrene	0.13	0.19	0.068	0.31	0.14	0	0.022	0.42	0.12	0.15	0.068	0.22
Benzo[a]fluorene	0.046	0.046	0.022	0.073	0.032	0.042	0.18	0.13	0.019	0.0068	0.0091	0.028
Benzo[b]fluorene	0.011	0.013	0.005	0.023	0.011	0.0038	0	0.013	0.0041	0.010	0.0007	0.0038
Retene	0.019	0.026	0.015	0.036	0.022	0.017	0	0.054	0.017	0.059	0.0034	0.011
Benzo[b]naphtho[2,1-d]thiophene	0.0025	0.0088	0.0012	0.010	0.0054	0.16	0.16	0.15	0.0012	0.0079	0.0008	0.0025
Cyclopenta[cd]pyrene	0	0	0	0	0.0002	0	0	0	0	0	0	0
Benz[a]anthracene	0.0008	0	0	0	0	0	0	0.021	0	0	0	0
Chrysene/Triphenylene	0.0099	0.0125	0	0.024	0.011	0.0022	0	0.031	0.0058	0.024	0.0017	0.0052
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.0010	0	0	0.0045	0.0012	0	0	0	0	0	0	0
Benzo[e]pyrene	0.0006	0	0	0.0039	0.0006	0	0	0	0	0	0	0
Benzo[a]pyrene	0.0007	0	0	0.0030	0	0	0	0	0	0	0	0
Perylene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	14.3	17.3	3.3	38.5	7.8	4.2	3.1	25.3	8.9	12.9	5.4	14.1
Sample Volume (m^3)	608	586	517	615	624	584	562	580	553	499	530	603
Corresponding Laboratory Blank	2/16/98	3/10/98	3/10/98	3/10/98	3/17/98	3/25/98	3/25/98	3/25/98	5/26/98	5/23/98	5/26/98	6/15/98
Surrogate Recoveries (%)												
d10-Anthracene	77%	86%	80%	81%	86%	91%	92%	96%	85%	62%	80%	86%
d10-Fluoranthene	91%	95%	89%	85%	95%	91%	100%	97%	93%	51%	94%	83%
d12-Benzo[e]Pyrene	91%	62%	90%	59%	93%	95%	106%	99%	94%	81%	99%	90%

B.2.

Sandy Hook Gas Phase PAHs (SH-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-PUF 4/17/98	SH-PUF 4/23/98	SH-PUF 4/29/98	SH-PUF 5/5/98	SH-PUF 5/11/98	SH-PUF 5/17/98	SH-PUF 5/23/98	SH-PUF 5/29/98	SH-PUF 5/29/98	SH-PUF 6/4/98	SH-PUF 6/10/98	SH-PUF 6/16/98
Fluorene	1.9	2.6	3.0	0.14	0.56	3.0	3.0	0.40	0.098	0.90	0.20	1.4
Phenanthrene	6.4	6.5	7.1	2.0	2.5	5.8	11	4.8	2.9	2.9	1.2	4.8
Anthracene	0.053	0.065	0.073	0.033	0.040	0.096	0.12	0.053	0	0.019	0.067	0.076
1Methylfluorene	0.85	1.19	1.11	0.15	0.51	0.72	1.1	0.17	0.031	0.51	0.76	0.54
Dibenzothiophene	0.58	0.63	0.75	0.12	0.21	0.68	1.6	0.36	0.28	0.11	0.16	0.47
4,5-Methylenephenanthrene	0.39	0.40	0.36	0.28	0.25	0.29	1.3	0.55	0.073	0.22	0.13	0.37
Methylphenanthrenes	6.5	5.6	8.6	2.9	3.0	2.6	8.6	3.9	0.025	1.4	1.5	2.3
Methyldibenzothiophenes	0.44	0.49	0.47	0.21	0.21	0.43	0.79	0.40	0.14	0.14	0.21	0.38
Fluoranthene	0.87	0.77	0.92	0.47	0.48	0.79	3.3	1.6	0.016	0.38	0.23	0.93
Pyrene	0.34	0.31	0.20	0.31	0.29	0.25	0.91	0.60	0.0080	0.11	0.13	0.43
3,6-Dimethylphenanthrene	0.27	0.23	0.20	0.20	0.14	0.16	0.55	0.26	0.013	0.076	0.13	0.20
Benzo[a]fluorene	0.041	0.025	0.031	0.043	0.033	0.022	0.12	0.14	0	0.011	0.027	0.048
Benzo[b]fluorene	0.0032	0.0011	0.0016	0.013	0.0033	0.0007	0.010	0.019	0	0.0007	0.0050	0.015
Retene	0.037	0.0056	0.013	0.0053	0.017	0.013	0.058	0.095	0.0068	0.0053	0.023	0.10
Benzo[b]naphtho[2,1-d]thiophene	0.0051	0.0022	0.0019	0.0064	0.0012	0.0037	0.013	0.0033	0.0012	0.0031	0.0010	0.0010
Cyclopenta[cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benz[a]anthracene	0	0	0	0	0	0	0.0019	0.019	0	0	0	0
Chrysene/Triphenylene	0.010	0	0	0.0063	0	0	0.041	0	0	0.0057	0.012	0.018
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[e]pyrene	0	0	0	0	0	0	0	0	0	0.0031	0	0
Benzo[a]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Perylene	0	0	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	18.7	18.8	22.9	6.9	8.2	14.9	32.2	13.3	3.6	6.8	4.8	12.1
Sample Volume (m^3)	573	511	512	3019	654	331	333	569	569	512	524	474
Corresponding Laboratory Blank	5/26/98	5/23/98	5/23/98	5/23/98	5/23/98	5/23/98	6/15/98	6/15/98	6/15/98	6/15/98	7/2/98	7/2/98
Surrogate Recoveries (%)												
d10-Anthracene	92%	80%	84%	99%	75%	82%	82%	82%	83%	84%	60%	85%
d10-Fluoranthene	98%	103%	90%	106%	88%	95%	83%	76%	87%	101%	72%	88%
d12-Benzo[e]Pyrene	98%	103%	95%	99%	92%	98%	92%	92%	95%	95%	51%	98%

B.2.

Sandy Hook Gas Phase PAHs (SH-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-PUF 6/22/98	SH-PUF 6/28/98	SH-PUF 7/4/98	day SH-PUF 7/5/98	night SH-PUF 7/5/98	day SH-PUF 7/6/98	night SH-PUF 7/6/98	day SH-PUF 7/7/98	night SH-PUF 7/7/98	day SH-PUF 7/8/98	night SH-PUF 7/8/98	day SH-PUF 7/9/98
Fluorene	0.50	0.46	2.4	0.79	4.9	0.26	1.5	0.12	0.52	0.10	2.7	2.2
Phenanthrene	1.8	3.3	9.2	3.9	6.0	1.9	4.8	1.3	1.50	0.74	3.6	9.4
Anthracene	0.023	0.038	0.048	0.071	0.035	0.041	0.080	0.026	0.023	0.023	0.043	0.15
1Methylfluorene	0.28	0.19	0.66	0.53	0.85	0.53	0.59	0.16	0.39	0.16	1.3	1.0
Dibenzothiophene	0.20	0.19	0.97	0.64	0.60	0.30	0.52	0.090	0.21	0.069	0.40	1.0
4,5-Methylenephenanthrene	0.17	0.21	0.56	0.26	0.35	0.15	0.25	0.095	0.11	0.056	0.21	0.60
Methylphenanthrenes	1.3	1.6	10	5.7	19	4.2	2.7	1.7	1.8	0.74	2.6	7.6
Methyldibenzothiophenes	0.24	0.23	0.63	0.64	0.39	2.1	0.54	0.93	0.30	0.33	0.57	0.82
Fluoranthene	0.32	0.58	1.8	0.81	0.63	0.39	0.70	0.25	0.21	0.12	0.60	1.5
Pyrene	0.30	0.33	0.64	0.71	0.40	0.46	0.52	0.22	0.19	0.13	0.28	0.65
3,6-Dimethylphenanthrene	0.078	0.096	0.25	0.26	0.19	0.25	0.15	0.10	0.092	0.050	0.14	0.39
Benzo[a]fluorene	0.024	0.029	0.073	0.068	0.030	0.050	0.050	0.018	0.0092	0.0044	0.024	0.053
Benzo[b]fluorene	0.0033	0.0036	0	0.014	0.0058	0.010	0.0086	0.0028	0.0018	0.0002	0.0035	0.012
Retene	0.072	0.043	0.070	0.11	0.021	0.077	0.11	0.041	0.0441	0.023	0.051	0.086
Benzo[b]naphtho[2,1-d]thiophene	0.0012	0.0086	0.037	0.033	0.034	0.018	0.081	0.0058	0.0001	0.0001	0.0029	0.017
Cyclopenta[cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benz[a]anthracene	0	0	0	0	0.0012	0	0	0.0013	0	0	0	0
Chrysene/Triphenylene	0.013	0.013	0.078	0.038	0.012	0.020	0	0.0082	0.0032	0	0.0085	0.018
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0	0	0.0014	0	0.0068	0.0043	0	0.0036	0	0	0	0
Benzo[e]pyrene	0	0	0	0.0098	0.0070	0	0	0	0	0	0	0
Benzo[a]pyrene	0	0	0	0	0.0020	0	0	0	0	0	0	0
Perylene	0	0	0	0	0.0007	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0.0013	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0.0043	0	0	0	0	0	0	0
Total PAHs	5.3	7.3	27.7	14.6	33.1	10.7	12.7	5.0	5.5	2.5	12.6	25.5
Sample Volume (m^3)	569	654	583	280	292	337	292	332	300	318	325	326
Corresponding Laboratory Blank	7/2/98	7/12/98	8/20/98	7/30/98	7/18/98	7/30/98	7/30/98	7/10/98	8/31/98	7/12/98	7/10/98	7/12/98
Surrogate Recoveries (%)												
d10-Anthracene	92%	89%	94%	104%	95%	101%	42%	67%	83%	76%	86%	80%
d10-Fluoranthene	93%	86%	80%	85%	92%	82%	42%	66%	88%	92%	88%	86%
d12-Benzo[e]Pyrene	100%	99%	89%	84%	98%	82%	37%	63%	99%	99%	105%	95%

B.2.

Sandy Hook Gas Phase PAHs (SH-PUF)

Surrogate Corrected Concentrations (ng/m^3)	night	day	night	day								
	SH-PUF	SH-PUF	SH-PUF	SH-PUF	SH-PUF	SH-PUF	SH-PUF	SH-PUF	SH-PUF	SH-PUF	SH-PUF	SH-PUF
PAH	**7/9/98**	**7/10/98**	**7/10/98**	**7/11/98**	**7/16/98**	**7/22/98**	**7/28/98**	**8/3/98**	**8/9/98**	**8/15/98**	**8/21/98**	**8/27/98**
Fluorene	6.3	2.1	2.2	0.88	3.4	2.2	0.63	Vial Broke	0.88	0.068	1.5	0.35
Phenanthrene	13	12	7.4	3.9	11	14	4.6	Sample	2.9	1.7	5.6	2.6
Anthracene	0.12	0.17	0.037	0.051	0.16	0.074	0.033	Lost	0.025	0.040	0.080	0.032
1Methylfluorene	1.7	0.44	0.77	0.32	0.55	0.65	0.21		0.20	0.062	3.3	0.19
Dibenzothiophene	1.4	1.1	0.38	0.28	0.99	1.4	0.39		0.27	0.14	0.64	0.28
4,5-Methylenephenanthrene	0.66	0.61	0.40	0.22	0.84	1.1	0.30		0.18	0.15	0.33	0.18
Methylphenanthrenes	5.8	5.3	5.5	2.0	4.9	6.2	2.5		1.2	1.7	5.6	3.2
Methyldibenzothiophenes	0.74	0.59	0.31	0.26	0.54	0.68	0.29		0.19	0.22	0.41	0.28
Fluoranthene	1.8	1.7	1.1	0.63	2.3	4.0	0.96		0.48	0.54	1.5	0.60
Pyrene	0.59	0.55	0.37	0.25	0.94	1.42	0.39		0.28	0.35	0.53	0.26
3,6-Dimethylphenanthrene	0.33	0.20	0.12	0.13	0.34	0.38	0.15		0.080	0.095	0.28	0.098
Benzo[a]fluorene	0.053	0.024	0.024	0.022	0.11	0.17	0.039		0.028	0.041	0.036	0.034
Benzo[b]fluorene	0.012	0.0042	0.0023	0.0035	0.018	0.034	0.0039		0.0070	0.010	0.0095	0.0039
Retene	0.039	0.035	0.013	0.018	0.13	0.080	0.049		0.052	0.053	0.11	0.053
Benzo[b]naphtho[2,1-d]thiophene	0.011	0.0016	0.0027	0.0053	0.017	0.026	0.0091		0.0022	0.011	0.012	0.011
Cyclopenta[cd]pyrene	0	0	0	0	0	0	0		0	0	0	0
Benz[a]anthracene	0	0	0	0	0	0	0		0	0	0	0
Chrysene/Triphenylene	0.0074	0.0077	0.0054	0.0070	0.027	0.033	0.015		0.0070	0.068	0.021	0.0034
Naphthacene	0	0	0	0	0	0	0		0	0	0	0
Benzo[b+k]fluoranthene	0	0	0	0	0.0013	0.0010	0.0011		0	0.0031	0	0
Benzo[e]pyrene	0	0	0	0	0.0007	0	0		0	0	0	0
Benzo[a]pyrene	0	0	0	0	0	0	0		0	0	0	0
Perylene	0	0	0	0	0	0	0		0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0		0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0		0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0		0	0	0	0
Coronene	0	0	0	0	0	0	0		0	0	0	0
Total PAHs	32.2	24.6	18.6	8.9	26.2	32.4	10.5		6.8	5.3	19.9	8.3
Sample Volume (m^3)	383	341	348	335	631	621	633		672	877	628	706
Corresponding Laboratory Blank	7/18/98	7/17/98	7/17/98	7/17/98	8/20/98	8/20/98	8/20/98		8/31/98	8/31/98	9/8/98	9/8/98
Surrogate Recoveries (%)												
d10-Anthracene	95%	73%	84%	87%	100%	100%	101%		82%	81%	108%	73%
d10-Fluoranthene	88%	88%	88%	92%	80%	81%	83%		75%	69%	94%	73%
d12-Benzo[e]Pyrene	99%	99%	101%	101%	80%	84%	81%		90%	78%	101%	103%

B.2.
Sandy Hook Gas Phase PAHs (SH-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-PUF 9/4/98	SH-PUF 9/13/98	SH-PUF 9/22/98	SH-PUF 10/1/98	SH-PUF 10/10/98	SH-PUF 10/19/98	SH-PUF 10/28/98	SH-PUF 11/6/98	SH-PUF 11/15/98	SH-PUF 11/24/98	SH-PUF 12/3/98	SH-PUF 12/12/98
Fluorene	0.51	0.46	0.69	0.051	Power	2.9	1.4	2.0	1.5	1.8	3.4	5.5
Phenanthrene	4.7	3.0	6.8	0.14	Outage	5.2	3.4	3.2	2.7	4.1	11	9.2
Anthracene	0.034	0.040	0.15	0.0057		0.13	0.032	0.042	0.039	0.073	0.44	0.55
1Methylfluorene	0.43	0.30	0.67	0.020		0.85	0.60	0.89	0.69	1.2	1.8	2.7
Dibenzothiophene	0.37	0.30	0.51	0.012		0.71	0.42	0.33	0.29	0.52	1.4	0.90
4,5-Methylenephenanthrene	0.35	0.19	0.61	0.0089		0.36	0.20	0.24	0.20	0.31	0.84	0.78
Methylphenanthrenes	4.5	1.9	4.8	0.11		7.1	2.9	3.5	4.0	4.8	7.0	9.7
Methyldibenzothiophenes	0.32	0.31	0.50	0.012		0.97	0.34	0.28	0.34	0.56	1.0	0.89
Fluoranthene	1.1	0.56	1.6	0.051		0.76	0.0081	0.47	0.34	0.48	1.9	1.2
Pyrene	0.45	0.31	0.82	0.017		0.38	0.19	0.19	0.16	0.27	1.0	0.89
3,6-Dimethylphenanthrene	0.20	0.17	0.43	0.0055		0.16	0.11	0.12	0.12	0.23	0.34	0.42
Benzo[a]fluorene	0.065	0.031	0.12	0.0004		0.047	0.027	0.031	0.011	0.037	0.078	0.063
Benzo[b]fluorene	0.016	0.0067	0.032	0.0002		0.0059	0.0024	0.0033	0.0024	0	0.036	0.024
Retene	0.053	0.063	0.066	0.012		0.016	0.0087	0.0057	0.0075	0.0087	0.19	0.053
Benzo[b]naphtho[2,1-d]thiophene	0.0097	0.0086	0.014	0.0054		0.0034	0.0029	0.0008	0.0017	0.0013	0.012	0.0031
Cyclopenta[cd]pyrene	0	0	0	0		0	0	0	0	0	0	0
Benz[a]anthracene	0	0	0	0		0.0001	0.0001	0.0004	0.0003	0.0002	0.0040	0.0012
Chrysene/Triphenylene	0.013	0.011	0.016	0.0001		0.0068	0.0056	0.0035	0.0039	0.0035	0.0479	0.0086
Naphthacene	0	0	0	0.0001		0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0	0	0	0		0	0	0.0010	0	0.0006	0	0
Benzo[e]pyrene	0	0	0	0		0	0	0.0015	0	0	0	0
Benzo[a]pyrene	0	0	0	0		0	0	0.0011	0	0	0	0
Perylene	0	0	0	0		0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0		0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0		0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0		0	0	0	0	0	0	0
Coronene	0	0	0	0		0	0	0	0	0	0	0
Total PAHs	13.1	7.7	17.9	0.4	0.0	19.6	9.6	11.3	10.4	14.4	30.9	32.8
Sample Volume (m^3)	685	684	683	638		674	666	703		658	659	699
Corresponding Laboratory Blank	9/30/98	9/30/98	9/30/98	10/21/98		11/24/98	11/24/98	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99
Surrogate Recoveries (%)												
d10-Anthracene	88%	100%	98%	45%		81%	77%	72%	71%	70%	71%	69%
d10-Fluoranthene	83%	85%	83%	68%		87%	82%	86%	84%	86%	84%	84%
d12-Benzo[e]Pyrene	81%	82%	85%	71%		78%	71%	77%	77%	75%	75%	79%

B.2.
Sandy Hook Gas Phase PAHs (SH-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-PUF 12/21/98	SH-PUF 12/30/98	SH-PUF 1/8/99	SH-PUF 1/17/99	SH-PUF 1/26/99	SH-PUF 2/4/99	SH-PUF 2/13/99	SH-PUF 2/22/99	SH-PUF 3/3/99	SH-PUF 3/12/99	SH-PUF 3/21/99	SH-PUF 3/30/99
Fluorene	0.89	7.2	3.7	3.0	Vial Broke	0.034	3.1	1.6	Power	Power	Power	Power
Phenanthrene	2.6	9.7	5.4	5.8	Sample	1.7	4.6	3.5	Outage	Outage	Outage	Outage
Anthracene	0.035	1.4	0.33	0.28	Lost	0.24	0.033	0.053				
1Methylfluorene	0.41	5.3	1.8	1.4		1.0	1.3	0.43				
Dibenzothiophene	0.29	1.8	0.73	0.57		0.049	0.40	0.15				
4,5-Methylenephenanthrene	0.18	0.082	0.52	0.51		0.44	0.38	0.34				
Methylphenanthrenes	4.2	18	4.3	6.7		8.0	4.2	2.8				
Methyldibenzothiophenes	0.29	1.7	0.78	0.68		0.027	0.30	0.11				
Fluoranthene	0.50	2.4	0.94	1.0		0.96	0.73	0.46				
Pyrene	0.25	2.3	1	0.68		0.60	0.12	0.20				
3,6-Dimethylphenanthrene	0.112	1.3	0	0.33		0.23	0.13	0.075				
Benzo[a]fluorene	0.032	0.24	0	0.053		0.052	0.0081	0.019				
Benzo[b]fluorene	0.011	0.12	0.037	0.016		0.021	0.0005	0.0065				
Retene	0.040	0.20	0	0.0364		0.0078	0.0015	0.0032				
Benzo[b]naphtho[2,1-d]thiophene	0.0064	0.0060	0.0069	0.0044		0.0046	0	0				
Cyclopenta[cd]pyrene	0	0.0047	0	0.0002		0.0007	0.0002	0.0057				
Benz[a]anthracene	0.0018	0.010	0.0023	0.0003		0.0013	0.0003	0.0097				
Chrysene/Triphenylene	0.020	0.022	0.018	0.0065		0.0061	0.0020	0.026				
Naphthacene	0	0	0	0		0	0	0.0089				
Benzo[b+k]fluoranthene	0.0045	0.0021	0	0		0	0	0.034				
Benzo[e]pyrene	0	0	0	0		0	0	0.022				
Benzo[a]pyrene	0	0	0	0		0	0	0.017				
Perylene	0	0	0	0		0	0	0.0046				
Indeno[1,2,3-cd]pyrene	0	0	0	0		0	0	0.018				
Benzo[g,h,i]perylene	0	0	0	0		0	0	0.018				
Dibenzo[a,h+a,c]anthracene	0	0	0	0		0	0	0.0012				
Coronene	0	0	0	0		0	0	0.011				
Total PAHs	9.8	51.9	19.9	21.1		13.4	15.3	9.9				
Sample Volume (m^3)	688	714	693	625		701	647					
Corresponding Laboratory Blank	2/15/99	2/15/99	2/15/99	2/24/99		2/24/99	3/8/99	3/8/99				
Surrogate Recoveries (%)												
d10-Anthracene	79%	90%	84%	81%		33%	82%	65%				
d10-Fluoranthene	83%	99%	85%	96%		84%	89%	84%				
d12-Benzo[e]Pyrene	80%	87%	81%	98%		84%	90%	90%				

B.2.
Sandy Hook Gas Phase PAHs (SH-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	SH-PUF 4/9/99	SH-PUF 4/16/99	SH-PUF 4/26/99	SH-PUF 5/5/99	SH-PUF 5/14/99	SH-PUF 5/23/99	SH-PUF 6/1/99	SH-PUF 6/10/99	SH-PUF 6/19/99	SH-PUF 6/28/99	SH-PUF 7/7/99	SH-PUF 7/16/99
Fluorene	Power	Power	Power	Power	1.2	0.70	0.11	0.45	1.7	0.42	0.58	0.48
Phenanthrene	Outage	Outage	Outage	Outage	3.9	2.4	6.8	1.7	8.4	6.5	11	7.4
Anthracene					0.089	0.027	0.062	0.023	0.13	0.075	0.087	0.049
1Methylfluorene					0.98	0.35	0.67	0.21	0.62	0.17	0.66	0.67
Dibenzothiophene					0.50	0.38	1.0	0.22	1.2	0.49	1.3	0.99
4,5-Methylenephenanthrene					0.31	0.16	0.37	0.11	0.67	0.54	0.64	0.48
Methylphenanthrenes					4.4	1.3	4.5	1.0	4.6	3.8	4.2	7.0
Methyldibenzothiophenes					0.83	0.47	0.93	0.24	0.93	0.49	0.36	0.25
Fluoranthene					0.47	0.39	0.99	0.31	2.1	1.6	2.1	1.6
Pyrene					0.40	0.21	0.33	0.16	0.74	1.6	0.65	0.49
3,6-Dimethylphenanthrene					0.23	0.091	0.20	0.054	0.21	0.15	0.17	0.13
Benzo[a]fluorene					0.032	0.015	0.021	0.018	0.088	0.072	0.048	0.029
Benzo[b]fluorene					0.0066	0.0068	0.0087	0.0015	0.025	0.023	0.016	0.0038
Retene					0.13	0.029	0.039	0.022	0.067	0.078	0.036	0.044
Benzo[b]naphtho[2,1-d]thiophene					0.0054	0.0059	0.0068	0.0047	0.018	0.034	0.011	0.0085
Cyclopenta[cd]pyrene					0.0001	0.0003	0.0011	0.0004	0.0009	0.0004	0.0005	0.0002
Benz[a]anthracene					0.0010	0.0002	0.0005	0.0007	0.0026	0.0024	0.0008	0.0006
Chrysene/Triphenylene					0.054	0.0081	0.015	0.010	0.042	0.067	0.021	0.021
Naphthacene					0	0	0	0	0.012	0	0	0
Benzo[b+k]fluoranthene					0.0030	0	0	0	0.011	0.015	0	0.0002
Benzo[e]pyrene					0	0	0	0	0.0047	0.0045	0	2.9E-05
Benzo[a]pyrene					0	0	0	0	0.0028	0	9.3E-06	4.4E-05
Perylene					0	0	0	0	0	0	5.1E-06	1.1E-05
Indeno[1,2,3-cd]pyrene					0	0	0	0	0	0	6.1E-06	6.7E-06
Benzo[g,h,i]perylene					0	0	0	0	0.0027	0.0013	0.0013	1.4E-05
Dibenzo[a,h+a,c]anthracene					0	0	0	0	0	0	7.8E-06	8.2E-06
Coronene					0	0	0	0	0	0	1.9E-05	0.0001
Total PAHs					13.6	6.6	16.1	4.5	21.7	16.2	21.5	19.7
Sample Volume (m^3)					648	687	626	692	707	702	639	632
Corresponding Laboratory Blank												
Surrogate Recoveries (%)												
d10-Anthracene					83%	85%	89%	92%	101%	88%	87%	94%
d10-Fluoranthene					97%	89%	96%	88%	95%	91%	91%	94%
d12-Benzo[e]Pyrene					79%	83%	85%	85%	86%	83%	96%	97%

B.2.
Sandy Hook Gas Phase PAHs (SH-PUF)
Surrogate Corrected Concentrations (ng/m³)

PAH	NO POWER 7/17/99-1/13/00
Fluorene	
Phenanthrene	
Anthracene	
1Methylfluorene	
Dibenzothiophene	
4,5-Methylenephenanthrene	
Methylphenanthrenes	
Methyldibenzothiophenes	
Fluoranthene	
Pyrene	
3,6-Dimethylphenanthrene	
Benzo[a]fluorene	
Benzo[b]fluorene	
Retene	
Benzo[b]naphtho[2,1-d]thiophene	
Cyclopenta[cd]pyrene	
Benz[a]anthracene	
Chrysene/Triphenylene	
Naphthacene	
Benzo[b+k]fluoranthene	
Benzo[e]pyrene	
Benzo[a]pyrene	
Perylene	
Indeno[1,2,3-cd]pyrene	
Benzo[g,h,i]perylene	
Dibenzo[a,h+a,c]anthracene	
Coronene	
Total PAHs	
Sample Volume (m^3)	
Corresponding Laboratory Blank	
Surrogate Recoveries (%)	
d10-Anthracene	
d10-Fluoranthene	
d12-Benzo[e]Pyrene	

B.3.
Sandy Hook Rain PAHs (SH-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	SH-Precip 2/3/98	SH-Precip 2/16/98	SH-Precip 2/28/98	SH-Precip 3/15/98	SH-Precip 3/24/98	SH-Precip 4/6/98	SH-Precip 4/22/98	SH-Precip 5/12/98	SH-Precip 5/23/98	SH-Precip 6/4/98	SH-Precip 6/17/98	SH-Precip 6/28/98
Fluorene	2.8	0.50	0.79	4.1	6.4	0.87	2.1	33	12	1.7	3.5	1.1
Phenanthrene	17	3.9	2.8	3.2	10	2.8	2.0	313	54	5.9	18	3.2
Anthracene	0.51	0.97	0.15	6.0	14	2.1	4.1	49	2.7	0.27	1.5	0.34
1Methylfluorene	1.3	1.7	0.54	6.3	22	2.4	3.5	85	3.8	0.48	1.1	1.0
Dibenzothiophene	1.4	3.2	0.21	42	15	4.3	16	22	3.7	0.54	1.5	0.29
4,5-Methylenephenanthrene	1.8	1.0	0.25	0.31	0.76	0.55	0.55	20	5.1	0.49	1.4	0.24
Methylphenanthrenes	10	9.7	2.1	19	12	10	9.4	213	39	3.0	9.0	2.2
Methyldibenzothiophenes	0.40	3.0	0.06	7.5	2.1	0.60	1.2	16	3.3	0.39	0.78	0.24
Fluoranthene	13	6.6	2.2	5.6	8.6	3.5	2.8	389	36	3.3	17	3.2
Pyrene	8.2	2.0	1.4	1.2	0.92	1.0	0.49	319	21	1.6	11	2.2
3,6-Dimethylphenanthrene	0.68	0.28	0.15	0.19	1.1	0.14	0.09	159	35	0.20	6.6	0.15
Benzo[a]fluorene	1.9	1.5	0.39	2.8	9.3	1.1	0.94	89	7.5	0.55	3.5	0.69
Benzo[b]fluorene	0.84	0.76	0.16	1.2	3.4	0.50	0.52	15	2.4	0.16	0.88	0.16
Retene	0.31	0.06	0.12	0.093	1.4	0.021	0.026	17	1.3	0.094	0.31	0.14
Benzo[b]naphtho[2,1-d]thiophene	1.8	1.1	0.44	0.60	3.3	0.41	0.36	40	1.0	0.27	1.7	0.54
Cyclopenta[cd]pyrene	0.17	0.41	0	1.8	9.0	0.45	0.60	11	3.3	0.19	0.44	0.31
Benz[a]anthracene	1.6	1.0	0.53	1.9	18	1.1	0.66	67	6.2	0.40	3.7	0.60
Chrysene/Triphenylene	5.3	3.2	1.3	3.8	34	2.6	1.8	184	13	1.0	8.1	1.5
Naphthacene	1.7	0.6	0	0.031	1.2	0.32	0.16	2.9	4.6	0.25	4.9	0.80
Benzo[b+k]fluoranthene	8.1	5.0	2.8	8.1	98	5.7	3.9	462	27	1.9	13	3.0
Benzo[e]pyrene	2.9	1.6	1.0	1.6	4.6	1.5	0.75	260	8.2	0.87	6.6	1.6
Benzo[a]pyrene	1.9	0.94	0.65	1.1	3.2	1.1	0.53	161	5.1	0.56	5.4	0.91
Perylene	1.0	0.71	0.59	0.71	3.4	0.62	0.35	122	0.55	0.36	2.2	0.96
Indeno[1,2,3-cd]pyrene	3.8	2.4	1.6	3.7	9.9	3.2	1.8	262	27	1.2	7.9	1.3
Benzo[g,h,i]perylene	2.0	1.3	0.89	1.7	3.9	1.6	0.84	169	11	0.89	8.3	1.2
Dibenzo[a,h+a,c]anthracene	0.62	0.34	0.23	0.64	0.23	0.32	0.18	7.3	2.3	0.16	0.98	0.017
Coronene	1.0	0.84	0.54	1.6	3.7	1.4	0.94	128	21	0.87	4.2	1.3
Total PAHs	93	55	22	126	300	50	56	3615	357	28	144	29
Volume of Precip. (L)	12	15	14	16	2.0	16	26	0.04	7.4	20	4.2	5.1
Corresponding Laboratory Blank	6/10/98	6/10/98	6/10/98	9/1/98	9/1/98	9/1/98	9/1/98	9/28/98	9/28/98	9/28/98	9/28/98	10/8/98
Surrogate Recoveries (%)												
d10-Anthracene	71%	13%	66%	22%	1%	34%	31%	54%	56%	60%	59%	90%
d10-Fluoranthene	75%	57%	72%	37%	3%	69%	35%	52%	47%	57%	53%	87%
d12-Benzo[e]Pyrene	94%	82%	94%	75%	35%	80%	74%	66%	54%	66%	52%	92%

B.3.
Sandy Hook Rain PAHs (SH-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	SH-Precip 7/16/98	SH-Precip 7/28/98	SH-Precip 8/9/98	SH-Precip 8/21/98	SH-Precip 9/4/98	SH-Precip 9/22/98	SH-Precip 10/10/98	SH-Precip 10/28/98	SH-Precip 11/15/98	SH-Precip 12/3/98	SH-Precip 12/21/98	SH-Precip 1/8/99
Fluorene	12	2.6	3.1	2.3	2.9	1.8	2.4	7.4	2.8	4.6	0.22	1.1
Phenanthrene	46	8.4	15	9.2	12	8.8	8.6	11	3.4	10	3.5	11
Anthracene	4.2	0.9	2.2	1.3	1.3	0.80	0.63	17	1.1	1.6	0.27	0.48
1Methylfluorene	14	2.4	2.2	1.2	1.5	0.55	36	34	39	7.6	18	2.2
Dibenzothiophene	3.8	0.9	1.0	0.67	1.3	0.74	0.90	0.18	0.085	0.20	0.57	0.88
4,5-Methylenephenanthrene	3.3	0.6	1.8	0.89	1.2	0.90	0.76	1.3	0.50	2.2	0.82	2.0
Methylphenanthrenes	25	5.1	8.4	7.2	7.5	6.0	6.8	11	6.2	20	8.7	16
Methyldibenzothiophenes	2.3	0.55	0.79	0.59	0.79	0.56	0.68	0	0.034	0.089	0.57	0.73
Fluoranthene	39	7.3	18	12	15	11	8.3	13	5.8	13	4.3	7.8
Pyrene	26	4.1	13	9.3	10	8.1	5.9	9.0	3.2	8.8	2.3	5.6
3,6-Dimethylphenanthrene	1.7	0.41	0.63	0.48	0.46	0.40	0	1.4	0.45	1.1	0.70	1.1
Benzo[a]fluorene	8.3	1.8	4.0	3.9	3.6	2.7	1.6	2.4	1.4	2.7	0.68	3.6
Benzo[b]fluorene	1.7	0.29	1.3	0.81	0.94	0.72	0.48	1.1	0.64	1.1	0.30	0.52
Retene	1.6	0.32	0.26	0.34	0.76	0.31	0.52	0.45	0.15	0.26	0.14	0.32
Benzo[b]naphtho[2,1-d]thiophene	3.9	0.99	2.3	4.1	3.3	2.4	0.95	1.6	0.84	1.5	0.27	NA
Cyclopenta[cd]pyrene	2.7	0.83	1.2	1.8	1.0	1.6	0.28	0.35	0.16	0.62	0.17	0.95
Benz[a]anthracene	5.0	1.3	5.0	5.3	4.2	3.3	1.3	3.7	2.1	3.0	0.53	0.76
Chrysene/Triphenylene	17	2.5	8.3	7.4	7.8	6.2	4.3	7.4	4.2	6.8	1.3	2.9
Naphthacene	1.7	1.2	1.8	1.6	1.6	0.09	0	2.7	1.3	2.1	0.21	0
Benzo[b+k]fluoranthene	33	6.2	15	17	16	14	6.7	14	7.3	10	2.1	4.5
Benzo[e]pyrene	19	3.7	6.7	6.3	6.4	5.4	4.8	5.9	2.8	5.5	1.1	3.4
Benzo[a]pyrene	9.6	1.7	5.4	4.9	5.0	4.0	2.9	4.8	2.0	4.2	0.67	1.2
Perylene	15	2.5	3.8	2.5	3.7	1.8	3.6	6.2	2.6	7.2	0.78	0.74
Indeno[1,2,3-cd]pyrene	35	2.8	4.6	8.4	5.3	16	4.8	7.0	3.2	6.4	1.3	2.1
Benzo[g,h,i]perylene	14	2.4	7.0	8.5	7.6	5.0	3.3	5.6	2.4	4.6	1.1	2.0
Dibenzo[a,h+a,c]anthracene	0.44	0.42	0.94	1.1	0.84	1.1	0.44	0.57	0.42	1.1	0.15	0.29
Coronene	10	1.1	1.7	3.8	3.1	5.0	2.0	2.8	1.6	2.5	0.84	1.6
Total PAHs	355	63	136	123	125	109	109	171	96	130	51	73
Volume of Precip. (L)	0.36	3.6	2.7	4.8	3.6	10	2.4	2.2	4.7	1.5	23	23
Corresponding Laboratory Blank	10/8/98	10/8/98	10/8/98	11/11/98	11/11/98	11/11/98	3/30/99	3/30/99	3/30/99	3/30/99	3/30/99	4/27/99
Surrogate Recoveries (%)												
d10-Anthracene	87%	96%	86%	95%	91%	94%	82%	54%	27%	47%	67%	70%
d10-Fluoranthene	87%	89%	86%	85%	91%	90%	83%	65%	69%	79%	87%	86%
d12-Benzo[e]Pyrene	105%	107%	95%	99%	100%	101%	76%	85%	104%	85%	98%	95%

B.3.
Sandy Hook Rain PAHs (SH-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	SH-Precip 1/26/99	SH-Precip 2/13/99	SH-Precip 3/3/99	SH-Precip 3/21/99	SH-Precip 4/8/99	SH-Precip 4/26/99	SH-Precip 5/14/99	SH-Precip 6/1/99	SH-Precip 6/19/99	SH-Precip 7/7/99	NO POWER 7/17/99-1/13/00
Fluorene	3.0		4.7	Power	Power	Power	2.3	1.4	1.9	0.81	
Phenanthrene	14		25	Outage	Outage	Outage	8.5	6.2	6.2	16	
Anthracene	0.77		3.1				0.29	0.36	0.44	1.1	
1Methylfluorene	2.1		1.6				1.4	2.3	2.0	5.2	
Dibenzothiophene	0.89		2.1				0.70	0.038	0.63	1.9	
4,5-Methylenephenanthrene	1.7		2.5				0.71	0.47	0.47	1.2	
Methylphenanthrenes	11		16				4.1	3.0	7.8	13	
Methyldibenzothiophenes	1.2		2.0				0.19	0.12	0.42	1.1	
Fluoranthene	11		25				3.9	4.9	4.8	12	
Pyrene	7.0		19				2.4	3.3	3.4	7.4	
3,6-Dimethylphenanthrene	0.90		0.86				0.39	0.18	0.24	0.56	
Benzo[a]fluorene	16		4.6				0.43	0.60	0.74	1.9	
Benzo[b]fluorene	0.80		2.3				0.096	0.13	0.18	0.82	
Retene	0.47		0.73				0.12	0.16	0.14	0.52	
Benzo[b]naphtho[2,1-d]thiophene	NA		2.8				0.38	0.64	0.61	1.6	
Cyclopenta[cd]pyrene	0.46		0.46				0.045	0.10	0.13	0.53	
Benz[a]anthracene	2.1		7.1				0.57	0.94	1.2	2.3	
Chrysene/Triphenylene	4.7		14				1.5	2.4	2.3	5.8	
Naphthacene	0		0				0	0	0	0.48	
Benzo[b+k]fluoranthene	8.3		26				2.6	4.0	4.4	10	
Benzo[e]pyrene	2.3		12				1.3	2.0	2.1	4.9	
Benzo[a]pyrene	2.7		11				0.91	1.4	1.8	3.6	
Perylene	2.8		2.9				0.71	0.34	0.62	1.8	
Indeno[1,2,3-cd]pyrene	3.8		21				1.4	1.2	3.2	11	
Benzo[g,h,i]perylene	3.4		11				1.3	1.5	1.9	5.5	
Dibenzo[a,h+a,c]anthracene	0.53		3.4				0.33	0.26	0.20	0.73	
Coronene	2.6		9.2				0.79	0.65	0.62	6.2	
Total PAHs	105		229				37	39	48	117	
Volume of Precip. (L)	8.3		14				10	4.2	4.9	2.4	
Corresponding Laboratory Blank	4/27/99		6/21/99				7/13/99	7/13/99	8/19/99	8/19/99	
Surrogate Recoveries (%)											
d10-Anthracene	78%		77%				80%	77%	86%	88%	
d10-Fluoranthene	87%		80%				88%	87%	90%	91%	
d12-Benzo[e]Pyrene	103%		68%				99%	103%	97%	95%	

C.1.

Liberty Science Center Particulate Phase PAHs (LS-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	day LS-QFF 7/5/98	night LS-QFF 7/5/98	day LS-QFF 7/6/98	night LS-QFF 7/6/98	day LS-QFF 7/7/98	night LS-QFF 7/7/98	day LS-QFF 7/8/98	night LS-QFF 7/8/98	day LS-QFF 7/9/98	night LS-QFF 7/9/98	day LS-QFF 7/10/98	night LS-QFF 7/10/98	day LS-QFF 7/11/98
Fluorene	0.0015	0.066	0.017	0.019	0.013	0.054	0.055	0.018	0.028	0.055	0.034	0.032	missing
Phenanthrene	0.013	0.16	0.15	0.12	0.10	0.066	0.078	0.14	0.24	0.49	0.30	0.31	sample
Anthracene	0.0022	0.076	0.021	0.0076	0.011	0.038	0.037	0.012	0.030	0.022	0.046	0.047	too
1Methylfluorene	0.0036	0.020	0.02	0.014	0.016	0.011	0.011	0.022	0.023	0.040	0.026	0.013	short
Dibenzothiophene	0.0018	0.031	0.0102	0.0083	0.0089	0.020	0.015	0.011	0.014	0.026	0.018	0.041	
4,5-Methylenephenanthrene	0.0018	0.026	0.021	0.014	0.013	0.0087	0.011	0.025	0.032	0.058	0.050	0.027	
Methylphenanthrenes	0.077	0.43	0.25	0.20	0.15	0.13	0.17	0.28	0.35	0.74	0.44	0.21	
Methyldibenzothiophenes	0.0038	0.031	0.015	0.019	0.013	0.016	0.015	0.0079	0.018	0.036	0.021	0.021	
Fluoranthene	0.013	0.18	0.19	0.10	0.11	0.061	0.10	0.16	0.29	0.36	0.42	0.21	
Pyrene	0.021	0.14	0.16	0.076	0.092	0.041	0.075	0.13	0.22	0.26	0.34	0.16	
3,6-Dimethylphenanthrene	0.012	0.038	0.023	0.027	0.019	0.0088	0.013	0.040	0.030	0.072	0.034	0.015	
Benzo[a]fluorene	0.0057	0.054	0.055	0.043	0.036	0.017	0.022	0.059	0.076	0.098	0.12	0.042	
Benzo[b]fluorene	0.0009	0.016	0.016	0.013	0.0093	0.0042	0.0079	0.023	0.020	0.030	0.028	0.016	
Retene	0.010	0.033	0.025	0.018	0.030	0.014	0.013	0.025	0.025	0.032	0.026	0.018	
Benzo[b]naphtho[2,1-d]thiophene	0.0009	0.16	0.038	0.031	0.0073	0.017	0.020	0.036	0.055	0.042	0.058	0.0054	
Cyclopenta[cd]pyrene	0.011	0.013	0.019	0.023	0.022	0.010	0.019	0.040	0.021	0.020	0.018	0.022	
Benz[a]anthracene	0.0014	0.054	0.062	0.15	0.034	0.010	0.020	0.21	0.11	0.10	0.18	0.073	
Chrysene/Triphenylene	0.014	0.14	0.13	0.36	0.077	0.040	0.067	0.55	0.21	0.25	0.28	0.13	
Naphthacene	0	0	0	0	0	0	0	0	0	0	0	0	
Benzo[b+k]fluoranthene	0.0052	0.27	0.22	0.13	0.12	0.046	0.094	0.29	0.39	0.36	0.50	0.19	
Benzo[e]pyrene	0.012	0.14	0.13	0.064	0.068	0.029	0.066	0.17	0.18	0.19	0.22	0.11	
Benzo[a]pyrene	0.0017	0.065	0.072	0.031	0.037	0.011	0.023	0.092	0.076	0.024	0.17	0.077	
Perylene	0	0.017	0.024	0.0053	0.013	0.0033	0.0064	0.024	0	0	0.057	0.025	
Indeno[1,2,3-cd]pyrene	0.0095	0.20	0.19	0.11	0.11	0.036	0.058	0.30	0.26	0.28	0.34	0.054	
Benzo[g,h,i]perylene	0.0052	0.21	0.16	0.091	0.093	0.043	0.10	0.25	0.22	0.26	0.24	0.099	
Dibenzo[a,h+a,c]anthracene	0.0025	0.018	0.022	0.016	0.014	0.0052	0.0093	0.045	0.042	0.034	0.073	0.018	
Coronene	0.0042	0.22	0.13	0.093	0.061	0.048	0.078	0.18	0.21	0.27	0.21	0.080	
Total PAHs	0.24	2.8	2.2	1.8	1.3	0.79	1.2	3.1	3.2	4.1	4.3	2.1	
Sample Volume (m^3)	383	381	375	374	374	375	385	374	374	397	393	381	
Corresponding Laboratory Blank	7/24/98	7/17/98	7/24/98	7/19/98	7/24/98	7/17/98	7/17/98	7/24/98	7/19/98	7/19/98	7/24/98	7/24/98	
Total Suspended Particulate (mg/m^3)	37.9	42.0	63.5	49.7	58.5	37.6	42.9	54.6	81.4	96.9	102.9	377.1	
Surrogate Recoveries (%)													
d10-Anthracene	76%	57%	79%	67%	96%	64%	67%	74%	79%	66%	80%	77%	
d10-Fluoranthene	96%	78%	76%	64%	74%	81%	86%	76%	86%	85%	83%	83%	
d12-Benzo[e]Pyrene	93%	94%	81%	66%	80%	92%	93%	81%	95%	94%	92%	93%	

C.1.
Liberty Science Center Particulate Phase PAHs (LS-QFF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	LS-QFF 10/7/98	LS-QFF 10/10/98	LS-QFF 10/13/98	LS-QFF 10/19/98	LS-QFF 10/28/98	LS-QFF 11/6/98	LS-QFF 11/15/98	LS-QFF 11/24/98	LS-QFF 12/3/98	LS-QFF 12/12/98	LS-QFF 12/21/98	LS-QFF 12/30/98	LS-QFF 1/8/99
Fluorene	0.014	0.019	0.0056	0.051	0.028	0.53	0.043	0.063	0.067	0.048	0.018	0.044	0.037
Phenanthrene	0.080	0.084	0.059	0.48	0.30	0.43	0.45	0.60	0.15	0.42	0.19	0.54	0.34
Anthracene	0.020	0.030	0.012	0.11	0.083	0.068	0.059	0.11	0.54	0.046	0.036	0.047	0.043
1Methylfluorene	0.0060	0.0095	0.010	0.035	0.028	0.044	0.49	0.87	0.060	0.0069	0.015	0.64	0.064
Dibenzothiophene	0.013	0.010	0.0091	0.12	0.038	0.35	0.18	0.28	0.088	0.18	0.019	0.24	0.10
4,5-Methylenephenanthrene	0.011	0.010	0.0063	0.064	0.046	0.87	0.12	0.10	0.097	0.082	0.024	0.13	0.067
Methylphenanthrenes	0.41	0.13	0.045	0.78	0.54	0.77	0.84	0.94	0.94	1.1	0.29	1.7	1.1
Methyldibenzothiophenes	0.043	0.015	0.016	0.11	0.043	0.15	0.12	0.13	0.12	0.17	0.060	0.088	0.170
Fluoranthene	0.070	0.086	0.045	0.52	0.31	0.66	0.72	0.74	0.74	0.56	0.18	0.95	0.50
Pyrene	0.064	0.066	0.037	0.54	0.29	0.72	0.79	0.79	0.67	0.62	0.16	0.84	0.59
3,6-Dimethylphenanthrene	0.013	0.014	0.0064	0.096	0.042	0.14	0.14	0.19	0.0029	0.16	0.016	0.30	0.18
Benzo[a]fluorene	0.023	0.020	0.011	0.15	0.085	0.25	0.24	0.23	0.20	0.20	0.046	0.30	0.29
Benzo[b]fluorene	0.0088	0.0095	0.012	0.086	0.044	0.16	0.15	0.14	0.12	0.11	0.023	0.14	0.18
Retene	0.0075	0.0078	0.0034	0.049	0.023	0.10	0.058	0.063	0.085	0.16	0.12	0.13	0.22
Benzo[b]naphtho[2,1-d]thiophene	0	0	0	0.14	0	0.27	0.18	0.069	0.20	0.21	0.034	0.052	0.16
Cyclopenta[cd]pyrene	0.027	0.025	0.012	0.090	0.071	0.093	0.083	0.14	0.19	0.076	0.038	0.048	0.073
Benz[a]anthracene	0.027	0.042	0.015	0.28	0.15	0.45	0.40	0.37	0.49	0.31	0.11	0.24	0.47
Chrysene/Triphenylene	0.078	0.12	0.047	0.42	0.30	0.63	0.58	0.56	0.74	0.52	0.27	0.55	0.75
Naphthacene	0.015	0.012	0.011	0.090	0.053	0.15	0.13	0.13	0.16	0.093	0.025	0	0
Benzo[b+k]fluoranthene	0.13	0.26	0.062	0.67	0.50	1.2	1.1	0.90	1.3	0.99	0.60	0.85	1.2
Benzo[e]pyrene	0.067	0.15	0.035	0.38	0.24	0.61	0.48	0.44	0.62	0.50	0.24	0.38	0.62
Benzo[a]pyrene	0.015	0.049	0.014	0.30	0.15	0.57	0.45	0.37	0.49	0.40	0.12	0.22	0.44
Perylene	0.0027	0.0087	0.0035	0.086	0.046	0.15	0.12	0.12	0.14	0.10	0.032	0.062	0.090
Indeno[1,2,3-cd]pyrene	0.12	0.23	0.058	0.55	0.34	1.4	1.1	0.69	0.99	0.78	0.34	0.51	0.98
Benzo[g,h,i]perylene	0.092	0.216	0.058	0.69	0.33	1.2	0.078	0.67	0.84	0.76	0.25	0.44	1.1
Dibenzo[a,h+a,c]anthracene	0.017	0.026	0.0086	0.071	0.056	0.13	0.12	0.10	0.14	0.092	0.047	0.071	0.092
Coronene	0.14	0.030	0.090	0.86	0.34	1.6	1.0	0.69	0.95	0.83	0.30	0.45	1.3
Total PAHs	1.5	1.7	0.7	7.8	4.5	13.7	10.2	10.5	11.1	9.5	3.6	9.9	11.2
Sample Volume (m^3)	681	716	699	699	661	702	721	657	664	657	662	613	762
Corresponding Laboratory Blank	10/19/98	10/19/98	1/4/99	2/9/99	2/9/99	1/4/99	1/4/99	2/17/99	2/17/99	2/17/99	2/17/99	3/2/99	3/2/99
Total Suspended Particulate (mg/m^3)	71.5	35.4	35.5	42.0	75.4	38.7	47.3	69.4	93.1	39.1	71.4	55.9	53.7
Surrogate Recoveries (%)													
d10-Anthracene	48%	63%	60%	69%	47%	67%	71%	61%	70%	71%	85%	85%	76%
d10-Fluoranthene	69%	82%	87%	81%	77%	75%	78%	81%	85%	82%	86%	85%	71%
d12-Benzo[e]Pyrene	68%	80%	103%	91%	85%	86%	89%	95%	96%	93%	96%	90%	79%

C.1.

Liberty Science Center Particulate Phase PAHs (LS-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	LS-QFF 1/17/99	LS-QFF 1/26/99	LS-QFF 2/4/99	LS-QFF 2/13/99	LS-QFF 2/22/99	LS-QFF 3/3/99	LS-QFF 3/12/99	LS-QFF 3/21/99	LS-QFF 3/30/99	LS-QFF 4/8/99	LS-QFF 4/17/99	LS-QFF 4/26/99	LS-QFF 5/14/99
Fluorene	0.031	0.064	0.047	0.021	0.075	Went Dry	0.40	0.0009	0.095	0.092	0.0021	0.038	0.024
Phenanthrene	0.22	0.75	0.91	0.24	1.2	During	0.62	0.075	0.46	0.42	0.16	0.34	0.74
Anthracene	0.039	0.073	0.12	0.027	0.073	Roto-evap	0.95	0.015	0.11	0.13	0.036	0.091	0.13
1Methylfluorene	0.032	0.099	0.12	0.040	0.14		0.049	0.015	0.075	0.051	0.014	0.029	0.14
Dibenzothiophene	0.028	0.11	0.090	0.076	0.16		0.18	0.028	0.20	0.077	0.032	0.063	0.21
4,5-Methylenephenanthrene	0.033	0.15	0.15	0.046	0.26		0.069	0.018	0.091	0.073	0.018	0.053	0.10
Methylphenanthrenes	0.37	2.3	1.9	0.43	2.7		0.63	0.22	0.95	0.56	0.15	0.37	0.57
Methyldibenzothiophenes	0.073	0.14	0.12	0.039	0.10		0.055	0.014	0.11	0.053	0.020	0.026	0.054
Fluoranthene	0.29	1.2	0.61	0.39	1.6		0.60	0.12	0.79	0.64	0.21	0.54	0.99
Pyrene	0.26	1.6	0.61	0.28	1.3		0.48	0.076	0.73	0.51	0.14	0.39	0.018
3,6-Dimethylphenanthrene	0.045	0.0031	0.11	0.049	0.29		0.081	0.019	0.13	0.078	0.010	0.031	0.048
Benzo[a]fluorene	0.097	0.48	0.21	0.11	0.41		0.16	0.0034	0.35	0.16	0.038	0.12	0.15
Benzo[b]fluorene	0.052	0.018	0.12	0.040	0.17		0.10	0.015	0.013	0.086	0.010	0.037	0.098
Retene	0.038	0.20	0.071	0.045	0.21		0.055	0.0076	0.13	0.032	0.014	0.037	0.019
Benzo[b]naphtho[2,1-d]thiophene	0.025	0.96	0.40	0.041	0.14		0.074	0.0091	0.34	0.094	0.026	0.061	0.12
Cyclopenta[cd]pyrene	0.044	0.16	0.12	0.036	0.12		0.087	0.012	0.20	0.093	0.014	0.013	0.012
Benz[a]anthracene	0.14	0.64	0.41	0.095	0.33		0.22	0.025	0.59	0.25	0.052	0.19	0.29
Chrysene/Triphenylene	0.36	0.97	0.76	0.24	0.74		0.38	0.060	0.70	0.40	0.16	0.36	0.57
Naphthacene	0	0	0	0	0		0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.65	1.6	1.2	0.37	1.0		0.60	0.097	1.3	0.72	0.26	0.58	0.81
Benzo[e]pyrene	0.31	0.85	0.66	0.19	0.49		0.29	0.052	0.63	0.33	0.15	0.32	0.43
Benzo[a]pyrene	0.11	0.67	0.30	0.10	0.29		0.20	0.023	0.54	0.24	0.065	0.21	0.30
Perylene	0.019	0.17	0.088	0.029	0.077		0.059	0.0047	0.16	0.076	0.016	0.062	0.092
Indeno[1,2,3-cd]pyrene	0.49	0.97	0.72	0.18	0.43		0.37	0.078	0.80	0.39	0.15	0.32	0.087
Benzo[g,h,i]perylene	0.58	1.3	0.94	0.35	0.82		0.29	0.088	0.65	0.26	0.17	0.28	0.41
Dibenzo[a,h+a,c]anthracene	0.049	0.094	0.063	0.012	0.026		0.050	0.0062	0.091	0.064	0.015	0.042	0.056
Coronene	0.77	1.2	0.72	0.15	0.32		0.30	0.11	0.047	0.25	0.15	0.18	0.32
Total PAHs	5.1	16.7	11.6	3.6	13.4		7.4	1.2	10.3	6.1	2.1	4.8	6.8
Sample Volume (m^3)	662	689	672	662	694		555	675	564	644	659	661	208
Corresponding Laboratory Blank	3/2/99	4/12/99	4/12/99	4/21/99	4/21/99		5/18/99	5/18/99	5/18/99	5/18/99	7/18/99	7/18/99	7/18/99
Total Suspended Particulate (mg/m^3)	60.0	73.7	61.4	37.6	55.0		41.6	51.2	66.6	86.7	31.3	73.0	97.9
Surrogate Recoveries (%)													
d10-Anthracene	73%	72%	40%	83%	80%		82%	44%	85%	90%	77%	83%	69%
d10-Fluoranthene	86%	72%	80%	89%	82%		83%	82%	77%	89%	89%	92%	87%
d12-Benzo[e]Pyrene	94%	85%	98%	95%	96%		85%	86%	84%	89%	92%	89%	96%

C.1.

Liberty Science Center Particulate Phase PAHs (LS-QFF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	LS-QFF 5/23/99	LS-QFF 6/1/99	LS-QFF 6/19/99	LS-QFF 6/28/99	LS-QFF 7/7/99	LS-QFF 7/16/99	LS-QFF 7/25/99	LS-QFF 8/3/99	LS-QFF 8/30/99	LS-QFF 9/8/99	LS-QFF 9/15/99	LS-QFF 9/27/99	LS-QFF 10/9/99
Fluorene	0.0047	0.0045	0.0041	0.010	0.029	0.025	0.027	0.026	0.030	0.018	0.014	0.0092	0.033
Phenanthrene	0.18	0.19	0.15	0.11	0.26	0.18	0.13	0.23	0.34	0.14	0.13	0.11	0.27
Anthracene	0.041	0.027	0.044	0.025	0.15	0.091	0.084	0.061	0.076	0.011	0.022	0.022	0.030
1Methylfluorene	0.015	0.019	0.014	0.016	0.028	0.018	0.015	0.027	0.035	0.084	0.017	0.012	0.021
Dibenzothiophene	0.017	0.013	0.019	0.0065	0.020	0.0067	0.012	0.023	0.056	0.011	0.011	0.013	0.017
4,5-Methylenephenanthrene	0.023	0.022	0.022	0.015	0.036	0.029	0.015	0.027	0.052	0.016	0.014	0.014	0.029
Methylphenanthrenes	0.32	0.25	0.20	0.18	0.36	0.26	0.18	0.30	0.59	0.22	0.21	0.10	0.22
Methyldibenzothiophenes	0.012	0.011	0.014	0.012	0.027	0.014	0.015	0.023	0.050	0.0052	0.0052	0.0078	0.0093
Fluoranthene	0.19	0.17	0.19	0.11	0.32	0.27	0.15	0.26	0.45	0.14	0.14	0.13	0.23
Pyrene	0.15	0.13	0.13	0.086	0.22	0.18	0.10	0.20	0.41	0.11	0.10	0.11	0.16
3,6-Dimethylphenanthrene	0.024	0.016	0.011	0.009	0.019	0.010	0.011	0.021	0.054	0.019	0.0084	0.013	0.012
Benzo[a]fluorene	0.043	0.033	0.037	0.042	0.088	0.057	0.033	0.080	0.21	0.056	0.025	0.036	0.044
Benzo[b]fluorene	0.047	0.019	0.017	0.012	0.035	0.024	0.013	0.027	0.065	0.028	0.0079	0.014	0.022
Retene	0.015	0.014	0.0050	0.0056	0.012	0.0017	0.0066	0.012	0.037	0.0074	0.0025	0.0092	0.0086
Benzo[b]naphtho[2,1-d]thiophene	0.021	0.030	0.024	0.019	0.051	0.039	0.021	0.047	0.090	0.031	0.023	0.028	0.033
Cyclopenta[cd]pyrene	0.010	0.0024	0.0024	0.0067	0.024	0.0052	0.0050	0.018	0.031	0.0028	0.016	0.0069	0.0071
Benz[a]anthracene	0.060	0.057	0.060	0.036	0.12	0.093	0.039	0.094	0.22	0.063	0.061	0.050	0.079
Chrysene/Triphenylene	0.17	0.15	0.14	0.087	0.25	0.18	0.094	0.20	0.37	0.12	0.097	0.12	0.17
Naphthacene	0	0	0	0	0	0	0	0	0	0.0051	0.0049	0.013	0.011
Benzo[b+k]fluoranthene	0.25	0.21	0.21	0.14	0.42	0.31	0.14	0.29	0.52	0.19	0.16	0.18	0.33
Benzo[e]pyrene	0.18	0.13	0.12	0.071	0.18	0.17	0.081	0.18	0.30	0.11	0.088	0.090	0.16
Benzo[a]pyrene	0.059	0.053	0.032	0.030	0.096	0.080	0.036	0.093	0.20	0.028	0.030	0.049	0.068
Perylene	0.015	0.017	0.0037	0.011	0.029	0.021	0.012	0.026	0.070	0.0045	0.0070	0.015	0.015
Indeno[1,2,3-cd]pyrene	0.17	0.10	0.11	0.066	0.17	0.24	0.11	0.27	0.48	0.061	0.062	0.079	0.16
Benzo[g,h,i]perylene	0.34	0.11	0.14	0.062	0.15	0.17	0.10	0.20	0.31	0.22	0.19	0.096	0.16
Dibenzo[a,h+a,c]anthracene	0.011	0.015	0.015	0.012	0.035	0.044	0.0096	0.037	0.096	0.019	0.0088	0.013	0.027
Coronene	0.36	0.091	0.11	0.055	0.15	0.13	0.11	0.18	0.23	0.30	0.29	0.085	0.14
Total PAHs	2.7	1.9	1.8	1.2	3.3	2.6	1.5	2.9	5.4	2.0	1.8	1.4	2.5
Sample Volume (m^3)	557	662	699	770	644	647	644	661	692	678	833	648	623
Corresponding Laboratory Blank	7/28/99	7/28/99	7/28/99	8/3/99	8/3/99	9/24/99	9/24/99	10/4/99	10/4/99	10/12/99	10/12/99	12/1/99	12/1/99
Total Suspended Particulate (mg/m^3)	115.5	92.6	62.4	74.4	60.1	105.3	52.7	61.9	196.0	90.4	38.4	38.6	56.8
Surrogate Recoveries (%)													
d10-Anthracene	58%	60%	60%	63%	64%	48%	65%	72%	76%	61%	64%	55%	54%
d10-Fluoranthene	90%	93%	91%	95%	83%	89%	85%	85%	82%	78%	74%	72%	80%
d12-Benzo[e]Pyrene	92%	94%	93%	98%	94%	94%	90%	84%	86%	102%	90%	80%	79%

C.1.

Liberty Science Center Particulate Phase PAHs (LS-QFF)

Surrogate Corrected Concentrations (ng/m³)

PAH	LS-QFF 10/21/99	LS-QFF 11/2/99	LS-QFF 11/14/99	LS-QFF 11/26/99	LS-QFF 12/8/99
Fluorene	0.039	0.013	0.0063	0.044	0.059
Phenanthrene	0.48	0.11	0.068	0.49	0.87
Anthracene	0.064	0.020	0.013	0.094	0.15
1Methylfluorene	0.038	0.0067	0.010	0.024	0.066
Dibenzothiophene	0.078	0.027	0.012	0.0057	0.17
4,5-Methylenephenanthrene	0.091	0.014	0.010	0.094	0.36
Methylphenanthrenes	1.2	0.13	0.12	0.55	2.3
Methyldibenzothiophenes	0.037	0.0032	0.0036	0.020	0.16
Fluoranthene	0.69	0.14	0.12	0.69	3.1
Pyrene	0.69	0.098	0.091	0.60	3.8
3,6-Dimethylphenanthrene	0.18	0.010	0.013	0.052	0.58
Benzo[a]fluorene	0.22	0.037	0.023	0.12	0.87
Benzo[b]fluorene	0.11	0.010	0.0067	0.046	0.91
Retene	0.053	0.0059	0.019	0.057	0.41
Benzo[b]naphtho[2,1-d]thiophene	0.11	0.021	0.027	0.012	0.30
Cyclopenta[cd]pyrene	0.13	0.0050	0.0029	0.014	1.1
Benz[a]anthracene	0.34	0.041	0.038	0.36	1.6
Chrysene/Triphenylene	0.56	0.096	0.11	0.65	1.7
Naphthacene	0.50	0	0.36	0.51	0
Benzo[b+k]fluoranthene	0.73	0.14	0.12	1.1	3.1
Benzo[e]pyrene	0.40	0.074	0.073	0.47	1.4
Benzo[a]pyrene	0.31	0.035	0.013	0.35	1.3
Perylene	0.087	0.0076	0.0018	0.12	0.36
Indeno[1,2,3-cd]pyrene	0.37	0.085	0.078	0.36	2.5
Benzo[g,h,i]perylene	0.50	0.13	0.12	0.45	2.1
Dibenzo[a,h+a,c]anthracene	0.033	0.0051	0.0038	0.038	0.13
Coronene	0.43	0.12	0.12	0.16	2.5
Total PAHs	8.4	1.4	1.6	7.5	31.9
Sample Volume (m³)	686	662	662	627	664
Corresponding Laboratory Blank	12/1/99	12/13/99	1/13/00	1/13/00	2/9/00
Total Suspended Particulate (mg/m³)	46.1	35.0	63.1	26.4	77.8
Surrogate Recoveries (%)					
d10-Anthracene	73%	51%	71%	57%	93%
d10-Fluoranthene	75%	67%	86%	75%	87%
d12-Benzo[e]Pyrene	81%	81%	94%	87%	92%

C.2.

Liberty Science Center Gas Phase PAHs (LS-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	day LS-PUF 7/5/98	night LS-PUF 7/5/98	day LS-PUF 7/6/98	night LS-PUF 7/6/98	day LS-PUF 7/7/98	night LS-PUF 7/7/98	day LS-PUF 7/8/98	night LS-PUF 7/8/98	day LS-PUF 7/9/98	night LS-PUF 7/9/98	day LS-PUF 7/10/98
Fluorene	1.9	11	2.3	10	1.8	2.5	3.5	5.7	2.4	0.48	1.7
Phenanthrene	13	34	13	16	9.6	13	9.8	21	24	14	25
Anthracene	0.35	1.4	0.47	0.46	0.24	0.082	0.25	0.47	0.81	0.80	1.1
1Methylfluorene	0.69	2.8	1.1	3.7	1.2	1.5	1.9	3.0	0.93	1.5	0.89
Dibenzothiophene	1.3	3.7	1.1	1.8	0.46	0.66	1.0	1.5	2.4	0.85	0.98
4,5-Methylenephenanthrene	0.94	2.3	0.93	1.3	0.68	0.88	0.82	1.4	2.0	1.9	1.8
Methylphenanthrenes	6.2	17	10	13	7.0	7.3	11	12	13	25	17
Methyldibenzothiophenes	0.68	1.6	0.77	1.2	0.57	0.68	0.84	1.3	1.4	0.39	0.64
Fluoranthene	3.1	5.6	2.4	2.5	1.7	2.1	1.5	3.5	4.8	10.0	5.0
Pyrene	0.94	2.6	1.1	1.4	0.73	1.1	0.89	1.9	2.1	4.3	2.2
3,6-Dimethylphenanthrene	0.39	0.79	0.64	1.3	0.62	0.44	0.75	0.75	0.97	1.6	0.89
Benzo[a]fluorene	0.092	0.15	0.12	0.22	0.096	0.085	0.12	0.20	0.24	0.64	0.15
Benzo[b]fluorene	0.015	0.035	0.027	0.061	0.020	0.027	0.029	0.076	0.063	0.21	0.023
Retene	0.044	0.068	0.12	0.094	0.054	0.047	0.053	0.087	0.12	0.014	0.060
Benzo[b]naphtho[2,1-d]thiophene	0.025	0.020	0.014	0.018	0.024	0.0070	0.014	0.011	0.050	0.052	0.028
Cyclopenta[cd]pyrene	0	0	0	0	0	0	0	0	0	0	0
Benz[a]anthracene	0	0	0	0.0009	0	0	0	0	0.0018	0.0071	0
Chrysene/Triphenylene	0.032	0.021	0.030	0.018	0.070	0	0.013	0.034	0.061	0.086	0.032
Naphthacene	0	0	0	0	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.0017	0	0	0	0	0	0	0	0	0.0010	0
Benzo[e]pyrene	0	0	0	0	0	0	0	0	0	0	0
Benzo[a]pyrene	0	0	0	0	0	0	0	0	0	0	0
Perylene	0	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	30	84	34	53	25	31	33	53	55	62	57
Sample Volume (m^3)	383	381	375	374	374	375	385	374	374	397	393
Corresponding Laboratory Blank	7/30/98	7/17/98	7/17/98	7/17/98	7/10/98	7/12/98	7/18/98	7/10/98	7/18/98	7/18/98	7/12/98
Surrogate Recoveries (%)											
d10-Anthracene	99%	80%	87%	108%	94%	80%	98%	82%	98%	83%	73%
d10-Fluoranthene	88%	83%	85%	88%	82%	87%	87%	86%	89%	84%	82%
d12-Benzo[e]Pyrene	86%	86%	89%	91%	88%	86%	100%	98%	101%	88%	87%

C.2.

Liberty Science Center Gas Phase PAHs (LS-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	night LS-PUF 7/10/98	day LS-PUF 7/11/98	LS-PUF 10/7/98	LS-PUF 10/10/98	LS-PUF 10/13/98	LS-PUF 10/19/98	LS-PUF 10/28/98	LS-PUF 11/6/98	LS-PUF 11/15/98	LS-PUF 11/24/98	LS-PUF 12/3/98
Fluorene	0.45	missing	1.4	2.5	1.2	14	7.1	9.5	8.1	7.4	12
Phenanthrene	3.4	sample	8.5	12	5.0	17	16	15	12	12	24
Anthracene	0.038	too	0.2	1.2	0.15	1.8	0.82	1.1	1.0	0.63	2.1
1Methylfluorene	0.19	short	2.3	1.5	0.85	4.7	3.8	4.3	3.2	3.2	6.5
Dibenzothiophene	0.20		0.5	1.8	0.58	4.5	3.2	2.1	2.2	1.7	4.0
4,5-Methylenephenanthrene	0.21		0.9	1.4	0.45	2.4	1.8	1.9	1.6	1.2	2.9
Methylphenanthrenes	1.7		13	8.4	5.0	12	18	17	14	13	26
Methyldibenzothiophenes	0.24		0.7	1.1	0.44	1.9	2.4	1.6	1.3	1.2	2.7
Fluoranthene	0.59		1.3	2.9	0.86	3.8	3.0	2.7	2.3	1.8	4.0
Pyrene	0.33		1.1	1.9	0.65	2.5	2.0	2.7	0.19	1.5	2.9
3,6-Dimethylphenanthrene	0.096		0.52	0.62	0.36	1.1	1.2	1.0	7.9	0.72	1.6
Benzo[a]fluorene	0.030		0.14	0.20	0.069	0.16	0.25	0.16	0.16	0.10	0.34
Benzo[b]fluorene	0.005		0.044	0.081	0.018	0.066	0.085	0.074	0.078	0.031	0.16
Retene	0.042		0.068	0.092	0.032	0.056	0.12	0.029	0.034	0.034	0.14
Benzo[b]naphtho[2,1-d]thiophene	0.0018		0.021	0.025	0.0087	0.014	0.066	0.0035	0.0048	0.028	0.0032
Cyclopenta[cd]pyrene	0		0	0	0	0.016	0.013	0	0	0	0.021
Benz[a]anthracene	0		0.0044	0.014	0.0006	0.0019	0.016	0.0016	0.0022	0.0017	0.027
Chrysene/Triphenylene	0.013		0.045	0.050	0.010	0.015	0.075	0.011	0.022	0.013	0.073
Naphthacene	0		0	0	0	0	0	0	0	0	0.018
Benzo[b+k]fluoranthene	0		0.0019	0.0025	0	0.0007	0.022	0	0.0010	0.0012	0.0056
Benzo[e]pyrene	0		0	0	0	0	0.018	0	0.0015	0.0016	0.0034
Benzo[a]pyrene	0		0	0	0	0	0.014	0	0	0	0.00083
Perylene	0		0	0	0	0	0.0046	0	0	0	0
Indeno[1,2,3-cd]pyrene	0		0	0	0	0	0.023	0	0	0	0
Benzo[g,h,i]perylene	0		0	0	0	0	0.015	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0		0	0	0	0	0.0021	0	0	0	0
Coronene	0		0	0	0	0	0	0	0	0	0
Total PAHs	7.5		31	36	16	66	59	59	55	45	89
Sample Volume (m^3)	381	45	681	716	699	699	661	702	721	657	664
Corresponding Laboratory Blank	7/12/98		10/21/98	10/21/98	11/24/98	11/24/98	11/24/98	2/8/99	1/5/99	1/5/99	1/5/99
Surrogate Recoveries (%)											
d10-Anthracene	90%		24%	81%	82%	75%	74%	79%	82%	77%	84%
d10-Fluoranthene	91%		43%	93%	88%	85%	85%	98%	96%	91%	101%
d12-Benzo[e]Pyrene	99%		64%	79%	81%	73%	65%	84%	80%	76%	79%

C.2.
Liberty Science Center Gas Phase PAHs (LS-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	LS-PUF 12/12/98	LS-PUF 12/21/98	LS-PUF 12/30/98	LS-PUF 1/8/99	LS-PUF 1/17/99	LS-PUF 1/26/99	LS-PUF 2/4/99	LS-PUF 2/13/99	LS-PUF 2/22/99	LS-PUF 3/3/99	LS-PUF 3/12/99
Fluorene	9.6	4.1	4.9	8.9	9.4	12	9.7	2.9	2.4	2.3	6.3
Phenanthrene	14	13	8.3	13	16	16	18	6.5	5.0	5.9	7.5
Anthracene	0.93	0.82	0.14	1.7	0.96	1.5	1.8	0.0052	0.012	0.13	0.093
1Methylfluorene	4.2	3.2	2.4	6.1	4.0	6.5	0.33	0.99	1.3	1.2	1.9
Dibenzothiophene	1.9	1.9	0.60	2.4	2.1	2.1	2.0	0.22	0.18	0.63	0.62
4,5-Methylenephenanthrene	1.4	1.5	0.68	2.0	1.6	1.8	2.0	0.47	0.48	0.50	0.57
Methylphenanthrenes	15	15	8.1	23	17	23	19	6.4	4.4	5.6	10
Methyldibenzothiophenes	1.4	1.6	0.48	2.2	1.9	2.2	2.2	0.21	0.083	0.56	0.50
Fluoranthene	1.9	2.6	0.83	3.0	3.0	2.2	3.2	0.82	0.63	1.2	0.95
Pyrene	1.7	2.2	0.37	3.3	2.6	2.3	3.2	0.34	0.16	0.77	0.46
3,6-Dimethylphenanthrene	0.83	1.0	0.21	1.7	1.1	1.3	1.5	0.13	0.071	0.33	1.1
Benzo[a]fluorene	0.15	0.26	0.013	0.28	0.16	0.12	0.22	0.011	0.0046	0.072	0.016
Benzo[b]fluorene	0.063	0.12	0.0025	0.14	0.084	0.045	0.11	0.0007	0.0008	0.025	0.0016
Retene	0.066	0.13	0.0046	0.15	0.082	0.038	0.16	0.0006	0.0007	0.022	0.0017
Benzo[b]naphtho[2,1-d]thiophene	0.0048	0.028	0.0010	0.0087	0.012	0.0037	0.014	0.0007	NA	0.015	0.0003
Cyclopenta[cd]pyrene	0.0064	0	0	0.016	0.0029	0.0033	0.0028	0.0001	0.0001	0.0002	0.0004
Benz[a]anthracene	0.0049	0.020	0.0010	0.0091	0.0078	0.0025	0.0070	0.0002	0.0002	0.0024	0.0004
Chrysene/Triphenylene	0.020	0.080	0.0052	0.022	0.034	0.011	0.030	0.0008	0.0017	0.028	0.0042
Naphthacene	0	0.016	0	0.0048	0	0	0	0	0	0	0
Benzo[b+k]fluoranthene	0.0012	0.0071	0.0037	0	0	0	0	0	0	0	0
Benzo[e]pyrene	0	0.0041	0.0036	0	0	0	0	0	0	0	0
Benzo[a]pyrene	0	0.0014	0.0023	0	0	0	0	0	0	0	0
Perylene	0	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	54	48	27	67	60	71	64	19	15	19	30
Sample Volume (m^3)	657	662	613	762	662	689	672	662	694	691	555
Corresponding Laboratory Blank	2/8/99	2/8/99	2/8/99	2/15/99	2/24/99	2/24/99	2/24/99	2/24/99	3/8/99	4/14/99	4/14/99
Surrogate Recoveries (%)											
d10-Anthracene	78%	83%	75%	91%	82%	86%	80%	76%	68%	94%	89%
d10-Fluoranthene	93%	97%	95%	103%	95%	97%	97%	91%	89%	92%	98%
d12-Benzo[e]Pyrene	81%	88%	86%	87%	87%	90%	81%	87%	91%	84%	89%

C.2.

Liberty Science Center Gas Phase PAHs (LS-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	LS-PUF 3/21/99	LS-PUF 3/30/99	LS-PUF 4/8/99	LS-PUF 4/17/99	LS-PUF 4/26/99	wrong LS-PUF 5/14/99	LS-PUF 5/23/99	LS-PUF 6/1/99	LS-PUF 6/10/99	LS-PUF 6/28/99	LS-PUF 7/7/99
Fluorene	2.9	16	5.9	8.5	6.8	15	5	4.2	2.7	1.5	7.5
Phenanthrene	5.6	17	22	15	21	30	18	18	11	13	21
Anthracene	0.14	1.0	0.64	0.33	0.49	0.63	0.70	0.34	0.29	0.29	1.9
1Methylfluorene	1.1	5.5	2.0	1.5	1.5	3.8	3.1	1.9	1.4	0.92	1.8
Dibenzothiophene	0.42	2.5	3.4	1.8	2.6	2.0	2.7	2.6	1.4	1.6	3.8
4,5-Methylenephenanthrene	0.44	1.6	2.3	1.1	1.8	1.8	0.2	1.7	0.87	1.7	3.8
Methylphenanthrenes	4.8	22	15	6.6	10	21	14	14	8.1	9.2	16
Methyldibenzothiophenes	0.37	1.8	1.5	0.71	0.82	1.5	1.9	2.3	1.1	1.3	1.8
Fluoranthene	0.91	2.6	5.1	2.2	4.2	3.4	3.6	3.8	2.1	4.3	9.3
Pyrene	0.49	1.5	2.1	1.0	1.6	1.4	2.1	1.6	1.1	1.8	4.1
3,6-Dimethylphenanthrene	0.23	1.0	0.68	0.32	0.40	0.65	0.84	0.80	0.44	0.73	0.85
Benzo[a]fluorene	0.035	0.17	0.10	0.14	0.071	0.063	0.19	0.22	0.092	0.26	0.41
Benzo[b]fluorene	0.012	0.039	0.046	0.030	0.021	0.010	0.089	0.072	0.035	0.041	0.032
Retene	0.012	0.045	0.049	0.029	0.026	0.015	0.076	0.12	0.043	0.10	0.094
Benzo[b]naphtho[2,1-d]thiophene	0.018	0.0032	0.044	0.0092	0.010	0.0010	0.020	0.0025	0.0004	0.0008	0.0007
Cyclopenta[cd]pyrene	0.0006	0.0016	0.0003	0.0013	0.0008	0.024	0.027	0.063	0.017	0.050	0.049
Benz[a]anthracene	0.0019	0.0026	0.0029	0.0005	0.0008	0.0029	0.011	0.0046	0.0013	0.0043	0.0069
Chrysene/Triphenylene	0.019	0.016	0.051	0.020	0.026	0.044	0.066	0.099	0.032	0.078	0.097
Naphthacene	0	0	0	0	0	0	0	0	0	0.0098	0
Benzo[b+k]fluoranthene	0	0.0067	0.0044	0	0	0	0	0.0084	0.0022	0.0075	0.0032
Benzo[e]pyrene	0	0.0064	0	0	0	0	0	0	0	0	0
Benzo[a]pyrene	0	0.0046	0	0	0	0	0	0	0	0	0
Perylene	0	0	0	0	0	0	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0	0	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0	0	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0	0	0	0	0	0	0
Coronene	0	0	0	0	0	0	0	0	0	0	0
Total PAHs	18	73	60	39	51	81	53	52	31	37	73
Sample Volume (m^3)	675	564	644	659	661	208	557	662	698.83	770	644
Corresponding Laboratory Blank	4/14/99	4/14/99	6/15/99	6/15/99	6/15/99	6/15/99	7/12/99	7/12/99	7/12/99	7/27/99	7/27/99
Surrogate Recoveries (%)											
d10-Anthracene	90%	98%	94%	90%	76%	60%	95%	89%	93%	106%	102%
d10-Fluoranthene	96%	104%	97%	91%	80%	85%	103%	103%	106%	101%	102%
d12-Benzo[e]Pyrene	88%	84%	83%	83%	71%	113%	88%	84%	92%	87%	90%

C.2.
Liberty Science Center Gas Phase PAHs (LS-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	LS-PUF 7/16/99	LS-PUF 7/25/99	LS-PUF 8/3/99	LS-PUF 8/30/99	LS-PUF 9/8/99	LS-PUF 9/15/99	LS-PUF 9/27/99	LS-PUF 10/9/99	LS-PUF 10/21/99	LS-PUF 11/2/99	LS-PUF 11/14/99
Fluorene	1.0	0.61	6.4	0.30	1.8	1.3	2.3	4.2	8.3	3.5	Sample
Phenanthrene	27	23	14	15	14	13	10	17	13	8.4	Broke
Anthracene	0.29	0.52	0.63	1.1	0.64	1.2	0.22	0.71	0.85	0.32	
1Methylfluorene	1.8	1.0	2.6	2.5	4.6	1.2	1.5	2.3	3.6	1.3	
Dibenzothiophene	3.7	2.6	2.4	2.0	2.0	1.8	1.3	2.6	2.0	1.0	
4,5-Methylenephenanthrene	2.5	2.4	1.2	1.5	1.4	1.6	0.92	1.4	1.1	0.81	
Methylphenanthrenes	22	13	11	17	14	17	8.6	17	13	5.2	
Methyldibenzothiophenes	1.2	0.75	1.5	2.6	2.2	2.2	0.41	0.64	0.62	0.37	
Fluoranthene	7.5	6.1	3.4	2.3	3.2	3.6	1.9	2.9	1.8	1.6	
Pyrene	2.5	2.4	1.5	1.5	1.9	2.2	1.1	1.5	1.2	1.1	
3,6-Dimethylphenanthrene	0.092	0.033	0.72	1.7	1.0	1.2	0.63	0.70	0.77	0.47	
Benzo[a]fluorene	0.23	0.18	0.18	0.23	0.38	0.42	0.16	0.20	0.15	0.13	
Benzo[b]fluorene	0.024	0.027	0.022	0.072	0.10	0.12	0.062	0.083	0.060	0.020	
Retene	0.12	0.10	0.12	0.11	0.15	0.15	0.068	0.085	0.044	0.051	
Benzo[b]naphtho[2,1-d]thiophene	0.0005	0.0002	0.03	0.018	0.041	0.063	0.022	0.028	0.014	0.022	
Cyclopenta[cd]pyrene	0.050	0.027	0.0004	0.049	0.0052	0.0077	0.0013	0.013	0.0017	0.0002	
Benz[a]anthracene	0.0053	0.0022	0.0027	0.0016	0.0088	0.020	0.0040	0.016	0.0068	0.0070	
Chrysene/Triphenylene	0.13	0.068	0.051	0.017	0.048	0.074	0.036	0.053	0.021	0.039	
Naphthacene	0	0	0	0	0.0050	0.013	0	0	0	0	
Benzo[b+k]fluoranthene	0.0088	0.0033	0.0024	0.0011	0.0045	0.0078	0.0032	0.0037	7.8E-04	2.7E-03	
Benzo[e]pyrene	0	0.0003	0.0018	0.0012	0.0032	0.0081	0.0017	0.0018	1.9E-04	1.3E-03	
Benzo[a]pyrene	0	0.0002	0.00025	0.00024	0.0003	0.0034	0.0002	0.0003	1.1E-05	1.3E-04	
Perylene	0	0.00003	0.000076	0	4.7E-05	0.0008	0.0001	0.0002	1.2E-05	8.2E-06	
Indeno[1,2,3-cd]pyrene	0	0.00001	0.00010	0.00016	0.0002	0.0035	0.0001	0.0001	1.3E-05	2.2E-05	
Benzo[g,h,i]perylene	0	0.00002	0.00012	0.00019	0.0002	0.0052	0.0003	0.0003	1.5E-05	1.1E-05	
Dibenzo[a,h+a,c]anthracene	0	0.00002	0.000021	0.000026	0.0001	0.0005	0.0001	0.0001	1.1E-05	4.0E-06	
Coronene	0	0.00002	0.000053	0.00024	0.0002	0.0049	0.0002	0.0003	4.4E-05	1.3E-05	
Total PAHs	70	52	45.44	48.29	47.60	46.75	29.55	52.11	46.80	24.35	
Sample Volume (m^3)	647	644	661	692	678	833	648	623	686	662	
Corresponding Laboratory Blank	8/16/99	8/16/99	9/7/99	9/29/99	10/4/99	10/4/99	10/25/99	10/25/99	11/22/99	11/22/99	
Surrogate Recoveries (%)											
d10-Anthracene	74%	89%	97%	77%	109%	102%	94%	95%	95%	86%	
d10-Fluoranthene	81%	93%	86%	80%	96%	95%	93%	96%	94%	85%	
d12-Benzo[e]Pyrene	85%	95%	93%	74%	91%	85%	98%	88%	91%	88%	

C.2.

Liberty Science Center Gas Phase PAHs (LS-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	LS-PUF 11/26/99	LS-PUF 12/8/99
Fluorene	3.10	17
Phenanthrene	11.08	24
Anthracene	0.45	3.9
1Methylfluorene	1.62	0.62
Dibenzothiophene	1.37	2.7
4,5-Methylenephenanthrene	1.02	2.6
Methylphenanthrenes	14.20	31
Methyldibenzothiophenes	0.53	2.4
Fluoranthene	2.08	2.5
Pyrene	1.54	2.3
3,6-Dimethylphenanthrene	0.11	1.8
Benzo[a]fluorene	0.19	0.23
Benzo[b]fluorene	0.04	0.15
Retene	0.08	0.037
Benzo[b]naphtho[2,1-d]thiophene	0.03	0.0018
Cyclopenta[cd]pyrene	0.00	0.0076
Benz[a]anthracene	0.01	0.0043
Chrysene/Triphenylene	0.04	0.014
Naphthacene	0.00	4.3E-05
Benzo[b+k]fluoranthene	0.00	0.0004
Benzo[e]pyrene	0.00	0.0005
Benzo[a]pyrene	0.00	0.0002
Perylene	0.00	4.5E-05
Indeno[1,2,3-cd]pyrene	0.00	0.0001
Benzo[g,h,i]perylene	0.00	0.0001
Dibenzo[a,h+a,c]anthracene	0.00	3.1E-05
Coronene	0.00	4.4E-05
Total PAHs	37.51	91.90
Sample Volume (m^3)	2/3/02	664
Corresponding Laboratory Blank	12/1/99	1/5/00
Surrogate Recoveries (%)		
d10-Anthracene	91%	97%
d10-Fluoranthene	92%	90%
d12-Benzo[e]Pyrene	95%	84%

C.3.
Liberty Science Center Rain PAHs (LS-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	LS-Precip 1/8/99	LS-Precip 1/26/99	LS-Precip 2/13/99	LS-Precip 3/3/99	LS-Precip 3/21/99	LS-Precip 4/8/99	LS-Precip 4/26/99	LS-Precip 5/14/99	LS-Precip 6/1/99	LS-Precip 6/19/99	LS-Precip 7/7/99	LS-Precip 7/25/99
Fluorene	16	10	13	8.9	8.4	11	19	6.8	6.7	6.9	16	9.0
Phenanthrene	90	53	77	47	53	54	133	32	34	52	47	59
Anthracene	4.6	2.9	3.4	7.9	19	4.8	24	1.7	3.0	4.3	1.8	6.0
1Methylfluorene	30	4.9	5.7	4.0	2.7	3.6	8.0	2.1	3.1	1.3	3.0	11
Dibenzothiophene	12	5.5	6.9	4.3	3.7	5.1	10	3.3	2.6	3.9	4.3	3.9
4,5-Methylenephenanthrene	12	6.0	9.2	4.8	5.5	5.3	15	2.8	3.2	5.1	3.4	5.6
Methylphenanthrenes	105	46	64	37	29	42	103	18	23	30	13	39
Methyldibenzothiophenes	9.8	4.2	5.9	5.1	3.8	4.9	10	0.91	0.56	1.2	1.4	2.9
Fluoranthene	50	33	45	27	53	35	148	15	24	57	17	63
Pyrene	40	24	29	16	37	24	111	9.3	15	38	7.7	44
3,6-Dimethylphenanthrene	9.1	3.9	5.4	2.4	2.3	2.8	6.3	1.1	1.3	1.7	1.0	2.1
Benzo[a]fluorene	7.8	4.2	6.0	4.1	10	16	33	2.0	3.3	7.8	2.2	11
Benzo[b]fluorene	4.2	2.1	2.7	2.2	5.7	3.1	16	1.0	0.65	2.3	1.00	3.9
Retene	2.5	0.87	2.2	6.6	1.5	1.0	3.8	0.38	0.55	0.78	0.70	1.5
Benzo[b]naphtho[2,1-d]thiophene	NA	NA	NA	1.6	5.3	2.8	18	0.28	0.45	0.38	1.6	5.9
Cyclopenta[cd]pyrene	2.0	0.67	1.0	0.81	1.4	2.0	2.9	0.81	1.9	5.3	0.97	1.3
Benz[a]anthracene	7.7	3.2	5.6	3.8	16	7.9	62	2.3	4.1	15	2.0	18
Chrysene/Triphenylene	16	13	12	9.1	28	13	86	4.0	8.8	27	5.2	34
Naphthacene	0	0	0	0	0	0	0	0	0	0	1.2	0
Benzo[b+k]fluoranthene	21	9.8	17	13	44	21	157	6.1	13	31	6.9	60
Benzo[e]pyrene	10	5.9	12	6.3	19.0	11	63	3.3	7.7	21	3.3	34
Benzo[a]pyrene	7.2	3.9	6.4	4.7	17	8.8	61	2.5	5.2	17	2.2	24
Perylene	2.9	3.3	3.7	1.6	5.2	3.0	17	1.1	1.5	5.1	0.84	10
Indeno[1,2,3-cd]pyrene	7.8	4.0	7.2	9.6	30	17	102	3.0	6.8	20	5.7	33
Benzo[g,h,i]perylene	7.2	4.2	7.4	5.7	16	9.9	20	3.1	7.2	19	3.08	27
Dibenzo[a,h+a,c]anthracene	0.78	0.27	0.94	1.4	5.4	2.8	55	0.74	1.7	5.2	0.77	5.3
Coronene	4.7	2.4	5.3	5.6	14	8.6	48	2.1	4.6	9.7	3.3	13
Total PAHs	480	251	354	241	439	320	1330	126	184	386	157	528
Volume of Precip. (L)	24	6.7	10	10	9.1	8.3	3.8	17	3.0	1.9	8.6	2.1
Corresponding Laboratory Blank	4/27/99	4/27/99	4/27/99	6/21/99	6/21/99	6/21/99	6/21/99	7/13/99	7/13/99	7/13/99	8/19/99	9/14/99
Surrogate Recoveries (%)												
d10-Anthracene	86%	78%	81%	80%	91%	80%	82%	89%	81%	76%	93%	81%
d10-Fluoranthene	79%	86%	84%	86%	94%	83%	82%	93%	99%	85%	91%	89%
d12-Benzo[e]Pyrene	122%	102%	92%	74%	81%	70%	69%	104%	105%	111%	100%	88%

C.3.
Liberty Science Center Rain PAHs (LS-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	LS-Precip 8/12/99	LS-Precip 8/30/99	LS-Precip 9/15/99	LS-Precip 10/9/99	LS-Precip 11/2/99	LS-Precip 11/25/99	LS-Precip 12/20/99
Fluorene	5.0	5	1.5	14.0	5	10.7	8
Phenanthrene	18	22	5	78	26	61	55
Anthracene	1.0	1.4	0.5	3.1	1.9	3.2	4.0
1Methylfluorene	17	4.8	0	7	1.9	5	3.9
Dibenzothiophene	1.5	1.9	0.4	8.2	2.4	6.6	5.5
4,5-Methylenephenanthrene	1.4	2.2	0.5	8.1	3.0	7.6	6.4
Methylphenanthrenes	8.5	14	3	57.2	18	56.3	46
Methyldibenzothiophenes	0.69	0.5	0.1	1.31	0.6	2.65	4.2
Fluoranthene	10	14	4	38	19	34	40
Pyrene	5.1	8.2	3	23.6	1.4	23.7	29.2
3,6-Dimethylphenanthrene	0.45	0.9	0.2	3.31	1.2	4.07	3.3
Benzo[a]fluorene	1.1	2.0	1	4.7	2.6	5.3	6.8
Benzo[b]fluorene	0.46	0.84	0.4	1.10	1.04	1.76	1.98
Retene	0.17	0.19	0.0	0.39	0.27	0.83	1.40
Benzo[b]naphtho[2,1-d]thiophene	0.63	0.9	0.4	2.38	1.6	2.37	3.3
Cyclopenta[cd]pyrene	0.21	0.18	0.1	1.03	0.28	1.13	0.70
Benz[a]anthracene	1.5	3.0	1	5.7	4.8	6.7	9.5
Chrysene/Triphenylene	2.8	4.8	2	10.4	7.7	11.0	15.9
Naphthacene	0	0.0	0	0	0.0	0	3.1
Benzo[b+k]fluoranthene	4.6	8.2	2	16.3	13.7	17.0	23.6
Benzo[e]pyrene	2.9	3.9	1	9.5	7.2	8.4	10.9
Benzo[a]pyrene	1.9	3.1	1	6.5	5.5	6.5	9.4
Perylene	1.4	1.21	0	1.9	1.49	2.5	4.24
Indeno[1,2,3-cd]pyrene	2.7	4.6	2	9.5	8.6	9.8	19.4
Benzo[g,h,i]perylene	2.7	3.50	1	6.6	5.53	6.5	9.32
Dibenzo[a,h+a,c]anthracene	0.36	0.52	0.2	0.92	0.69	1.03	1.10
Coronene	1.9	2.0	0	1.0	1.8	2.6	3.2
Total PAHs	94	113	31	320	143	298	330
Volume of Precip. (L)	20	37	38	5.5	13	16	7.7
Corresponding Laboratory Blank	9/14/99	11/3/99	11/3/99	11/3/99	1/4/00	1/4/00	3/6/00
Surrogate Recoveries (%)							
d10-Anthracene	83%	83%	76%	78%	85%	85%	78%
d10-Fluoranthene	86%	83%	80%	83%	87%	84%	79%
d12-Benzo[e]Pyrene	84%	81%	81%	86%	88%	87%	87%

C.4. Field Blank PAHs Dissolved Phase In Water (FB-XAD)
Surrogate Corrected Concentrations (ng)

PAH	FB-XAD July-98
Fluorene	7.1
Phenanthrene	30
Anthracene	2.1
1Methylfluorene	13
Dibenzothiophene	1.7
4,5-Methylenephenanthrene	2.2
Methylphenanthrenes	69
Methyldibenzothiophenes	11
Fluoranthene	22
Pyrene	3.3
3,6-Dimethylphenanthrene	1.8
Benzo[a]fluorene	8.2
Benzo[b]fluorene	0.48
Retene	4.5
Benzo[b]naphtho[2,1-d]thiophene	1.0
Cyclopenta[cd]pyrene	11
Benz[a]anthracene	0
Chrysene/Triphenylene	7.0
Naphthacene	0
Benzo[b+k]fluoranthene	1.6
Benzo[e]pyrene	0
Benzo[a]pyrene	0.87
Perylene	0
Indeno[1,2,3-cd]pyrene	0
Benzo[g,h,i]perylene	0.37
Dibenzo[a,h+a,c]anthracene	0
Coronene	0
Total PAHs	198
Corresponding Laboratory Blank	7/28/98
Surrogate Recoveries (%)	
d10-Anthracene	80%
d10-Fluoranthene	89%
d10-Benzo[e]pyrene	92%

D.1.

Lower Hudson River Estuary Particulate Phase PAHs (Raritan Bay: RB-QFF)(New York Harbor: NH-QFF)

Surrogate Corrected Concentrations (ng/m³)

PAH	day RB-QFF 7/5/98	day RB-QFF 7/6/98	day RB-QFF 7/7/98	morning NH-QFF 7/10/98	afternoon NH-QFF 7/10/98
Fluorene	0.019	0.0085	0.0046	0.015	0.013
Phenanthrene	0.048	0.11	0.027	0.17	0.11
Anthracene	0.0097	0.015	0.0052	0.024	0.024
1Methylfluorene	0.026	0.020	0.0085	0.029	0.030
Dibenzothiophene	0.0075	0.0074	0.0053	0.012	0.015
4,5-Methylenephenanthrene	0.0061	0.015	0.0027	0.022	0.014
Methylphenanthrenes	0.11	0.14	0.063	0.23	0.12
Methyldibenzothiophenes	0.011	0.027	0.0069	0.024	0.012
Fluoranthene	0.060	0.14	0.024	0.20	0.11
Pyrene	0.054	0.098	0.027	0.14	0.063
3,6-Dimethylphenanthrene	0.010	0.011	0.0055	0.014	0.017
Benzo[a]fluorene	0.016	0.023	0.0061	0.033	0.021
Benzo[b]fluorene	0.0041	0.0072	0.0017	0.013	0.0052
Retene	0.031	0.014	0.019	0.023	0.021
Benzo[b]naphtho[2,1-d]thiophene	0.018	0.013	0.011	0.18	0.019
Cyclopenta[cd]pyrene	0.0053	0.0004	0.0012	0.034	0.010
Benz[a]anthracene	0.008	0.025	0.0042	0.046	0.020
Chrysene/Triphenylene	0.074	0.089	0.014	0.137	0.048
Naphthacene	0	0	0	0	0
Benzo[b+k]fluoranthene	0.19	0.11	0.033	0.19	0.065
Benzo[e]pyrene	0.13	0.078	0.025	0.12	0.060
Benzo[a]pyrene	0.020	0.035	0.0085	0.054	0.032
Perylene	0.0013	0.0012	0.0019	0.0019	0.0011
Indeno[1,2,3-cd]pyrene	0.080	0.098	0.011	0.053	0.046
Benzo[g,h,i]perylene	0.078	0.050	0.016	0.082	0.031
Dibenzo[a,h+a,c]anthracene	0.0049	0.0082	0.0032	0.028	0.0056
Coronene	0.038	0.025	0.0065	0.040	0.017
Total PAHs	1.1	1.2	0.34	1.9	0.93
Sample Volume (m³)	304.9	281.2	278.68	203.4	152.88
Corresponding Laboratory Blank	8/6/98	7/17/98	7/24/98	7/19/98	7/19/98
Total Suspended Particulate (μg/m³)	49.9	56.2	59.6	107	122
Surrogate Recoveries (%)					
d10-Anthracene	79%	74%	81%	74%	78%
d10-Fluoranthene	80%	84%	89%	86%	83%
d10-Benzo[e]pyrene	83%	95%	92%	93%	90%

D.2.

Lower Hudson River Estuary Gas Phase PAHs (Raritan Bay: RB-PUF)(New York Harbor: NH-PUF)
Surrogate Corrected Concentrations (ng/m^3)

PAH	day RB-PUF 7/5/98	day RB-PUF 7/6/98	day RB-PUF 7/7/98	morning NH-PUF 7/10/98	afternoon NH-PUF 7/10/98
Fluorene	0.99	0.48	0.37	1.8	4.7
Phenanthrene	4.1	2.3	3.3	14	15
Anthracene	0.0017	0.032	0.12	0.45	0.64
1Methylfluorene	0.67	0.48	2.5	0.69	1.3
Dibenzothiophene	0.32	0.37	0.41	1.5	2.0
4,5-Methylenephenanthrene	0.50	0.27	0.32	1.0	1.3
Methylphenanthrenes	2.8	2.9	11	9.4	10
Methyldibenzothiophenes	0.26	0.31	0.78	1.1	1.7
Fluoranthene	0.82	0.44	0.30	2.6	2.3
Pyrene	0.25	0.28	0.47	1.2	0.88
3,6-Dimethylphenanthrene	0.096	0.12	1.3	0.55	0.31
Benzo[a]fluorene	0.018	0.036	0.12	0.037	0.073
Benzo[b]fluorene	0.0016	0.0087	0.028	0.012	0.061
Retene	0.011	0.024	0.091	0.044	0.059
Benzo[b]naphtho[2,1-d]thiophene	0.010	0.011	0.0091	0.16	0.026
Cyclopenta[cd]pyrene	0	0	0	0	0
Benz[a]anthracene	0.0040	0.0040	0	0	0
Chrysene/Triphenylene	0.010	0.022	0.072	0.065	0.021
Naphthacene	0	0	0	0	0
Benzo[b+k]fluoranthene	0.0056	0.0056	0	0	0
Benzo[e]pyrene	0.0019	0.0018	0	0	0
Benzo[a]pyrene	0.0006	0.0006	0	0	0
Perylene	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0
Coronene	0	0	0	0	0
Total PAHs	11	8.1	21	35	40
Sample Volume (m^3)	304.9	281.2	278.68	203.4	152.88
Corresponding Laboratory Blank	7/10/98	7/30/98	7/10/98	7/17/98	7/18/98
Surrogate Recoveries (%)					
d10-Anthracene	80%	80%	98%	89%	67%
d10-Fluoranthene	91%	83%	84%	91%	94%
d10-Benzo[e]pyrene	92%	100%	103%	97%	92%

D.3.

Lower Hudson River Estuary Water Particulate Phase PAHs (Raritan Bay: RB-GFF)(New York Harbor: NH-GFF)
Surrogate Corrected Concentrations (ng/L)

PAH	day RB-GFF 7/5/98	day RB-GFF 7/6/98	day RB-GFF 7/7/98	morning NH-GFF 7/10/98	afternoon NH-GFF 7/10/98
Fluorene	0.092	0.10	0.089	0.21	0.65
Phenanthrene	0.37	0.33	0.27	0.94	3.3
Anthracene	0.17	0.17	0.12	0.57	2.3
1Methylfluorene	0.10	0.11	0.11	0.16	0.43
Dibenzothiophene	0.056	0.052	0.040	0.15	0.52
4,5-Methylenephenanthrene	0.18	0.13	0.079	0.40	1.4
Methylphenanthrenes	0.82	0.76	0.61	1.5	6.8
Methyldibenzothiophenes	0.083	0.072	0.057	0.20	0.67
Fluoranthene	0.67	0.62	0.37	2.1	6.2
Pyrene	0.62	0.58	0.35	2.3	7.6
3,6-Dimethylphenanthrene	0.068	0.069	0.041	0.21	0.60
Benzo[a]fluorene	0.36	0.38	0.23	1.5	5.5
Benzo[b]fluorene	0.13	0.15	0.080	0.52	2.2
Retene	0.073	0.079	0.12	0.39	1.3
Benzo[b]naphtho[2,1-d]thiophene	0.021	0.045	0.032	0.13	0.45
Cyclopenta[cd]pyrene	0.042	0.062	0.028	0.23	1.0
Benz[a]anthracene	0.27	0.30	0.17	1.2	4.8
Chrysene/Triphenylene	0.42	0.41	0.24	1.6	5.7
Naphthacene	0.024	0.054	0.033	0.066	0.24
Benzo[b+k]fluoranthene	0.85	0.84	0.52	1.7	11
Benzo[e]pyrene	0.48	0.47	0.30	1.7	5.2
Benzo[a]pyrene	0.39	0.40	0.27	1.6	5.5
Perylene	0.43	0.46	0.26	1.5	4.3
Indeno[1,2,3-cd]pyrene	0.94	1.0	0.66	2.8	9.3
Benzo[g,h,i]perylene	0.46	0.51	0.35	1.3	4.4
Dibenzo[a,h+a,c]anthracene	0.24	0.25	0.18	0.75	2.2
Coronene	0.24	0.25	0.16	0.75	2.7
Total PAHs	8.6	8.7	5.8	27	96
Corresponding Laboratory Blank	8/10/98	8/10/98	8/10/98	8/10/98	8/10/98
Volume of Water (L)	35	39	49	30	23
Total Suspended Matter (mg C/L)	5.4	5.7	4.2	3.4	9.6
Surrogate Recoveries (%)					
d10-Anthracene	70%	80%	98%	89%	67%
d10-Fluoranthene	91%	83%	84%	91%	94%
d10-Benzo[e]pyrene	92%	100%	103%	97%	92%

D.4.

Lower Hudson River Estuary Dissolved Phase PAHs (Raritan Bay: RB-XAD)(New York Harbor: NH-XAD)

Surrogate Corrected Concentrations (ng/L)

PAH	day RB-XAD 7/5/98	day RB-XAD 7/6/98	day RB-XAD 7/7/98	morning NH-XAD 7/10/98	afternoon NH-XAD 7/10/98
Fluorene	0.76	0.80	0.59	2.2	2.6
Phenanthrene	0.92	2.4	1.9	5.6	5.5
Anthracene	0.21	0.23	0.20	0.86	1.6
1Methylfluorene	0.37	0.59	0.48	1.2	1.3
Dibenzothiophene	0.14	0.33	0.26	0.77	0.76
4,5-Methylenephenanthrene	0.65	0.96	0.58	4.3	6.2
Methylphenanthrenes	0.99	4.3	3.4	9.4	9.0
Methyldibenzothiophenes	0.24	0.92	0.55	1.9	0.99
Fluoranthene	0.45	1.7	0.78	9.7	14
Pyrene	0.40	1.4	0.73	10	16
3,6-Dimethylphenanthrene	0.099	0.43	0.25	1.0	1.0
Benzo[a]fluorene	0.11	0.40	0.19	3.4	5.6
Benzo[b]fluorene	0.029	0.12	0.048	1.2	2.0
Retene	0.083	0.26	0.19	0.64	0.62
Benzo[b]naphtho[2,1-d]thiophene	0	0	0	0	0
Cyclopenta[cd]pyrene	0.0013	0.0029	0.0085	0.012	0.080
Benz[a]anthracene	0.019	0.065	0.030	0.83	1.6
Chrysene/Triphenylene	0.097	0.24	0.13	1.5	2.4
Naphthacene	0	0	0	0	0
Benzo[b+k]fluoranthene	0.063	0.092	0.055	0.49	0.80
Benzo[e]pyrene	0.060	0.086	0.050	0.310	0.501
Benzo[a]pyrene	0	0	0	0	0
Perylene	0	0	0	0	0
Indeno[1,2,3-cd]pyrene	0	0	0	0	0
Benzo[g,h,i]perylene	0	0	0	0	0
Dibenzo[a,h+a,c]anthracene	0	0	0	0	0
Coronene	0	0	0	0	0
Total PAHs	5.7	15	10	56	72
Corresponding Laboratory Blank	7/28/98	7/28/98	7/28/98	7/28/98	7/28/98
Volume of Water (L)	35	39	49	30	23
Surrogate Recoveries (%)					
d10-Anthracene	76%	85%	95%	98%	88%
d10-Fluoranthene	70%	74%	82%	86%	81%
d10-Benzo[e]pyrene	70%	81%	99%	108%	96%

A.1.
Laboratory Blanks Particulate Phase PAHs (LB-QFF)
Surrogate Corrected Concentrations (ng)

PAH	LB-QFF 10/16/97	LB-QFF 11/5/97	LB-QFF 2/16/98	LB-QFF 3/5/98	LB-QFF 3/11/98	LB-QFF 3/27/98	LB-QFF 5/27/98	LB-QFF 6/1/98	LB-QFF 6/29/98	LB-QFF 7/1/98	LB-QFF 7/15/98
Fluorene	Sample	0.092	0.049	0	0.83	0.67	0.29	0.20	0.070	0.13	0.11
Phenanthrene	Missing	0.29	0.10	0.12	0.40	1.2	0.60	0.50	0.16	0.23	0.24
Anthracene		0.13	0.050	0.33	0.14	0	0.020	0.040	0.080	0.050	0.12
1Methylfluorene		0.019	0.069	0	0.088	0	0.14	0.16	0.020	0.13	0.15
Dibenzothiophene		0.0090	0.018	0.050	0.13	0.011	0.077	0	0.070	0	0.13
4,5-Methylenephenanthrene		0.0060	0.011	0.080	0	0.017	0.050	0.010	0.090	0.060	0.071
Methylphenanthrenes		0.096	0.27	0.010	0.21	0.040	0.56	0.20	0.61	0.56	0.37
Methyldibenzothiophenes		0.022	0.075	0.080	0.040	0.030	0.010	0.020	0.020	0.010	0.15
Fluoranthene		0.052	0.056	0.020	0.090	0.061	0.11	0.061	0.060	0.050	0.23
Pyrene		0.076	0.075	0.013	0.14	0.068	0.12	0.048	0.041	0.029	0.20
3,6-Dimethylphenanthrene		0.018	0.013	0.022	0.010	0.022	0.090	0.020	0.010	0.022	0.040
Benzo[a]fluorene		0.016	0.0030	0.021	0.010	0.019	0.010	0.018	0.020	0.020	0.11
Benzo[b]fluorene		0.0070	0.0090	0.010	0.059	0.030	0.030	0.040	0.034	0.040	0.11
Retene		0.012	0.047	0.020	0.17	0.090	0.070	0.027	0.13	0.042	0.22
Benzo[b]naphtho[2,1-d]thiophene		0.0035	0.012	0.015	0.20	0.013	0.016	0.024	0.020	0.020	0.16
Cyclopenta[cd]pyrene		0.023	0.011	0.040	0.25	0.037	0.025	0.089	0.039	0.080	0.39
Benz[a]anthracene		0.21	0.014	0.12	0.020	0.030	0.041	0.010	0.031	0.020	0.20
Chrysene/Triphenylene		0.031	0.011	0.031	0.042	0.030	0.035	0.019	0.030	0	0.19
Naphthacene		0.031	0.0040	0.022	0.077	0.026	0.010	0.10	0.010	0.040	0.11
Benzo[b+k]fluoranthene		0.059	0.38	0.22	0.050	0.019	0.12	0.078	0.11	0.11	0.26
Benzo[e]pyrene		0.017	0.032	0.032	0.060	0.030	0.020	0.080	0.020	0.070	0.10
Benzo[a]pyrene		0.0070	0.068	0.036	0.021	0.011	0.040	0.069	0.038	0.37	0.10
Perylene		0.0040	0.025	0.023	0.049	0.012	0.039	0.020	0.038	0.10	0.18
Indeno[1,2,3-cd]pyrene		0.013	0.20	0.026	0.010	0.011	0.010	0.033	0.065	0.11	0.0080
Benzo[g,h,i]perylene		0.0040	0.60	0.021	0	0.020	0.014	0.010	0.018	0.031	0.028
Dibenzo[a,h+a,c]anthracene		0.020	0.020	0.020	0.020	0.030	0.038	0.040	0.040	0.077	0.089
Coronene		0.0050	0.69	0.010	0.011	0.020	0.040	0.034	0.031	0.060	0.091
Total PAHs		1.3	2.9	1.4	3.1	2.5	2.6	2.0	1.9	2.5	4.2
Surrogate Recoveries (%)											
d10-Anthracene		33%	12%	103%	102%	62%	57%	41%	3%	69%	74%
d10-Fluoranthene		69%	22%	85%	88%	69%	72%	79%	46%	65%	63%
d10-Benzo[e]pyrene		95%	49%	98%	99%	85%	101%	99%	101%	86%	61%

A.1.
Laboratory Blanks Particulate Phase PAHs (LB-QFF)
Surrogate Corrected Concentrations (ng)

PAH	LB-QFF 7/17/98	LB-QFF 7/19/98	LB-QFF 7/24/98	LB-QFF 8/6/98	LB-QFF 9/14/98	LB-QFF 9/18/98	LB-QFF 9/24/98	LB-QFF 10/15/98	LB-QFF 10/19/98	LB-QFF 1/4/99	LB-QFF 2/9/99
Fluorene	0.030	0.18	0.23	0.36	0.72	0.66	1.2	0.30	0.030	0.11	0.088
Phenanthrene	0.84	0.61	0.45	0.51	1.6	1.3	1.3	0.53	0.49	84	13
Anthracene	0.090	0.030	0	0.11	0.15	0.25	0.030	0.085	0.011	0.19	0.15
1Methylfluorene	0.10	0.068	0.014	0.26	0.65	0.020	0.34	0.011	0.012	0.25	0.20
Dibenzothiophene	0.010	0.017	0.016	0.050	0.10	0.023	0.44	0	0.30	0.029	0.029
4,5-Methylenephenanthrene	0.030	0.022	0.010	0.010	0.23	0.010	0	0.010	0	0.018	0.018
Methylphenanthrenes	0.27	0.160	0.092	0.092	1.0	0.11	0.11	0.063	0.053	0.15	0.15
Methyldibenzothiophenes	0.069	0.011	0.010	0.020	0.49	0.030	0.078	0.020	0.093	0.016	0.016
Fluoranthene	0.24	0.100	0.020	0.14	0.17	0.18	0.21	0.14	0.11	0.12	0.12
Pyrene	0.22	0.066	0.030	0.12	0.13	0.080	0.15	0.090	0.087	0.087	0.087
3,6-Dimethylphenanthrene	0.030	0.038	0.010	0.011	0.030	0.010	0.020	0.011	0.0023	0.036	0.036
Benzo[a]fluorene	0.010	0.032	0	0.010	0.039	0.010	0.012	0.010	0.0024	0.013	0.013
Benzo[b]fluorene	0.010	0.010	0.010	0.010	0.058	0.010	0.013	0.011	0.015	0.012	0.012
Retene	0.080	0.010	0.020	0.051	0.060	0.030	0.036	0.022	0.011	0.88	0.88
Benzo[b]naphtho[2,1-d]thiophene	0.10	0.024	0.020	0.099	0.10	0.017	0.020	0.013	0.015	0.017	0.015
Cyclopenta[cd]pyrene	0.14	0.060	0.050	0.11	0.17	0.018	0.090	0.020	0.013	0.0030	0.029
Benz[a]anthracene	0.17	0.020	0	0.039	0.050	0.019	0.010	0.010	0.0031	0.012	0.012
Chrysene/Triphenylene	0.022	0.039	0.010	0.11	0.030	0.020	0.020	0	0.0024	0.015	0.015
Naphthacene	0.050	0.159	0.012	0.19	0.18	0.030	0.32	0.040	0.015	0.094	0.094
Benzo[b+k]fluoranthene	0.16	0.030	0.020	0.030	0.13	0.029	0.080	0.010	0.0042	0.062	0.062
Benzo[e]pyrene	0.33	0.052	0.034	0.020	0.040	0.025	0.029	0.019	0.012	0	0
Benzo[a]pyrene	0.32	0.040	0.025	0.039	0.020	0.010	0.13	0.020	0.0042	0.056	0.056
Perylene	0.14	0.027	0.024	0.032	0.020	0.024	0.088	0.010	0.0014	0.018	0.018
Indeno[1,2,3-cd]pyrene	0.030	0.028	0.020	0.010	0.010	0.010	0.010	0.020	0.0010	0.015	0.015
Benzo[g,h,i]perylene	0	0.012	0.011	0.010	0	0.013	0	0.015	0.0003	0.021	0.021
Dibenzo[a,h+a,c]anthracene	0.011	0.020	0.020	0.013	0.012	0.010	0.010	0.010	0.0003	0.016	0.016
Coronene	0.041	0.020	0.021	0.010	0.060	0.022	0.011	0.011	0.0001	0.0093	0.0093
Total PAHs	3.5	1.9	1.2	2.5	6.2	3.0	4.7	1.5	1.3	86	16
Surrogate Recoveries (%)											
d10-Anthracene	73%	87%	66%	77%	6%	89%	69%	76%	74%	103%	92%
d10-Fluoranthene	76%	88%	66%	78%	27%	89%	73%	80%	85%	91%	92%
d10-Benzo[e]pyrene	101%	100%	72%	100%	111%	87%	92%	95%	90%	106%	103%

A.1.
Laboratory Blanks Particulate Phase PAHs (LB-QFF)
Surrogate Corrected Concentrations (ng)

PAH	LB-QFF 2/17/99	LB-QFF 3/2/99	LB-QFF 4/12/99	LB-QFF 4/21/99	LB-QFF 5/18/99	LB-QFF 7/18/99	LB-QFF 7/28/99	LB-QFF 8/3/99	LB-QFF 9/24/99	LB-QFF 10/4/99
Fluorene	0.12	0.10	0.084	0.18	0.041	0.041	0.23	0.10	0.030	0.42
Phenanthrene	87	65	0.49	0.51	0.57	0.67	2.5	0.81	1.7	3.3
Anthracene	0.23	0.18	0.0093	0.49	0.041	0.006	0.036	0.019	0.033	0.11
1Methylfluorene	0.31	0.24	0.013	0.68	0.032	0.066	0.52	0.023	0.21	0.67
Dibenzothiophene	0.026	0.029	0.0037	0.046	0.038	0.048	0.12	0.0049	0.10	0.15
4,5-Methylenephenanthrene	0.018	0.018	0.0079	0.027	0.019	0.021	0.074	0.0064	0.047	0.072
Methylphenanthrenes	0.16	0.15	0.040	0.30	0.11	0.28	1.32	0.032	0.79	1.7
Methyldibenzothiophenes	0.017	0.016	0.015	0.018	0.016	0.0059	0.12	0.0055	0.059	0.094
Fluoranthene	0.13	0.12	0.049	0.21	0.10	0.20	0.23	0.15	0.28	0.25
Pyrene	0.083	0.088	0.050	0.11	0.10	0.081	1.47	0.086	0.26	0.20
3,6-Dimethylphenanthrene	0.042	0.034	0.0063	0.085	0.012	0.023	0.052	0.0042	0.019	0.055
Benzo[a]fluorene	0.012	0.014	0.0041	0.017	0.020	0.0087	0.0044	0.0033	0.11	0.022
Benzo[b]fluorene	0.011	0.012	0.0047	0.016	0.014	0.0076	0.0053	0.0023	0.031	0.011
Retene	1.1	0.83	0.0043	2.4	0.042	0.022	0.013	0.0078	0.018	0.013
Benzo[b]naphtho[2,1-d]thiophene	0.014	0.0081	0.0023	0.031	0.010	0.0060	0.0043	0.024	0.0052	0.0054
Cyclopenta[cd]pyrene	0.0050	0.0071	0.0080	0.031	0.014	0.0022	0.0032	0.0028	0.0040	0.0050
Benz[a]anthracene	0.013	0.012	0.0034	0.024	0.0082	0.0021	0.0030	0.0015	0.022	0.0048
Chrysene/Triphenylene	0.017	0.014	0.0034	0.032	0.0078	0.012	0.24	0.0023	0.064	0.011
Naphthacene	0.056	0.10	0.0063	0.059	0.25	0.014	0.0031	0.0040	0.011	0.012
Benzo[b+k]fluoranthene	0.075	0.059	0.0042	0.16	0.0097	0.0031	0.0053	0.0043	0.0089	0.0034
Benzo[e]pyrene	0	0	0.0074	0.16	0.020	0.17	0.015	0.012	0.012	0.0079
Benzo[a]pyrene	0.064	0.054	0.0067	0.132	0.025	0.15	0.013	0.011	0.0084	0.0071
Perylene	0.019	0.017	0.0048	0.036	0.011	0.0019	0.0029	0.0052	0.0046	0.0045
Indeno[1,2,3-cd]pyrene	0.015	0.015	0.015	0.016	0.015	0.0044	0.0091	0.0049	0.011	0.014
Benzo[g,h,i]perylene	0.024	0.020	0.014	0.039	0.0061	0.0087	0.011	0.0027	0.010	0.0072
Dibenzo[a,h+a,c]anthracene	0.017	0.016	0.0085	0.028	0.0098	0.0045	0.011	0.0027	0.010	0.0090
Coronene	0.0093	0.0093	0.011	0.0075	0.0091	0.0045	0.033	0.0048	0.014	0.046
Total PAHs	90	67	0.87	5.9	1.6	1.9	7.0	1.3	3.8	7.2
Surrogate Recoveries (%)										
d10-Anthracene	100%	72%	62%	85%	90%	69%	67%	78%	65%	42%
d10-Fluoranthene	97%	88%	92%	88%	80%	88%	83%	88%	88%	77%
d10-Benzo[e]pyrene	105%	93%	97%	92%	94%	94%	85%	93%	110%	85%

A.2.
Laboratory Blanks Gas Phase PAHs (LB-PUF)
Surrogate Corrected Concentrations (ng)

PAH	LB-PUF 10/14/97	LB-PUF 10/22/97	LB-PUF 10/28/97	LB-PUF 11/9/97	LB-PUF 2/16/98	LB-PUF 3/5/98	LB-PUF 3/10/98	LB-PUF 3/18/98	LB-PUF 5/23/98	LB-PUF 5/26/98	LB-PUF 6/15/98
Fluorene	1.9	2.1	0.058	0.11	1.2	0.56	0.013	0.37	0.011	0	3.8
Phenanthrene	2.6	3.8	0.058	0.16	1.8	0.86	0.28	0.74	0.31	0.29	6.5
Anthracene	0.010	0.040	0.066	0.030	0.15	0.21	0.36	0.010	0.010	0	0.029
1Methylfluorene	0.075	0.010	0.076	0.060	0.080	0.22	0.16	0.22	0.082	0.055	0.94
Dibenzothiophene	NQ	NQ	NQ	NQ	0.11	0.060	0.031	0.010	0.0034	0.029	0.29
4,5-Methylenephenanthrene	0.040	18	0.010	0.020	0.19	0.044	0.073	0.040	0.010	0.012	0.068
Methylphenanthrenes	0.090	14	0.020	0.010	0.040	0.052	0.10	0.062	0.23	0.35	1.2
Methyldibenzothiophenes	NQ	NQ	0.010	0.067	0	0.13	0.003	0.090	0.025	0.020	0.21
Fluoranthene	0.62	0.71	0.164	0.20	0.22	0.12	0.050	0.11	0.030	0.010	0.56
Pyrene	0.30	0.39	0.303	0.082	0.13	0.072	0.010	0.090	0.017	0.014	0.27
3,6-Dimethylphenanthrene	0.011	0.020	0.601	0.060	0.019	0.054	0.059	0.070	0.040	0.030	0.063
Benzo[a]fluorene	0.10	0.063	0.080	0.038	0.013	0.010	0.010	0.040	0.080	0.054	0.044
Benzo[b]fluorene	0.010	0.034	0.060	0.050	0.022	0.010	0	0.020	0.050	0.020	0.020
Retene	0.13	0.11	0.11	0.21	0.20	0	1.3	0.13	0.25	0.39	0.19
Benzo[b]naphtho[2,1-d]thiophene	NQ	NQ	0	0.017	0.019	0.0026	0.024	0.013	0.016	0.012	0.020
Cyclopenta[cd]pyrene	NQ	NQ	0	0.040	0.0084	0.010	0.040	0.040	0.0054	0.0085	0.0051
Benz[a]anthracene	0.020	0.090	0	0.015	0.034	0.022	0.015	0.020	0.19	0.019	0.032
Chrysene/Triphenylene	0.054	0.041	0	0.014	0.020	0.010	0.010	0.060	0.14	0.079	0.037
Naphthacene	0.018	0.020	0	0.030	0.013	0.033	0.030	0.23	0.010	0.010	0.12
Benzo[b+k]fluoranthene	0.019	0.32	0	0.080	0.010	0.024	0.022	0.030	0.43	0.071	0.082
Benzo[e]pyrene	0.072	0.13	0	0.020	0.030	0.058	0.069	0.20	0.56	0.030	0.34
Benzo[a]pyrene	0.30	0.17	0	0.014	0.010	0.020	0.030	0.019	0.18	0.21	0.49
Perylene	0.010	0.022	0	0.010	0.024	0.013	0.029	0.010	0.44	0.082	0.40
Indeno[1,2,3-cd]pyrene	0.020	0.010	0	0.019	0.010	0.010	0.019	0.011	0.030	0.027	0.010
Benzo[g,h,i]perylene	0.010	0.023	0	0.010	0.020	0.014	0.020	0.013	0.063	0.11	0.020
Dibenzo[a,h+a,c]anthracene	0.011	0.023	0	0.012	0	0.012	0	0.010	0.010	0.031	0.030
Coronene	0.012	0.060	0	0.011	0.043	0.019	0	0.020	0.080	0.11	0.065
Total PAHs	6.4	40	1.6	1.4	4.4	2.6	2.7	2.7	3.3	2.1	16
Surrogate Recoveries (%)											
d10-Anthracene	59%	64%	88%	91%	87%	81%	102%	87%	88%	85%	50%
d10-Fluoranthene	125%	89%	101%	101%	91%	85%	73%	88%	78%	88%	74%
d10-Benzo[e]pyrene	106%	101%	100%	104%	98%	89%	39%	92%	79%	96%	100%

A.2.
Laboratory Blanks Gas Phase PAHs (LB-PUF)
Surrogate Corrected Concentrations (ng)

PAH	LB-PUF 7/2/98	LB-PUF 7/10/98	LB-PUF 7/12/98	LB-PUF 7/15/98	LB-PUF 7/17/98	LB-PUF 7/18/98	LB-PUF 7/30/98	LB-PUF 8/20/98	LB-PUF 8/31/98	LB-PUF 9/8/98	LB-PUF 9/30/98
Fluorene	0.014	0.080	0.88	0.40	0.26	1.2	0.21	0.49	0.98	0.70	0.80
Phenanthrene	0.35	0.060	1.5	0.16	0.67	2.3	0.62	0.84	0.91	0.087	2.0
Anthracene	0.040	0.038	0.050	0.023	0.040	0.030	0.090	0.040	0.33	0.029	0.43
1Methylfluorene	0.13	0.35	0.020	1.9	0.12	1.3	0.070	0.15	0.19	0.019	0.059
Dibenzothiophene	0.030	0.1	0.11	0.47	0.11	0.21	0	0.054	0.28	1.4	0.18
4,5-Methylenephenanthrene	0.020	0.050	0.030	0.010	0.050	0.080	0.018	0.050	0.90	0.020	0.010
Methylphenanthrenes	0.41	0.030	0.51	0.13	1.2	0.71	1.5	0.20	11	0.080	0.80
Methyldibenzothiophenes	0.033	0.17	0.11	0.010	0.040	0.25	0.046	0.060	0.94	0.010	0.20
Fluoranthene	0.040	0.22	0.27	1.4	0.11	0.13	0.13	0.24	0.13	0.26	0.22
Pyrene	0.010	0.10	0.19	0.93	0.072	0.079	0.070	0.21	0.060	0.19	0.18
3,6-Dimethylphenanthrene	0.061	0.033	0.090	0.090	0.039	0.11	0.020	0.080	0.11	0	0.022
Benzo[a]fluorene	0.010	0	0.032	0.030	0.033	0.020	0.040	0.030	0	0.010	0
Benzo[b]fluorene	0.040	0.010	0.040	0.010	0.042	0.040	0.028	0	0.030	0.020	0.020
Retene	0.050	0.15	0.56	0.040	0.040	0.11	0.015	0.030	0.61	0.17	0.040
Benzo[b]naphtho[2,1-d]thiophene	0.099	0.0098	0.019	0.013	0.018	0.0085	0.019	0.015	0.013	0.10	0.10
Cyclopenta[cd]pyrene	0.43	0.010	0.0028	0.94	0.043	0.019	0.099	0.024	0.039	0.21	0.37
Benz[a]anthracene	0.050	0.024	0.014	0.010	0.030	0	0.016	0.039	0	0.058	0.040
Chrysene/Triphenylene	0.040	0.020	0.050	0.018	0.028	0	0.020	0.14	0	0.090	0.059
Naphthacene	0.44	0.032	0.43	0.020	0.040	0.055	0.18	0.19	0.040	0.11	0.11
Benzo[b+k]fluoranthene	0.11	0.036	0.054	0.011	0.042	0.010	0.010	0.040	0.030	0.080	0.11
Benzo[e]pyrene	0.61	0.020	0.040	0.070	0.020	0.040	0.011	0.060	0.20	0.020	0.17
Benzo[a]pyrene	0.30	0.010	0.030	0.040	0.029	0.080	0.010	0.050	0.020	0.050	0.14
Perylene	0.31	0.025	0.013	0.12	0.010	0.050	0.022	0.040	0.028	0.15	0.17
Indeno[1,2,3-cd]pyrene	0.024	0.012	0.010	0.090	0.010	0.066	0	0.010	0.010	0.010	0.010
Benzo[g,h,i]perylene	0.020	0.012	0	0.070	0.010	0.020	0.010	0	0.010	0	0
Dibenzo[a,h+a,c]anthracene	0.030	0.010	0	0.12	0.020	0.010	0	0.020	0	0.010	0.024
Coronene	0.050	0.013	0	0.31	0.0020	0.12	0.010	0.023	0.016	0.049	0.019
Total PAHs	3.8	1.6	5.1	7.4	3.1	7.0	3.3	3.1	17	3.9	6.3
Surrogate Recoveries (%)											
d10-Anthracene	33%	80%	81%	102%	72%	74%	72%	67%	81%	80%	75%
d10-Fluoranthene	92%	80%	82%	86%	82%	78%	79%	73%	83%	81%	78%
d10-Benzo[e]pyrene	96%	80%	89%	101%	100%	85%	101%	96%	88%	99%	88%

A.2.

Laboratory Blanks Gas Phase PAHs (LB-PUF)

Surrogate Corrected Concentrations (ng)

PAH	LB-PUF 10/21/98	LB-PUF 11/24/98	LB-PUF 1/5/99	LB-PUF 2/8/99	LB-PUF 2/15/99	LB-PUF 2/24/99	LB-PUF 3/8/99	LB-PUF 4/14/99	LB-PUF 6/15/99	LB-PUF 7/12/99	LB-PUF 7/27/99
Fluorene	0.17	0.62	5.4	0	0	0.15	0.062	0.20	1.0	0.48	0.25
Phenanthrene	0.56	2.8	74	79	67	72	64	0.83	1.4	2.0	2.0
Anthracene	0.010	0.031	0.047	0.048	0.052	0.046	0.047	0.047	0.044	0.060	0.050
1Methylfluorene	0	0.011	1.7	0	0	0.014	0.056	0.36	0.077	0.13	0.50
Dibenzothiophene	0.041	0.34	0.093	0.090	0.090	0.020	0.095	0.019	0.24	0.015	0.072
4,5-Methylenephenanthrene	0	0.080	0.063	0.056	0.056	0.091	0.13	0.021	0.022	0.016	0.016
Methylphenanthrenes	0.72	2.0	1109	32	0	61	17	67	255	17	11
Methyldibenzothiophenes	0.13	0.36	0.11	0.094	0.094	0.015	0.014	0.25	0.17	0.057	0.019
Fluoranthene	0.092	1.7	0.85	0.16	0.16	0.16	0.15	0.11	0.26	0.22	0.12
Pyrene	0.10	0.88	0.55	0.13	0.13	0.13	0.082	0.099	0.23	0.14	0.098
3,6-Dimethylphenanthrene	0.010	0.15	0.043	0.046	0.046	0.013	0.13	0.015	0.0068	0.0069	0.062
Benzo[a]fluorene	0.0011	0.011	0.026	0.024	0.024	0.024	0.015	0.0085	0.064	0.0082	0.0083
Benzo[b]fluorene	0.010	0.0001	0.013	0.013	0.013	0.0092	0.011	0.0081	0.027	0.0045	0.010
Retene	0.022	0.32	0.043	0.046	0.046	0.014	0.039	0.025	0.086	0.67	0.066
Benzo[b]naphtho[2,1-d]thiophene	0.016	0.011	0.0037	0.017	0.0056	0.012	n/a	0.0069	0.015	0.0082	0.0070
Cyclopenta[cd]pyrene	0.030	0.012	0.0060	0.00070	0.020	0.0058	0.020	0.011	0.0057	0.0071	0.0093
Benz[a]anthracene	0.0030	0.0042	0.0051	0.0050	0.0050	0.0025	0.011	0.0032	0.0037	0.0028	0.0046
Chrysene/Triphenylene	0.0021	0.0040	0.0052	0.0052	0.0052	0.0055	0.0092	0.0033	0.0029	0.0022	0.0051
Naphthacene	0.010	0.0001	0.010	0.0100	0.010	0.0071	0.0072	0.014	0.012	0.011	0.0093
Benzo[b+k]fluoranthene	0.0041	0.0045	0.030	0.026	0.026	0.0045	0.11	0.0039	0.0051	0.0037	0.0056
Benzo[e]pyrene	0.0021	0.0002	0	0	0	0.012	0.20	0.019	0.018	0.012	0.016
Benzo[a]pyrene	0.0031	0.0003	0.058	0.052	0.052	0.012	0.20	0.0099	0.020	0.0098	0.015
Perylene	0.0001	0.0001	0.014	0.013	0.013	0.0068	0.039	0.0068	0.0075	0.0051	0.0061
Indeno[1,2,3-cd]pyrene	0.0001	0.0001	0.0088	0.0089	0.0089	0.0052	0.017	0.0040	0.0086	0.0076	0.0091
Benzo[g,h,i]perylene	0	0.0001	0.0083	0.0075	0.0075	0.017	0.0072	0.0030	0.0079	0.0034	0.0029
Dibenzo[a,h+a,c]anthracene	0	0.0002	0.013	0.013	0.013	0.025	0.016	0.0043	0.0065	0.0044	0.011
Coronene	0	0.0002	0.0081	0.0079	0.0079	0.012	0.0082	0.0052	0.0078	0.0061	0.0068
Total PAHs	1.9	9.3	1192	113	68	135	83	69	259	20	15
Surrogate Recoveries (%)											
d10-Anthracene	54%	74%	81%	84%	62%	101%	86%	106%	123%	96%	97%
d10-Fluoranthene	41%	81%	88%	79%	65%	89%	78%	92%	87%	77%	88%
d10-Benzo[e]pyrene	65%	85%	84%	71%	90%	96%	84%	96%	101%	79%	91%

A.2.

Laboratory Blanks Gas Phase PAHs (LB-PUF)

Surrogate Corrected Concentrations (ng)

PAH	LB-PUF 8/16/99	LB-PUF 9/7/99	LB-PUF 9/29/99
Fluorene	0.093	2.1	1.8
Phenanthrene	7.98	4.4	3.2
Anthracene	0.03	0.02	0.41
1Methylfluorene	0.25	0.40	0.70
Dibenzothiophene	0.040	0.38	0.24
4,5-Methylenephenanthrene	0.072	0.18	0.10
Methylphenanthrenes	2.2	33	2.0
Methyldibenzothiophenes	0.038	0.046	0.19
Fluoranthene	0.23	0.30	0.28
Pyrene	0.25	0.18	0.16
3,6-Dimethylphenanthrene	0.02	0.04	0.16
Benzo[a]fluorene	0.011	0.11	0.011
Benzo[b]fluorene	0.0055	0.021	0.0081
Retene	0.28	0.28	0.34
Benzo[b]naphtho[2,1-d]thiophene	0.0081	0.23	0.018
Cyclopenta[cd]pyrene	0.0045	0.0081	0.019
Benz[a]anthracene	0.0060	0.0032	0.074
Chrysene/Triphenylene	0.010	0.0043	0.092
Naphthacene	0.0050	0.010	0.012
Benzo[b+k]fluoranthene	0.039	0.0020	0.0017
Benzo[e]pyrene	0.033	0.013	0.0022
Benzo[a]pyrene	0.022	0.014	0.0019
Perylene	0.0053	0.0030	0.0025
Indeno[1,2,3-cd]pyrene	0.0066	0.016	0.042
Benzo[g,h,i]perylene	0.0065	0.011	0.0063
Dibenzo[a,h+a,c]anthracene	0.0058	0.015	0.23
Coronene	0.0057	0.052	0.16
Total PAHs	12	42	10
Surrogate Recoveries (%)			
d10-Anthracene	81%	82%	66%
d10-Fluoranthene	91%	87%	86%
d10-Benzo[e]pyrene	100%	99%	106%

A.3.

Laboratory Blanks PAHs in Precipitation (LB-Precip)

Surrogate Corrected Concentrations (ng)

PAH	LB-Precip 6/10/98	LB-Precip 9/1/98	LB-Precip 9/28/98	LB-Precip 10/8/98	LB-Precip 11/11/98	LB-Precip 3/30/99	LB-Precip 4/27/99	LB-Precip 6/21/99	LB-Precip 7/13/99	LB-Precip 8/19/99
Fluorene	0.36	0.099	0.24	0.22	0.42	0.50	0.24	0.19	0.30	1.07
Phenanthrene	1.1	1.0	1.0	2.9	3.2	6.6	7.0	6.7	66.14	55.24
Anthracene	0.048	0.23	0.041	0.12	0.42	1.2	0.91	0.64	1.02	7.65
1Methylfluorene	4.0	1.0	5.0	2.7	3.2	3.0	5.0	3.6	4.03	2.27
Dibenzothiophene	0.13	0.060	0.0010	0.040	0.023	0.030	0.020	0.012	0.09	0.49
4,5-Methylenephenanthrene	0.070	0.10	0.062	0.12	0.36	0.16	0.16	0.0060	0.04	0.23
Methylphenanthrenes	0.91	1.7	0.036	1.1	0.47	0.69	0.72	0.084	0.63	6.87
Methyldibenzothiophenes	0.048	0.021	0.35	0.0035	0.13	0.025	0.0077	0.010	0.01	0.89
Fluoranthene	0.23	0.41	0.17	0.58	0.34	0.61	0.27	0.22	0.23	0.95
Pyrene	0.24	0.46	0.11	0.044	0.10	0.49	0.15	0.16	0.09	0.59
3,6-Dimethylphenanthrene	0.049	0.023	0.0056	0.036	0.10	0.14	0.11	0.0049	0.18	0.18
Benzo[a]fluorene	0.0054	0.015	0.034	0.017	0.020	0.10	0.012	0.0056	0.02	0.02
Benzo[b]fluorene	0.0094	0.087	0.033	0.016	0.015	0.053	0.011	0.0060	0.03	0.01
Retene	0.099	0.026	0.0070	0.093	0.023	0.15	0.031	0.0597	0.10	0.43
Benzo[b]naphtho[2,1-d]thiophene	0.024	0.023	0.0046	0.026	0.023	0.043	NA	0.060	0.11	0.07
Cyclopenta[cd]pyrene	0.036	0.038	0.0043	0.037	0.036	0.039	0.015	0.0058	0.01	0.03
Benz[a]anthracene	0.074	0.045	0.0083	0.011	0.022	0.068	0.015	0.0081	0.01	0.05
Chrysene/Triphenylene	0.075	0.45	0.031	0.068	0.0086	0.047	0.026	0.0061	0.01	0.18
Naphthacene	0.025	0.020	0.017	0.032	0.017	0.015	0.0029	0.012	0.02	0.04
Benzo[b+k]fluoranthene	0.043	0.95	0.74	0.17	0.0042002	0.24	0.0055	0.017	0.00	0.00
Benzo[e]pyrene	0.075	1.6	3.5	0.26	0.014	0.87	0.25	2.9	0.05	0.01
Benzo[a]pyrene	0.014	0.45	0.21	0.41	0.019	0.033	0.18	0.39	0.03	0.00
Perylene	0.067	0.90	0.97	0.44	0.59	0.86	0.46	2.0	0.03	0.00
Indeno[1,2,3-cd]pyrene	0.012	0.055	0.032	0.021	0.098	0.035	0.013	0.048	0.03	0.02
Benzo[g,h,i]perylene	0.075	0.0085	0.0067	0.038	0.024	0.065	0.0061	0.018	0.06	0.01
Dibenzo[a,h+a,c]anthracene	0.041	0.027	0.023	0.0057	0.0039	0.088	0.0095	0.014	0.03	0.00
Coronene	0.010	0.054	0.0056	0.0099	0.013	0.050	0.0066	0.0038	0.03	0.03
Total PAHs	8	10	13	10	10	16	16	17	73	77
Surrogate Recoveries (%)										
d10-Anthracene	52%	70%	70%	75%	82%	78%	78%	91%	65%	75%
d10-Fluoranthene	66%	77%	79%	84%	70%	78%	77%	85%	83%	82%
d10-Benzo[e]pyrene	96%	86%	98%	96%	94%	93%	88%	111%	94%	105%

A.4.
Laboratory Blanks PAHs Particulate Phase In Water (LB-GFF)
Surrogate Corrected Concentrations (ng)

PAH	LB-GFF 8/10/98
Fluorene	0.35
Phenanthrene	0.75
Anthracene	0.048
1Methylfluorene	0.43
Dibenzothiophene	0.16
4,5-Methylenephenanthrene	0.053
Methylphenanthrenes	0.85
Methyldibenzothiophenes	0.15
Fluoranthene	0.32
Pyrene	0.10
3,6-Dimethylphenanthrene	0.12
Benzo[a]fluorene	0.063
Benzo[b]fluorene	0
Retene	0.15
Benzo[b]naphtho[2,1-d]thiophene Cyclopenta[cd]pyrene	0
Benz[a]anthracene	0.14
Chrysene/Triphenylene	0
Naphthacene	0
Benzo[b+k]fluoranthene	0
Benzo[e]pyrene	0
Benzo[a]pyrene	0
Perylene	0
Indeno[1,2,3-cd]pyrene	0
Benzo[g,h,i]perylene	0
Dibenzo[a,h+a,c]anthracene	0
Coronene	0
Total PAHs	3.7
Surrogate Recoveries (%)	
d10-Anthracene	86%
d10-Fluoranthene	83%
d10-Benzo[e]pyrene	101%

A.5.

Laboratory Blanks PAHs Dissolved Phase In Water (LB-XAD)
Surrogate Corrected Concentrations (ng)

PAH	LB-XAD 7/28/98
Fluorene	7.1
Phenanthrene	30
Anthracene	2.1
1Methylfluorene	13
Dibenzothiophene	1.7
4,5-Methylenephenanthrene	2.2
Methylphenanthrenes	69
Methyldibenzothiophenes	11
Fluoranthene	22
Pyrene	3.3
3,6-Dimethylphenanthrene	1.8
Benzo[a]fluorene	8.2
Benzo[b]fluorene	0.48
Retene	4.5
Benzo[b]naphtho[2,1-d]thiophene Cyclopenta[cd]pyrene	11
Benz[a]anthracene	0
Chrysene/Triphenylene	7.0
Naphthacene	0
Benzo[b+k]fluoranthene	1.6
Benzo[e]pyrene	0
Benzo[a]pyrene	0.87
Perylene	0
Indeno[1,2,3-cd]pyrene	0
Benzo[g,h,i]perylene	0.37
Dibenzo[a,h+a,c]anthracene	0
Coronene	0
Total PAHs	197
Surrogate Recoveries (%)	
d10-Anthracene	70%
d10-Fluoranthene	67%
d10-Benzo[e]pyrene	76%

B.1.

Matrix Spikes Particulate Phase PAHs (MS-QFF)

Surrogate Corrected Concentrations (ng)

PAH	MS-QFF 3/11/98	MS-QFF 6/1/98	MS-QFF 7/1/98	MS-QFF 7/28/98	MS-QFF 9/14/98	MS-QFF 9/24/98	MS-QFF 10/19/98	MS-QFF 2/17/99	MS-QFF 7/28/99	MS-QFF 10/4/99
Fluorene	81.92%	29.18%	35.37%	Sample	54.11%	10.01%	68.22%	78.94%	13.01%	70.14%
Phenanthrene	87.82%	36.86%	36.75%	Missing	43.86%	14.17%	72.78%	87.70%	81.35%	82.74%
Anthracene	91.73%	33.48%	34.25%		48.82%	14.10%	76.05%	83.12%	71.84%	72.77%
1Methylfluorene	93.62%	36.26%	29.05%		40.24%	14.53%	81.20%	82.81%	75.04%	75.53%
Dibenzothiophene	81.43%	32.84%	25.07%		40.26%	7.81%	79.57%	86.48%	77.42%	82.80%
4,5-Methylenephenanthrene	99.09%	40.89%	44.02%		49.40%	13.27%	45.02%	83.16%	77.01%	74.76%
Methylphenanthrenes	88.36%	29.76%	43.08%		61.83%	13.01%	62.26%	91.39%	57.00%	72.36%
Methyldibenzothiophenes	NA	NA	NA		NA	NA	NA	NA	77.42%	82.80%
Fluoranthene	87.07%	33.43%	60.41%		74.10%	22.84%	77.94%	91.41%	85.95%	84.91%
Pyrene	85.40%	36.62%	62.89%		84.66%	20.92%	78.47%	92.90%	84.83%	85.57%
3,6-Dimethylphenanthrene	78.90%	38.94%	66.29%		97.80%	14.40%	75.74%	86.61%	82.38%	77.69%
Benzo[a]fluorene	84.04%	31.52%	65.59%		91.23%	31.75%	57.83%	88.68%	85.78%	85.28%
Benzo[b]fluorene	80.44%	26.55%	66.22%		88.76%	30.36%	59.82%	84.86%	82.96%	80.05%
Retene	86.86%	24.81%	64.32%		86.04%	26.32%	67.98%	95.76%	87.87%	89.11%
Benzo[b]naphtho[2,1-d]thiophene	86.45%	23.34%	67.98%		91.00%	26.50%	69.45%	95.69%	84.14%	94.18%
Cyclopenta[cd]pyrene	86.27%	22.16%	68.76%		91.75%	26.54%	70.24%	87.69%	6.55%	12.37%
Benz[a]anthracene	82.32%	24.98%	61.07%		85.86%	27.80%	36.69%	88.84%	74.19%	80.48%
Chrysene/Triphenylene	103.59%	31.71%	54.84%		84.17%	37.96%	74.67%	100.31%	86.85%	89.72%
Naphthacene	NA	NA	NA		NA	NA	NA	NA	6.79%	0.00%
Benzo[b+k]fluoranthene	77.35%	35.61%	65.19%		81.94%	58.00%	61.64%	97.93%	80.45%	87.35%
Benzo[e]pyrene	78.41%	40.32%	85.26%		87.33%	52.21%	81.27%	102.91%	87.70%	89.64%
Benzo[a]pyrene	81.99%	32.09%	77.25%		89.80%	49.36%	67.34%	96.32%	42.50%	68.69%
Perylene	84.11%	34.77%	75.68%		89.67%	49.74%	66.75%	100.43%	28.75%	47.61%
Indeno[1,2,3-cd]pyrene	69.15%	35.26%	82.00%		104.26%	66.90%	129.17%	72.70%	49.28%	58.39%
Benzo[g,h,i]perylene	70.14%	38.07%	82.87%		97.13%	50.81%	57.88%	97.73%	73.89%	72.37%
Dibenzo[a,h+a,c]anthracene	69.88%	37.23%	84.17%		92.55%	53.74%	47.95%	92.46%	79.30%	67.99%
Coronene	68.44%	39.02%	87.60%		80.68%	57.94%	31.99%	89.14%	74.11%	67.91%
Corresponding Laboratory Blank	3/11/98	6/1/98	7/1/98	7/28/98	9/14/98	9/24/98	10/19/98	2/17/99	7/28/99	10/4/99
Surrogate Recoveries (%)										
d10-Anthracene	95%	33%	30%		49%	22%	79%	85%	66%	69%
d10-Fluoranthene	90%	36%	67%		90%	28%	76%	90%	82%	87%
d10-Benzo[e]pyrene	73%	43%	85%		102%	59%	79%	101%	85%	94%

B.2.
Matrix Spikes Gas Phase PAHs (MS-PUF)
Surrogate Corrected Concentrations (ng)

PAH	MS-PUF 3/10/98	MS-PUF 3/25/98	MS-PUF 7/2/98	MS-PUF 7/12/98	MS-PUF 7/15/98	MS-PUF 7/18/98	MS-PUF 8/31/98	MS-PUF 2/15/99	MS-PUF 3/8/99	MS-PUF 7/27/99	MS-PUF 9/9/99
Fluorene	50.41%	68.84%	44.34%	69.78%	77.66%	73.52%	40.13%	2.71%	Vial Broke	82.76%	59.96%
Phenanthrene	51.22%	76.01%	59.70%	76.75%	81.19%	72.59%	36.47%	10.44%	Sample	53.97%	72.05%
Anthracene	49.84%	84.47%	58.76%	67.70%	82.66%	72.64%	27.19%	16.05%	Lost	84.90%	67.01%
1Methylfluorene	44.96%	80.91%	53.53%	72.07%	96.44%	75.05%	40.15%	15.13%		82.77%	67.26%
Dibenzothiophene	35.58%	87.46%	58.84%	49.27%	88.93%	55.39%	31.59%	1.38%		70.19%	53.97%
4,5-Methylenephenanthrene	45.86%	89.75%	55.77%	69.52%	84.07%	69.01%	43.96%	21.11%		85.14%	69.35%
Methylphenanthrenes	55.92%	84.65%	56.72%	73.32%	89.99%	75.63%	59.59%	40.81%		85.31%	77.85%
Methyldibenzothiophenes	NA	NA	NA	NA	NA	NA	NA	NA		70.19%	53.97%
Fluoranthene	51.13%	80.01%	56.28%	81.72%	81.87%	68.10%	79.58%	39.87%		82.48%	70.36%
Pyrene	50.29%	80.65%	56.63%	83.01%	84.34%	69.94%	78.59%	39.80%		81.46%	71.19%
3,6-Dimethylphenanthrene	64.26%	94.32%	73.18%	86.33%	97.71%	73.14%	98.37%	39.83%		82.81%	70.11%
Benzo[a]fluorene	40.00%	83.98%	60.73%	68.40%	94.52%	63.23%	83.46%	40.60%		79.54%	73.04%
Benzo[b]fluorene	41.34%	74.40%	65.24%	62.35%	83.58%	62.53%	82.60%	39.08%		82.84%	66.62%
Retene	53.08%	80.01%	55.68%	66.70%	109.24%	57.08%	86.12%	14.01%		81.78%	72.64%
Benzo[b]naphtho[2,1-d]thiophene	59.33%	96.66%	59.72%	85.92%	99.89%	78.12%	85.92%	36.12%		87.96%	82.10%
Cyclopenta[cd]pyrene	62.92%	97.56%	65.57%	85.55%	107.80%	76.81%	81.93%	31.00%		65.62%	80.36%
Benz[a]anthracene	54.99%	83.40%	65.91%	85.80%	88.70%	78.02%	88.70%	37.83%		63.99%	72.72%
Chrysene/Triphenylene	59.22%	90.63%	57.37%	84.16%	93.09%	76.83%	73.99%	39.51%		85.45%	73.65%
Naphthacene	NA	NA	NA	NA	NA	NA	NA	NA		86.19%	39.22%
Benzo[b+k]fluoranthene	47.30%	96.67%	78.62%	82.87%	87.93%	66.58%	74.94%	39.73%		91.47%	75.44%
Benzo[e]pyrene	51.47%	88.07%	79.32%	88.15%	98.11%	83.32%	94.41%	42.47%		84.33%	80.63%
Benzo[a]pyrene	42.01%	84.63%	69.04%	84.82%	110.00%	69.31%	93.92%	41.61%		81.81%	76.85%
Perylene	55.39%	92.21%	79.59%	90.98%	128.73%	77.05%	91.47%	42.05%		84.46%	73.60%
Indeno[1,2,3-cd]pyrene	58.83%	94.03%	73.39%	92.68%	103.18%	77.94%	102.63%	40.62%		90.02%	62.64%
Benzo[g,h,i]perylene	52.36%	93.98%	75.14%	75.03%	96.65%	63.72%	90.62%	39.86%		90.55%	71.30%
Dibenzo[a,h+a,c]anthracene	43.51%	92.69%	53.15%	95.29%	92.90%	61.95%	95.80%	40.21%		78.46%	70.87%
Coronene	59.55%	98.09%	70.31%	83.15%	68.31%	68.60%	89.63%	38.97%		80.02%	60.27%
Corresponding Laboratory Blank										7/27/99	9/9/99
Surrogate Recoveries (%)											
d10-Anthracene	54%	85%	57%	77%	89%	73%	42%	25%		94%	70%
d10-Fluoranthene	56%	89%	65%	81%	98%	78%	82%	40%		82%	74%
d10-Benzo[e]pyrene	58%	103%	77%	94%	96%	92%	92%	43%		86%	83%

B.3.
Matrix Spikes PAHs GF/F (MS-GFF)
Surrogate Corrected Concentrations (ng)

PAH	MS-GFF 9/28/98
Fluorene	70.84%
Phenanthrene	67.39%
Anthracene	72.87%
1Methylfluorene	68.50%
Dibenzothiophene	72.52%
4,5-Methylenephenanthrene	71.96%
Methylphenanthrenes	72.87%
Methyldibenzothiophenes	NA
Fluoranthene	76.67%
Pyrene	76.04%
3,6-Dimethylphenanthrene	83.15%
Benzo[a]fluorene	88.98%
Benzo[b]fluorene	90.70%
Retene	77.27%
Benzo[b]naphtho[2,1-d]thiophene	87.22%
Cyclopenta[cd]pyrene	NA
Benz[a]anthracene	108.26%
Chrysene/Triphenylene	107.37%
Naphthacene	104.46%
Benzo[b+k]fluoranthene	108.76%
Benzo[e]pyrene	66.20%
Benzo[a]pyrene	68.05%
Perylene	61.36%
Indeno[1,2,3-cd]pyrene	64.60%
Benzo[g,h,i]perylene	64.40%
Dibenzo[a,h+a,c]anthracene	61.86%
Coronene	65.61%
Corresponding Laboratory Blank	
Surrogate Recoveries (%)	
d10-Anthracene	74%
d10-Fluoranthene	91%
d10-Benzo[e]pyrene	64%

B.4.
Matrix Spikes PAHs XAD (MS-Precip)
Surrogate Corrected Concentrations (ng)

PAH	MS-XAD 9/28/98
Fluorene	Sample
Phenanthrene	Missing
Anthracene	
1Methylfluorene	
Dibenzothiophene	
4,5-Methylenephenanthrene	
Methylphenanthrenes	
Methyldibenzothiophenes	
Fluoranthene	
Pyrene	
3,6-Dimethylphenanthrene	
Benzo[a]fluorene	
Benzo[b]fluorene	
Retene	
Benzo[b]naphtho[2,1-d]thiophene	
Cyclopenta[cd]pyrene	
Benz[a]anthracene	
Chrysene/Triphenylene	
Naphthacene	
Benzo[b+k]fluoranthene	
Benzo[e]pyrene	
Benzo[a]pyrene	
Perylene	
Indeno[1,2,3-cd]pyrene	
Benzo[g,h,i]perylene	
Dibenzo[a,h+a,c]anthracene	
Coronene	
Total PAHs	
Corresponding Laboratory Blank	
Surrogate Recoveries (%)	
d10-Anthracene	
d10-Fluoranthene	
d10-Benzo[e]pyrene	

C.1.
Field Blanks Particulate Phase PAHs (FB-QFF) (Passive 4days)
Surrogate Corrected Concentrations (ng)

PAH	NB FB-QFF 10/6/97	NB FB-QFF 10/17/97	NB FB-QFF 10/28/97	NB FB-QFF 11/3/97	NB FB-QFF 11/25/97	NB FB-QFF 1/12/98	NB FB-QFF 1/23/98	NB FB-QFF 7/7/98	NB FB-QFF 7/10/98	NB FB-QFF 10/19/98	NB FB-QFF 2/22/99
Fluorene	4.65	0.22	1.1	0.060	0.45	Sample	0.46	0.11	20	0	0.28
Phenanthrene	2.37	0.93	0.26	0.22	2.0	Missing	1.4	0.29	13	0.67	3.0
Anthracene	0.322	0.21	0.15	0.13	0.076		0.090	0.13	0.99	0	0.043
1Methylfluorene	0.761	0.57	0.29	0.21	1.2		0.089	0.28	0.98	0.023	0.026
Dibenzothiophene	NQ	NQ	NQ	0.11	0.28		0.12	0.16	0.56	0.095	0.029
4,5-Methylenephenanthrene	0.323	0.29	0.35	0.23	0.13		0.17	0.28	0.66	0.052	0.096
Methylphenanthrenes	0.389	1.3	2.4	0.36	1.1		1.0	0.85	0.98	0.78	1.5
Methyldibenzothiophenes	NQ	NQ	NQ	0.22	0.13		0.16	0.23	0.56	0.12	0.27
Fluoranthene	0.154	0.87	0.19	0.58	1.1		0.66	0.52	0.29	0.097	3.9
Pyrene	0.249	2.5	0.24	0.42	0.95		0.22	0.48	0.14	0.16	2.9
3,6-Dimethylphenanthrene	0.52	0.20	0.65	0.26	0.11		0.26	0.22	0.14	0.014	0.021
Benzo[a]fluorene	0.287	0.34	0.34	0.12	0.12		0.12	0.23	0.48	0.088	0.24
Benzo[b]fluorene	0.089	0.12	0.13	0.13	0.026		0.15	0.16	0.41	0.012	0.023
Retene	0.87	1.5	0.52	0.41	0.15		0.24	0.54	0.47	0.098	0.24
Benzo[b]naphtho[2,1-d]thiophene	0.24	0.49	0.13	0.099	0.035		0.046	0.14	0.12	0.0069	0.021
Cyclopenta[cd]pyrene	0.11	0.053	NQ	0.23	0.034		0.69	0.23	0.18	0.046	0.051
Benz[a]anthracene	0.454	0.50	0.28	0.092	0.11		0.18	0.56	0.35	0.057	0.15
Chrysene/Triphenylene	0.854	0.77	0.69	0.24	0.37		0.28	0.28	0.30	0.36	1.0
Naphthacene	0.064	0.080	0.040	0.045	0.010		0.040	0.050	0.033	0.040	0.097
Benzo[b+k]fluoranthene	0.211	0.19	0.87	0.33	0.66		0.94	0.52	0.46	1.2	3.2
Benzo[e]pyrene	0.751	0.74	0.56	0.19	0.51		0.72	0.60	0.34	0.29	1.7
Benzo[a]pyrene	0.483	0.53	0.28	0.21	0.25		0.67	0.36	0.42	0.30	0.063
Perylene	0.19	0.16	0.11	0.16	0.025		0.25	0.31	0.21	0.017	0.035
Indeno[1,2,3-cd]pyrene	0.268	0.60	0.35	0.32	0.037		0.16	0.26	1.0	0.013	0.021
Benzo[g,h,i]perylene	0.107	0.64	0.38	0.32	0.31		0.33	0.54	0.35	0.82	2.4
Dibenzo[a,h+a,c]anthracene	0.19	0.16	0.39	0.35	0.010		0.23	0.33	0.54	0.015	0.022
Coronene	0.272	0.29	0.26	0.30	0.19		0.30	0.30	0.85	0.26	0.77
Total PAHs	15	14	11	6.4	10		10	8.9	45	5.6	22
Corresponding Laboratory Blank	10/16/97	11/5/97	11/5/97	3/25/198	2/16/98		3/27/98	7/15/98	7/15/98	2/9/99	4/21/99
Surrogate Recoveries (%)											
d10-Anthracene	36%	82%	70%	83%	79%		85%	82%	59%	100%	67%
d10-Fluoranthene	92%	101%	100%	91%	92%		84%	87%	57%	92%	71%
d10-Benzo[e]pyrene	101%	102%	100%	97%	100%		89%	90%	38%	88%	84%

C.1.
Field Blanks Particulate Phase PAHs (FB-QFF)
Surrogate Corrected Concentrations (ng)

PAH	SH FB-QFF 1/29/98	SH FB-QFF 2/10/98	SH FB-QFF 6/22/98	SH FB-QFF 7/7/98	SH FB-QFF 7/11/98	SH FB-QFF 10/19/98	SH FB-QFF 2/13/99	LS FB-QFF 7/7/98	LS FB-QFF 7/10/98	LS FB-QFF 2/22/99
Fluorene	4.3	0.84	0.19	0.060	1.0	0.50	0.14	3.7	2.0	0.41
Phenanthrene	13	0.94	0.56	0.23	0.85	3.2	1.9	11	11	1.3
Anthracene	2.2	0.32	0.15	0.13	0.23	0.36	0.062	0.23	0.32	0.022
1Methylfluorene	6.1	0.46	0.29	0.21	0.78	0.020	0.029	3.6	1.3	0.014
Dibenzothiophene	9.3	0.32	0.45	0.22	0.12	0.14	0.0043	0.12	0.48	0.25
4,5-Methylenephenanthrene	3.4	0.45	0.22	0.13	0.21	0.068	0.021	0.35	0.50	0.039
Methylphenanthrenes	8.3	0.56	0.65	0.64	0.84	1.0	0.24	0.74	2.2	0.59
Methyldibenzothiophenes	4.8	0.12	0.13	0.28	0.16	0.18	0.013	0.32	0.60	0.087
Fluoranthene	31	0.12	0.011	0.012	0.23	0.41	0.81	0.36	2.1	0.18
Pyrene	24	0.56	0.13	0.11	0.089	0.28	0.41	0.35	1.7	0.17
3,6-Dimethylphenanthrene	3.0	0.23	0.064	0.23	0.58	0.016	0.0080	0.22	0.30	0.012
Benzo[a]fluorene	4.8	0.33	0.078	0.36	0.29	0.13	0.0059	0.36	0.29	0.017
Benzo[b]fluorene	2.0	0.32	0.05	0.12	0.23	0.016	0.0050	0.34	0.11	0.0085
Retene	12	0.89	0.58	0.33	0.72	0.14	0.0067	0.56	0.35	0.047
Benzo[b]naphtho[2,1-d]thiophene	1.2	0.10	0.14	0.10	0.21	0.085	0.0041	0.13	0.10	0.0088
Cyclopenta[cd]pyrene	1.6	0.020	0.012	0.13	0.19	0.032	0.073	0.088	0.16	0.014
Benz[a]anthracene	7.0	0.52	0.4	0.42	0.32	0.081	0.0088	0.37	0.28	0.0087
Chrysene/Triphenylene	15	0.12	0.41	0.56	0.41	0.53	0.0062	0.38	0.44	0.026
Naphthacene	0.27	0.29	0.87	0.34	0.54	0.056	0.0065	0.062	0.020	0.016
Benzo[b+k]fluoranthene	16	0.23	0.24	0.27	0.32	1.6	0.23	0.52	0.87	0.016
Benzo[e]pyrene	13	0.88	0.35	0.4	0.31	0	0.13	0.45	0.91	0.18
Benzo[a]pyrene	10	0.33	0.35	0.56	0.53	0.11	0.11	0.44	0.69	0.15
Perylene	3.5	0.35	0.20	0.06	0.092	0.020	0.012	0.36	0.19	0.0041
Indeno[1,2,3-cd]pyrene	12	0.45	0.31	0.69	0.61	0.013	0.012	0.67	0.36	0.0056
Benzo[g,h,i]perylene	11	0.41	0.32	0.23	0.63	1.2	0.011	0.60	0.32	0.019
Dibenzo[a,h+a,c]anthracene	3.4	0.92	0.35	0.39	0.59	0.018	0.0086	0.65	0.56	0.015
Coronene	6.2	0.54	0.23	0.38	0.37	0.39	0.012	0.32	0.22	0.0060
Total PAHs	229	12	7.7	7.6	11	11	4.3	27	28	3.7
Corresponding Laboratory Blank	2/16/98	3/11/98	7/1/98	7/17/98	7/24/98	2/9/99	4/12/99	7/19/98	8/6/98	4/21/99
Surrogate Recoveries (%)										
d10-Anthracene	78%	82%	91%	73%	64%	100%	64%	3%	84%	71%
d10-Fluoranthene	90%	83%	93%	77%	77%	87%	82%	43%	87%	72%
d10-Benzo[e]pyrene	94%	55%	81%	93%	95%	92%	82%	100%	98%	80%

C.1.
Field Blanks Particulate Phase PAHs (FB-QFF)
Surrogate Corrected Concentrations (ng)

PAH	NH FB-QFF 7/10/98
Fluorene	Sample
Phenanthrene	Missing
Anthracene	
1Methylfluorene	
Dibenzothiophene	
4,5-Methylenephenanthrene	
Methylphenanthrenes	
Methyldibenzothiophenes	
Fluoranthene	
Pyrene	
3,6-Dimethylphenanthrene	
Benzo[a]fluorene	
Benzo[b]fluorene	
Retene	
Benzo[b]naphtho[2,1-d]thiophene	
Cyclopenta[cd]pyrene	
Benz[a]anthracene	
Chrysene/Triphenylene	
Naphthacene	
Benzo[b+k]fluoranthene	
Benzo[e]pyrene	
Benzo[a]pyrene	
Perylene	
Indeno[1,2,3-cd]pyrene	
Benzo[g,h,i]perylene	
Dibenzo[a,h+a,c]anthracene	
Coronene	
Total PAHs	
Corresponding Laboratory Blank	
Surrogate Recoveries (%)	
d10-Anthracene	
d10-Fluoranthene	
d10-Benzo[e]pyrene	

C.2.
Field Blanks Gas Phase PAHs (FB-PUF)
Surrogate Corrected Concentrations (ng)

PAH	NB FB-PUF 10/17/97	NB FB-PUF 10/28/97	NB FB-PUF 11/3/97	NB FB-PUF 11/25/97	NB FB-PUF 12/18/97	NB FB-PUF 1/12/98	NB FB-PUF 7/7/98	NB FB-PUF 7/10/98	NB FB-PUF 10/19/98	NB FB-PUF 2/22/99	SH FB-PUF 1/29/98
Fluorene	0.12	0.72	Sample	1.6	0.81	1.5	0.42	0.71	0.55	0.83	7.8
Phenanthrene	0.23	1.3	Missing	2.3	1.2	2.1	1.1	0.77	1.4	5.1	11
Anthracene	0.24	0.31		1.0	0.36	0.49	0.10	1.1	0.059	0.085	0.41
1Methylfluorene	0.39	0.43		0.41	0.53	0.35	1.9	4.3	0.77	1.1	5.1
Dibenzothiophene	0.090	0.009		0.28	0.26	0.62	0.53	1.2	0.089	0.11	3.1
4,5-Methylenephenanthrene	0.48	0.93		0.63	0.17	0.32	0.043	0.89	0.64	0.63	0.89
Methylphenanthrenes	0.51	0.53		0.40	0.31	0.30	0.42	0.86	29	48	2.1
Methyldibenzothiophenes	0.09	0.067		0.62	0.29	0.090	0.031	0.85	0.045	0.050	2
Fluoranthene	0.12	1.2		0.85	0.76	0.55	1.5	2.3	0.50	0.68	1.3
Pyrene	0.12	1.5		0.75	0.69	0.46	1.0	1.7	0.27	0.41	1.1
3,6-Dimethylphenanthrene	0.44	0.82		0.67	0.33	0.049	0.099	0.16	0.10	0.068	1.3
Benzo[a]fluorene	0.22	0.11		0.42	0.61	0.14	0.12	0.68	0.027	0.031	0.49
Benzo[b]fluorene	0.14	0.10		0.42	0.52	0.065	0.11	0.43	0.015	0.015	0.21
Retene	0.088	0.43		0.27	0.22	0.28	0.16	0.82	0.19	0.19	0.58
Benzo[b]naphtho[2,1-d]thiophene	0.027	0.037		0.054	0.12	0.045	0.42	0.33	0.02	0.058	0.045
Cyclopenta[cd]pyrene	0.0082	0.016		0.18	0.22	0.10	0.53	0.59	0.022	0.024	0.093
Benz[a]anthracene	0.11	0.30		0.37	0.34	0.35	0.10	0.35	0.020	0.021	0.73
Chrysene/Triphenylene	0.028	0.21		0.19	0.53	0.39	0.18	0.22	0.028	0.038	0.65
Naphthacene	0.0037	0.26		0.23	0.45	0.17	0.030	0.12	0.0098	0.014	0.20
Benzo[b+k]fluoranthene	0.024	0.30		0.72	0.21	0.73	0.34	0.40	0.0075	0.015	0.61
Benzo[e]pyrene	0.19	0.21		0.40	0.66	0.55	0.52	0.53	0.14	0.14	0.44
Benzo[a]pyrene	0.11	0.21		0.36	0.43	0.33	0.50	0.50	0.15	0.15	0.47
Perylene	0.17	0.32		0.26	0.32	0.23	0.42	0.35	0.034	0.033	0.54
Indeno[1,2,3-cd]pyrene	0.11	0.23		0.29	3.4	0.20	0.18	0.55	0.017	0.023	0.39
Benzo[g,h,i]perylene	0.30	0.53		0.28	0.31	0.33	0.48	0.92	0.017	0.020	0.37
Dibenzo[a,h+a,c]anthracene	0.12	0.62		0.45	0.53	0.35	0.77	0.68	0.043	0.065	0.75
Coronene	0.18	0.44		0.27	0.48	0.46	0.71	0.86	0.012	0.018	0.39
Total PAHs	4.7	12		15	15	12	13	23	34	58	43
Corresponding Laboratory Blank		11/9/97		3/10/98	3/18/98	2/16/98	7/15/98	7/15/98	11/24/98	3/8/99	2/16/98
Surrogate Recoveries (%)											
d10-Anthracene	75%	86%		89%	66%	75%	100%	102%	97%	63%	78%
d10-Fluoranthene	87%	89%		91%	83%	83%	71%	71%	81%	71%	88%
d10-Benzo[e]pyrene	86%	97%		93%	90%	91%	60%	55%	73%	84%	92%

C.2.
Field Blanks Gas Phase PAHs (FB-PUF)
Surrogate Corrected Concentrations (ng)

PAH	SH FB-PUF 2/10/98	SH FB-PUF 6/22/98	SH FB-PUF 7/7/98	SH FB-PUF 7/11/98	SH FB-PUF 10/19/98	SH FB-PUF 2/13/99	LS FB-PUF 7/7/98	LS FB-PUF 7/10/99	LS FB-PUF 2/22/99	NH FB-PUF 7/10/98
Fluorene	2.6	0.18	1.4	0.66	1.2	2.4	0.34	0.67	0.28	Sample
Phenanthrene	2.6	1.1	3.0	1.4	3.6	6.8	0.97	2.0	1.6	Missing
Anthracene	0.22	0.080	0.20	0.26	0.078	0.12	0.27	0.34	0.033	
1Methylfluorene	1.5	0.29	1.5	0.88	0.87	1.1	0.71	0.58	0.46	
Dibenzothiophene	0.20	0.28	0.57	0.58	0.090	0.092	0.32	0.46	0.070	
4,5-Methylenephenanthrene	0.74	0.48	0.40	0.21	0.51	0.26	0.18	0.28	0.64	
Methylphenanthrenes	0.54	1.2	1.2	1.9	4.3	5.3	0.92	2.2	27	
Methyldibenzothiophenes	0.32	0.24	0.37	0.95	0.035	0.016	0.47	0.24	0.040	
Fluoranthene	0.52	0.37	0.26	0.53	0.42	1.2	0.35	0.39	0.40	
Pyrene	0.72	0.25	0.16	0.48	0.39	0.50	0.21	0.23	0.27	
3,6-Dimethylphenanthrene	0.13	0.19	0.32	0.63	0.11	0.13	0.094	0.23	0.14	
Benzo[a]fluorene	0.070	0.099	0.58	0.29	0.072	0.16	0.32	0.68	0.023	
Benzo[b]fluorene	0.15	0.27	0.58	0.22	0.013	0.0087	0.29	0.58	0.014	
Retene	1.8	0.59	0.86	0.56	0.19	0.18	0.77	0.84	0.19	
Benzo[b]naphtho[2,1-d]thiophene	0.022	0.11	0.099	0.021	0.041	0.018	0.014	0.075	0.020	
Cyclopenta[cd]pyrene	0.035	0.30	0.14	0.087	0.020	0.017	0.015	0.092	0.020	
Benz[a]anthracene	0.044	0.61	0.35	0.35	0.020	0.021	0.45	30	0.019	
Chrysene/Triphenylene	0.053	0.58	0.31	0.39	0.026	0.022	0.43	0.24	0.019	
Naphthacene	0.032	0.52	0.22	0.16	0.0094	0.0084	0.062	0.16	0.0061	
Benzo[b+k]fluoranthene	0.040	0.61	0.45	0.25	0.048	0.13	0.16	0.49	0	
Benzo[e]pyrene	0.26	1.0	0.56	0.14	0.16	0.20	0.44	0.61	0.15	
Benzo[a]pyrene	0.19	0.70	0.62	0.22	0.13	0.10	0.42	0.59	0.14	
Perylene	0.12	0.57	0.51	0.27	0.029	0.020	0.67	0.22	0.034	
Indeno[1,2,3-cd]pyrene	0.40	0.37	0.44	0.42	0.015	0.011	0.74	0.64	0.011	
Benzo[g,h,i]perylene	0.22	0.27	0.34	0.29	0.019	0.025	0.36	0.63	0.013	
Dibenzo[a,h+a,c]anthracene	0.29	0.37	0.52	0.58	0.034	0.017	0.57	0.74	0.021	
Coronene	0.17	0.31	0.43	0.35	0.0093	0.0045	0.47	0.85	0.0051	
Total PAHs	14	12	16	13	12	19	11	45	32	
Corresponding Laboratory Blank	2/16/97	7/2/98	7/18/98	7/17/98	11/24/98	3/8/99	7/8/98	7/17/98	3/8/99	
Surrogate Recoveries (%)										
d10-Anthracene	84%	68%	87%	71%	75%	80%	82%	78%	72%	
d10-Fluoranthene	81%	76%	85%	78%	88%	83%	88%	80%	82%	
d10-Benzo[e]pyrene	87%	84%	100%	97%	90%	89%	96%	102%	92%	

C.3.
Field Blank PAHs Particulate Phase In Water (FB-GFF)
Surrogate Corrected Concentrations (ng)

PAH	FB-GFF July-98
Fluorene	0.35
Phenanthrene	0.75
Anthracene	0.048
1Methylfluorene	0.43
Dibenzothiophene	0.16
4,5-Methylenephenanthrene	0.053
Methylphenanthrenes	0.85
Methyldibenzothiophenes	0.15
Fluoranthene	0.32
Pyrene	0.10
3,6-Dimethylphenanthrene	0.12
Benzo[a]fluorene	0.063
Benzo[b]fluorene	0
Retene	0.15
Benzo[b]naphtho[2,1-d]thiophene	0.087
Cyclopenta[cd]pyrene	0
Benz[a]anthracene	0.14
Chrysene/Triphenylene	0
Naphthacene	0
Benzo[b+k]fluoranthene	0
Benzo[e]pyrene	0
Benzo[a]pyrene	0
Perylene	0
Indeno[1,2,3-cd]pyrene	0
Benzo[g,h,i]perylene	0
Dibenzo[a,h+a,c]anthracene	0
Coronene	0
Total PAHs	3.8
Corresponding Laboratory Blank	8/10/98
Surrogate Recoveries (%)	
d10-Anthracene	86%
d10-Fluoranthene	83%
d10-Benzo[e]pyrene	101%

C.4.

Field Blank PAHs Dissolved Phase In Water (FB-XAD)
Surrogate Corrected Concentrations (ng)

PAH	FB-XAD July-98
Fluorene	7.1
Phenanthrene	30
Anthracene	2.1
1Methylfluorene	13
Dibenzothiophene	1.7
4,5-Methylenephenanthrene	2.2
Methylphenanthrenes	69
Methyldibenzothiophenes	11
Fluoranthene	22
Pyrene	3.3
3,6-Dimethylphenanthrene	1.8
Benzo[a]fluorene	8.2
Benzo[b]fluorene	0.48
Retene	4.5
Benzo[b]naphtho[2,1-d]thiophene	1.0
Cyclopenta[cd]pyrene	11
Benz[a]anthracene	0
Chrysene/Triphenylene	7.0
Naphthacene	0
Benzo[b+k]fluoranthene	1.6
Benzo[e]pyrene	0
Benzo[a]pyrene	0.87
Perylene	0
Indeno[1,2,3-cd]pyrene	0
Benzo[g,h,i]perylene	0.37
Dibenzo[a,h+a,c]anthracene	0
Coronene	0
Total PAHs	198
Corresponding Laboratory Blank	7/28/98
Surrogate Recoveries (%)	
d10-Anthracene	80%
d10-Fluoranthene	89%
d10-Benzo[e]pyrene	92%

A.1. New Brunswick Particulate Phase PCBs (NB-QFF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	NB-QFF 10/8/97	NB-QFF 10/9/97	NB-QFF 10/12/97	NB-QFF 10/13/97	NB-QFF 10/15/97	NB-QFF 10/16/97	NB-QFF 10/21/97	NB-QFF 10/28/97	duplicate NB-QFF 10/29/97	duplicate NB-QFF 10/29/97	duplicate NB-QFF 11/2/97	duplicate NB-QFF 11/2/97	NB-QFF 11/6/97	NB-QFF 11/12/97
18	0.75	0.89	0.71	0.90	2.9	0.60	0.91	0.46	1.1	0.54	0.33	0.28	1.2	0.78
17+15	0	0.48	0.42	0.22	0	0.21	0.24	0.19	0.27	0.28	0.18	0.20	0.23	0
16+32	0	0	0	0	0	0	0.40	0.33	0.50	0.72	0.50	0.39	0.74	0
31	0.38	0.64	0.32	0.26	0.41	0.89	0.86	0.55	0.94	0.57	0.53	0.51	0.83	0.98
28	0.58	0.96	0.57	0.44	0.096	0.36	0.52	0.33	0.59	0.63	0.30	0.32	0.48	0.54
21+33+53	0.72	0.92	0.62	0.60	0	0.31	0.48	0.23	0.49	0.44	0.41	0.44	0.74	0
22	1.1	0.59	0.35	0.47	0	0.13	0.28	0	0	0.53	0.26	0.22	0.45	0
45	0	0	0	0	0.096	0.027	0.088	0.048	0	0.13	0	0	0	0
52+43	0.34	0.42	0.20	0.25	0	0.11	0.20	0.11	0.074	0.21	0.12	0.12	0.38	0.69
49	0.14	0.18	0.14	0	0	0.15	0.17	0.11	0.24	0	0.065	0.15	0.16	0
47+48	0	0	0.82	0	0	0.084	0.22	0.085	0.12	0.13	0.057	0.084	0.25	0
44	2.4	1.8	1.7	1.8	0	1.3	1.2	0.81	1.1	1.9	0.71	1.0	4.1	15
37+42	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41+71	0	0	0	0	0	0.11	0.16	0.058	0	0.13	0	0.037	0.18	0.30
64	0.25	0.22	0	0	0	0.15	0.20	0.11	0.20	0.37	0.15	0.13	0.39	0.38
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0.13	0.27	0.12	0.22	0	0.24	0.13	0.81	0
70+76	0	0.36	0.20	0.27	0	0.27	0.60	0.20	0.24	0.30	0.12	0.10	0.65	0.44
66+95	1.0	1.2	0.92	1.1	5.4	0.52	0.29	0	0.80	0.84	0.64	0.55	3.0	2.8
91	0	0	0	0	0.18	0.029	0.049	0.020	0.11	0.038	0.045	0.046	0.19	0.35
56+60+89	1.1	0	0	0	0	0	0	0	0	0.70	0.053	0.020	0.80	0.94
92+84	0.38	0	0	0	0	0	0	0	0	0.67	0	0.11	2.1	0.62
101	0.29	0.19	0.18	0.14	0	0.21	0.41	0.16	0.53	0.25	0.15	0.17	1.2	1.6
83	0	0	0	0	0	0	0	0	0	0	0.035	0	0	0
97	0	0.12	0.12	0.095	0	0.075	0.12	0.042	0.10	0.10	0.033	0.0048	0.23	0.49
87+81	0.21	0.17	0.14	0.12	0	0.19	0.21	0.12	0.43	0.18	0.093	0.13	0.36	1.3
85+136	0	0	0	0	0	0.040	0.11	0	0.043	0	0.052	0.011	0.29	0.47
110+77	0.46	0.51	0.39	0.30	0.47	0.40	0.51	0.19	0.45	0.39	0.21	0.15	1.4	2.5
82	0	0.057	0.058	0	0.23	0	0.034	0.016	0	0	0.028	0.020	0.17	0.29
151	0.061	0.12	0.049	0	0.21	0.016	0.057	0.033	0.085	0.083	0.032	0.015	0.27	0.20
135+144+147+124	0.23	0.24	0.079	0.12	0	0.021	0.10	0.048	0.20	0.073	0.061	0	0.21	0.12
149+123+107	0.37	0.54	0.28	0.13	0	0.30	0.31	0.16	0.39	0.40	0.10	0.096	0.83	1.1
118	0.22	0.19	0.15	0.084	0	0	0.38	0.17	0.46	0.36	0.14	0.093	0	1.8
146	0	0	0	0	0	0.066	0.11	0.073	0.14	0	0.027	0.028	0.15	0
153+132	0.093	0.12	0.11	0.069	0	0.60	0.96	0.55	0.82	0.97	0.14	0.18	1.6	1.8
105	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4
141	0.091	0.15	0.12	0	0	0.062	0.11	0	0.17	0.11	0.034	0.020	0.35	0.55
137+176+130	0	0.093	0	0.24	0	0.019	0	0.013	0	0.072	0	0	0	0
163+138	0.56	0.67	0.71	0.39	0	0	0.89	0.53	1.3	0.82	0.23	0.23	2.5	2.0
178+129	0	0.057	0.053	0	0	0	0.052	0	0.30	0.067	0	0.032	0.28	0
187+182	0.15	0.30	0.31	0.18	0	0.16	0.21	0.15	0.40	0.33	0.10	0.12	0.55	0.38
183	0	0.24	0.22	0	0	0.11	0.13	0.082	0.25	0.17	0.051	0.071	0.42	0.23
185	0	0.064	0	0	0	0.037	0.028	0.019	0.078	0.042	0.033	0.037	0.092	0.16
174	0.17	0.20	0.20	0.14	0	0.11	0.17	0.098	0.28	0.27	0	0.057	0.55	0
177	0.11	0.37	0.25	0.13	0	0.055	0.094	0.049	0.078	0.12	0	0.021	0.38	0
202+171+156	0	0	0	0	0	0	0.078	0.066	0.090	0	0.0081	0	0.15	0
180	0.28	0.42	0.51	0.14	0	0.30	0.48	0.34	1.1	0.75	0.21	0.17	1.6	0.98
199	0	0	0	0	0	0	0.014	0.014	0	0.053	0	0	0.087	0
170+190	0.60	0.40	0.50	0.26	0	0.19	0.30	0.16	0.35	0.67	0.11	0.048	0.66	0.082
198	0	0	0	0	0	0.012	0.0087	0.0090	0.010	0	0.0039	0	0	0
201	0.35	0.25	0.26	0.22	0	0.22	0.27	0.19	0.76	0.47	0.10	0	0.80	0
203+196	0.25	0.31	0.29	0.23	0	0.32	0.30	0.27	0.80	0.56	0.14	0.10	0.87	0
195+208	0.30	0	0	0.21	0	0.25	0.13	0.12	0.21	0.35	0.041	0.030	0.11	0
194	0	0.051	0.047	0	0	0.15	0.11	0.067	0.26	0	0.14	0.11	0.61	0
206	0.36	0.19	0.23	0.32	0	0	0.19	0.13	0	0.35	0	0	0.19	0
Total PCBs	14	15	12	9.8	9.9	9.3	14	7.6	17	17	7.0	6.8	34	42
Homologue Group														
3	3.5	4.5	3.0	2.9	3.4	2.5	3.7	2.1	3.9	3.7	2.5	2.4	4.6	2.3
4	5.3	4.1	3.9	3.4	5.5	2.9	3.4	1.7	3.0	4.7	2.2	2.4	11	21
5	1.6	1.2	1.0	0.74	0.88	0.95	1.8	0.71	2.1	2.0	0.80	0.73	5.9	11
6	1.4	1.9	1.4	0.94	0.21	1.1	2.5	1.4	3.0	2.5	0.63	0.56	5.9	5.7
7	1.3	2.1	2.0	0.86	0	0.96	1.5	0.90	2.8	2.4	0.51	0.56	4.5	1.8
8	0.90	0.61	0.60	0.66	0	0.96	0.91	0.73	2.1	1.4	0.44	0.24	2.6	0
9	0.36	0.19	0.23	0.32	0	0	0.19	0.13	0	0.35	0	0	0.19	0
Corresponding Laboratory Blank	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	3/5/98	3/5/98	2/16/98	3/27/98
Total Suspended Particulate (μg/m^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22.9	21.7	43.7	35.4
Surrogate Recoveries (%)														
#65	96 %	93 %	100 %	100 %	112 %	109 %	93 %	115 %	156 %	113 %			102 %	98 %
#166	89 %	85 %	90 %	91 %	103 %	126 %	101 %	127 %	124 %	137 %			111 %	121 %

A.1. New Brunswick Particulate Phase PCBs (NB-QFF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	NB-QFF 11/18/97	NB-QFF 11/24/97	NB-QFF 11/30/97	NB-QFF 12/6/97	NB-QFF 12/12/97	NB-QFF 12/18/97	NB-QFF 12/24/97	NB-QFF 12/30/97	NB-QFF 1/5/98	NB-QFF 1/11/98	NB-QFF 1/17/98	NB-QFF 1/23/98	NB-QFF 1/29/98	NB-QFF 2/4/98
18	1.2	0	0	0	0.23	0	0.24	0.74	0	1.0	0.54	0	0	0
17+15	0.13	0	0.17	0	0.046	0.12	0.060	0.15	0	0.44	0.034	0	0	0
16+32	0	0.61	0.37	0.60	0.75	0	0.28	0.51	0	0	0.60	0	0	0
31	0.62	0.50	0.77	0.22	0.46	0.65	0.31	0.51	0.44	1.4	0.29	0.11	0.19	0.60
28	0.33	0.24	0.39	0.23	0.37	0.39	0.20	0.24	0.27	0.69	0.18	0.019	0.054	0.48
21+33+53	0	0.24	1.1	0	0.27	0.66	0.21	0.39	0	1.3	0.52	0	0	0.19
22	0	0	0	0	0	0	0	0.44	0	0.74	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0.58	0	0	0	0
52+43	0	0.52	0.28	0	0	0.64	0.11	0.38	0.41	1.5	0	0	0	0
49	0	0	0.089	0.070	0	0.053	0.084	0.20	0	0.75	0.28	0	0	0
47+48	0	0.64	0.20	0	0.33	0.28	0.49	0.88	0	1.6	0.31	0	0	0
44	2.8	0.25	0.81	1.3	0.65	4.1	0.71	0.74	4.2	3.3	2.0	0.25	0.49	0.38
37+42	0	0	0	0	0	0	0	0	0	0.29	0	0	0	0
41+71	0	0.066	0	0	0.064	0	0.027	0.10	0	0.73	0.12	0.083	0	0.20
64	0.32	0.26	0.31	0.21	0.22	0.39	0.12	0.17	0.31	0.68	0.20	0.055	0.30	0.18
40	0	0.27	0	0	0	0.75	0.15	0	0.41	0	0.17	0.077	0	0
74	0	0.84	0.88	0	0.67	0	0.40	0.22	0	0.48	0.47	0.11	0	0
70+76	0.22	0.44	1.0	0.46	0.27	0.53	0.20	0.47	0.47	2.3	0.83	0.14	0.40	0.46
66+95	1.6	1.4	3.1	0	1.7	2.5	1.5	1.9	2.1	6.6	2.3	0.93	1.8	2.2
91	0.21	0	0.22	0	0.099	0	0	0.30	0	0.59	0.86	0.18	0.84	0
56+60+89	0.36	0.31	0.84	0	0.14	0.45	0.22	0	0	0.74	0.42	0.17	0.67	0
92+84	0	0.34	1.7	0	0.34	0	0.25	0.25	2.3	1.8	0	0	0.44	0
101	0.54	0.29	1.8	0	0.51	0.78	0.45	0.72	0.80	2.8	1.5	0.43	0.68	1.1
83	0	0	0.17	0	0	0	0.049	0	0	0.17	0	0	0	0
97	0.31	0.13	0.43	0.099	0.14	0.23	0.12	0.18	0.31	0.59	0.46	0.12	0.23	0.28
87+81	0.62	0.44	0.63	0.44	0.36	0.46	0.36	0.55	0.46	1.1	1.7	0.50	0.65	0.63
85+136	0.29	0.11	0.27	0.19	0.089	0.13	0.074	0.17	0	0.52	0.56	0.16	0.22	0.20
110+77	1.6	0.76	2.4	0.70	0.66	1.2	0.70	0.94	1.3	3.1	2.5	0.71	1.3	1.6
82	0.18	0.062	0.28	0.13	0.099	0	0.084	0.094	0.11	0.33	0.25	0.084	0.13	0.17
151	0.20	0.063	0.25	0.18	0.069	0.11	0.060	0.11	0	0.44	0.27	0.085	0.19	0.25
135+144+147+124	0.055	0.061	0.35	0	0.10	0.18	0.057	0.063	0.066	0.44	0.20	0.13	0.34	0.13
149+123+107	0.93	0.28	0.98	0.27	0.36	0.73	0.33	0.46	0.60	1.5	1.2	0.37	0.81	1.0
118	1.6	0.46	1.9	0	0.49	1.3	0.44	0.55	0	2.4	2.1	0.53	1.2	1.5
146	0.26	0.056	0	0	0.055	0	0.050	0.12	0.071	0	0.38	0.049	0	0.27
153+132	1.8	0.63	1.9	0.90	0.67	1.9	0.69	0.58	1.3	2.4	2.4	0.62	1.4	1.9
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141	0.49	0.12	0.32	0	0.13	0.41	0.090	0.13	0.24	0.63	0.48	0.18	0.22	0.50
137+176+130	0	0	0	0	0	0	0	0	0	0	0	0	0	0
163+138	3.3	0.69	3.8	0.54	0.73	0	0.89	0.58	2.6	2.9	2.9	0.94	1.6	3.0
178+129	0	0	0.41	0	0	0	0	0	0	0.37	0	0	0.23	0
187+182	0.90	0.23	0.54	0.29	0.22	0.88	0.25	0.19	0.40	0.69	0.68	0.28	0.53	0.75
183	0.36	0.12	0.45	0	0.13	0.51	0.12	0.064	0.28	0.40	0.38	0.11	0.27	0.49
185	0.12	0.052	0.12	0.082	0.047	0.19	0	0.033	0	0.091	0	0.038	0.060	0
174	3.2	0.15	0.75	0	0.16	0.67	0.16	0.084	0.53	0.47	0.50	0.22	0.39	0.79
177	0.33	0	0.40	0	0.080	0.24	0.089	0.018	0.17	0.26	0.28	0.094	0.21	0.56
202+171+156	0	0	0.22	0	0	0	0.029	0	0	0.16	0.075	0.011	0.017	0.044
180	1.5	0.23	2.3	0.32	0.45	1.5	0.39	0.19	1.5	0.96	0.98	0.40	0.86	1.8
199	0	0.028	0.080	0	0	0.17	0	0	0.16	0	0	0	0.066	0
170+190	0.60	0.10	0.99	0.16	0.16	0.52	0.16	0.049	0.57	0.36	0.34	0.15	0.35	0.75
198	0	0	0	0	0.0060	0	0.0065	0	0	0.015	0.0080	0.0079	0.011	0.015
201	1.2	0.15	1.3	0.068	0.32	1.3	0.24	0.11	1.2	0.63	0.69	0.75	0.57	0.76
203+196	1.0	0.17	1.6	0	0.27	1.2	0.26	0.12	1.3	0.58	0.66	0.23	0.56	0.90
195+208	0.22	0.022	0.35	0	0.066	0.23	0.025	0	0.33	0	0.11	0.040	0.084	0.26
194	0	0	0.67	0	0.096	0.64	0.10	0	0.50	0.20	0.25	0.086	0	0
206	0.40	0	0.46	0	0.10	0	0	0	0.33	0	0.26	0	0.17	0.11
Total PCBs	30	12	38	7.4	13	27	12	15	26	52	32	9.5	18	24
Homologue Group														
3	2.3	1.6	2.8	1.1	2.1	1.8	1.3	3.0	0.72	5.9	2.2	0.13	0.24	1.3
4	5.2	5.0	7.5	2.0	4.1	9.8	4.0	5.1	7.9	19	7.1	1.8	3.6	3.4
5	5.3	2.6	9.8	1.6	2.8	4.1	2.5	3.7	5.3	13	10.0	2.7	5.7	5.4
6	7.0	1.9	7.6	1.9	2.1	3.3	2.2	2.0	4.9	8.3	7.8	2.4	4.6	7.1
7	7.0	0.89	6.0	0.85	1.2	4.6	1.2	0.63	3.4	3.6	3.1	1.3	2.9	5.1
8	2.4	0.37	4.3	0.068	0.76	3.5	0.66	0.22	3.4	1.6	1.8	1.1	1.3	2.0
9	0.40	0	0.46	0	0.10	0	0	0	0.33	0	0.26	0	0.17	0.11
Corresponding Laboratory Blank	3/27/98	3/5/98	2/16/98	3/27/98	3/5/98	2/16/98	3/5/98	3/5/98	2/16/98	3/5/98	3/5/98	3/25/98	3/11/98	2/16/98
Total Suspended Particulate (μg/m^3)	55.4	15.7	52.2	19.9	29.5	57.8	24.8	12.0	1.8	30.0	31.5	7.2	29.4	24.5
Surrogate Recoveries (%)														
#65	106 %	129 %	101 %	108 %	91 %	99 %	96 %	111 %	94 %	102 %	119 %	102 %	101 %	110 %
#166	127 %	111 %	104 %	111 %	95 %	110 %	99 %	108 %	108 %	110 %	108 %	108 %	101 %	106 %

A.1. New Brunswick Particulate Phase PCBs (NB-QFF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	NB-QFF 2/10/98	NB-QFF 2/16/98	NB-QFF 2/22/98	NB-QFF 2/28/98	NB-QFF 3/6/98	NB-QFF 3/12/98	NB-QFF 3/18/98	NB-QFF 3/24/98	NB-QFF 3/30/98	NB-QFF 4/5/98	NB-QFF 4/11/98	NB-QFF 4/17/98	NB-QFF 4/23/98	NB-QFF 4/29/98
18	0	0.98	0	0	0	0.55	0	0.50	1.3	0.28	0.36	0.34	0.18	0.72
17+15	0	0.057	0	0	0	0	0	0	0.032	0	0.27	0.016	0	0
16+32	0	0	0	0	0	0	0	0	0	0	1.1	0	0	0
31	0.80	0.32	0.20	0	0	0.52	0.25	0	0.53	0.90	0	0.40	0	0.36
28	0.60	0.17	0.12	0.080	0	0.22	0.11	0.38	0.25	0.31	0	0.23	0	0.36
21+33+53	0	0	0	0	0.13	0.78	0	0.66	0	0.36	0	0	0	0.46
22	0	0.22	0.14	0	0	0	0	0	0	0.34	2.5	0	0	0
45	0	0	0	0	0	0	0	0	0.15	0	0.44	0	0	0
52+43	0.46	0.40	0.23	0	0	0.30	0	0	0.25	0.26	0	0.19	0	0.11
49	0	0.21	0.10	0	0	0	0	0	0.13	0.19	0.88	0	0	0.17
47+48	0	0.100	0.079	0.071	0.12	0	0	0	0	0	0	0	0	0
44	27	0.34	0.22	0.12	0.13	0.29	0.28	0.29	0.23	0.24	0	0.11	0.040	0.23
37+42	0	0.24	0.055	0.036	0	0.071	0.12	0.098	0	0	0	0	0	0
41+71	0.90	0.16	0.20	0.15	0.21	0.049	0.081	0.17	0.15	0.10	0.54	0	0	0
64	0.80	0.15	0.12	0.068	0.15	0.14	0.11	0.24	0.11	0.13	0.40	0.22	0.34	0
40	1.1	0	0	0	0	0	0.058	0.19	0.18	0.18	0.61	0.12	0	0
74	0	0.28	0.25	0.25	0.39	0.15	0.28	0.37	0	0	0	0	0	0
70+76	0.81	0.46	0.26	0.16	0.17	0.39	0.28	0.63	0	0	0.15	0	0.16	0
66+95	5.3	1.9	2.0	1.2	2.6	2.4	1.6	3.4	0	0	2.5	0	0.33	0.95
91	2.0	0.16	0.14	0	0.080	0.29	0.24	0.44	0.17	0.10	0.44	0	0.0092	0
56+60+89	3.1	0.53	0.37	0.26	0.30	0.65	0.38	0.96	0	0.41	0.59	0	0.42	0.79
92+84	0	1.1	0	0	0.32	0.38	0.41	0.65	0	0.51	0.92	0	0.34	0
101	2.7	0.68	0.54	0.34	0.41	0.69	0.75	1.0	0.44	0.84	0.88	0.30	0.41	0.49
83	0	0	0	0	0	0	0	0	0	0	0.18	0	0.022	0
97	1.3	0.18	0.15	0.081	0.11	0.19	0.19	0.25	0.13	0.17	0.20	0.060	0.045	0.21
87+81	2.8	0.29	0.36	0.15	0.19	0.52	0.35	0.35	0.084	0.32	1.0	0.12	0.092	0
85+136	1.1	0.22	0.17	0.077	0.070	0.17	0.28	0.19	0.14	0.20	0.36	0.13	0	0.50
110+77	5.4	0.94	0.82	0.51	0.46	0.92	1.1	1.5	0.66	0.97	1.2	0.36	0.50	1.4
82	0.81	0.15	0.12	0.074	0.053	0.091	0.19	0.21	0.091	0.13	0.12	0.10	0.034	0.066
151	0.76	0.12	0.17	0.072	0.13	0.15	0.13	0.35	0.16	0.17	0.25	0.18	0.050	0.19
135+144+147+124	0.37	0.15	0.12	0.049	0.12	0.12	0.10	0.089	0	0.12	0.091	0.048	0	0.19
149+123+107	3.2	0.46	0.52	0.25	0.34	0.63	0.62	0.85	0.37	0.50	0.58	0.26	0.30	0.48
118	5.7	0.77	0.66	0.36	0.35	0.73	0.88	0.90	0	0	0.57	0	0	0
146	0	0.063	0.061	0.025	0.025	0.080	0.075	0.14	0.041	0.069	0	0	0	0
153+132	6.1	0.77	0.95	0.45	0.50	0.86	0.95	0.86	0.52	0.65	0.82	0.20	0.28	0.35
105	0	0.39	0	0.21	0.17	0	0	0	0.19	0	0.28	0	0	0.12
141	1.5	0.17	0.24	0.099	0.11	0.33	0.30	0.28	0.088	0.13	0.21	0	0.065	0.062
137+176+130	0	0	0	0	0.084	0	0	0	0	0	0	0	0	0
163+138	10	1.4	1.7	0.76	0.87	1.2	1.7	1.6	0.65	0.86	1.3	0.31	0.37	0.60
178+129	0.74	0.15	0.19	0	0	0	0.19	0.078	0	0	0.13	0	0	0
187+182	1.6	0.22	0.38	0.19	0.21	0.30	0.41	0.34	0.15	0.24	0.35	0.11	0.083	0.12
183	1.0	0.14	0.23	0.076	0.10	0.15	0.19	0.22	0.071	0.11	0.21	0	0.13	0.14
185	0.27	0.041	0.059	0.023	0.038	0.050	0.057	0	0.037	0.028	0	0	0	0.039
174	7.7	0.22	0.42	0.13	0.18	0.23	0.31	0.27	0.095	0.17	0.26	0.062	0.042	0.11
177	1.0	0.14	0.29	0.070	0.11	0.081	0.18	0.054	0.082	0.15	0.27	0	0.085	0
202+171+156	0.15	0.011	0	0.0036	0.0045	0.0099	0.024	0	0	0.0055	0.23	0	0	0.0087
180	3.4	0.61	1.0	0.36	0.50	0.48	0.74	0.68	0.32	0.47	0.72	0.15	0.25	0.38
199	0	0	0	0	0.060	0	0	0	0.17	0.066	0	0.079	0	0.13
170+190	1.8	0.31	0.44	0.16	0.17	0.18	0.29	0.38	0.21	0.17	0.35	0.10	0.21	0.20
198	0	0.0053	0.0030	0	0.0048	0	0	0	0	0.0050	0	0	0	0
201	2.5	0.36	0.41	0.21	0.27	0	0.87	0.39	0.21	0.22	0.24	0.066	0.097	0.23
203+196	2.4	0.40	0.53	0.25	0.32	0.26	0.59	0.44	0.28	0.22	0.36	0.13	0.13	0.26
195+208	0.50	0.099	0.13	0.073	0.061	0.070	0.12	0.080	0.050	0.043	0.069	0	0.026	0.039
194	0	0.23	0	0	0	0	0	0	0	0.053	0.13	0	0	0
206	0.19	0.18	0	0.20	0	0.13	0.34	0.21	0.12	0	0.069	0	0	0.11
Total PCBs	108	18	15	7.6	11	16	16	21	8.8	11	23	4.4	5.0	11
Homologue Group														
3	1.4	2.0	0.52	0.12	0.13	2.1	0.48	1.6	2.1	2.2	4.3	0.99	0.18	1.9
4	40	4.5	3.8	2.2	4.1	4.4	3.1	6.2	1.2	1.5	6.1	0.63	1.3	2.3
5	22	4.9	3.0	1.8	2.2	4.0	4.4	5.5	1.9	3.3	6.1	1.1	1.5	2.8
6	22	3.2	3.8	1.7	2.2	3.4	3.8	4.2	1.8	2.5	3.3	1.00	1.1	1.9
7	17	1.8	3.0	1.0	1.3	1.5	2.4	2.0	0.96	1.3	2.3	0.42	0.80	0.98
8	5.5	1.1	1.1	0.53	0.72	0.34	1.6	0.91	0.71	0.62	1.0	0.27	0.25	0.66
9	0.19	0.18	0	0.20	0	0.13	0.34	0.21	0.12	0	0.069	0	0	0.11
Corresponding Laboratory Blank	3/11/98	3/11/98	3/11/98	3/11/98	3/11/98	3/27/98	3/27/98	3/27/98	5/27/98	6/1/98	6/29/98	5/27/98	6/1/98	5/27/98
Total Suspended Particulate (μg/m^3)	68.0	29.2	23.0	22.8	21.5	19.6	18.8	30.0	60.9	13.9	22.9	27.4	25.3	88.1
Surrogate Recoveries (%)														
#65	104 %	100 %	92 %	85 %	100 %	106 %	86 %	96 %	99 %	93 %	99 %	101 %	93 %	100 %
#166	126 %	107 %	113 %	106 %	119 %	121 %	103 %	100 %	112 %	101 %	98 %	106 %	103 %	103 %

A.1. New Brunswick Particulate Phase PCBs (NB-QFF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	NB-QFF 5/5/98	NB-QFF 5/11/98	NB-QFF 5/17/98	NB-QFF 5/23/98	NB-QFF 5/29/98	NB-QFF 6/4/98	NB-QFF 6/10/98	NB-QFF 6/16/98	NB-QFF 6/22/98	NB-QFF 6/25/98	day NB-QFF 6/26/98	night NB-QFF 6/26/98	NB-QFF 6/28/98	NB-QFF 7/4/98
18	2.7	0.31	0.35	0.18	4.9	1.3	1.5	0.77	1.2	3.2			0.10	0.22
17+15	0.11	0.013	0.037	0	0.91	0.71	0.75	0.12	0.31	1.1			0.015	0
16+32	0	0	0	0	0.63	3.6	4.7	1.0	3.7	0			0.49	0
31	1.8	0.40	0.80	0.67	3.0	0.98	1.6	0	0	0			0	0
28	0.85	0.20	0.27	0.18	1.1	0.80	1.2	0.35	0	1.3			0	0
21+33+53	2.0	0	0	0.29	3.7	0	4.7	1.00	1.9	2.3			0	0
22	0	0	0.65	0	8.0	2.5	8.0	1.6	3.7	5.8			0.51	0.059
45	0	0	0.30	0	0.49	0.42	0	0.11	0	0			0	0
52+43	0.37	0.13	0.20	0.68	2.8	0	1.8	0.75	0	0			0	0
49	0.37	0.15	0.37	0	1.4	1.4	0.61	0.12	0.28	0.73			0.46	0.18
47+48	0	0	0	0	0.52	1.8	0	0.31	0	0			0	0
44	8.6	0.10	0.20	0	0.84	1.00	1.2	0.076	0	1.1			0	0.073
37+42	0.22	0	0	0	2.1	0	0	0.040	0	0			0.14	0.11
41+71	0.98	0	0.086	0	0.92	0.59	1.6	0.14	0.75	0.55			0.15	0.12
64	0.83	0.21	0.33	0	0.25	1.0	0.59	0.11	0.52	1.1			0	0.052
40	0	0	0	0	0.80	2.1	0.58	0.075	1.4	2.6			0	0
74	0	0	0	0	1.7	0	0	0.16	0	0			0	0
70+76	0	0	0	0	0.71	0	0	0.39	0	0			0	0.15
66+95	0	0	0	0	8.3	3.8	4.8	3.1	0	11			0	0.58
91	0.17	0	0.038	0	1.4	0.38	0.051	0.11	0.46	0.72			0.027	0.041
56+60+89	1.2	0.37	0	0	2.2	0	0	0.35	0	0			0	0.046
92+84	0	0.41	1.0	0	1.7	1.9	0	0.94	0	5.3			0.27	0.29
101	0.63	0.43	0.98	0.62	2.9	0.97	1.8	0.82	0.39	0.58			0.35	0.41
83	0.15	0	0	0	0.47	0.21	0.18	0.081	0.18	0.13			0.099	0.035
97	0.48	0.096	0.20	0.17	0.50	0.26	0.52	0.20	0	0			0.038	0.11
87+81	0.69	0.10	0.061	0	1.2	0.36	0.80	0.37	0.55	0.84			0	0.15
85+136	0.17	0.31	0	0	2.2	0.37	0.41	0.38	1.1	2.0			0	0.12
110+77	2.5	0.47	1.5	1.0	4.0	1.3	1.8	1.2	1.1	1.9			0	0.39
82	0.58	0.078	0.097	0.055	0.35	0.18	0	0.089	0	0			0.026	0.014
151	0.47	0.12	0.34	0.23	0.88	0.43	0.69	0.12	0.53	1.2			0.060	0.051
135+144+147+124	0.40	0.088	0.32	0.19	0.27	0	0	0.084	0	0			0.064	0
149+123+107	1.5	0.30	0.70	0.52	2.0	0.73	1.4	0.48	0.79	1.1			0.27	0.40
118	0	0	0	0	1.6	0.71	0	0	0.45	0.33			0.15	0.26
146	0.10	0.047	0	0.029	0	0	0	0.11	0	0			0	0.058
153+132	1.9	0.30	0.64	0.53	2.3	0.80	0.88	0.87	0.36	0.82			0	0.28
105	0	0	0	0	1.0	0.27	0	0	0	0			0	0.086
141	0.49	0.057	0.13	0.17	0.56	0.20	0.25	0.14	0.12	0.22			0	0
137+176+130	0	0	0	0	0	0	0	0	0	0.58			0	0
163+138	3.5	0.53	0.96	0.66	3.2	1.2	1.4	1.3	0.62	1.3			0.43	0.47
178+129	0	0	0	0	0	0	0	0	0	0			0	0
187+182	0.62	0.15	0.23	0.19	0.81	0.29	0.24	0.17	0.19	0.49			0.14	0.072
183	0.47	0.12	0.38	0.15	0.60	0.16	0.27	0.10	0	0			0.15	0
185	0.12	0	0.052	0.037	0	0	0	0	0	0			0	0
174	1.4	0.11	0.18	0.14	0.72	0.24	0.16	0.089	0.10	0.13			0.040	0.065
177	0.65	0	0	0.12	0.52	0.22	0.19	0.082	0	0.078			0.049	0
202+171+156	0	0.0029	0.024	0	0.22	0	0	0	0.018	0.026			0	0
180	2.3	0.35	0.56	0.34	1.6	0.63	0.45	0.23	0.24	0.32			0.22	0.14
199	0.10	0.069	0	0	0	0	0.013	0	0	0			0	0
170+190	1.7	0.17	0.37	0.26	1.3	0.30	0.34	0.25	0.24	0.60			0.049	0.093
198	0	0.0049	0.0073	0	0	0	0	0	0	0			0	0
201	2.2	0.15	0.30	0.22	0.27	0.24	0.16	0.063	0.15	0.19			0.061	0.086
203+196	1.8	0.18	0.37	0.24	1.4	0.38	0.21	0.069	0.22	0.40			0.093	0.086
195+208	0.42	0.064	0.098	0.019	0.21	0.12	0.092	0	0.064	0.10			0	0.024
194	2.1	0	0	0	0.71	0.23	0.15	0.046	0.14	0.17			0.046	0.045
206	1.1	0.049	0.25	0.087	0.64	0.12	0.13	0.029	0.14	0.14			0.076	0.047
Total PCBs	49	6.6	13	8.0	81	35	46	19	22	51			4.6	5.4
Homologue Group														
3	7.7	0.92	2.1	1.3	24	9.9	22	4.9	11	14			1.3	0.39
4	12	0.96	1.5	0.68	21	12	11	5.7	3.0	17			0.61	1.2
5	5.3	1.9	3.8	1.9	17	7.0	5.5	4.2	4.3	12			0.96	1.9
6	8.3	1.4	3.1	2.3	9.2	3.3	4.5	3.1	2.4	5.2			0.82	1.3
7	7.1	0.90	1.8	1.2	5.6	1.8	1.6	0.93	0.77	1.6			0.65	0.37
8	6.6	0.47	0.79	0.48	2.8	0.97	0.63	0.18	0.60	0.89			0.20	0.24
9	1.1	0.049	0.25	0.087	0.64	0.12	0.13	0.029	0.14	0.14			0.076	0.047
Corresponding Laboratory Blank	5/27/98	6/1/98	5/27/98	6/1/98	6/29/98	6/29/98	6/29/98	7/1/98	7/1/98	7/1/98	7/1/98	7/1/98	8/6/98	8/6/98
Total Suspended Particulate (μg/m³)	64.9	48.5	69.0	39.1	196.1	24.4	51.8	58.3	58.9	41.4	86.2	73.2	28.7	NA
Surrogate Recoveries (%)														
#65	92 %	98 %	93 %	98 %	87 %	91 %	81 %	67 %	90 %	81 %			97 %	80 %
#166	123 %	109 %	106 %	111 %	102 %	116 %	94 %	71 %	109 %	102 %			102 %	93 %

A.1. New Brunswick Particulate Phase PCBs (NB-QFF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	day NB-QFF 7/5/98	night NB-QFF 7/5/98	day NB-QFF 7/6/98	night NB-QFF 7/6/98	day NB-QFF 7/7/98	night NB-QFF 7/7/98	day NB-QFF 7/8/98	night NB-QFF 7/8/98	day NB-QFF 7/9/98	night NB-QFF 7/9/98	day NB-QFF 7/10/98	night NB-QFF 7/10/98	day NB-QFF 7/11/98	NB-QFF 7/16/98
18	1.2	3.3	2.0	1.7			7.4	3.7	1.5	3.5	1.8	0	1.9	0
17+15	0.61	1.4	1.1	1.00			3.5	1.7	0.53	2.1	0.69	5.9	1.1	0
16+32	1.4	2.9	2.7	2.1			7.6	4.6	1.7	3.6	2.3	0	3.0	0
31	1.9	3.6	2.3	1.8			9.8	4.8	2.5	4.1	1.8	0.87	3.0	0
28	0.71	0.84	1.3	0.66			4.5	1.8	1.6	1.7	0.52	0.41	2.2	0.39
21+33+53	1.3	3.7	2.2	1.6			7.6	4.3	1.7	3.0	1.1	0	2.0	0
22	0.83	0	1.6	0			5.2	2.5	1.6	1.9	0.97	0	2.5	0.41
45	0.26	0.72	0.77	0.57			2.6	1.3	0.75	1.1	0.77	0	1.3	0
52+43	3.5	7.6	4.2	4.6			9.1	5.8	3.6	5.1	3.2	0.92	5.7	0
49	0.65	1.7	1.1	1.1			3.6	1.7	0.99	1.4	0.77	0	2.0	0.34
47+48	0.43	0.83	0.93	0.50			3.1	1.3	1.00	1.1	0.58	0	1.6	0
44	1.2	2.8	2.5	1.4			8.7	4.3	2.8	4.0	1.9	0	4.2	0.39
37+42	0.44	0.66	1.6	0.61			4.5	2.1	1.7	1.4	0.69	4.0	2.6	0
41+71	0.62	1.2	1.1	0.63			3.3	1.3	1.2	0.80	0.63	0	2.2	0.41
64	0.38	0.85	0.95	0.41			2.7	1.1	0.97	0.78	0.47	0	1.7	0
40	0.35	0.82	0.81	0.66			2.2	1.7	0.90	1.2	0.68	0	1.1	0
74	0.87	1.1	0.97	0			1.9	1.2	0.71	1.0	0.96	0.41	1.5	0.37
70+76	1.7	2.4	1.6	0			8.0	3.6	1.1	3.1	6.1	0	2.3	0
66+95	4.3	7.7	4.9	2.2			14	7.5	4.2	7.2	6.3	0	8.1	3.0
91	0.25	0.38	0.43	0.28			0.52	0.27	0.30	0.24	0.30	1.2	0.82	0.21
56+60+89	0.96	1.3	1.8	0			3.1	1.6	1.4	1.5	0.48	0	3.1	0
92+84	1.8	4.1	1.9	4.7			3.6	2.7	0	3.3	2.9	0	4.6	1.3
101	1.4	2.0	2.3	1.5			3.0	1.8	1.7	2.1	1.9	1.4	4.3	0.39
83	0.27	0.31	0.28	0.45			0.30	0.26	0.35	0.21	0.27	0	0	0.18
97	0.35	0.45	1.0	0.36			0.66	0.24	0.28	0.53	0.55	0	1.1	0.10
87+81	0.82	1.0	1.4	0.83			2.6	1.2	0.87	1.2	2.2	0	2.7	0
85+136	0.32	0.47	0.58	0			1.2	0.70	0.56	0.48	0.42	0	1.7	0
110+77	1.7	1.7	1.7	0.53			2.6	1.4	1.3	1.7	1.9	0.47	3.7	0.95
82	0.084	0.21	0.21	0.075			0.46	0.25	0.12	0.35	0.33	0	0.18	0
151	0.28	0.48	0.41	0.23			0.91	0.43	0.29	0.55	0.54	0.64	0.62	0.31
135+144+147+124	0.33	0.58	0.32	0			1.1	0.69	0	0.73	0.90	0	0	0
149+123+107	1.1	1.5	1.4	0.64			2.5	1.2	1.0	1.6	1.6	0.51	1.8	0.40
118	0.84	1.1	1.1	0.39			0.81	0.63	0.52	0.82	1.4	0.49	1.1	0
146	0.30	0.50	0	0.52			0.88	0.43	0.31	0.54	0.78	0	0.62	0
153+132	1.3	1.5	1.7	0.91			2.2	1.2	1.2	1.5	1.7	0.88	3.2	0
105	0.51	0.35	0	0			0	0	0	0.56	0.75	0	0.51	0
141	0.29	0.40	0.43	0.17			0.56	0.19	0.29	0.20	0.26	0.41	0.77	0
137+176+130	0	0	0	0			0	0	0.22	0	0	0.15	0	0
163+138	1.4	2.2	2.2	1.5			2.9	1.2	1.3	1.4	2.2	1.2	4.2	0
178+129	0	0.13	0.40	0.29			0	0	0.33	0	0	0.34	0	0
187+182	0.44	0.61	0.50	0.61			0.68	1.2	0.29	1.1	1.8	0.27	0	0
183	0.20	0.20	0.35	0.33			0.39	0	0.17	0	0	0	0.57	0
185	0.037	0	0	0			0	0	0.055	0	0.18	0	0.11	0
174	0.27	0.26	0.40	0.32			0.47	0	0.25	0	0	0.39	0.90	0
177	0.25	0	0.33	0.22			0	0	0.16	0	0	0.096	0.61	0
202+171+156	0	0	0	0			0	0	0	0	0	0	0	0
180	0.58	0.73	0.88	0.62			1.1	0.75	0.47	0.83	0.92	0.63	2.6	0.29
199	0	0	0	0			0	0	0	0	0	0	0	0
170+190	0.16	0	0.49	0			0.19	0	0.27	0.28	0	0.26	1.3	0
198	0	0	0	0.26			0	0	0	0	0	0	0	0
201	0.17	0	0.61	0.26			0	0	0.27	0.16	0	0	0.63	0
203+196	0.18	0	0.68	0.24			0	0	0.30	0	0	0.34	0.53	0
195+208	0	0	0.088	0			0	0	0.038	0	0	0.0091	0.11	0
194	0	0	0.45	0.19			0	0	0.12	0	0	0.083	0.28	0
206	0	0	0.39	0.18			0	0	0.092	0	0	0.26	0.090	0.19
Total PCBs	39	67	59	38			142	75	46	70	57	23	93	9.7
Homologue Group														
3	8.5	16	15	9.6			50	25	13	21	9.9	11	18	0.80
4	15	29	22	12			62	32	20	28	23	1.3	35	4.5
5	8.3	12	11	9.1			16	9.4	6.0	12	13	3.6	21	3.2
6	5.1	7.2	6.4	4.0			11	5.3	4.7	6.6	8.1	3.8	11	0.71
7	1.9	1.9	3.4	2.4			2.8	1.9	2.0	2.2	2.9	2.0	6.1	0.29
8	0.35	0	1.8	0.94			0	0	0.73	0.16	0	0.44	1.6	0
9	0	0	0.39	0.18			0	0	0.092	0	0	0.26	0.090	0.19
Corresponding Laboratory Blank	7/15/98		7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	
Total Suspended Particulate (μg/m^3)	27.8		35.9	33.7	46.4	349.8	35.0	36.3	45.4	75.0	50.5	31.0	39.2	
Surrogate Recoveries (%)														
#65	80 %	77 %	81 %	99 %			68 %	71 %	73 %	69 %	69 %	68 %	33 %	111 %
#166	85 %	85 %	91 %	88 %			83 %	86 %	83 %	75 %	87 %	60 %	47 %	92 %

A.1. New Brunswick Particulate Phase PCBs (NB-QFF) Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	NB-QFF 7/22/98	NB-QFF 7/28/98	NB-QFF 8/3/98	NB-QFF 8/9/98	NB-QFF 8/15/98	NB-QFF 8/21/98	NB-QFF 8/27/98	NB-QFF 9/2/98	NB-QFF 9/4/98	NB-QFF 9/8/98	NB-QFF 9/13/98	NB-QFF 9/19/98	NB-QFF 9/22/98	NB-QFF 9/25/98
18	0.082	0.19	0.20	0.66	2.0	1.2	0.72	0.81	1.9	1.3	0.23		0.89	0.79
17+15	0.028	0.066	0.063	0.100	0.37	0.29	0.36	0.39	0.36	0.74	0.072		0.19	0.11
16+32	0.076	0.040	0.034	0.29	3.6	2.1	1.3	0	0.55	2.3	0		2.8	0.018
31	0.026	0.33	0.39	0.046	0	1.7	0.93	2.2	0.55	1.6	0.30		1.1	0.25
28	0.015	0.19	0.25	0.23	0	0.43	0.47	0	0.32	0.77	0.20		0.51	0.11
21+33+53	0.10	0.080	0.083	0.41	2.8	1.0	0.42	1.2	0.71	2.7	0		0	0
22	0.38	0.48	0.46	1.5	11	2.9	0.97	1.3	2.1	7.3	0.39		3.2	0.62
45	0	0	0.16	0	0	0	0	0	0	0	0		0	0
52+43	0	0	0	0	1.8	1.1	0.97	0	0.70	1.3	0		1.9	0.55
49	0.39	0.24	0.27	0.17	0.39	0.47	0.42	0.37	0.28	0.98	0.19		0.33	0.21
47+48	0	0	0	0	0.91	0	0.37	0	0	0	0		1.9	0
44	0.094	0.063	0.24	0.17	2.7	0	0.26	0.050	0	0	0		0.067	0
37+42	0	0	0	0	0	0.12	0.093	0	0	0	0.18		0	0.19
41+71	0.078	0.031	0.057	0.11	0.77	0.58	0.17	0.40	0.77	0	0.13		0.75	0.24
64	0.094	0.022	0.16	0.076	0	0	0.17	0.26	0	0	0.15		0.37	0.11
40	0.22	0.13	0.34	0.16	0.27	0.20	0.23	0.46	0.18	1.2	0.50		0.33	0.58
74	0	0	0	0	0	0.090	0	0	0	0	0		0	0.071
70+76	0.0095	0.020	0.073	0.041	0	0	0.075	0.11	0	0	0		0.068	0.055
66+95	1.1	1.2	1.5	1.1	1.9	3.0	2.2	2.6	1.4	2.5	1.1		3.2	1.3
91	0.16	0.13	0.25	0.16	0.16	0.56	0.25	0.54	0.12	0.40	0.13		0.092	0.030
56+60+89	0.15	0	0	0	0	0	0.59	0	0.83	1.9	0.57		0	0
92+84	0.75	0.54	1.2	0.65	0	0	1.2	1.1	0.86	0	0.64		1.0	0.62
101	0.28	0	0.26	0.29	0	0	0.59	1.3	0	0	0.37		1.4	0.66
83	0.045	0.074	0.064	0.024	0	0.0073	0.15	0.12	0	0	0.11		0.094	0
97	0.033	0.027	0.082	0	0	0.48	0.36	0.20	0	0.51	0		0.30	0
87+81	0.21	0.15	0.31	0	0.29	0.77	0.28	0	0	0.43	0		0.61	0.25
85+136	0.13	0.18	0.35	0.31	0.22	0.59	0.30	0.62	0.64	0.40	0.23		0.24	0.27
110+77	0.23	0.36	0.56	0.25	0	1.4	1.3	1.6	0.48	0.70	0.38		1.9	0.53
82	0.065	0.035	0.069	0	0	0.078	0.11	0.16	0	0.022	0.043		0.14	0.071
151	0.14	0.15	0.42	0.23	0.73	0.31	0.25	0.25	0.51	0.33	0.14		0.22	0.13
135+144+147+124	0.027	0.017	0	0	0	0.072	0.036	0.21	0	0	0		0	0
149+123+107	0.19	0.33	0.48	0.43	0	0.45	0.53	1.2	0.40	0.26	0.35		0.67	0.36
118	0.16	0	0.32	0	0	0	0.59	1.1	0	0	0.073		0	0
146	0	0	0	0	0	0.28	0	0	0	0	0		0	0
153+132	0.17	0.21	0.44	0.17	0.054	0.58	0.68	1.1	0.27	0.35	0.26		1.0	0.37
105	0	0	0.035	0	0	0.087	0.26	0	0	0	0.020		1.0	0
141	0.043	0.049	0.11	0.061	0	0.027	0.15	0	0	0	0.088		0.25	0.11
137+176+130	0	0	0.11	0	0.23	0.11	0	0	0.076	0.073	0		0	0
163+138	0.33	0.40	0.54	0.35	0.020	0.70	1.2	1.7	0.46	0.45	0.31		1.6	0.76
178+129	0	0	0	0	0	0	0	0	0	0	0		0.063	0
187+182	0.13	0.14	0.18	0.10	0.37	0.27	0.22	0.44	0.16	0.17	0.22		0.25	0.20
183	0.065	0.079	0	0	0.15	0.14	0.16	0.34	0	0.16	0.094		0.13	0.11
185	0	0	0	0	0	0	0	0	0	0	0		0.046	0
174	0.049	0.084	0.12	0.024	0.015	0.19	0.17	0.26	0.15	0.30	0.056		0.26	0.15
177	0	0.064	0	0.068	0	0.13	0.18	0.37	0	0.086	0.056		0.21	0.19
202+171+156	0.032	0.024	0	0.0052	0.022	0.045	0	0	0	0.088	0		0.020	0
180	0.086	0.16	0.25	0.23	0.33	0.33	0.51	0.61	0.26	0.22	0.18		0.80	0.37
199	0	0	0.023	0.013	0	0	0	0	0	0	0		0	0
170+190	0	0.14	0.23	0.12	0.35	0.30	0.34	0.52	0.23	0.26	0.14		0.37	0.19
198	0.023	0	0	0	0	0	0	0	0	0	0		0	0
201	0	0.057	0.11	0	0.10	0.11	0.19	0.23	0.063	0.098	0		0.50	0.19
203+196	0	0.077	0.20	0.045	0	0.20	0.23	0.36	0.14	0.16	0.12		0.42	0.22
195+208	0.028	0.053	0.089	0.052	0	0.063	0.068	0	0	0	0.055		0.078	0.065
194	0.026	0.057	0.087	0.026	0	0.081	0.16	0.23	0.15	0.050	0.043		0.19	0.13
206	0.023	0.041	0.081	0.047	0.033	0.073	0.16	0.16	0.079	0.061	0.031		0.17	0
Total PCBs	6.2	6.7	11	8.7	31	24	21	10	16	30	8.1		26	11
Homologue Group														
3	0.71	1.4	1.5	3.2	20	9.9	5.3	5.9	6.5	17	1.4		8.7	2.1
4	2.1	1.7	2.8	1.9	8.7	5.4	5.5	4.2	4.2	8.0	2.6		9.0	3.2
5	2.0	1.5	3.5	1.7	0.67	4.0	5.3	6.7	2.1	2.5	2.0		6.8	2.4
6	0.90	1.2	2.1	1.2	1.0	2.5	2.8	4.5	1.7	1.5	1.2		3.8	1.7
7	0.33	0.66	0.79	0.55	1.2	1.4	1.6	2.5	0.79	1.2	0.74		2.1	1.2
8	0.11	0.27	0.50	0.14	0.13	0.50	0.65	0.83	0.36	0.40	0.22		1.2	0.61
9	0.023	0.041	0.081	0.047	0.033	0.073	0.16	0.16	0.079	0.061	0.031		0.17	0
Corresponding Laboratory Blank	9/14/98	9/14/98	9/14/98	9/18/98	9/24/98	9/24/98	9/18/98	10/15/98	9/24/98	9/24/98	9/24/98	10/15/98	10/15/98	10/15/98
Total Suspended Particulate ($\mu g/m^3$)	27.6	70.3	58.1	51.3	36.9	27.7	46.9	47.2	54.1	24.4	42.0	14.5	52.4	47.9
Surrogate Recoveries (%)														
#65	97 %	98 %	95 %	96 %	84 %	83 %	93 %	98 %	75 %	89 %	51 %		74 %	97 %
#166	105 %	104 %	111 %	103 %	99 %	97 %	105 %	107 %	92 %	105 %	53 %		106 %	104 %

A.1. New Brunswick Particulate Phase PCBs (NB-QFF) Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	NB-QFF 10/1/98	NB-QFF 10/7/98	NB-QFF 10/10/98	NB-QFF 10/13/98	NB-QFF 10/19/98	NB-QFF 10/28/98	NB-QFF 11/6/98	NB-QFF 11/15/98	NB-QFF 11/24/98	NB-QFF 12/3/98	NB-QFF 12/12/98	NB-QFF 12/21/98	NB-QFF 12/30/98	NB-QFF 1/8/99
18	1.5	1.2	0.23	0.19	0.24	0.21	1.6	0.72	0.35	0.14	0	0.58	0.24	0.83
17+15	0	0.28	0	0	0.074	0	0.36	0.22	0	0.11	0	0.29	0.54	0.44
16+32	0	0.36	0	0.30	0.42	0	0	0.36	0	0.46	0	0.39	2.0	0.67
31	0.20	0	0	0	0	0	0	0	0	0.39	0	0.31	0.30	0.66
28	0.57	0.59	0.22	0.17	0.36	0.10	0	0.17	0.13	0.34	0	0.38	0.098	0.52
21+33+53	0.030	0	0	0	0.043	0.020	0	0.046	0.12	0.28	7.3	0.33	0.33	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0.16	0.43	0.20	0.51	0.57
52+43	2.2	0.24	0.46	0.89	1.2	0.32	1.4	1.2	1.1	1.1	0	1.1	0.91	1.7
49	0.67	0	0.061	0	0	0.074	0.15	0.17	0.25	0.12	0	0.074	0.36	0.23
47+48	0.17	0	0	0.070	0.12	0.17	0	0.098	0.087	0	0	0.026	0	0
44	0.24	0	0.10	0.33	0.13	0.079	0.29	0.14	0.28	0.094	0	0.28	0.31	0.45
37+42	0.22	0.17	0	0.16	0.20	0.22	0.50	0.34	0.33	0.40	0	0	0.31	0.66
41+71	0.57	0.43	0	0.20	0.22	0.017	0.12	0.39	0.20	0.12	0	0.15	0.22	0.26
64	0.57	0.37	0.14	0.18	0.14	0.28	0.29	0.33	0.23	0.16	0	0.11	0.22	0.15
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	0.31	0	0.25	0	0.33	0	0.19	0.19	0.31	0.24	0	0.20	0.32	0.36
70+76	0.33	0.058	0.20	0.036	0.24	0.13	0.35	0.20	0.52	0.16	0	0.26	0.45	0.44
66+95	0.86	0.19	0.83	0.23	0.40	0.46	1.5	1.4	1.5	0.89	0	0.70	1.7	1.6
91	0	0.51	0.24	0	0.27	0.062	0.38	0.36	0.45	0	1.2	0.17	0.37	0.75
56+60+89	0.87	0.25	0.15	0.20	0.25	0.16	0.28	0.56	0.47	0.38	0	0.27	0.23	0.74
92+84	0.97	0	0.67	0.19	0	0.31	1.3	1.1	1.1	0	0	0.55	1.3	1.0
101	1.0	0.26	0.66	0.23	0.44	0.45	1.2	0.69	1.3	0.46	1.2	0.49	1.4	1.2
83	0.26	0.14	0.12	0.10	0	0.11	0.16	0.19	0.14	0.20	0.23	0.093	0.19	0.61
97	0.18	0	0.13	0	0.14	0	0.38	0.19	0.34	0.10	0.42	0.15	0.32	0.35
87+81	0.77	0.40	0.34	0	0.28	0.14	1.1	0.62	0.93	0.30	1.7	0.39	1.0	1.2
85+136	0.45	0.23	0.24	0.13	0.34	0.30	0.40	0.13	0.39	0.18	0.53	0.17	0.46	0.57
110+77	0.87	0.35	0.56	0.16	0.30	0.40	1.4	0.60	1.4	0.49	1.5	0.61	1.4	2.1
82	0.13	0.040	0.080	0	0.095	0.031	0.16	0.11	0.17	0.063	0.22	0.071	0.098	0.24
151	0	0.072	0.048	0.010	0.047	0.098	0.15	0.093	0.19	0.073	0.14	0.065	0.25	0.16
135+144+147+124	0	0.30	0.072	0	0.12	0.23	0.22	0.16	0.24	0.13	0.37	0.12	0.33	0.42
149+123+107	0.49	0.26	0.32	0.046	0.24	0.27	0.79	0.44	0.80	0.68	1.1	0.65	0.91	1.7
118	0.62	0.21	0.42	0.12	0.31	0.27	0.97	0.44	0.89	0.67	1.4	0.69	0.83	2.5
146	0.18	0	0	0	0.17	0.14	0.27	0.20	0.22	0.25	0.32	0.13	0.16	0.66
153+132	0.87	0.19	0.42	0.15	0.51	0.33	1.2	0.75	1.2	0.68	1.4	0.59	0.85	2.8
105	0	0	0	0	0	0	0	0.45	0	0	0	0	0	2.8
141	0.19	0.10	0.090	0.056	0.20	0.087	0.34	0.23	0.29	0.21	0.58	0.12	0.21	0.57
137+176+130	0.28	0.056	0.11	0.068	0.17	0	0	0	0.19	0	0	0	0	0
163+138	1.3	0.10	0.51	0.15	0.72	0.41	1.8	0.99	1.3	1.0	1.8	1.1	1.1	4.8
178+129	0	0	0	0	0	0.098	0.27	0.24	0.28	0.057	0	0	0.18	0.28
187+182	0.29	0.11	0.091	0	0.11	0.098	0.30	0.29	0.29	0.33	0.35	0.17	0.21	1.1
183	0.32	0	0	0	0	0.11	0.33	0.30	0.26	0.26	0.22	0.17	0.16	0.82
185	0.072	0	0.039	0	0	0.029	0.074	0.079	0.079	0	0	0	0.017	0.14
174	0.27	0.069	0.071	0.050	0.19	0.12	0.31	0.29	0.29	0.47	0.38	0.23	0.21	1.1
177	0.14	0	0	0	0.028	0.045	0.21	0.14	0.12	0.36	0.22	0.17	0.18	0.71
202+171+156	0	0	0.099	0	0.20	0.10	0	0	0	0.45	0.30	0.10	0.13	1.1
180	0.56	0.25	0.17	0.095	0.43	0.24	0.65	0.61	0.53	1.3	0.63	0.49	0.38	2.6
199	0	0	0	0	0	0.018	0.026	0	0	0.060	0.060	0.049	0.038	0.15
170+190	0.34	0.10	0.097	0.062	0.25	0.14	0.32	0.30	0.25	0.64	0.37	0.28	0.21	0.79
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0.23	0.058	0.028	0.035	0.20	0.15	0.40	0.42	0.31	0.95	0.50	0.32	0.21	1.6
203+196	0.39	0.12	0.12	0	0.31	0.18	0.44	0.51	0.36	1.1	0.50	0.35	0.28	1.9
195+208	0.046	0.038	0	0	0.076	0.040	0.070	0.077	0.078	0.23	0.087	0.12	0.037	0.28
194	0.14	0.079	0.050	0.035	0.14	0.074	0.14	0.16	0.12	0.96	0.14	0.17	0.095	0.64
206	0.098	0.035	0.035	0.026	0	0.058	0.12	0.11	0.079	0.52	0.18	0.15	0.065	0.48
Total PCBs	21	8.2	8.5	4.7	11	7.4	23	18	20	19	26	15	23	49
Homologue Group														
3	2.5	2.6	0.45	0.82	1.3	0.55	2.5	1.9	0.93	2.1	7.3	2.3	3.8	3.8
4	6.8	1.5	2.2	2.1	3.1	1.7	4.6	4.7	4.9	3.4	0.43	3.3	5.3	6.5
5	5.3	2.2	3.5	0.93	2.2	2.1	7.4	4.9	7.0	2.5	8.4	3.4	7.4	13
6	3.3	1.1	1.6	0.48	2.2	1.6	4.8	2.8	4.4	3.0	5.7	2.8	3.8	11
7	2.0	0.53	0.47	0.21	1.0	0.88	2.5	2.3	2.1	3.4	2.2	1.5	1.5	7.6
8	0.81	0.30	0.29	0.070	0.93	0.56	1.1	1.2	0.87	3.7	1.6	1.1	0.78	5.7
9	0.098	0.035	0.035	0.026	0	0.058	0.12	0.11	0.079	0.52	0.18	0.15	0.065	0.48
Corresponding Laboratory Blank	10/15/98	10/19/98	10/19/98	1/4/99	2/9/99	2/9/99	1/4/99	1/4/99	2/17/99	2/17/99	2/17/99	3/2/99	3/2/99	3/2/99
Total Suspended Particulate ($\mu g/m^3$)	45.1	44.2	18.5	33.9	55.4	35.0	40.4	34.1	21.9	58.8	42.9	77.5	24.0	78.2
Surrogate Recoveries (%)														
#65	65 %	72 %	86 %	87 %	82 %	79 %	80 %	74 %	104 %	104 %	108 %	94 %	80 %	86 %
#166	73 %	84 %	88 %	89 %	89 %	96 %	95 %	86 %	114 %	107 %	88 %	93 %	107 %	97 %

A.1. New Brunswick Particulate
Phase PCBs (NB-QFF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	NB-QFF 1/17/99	NB-QFF 1/26/99	NB-QFF 2/4/99	NB-QFF 2/13/99	NB-QFF 2/22/99	NB-QFF 3/3/99	NB-QFF 3/12/99	NB-QFF 3/21/99	NB-QFF 3/30/99	NB-QFF 4/8/99	NB-QFF 4/16/99	NB-QFF 4/26/99	NB-QFF 5/5/99	NB-QFF 5/14/99
18	0.50	0.54	1.0	0.21	0	0	0.14	0.12	0.39	1.1	0.10	0.36	0.35	0.48
17+15	0.048	0.68	0.32	0.34	0.84	0	0.15	0.27	0.45	0.59	0	0	0	0
16+32	0.24	2.4	0.79	0	0	0	0.63	0.47	0	1.1	0.30	0.90	0.77	1.6
31	0.11	1.1	0.18	0.36	0	0	0.44	0.26	0.47	0.97	0.20	0.68	0.65	0.87
28	0	0.23	0.094	0.10	0.094	0.11	0.17	0.10	0.31	0.66	0.14	0.86	0.53	0.40
21+33+53	0	0.38	0	0.18	1.1	0	0.13	0.10	0.35	0.51	0	0	0	0
22	0	0	0	0.30	0	0	0	0	0	0	0.28	0.60	0.59	1.0
45	0	0	0	0	0	0	0	0.13	0.22	0.40	0	0.066	0	0
52+43	0	0	0	1.5	0	0	1.7	0.37	0	0	0.57	1.1	0.97	1.1
49	0	0.34	0	0.41	0.49	0	0.21	0.057	0.14	0.34	0.28	0.43	0.59	0.40
47+48	0.15	0.27	0	0.094	0.33	0	0.18	0.100	0.26	0.19	0.17	0.086	0	0.11
44	0.13	0.94	0.25	0.32	0.58	0	0.57	0.068	0.14	0.59	0.21	0.60	0.96	0.43
37+42	0.32	0.47	0.34	0.39	1.0	0	0.33	0.16	0.29	0.72	0	0.076	0.26	0.086
41+71	0.19	0.32	0.21	0.14	0.35	0	0.14	0.081	0.11	0.21	0.12	0.37	0.63	1.1
64	0.17	0	0.14	0.12	0.39	0	0.16	0.10	0.11	0.25	0.06	0.096	0.23	0
40	0	0	0	0	0	0	0.12	0	0	0	0	0	0	0
74	0.15	0.36	0	0.16	0.51	0	0.27	0	0.17	0.26	0.073	0.13	0.20	0.12
70+76	0.16	0.73	0.36	0.56	0.71	0	0.75	0.18	0.23	0.35	0.18	0.36	0.63	0.23
66+95	1.0	2.7	0.49	2.1	3.0	0	2.8	0.51	0.71	0.97	0.56	1.2	1.5	0.74
91	0.21	0.95	0.39	0.72	1.1	0	0.49	0.20	0.17	0.45	0	0.10	0	0
56+60+89	0.48	0.61	0.28	0.29	1.00	0	0.30	0.22	0.35	0.65	0.16	0.28	0.54	0.29
92+84	0.58	0	0.69	0.98	1.9	0	1.7	0.32	0.66	1.4	0.33	0.77	0.60	0.26
101	0.52	1.8	0.94	1.3	1.7	0.39	2.0	0.34	0.65	1.1	0.39	0.86	0.68	0.39
83	0.15	0.34	0.18	0.19	0.30	0	0.16	0.082	0.11	0.32	0	0	0	0
97	0.16	0.47	0.14	0.25	0.36	0	0.41	0.080	0.16	0.26	0.090	0.18	0.17	0.088
87+81	0.46	1.4	0.41	0.73	0	0.50	1.1	0.34	0.62	0.52	0	0	0	0
85+136	0.25	0.92	0.30	0.55	0.68	0	0.70	0.15	0.44	0.44	0	0.27	0.22	0.41
110+77	0.64	2.3	0.87	1.3	1.6	0.45	1.8	0.37	1.0	1.5	0.49	1.1	0.90	0.59
82	0.084	0.21	0.079	0.099	0.12	0	0.15	0.058	0.086	0.16	0.065	0.13	0.14	0.084
151	0.099	0.34	0.12	0.19	0.19	0	0.26	0.058	0.13	0.21	0.091	0.19	0.20	0.18
135+144+147+124	0.072	0.53	0.16	0.25	0.40	0	0.33	0.078	0.21	0.26	0.091	0.20	0.19	0.24
149+123+107	0.65	1.7	0.67	0.81	0.94	0.41	0.95	0.46	0.82	1.3	0.30	0.93	1.1	0.79
118	0.77	2.0	0.69	0.81	1.2	0.47	0.87	0.50	0.93	2.3	0	0	0	0
146	0.21	0	0.21	0.19	0.20	0	0.19	0.17	0.20	0.58	0.12	0.17	0.19	0
153+132	0.76	2.3	0.68	0.84	0.88	0.099	0.87	0.41	0.93	1.5	0.47	1.2	1.7	1.1
105	0	0.54	0	0.30	0.58	0	0	0	0	0.70	0	0.51	0.68	0.37
141	0.20	0.076	0.16	0.21	0.29	0.063	0.20	0.069	0.22	0.36	0.10	0.29	0.28	0
137+176+130	0	0	0	0	0	0	0	0	0	0	0	0	0	0
163+138	1.4	3.1	1.2	1.0	1.2	0.53	0.98	0.67	1.3	2.5	0.63	1.6	1.9	1.5
178+129	0.15	0.28	0.064	0.092	0	0	0.056	0	0.081	0.12	0.024	0	0	0
187+182	0.33	0.64	0.26	0.24	0.16	0.083	0.16	0.17	0.35	0.52	0.045	0.21	0.27	0.24
183	0.25	0.39	0.23	0	0.21	0.061	0.11	0.13	0.20	0.34	0.053	0.15	0.21	0.21
185	0	0.072	0.035	0.017	0	0	0.014	0	0.041	0.053	0	0.014	0	0
174	0.28	0.48	0.24	0.19	0.18	0.11	0.14	0.13	0.28	0.51	0.074	0.24	0.33	0.30
177	0.32	0.50	0.18	0.13	0.15	0.077	0.11	0.14	0.21	0.35	0.049	0.12	0.22	0.19
202+171+156	0.20	0.33	0.12	0.10	0.21	0.18	0.062	0.11	0.15	0.39	0.075	0	0.25	0.11
180	0.81	0.98	0.65	0.36	0.27	0.17	0.25	0.29	0.52	1.1	0.19	0.47	0.90	0
199	0.047	0.083	0.030	0.026	0	0	0	0.030	0.026	0.032	0.060	0.011	0.029	0.018
170+190	0.35	0.38	0.21	0.15	0.24	0.11	0.11	0.11	0.22	0.45	0.11	0.21	0.40	0.31
198	0	0	0	0	0	0	0	0	0	0				
201	0.52	0.64	0.39	0.18	0.22	0.12	0.10	0.18	0.23	0.47	0.10	0.28	0.42	0.39
203+196	0.64	0.73	0.47	0.23	0.28	0.14	0.13	0.21	0.36	0.59	0.13	0.27	0.45	0.42
195+208	0.083	0.12	0.057	0.033	0.037	0.036	0.015	0.045	0.023	0.095	0.024	0.059	0.21	0.080
194	0.20	0.30	0.16	0.070	0.068	0.044	0.037	0.35	0.13	0.25	0.061	0.10	0.22	0.21
206	0.15	0.20	0.16	0.062	0.069	0.054	0.042	0.43	0.10	0.20	0.15	0.092	0.15	0.14
Total PCBs	15	37	16	20	26	4.2	24	10	16	31	7.7	19	22	17
Homologue Group														
3	1.2	5.8	2.8	1.9	3.1	0.11	2.0	1.5	2.3	5.7	1.0	3.5	3.1	4.4
4	2.5	6.3	1.7	5.7	7.3	0	7.2	1.8	2.4	4.2	1.8	3.5	4.8	3.8
5	3.8	11	4.7	7.3	9.6	1.8	9.4	2.4	4.8	9.2	2.0	5.1	5.2	2.6
6	3.4	8.0	3.1	3.5	4.1	1.1	3.8	1.9	3.8	6.7	1.9	5.3	6.1	4.4
7	2.5	3.7	1.9	1.2	1.2	0.62	0.94	0.96	1.9	3.4	0.44	1.2	1.9	0.94
8	1.7	2.2	1.2	0.65	0.81	0.52	0.35	0.93	0.91	1.8	0.56	0.93	2.0	1.5
9	0.15	0.20	0.16	0.062	0.069	0.054	0.042	0.43	0.10	0.20	0.15	0.092	0.15	0.14
Corresponding Laboratory Blank	3/2/99	4/12/99	4/12/99	4/21/99	4/21/99	4/21/99	5/18/99	5/18/99	5/18/99	5/18/99				
Total Suspended Particulate (μg/m^3)	55.4	45.6	39.7	26.1	34.6	33.0	16.9	45.5	28.1	70.0	38	61	107	54
Surrogate Recoveries (%)														
#65	38 %	81 %	96 %	92 %	93 %	88 %	89 %	93 %	83 %	83 %	85 %	66 %	69 %	70 %
#166	36 %	82 %	102 %	84 %	77 %	94 %	81 %	90 %	90 %	88 %	88 %	89 %	82 %	85 %

A.1. New Brunswick Particulate
Phase PCBs (NB-QFF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	NB-QFF 5/23/99	NB-QFF 6/1/99	NB-QFF 6/10/99	NB-QFF 6/19/99	NB-QFF 6/28/99	NB-QFF 7/7/99	NB-QFF 7/16/99	NB-QFF 7/25/99	NB-QFF 8/3/99	NB-QFF 8/12/99	NB-QFF 8/21/99	NB-QFF 8/30/99	NB-QFF 9/8/99
18	0	0.29	0.32	0.17	0	0	0.11	0.089	0.17	RON	Hites	0.27	0.053
17+15	0	0	0	0	0	0	0	0	0			0	0
16+32	0.17	0.61	0.55	0.27	0.15	0.20	0.17	0	0			0.42	0.031
31	0.33	0.48	0.65	0.54	0.17	0.29	0.29	0.17	0.42			0.38	0.15
28	0.19	0.28	0.37	0.26	0.11	0.19	0.20	0.13	0.24			0.27	0.063
21+33+53	0	0	0	0	0	0	0	0	0			0	0
22	0.28	0.56	1.2	0.73	0.22	0.65	0.29	0.37	0.49			0	0.076
45	0	0	0	0	0	0	0	0	0			0	0
52+43	0.24	0.84	1.1	0.88	0.25	0.46	0.41	0.40	0.64			0.37	0.17
49	0.25	0.52	0.62	0.46	0.17	0.35	0.42	0.27	0.38			0.21	0.30
47+48	0	0	0	0	0.10	0	0	0	0			0.055	0.070
44	0.20	0.50	0.82	0	0.15	0.31	0.30	0.24	0.38			0.25	0
37+42	0.078	0.12	0.16	0	0.052	0.071	0.073	0	0.12			0	0
41+71	0.11	0.35	0.35	0.19	0.071	0.16	0.22	0.094	0.17			0.27	0.064
64	0.051	0.083	0.15	0.063	0.039	0.038	0.056	0.028	0.057			0.066	0.022
40	0	0	0	0	0	0	0	0	0			0	0
74	0.056	0.10	0.17	0.061	0.049	0.068	0.037	0.062	0.079			0.067	0.017
70+76	0.14	0.21	0.51	0.26	0.12	0.15	0.12	0.14	0.33			0.18	0.059
66+95	0.42	0.62	1.9	0.76	0.33	0.52	0.40	0.34	0.60			0.50	0.21
91	0	0	0	0	0	0	0	0	0			0	0
56+60+89	0.19	0.22	0.65	0.17	0.15	0.21	0.16	0.14	0.18			0.20	0.075
92+84	0.25	0.42	1.5	0.73	0.30	0.39	0.24	0.15	0.32			0.34	0.20
101	0.20	0.44	1.5	0.57	0.25	0.41	0.27	0.22	0.31			0.35	0.13
83	0	0	0	0	0	0	0	0	0			0	0
97	0.055	0.083	0.27	0.11	0.068	0.076	0.064	0.054	0.081			0.084	0.028
87+81	0	0	0	0	0	0	0	0	0			0	0
85+136	0	0.13	0.41	0.21	0.049	0.14	0.054	0.082	0			0.069	0
110+77	0.38	0.54	2.0	0.65	0.29	0.39	0.36	0.29	0.44			0.49	0.15
82	0.075	0.12	0.21	0.073	0.049	0.050	0.070	0.069	0.10			0.096	0.033
151	0.089	0.18	0.33	0.15	0.10	0.20	0.17	0.14	0.13			0.16	0.061
135+144+147+124	0.10	0.17	0.46	0.18	0.077	0.16	0.16	0.11	0.11			0.17	0.050
149+123+107	0.39	0.53	1.6	0.54	0.21	0.67	0.60	0.36	0.38			0.61	0.17
118	0	0	0	0	0	0	0	0	0			0	0
146	0	0.14	0.34	0.15	0.12	0.12	0.13	0.10	0.14			0.14	0.14
153+132	0.097	0.75	2.6	0.79	0.36	1.0	0.99	1.1	0.81			0.98	0.32
105	0	0	1.1	0.23	0.12	0	0	0	0			0.35	0.10
141	0.098	0.19	0.49	0.15	0.091	0.24	0.18	0.15	0.17			0.21	0.082
137+176+130	0	0	0	0	0	0	0	0	0			0	0
163+138	0.67	0.94	3.9	1.1	0.44	1.1	0.81	0.69	0.88			1.2	0.34
178+129	0	0	0.45	0	0.032	0	0	0	0			0	0
187+182	0.080	0.15	0.46	0.16	0.023	0.27	0.18	0.12	0.18			0.19	0.052
183	0.078	0.15	0.33	0.11	0.065	0.18	0.16	0.10	0.12			0.15	0.054
185	0.0090	0.020	0.030	0	0	0.033	0.023	0.021	0			0.017	0.008
174	0.12	0.18	0.55	0.19	0.075	0.32	0.22	0.18	0.19			0.24	0.077
177	0.080	0.11	0.35	0.13	0.059	0.18	0.15	0.12	0.13			0.17	0.054
202+171+156	0.10	0.076	0.45	0.14	0.047	0.13	0.090	0.067	0.13			0.12	0
180	0.28	0.37	1.3	0.40	0.13	0.68	0.38	0.29	0.43			0.56	0.14
199	0.0063	0.017	0.029	0.013	0	0.017	0.012	0.015	0.039			0.013	0.0053
170+190	0.15	0.19	0.66	0	0.057	0.29	0.18	0.13	0.19			0.26	0.053
198													
201	0.19	0.19	0.50	0.20	0.082	0.28	0.17	0.13	0.25			0.30	0.072
203+196	0.20	0.21	0.56	0.21	0.085	0.32	0.20	0.14	0.26			0.32	0.080
195+208	0.056	0.18	0.16	0.079	0.029	0.10	0.11	0.090	0.17			0.089	0.036
194	0.15	0.10	0.35	0.12	0.084	0.17	0.097	0.067	0.11			0.17	0.041
206	0.18	0.097	0.21	0.079	0.17	0.10	0.094	0.073	0.13			0.12	0.028
Total PCBs	6.8	12	33	12	5.6	12	9.4	7.5	10			11	3.9
Homologue Group													
3	1.0	2.3	3.3	2.0	0.70	1.4	1.1	0.76	1.4			1.3	0.37
4	1.2	2.8	4.3	2.1	1.1	1.7	1.7	1.4	2.2			1.7	0.78
5	1.5	2.3	9.0	3.5	1.5	1.9	1.5	1.3	2.1			2.3	1.0
6	1.6	3.2	11	3.5	1.5	3.8	3.2	2.8	2.8			3.8	1.2
7	0.64	0.98	3.5	1.00	0.39	1.6	1.1	0.83	1.0			1.3	0.38
8	0.85	0.95	2.7	0.76	0.38	1.3	0.85	0.63	1.1			1.3	0.29
9	0.18	0.097	0.21	0.079	0.17	0.10	0.094	0.073	0.13			0.12	0.028
Corresponding Laboratory Blank													
Total Suspended Particulate (μg/m³)	68	89	67	45	52	50	102	44	33	76	27	35	69
Surrogate Recoveries (%)													
#65	71 %	88 %	56 %	78 %	79 %	62 %	88 %	77 %	89 %			74 %	73 %
#166	98 %	94 %	78 %	98 %	98 %	84 %	100 %	85 %	95 %			91 %	81 %

A.1. New Brunswick Particulate
Phase PCBs (NB-QFF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	NB-QFF 9/15/99	NB-QFF 9/27/99	NB-QFF 10/9/99	NB-QFF 10/21/99	NB-QFF 11/2/99	NB-QFF 11/14/99	NB-QFF 11/26/99	NB-QFF 12/8/99	NB-QFF 12/20/99
18	0.083	0	SAMPLE	0	0	0.24	0.15	0.25	0.30
17+15	0	0		0	0	0	0	0	0
16+32	0.067	0.092		0.48	0.073	0.26	0	0.67	0.30
31	0.20	0.26		0.21	0.16	0.42	0	0.49	0.27
28	0.12	0.14		0.13	0.095	0.22	0	0.17	0.10
21+33+53	0	0		0	0	0	0	0	0
22	0.41	0.59		0.32	0.48	0.58	0.33	0.26	0.20
45	0	0		0.00	0	0.86	0	0	0
52+43	0.25	0.31		0.30	0.26	1.2	0.30	0.88	0.11
49	0.23	0.26		0.14	0.21	0.34	0.19	0.50	0.081
47+48	0.00	0.11		0	0.19	0.14	0.18	1.0	0
44	0.23	0.19		0	0.14	0.35	0	0	0.069
37+42	0	0.033		0	0	0	0	0	0
41+71	0.086	0.046		0	0	0.20	0.068	0.21	0
64	0.028	0.034		0	0	0.066	0.028	0.067	0
40	0	0		0	0	0	0	0	0
74	0.045	0.067		0.063	0.038	0.18	0.045	0.19	0.016
70+76	0.10	0.14		0.092	0.088	0.42	0.083	0.39	0.029
66+95	0.34	0.68		0.23	0.22	1.5	0.52	1.1	0.15
91	0	0		0	0	0.14	0	0	0
56+60+89	0.11	0.13		0.094	0.063	0.26	0.072	0.28	0.039
92+84	0.25	0.19		0.18	0.091	0.47	0.13	0.69	0.34
101	0.24	0.30		0.21	0.14	0.99	0.16	0.88	0.076
83	0	0		0	0	0.05	0	0	0
97	0.063	0.061		0.058	0	0.22	0.035	0.21	0.016
87+81	0	0		0	0	0	0	0	0
85+136	0.048	0		0.14	0.037	0.21	0.017	0.11	0.14
110+77	0.32	0.24		0.23	0.11	0.88	0.12	0.75	0.087
82	0.050	0.048		0.041	0.022	0.051	0.037	0.085	0.060
151	0.12	0.090		0.098	0.072	0.23	0.053	0.34	0.099
135+144+147+124	0.12	0.083		0.095	0.064	0.28	0.053	0.28	0.054
149+123+107	0.47	0.32		0.35	0.20	0.99	0.16	1.2	0.11
118	0	0		0	0	0	0	0	0
146	0.12	0.081		0.14	0.099	0.14	0.092	0.19	0.057
153+132	0.68	0.65		0.76	0.21	1.0	0.17	1.3	0.12
105	0	0.33		0	0	0	0	0.76	0
141	0.16	0.10		0.094	0.054	0.25	0.036	0.050	0.044
137+176+130	0	0		0	0	0	0	0	0
163+138	0.86	0.62		0.76	0.34	1.6	0.23	0.20	0.17
178+129	0	0		0	0	0	0	0	0
187+182	0.072	0.067		0.16	0.046	0.30	0.0072	0.58	0.10
183	0.14	0.077		0.12	0.054	0.18	0.032	0.31	0.049
185	0.016	0.016		0.024	0.015	0.032	0	0.040	0.0082
174	0.22	0.13		0.20	0.085	0.26	0.072	0.49	0.17
177	0.13	0.11		0.21	0.079	0.17	0.045	0.25	0.014
202+171+156	0.13	0		0	0.038	0.16	0.032	0.36	0.045
180	0.48	0.26		0.47	0.17	0.56	0.10	1.1	0.13
199	0.0075	0.0060		0.026	0	0.013	0	0.046	0.019
170+190	0.26	0.091		0.15	0.052	0.24	0.039	0.45	0.025
198									
201	0.28	0.12		0.30	0.099	0.31	0.058	0.76	0.081
203+196	0.31	0.16		0.31	0.15	0.36	0.098	0.81	0.22
195+208	0.076	0.034		0.066	0.029	0.069	0.016	0.20	0.033
194	0.22	0.075		0.14	0.048	0.17	0.032	0.39	0.039
206	0.27	0.073		0.13	0.12	0.26	0.050	0.31	0.072
Total PCBs	8.4	7.4		7.5	4.4	18	3.8	20	4.0
Homologue Group									
3	0.88	1.1		1.1	0.81	1.7	0.48	1.8	1.2
4	1.1	1.3		0.68	0.98	4.0	0.96	3.5	0.34
5	1.3	1.9		1.0	0.64	4.5	1.2	4.7	0.77
6	2.7	2.0		2.6	1.1	4.9	0.85	3.7	0.83
7	1.1	0.67		1.2	0.45	1.5	0.26	2.8	0.47
8	1.3	0.48		0.98	0.41	1.3	0.28	3.0	0.46
9	0.27	0.073		0.13	0.12	0.26	0.050	0.31	0.072
Corresponding Laboratory Blank									
Total Suspended Particulate (µg/m^3)	50	41		27	24	48	20	39	23
Surrogate Recoveries (%)									
#65	69 %	62 %		73 %	58 %	63 %	51 %	80 %	73 %
#166	90 %	78 %		78 %	62 %	77 %	59 %	93 %	82 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	NB-PUF 10/5/97	NB-PUF 10/8/97	NB-PUF 10/9/97	NB-PUF 10/12/97	NB-PUF 10/13/97	NB-PUF 10/15/97	NB-PUF 10/16/97	Split PUF top NB-PUF 10/21/97	Split PUF bottom NB-PUF 10/21/97	NB-PUF 10/28/97	Duplicate Samples NB-PUF 10/29/97	Duplicate Samples NB-PUF 10/29/97	Duplicate Samples NB-PUF 11/2/97	Duplicate Samples NB-PUF 11/2/97	NB-PUF 11/6/97
18		71	43	40	41	29	27	15	1.9	15	31	35	13	14	44
17+15		45	26	25	16	19	10	5.6	0.56	7.4	17	22	4.4	7.8	25
16+32		98	72	63	49	38	44	20	0	22	38	57	16	17	50
31		66	48	24	25	20	25	12	0.72	18	48	33	14	16	47
28		99	81	46	45	29	27	13	0	15	29	29	13	11	30
21+33+53		51	42	21	21	15	16	7.7	0	9.8	19	23	7.2	9.7	31
22		55	48	28	30	23	19	5.6	0.52	5.7	14	13	4.4	6.8	36
45		38	35	24	30	0	0	3.9	0	0	12	0	0	0	0
52+43		46	31	19	20	16	10	6.6	0	6.8	11	15	6.5	6.7	35
49		30	13	0	8.2	7.4	5.6	3.5	0	4.5	4.6	1.9	2.6	3.1	14
47+48		37	31	8.9	17	0	9.1	4.3	0.16	5.4	9.0	3.3	5.7	6.5	14
44		59	53	35	34	20	11	6.5	0.31	6.6	14	22	6.4	8.0	21
37+42		0	16	5.2	5.3	5.2	3.5	1.7	0	2.1	4.0	7.1	1.9	2.1	6.2
41+71		19	9.8	0	5.0	4.6	6.4	2.5	0.27	2.8	4.6	5.0	2.1	1.4	9.9
64		19	13	6.0	5.7	4.3	4.4	2.2	0.12	2.6	5.4	6.9	2.1	2.2	7.8
40		7.7	0	0	0	2.1	3.4	1.3	0	1.5	4.1	3.9	1.3	1.4	3.2
74		12	6.6	0	4.4	5.9	4.1	1.8	0	2.5	6.4	4.9	2.1	3.5	3.5
70+76		26	19	11	11	9.5	7.6	6.0	0	9.0	13	15	5.6	8.4	13
66+95		36	22	10	15	0	4.2	2.5	0.12	18	28	33	11	17	48
91		0	0	0	0	0	4.0	1.7	0	1.7	2.6	3.2	1.9	2.8	9.0
56+60+89		25	21	0	9.6	6.2	0	1.8	0	6.3	12	12	4.0	5.3	7.7
92+84		21	17	8.3	7.9	9.6	2.8	3.6	0	3.9	6.3	7.1	4.3	4.2	16
101		16	14	8.9	8.1	7.5	5.1	3.3	0.019	4.2	6.9	7.3	3.9	4.9	15
83		1.3	0	0	0.40	0.67	0	0.19	0	0	0	0	0	0	1.9
97		5.3	4.8	3.3	2.6	2.5	1.4	0.93	0	0.94	1.4	1.4	1.1	1.1	2.9
87+81		8.7	7.4	6.0	4.7	4.3	3.5	1.3	0	1.5	3.1	2.5	1.6	2.0	7.4
85+136		0	0	0	0	0	0.41	0.60	0	0.45	0.58	0.46	1.3	0.34	1.0
110+77		20	19	11	11	7.9	7.1	4.1	0	4.3	5.7	6.8	4.1	4.4	15
82		2.0	1.4	1.0	0.68	0.80	0.45	0.29	0	0.25	0.50	0.50	0.21	0.28	0.98
151		3.6	3.3	2.4	2.3	2.1	0.89	0.70	0.12	0.56	0.84	1.2	0.63	0.62	1.5
135+144+147+124		6.9	2.8	1.3	1.5	1.2	1.0	0.42	0	0.32	0.65	0.69	0.56	0.55	1.1
149+123+107		9.6	11	5.4	6.2	4.0	2.6	1.9	0.044	1.5	2.8	2.7	2.4	2.2	4.5
118		7.1	7.3	3.7	4.0	2.9	0	1.3	0	0	2.1	1.5	1.6	1.2	4.0
146		0	0	0	0	0	0.52	0.26	0	0.15	0.28	0	0.39	0	0
153+132		2.1	2.4	1.5	1.3	0.77	5.2	3.5	0	2.7	5.0	5.5	4.4	4.9	5.1
105		0	0	0	0	0	0	0	0	0	0	0	0	0	3.4
141(+ 179 from 4/16/99)		2.5	2.9	2.3	2.0	1.4	0.28	0.34	0	0.29	0.50	0.57	0.48	0.48	0.94
137+176+130		0.72	0.91	0	0.56	0.55	0.44	0.18	0.094	0	0	0	0	0.44	0
163+138		11	14	5.7	7.6	4.2	2.8	1.6	0	1.3	2.8	0	2.5	2.3	3.8
178+129		1.1	1.1	0	0.49	0	0	0.82	0	0.064	0.23	0	0.21	0.57	0
187+182		3.3	4.4	2.6	2.1	0	0.78	0.48	0	0.40	0.62	0.39	0.72	0.92	1.6
183		2.0	2.6	1.6	1.7	1.4	0.59	0.27	0	0.20	0.29	0.50	0.39	0.45	0.51
185		0	0	0	0.20	0.20	0	0.061	0	0.027	0	0.10	0.056	0.050	0
174		1.6	2.2	1.3	0.96	0.70	0	0.18	0	0.17	0.33	0.55	0.33	0.38	0.35
177		1.1	2.3	0.78	0.64	0.52	0.12	0.095	0	0.079	0.22	0.15	0.17	0.14	0.18
202+171+156		0	0	0	0	0	0.071	0.073	0	0.052	0.14	0.073	0.16	0.11	0.16
180		2.2	2.8	1.1	1.3	1.2	0.42	0.26	0	0.17	0.43	0.47	0.50	0.52	0.50
199		0	0.38	0	0	0	0	0.043	0	0.0078	0	0	0.033	0	0
170+190		1.4	2.0	0.72	1.4	0	0	0	0	0.10	0	0	0.29	0.13	0
198		0	0	0	0	0	0	0	0	0	0	0	0	0	0
201		2.6	2.5	0.58	0.67	0.32	0.17	0.15	0	0.075	0.095	1.3	0.22	0.16	0.13
203+196		1.3	1.8	0.74	1.1	0.68	0	0.074	0	0.052	0.19	0	0.26	0.24	0.28
195+208		0	0	0	0	0	0	0	0	0	0	0	0	0	0
194		0.12	0	0	0.11	0	0	0	0	0	0	0	0	0	0
206		0.39	0	0.070	0.23	1.5	0	0	0	0	0	0	0	0	0
Total PCBs		973	761	435	463	310	278	152	5.0	186	369	388	158	184	544
Homologue Group															
3		484	377	251	233	178	171	80	3.7	95	200	220	74	84	269
4		354	254	114	159	75	66	43	0.98	66	124	123	49	64	178
5		81	71	42	39	36	25	17	0.019	17	29	31	20	21	76
6		36	37	19	21	14	14	8.9	0.25	6.8	13	11	11	11	17
7		13	17	8.1	8.6	3.9	1.9	2.2	0	1.2	2.1	2.2	2.7	3.1	3.1
8		4.1	4.7	1.3	1.9	1.0	0.25	0.34	0	0.19	0.43	1.4	0.67	0.51	0.58
9		0.39	0	0.070	0.23	1.5	0	0	0	0	0	0	0	0	0
Corresponding Laboratory Blank	10/14/97	10/2/97	10/22/97	10/28/97	10/22/97	10/28/97	10/28/97	10/22/97	10/22/97	11/9/97	11/9/97	11/9/97	11/9/97	11/9/97	3/5/98
Surrogate Recoveries (%)															
#65		298 %	320 %	184 %	338 %	140 %	161 %	83 %	59 %	117 %	130 %	118 %	76 %	109 %	119 %
#166		85 %	83 %	89 %	87 %	87 %	102 %	99 %	68 %	99 %	104 %	96 %	94 %	99 %	102 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	NB-PUF 11/12/97	NB-PUF 11/18/97	NB-PUF 11/24/97	NB-PUF 11/30/97	NB-PUF 12/6/97	NB-PUF 12/12/97	NB-PUF 12/18/97	NB-PUF 12/24/97	NB-PUF 12/30/97	NB-PUF 1/5/98	NB-PUF 1/11/98	NB-PUF 1/17/98	NB-PUF 1/23/98	NB-PUF 1/29/98	NB-PUF 2/4/98
18	23	22	10	74	14	41	46	39	16	94	16	26	42	26	29
17+15	14	13	6.3	33	7.1	25	22	20	10	53	8.3	13	24	9.0	13
16+32	26	24	8.9	48	11	28	43	36	12	114	20	36	51	28	25
31	20	18	6.1	44	9.2	22	35	26	7.4	105	11	16	37	21	22
28	13	11	4.6	26	5.2	15	21	17	5.5	68	8.7	12	28	15	17
21+33+53	15	13	4.0	29	2.0	12	21	16	5.0	69	7.6	13	26	15	12
22	12	14	4.5	38	9.2	9.7	16	31	0	50	7.8	9.9	19	0	0
45	8.6	0	0	0	0	9.8	0	17	0	41	0	0	0	0	0
52+43	17	15	6.1	51	5.9	18	26	25	5.4	75	11	17	34	17	17
49	5.6	6.3	2.3	17	2.0	5.6	11	11	1.6	35	4.5	6.2	15	4.0	6.5
47+48	4.1	4.7	4.2	21	6.2	26	17	29	8.3	52	16	24	32	18	21
44	10	8.1	3.6	31	4.7	9.9	16	15	5.8	53	6.1	8.1	25	11	12
37+42	2.1	1.5	0.44	5.7	1.2	2.4	3.3	4.3	0	18	1.9	2.9	0	0	3.7
41+71	3.6	2.3	1.5	5.6	2.3	2.6	3.2	7.9	3.5	19	2.2	3.8	6.8	7.4	9.5
64	3.1	2.8	1.1	7.4	1.5	3.5	4.9	4.8	1.2	16	2.1	3.4	7.4	3.7	3.7
40	1.3	0	0.49	4.6	0.48	0	0	2.1	0	9.5	0.71	1.5	3.5	0	0
74	1.5	1.2	1.2	4.3	1.2	3.1	5.3	3.9	0.96	17	1.6	2.3	5.4	2.1	2.2
70+76	5.5	4.1	2.4	15	1.3	7.7	12	7.8	1.0	32	2.5	4.0	13	6.5	4.4
66+95	20	21	9.8	81	6.7	26	37	35	8.4	98	12	19	46	25	19
91	3.1	4.4	1.8	17	1.8	4.9	7.6	8.4	0	18	2.7	5.4	7.4	5.7	0
56+60+89	2.0	2.1	0.81	6.6	0.65	3.9	6.5	3.2	0	19	1.1	2.9	2.6	0	0
92+84	4.6	5.8	2.1	28	1.7	6.3	10	9.5	0	23	3.2	5.8	13	6.3	4.3
101	5.6	6.2	2.7	24	2.3	8.5	12	12	2.6	31	3.9	7.2	17	11	7.7
83	0.37	0.73	0.15	2.0	0	0.39	0.60	1.8	0	0	0	0	0.78	0	0
97	1.0	1.3	0.50	4.8	0.77	1.3	1.9	2.8	1.4	5.5	0.79	1.6	3.2	2.9	2.6
87+81	3.1	4.2	1.6	16	2.3	3.1	4.6	7.9	2.3	11	2.3	4.0	4.8	4.6	3.9
85+136	0.27	0.18	0.094	1.4	0.083	1.3	1.7	0.43	0	6.2	0.12	0.27	2.8	0	0
110+77	4.9	7.2	2.7	31	4.0	6.6	10	13	5.2	26	4.0	7.8	14	12	11
82	0.51	0.53	0.25	1.8	0.092	0.44	0.62	0.73	0.19	1.7	0.084	0.16	0.92	0.25	0.31
151	0.60	0.72	0.38	2.7	0.81	0.85	1.2	1.2	0.56	2.7	0.53	0.80	1.8	0.98	1.1
135+144+147+124	0.39	0.40	0.29	2.8	0.73	0.87	1.1	1.0	1.4	3.7	0.51	1.4	1.7	1.5	1.8
149+123+107	1.6	2.0	0.92	7.7	1.1	2.1	3.2	3.4	1.1	7.5	1.1	1.9	4.5	2.5	2.5
118	0.87	1.7	0.66	7.4	1.1	1.8	3.0	3.6	1.4	7.9	0.69	1.3	4.3	2.6	2.2
146	0	0	0	0	0	0.26	0.36	0	0	0	0	0	0.79	0	0
153+132	1.5	1.7	0.74	8.8	0.84	2.0	2.9	3.7	1.0	7.6	0.78	1.4	4.1	2.2	2.2
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141(+ 179 from 4/16/99)	0.26	0.33	0.14	1.6	0	0.51	0.69	0.73	0.16	1.7	0	0	1.1	0.35	0.32
137+176+130	0	0	0	0.17	0	0	0.23	0	0	0	0	0	0	0.22	0
163+138	0.81	1.1	0.47	6.0	0.76	1.6	2.1	2.4	1.1	6.5	0.76	1.00	3.6	2.4	1.9
178+129	0	0	0	0	0	0.10	0.41	0	0	0.51	0	0	0.74	0.16	0
187+182	1.2	1.3	0.51	2.9	0	1.3	1.6	1.5	0	2.0	0	0	1.5	0.99	1.0
183	0.13	0.10	0.045	0.44	0	0.10	0.19	0.28	0	0.62	0	0	0.40	0.27	0.19
185	0	0	0	0.19	0.025	0.079	0.062	0.11	0	0	0	0.034	0.10	0	0
174	0.092	0	0.070	0.75	0.082	0	0.19	0.31	0	0.77	0.069	0	0.43	0.27	0.15
177	0	0.081	0	0.51	0.072	0	0.12	0	0	0	0.070	0.060	0.22	0.13	0.10
202+171+156	0	0.050	0	0.085	0.028	0.080	0.10	0	0	0.18	0.030	0.055	0.11	0.10	0
180	0.065	0.14	0.026	0.61	0.088	0.14	0.090	0.19	0	0.59	0.19	0.066	0.40	0.11	0.11
199	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.20
170+190	0.060	0	0	0	0	0	0	0.066	0	0	0.015	0	0.086	0	0
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0	0	0	0.21	0	0	0.20	0	0	0.26	0	0	0.17	0	0
203+196	0.22	0	0	0.30	0	0	0.12	0	0	0.31	0	0	0.23	0	0
195+208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total PCBs	240	225	95	711	110	317	414	427	111	1,200	163	261	507	266	260
Homologue Group															
3	126	117	45	299	59	156	207	190	57	573	82	128	227	113	122
4	82	68	33	244	33	116	139	162	36	465	59	93	190	95	95
5	24	32	13	133	14	35	52	59	13	130	18	33	68	45	32
6	5.1	6.3	2.9	30	4.3	8.2	12	13	5.3	30	3.6	6.5	18	10	9.8
7	1.5	1.6	0.65	5.4	0.27	1.7	2.7	2.5	0	4.5	0.34	0.16	3.9	1.9	1.6
8	0.22	0.050	0	0.59	0.028	0.080	0.42	0	0	0.75	0.030	0.055	0.51	0.10	0.20
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corresponding Laboratory Blank	3/5/98	3/5/98	3/5/98	3/17/98	3/5/98	3/10/98	3/5/98	2/16/98	3/10/98	3/17/98	3/17/98	2/16/98	2/16/98	2/16/98	3/17/98
Surrogate Recoveries (%)															
#65	114 %	114 %	107 %	45 %	106 %	107 %	112 %	126 %	102 %	111 %	106 %	115 %	106 %	135 %	119 %
#166	106 %	107 %	100 %	37 %	111 %	104 %	109 %	108 %	106 %	106 %	107 %	107 %	106 %	107 %	104 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	NB-PUF 2/10/98	NB-PUF 2/16/98	NB-PUF 2/22/98	NB-PUF 2/28/98	NB-PUF 3/6/98	NB-PUF 3/12/98	NB-PUF 3/18/98	NB-PUF 3/24/98	NB-PUF 3/30/98	NB-PUF 4/5/98	NB-PUF 4/11/98	NB-PUF 4/17/98	NB-PUF 4/23/98	NB-PUF 4/29/98	NB-PUF 5/5/98
18	63	29	19	54	18	8.0	34	15	47	16	22	31	20	43	131
17+15	38	17	12	32	5.9	4.4	18	6.2	19	7.5	8.8	13	7.8	10	52
16+32	170	0	25	84	19	8.4	62	21	44	15	26	32	26	65	219
31	69	31	17	61	20	4.6	30	12	45	15	22	33	26	44	211
28	55	23	10	48	11	3.8	24	8.4	28	8.2	11	18	13	32	137
21+33+53	121	48	0	51	9.3	3.6	26	9.1	28	7.6	10	17	13	50	122
22	36	21	12	46	13	6.1	27	9.5	35	6.6	11	13	11	18	100
45	0	0	0	0	0	0	0	0	20	3.9	15	6.2	12	14	57
52+43	43	23	17	45	15	5.8	30	13	35	15	18	27	28	27	114
49	24	11	9.2	21	6.5	2.1	15	5.2	16	5.1	11	9.9	11	15	55
47+48	32	19	20	39	14	4.3	30	9.1	43	22	14	23	17	25	68
44	39	20	10	34	8.5	3.6	20	7.9	24	8.0	8.9	18	16	19	84
37+42	18	8.1	5.5	13	1.6	1.0	7.2	2.1	4.9	1.8	2.4	3.9	3.0	5.3	29
41+71	18	9.6	4.8	15	2.7	1.8	6.8	2.6	8.2	2.5	2.8	5.7	4.3	7.6	41
64	13	6.2	2.7	12	2.5	0.97	6.2	2.3	7.4	2.2	2.7	4.9	3.9	6.4	31
40	10	3.2	2.7	6.6	2.4	0.29	3.2	1.1	4.6	1.5	2.5	3.3	3.2	5.6	21
74	9.1	4.1	2.5	10.0	3.0	0.73	5.3	3.2	12	3.9	6.2	9.9	7.2	8.6	45
70+76	15	7.0	6.1	20	6.6	1.1	9.5	4.6	16	7.3	10	17	15	14	85
66+95	53	27	24	63	25	6.0	36	18	48	28	34	54	57	44	205
91	11	5.3	5.5	10	6.5	1.3	9.6	3.5	13	3.4	7.2	7.0	9.0	9.0	24
56+60+89	11	6.2	3.6	15	4.8	0.53	7.2	2.9	15	3.3	4.8	12	6.9	12	60
92+84	10.0	6.5	6.6	18	6.6	2.0	14	4.5	26	7.2	9.5	16	16	23	49
101	20	10	7.5	22	8.5	2.1	15	7.2	21	9.1	13	18	19	16	64
83	0	0	0.33	0	0.60	0	0	0	3.6	0.73	1.1	1.8	1.6	1.8	5.1
97	4.1	2.6	1.3	5.1	1.5	0.59	3.0	1.5	4.5	1.5	2.3	3.2	3.2	3.6	13
87+81	9.5	7.0	2.7	13	3.5	1.5	8.1	3.5	9.0	3.5	4.9	6.1	7.7	7.7	26
85+136	2.7	0.49	1.3	10.0	0.82	0.060	0.84	0.28	4.9	1.5	1.7	3.1	2.5	5.3	17
110+77	19	13	6.5	26	8.4	2.6	15	7.9	23	8.1	12	17	16	18	69
82	0.76	0.36	0.41	1.9	0.54	0.17	0.70	0.42	1.5	0.62	0.79	1.3	1.4	1.1	6.1
151	1.7	1.1	0.97	2.5	1.1	0.30	1.4	0.88	2.3	0.71	0.96	1.5	1.5	1.8	5.7
135+144+147+124	2.5	1.7	0.84	3.0	0.99	0.51	2.2	0.97	3.1	0.81	1.1	1.8	2.1	1.9	6.9
149+123+107	5.1	3.2	2.6	7.3	3.1	0.67	4.5	2.5	11	2.3	3.2	5.9	5.5	6.5	19
118	4.4	3.1	2.3	9.1	3.5	0.49	4.1	2.2	9.6	2.2	4.3	6.9	5.8	5.2	33
146	0	0	0	1.6	0	0	0.55	0.39	0	0.32	0.51	1.1	0.92	1.1	3.8
153+132	3.3	3.6	2.6	8.8	3.3	0.41	4.6	2.5	9.4	2.2	3.2	6.0	5.5	6.3	22
105	0	0.78	0	0	0	0	0	0	0	0.80	1.3	2.2	1.9	0	0
141(+ 179 from 4/16/99)	0.19	0	0.51	2.3	0.72	0	1.4	0.78	2.3	0.41	0.74	1.4	1.2	1.7	5.3
137+176+130	0	0	0	0	0.28	0	0	0	0	0	0	0	0	0	0
163+138	1.2	3.2	2.1	9.3	3.1	0.40	4.1	2.3	11	1.9	3.0	6.2	5.6	6.1	26
178+129	0	0	0.24	0.70	0.30	0	0.32	0	0.88	0	0.15	0.43	0	0.25	2.1
187+182	1.00	1.4	2.1	2.5	1.6	0	1.6	1.5	3.0	2.1	1.7	1.9	2.4	2.5	5.1
183	0.21	0.36	0.22	1.0	0.32	0.039	0.43	0.17	1.1	0.14	0.25	0.57	0.42	0.69	2.6
185	0	0.086	0.16	0.15	0.057	0	0.093	0.049	0.22	0.039	0.063	0.12	0.075	0.19	0.55
174	0.18	0.50	0.32	1.3	0.37	0.064	0.54	0.29	1.6	0.20	0.33	0.98	0.66	1.0	3.4
177	0.11	0.28	0.17	0.83	0.26	0	0.37	0.15	1.2	0.14	0.19	0.58	0.60	0.68	2.4
202+171+156	0.13	0.17	0.14	0.54	0.14	0.024	0.18	0.13	0.53	0.067	0.11	0.20	0.25	0.38	1.2
180	0.097	0.53	0.19	2.0	0.34	0.19	0.60	0.22	3.0	0.13	0.34	1.2	0.69	1.4	6.1
199	0	0.096	0	0.20	0	0	0.14	0	0.69	0.030	0.044	0.14	0.14	0.32	0.62
170+190	0	0.071	0	0.67	0.053	0.0048	0.14	0	0.76	0.041	0.098	0.51	0.38	0.52	2.2
198	0	0	0	0.016	0	0	0	0	0.13	0	0	0	0	0	0
201	0	0.22	0.23	1.1	0.20	0.029	0.25	0.17	1.7	0.10	0.13	0.64	0.43	0.79	2.7
203+196	0	0.23	0	1.2	0.19	0.042	0.29	0.14	1.6	0.15	0.22	0.57	0.40	0.78	3.1
195+208	0	0	0	0.11	0	0	0	0	0.11	0	0	0.031	0	0.054	0.32
194	0	0	0	0.18	0	0	0	0	0.25	0	0	0.086	0	0	0
206	0	0	0	0.27	0	0	0	0	0	0	0	0	0	0	0.27
Total PCBs	935	379	251	830	247	81	490	197	669	231	318	464	412	590	2,290
Homologue Group															
3	569	177	100	387	99	40	227	83	251	78	115	160	119	267	1,000
4	269	136	103	281	91	27	169	70	247	104	130	190	180	197	866
5	80	49	34	115	41	11	70	31	115	39	57	82	84	91	306
6	14	13	9.6	35	13	2.3	19	10	39	8.6	13	24	22	25	88
7	1.6	3.3	3.4	9.1	3.3	0.29	4.1	2.4	12	2.7	3.1	6.2	5.2	7.2	24
8	0.13	0.72	0.37	3.4	0.52	0.095	0.87	0.44	4.9	0.35	0.50	1.7	1.2	2.3	8.0
9	0	0	0	0.27	0	0	0	0	0	0	0	0	0	0	0.27
Corresponding Laboratory Blank	3/17/98	3/10/98	3/17/98	3/10/98	3/17/98	3/17/98	5/23/98	5/26/98	5/26/98	5/26/98	5/23/98	5/23/98	5/26/98	5/26/98	5/23/98
Surrogate Recoveries (%)															
#65	97 %	118 %	104 %	137 %	107 %	105 %	138 %	110 %	100 %	109 %	116 %	96 %	103 %	109 %	109 %
#166	108 %	108 %	105 %	110 %	107 %	107 %	109 %	109 %	111 %	104 %	100 %	101 %	96 %	98 %	101 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	NB-PUF 5/11/98	NB-PUF 5/17/98	NB-PUF 5/23/98	NB-PUF 5/29/98	NB-PUF 6/4/98	NB-PUF 6/10/98	NB-PUF 6/16/98	NB-PUF 6/22/98	NB-PUF 6/25/98	Split PUF day-top NB-PUF 6/26/98	Split PUF day-bottom NB-PUF 6/26/98	night NB-PUF 6/26/98	NB-PUF 6/28/98	NB-PUF 7/4/98	day NB-PUF 7/5/98
18	37	108	48	80	25	70	48	57	61	26	25	341	35	36	31
17+15	18	64	26	48	19	38	36	31	39	19	0	72	15	0	23
16+32	41	150	66	120	43	81	75	66	81	39	0	139	28	64	26
31	39	138	56	95	38	68	54	68	111	74	47	99	25	63	31
28	22	94	35	65	23	43	47	46	68	38	28	73	20	34	20
21+33+53	22	85	27	71	14	32	28	30	37	28	8.9	58	10	36	22
22	17	82	19	82	24	65	49	92	83	48	29	87	27	45	16
45	15	44	15	42	0	0	0	34	0	0	0	86	0	28	3.1
52+43	30	98	32	91	25	53	49	44	59	55	7.3	95	26	93	43
49	13	47	15	35	14	26	16	18	30	23	3.8	32	9.9	20	12
47+48	29	58	21	38	13	33	21	23	32	20	3.8	49	28	33	7.6
44	20	71	22	54	21	40	38	59	47	51	13	66	17	0	22
37+42	5.7	36	4.4	20	6.5	13	5.5	10	0	0	0.49	30	4.1	24	4.6
41+71	7.1	35	7.7	25	9.6	18	15	14	35	21	3.1	25	6.2	20	6.5
64	5.7	24	6.3	20	5.7	10	11	13	16	14	2.1	20	4.0	14	5.3
40	4.2	16	4.6	15	5.3	15	13	14	21	18	3.9	17	5.9	32	2.7
74	11	31	13	24	9.7	16	0	16	0	0	7.2	8.8	7.7	6.5	6.3
70+76	19	55	20	32	12	17	12	25	27	23	0	19	7.5	37	16
66+95	51	147	53	123	41	66	64	101	113	102	7.7	115	27	83	58
91	9.1	21	6.2	25	5.2	14	13	17	20	18	2.3	29	13	21	11
56+60+89	11	40	14	28	9.2	18	21	34	21	20	0.76	13	11	14	10
92+84	14	44	16	71	18	34	0	0	0	0	0	0	18	44	41
101	18	56	18	51	13	22	25	24	36	34	1.3	47	14	25	28
83	2.0	4.7	1.6	4.8	0.99	2.0	4.4	5.6	7.2	6.1	0.15	9.5	2.4	0	3.3
97	3.7	12	3.3	10	2.2	4.3	5.8	7.5	7.7	7.7	0	13	2.9	8.9	5.6
87+81	7.6	22	7.1	25	5.9	12	15	21	20	20	0	33	6.5	8.8	10
85+136	4.3	11	3.0	19	4.9	11	5.9	1.2	17	15	0	14	11	13	11
110+77	18	61	17	52	12	27	38	37	49	42	1.2	56	16	31	28
82	1.3	5.1	1.2	2.5	0.66	1.3	1.7	2.7	3.1	3.1	0	2.8	0.71	2.1	1.2
151	1.7	5.8	1.4	5.8	1.2	2.7	3.0	2.7	4.4	5.4	0.25	6.1	1.9	3.7	2.7
135+144+147+124	2.1	7.1	1.8	6.4	1.2	3.0	1.4	1.8	2.6	2.6	0	4.7	1.8	2.7	3.0
149+123+107	5.9	19	4.9	22	4.1	8.0	11	9.7	13	16	0.27	19	6.3	12	9.3
118	8.4	23	7.1	15	2.9	7.7	8.6	16	14	13	0	12	5.5	12	9.5
146	1.0	3.6	0.95	1.8	0.34	1.2	1.5	1.2	2.6	2.3	0	0.78	0.88	2.8	1.9
153+132	5.7	22	5.4	21	3.5	9.0	7.5	11	14	15	0.15	20	6.1	11	9.2
105	2.2	8.3	2.4	5.3	0.55	2.3	2.7	2.5	3.0	3.0	0	3.4	1.5	4.7	2.4
141(+ 179 from 4/16/99)	1.5	5.2	1.2	5.8	1.2	3.0	3.4	6.4	4.3	6.7	0	5.0	1.5	3.4	1.9
137+176+130	0	0	0	0	0	0.20	0	0	0.26	0.34	0	0	0.10	0.23	0.33
163+138	6.3	25	5.5	21	3.3	10	11	12	16	17	0.034	16	6.2	11	10
178+129	0	2.0	0.35	1.5	0.29	0.91	0.75	1.4	1.2	1.3	0	0	0.86	1.3	0.71
187+182	2.3	5.5	2.0	8.0	2.5	3.7	3.9	3.8	5.7	7.0	0	6.1	3.2	3.6	4.7
183	0.64	2.3	0.56	2.6	0.38	1.2	1.7	1.6	2.0	2.1	0	1.6	0.77	1.9	1.7
185	0.12	0.39	0.099	0.43	0.077	0.22	0.73	0.51	0.49	0.95	0	0.90	0.13	0.51	0.16
174	0.89	3.2	0.78	3.4	0.43	1.8	1.8	2.2	2.5	2.6	0	2.3	0.98	1.8	1.3
177	0.82	2.3	0.60	3.2	0.44	1.3	1.4	1.7	1.8	1.9	0	1.7	0.76	1.1	0.83
202+171+156	0.40	1.2	0.31	1.3	0.19	0.68	0.90	0.89	0.93	1.0	0	0.90	0.27	0	0.33
180	1.2	5.0	1.3	5.6	0.60	2.9	2.4	3.1	4.0	3.9	0	2.8	1.4	2.8	2.0
199	0.31	0.40	0.16	0.59	0	0.16	0.091	0.23	0.24	0.23	0	0	0.089	0.13	0
170+190	0.68	1.7	0.50	1.4	0.13	0.79	0.93	1.1	1.5	1.5	0	0.60	0.35	0.96	0.66
198	0	0.058	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0.57	2.1	0.64	2.9	0.25	1.6	1.4	2.2	2.1	2.3	0	1.5	0.58	1.9	0.70
203+196	0.56	2.4	0.69	2.5	0.35	1.5	1.6	2.1	2.3	2.5	0	1.6	0.69	1.7	1.0
195+208	0.090	0.24	0.043	0	0	0.22	0.14	0.23	0.27	0.26	0	0	0.074	0.26	0.42
194	0.059	0.53	0	0.18	0.052	0.31	0.23	0.44	0	0.50	0	0	0.14	0.56	0
206	0	0.24	0.056	0	0	0.12	0	0.31	0.36	0.32	0	0	0.071	0.32	0
Total PCBs	540	1,810	616	1,510	446	916	778	1,000	1,140	872	196	1,760	441	919	571
Homologue Group															
3	203	756	282	582	194	411	342	401	482	271	138	899	164	302	173
4	215	665	222	526	166	312	260	397	401	346	52	546	151	380	192
5	89	268	83	282	66	138	120	136	178	162	5.0	219	91	171	152
6	24	87	21	84	15	37	39	45	57	65	0.71	71	25	47	38
7	6.7	22	6.1	26	4.9	13	14	15	19	21	0	16	8.4	14	12
8	2.0	7.0	1.8	7.5	0.84	4.4	4.4	6.0	5.9	6.7	0	4.0	1.8	4.6	2.5
9	0	0.24	0.056	0	0	0.12	0	0.31	0.36	0.32	0	0	0.071	0.32	0
Corresponding Laboratory Blank	5/23/98	6/15/98	6/15/98	6/15/98	6/15/98	7/2/98		7/2/98	7/2/98	7/2/98	7/2/98	8/20/98	8/20/98	7/15/98	7/15/98
Surrogate Recoveries (%)															
#65	108 %	72 %	114 %	93 %	96 %	38 %	121 %	154 %	120 %	106 %	84 %	151 %	97 %	79 %	83 %
#166	101 %	70 %	102 %	88 %	83 %	47 %	102 %	105 %	106 %	101 %	98 %	100 %	104 %	82 %	105 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	night NB-PUF 7/5/98	day NB-PUF 7/6/98	night NB-PUF 7/6/98	day NB-PUF 7/7/98	night NB-PUF 7/7/98	day NB-PUF 7/8/98	night NB-PUF 7/8/98	day NB-PUF 7/9/98	night NB-PUF 7/9/98	day NB-PUF 7/10/98	night NB-PUF 7/10/98	day NB-PUF 7/11/98	NB-PUF 7/16/98	NB-PUF 7/22/98	NB-PUF 7/28/98
18	73	85	50	79		51	43	44	91	33	56	25	71	57	47
17+15	35	44	25	42		30	24	29	41	25	38	12	73	40	32
16+32	70	84	48	78		46	47	37	66	32	49	26	72	65	30
31	71	107	50	109		51	41	40	49	39	47	30	82	77	40
28	38	59	25	59		29	28	29	29	26	32	20	52	51	26
21+33+53	42	63	30	69		28	26	27	36	26	30	19	36	35	19
22	31	54	21	58		28	22	21	194	20	27	15	49	45	33
45	7.1	8.9	4.8	8.2		5.7	5.2	4.1	0	4.1	6.6	3.3	0	0	5.8
52+43	77	78	39	58		44	39	36	65	60	56	42	63	76	39
49	23	30	12	27		15	12	12	16	15	17	11	25	27	14
47+48	14	25	8.4	21		10	8.8	9.7	19	9.6	11	7.4	39	46	29
44	40	42	25	38		27	23	20	49	30	31	25	47	47	24
37+42	0	14	0	16		10	0	4.4	11	8.5	8.8	6.8	13	11	6.4
41+71	13	25	7.8	22		10	7.3	7.1	19	9.3	9.6	8.9	20	21	9.8
64	10	14	6.2	14		7.9	6.3	6.6	12	8.1	8.7	6.4	12	12	6.3
40	5.4	9.9	3.7	10		4.8	5.2	2.3	5.1	4.3	5.2	4.6	15	13	6.8
74	9.1	16	7.0	15		6.2	5.0	6.7	7.2	9.5	8.3	6.5	12	18	11
70+76	31	42	16	35		20	16	12	0	24	18	17	21	21	16
66+95	130	130	70	88		74	53	41	73	82	62	60	86	74	58
91	28	22	22	16		22	14	6.9	30	14	11	8.7	22	20	15
56+60+89	17	24	8.6	27		11	8.6	8.1	11	16	14	12	27	25	15
92+84	58	54	0	59		0	51	0	120	48	40	34	38	36	24
101	37	40	20	25		21	17	17	54	40	31	30	32	36	25
83	4.4	4.3	3.6	4.3		3.7	2.6	3.9	0	4.1	2.6	2.7	4.4	4.7	3.5
97	6.8	7.5	3.5	4.9		3.8	3.2	2.9	7.2	8.5	5.6	5.4	7.4	8.2	5.2
87+81	19	16	10	12		12	8.0	6.7	18	14	13	10	13	13	9.1
85+136	13	16	9.7	13		9.2	6.6	8.4	25	11	12	12	13	13	9.8
110+77	33	42	20	28		23	18	18	2.3	39	28	28	38	38	24
82	0.67	1.9	0.13	0.95		0.51	0.52	0.57	0	1.8	1.7	1.6	1.9	1.7	0.97
151	3.4	4.7	2.1	2.7		2.5	2.3	1.9	10	4.0	3.0	3.3	3.3	4.3	2.9
135+144+147+124	3.4	5.2	1.9	3.0		2.8	2.1	2.1	0	4.4	3.1	3.9	3.7	4.5	3.7
149+123+107	10	15	6.9	9.6		8.9	7.1	6.7	17	13	8.8	10	13	14	9.8
118	11	19	7.1	13		9.1	5.8	6.7	0	15	8.2	11	10	14	11
146	2.0	3.1	1.8	2.3		2.3	0	1.4	0	2.6	1.4	1.8	2.6	3.1	1.3
153+132	9.0	16	6.6	11		8.4	6.7	7.4	4.7	14	8.1	9.6	11	13	9.6
105	2.7	5.6	2.5	4.5		2.7	1.6	1.8	0	6.9	2.3	2.2	3.2	3.3	2.3
141(+ 179 from 4/16/99)	0	3.5	1.0	2.3		2.0	0.82	1.7	0	3.0	1.7	2.1	2.9	3.5	2.1
137+176+130	0.36	0.32	0	0		0.28	0	0.26	3.3	0.86	0.28	0.31	0.30	0.32	0.15
163+138	9.0	19	7.2	12		11	0	8.2	8.4	14	7.9	9.8	12	14	11
178+129	0	0.88	0	0		0.70	0	0.53	0	0.72	0.54	0.86	1.2	1.5	0.91
187+182	4.6	6.4	4.5	5.7		5.2	5.3	3.5	0	4.7	4.3	5.1	4.0	4.4	3.3
183	1.9	2.3	1.9	2.4		2.0	0	1.4	0	1.8	1.0	1.3	1.6	2.3	1.5
185	0.18	0.32	0	0.31		0.21	0	0.17	0	0.23	0.12	0.21	0.28	0.41	0.20
174	0.88	2.7	0.50	1.2		1.6	0.51	1.3	1.2	1.8	0.91	1.3	1.8	2.3	1.5
177	0.52	1.7	0	0.67		1.1	0	0.84	0.45	1.4	0.62	0.71	1.9	2.0	1.1
202+171+156	0.36	0.80	0	0		0.57	0	0.40	0.79	0.60	0.30	0	0.59	0.56	0.61
180	0.83	4.3	0.53	2.6		3.3	1.5	1.9	0	2.6	1.3	2.4	2.8	3.4	2.2
199	0	0.15	0	0		0	0	0.095	0	0	0	0	0	0.21	0.098
170+190	0	1.2	0	0		0.85	0	0.62	1.3	0.46	0.19	0	0.77	1.1	0.55
198	0	0	0	0		0	0	0	0	0	0	0	0.53	0	0
201	0	1.9	0	0		1.1	0	0.92	0	0.91	0.20	0.47	0	1.6	1.2
203+196	0	2.3	0	0		1.8	0	1.1	1.5	1.0	0.14	0	1.3	1.7	1.2
195+208	0.99	0	0	0		0	0	0.13	0	0.19	0.13	0.59	0.12	0.20	0.085
194	0	0.84	0.58	0		0.54	0	0.17	0	0	0.26	0.81	0.34	0.44	0.25
206	0	0	0.14	0		0	0	0.17	0	0	0	0	0.11	0.22	0
Total PCBs	998	1,280	593	1,110		675	576	512	1,100	756	734	559	1,060	1,030	653
Homologue Group															
3	360	508	249	511		274	230	232	518	209	287	155	448	381	233
4	376	447	210	363		237	190	165	277	273	248	204	367	380	234
5	214	227	98	181		107	130	73	257	203	154	146	183	188	131
6	37	67	28	43		39	19	30	44	55	34	41	49	56	40
7	8.9	20	7.4	13		15	7.3	10	2.9	14	9.0	12	14	17	11
8	1.4	6.0	0.58	0		4.0	0	2.8	2.3	2.7	1.0	1.9	2.9	4.7	3.4
9	0	0	0.14	0		0	0	0.17	0	0	0	0	0.11	0.22	0
Corresponding Laboratory Blank	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98			7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	8/20/98	8/31/98	8/31/98
Surrogate Recoveries (%)															
#65	59 %	74 %	80 %	80 %		87 %	71 %	79 %	90 %	76 %	86 %	69 %	106 %	93 %	97 %
#166	73 %	95 %	97 %	103 %		113 %	102 %	99 %	66 %	100 %	102 %	84 %	99 %	104 %	99 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	NB-PUF 8/3/98	NB-PUF 8/9/98	NB-PUF 8/15/98	NB-PUF 8/21/98	NB-PUF 8/27/98	NB-PUF 9/2/98	NB-PUF 9/4/98	NB-PUF 9/8/98	NB-PUF 9/13/98	NB-PUF 9/19/98	NB-PUF 9/22/98	NB-PUF 9/25/98	NB-PUF 10/1/98	NB-PUF 10/7/98	NB-PUF 10/10/98
18	172	70	39	63	73	59	65	26	51		43	54	26	25	27
17+15	54	31	21	0	56	0	48	0	0		0	45	17	12	0
16+32	59	35	34	52	85	63	65	30	44		61	86	33	24	27
31	62	73	39	58	115	65	90	29	55		58	51	21	24	27
28	43	36	23	42	65	37	43	19	34		32	31	11	14	14
21+33+53	28	22	12	19	56	32	36	9.5	20		16	21	9.3	6.5	10
22	81	57	38	52	97	70	80	24	57		42	52	15	35	24
45	0	23	0	0	0	0	39	0	0		0	0	0	0	0
52+43	46	33	25	29	77	53	65	24	32		55	44	25	17	34
49	16	14	11	14	30	18	22	10.0	17		18	26	13	13	14
47+48	25	27	21	20	40	26	29	11	15		24	23	7.9	9.6	15
44	49	34	20	41	59	46	55	15	37		40	41	12	15	20
37+42	0	0	4.3	0	14	7.8	10	8.5	17		8.0	6.4	6.1	0	7.0
41+71	12	13	7.8	14	26	14	18	7.9	13		14	14	6.3	4.9	8.8
64	10	9.2	5.5	9.1	17	10	12	4.8	7.6		8.5	10	4.1	3.7	4.8
40	12	9.9	9.1	8.8	13	9.9	13	5.3	10		9.6	15	3.5	7.4	7.6
74	0	0	0	4.3	12	8.6	5.8	7.4	9.7		7.9	2.0	6.1	0	11
70+76	12	12	7.7	10	30	17	29	13	23		23	12	12	5.3	13
66+95	71	64	49	52	112	75	102	42	67		91	51	42	28	62
91	22	22	18	12	25	19	27	8.2	21		19	17	5.5	14	13
56+60+89	31	25	21	21	30	22	27	11	16		20	19	5.1	3.8	11
92+84	0	0	0	0	0	0	0	15	46		31	37	11	14	18
101	25	20	17	18	41	29	36	15	26		34	25	14	10	22
83	3.4	3.5	3.6	2.4	9.2	3.1	4.7	1.1	2.5		3.1	2.5	0.88	1.2	1.5
97	7.4	5.4	4.2	5.5	9.9	6.0	7.9	2.6	4.9		7.0	5.7	2.3	2.2	4.5
87+81	19	15	11	9.8	25	16	21	6.2	14		15	13	6.0	7.8	10
85+136	8.2	10	7.4	4.1	13	8.9	11	7.4	7.4		8.9	7.7	3.7	0.50	6.3
110+77	32	29	21	21	51	32	44	14	31		35	25	13	12	21
82	2.6	1.7	0.92	2.2	3.6	1.7	1.00	0.40	1.5		1.9	1.1	0.21	0.29	0.87
151	3.6	3.0	1.9	2.5	5.4	3.2	4.0	1.7	3.2		3.2	2.3	1.3	1.3	2.3
135+144+147+124	1.3	2.5	1.1	0.70	6.3	2.2	4.0	1.7	2.3		3.1	1.8	1.6	1.2	2.6
149+123+107	10	9.2	6.0	5.8	16	9.2	12	5.5	9.5		10	7.4	4.6	4.3	7.5
118	11	11	5.7	4.4	20	6.9	12	4.5	11		10.0	6.8	4.1	3.4	6.9
146	1.5	2.1	1.4	1.3	2.8	1.5	1.8	0	1.2		1.5	0.99	0.36	0.69	0.79
153+132	6.2	12	5.8	5.6	19	9.0	12	4.6	8.8		9.7	6.8	3.8	4.1	7.5
105	2.0	3.7	1.7	1.1	6.7	2.2	3.8	1.4	3.2		3.3	1.7	0.80	0.91	1.8
141(+ 179 from 4/16/99)	3.4	4.0	1.9	1.8	4.6	3.1	3.7	0.99	2.3		2.0	1.5	0.91	0	1.7
137+176+130	0	0.16	0	0.15	0.33	0.22	0.21	0.10	0.26		0.15	0.18	0.073	0.12	0.14
163+138	11	12	6.6	5.8	20	9.5	12	4.4	10		11	7.1	3.4	4.7	7.0
178+129	0.94	1.1	0.82	0.33	2.2	1.1	1.4	0.54	1.1		1.4	0.76	0.25	0.67	0.44
187+182	3.7	4.2	2.7	2.2	4.9	3.3	4.1	2.5	3.9		3.7	2.5	2.1	2.2	2.8
183	1.2	1.5	0.76	0.84	2.3	1.1	1.5	0.57	1.3		1.3	0.78	0.34	0.50	0.85
185	0.41	0.44	0.25	0.22	0.67	0.29	0.37	0.080	0.19		0.59	0.18	0	0.15	0.15
174	1.6	2.1	0.99	1.0	3.0	1.5	1.9	0.63	1.7		1.8	0.97	0.38	0.85	0.96
177	0.99	1.6	0.88	0.82	2.1	1.1	1.4	0.44	1.2		1.2	0.79	0.37	0.59	0.75
202+171+156	0.79	0.72	0.26	0.21	1.1	0.52	0.67	0.23	0.51		0	0.34	0.17	0.32	0.27
180	1.9	3.3	1.3	1.2	3.9	1.8	2.5	0.77	1.8		2.7	1.5	0.35	1.0	0.83
199	0.11	0.11	0.097	0.12	0.26	0.11	0.14	0.036	0.10		0.75	0.11	0	0	0
170+190	0.58	1.0	0.44	0.43	1.2	0.54	0.76	0.14	0.48		0.59	0.42	0	0.30	0
198	0	0	0.35	0	0	0	0	0	0		0	0	0	0	0
201	1.3	1.9	0	0.97	2.2	0.91	1.4	0.25	0.92		2.6	0.60	0.13	0.46	0.63
203+196	1.1	1.7	0.73	0.61	1.9	0.88	1.3	0.33	1.0		1.7	0.68	0.15	0.47	0.73
195+208	0.14	0.19	0.098	0.073	0.22	0.18	0.14	0	0.091		0.088	0.069	0	0.056	0
194	0.16	0.35	0.097	0.11	0.36	0.13	0.16	0	0.13		0.14	0.14	0	0.059	0
206	0.086	0.37	0.089	0.040	0.28	0.24	0.11	0	0.082		0.063	0.056	0	0	0
Total PCBs	966	774	515	622	1,310	811	1,090	399	747		800	785	359	338	439
Homologue Group															
3	498	324	211	286	561	334	437	146	278		260	347	140	140	136
4	284	264	178	223	445	301	416	151	248		311	257	137	108	202
5	133	121	91	80	204	124	168	76	169		169	143	62	66	106
6	37	45	25	24	74	38	50	19	38		41	28	16	16	29
7	11	15	8.2	7.1	20	11	14	5.7	12		13	7.9	3.8	6.3	6.8
8	3.5	5.0	1.6	2.1	6.0	2.7	3.8	0.85	2.8		5.3	1.9	0.45	1.4	1.6
9	0.086	0.37	0.089	0.040	0.28	0.24	0.11	0	0.082		0.063	0.056	0	0	0
Corresponding Laboratory Blank	8/31/98	9/8/98	9/8/98	9/8/98	9/8/98	9/8/98	9/30/98	9/30/98	9/30/98	9/30/98	9/30/98	10/21/98	10/21/98	10/21/98	11/24/98
Surrogate Recoveries (%)															
#65	190 %	171 %	173 %	138 %	196 %	175 %	200 %	91 %	138 %		101 %	168 %	101 %	118 %	93 %
#166	117 %	108 %	104 %	105 %	110 %	108 %	108 %	97 %	100 %		90 %	107 %	100 %	96 %	99 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	NB-PUF 10/13/98	NB-PUF 10/19/98	NB-PUF 10/28/98	NB-PUF 11/6/98	NB-PUF 11/15/98	NB-PUF 11/24/98	NB-PUF 12/3/98	NB-PUF 12/12/98	NB-PUF 12/21/98	NB-PUF 12/30/98	NB-PUF 1/8/99	NB-PUF 1/17/99	NB-PUF 1/26/99	NB-PUF 2/4/99	NB-PUF 2/13/99
18	18	46	34	18	27	20	59	15	37	4.3	7.5	17	13	27	6.2
17+15	19	34	0	15	12	15	30	5.5	22	2.8	2.8	20	18	26	4.0
16+32	28	59	48	21	26	20	59	26	34	3.8	5.4	67	34	34	7.7
31	0	27	14	8.1	10.0	13	36	0	0	3.0	3.6	0	14	14	3.1
28	8.9	30	26	8.6	14	13	41	9.2	27	2.3	4.3	13	9.8	18	5.1
21+33+53	3.5	14	11	6.9	6.1	11	35	7.4	21	1.8	2.4	9.7	8.8	14	3.2
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	24	16	9.6	13	5.7	29	16	22	2.7	3.6	12	7.1	0	0.36
52+43	10	25	31	20	19	17	42	17	29	4.4	5.5	21	13	23	6.0
49	7.6	21	10	8.0	8.3	6.0	22	12	15	1.5	3.0	13	9.8	0	2.2
47+48	0	6.0	6.5	2.5	2.5	2.1	12	1.2	3.6	0.26	2.0	2.3	1.1	1.8	0.64
44	5.8	25	16	5.9	12	12	28	8.6	19	2.0	2.9	13	5.9	14	3.2
37+42	3.3	12	6.1	2.9	5.5	11	15	4.8	13	1.1	2.4	10.0	0	9.2	2.3
41+71	2.9	7.6	9.6	4.0	4.0	3.0	11	4.8	7.9	0.63	1.7	5.4	3.5	6.1	1.0
64	3.0	8.1	9.5	3.1	3.7	3.5	9.2	3.4	5.9	0.56	0.93	3.9	2.4	4.5	0.87
40	3.8	6.0	2.7	1.5	1.9	1.8	6.0	2.1	3.7	0.20	0.64	2.5	2.1	4.4	0.59
74	2.5	5.3	4.0	8.3	2.3	2.0	6.9	2.8	4.7	0.36	0.81	3.0	1.6	7.4	0.76
70+76	4.8	11	9.6	5.7	6.0	5.2	16	6.0	10	0.82	0.97	7.0	3.5	8.5	1.1
66+95	21	43	26	18	25	21	48	19	32	3.3	4.1	23	9.0	27	4.7
91	13	10	6.2	4.5	4.7	3.1	13	6.2	10.0	0.70	0.82	5.9	3.5	5.8	0.93
56+60+89	5.0	8.1	8.3	3.8	4.4	2.8	10	3.4	6.3	0.34	0.51	4.5	2.3	5.2	0.86
92+84	12	20	10	21	16	14	23	11	16	1.5	1.7	13	3.6	11	1.9
101	9.0	18	13	12	11	8.4	24	8.9	16	1.0	1.1	11	4.9	9.3	1.5
83	1.2	1.8	1.7	0.59	0.71	0.40	2.5	0.87	2.0	0	0	1.0	0.50	0.57	0.072
97	2.3	3.0	3.0	2.2	1.8	2.2	5.0	2.0	3.9	0.21	0.17	2.6	1.2	1.8	0.24
87+81	7.2	7.9	7.9	6.5	4.9	5.1	11	4.5	8.9	0	0	6.6	3.0	0	0
85+136	2.1	4.6	2.5	3.2	2.6	2.7	8.0	2.3	4.9	0.30	0.34	3.7	1.5	5.3	0.64
110+77	9.1	13	12	8.4	7.7	6.8	20	6.8	14	0.53	0.58	9.4	3.7	9.3	1.2
82	0.29	0.44	0.32	0.30	0.27	0.30	1.1	0.40	0.96	0	0.032	0.98	0.27	0.51	0
151	1.0	1.8	1.5	0.99	1.0	0.65	4.4	0.83	2.1	0	0.076	1.5	0.49	1.1	0.13
135+144+147+124	0	1.8	0	0.96	0	0.69	4.1	0.95	2.4	0	0	1.8	0.55	1.2	0.11
149+123+107	3.5	5.5	4.6	2.9	3.1	2.4	11	2.4	6.8	0.13	0.14	4.3	1.5	3.6	0.45
118	3.2	4.0	3.6	2.1	2.3	1.6	6.8	2.0	5.2	0.096	0.095	3.2	1.1	2.7	0.28
146	0.83	0.88	0.97	0.39	0.45	0.28	2.3	0.30	1.2	0	0	0.72	0	0	0
153+132	4.0	5.3	4.8	2.2	2.7	2.0	11	2.0	6.1	0.11	0.086	3.7	0.92	3.0	0.24
105	1.3	0	1.7	1.1	0.86	0.78	3.3	0	0	0	0	0	0	0.90	0
141(+ 179 from 4/16/99)	0.87	1.2	1.0	0.59	0.57	0.71	3.2	0.47	1.4	0	0	0.89	0.21	0.53	0.058
137+176+130	0	0	0	0.24	0.33	0.24	0	0	0	0	0	0	0	0	0
163+138	3.9	4.8	4.6	1.6	2.2	1.7	11	1.7	6.4	0.063	0.11	3.1	0.97	2.8	0.17
178+129	0.31	0.22	0.18	0.090	0.094	0.097	1.4	0	0.47	0	0	0	0.67	0.15	0
187+182	0.95	1.3	1.1	0.43	0.61	0.61	4.2	0.26	1.2	0	0	0.59	0.10	1.0	0.14
183	0.45	0.63	0.58	0.072	0.25	0.23	2.3	0.20	0.77	0	0	0.30	0.085	0.57	0
185	0.080	0	0.16	0.029	0	0	0.46	0.059	0.18	0	0	0.071	0	0.093	0
174	0.47	0.70	0.72	0.16	0.29	0.29	3.4	0.27	1.0	0	0	0.41	0.16	0.40	0.038
177	0.31	0.41	0.34	0.11	0.14	0.14	2.0	0.14	0	0	0	0.23	0.098	0.26	0
202+171+156	0.28	0.38	0.37	0.095	0.12	0.22	1.3	0.14	0.43	0	0	0.30	0.13	0.21	0
180	0.61	0.83	0.76	0.081	0.21	0.24	4.9	0.18	1.3	0	0	0.36	0.13	0.34	0.024
199	0.049	0.056	0.11	0	0	0	0.37	0.031	0.081	0	0	0	0	0	0
170+190	0.14	0.24	0.12	0	0.073	0.12	1.1	0.073	0.38	0	0	0	0.15	0	0
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0.30	0.38	0.51	0.040	0.090	0.092	1.9	0.093	0.55	0	0	0	0.12	0.13	0
203+196	0.34	0.44	0.41	0.077	0.14	0.30	2.1	0.12	0.56	0	0	0	0.13	0.23	0
195+208	0	0.029	0.044	0	0	0	0.14	0	0	0	0	0	0	0	0
194	0.029	0.048	0.053	0	0.0096	0.040	0.23	0	0.057	0	0	0	0	0.023	0
206	0.030	0.020	0.044	0	0	0.024	0	0	0.040	0	0	0	0	0	0
Total PCBs	226	524	373	244	267	241	707	220	429	41	60	322	187	308	62
Homologue Group															
3	81	222	138	80	99	103	277	68	154	19	28	136	97	143	32
4	67	191	150	91	102	82	240	97	160	17	27	110	61	102	22
5	60	83	62	62	53	45	117	45	82	4.4	4.8	58	23	47	6.8
6	14	21	18	9.9	10	8.6	47	8.6	27	0.30	0.41	16	4.6	12	1.2
7	3.3	4.4	4.0	0.97	1.7	1.7	20	1.2	5.3	0	0	2.0	1.4	2.8	0.20
8	0.99	1.3	1.5	0.21	0.36	0.66	5.9	0.39	1.7	0	0	0.30	0.37	0.59	0
9	0.030	0.020	0.044	0	0	0.024	0	0	0.040	0	0	0	0	0	0
Corresponding Laboratory Blank	11/24/98	11/24/98	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/8/99	2/15/99	2/15/99	2/15/99	2/15/99	2/24/99	2/24/99	3/8/99
Surrogate Recoveries (%)															
#65	76 %	65 %	83 %	113 %	89 %	93 %	99 %	109 %	90 %	95 %	85 %	92 %	100 %	95 %	98 %
#166	83 %	66 %	93 %	96 %	83 %	81 %	92 %	98 %	96 %	97 %	94 %	91 %	94 %	94 %	99 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	NB-PUF 2/22/99	NB-PUF 3/3/99	NB-PUF 3/12/99	NB-PUF 3/21/99	NB-PUF 3/30/99	NB-PUF 4/9/99	NB-PUF 4/16/99	NB-PUF 4/26/99	NB-PUF 5/5/99	NB-PUF 5/14/99	NB-PUF 5/25/99	NB-PUF 6/1/99	NB-PUF 6/10/99	NB-PUF 6/19/99	NB-PUF 6/28/99
18	4.4	9.9	5.2	31	22	39	33	16	78	47		50	59	28	21
17+15	2.5	4.2	3.1	18	12	20	22	0	46	28		31	34	21	60
16+32	4.6	8.8	5.1	35	21	54	34	21	81	55		63	69	34	26
31	3.1	5.6	3.4	24	20	23	28	14	48	30		53	48	31	29
28	2.6	5.9	3.6	27	15	30	24	12	56	37		43	60	27	23
21+33+53	1.8	5.2	5.2	21	10	29	0	0	32	22		42	27	24	21
22	0	0	0	0	0	0	22	9.4	0	0		35	0	21	17
45	0	0	1.6	16	0	0	3.7	2.2	0	0		6.5	37	6.2	5.7
52+43	4.5	8.9	9.6	25	28	40	30	19	63	38		50	60	33	33
49	1.7	3.7	2.1	11	11	15	22	13	27	24		22	22	16	0
47+48	0.31	1.0	0.88	10.0	4.8	4.8	7.7	4.2	0.020	9.6		12	15	6.3	7.8
44	1.8	4.9	4.0	18	15	22	21	12	33	21		29	38	21	23
37+42	2.1	2.9	1.4	10	5.6	12	12	5.6	24	16		16	21	10	10
41+71	0.47	2.5	1.4	7.9	6.5	12	7	3.3	21	9.4		15	15	9.0	7.5
64	0.44	1.7	1.2	6.0	4.5	7.9	6.9	3.6	14	8.7		10	12	6.0	5.5
40	0.26	1.2	0.51	4.3	2.9	3.7	0	0	8.9	4.6		3.3	8.0	1.9	1.5
74	0.38	0	1.0	4.5	5.1	12	4.4	3.1	8.2	16		7.4	9.7	250	4.9
70+76	0.76	3.9	2.4	9.3	9.7	15	10	7.8	21	16		16	23	11	11
66+95	2.7	14	8.6	32	32	43	28	22	64	47		47	75	34	36
91	0.84	5.5	1.2	6.4	6.5	9.3	2.5	2.0	22	13		3.3	16	2.3	2.3
56+60+89	0.34	3.6	0.62	10	4.7	10	7.8	5.6	19	12		15	13	11	11
92+84	1.0	9.6	4.1	13	15	26	15	11	38	34		27	53	27	34
101	0.88	5.4	4.0	11	13	21	11	11	28	21		20	18	15	19
83	0	0.56	0.28	0.95	1.1	2.2	1.2	2.0	3.7	2.0		1.2	5.3	1.1	0
97	0.12	1.2	0.80	2.7	2.7	5.1	3.3	2.7	7.8	4.6		4.7	3.5	3.6	3.9
87+81	0	3.8	2.1	5.9	6.2	12	0	0	17	12		14	8.9	12	11
85+136	0.35	2.5	1.2	4.2	4.0	6.5	1.1	1.2	0.034	5.8		3.6	612	3.1	3.4
110+77	0.47	5.6	3.1	12	10	18	11	10	31	18		21	32	16	17
82	0	0.40	0.22	1.1	0.53	0.69	0.69	0.76	1.4	0.81		1.7	1.8	1.1	1.6
151	0.039	0.79	0.31	1.5	1.4	2.6	1.6	2.1	3.4	2.3		3.2	4.8	2.5	6.0
135+144+147+124	0	1.0	0.48	1.8	1.5	3.1	1.7	1.9	4.3	2.9		3.5	5.2	2.5	3.6
149+123+107	0.19	2.7	1.3	4.8	4.2	7.7	5.2	4.8	11	7.1		11	14	7.2	10
118	0.097	2.1	1.1	5.0	3.3	6.8	0	0	9.1	6.7		7.5	8.7	5.0	6.6
146	0	0	0.15	0.64	0.53	1.3	4.4	3.0	1.8	1.5		2.0	2.8	3.0	5.7
153+132	0.036	2.6	1.1	5.1	3.4	7.7	5.1	5.2	0.016	7.1		11	13	7.6	11
105	0	0.89	0	2.7	0	2.4	2.1	1.7	4.3	2.4		3.4	4.6	2.1	2.4
141(+ 179 from 4/16/99)	0.047	0.65	0.22	0.83	0.82	1.7	1.4	1.4	0.013	1.6		2.7	3.6	1.9	2.9
137+176+130	0	0	0	0	0.42	0	0	0	0	0		0.45	1.3	0.47	0.50
163+138	0	2.8	1.1	6.7	3.4	8.3	5.1	5.0	12	7.9		10	14	7.7	9.7
178+129	0	0.18	0	0.53	0.30	1.4	0.67	0	1.5	0		0.95	1.6	0.82	1.2
187+182	0.087	0.75	0.19	1.3	0.72	1.8	0.94	1.1	2.8	1.5		2.2	3.8	1.5	2.4
183	0	0.34	0.12	1.1	0.42	0.96	0.53	0.60	1.6	0.97		1.5	2.2	1.1	1.7
185	0	0.074	0.022	0.42	0	0	0.12	0.12	0.34	0		0.19	0.51	0.15	0.28
174	0	0.39	0.13	0.82	0.50	1.2	0.83	0.94	2.0	1.1		1.8	2.5	1.3	1.8
177	0	0.31	0.12	0.54	0.32	0.71	0.45	0.60	1.1	0.61		1.1	1.6	0.69	1.2
202+171+156	0.023	0.22	0.075	0.45	0.25	0.84	0.59	0.58	1.3	0.75		0.99	1.7	0.75	0.93
180	0	0.47	0	1.5	0.63	1.7	1.2	1.1	2.6	1.5		2.4	4.6	1.7	2.3
199	0	0.063	0.058	0.15	0.087	0.14	0	0.066	0.16	0.12		0.13	0	0.10	0.19
170+190	0	0.098	0.10	0.37	0	0.49	0.29	0.27	0.78	0.44		0.81	1.1	0.54	0.75
198	0	0	0	0	0	0	0	0	0	0			0		
201	0	0.19	0.11	1.1	0	0.61	0.70	0.52	1.1	0.54		1.1	1.8	0.91	1.4
203+196	0	0.26	0.16	1.5	0.42	0.78	0.70	0.61	1.2	0.67		1.2	1.9	0.92	1.3
195+208	0	0	0	0.060	0.037	0.14	0.14	0.099	0.12	0.033		0.10	0.095	0.17	0.26
194	0	0	0.036	0.098	0.078	0.080	0.13	0.076	0.14	0.094		0.21	0.32	0.18	0.34
206	0	0	0	0.094	0.042	0.046	0.081	0.051	0.12	0.053		0.12	0	0.14	0.19
Total PCBs	39	140	85	417	312	547	405	247	856	600		730	1490	736	521
Homologue Group															
3	21	42	27	166	106	207			365	236		333	318	198	206
4	14	46	34	154	125	187			280	206		189	328	376	115
5	3.8	38	18	65	62	111			162	120		156	763	122	138
6	0.31	11	4.7	21	16	32			33	30		50	58	38	55
7	0.087	2.6	0.68	6.6	2.9	8.2			13	6.0		10	18	7.3	11
8	0.023	0.73	0.43	3.4	0.87	2.6			4.0	2.2		4.6	5.9	3.6	5.15
9	0	0	0	0.094	0.042	0.046			0.12	0.053		0.12	0	0.14	0.19
Corresponding Laboratory Blank	4/14/99	4/14/99	4/14/99	4/14/99	6/15/99	6/15/99	6/15/99	6/15/99	6/15/99	6/15/99	7/12/99	7/12/99	7/12/99	7/12/99	7/27/99
Surrogate Recoveries (%)															
#65	103 %	95 %	91 %	80 %	108 %	97 %			89 %	99 %		88 %	67 %	91 %	80 %
#166	98 %	95 %	94 %	85 %	101 %	95 %			96 %	94 %		91 %	94 %	93 %	89 %

A.2. New Brunswick Gas Phase
PCBs (NB-PUF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	NB-PUF 7/7/99	NB-PUF 7/16/99	NB-PUF 7/25/99	NB-PUF 8/3/99	NB-PUF 8/12/99	NB-PUF 8/21/99	NB-PUF 8/30/99	NB-PUF 9/8/99	NB-PUF 9/15/99	NB-PUF 9/27/99	NB-PUF 10/21/99	NB-PUF 11/2/99	NB-PUF 11/14/99	NB-PUF 11/26/99
18	36	39	27	27	to ron	to ron	24	20	68	36	9.6	9.0	12	13
17+15	35	45	29	17	Hites	Hites	16	9.8	94	49	9.5	31	9.1	7.2
16+32	36	47	27	28			25	20	62	41	10	9.0	14	13
31	38	51	34	24			25	20	65	43	7.8	9.4	10	12
28	27	40	26	20			19	18	47	36	6.7	8.9	9.0	12
21+33+53	27	33	22	16			16	16	42	31	6.7	7.1	7.8	9.6
22	22	33	18	22			9.2	26	34	24	5.1	7.1	7.2	8.1
45	16	11	14	7.7			3.0	10	7.4	7.5	2.5	8.6	1.7	2.7
52+43	43	53	52	26			29	23	64	41	13	13	17	15
49	21	36	19	14			18	30	31	23	6.4	11	8.0	15
47+48	12	13	11	0			7.6	6.0	16	12	2.1	3.3	3.2	4.5
44	26	38	35	21			16	22	37	28	7.0	8.9	8.8	11
37+42	5.2	18	11	8.7			7.3	12	15	15	3.6	6.4	4.3	6.1
41+71	7.0	16	11	7.2			8.2	6.1	16	14	2.5	3.4	3.3	4.0
64	5.8	10	7.0	4.3			4.0	4.4	9.0	7.5	2.1	2.6	2.3	3.3
40	3.1	0	0	2.7			0.99	2.4	2.8	2.8	0.79	0.76	0.65	1.1
74	5.8	7.5	8.2	2.4			3.7	7.4	8.3	6.4	1.7	2.2	2.3	3.4
70+76	12	18	19	8.2			8.0	7.3	18	13	3.7	5.1	5.2	6.8
66+95	38	61	67	27			24	23	58	42	13	15	16	20
91	2.7	4.1	5.9	2.6			2.2	1.3	4.1	2.9	1.2	1.3	1.4	1.7
56+60+89	11	19	16	6.0			6.5	6.9	13	12	2.9	4.7	3.9	5.7
92+84	26	46	45	18			17	22	34	26	8	11	10	13
101	17	29	33	13			13	9.8	25	18	6.6	8.1	8.3	10
83	0.59	1.2	1.9	0.71			0.67	0.76	0.58	0.72	0.35	0.38	0.43	3.6
97	3.3	5.3	0	2.5			2.5	2.4	4.5	3.5	1.5	2.0	1.8	2.3
87+81	32	47	44	16			8.9	27	19	14	4.6	4.9	5.3	5.7
85+136	2.5	5.6	5.7	136			2.4	2.4	5.1	3.5	1.3	1.3	1.6	1.5
110+77	16	29	31	14			10	11	21	18	6.3	7.6	7.8	9.0
82	1.4	2.6	2.4	1.3			0.82	1.4	2.2	1.7	0.41	0.63	0.68	0.52
151	3.4	6.1	5.6	3.0			2.2	3.2	6.2	3.8	1.1	1.8	1.4	1.7
135+144+147+124	3.1	5.2	5.5	3.0			2.2	2.9	6.0	4.0	1.0	1.5	1.4	1.5
149+123+107	9.4	16	15	9.3			6.4	7.7	19	11	2.6	4.1	3.1	3.7
118	6.9	12	12	6.6			4.3	6.1	15	8.6	1.8	3.4	2.4	3.1
146	3.6	5.3	5.9	4.7			2.3	7.3	4.4	3.5	1.8	3.9	1.4	3.2
153+132	9.6	18	16	9.2			6.3	8.5	18	12	2.5	4.2	3.3	4.3
105	2.7	5.8	5.1	2.5			1.3	2.8	4.2	3.6	0.58	1.4	1.0	0.88
141(+ 179 from 4/16/99)	2.6	4.5	4.0	2.4			1.8	2.1	4.5	3.1	0.71	1.4	0.93	1.3
137+176+130	1.1	1.5	1.6	0.94			0.35	1.0	2.0	0.98	0.18	0.32	0.22	0.29
163+138	10	19	17	9.4			6.1	9.1	20	13	2.2	5.1	2.9	4.5
178+129	4.9	3.5	3.8	0			0	3.1	0	0.76	0.21	0.36	0	0.34
187+182	2.5	4.2	3.4	1.5			1.2	1.5	4.0	2.7	0.49	1.0	0.65	0.94
183	1.5	2.4	1.8	1.0			0.71	1.2	2.2	2.0	0.28	0.68	0.52	0.62
185	0.31	0.43	0.41	0.20			0.14	0.20	0.36	0.27	0.053	0.12	0.10	0.11
174	1.9	3.1	2.6	1.5			1.0	1.4	2.8	2.3	0.42	0.99	0.58	0.76
177	1.2	1.9	1.6	0.89			0.57	0.93	1.8	1.4	0.21	0.64	0.30	0.51
202+171+156	0.85	2.2	2.2	0.98			0.55	1.2	1.3	1.7	0.19	0.61	0.31	0.48
180	2.5	4.2	3.2	1.8			1.1	1.8	3.6	3.1	0.34	1.1	0.70	0.97
199	0.19	0.37	0.28	0.12			0.091	0.14	0.31	0.24	0.041	0.17	0.058	0.084
170+190	0.79	1.2	0.97	0.53			0.30	0.64	1.0	1.0	0.078	0.31	0.13	0.30
198														
201	1.4	2.4	1.7	0.84			0.52	0.99	2.2	1.8	0.18	0.67	0.30	0.56
203+196	1.4	2.4	1.7	0.82			0.53	0.95	2.3	1.9	0.18	0.65	0.29	0.62
195+208	0.092	0.48	0.33	0.16			0.098	0.21	0.39	0.39	0.045	0.23	0.067	0.14
194	0.22	0.39	0.26	0.13			0.063	0.19	0.34	0.45	0.015	0.11	0.036	0.11
206	0.16	0.32	0.18	0.07			0.032	0.12	0.26	0.40	0.010	0.13	0.021	0.094
Total PCBs	599	881	734	554			368	433	946	656	164	238	206	253
Homologue Group														
3	226	305	195	162			141	142	427	275	59	88	74	81
4	200	225	198	103			107	132	228	171	46	65	57	75
5	110	252	255	118			89	137	199	143	46	58	59	73
6	43	85	79	180			31	46	88	59	14	24	17	23
7	16	20	17	6.9			4.8	10	15	13	2.0	4.9	2.8	4.3
8	4.1	9.5	7.4	3.6			2.1	4.4	7.8	7.4	0.73	2.7	1.2	2.3
9	0.16	0.32	0.18	0.074			0.032	0.12	0.26	0.40	0.010	0.13	0.021	0.094
Corresponding Laboratory Blank		7/27/99	8/16/99	8/16/99	9/7/99	9/7/99	9/7/99	9/29/99	9/29/99	10/25/99	10/25/99	11/22/99	11/22/99	
Surrogate Recoveries (%)														
#65	84 %	74 %	73 %	107 %			83%	114%	99%	81%	82%	79%	83%	32%
#166	84 %	77 %	76 %	84 %			87%	80%	80%	81%	86%	81%	85%	48%

A.2. New Brunswick Gas Phase PCBs (NB-PUF)
Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	NB-PUF 12/8/99	NB-PUF 12/20/99
18	14	47
17+15	10	28
16+32	16	50
31	9.0	38
28	7.5	31
21+33+53	7.8	27
22	6.3	21
45	2.0	4.1
52+43	15	41
49	9.1	33
47+48	2.3	9.6
44	8.5	24
37+42	4.5	11
41+71	2.3	10
64	2.3	7.1
40	1.0	0
74	1.5	4.9
70+76	3.3	9.2
66+95	12	34
91	1.1	2.9
56+60+89	2.9	7.1
92+84	8.7	21
101	5.8	15
83	0.30	0.61
97	0.96	3.0
87+81	3.6	9.2
85+136	0	2.6
110+77	4.2	14
82	0.46	1.1
151	0.92	2.4
135+144+147+124	0.84	2.5
149+123+107	2.1	6.4
118	1.6	5.1
146	1.6	4.7
153+132	1.9	6.7
105	0.39	2.1
141(+ 179 from 4/16/99)	0.58	1.8
137+176+130	0.11	0.33
163+138	1.6	6.4
178+129	0	0
187+182	0.40	1.3
183	0.22	0.73
185	0.031	0.13
174	0.37	1.0
177	0.20	0.60
202+171+156	0.18	0.48
180	0.32	0.95
199	0.023	0.034
170+190	0.082	0.75
198		
201	0.13	0.49
203+196	0.15	0.47
195+208	0.039	0.085
194	0.011	0.034
206	0.012	0.021
Total PCBs	177	549
Homologue Group		
3	75	252
4	53	153
5	41	118
6	10	35
7	1.5	4.8
8	0.62	2.3
9	0.012	0.021
Corresponding Laboratory Blank		
Surrogate Recoveries (%)		
#65	87%	86%
#166	86%	79%

A.3. New Brunswick PCBs in Precipitation (NB-Precip)
Surrogate Corrected Concentrations
(ng/L)

PCB Congener	NB-Precip 1/24/98	NB-Precip 2/3/98	NB-Precip 2/11/98	NB-Precip 2/16/98	NB-Precip 2/28/98	NB-Precip 3/12/98	NB-Precip 3/24/98	NB-Precip 4/5/98	NB-Precip 4/17/98	NB-Precip 4/29/98	NB-Precip 5/12/98	NB-Precip 5/23/98	NB-Precip 6/4/98	NB-Precip 6/17/98
18	6.1	0.15	0.025	0.089	0.067		0.18	0.13	0.17		0	0.21	0.030	0.48
17+15	1.7	0.10	0.0048	0.030	0.036		0.12	0.097	0		0	0.026	0.022	0.063
16+32	0.70	0.020	0.0094	0.028	0.040		0.025	0.019	0		1.1	0.026	0.013	0.020
31	12	0.55	0.025	0.049	0.070		0.070	0.021	0.012		0	0.0048	0.013	0.015
28	7.7	0.31	0.012	0.041	0.041		0.030	0.017	0.049		0	0.013	0.013	0.018
21+33+53	0	0.064	0.018	0.036	0.070		0	0	0.033		0	0	0.013	0
22	5.3	0.35	0.046	0.098	0.092		0.12	0.078	0		1.4	0.097	0.028	0.10
45	0.39	0.028	0.00088	0.0075	0.031		0	0	0		0	0	0	0
52+43	3.2	0.42	0.037	0.074	0.11		0.25	0.15	0.12		0	0.028	0.046	0.088
49	0.42	0.059	0.0048	0.019	0.023		0.039	0.020	0.0094		2.2	0.0087	0.0094	0.016
47+48	0.43	0.054	0.0063	0.035	0.044		0	0	0		0	0	0.0022	0.0092
44	0.80	0.20	0.010	0.057	0.060		0.030	0	0.025		0.71	0.012	0.017	0.025
37+42	0	0.11	0	0.0085	0.022		0	0.014	0.038		0	0.020	0	0.028
41+71	0	0.19	0.022	0.024	0.026		0.025	0.018	0.015		0.74	0	0.0077	0.017
64	0	0.10	0	0.024	0.024		0	0.0046	0.027		0	0	0.0044	0
40	0	0.10	0	0.016	0.034		0	0	0.0039		0.13	0.0022	0.0040	0.0034
74	0	0.13	0	0	0.033		0	0	0.058		0.81	0	0.0089	0.018
70+76	0.40	0.17	0	0.031	0.086		0	0	0.033		0	0	0.011	0
66+95	2.8	0.46	0.017	0.083	0.22		0.10	0.072	0.10		0	0	0.065	0.14
91	0.63	0.037	0	0.011	0.016		0.020	0.0041	0		0	0	0.0088	0.0027
56+60+89	0	0.18	0	0.021	0.13		0	0	0.058		1.7	0	0.023	0.040
92+84	0	0.18	0	0.021	0.079		0	0	0		0	0	0.019	0
101	4.0	0.43	0.018	0.075	0.077		0.096	0.054	0.063		0.66	0.017	0.036	0.027
83	0	0	0	0	0		0	0	0		0	0	0	0
97	0	0.13	0	0	0.031		0.0096	0.011	0.025		0	0.0046	0.015	0.019
87+81	0	0.30	0	0.041	0.075		0	0	0		0	0.015	0.022	0.036
85+136	0	0	0	0	0.0093		0.020	0.0051	0.030		0	0.0059	0.010	0.036
110+77	2.6	0.33	0.010	0.047	0.12		0.058	0.049	0.095		0.81	0.029	0.040	0.054
82	0	0	0	0	0.0097		0.0029	0.0034	0		0	0.0024	0.0014	0.0024
151	0	0.17	0.0057	0.018	0.0099		0	0	0.011		0.20	0.0090	0.0024	0.0036
135+144+147+124	0	0	0	0	0.013		0.0032	0	0.0092		0	0.0060	0.0033	0.0067
149+123+107	3.8	0.65	0.020	0.087	0.047		0	0.023	0.048		0.65	0.031	0.024	0.045
118	0	0	0.0061	0.087	0.077		0	0	0.065		0	0.015	0.041	0.049
146	0	0	0	0	0		0	0	0		0.15	0	0	0
153+132	4.7	0.64	0.026	0.11	0.079		0	0.018	0.086		1.1	0	0.030	0
105	0	0.29	0.017	0.049	0.052		0	0	0		0.50	0	0.027	0
141	0	0	0.0017	0.024	0.021		0	0.0054	0.019		0	0.012	0.0070	0.011
137+176+130	0	0	0	0	0.0063		0	0	0.013		0	0	0	0
163+138	7.1	1.1	0.048	0.20	0.14		0.075	0.058	0.12		1.6	0.062	0.053	0.076
178+129	0	0	0	0	0.011		0	0	0.011		0	0	0.0016	0
187+182	3.9	0	0.016	0.082	0.078		0.044	0.016	0.032		2.5	0.020	0.0084	0.027
183	0	0	0	0	0		0	0	0.027		0.49	0.0095	0.0045	0.0077
185	0.15	0	0	0	0		0	0	0		0	0.0036	0.00054	0.0023
174	3.7	0.55	0	0.090	0.041		0.020	0.0099	0.037		0.27	0.017	0.0069	0.011
177	0	0	0	0.041	0.041		0.015	0.0095	0.018		0.65	0.0088	0.0057	0.016
202+171+156	0	0	0	0	0.021		0	0	0		0	0	0.00052	0
180	5.1	0.73	0.033	0.12	0.13		0.059	0.038	0.097		2.0	0.037	0.017	0.033
199	0	0	0	0	0.0074		0	0	0.0026		0	0	0	0
170+190	0	0.17	0.0058	0.031	0.054		0.025	0.017	0.056		0	0.011	0.0094	0.013
198	0	0	0	0	0.0017		0	0	0		0.60	0	0	0
201	3.3	0.40	0.016	0.089	0.071		0.067	0.023	0.054		1.4	0.038	0.010	0.022
203+196	0	0.28	0.012	0	0.074		0.039	0.030	0.080		1.6	0.024	0.011	0.023
195+208	0	0	0.0017	0	0.015		0	0.0056	0.017		0.090	0	0	0.0062
194	0	0	0.0023	0.015	0.028		0.018	0.013	0		1.1	0.022	0.0096	0.017
206	0	0.09	0.0012	0.023	0.014		0.0067	0.0055	0.019		0.27	0.0048	0	0.0045
Total PCBs	81	10	0.48	2.0	2.7		1.6	1.0	1.8		26	0.85	0.76	1.6
Homologue Group														
3	34	1.7	0.14	0.38	0.44		0.54	0.37	0.30		2.5	0.40	0.13	0.72
4	8.4	2.1	0.098	0.39	0.82		0.44	0.26	0.45		6.3	0.050	0.20	0.36
5	7.2	1.7	0.051	0.33	0.55		0.21	0.13	0.28		2.0	0.090	0.22	0.23
6	16	2.6	0.10	0.43	0.32		0.078	0.10	0.31		3.8	0.12	0.12	0.14
7	13	1.5	0.054	0.37	0.35		0.16	0.090	0.28		5.9	0.11	0.055	0.11
8	3.3	0.68	0.032	0.10	0.22		0.12	0.071	0.15		4.8	0.083	0.031	0.068
9	0	0.086	0.0012	0.023	0.014		0.0067	0.0055	0.019		0.27	0.0048	0	0.0045
Corresponding Laboratory Blank	6/10/98	9/1/98	6/10/98	6/10/98	6/10/98	9/1/98	9/1/98	9/1/98	9/1/98		9/28/98	9/28/98	9/28/98	10/8/98
Volume of Precip. (L)	0.13	6.2	3.6	17	8.7	13	8.6	13	7.7		0.050	9.5	22	4.4
Surrogate Recoveries (%)														
#65	62 %	78 %	93 %	95 %	60 %		73 %	68 %	69 %		95 %	32 %	102 %	91 %
#166	75 %	66 %	97 %	113 %	107 %		82 %	78 %	74 %		94 %	33 %	99 %	103 %

A.3. New Brunswick PCBs in Precipitation (NB-Precip)
Surrogate Corrected Concentrations (ng/L)

PCB Congener	NB-Precip 6/28/98	NB-Precip 7/9/98	NB-Precip 7/22/98	NB-Precip 8/3/98	NB-Precip 8/15/98	NB-Precip 8/21/98	NB-Precip 9/4/98	NB-Precip 9/22/98	NB-Precip 10/10/98	NB-Precip 10/28/98	NB-Precip 11/15/98	NB-Precip 12/3/98	NB-Precip 12/21/98	NB-Precip 1/8/99
18		3.2	1.1	3.2	0.53	0	0.27	0.046	0		0.070	0.013		0.037
17+15		0.41	0.073	0.39	0.075	0	0.018	0.012	0		0.018	0.0040		0.016
16+32		0	0.045	0.058	0	0	0.017	0.019	0		0.036	0.012		0.036
31		0.38	0.099	0.22	0.039	0.017	0.011	0.022	0		0.010	0.0071		0.028
28		0.21	0.030	0.11	0.030	0.012	0.011	0.021	0.027		0.027	0.011		0.032
21+33+53		0.88	0	0	0	0	0	0.020	0.015		0.011	0.0078		0.015
22		0.35	0.13	0.25	0.061	0.079	0.058	0.053	0		0	0		0
45		0	0	0	0	0	0	0	0		0	0.0044		0
52+43		0.76	0.067	0	0.054	0	0.023	0.055	0.30		0	0.023		0.061
49		0.093	0.034	0.099	0.019	0.0049	0.010	0.019	0		0.011	0.0035		0.0077
47+48		0.013	0	0	0	0.0026	0.0094	0.0017	0.022		0.010	0		0.0038
44		0.22	0.051	0.15	0.022	0.017	0.025	0.024	0.0054		0.014	0.0067		0.022
37+42		0.13	0.075	0.20	0.025	0	0	0.0059	0.022		0.022	0.0093		0.032
41+71		0.25	0.11	0.34	0.056	0.025	0	0	0		0.0091	0.0031		0.034
64		0	0	0	0	0	0	0	0.0026		0.0072	0.0029		0.019
40		0.0055	0	0.015	0	0	0.016	0.0093	0		0	0		0.0055
74		0.14	0.029	0	0.017	0	0	0	0.012		0.0086	0.0056		0.012
70+76		0.71	0	0	0.090	0.10	0.059	0	0.015		0.017	0.012		0.028
66+95		1.2	0	0	0.086	0.059	0.057	0.059	0.047		0.047	0.028		0.055
91		0.13	0	0	0.0041	0.0025	0.013	0.043	0		0	0		0.023
56+60+89		0.29	0	0	0	0	0.013	0	0		0	0		0.029
92+84		0.34	0.10	0.097	0.031	0.013	0.0094	0.027	0		0.019	0.017		0.027
101		0.58	0.028	0.090	0.023	0.025	0.020	0.037	0.023		0.032	0.018		0.031
83		0	0	0	0	0	0	0	0		0	0		0.0042
97		0.17	0.012	0.041	0.0082	0.0077	0.0076	0	0.0039		0.0081	0.0035		0.0071
87+81		0.30	0	0	0.020	0.018	0.025	0.026	0		0.028	0.011		0.041
85+136		0.14	0.0093	0.081	0.021	0.018	0.0069	0.027	0.018		0.021	0.0057		0.010
110+77		0.69	0.038	0.11	0.031	0.025	0.034	0.033	0.026		0.034	0.018		0.049
82		0.041	0.0013	0.0039	0.0011	0.0017	0.0023	0.0049	0		0.0051	0.0015		0.0042
151		0.046	0.0044	0.018	0.0040	0.0033	0.0032	0	0.0023		0.0042	0.0022		0.0045
135+144+147+124		0.069	0	0.0093	0.0011	0.0051	0.0091	0.0034	0		0.0094	0.0034		0.011
149+123+107		0.30	0.043	0.080	0.021	0.019	0.031	0.031	0.032		0.029	0.013		0.034
118		0.39	0.023	0.075	0.014	0.015	0.025	0.034	0.027		0.051	0.018		0.042
146		0.053	0	0	0	0	0	0	0.0083		0.0027	0		0.0072
153+132		0.37	0.036	0.11	0.024	0.032	0.034	0.048	0.030		0.036	0.016		0.044
105		0.34	0	0	0.013	0.022	0.024	0	0		0	0		0
141		0.095	0.0087	0.027	0.0039	0.0081	0	0.011	0.0041		0.0058	0.0030		0.011
137+176+130		0	0	0	0	0.11	0	0	0.0062		0	0		0
163+138		0.67	0.040	0.13	0.033	0.041	0.053	0.087	0.027		0.069	0.027		0.073
178+129		0.083	0	0	0	0.0025	0	0.0055	0		0	0		0.011
187+182		0.16	0.038	0.13	0.023	0.026	0.013	0.023	0.0084		0.0043	0.0033		0.016
183		0.051	0.013	0.023	0.0023	0.0085	0.0061	0.013	0.0037		0.0057	0.0029		0.013
185		0	0.0038	0.011	0	0.00094	0.0012	0.00073	0		0	0		0.0017
174		0.094	0.0092	0.037	0.0037	0.010	0.0093	0.014	0.0038		0.0099	0.0077		0.019
177		0	0	0.033	0	0.0090	0.010	0.013	0.0027		0.0073	0.0033		0.014
202+171+156		0	0	0.0058	0	0.0021	0.0035	0.0039	0.0051		0.0081	0.0036		0.016
180		0.23	0.014	0.11	0.0088	0.028	0.021	0.042	0.0080		0.022	0.011		0.041
199		0	0	0.0056	0	0	0.00040	0	0		0.00076	0		0.0027
170+190		0.042	0.0064	0.029	0.0037	0.0053	0.0018	0.018	0.0040		0.017	0.015		0.019
198		0	0	0	0	0	0	0	0		0	0		0
201		0.12	0.018	0.060	0	0.014	0	0.029	0.0060		0.012	0.0050		0.020
203+196		0.14	0.015	0.062	0.012	0.018	0.0088	0.025	0.011		0.016	0.0072		0.026
195+208		0	0	0.01	0	0.0040	0.0033	0.0040	0		0.0027	0.0017		0.0046
194		0.11	0.012	0.042	0.0046	0.011	0.012	0.015	0.0035		0.0066	0.0027		0.011
206		0	0	0.018	0	0.0048	0	0.0075	0		0.0036	0.0010		0.0082
Total PCBs		15	2.3	6.5	1.4	0.82	0.99	0.99	0.73		0.79	0.37		1.1
Homologue Group														
3		5.6	1.6	4.4	0.76	0.11	0.38	0.20	0.064		0.20	0.064		0.20
4		3.7	0.29	0.61	0.35	0.21	0.21	0.17	0.40		0.12	0.089		0.28
5		3.1	0.21	0.50	0.17	0.15	0.17	0.23	0.098		0.20	0.093		0.24
6		1.6	0.13	0.37	0.087	0.21	0.13	0.18	0.11		0.16	0.064		0.19
7		0.66	0.085	0.37	0.041	0.090	0.063	0.13	0.031		0.066	0.043		0.13
8		0.37	0.045	0.19	0.017	0.049	0.028	0.077	0.026		0.046	0.020		0.080
9		0	0	0.018	0	0.0048	0	0.0075	0		0.0036	0.0010		0.0082
Corresponding Laboratory Blank	10/8/98	10/8/98	10/8/98	10/8/98	11/11/98	11/11/98	11/11/98	11/11/98	3/30/99	3/30/99	3/30/99	3/30/99		4/27/99
Volume of Precip. (L)	5.4	0.77	2.3	1.4	4.0	9.2	10	10	2.0	2.1	4.0	15		29
Surrogate Recoveries (%)														
#65		91 %	97 %	76 %	97 %	85 %	100 %	115 %	86 %		80 %	95 %		85 %
#166		109 %	103 %	92 %	100 %	94 %	101 %	100 %	93 %		77 %	63 %		68 %

A.3. New Brunswick PCBs in Precipitation (NB-Precip)
Surrogate Corrected Concentrations
(ng/L)

PCB Congener	NB-Precip 1/26/99	NB-Precip 2/13/99	NB-Precip 3/3/99	NB-Precip 3/21/99	NB-Precip 4/8/99	NB-Precip 4/26/99	NB-Precip 5/14/99	NB-Precip 6/1/99	NB-Precip 6/19/99	NB-Precip 7/7/99	NB-Precip 8/12/99	NB-Precip 8/30/99	NB-Precip 9/15/99	NB-Precip 10/9/99
18	0.043		0.029	0.29	0.031	0.12	0.016	0.031	0	0.431	0.0086	0.012	0.0080	0.010
17+15	0.0093		0.011	0.032	0	0	0.023	0	0.050	0.282	0	0.015	0	0
16+32	0.018		0.030	0.046	0.0056	0.17	0.021	0.049	0.075	0.67	0.019	0.020	0.0085	0.017
31	0.0067		0.015	0.027	0.029	0.24	0.025	0.10	0.089	0.52	0.020	0.016	0.010	0.015
28	0.017		0.016	0.035	0.028	0.26	0.024	0.093	0.089	0.52	0.028	0.015	0.0094	0.016
21+33+53	0.0072		0.014	0.013	0.022	0.24	0.021	0.067	0.056	0.32	0.016	0.015	0.0059	0.010
22	0		0	0	0.020	0.17	0.017	0.065	0.033	0.21	0.012	0.019	0.0078	0.012
45	0		0.012	0.034	0	0.030	0.0026	0	0.0072	0.043	0.0030	0.0014	0.0014	0.0018
52+43	0		0	0	0.075	0.37	0.043	0.18	0.11	0.62	0.041	0.019	0.018	0.026
49	0.0013		0.0065	0.13	0.051	0.36	0.040	0.23	0.12	0.57	0.053	0.018	0.029	0.021
47+48	0.0033		0.0060	1.8	0.015	0.14	0.011	0.073	0.031	0.26	0.0099	0.0062	0.0037	0.0060
44	0.0091		0.012	0.038	0.053	0.29	0.033	0.13	0.096	0.60	0.032	0.020	0.015	0.022
37+42	0.023		0.0090	0.028	0.029	0.19	0.019	0.096	0.036	0.20	0.016	0.013	0.010	0.017
41+71	0.0038		0.0066	0.0086	0.026	0.13	0.013	0.036	0.035	0.15	0.0090	0.0080	0.0049	0.012
64	0.0027		0.0052	0.0091	0.019	0.098	0.010	0.040	0.022	0.12	0.0092	0.0054	0.0038	0.0050
40	0		0	0	0.0081	0.018	0.0016	0.0084	0	0.026	0.0010	0.00091	0	0.0011
74	0.0081		0.0075	0.017	0.014	0.13	0.015	0.051	0.030	0.14	0.017	0.0061	0.0064	0.010
70+76	0.010		0.011	0.047	0.035	0.25	0.026	0.079	0.055	0.22	0.027	0.011	0.0089	0.012
66+95	0.021		0.017	0.15	0.11	0.80	0.079	0.20	0.14	0.57	0.077	0.029	0.025	0.033
91	0		0	0	0.015	0.032	0.0055	0.0078	0.0058	0.032	0.0048	0.0018	0	0
56+60+89	0		0.012	0.021	0.037	0.27	0.029	0.084	0.044	0.17	0.026	0.012	0.0079	0.014
92+84	0.012		0.020	0.069	0.079	0.33	0.042	0.13	0.052	0.16	0.040	0.027	0.019	0.030
101	0.018		0.014	0.067	0.070	0.43	0.043	0.091	0.077	0.25	0.045	0.015	0.013	0.018
83	0		0.0031	0.010	0.015	0.12	0.0013	0.0058	0.019	0.088	0.013	0.0016	0.0070	0.0095
97	0.0031		0.0052	0.022	0.018	0.093	0.012	0.026	0.017	0.054	0.011	0.0035	0.0033	0.0043
87+81	0.023		0.015	0.060	0.046	0.30	0.033	0.093	0.038	0.13	0.033	0.0088	0.0080	0.011
85+136	0.0079		0.0069	0.040	0	0.19	0.0074	0.0068	0.0068	0.0087	0.0058	0.0031	0.0012	0.0040
110+77	0.020		0	0.065	0.095	0.58	0.061	0.15	0.074	0.18	0.057	0.023	0.017	0.025
82	0.0021		0.0025	0.015	0.014	0.12	0.010	0.051	0.013	0.033	0.0089	0.0037	0.0038	0.0060
151	0.0025		0.0017	0.0093	0.017	0.26	0.012	0.039	0.018	0.057	0.017	0.0042	0.0056	0.0065
135+144+147+124	0.0048		0.0041	0.016	0.021	0.19	0.010	0.024	0.019	0.040	0.015	0.0041	0.0038	0.0043
149+123+107	0.024		0.033	0.12	0.044	0.61	0.035	0.072	0.051	0.13	0.047	0.013	0.0089	0.011
118	0.029		0.031	0.14	0.064	0.37	0.045	0.15	0.077	0.15	0.047	0.016	0.014	0.017
146	0		0.0024	0.019	0.031	0.22	0.018	0.069	0.022	0.053	0.018	0.027	0.021	0.026
153+132	0.018		0.016	0.062	0.079	0.79	0.054	0.082	0.068	0.12	0.070	0.021	0.017	0.019
105	0		0	0	0.057	0.22	0.026	0.034	0	0	0.023	0.011	0	0
141	0.0042		0.0028	0.010	0.016	0.24	0.011	0.014	0.021	0.038	0.019	0.0035	0.0040	0.0046
137+176+130	0		0	0.026	0.013	0.026	0.0044	0.0079	0.0044	0.0044	0.0046	0.0013	0.00081	0
163+138	0.037		0.033	0.12	0.11	1.00	0.078	0.16	0.11	0.15	0.10	0.030	0.020	0.028
178+129	0		0.0059	0.0056	0.010	0	0.0050	0.020	0.013	0.013	0.014	0.0053	0.0022	0.0046
187+182	0.0045		0.0046	0.012	0.0053	0.23	0.0088	0.0092	0.013	0.016	0.021	0.0044	0.0022	0.0023
183	0.0048		0.015	0.012	0.0084	0.18	0.0064	0.022	0	0.024	0.015	0.0036	0.0024	0.0035
185	0.00043		0.000	0.0048	0.0014	0.036	0.00083	0	0.0023	0.0033	0.0025	0.00053	0.00070	0.00072
174	0.0071		0.0056	0.028	0.011	0.36	0.011	0.043	0.038	0	0.035	0.0054	0.0051	0
177	0.0059		0.0055	0.022	0.0093	0.21	0.0072	0.026	0.015	0.027	0.017	0.0034	0.0027	0.0050
202+171+156	0.0099		0.0079	0.012	0.015	0.17	0.0073	0.040	0.021	0.024	0.018	0.0028	0.0037	0.0049
180	0.017		0.014	0.044	0.034	0.68	0.029	0.091	0.062	0.072	0.058	0.014	0.013	0.014
199	0.0016		0.00068	0.0012	0.00068	0.018	0.00057	0.0015	0.00092	0.0020	0.0015	0	0	0
170+190	0.0095		0.0063	0.033	0.013	0.27	0.014	0.040	0.025	0.017	0.029	0.0064	0.0046	0.0055
198	0		0	0	0	0	0	0	0	0	0	0	0	0
201	0.0084		0.010	0.027	0.014	0.24	0.017	0.039	0.040	0.031	0.029	0.0087	0.0091	0.011
203+196	0.013		0.014	0.035	0.015	0.27	0.017	0.077	0.048	0.031	0.041	0.0090	0.0085	0.011
195+208	0.0042		0.0057	0	0.0029	0.071	0.0047	0.016	0.010	0.0060	0.0077	0.0022	0.0014	0.0015
194	0.0062		0.010	0.015	0.0063	0.11	0.0079	0.025	0.020	0.015	0.016	0.0045	0.0034	0.0030
206	0.0013		0.0043	0.0094	0.0062	0.057	0.0060	0.025	0.016	0.010	0.0093	0.0035	0.0034	0.0031
Total PCBs	0.48		0.52	3.8	1.6	13	1.1	3.3	2.1	8.6	1.3	0.55	0.41	0.55
Homologue Group														
3	0.12		0.13	0.47	0.17	1.4	0.17	0.50	0.43	3.2	0.12	0.12	0.059	0.096
4	0.060		0.095	2.2	0.44	2.9	0.30	1.1	0.68	3.5	0.30	0.14	0.12	0.16
5	0.11		0.098	0.49	0.47	2.8	0.29	0.74	0.38	1.1	0.29	0.11	0.086	0.12
6	0.090		0.092	0.38	0.33	3.3	0.22	0.47	0.32	0.59	0.29	0.10	0.081	0.099
7	0.050		0.057	0.16	0.093	2.0	0.083	0.25	0.17	0.17	0.19	0.043	0.033	0.035
8	0.044		0.049	0.090	0.054	0.88	0.055	0.20	0.14	0.11	0.11	0.027	0.026	0.031
9	0.0013		0.0043	0.0094	0.0062	0.057	0.0060	0.025	0.016	0.010	0.0093	0.0035	0.0034	0.0031
Corresponding Laboratory Blank	4/27/99		6/21/99	6/21/99	6/21/99	6/21/99	7/13/99	7/13/99	8/19/99	8/19/99	9/14/99	11/03/99	11/03/99	01/04/00
Volume of Precip. (L)	8.3		14.14	2.00	10.8	1.75	18.4	1.6	5.56	2.1	10	33.45	13.3	9.2
Surrogate Recoveries (%)														
#65	89 %		87 %	82 %	91 %	82 %	80 %	69 %	73 %	79 %	80 %	82 %	84 %	77 %
#166	82 %		87 %	88 %	93 %	90 %	89 %	84 %	79 %	78 %	88 %	89 %	91 %	83 %

A.3. New Brunswick PCBs in Precipitation (NB-Precip)
Surrogate Corrected Concentrations (ng/L)

PCB Congener	NB-Precip 11/2/99	NB-Precip 11/26/99	NB-Precip 12/21/99
18	0.052	0.011	0.027
17+15	0	0.027	0
16+32	0.077	0.015	0.030
31	0.15	0.012	0.040
28	0.14	0.010	0.033
21+33+53	0.088	0.0091	0.029
22	0.11	0.012	0.024
45	0.015	0.0014	0.0019
52+43	0.25	0.020	0.068
49	0.33	0.057	0.19
47+48	0.15	0.0059	0.032
44	0.22	0.016	0.039
37+42	0.19	0.0089	0.021
41+71	0.083	0.0067	0.015
64	0.050	0.0041	0.0091
40	0.0066	0.00056	0.0020
74	0.083	0.0067	0.015
70+76	0.11	0.0093	0.029
66+95	0.30	0.028	0.071
91	0.018	0.0014	0
56+60+89	0.14	0.0094	0.019
92+84	0.16	0.024	0.025
101	0.15	0.017	0.041
83	0.10	0.0062	0
97	0.041	0.0039	0.010
87+81	0.14	0.0091	0.029
85+136	0	0.0019	0.0016
110+77	0.19	0.022	0.039
82	0.11	0.0043	0.0095
151	0.11	0.0057	0.011
135+144+147+124	0.062	0.0046	0.010
149+123+107	0.19	0.013	0.023
118	0.35	0.017	0.029
146	0.097	0.015	0.013
153+132	0.17	0.025	0.037
105	0	0.012	0.015
141	0.062	0.0054	0.010
137+176+130	0	0.00082	0.0023
163+138	0.25	0.030	0.051
178+129	0.054	0.0010	0.0035
187+182	0	0.0045	0.011
183	0.042	0.0042	0.0077
185	0.015	0.00068	0.0011
174	0	0.0062	0.014
177	0.087	0.0048	0.0082
202+171+156	0.066	0.0050	0.0081
180	0.28	0.016	0.030
199	0	0	0
170+190	0.055	0.0059	0.010
198	0	0	0
201	0.094	0.0087	0.019
203+196	0.095	0.0085	0.020
195+208	0.021	0.0019	0.0043
194	0.042	0.0035	0.0074
206	0.036	0.0037	0.0070
Total PCBs	5.6	0.56	1.2
Homologue Group			
3	0.81	0.11	0.20
4	1.7	0.16	0.49
5	1.3	0.12	0.20
6	0.94	0.10	0.16
7	0.53	0.043	0.085
8	0.32	0.028	0.060
9	0.036	0.0037	0.0070
Corresponding Laboratory Blank	01/04/00	01/04/00	03/06/00
Volume of Precip. (L)	0.6	26.3	7.8
Surrogate Recoveries (%)			
#65	78 %	88 %	69 %
#166	84 %	87 %	70 %

B.1. Sandy Hook Particulate Phase
PCBs (SH-QFF)

Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	SH-QFF 2/4/98	SH-QFF 2/10/98	SH-QFF 2/16/98	SH-QFF 2/22/98	SH-QFF 2/28/98	SH-QFF 3/6/98	SH-QFF 3/12/98	SH-QFF 3/18/98	SH-QFF 3/24/98	SH-QFF 3/30/98	SH-QFF 4/5/98	SH-QFF 4/11/98	SH-QFF 4/17/98	SH-QFF 4/23/98
18	0	0	0	0.051	0	0	0.13	0.25	0.11	0.68	0.16	0.18		0.53
17+15	0	0	0	0	0	0	0.045	0	0.011	0.12	0.062	0		0
16+32	0	0	0	0	0	0	0	0.53	0	0	0.38	0.042		0
31	0	0.13	0	0.22	0.11	0	0.44	0.69	0.28	0	0.25	0.11		0
28	0	0.22	0	0	0.032	0	0.13	0.06	0.045	0	0.057	0.017		0
21+33+53	0	0	0	0	0	0	0	0	0	0	0	0.52		0
22	0	0	0	0	0	0	0	1.9	0	0	0	0		0
45	0	0	0	0	0	0	0	0	0	0.98	0	0.21		0
52+43	0.52	0	0	0.069	0.061	0.018	0.27	0.37	0.11	0	0.39	0.27		0
49	0	0	0	0.085	0	0	0	0	0.14	0.14	0.23	0		0.12
47+48	0	0.037	0	0.012	0.022	0	0	0	0	0	0	0		0
44	0.5	0.2	0	0.24	0.097	0.15	0.33	0	0.19	0.48	0.2	0		1.3
37+42	0	0	0	0	0.023	0	0.11	0	0.058	0	0.11	0		0
41+71	0	0.12	0	0.058	0.039	0	0.098	0	0.073	0	0.18	0		0
64	0.11	0.12	0	0.05	0.035	0	0.12	0	0.081	0	0.082	0.062		0.16
40	0	0	0	0	0.034	0	0.14	0	0.11	0.55	0.12	0		0.16
74	0.37	0.35	0	0.31	0.099	0	0.11	0	0.39	0	0.18	0		0
70+76	0.36	0.16	0	0.2	0.11	0.047	0.24	0	0.27	0	0	0		0
66+95	1.9	1.7	0	0.66	0.51	0.71	1.8	0	0.98	0	0	0		0
91	0	0.11	0	0.063	0.073	0	0.32	0	0.19	0.24	0.16	0.1		0
56+60+89	0	0.19	0	0.1	0.17	0	0.38	0	0.28	0.24	0.19	0.19		0.69
92+84	3.2	0	0	0	0	0	0	0	0	0	0.25	0		0
101	0.82	0.56	0.22	0.42	0.31	0	0.76	0.062	0.31	0.36	0.39	0.54		0
83	0	0	0	0.034	0	0	0	0	0	0	0.029	0.027		0
97	0.22	0.12	0	0.073	0.089	0.031	0.2	0	0.098	0.077	0.096	0.064		0.18
87+81	0.44	0.14	0	0.19	0.21	0.11	0.53	0.51	0.24	0.32	0.27	0.28		0.52
85+136	0.12	0.18	0	0.11	0.1	0.048	0.19	0	0.19	0	0.075	0.15		0
110+77	1	0.6	0.21	0.36	0.43	0.17	0.97	0.77	0.45	0.36	0.56	0.86		0.89
82	0.095	0.051	0	0.064	0.05	0.02	0.14	0.062	0.059	0	0.091	0.11		0.17
151	0.13	0.086	0	0.052	0.046	0.024	0.13	0.074	0.11	0	0.083	0.081		0.15
135+144+147+124	0.16	0.12	0	0.064	0.055	0	0.094	0.0059	0.027	0	0.068	0.14		0.087
149+123+107	0.5	0.31	0.075	0.2	0.22	0.11	0.6	0.27	0.36	0.19	0.38	0.66		0.4
118	0	0.42	0.054	0.33	0.31	0	0.77	0.53	0.36	1	0	0		0
146	0.13	0.078	0	0.046	0.032	0.013	0.077	0	0.046	0	0.074	0.032		0
153+132	0.92	0.64	0.077	0.38	0.38	0.19	0.81	0.6	0.52	0	0.65	0.94		0.72
105	0	0.22	0	0	0.16	0	0	0	0	0	0	0		0
141	0.17	0.099	0.067	0.055	0.081	0.031	0.18	0.21	0.066	0	0.1	0.093		0.092
137+176+130	0	0	0	0	0	0	0	0	0	0	0	0		0
163+138	1.2	1.1	0.24	0.57	0.63	0.29	1.1	0	0.66	0.93	0.83	1.3		0.82
178+129	0	0	0	0.1	0	0	0.055	0	0.067	0	0	0		0
187+182	0.33	0.28	0	0.14	0.16	0.092	0.26	0.16	0.22	0.38	0.23	0.24		0.074
183	0.18	0.11	0	0.067	0.066	0.028	0.11	0.27	0.1	0.12	0.11	0.13		0.14
185	0	0.038	0	0.039	0.02	0	0.031	0	0.041	0.22	0.02	0		0
174	0.24	0.19	0	0.093	0.12	0.054	0.16	0.86	0.17	0.17	0.16	0.23		0.62
177	0.091	0.15	0	0	0.074	0.024	0	0.3	0.12	0	0.13	0.42		0
202+171+156	0	0.02	0	0	0.0047	0	0.035	0	0.026	0	0.022	0		0
180	0.33	0.6	0	0.28	0.28	0.12	0.29	0.44	0.34	0.26	0.31	0.71		0.55
199	0	0	0	0	0	0	0.075	0	0	0.24	0.041	0		0
170+190	0.13	0.34	0	0.1	0.11	0.056	0.09	0.17	0.14	0.22	0.12	0.22		0.28
198	0.012	0.01	0	0.0038	0	0	0.0028	0	0	0	0	0		0
201	0.24	0.32	0	0.13	0.17	0.065	0.17	0.21	0.21	0.13	0.19	0.41		0.78
203+196	0.25	0.32	0	0.13	0.16	0.07	0.2	1.1	0.21	0.14	0.17	0.46		0.5
195+208	0.027	0.051	0.031	0.028	0.015	0	0.028	0	0.035	0	0.027	0		0
194	0.068	0	0	0.098	0	0	0	0	0	0	0	0		0
206	0	0.15	0	0	0	0	0	0	0.08	0	0.048	0.24		0
Total PCBs	15	11	0.97	6.3	5.7	2.5	13	10	8.6	8.6	8.3	10		9.9
Homologue Group														
3	0	0.35	0	0.27	0.17	0	0.86	3.5	0.5	0.8	1	0.87		0.53
4	3.7	2.9	0	1.8	1.2	0.93	3.4	0.37	2.6	2.4	1.6	0.73		2.4
5	6	2.4	0.49	1.6	1.7	0.38	3.9	1.9	1.9	2.4	1.9	2.1		1.8
6	3.3	2.4	0.46	1.4	1.5	0.66	3	1.2	1.8	1.1	2.2	3.3		2.3
7	1.3	1.7	0	0.83	0.83	0.38	0.99	2.2	1.2	1.4	1.1	2		1.7
8	0.6	0.72	0.031	0.4	0.35	0.14	0.51	1.3	0.48	0.51	0.45	0.87		1.3
9	0	0.15	0	0	0	0	0	0	0.08	0	0.048	0.24		0
Corresponding Laboratory Blank	2/16/2098	3/11/2098	3/11/2098	3/11/2098	3/11/2098	3/11/2098	3/27/2098	3/27/2098	5/27/2098	5/27/2098	6/1/2098	5/27/2098	6/29/2098	6/1/2098
Total Suspended Particulate (μg/m^3)	49.0	36.2	30.9	30.7	31.4	30.3	11.2	35.9	26.8	57.1	16.6	29.5	38.2	22.3
Surrogate Recoveries (%)														
#65	84 %	102 %	93 %	107 %	105 %	100 %	81 %	83 %	88 %	95 %	96 %	95 %		88 %
#166	108 %	112 %	109 %	135 %	114 %	114 %	103 %	125 %	105 %	116 %	115 %	109 %		112 %

B.1. Sandy Hook Particulate Phase
PCBs (SH-QFF)

Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	SH-QFF 4/29/98	SH-QFF 5/5/98	SH-QFF 5/11/98	SH-QFF 5/17/98	SH-QFF 5/23/98	SH-QFF 5/29/98	SH-QFF 6/4/98	SH-QFF 6/10/98	SH-QFF 6/16/98	SH-QFF 6/22/98	SH-QFF 6/28/98	SH-QFF 7/4/98	day SH-QFF 7/5/98	night SH-QFF 7/5/98
18	0.3	0	0.17	0	0.5	0.99	2.4	0.56	1.4		0.11			0.99
17+15	0.082	0	0.061	0	0.57	0.32	0.65	0.36	0.23		0.067			0.52
16+32	0.17	0.0072	0.2	1.6	1.8	0.71	1.2	0.74	0		0.24			2.2
31	0.21	0	0.2	0.83	3.1	0.56	1.4	0.58	0		0.55			2.9
28	0.04	0	0.052	0.19	1.1	0.21	0.34	0.3	0.34		0			0
21+33+53	0	0	0.066	0	1.6	0	0	0	1.1		0			0
22	0	0	0	0	3.2	1.2	2.3	3.3	0		0.12			4.9
45	0	0	0	0.18	0	0	0	0	0		0.11			0
52+43	0.1	0.06	0.16	0.21	0	0	0	1	0.25		0.15			1.9
49	0.13	0.014	0.11	0.21	1.1	0.23	0.63	0.21	0.13		0.094			0.78
47+48	0	0	0	0	0.28	0	0	0	0		0			0
44	0.2	0.013	0.083	0.64	0	0	0	0	0		0			0.58
37+42	0	0.012	0.029	0	0	0.43	0	0.45	0		0.46			0
41+71	0.19	0.021	0.043	0.073	0.7	0.14	0.42	0.51	0.71		0.11			0.97
64	0.057	0.0045	0.04	0.2	0.22	0.051	0.12	0	0.059		0			0.54
40	0	0	0	0	2.5	0.2	0.33	0.34	0.063		0.062			0.55
74	0	0.036	0.17	0	0	0	0	0	0		0			0
70+76	0	0	0.18	0.13	0	0	0	0	0		0			0
66+95	0	0.047	0.64	0	0	0	1.4	1.4	0.79		0.57			6.3
91	0	0.019	0	0	0.74	0	0.28	0.11	0.026		0.012			0
56+60+89	0.23	0	0.066	0.59	0.54	0	0.32	0	0		0			0.72
92+84	0	0	0.16	0	0	0.22	0	0	0		0.052			1.1
101	0.27	0.03	0.21	0.21	1.1	0.3	0.58	0.55	0.29		0.15			2.8
83	0.12	0	0	0	0.45	0.073	0.11	0.21	0.071		0.043			0.075
97	0	0.0088	0.054	0.12	0.33	0.11	0.12	0.26	0.023		0			0.34
87+81	0.13	0.059	0.44	0.19	0.67	0.2	0.28	0.16	0		0.11			1.2
85+136	0.078	0.0084	0.19	0.26	0.77	0.15	0.13	0.12	0.15		0.017			0.77
110+77	0.4	0.079	0.23	0.54	0.59	0.37	0.62	0.44	0.34		0.086			2.4
82	0.077	0.012	0.049	0.14	0.15	0.033	0.083	0.031	0.017		0.029			0.25
151	0.067	0.0077	0.05	0.18	0	0.1	0.14	0.13	0.068		0			0.67
135+144+147+124	0.12	0.0083	0.06	0.045	0.55	0.033	0.11	0	0		0.039			0.37
149+123+107	0.36	0.016	0.19	0.47	0.84	0.33	0.42	0.44	0.2		0.15			1.8
118	0	0	0	0	0.31	0.2	0.27	0.13	0		0.048			0
146	0	0.0023	0.03	0	0	0	0	0	0		0			0.54
153+132	0.48	0	0.3	0.43	0.58	0.33	0.5	0.18	0.15		0.15			1.6
105	0	0	0	0	0	0.094	0.22	0.025	0		0			0
141	0.062	0.0043	0.039	0.08	0.25	0.088	0.097	0.033	0.032		0			0.48
137+176+130	0	0	0	0	0	0	0	0	0		0			0.36
163+138	0.8	0.073	0.38	0.71	1.2	0.55	0.72	0.49	0.28		0.33			2.1
178+129	0	0	0	0	0	0.12	0.27	0	0.032		0			0.36
187+182	0.16	0.015	0.1	0.14	0.46	0.25	0.27	0.2	0.24		0.17			0.78
183	0.081	0.0086	0.083	0.18	0	0.082	0	0.083	0.056		0			0.2
185	0.043	0.0044	0.024	0	0.0049	0	0	0.14	0.12		0			0
174	0.16	0.0099	0.05	0.19	0.31	0.17	0.18	0.069	0.11		0.025			0.49
177	0.1	0.0096	0.052	0	0	0	0	0	0		0			0.41
202+171+156	0.0094	0.00049	0.016	0	0	0	0	0	0		0			0
180	0.61	0.026	0.15	0.31	0.61	0.28	0.38	0.16	0.17		0.058			0.38
199	0.18	0.0071	0.046	0	0	0	0.022	0	0		0			0
170+190	0.25	0.0085	0.084	0.08	0.34	0.22	0.22	0.057	0.14		0.073			0.29
198	0	0	0.0033	0	0	0	0	0	0		0			0
201	0.43	0.014	0.067	0.21	0.23	0.18	0.2	0	0		0.027			0.29
203+196	0.5	0.014	0.067	0.21	0.26	0.24	0.21	0.046	0.041		0.04			0.23
195+208	0.13	0.0041	0	0	0.21	0	0	0	0		0			0.13
194	0	0	0	0	0.24	0.15	0.15	0.036	0.029		0.03			0
206	0.33	0	0	0.13	0.11	0.13	0.083	0.047	0.041		0.088			0.18
Total PCBs	7.7	0.66	5.4	9.7	29	10	18	14	7.6		4.4			44
Homologue Group,														
3	0.79	0.019	0.78	2.6	12	4.4	8.3	6.3	3		1.6			12
4	0.91	0.2	1.5	2.2	5.4	0.62	3.2	3.5	2		1.1			12
5	1.1	0.22	1.3	1.5	5.1	1.7	2.7	2	0.91		0.55			8.9
6	1.9	0.11	1	1.9	3.5	1.4	2	1.3	0.72		0.68			7.8
7	1.4	0.082	0.54	0.89	1.7	1.1	1.3	0.71	0.88		0.32			2.9
8	1.2	0.039	0.2	0.42	0.94	0.58	0.59	0.082	0.07		0.096			0.65
9	0.33	0	0	0.13	0.11	0.13	0.083	0.047	0.041		0.088			0.18
Corresponding Laboratory Blank	5/27/2098	6/1/2098	6/1/2098	5/27/2098	6/29/2098	6/29/2098	6/29/2098	6/29/2098	7/1/2098	7/1/2098	8/6/2098	8/6/2098	8/6/2098	7/19/2098
Total Suspended Particulate (μg/m^3)	96.3	26.9	62.0	55.0	96.5	72.4	46.5	37.2	63.0	43.6	219	74.5	59.3	58.6
Surrogate Recoveries (%)														
#65	88 %	93 %	83 %	89 %	57 %	101 %	83 %	83 %	94 %		80 %			91 %
#166	113 %	110 %	109 %	117 %	74 %	118 %	100 %	107 %	109 %		101 %			108 %

B.1. Sandy Hook Particulate Phase
PCBs (SH-QFF)

Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	day SH-QFF 7/6/98	night SH-QFF 7/6/98	day SH-QFF 7/7/98	night SH-QFF 7/7/98	day SH-QFF 7/8/98	night SH-QFF 7/8/98	day SH-QFF 7/9/98	night SH-QFF 7/9/98	day SH-QFF 7/10/98	night SH-QFF 7/10/98	day SH-QFF 7/11/98	SH-QFF 7/16/98	SH-QFF 7/22/98	SH-QFF 7/28/98
18	0.4	2.5	0.94	1.1	0.36	0.25	1.3	0.31	0.29	1.1	0.39	0.14	0.13	0.94
17+15	0.37	1.4	0.25	0.17	0.12	0.12	0	0.26	0.22	0.2	0.32	0.14	0	0.31
16+32	1.2	2.3	0.82	0	0.17	0.58	0.69	0.15	1.2	0.37	0.76	0.11	0.14	0
31	4.1	2.7	2	0	0.69	1.7	0	0	0	0	0	0.27	0	0.2
28	0	1.1	0.19	0	0	0	0	0	0	0	0	0.11	0	0.12
21+33+53	0	2	0	0	0	0	0	0	0	0	0	0	0	0
22	0.34	0	1.1	1.5	0.61	0.77	3.5	1.6	1.9	2.8	0.24	0.5	0.57	1
45	0	0.86	0.38	0.25	0.13	0	0.24	0.26	0.32	0.18	0	0.16	0.12	0
52+43	0.92	1.8	1.9	0.81	0.72	0.96	0	0.66	0.69	0.44	0.34	0.19	0	0.43
49	0.55	1.1	0.44	0.24	0.22	0.41	0.23	0.38	0.41	0.19	0	0.18	0.17	0.17
47+48	0	0	0.073	0	0	0	0	0	0	0	0	0	0	0
44	0	0.89	0.28	0	0	0	0	0.13	0.26	0	0	0	0	0
37+42	0	0.83	0.35	0.5	0	0.86	0	0	0	0	0	0	0	0.4
41+71	0	0.6	0.41	0.25	0.16	0.39	0.15	0.096	0.36	0.11	0.56	0.14	0.18	0
64	0	0.4	0.19	0.23	0.073	0.068	0.15	0.12	0.16	0.072	0	0.048	0.078	0
40	0.56	0.46	0.52	0.55	0.31	0.27	1	0.44	0.43	0.29	0.53	0.2	0.18	0.31
74	0	0	0	0	0	0	0.33	0	0	0.099	0	0	0	0.26
70+76	0	0	0.51	2.3	0	0	0	0	0.12	0.059	0	0	0	0.017
66+95	1.7	4.6	3.1	2.2	0.99	1.4	2.7	1.9	4.3	1.4	1.1	1	1.6	2.2
91	0	0.37	1.8	0.72	0.18	0.14	0.44	0	0.58	0.54	0.17	0.32	0.4	0
56+60+89	0	0.79	0.48	0.24	0	0	0	0.46	0.44	0.18	0	0.48	0.44	0.33
92+84	0.67	1.9	0.53	0.69	0.19	0	0	0.83	0.57	0.6	0.2	0	0.33	0.28
101	0.86	1.3	1.4	0.79	0.35	0.68	0.52	0.7	1	0.54	0.8	0.52	0.67	0
83	0.19	0.38	0.14	0.047	0.043	0.13	0.2	0.081	0.13	0.094	0.11	0.075	0.052	0
97	0.23	0	0.23	0	0.047	0.16	0.18	0.16	0.2	0.11	0	0.093	0.13	0
87+81	0.51	0.47	0.68	0.12	0.26	0.38	0.3	0.4	0.31	0.34	0.32	0.21	0.25	0
85+136	0	0.19	0.39	0.24	0.047	0.062	0.34	0.25	0.15	0.26	0.15	0	0.19	0
110+77	0.38	0.58	1	0.26	0.21	0.32	0.88	0.79	0.71	0.53	0.41	0.3	0.42	0
82	0	0	0.086	0.062	0.021	0.046	0.12	0.095	0.082	0.077	0.038	0.052	0.093	0
151	0.1	0.16	0.24	0.089	0.046	0.1	0.22	0.19	0.16	0.11	0.082	0.13	0.14	0
135+144+147+124	0.28	0.49	0.31	0	0.06	0.16	0	0.016	0.089	0.16	0.17	0	0.023	0
149+123+107	0.53	1.2	0.71	0.34	0.21	0.42	0.48	0.53	0.55	0.63	0.42	0.31	0.38	0
118	0.19	0.34	0	0.23	0	0.18	0.078	0.19	0	0	0.23	0.19	0.25	0
146	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153+132	0.4	0	0.6	0.26	0.18	0.42	0.33	0.42	0.61	0.4	0.46	0.21	0.29	0.098
105	0.18	0	0.27	0	0	0.15	0	0	0.21	0	0.2	0	0	0
141	0.11	0	0.16	0.07	0	0	0.095	0.12	0.15	0.081	0.089	0.072	0.076	0
137+176+130	0	0	0.26	0.69	0.26	0	0	0	0	0	0	0	0.099	0
163+138	0.71	0	0.82	0.28	0.21	0.65	0.85	0.91	1.1	0.81	0.8	0.47	0.46	0.16
178+129	0	0	0	0	0	0	0	0	0	0	0	0.061	0.15	0
187+182	0.51	0	0.21	0	0	0.34	0.23	0.31	0.25	0.21	0.2	0.22	0.26	0.13
183	0.064	0	0.066	0	0.018	0.15	0	0.16	0.19	0.16	0.1	0.064	0	0
185	0	0	0	0	0	0	0	0	0	0	0	0	0	0
174	0	0	0.23	0.21	0.036	0.092	0.15	0.21	0.22	0.15	0.086	0.094	0.14	0
177	0	0	0	0	0	0	0.052	0.057	0	0.077	0	0	0	0
202+171+156	0	0	0	0	0	0	0	0.065	0	0	0	0	0	0
180	0.11	0	0.15	0.11	0.1	0.42	0.25	0.32	0.33	0.54	0.2	0.18	0.14	0.29
199	0	0	0	0	0	0	0	0	0	0	0	0.0065	0	0
170+190	0.1	0	0.079	0.37	0.054	0.75	0.13	0.25	0.22	0.22	0.13	0.12	0.21	0.059
198	0	0	0	0	0	0.038	0	0	0.026	0	0	0	0	0
201	0.073	0	0.11	0.14	0.061	0	0.16	0.26	0.21	0.16	0.12	0.11	0.12	0
203+196	0.091	0	0.047	0.067	0.046	0.14	0.13	0.23	0.16	0.14	0.12	0.13	0.13	0.091
195+208	0	0	0.085	0.08	0.04	0.063	0.046	0.081	0.086	0.084	0	0	0	0
194	0.032	0	0.024	0.046	0.022	0.033	0.12	0.16	0.13	0.14	0.056	0.055	0	0.031
206	0.16	0	0	0	0.075	0	0.15	0.15	0.098	0.1	0.1	0.075	0.084	0.013
Total PCBs	17	32	25	16	7.3	14	17	15	20	15	10	7.8	9.1	7.9
Homologue Group														
3	6.4	13	5.7	3.3	2	4.3	5.5	2.3	3.6	4.5	1.7	1.3	0.84	3
4	3.7	11	8.2	7	2.6	3.5	4.8	4.4	7.5	3	2.5	2.4	2.8	3.7
5	3.2	5.5	6.5	3.2	1.4	2.3	3	3.5	4	3.1	2.6	1.8	2.8	0.28
6	2.1	1.9	3.1	1.7	0.96	1.7	2	2.2	2.6	2.2	2	1.2	1.5	0.26
7	0.79	0	0.73	0.68	0.21	1.7	0.81	1.3	1.2	1.4	0.72	0.73	0.9	0.48
8	0.2	0	0.27	0.33	0.17	0.28	0.45	0.79	0.62	0.52	0.29	0.3	0.25	0.12
9	0.16	0	0	0	0.075	0	0.15	0.15	0.098	0.1	0.1	0.075	0.084	0.013
Corresponding Laboratory Blank	8/6/2098	7/15/2098	7/24/2098	7/24/2098	7/19/2098	8/6/2098	7/17/2098	7/17/2098	7/17/2098	7/17/2098	8/6/2098	9/14/2098	9/14/2098	9/14/2098
Total Suspended Particulate (μg/m^3)	52.7	83.8	42.1	40.0	31.8	65.8	73.0	78.9	47.2	47.7	61.4	52.5	70.2	51.7
Surrogate Recoveries (%)														
#65	79 %	70 %	84 %	89 %	89 %	80 %	95 %	95 %	88 %	97 %	73 %	81 %	92 %	81 %
#166	99 %	77 %	108 %	98 %	104 %	101 %	107 %	101 %	105 %	102 %	90 %	109 %	105 %	96 %

B.1. Sandy Hook Particulate Phase
PCBs (SH-QFF)

Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	SH-QFF 8/3/98	SH-QFF 8/9/98	SH-QFF 8/15/98	SH-QFF 8/21/98	SH-QFF 8/27/98	SH-QFF 9/4/98	SH-QFF 9/13/98	SH-QFF 9/22/98	SH-QFF 10/1/98	SH-QFF 10/10/98	SH-QFF 10/19/98	SH-QFF 10/28/98	SH-QFF 11/6/98	SH-QFF 11/15/98
18	1.1	0.49	0.1	1.4	0.46	0.91	0.51	0.94	0.76	HiVol	0.73	0.41	0.48	0.22
17+15	0.37	0.062	0.026	0.56	0.16	0.13	0.27	0.56	0	alfunction	0.27	0.18	0.24	0.25
16+32	0.86	0.6	0	0	0.73	1.2	0.65	0.16	0.83		0.47	0.19	0.49	0
31	0.45	0.11	0	0.76	0.37	0.82	0.26	1.1	0.13		0	0	0	0
28	0.27	0.028	0	0.29	0.11	0.34	0.1	0.33	0.08		0.83	0.44	0.64	0.41
21+33+53	0	0	0	0	0	0	0	0.7	0		0	0	0	0
22	2.2	0.81	0.041	1.9	1.8	0.91	1.7	0.78	0		0	0	0	0
45	0	0	0	0	0	0	0	0	0		0	0.0068	0	0
52+43	0.91	0.35	0	0.65	0.44	1.7	1.2	0	0		0	0.63	0.73	0.33
49	0.35	0.076	0.12	0.23	0.22	0.32	0.16	0.32	1.2		0	0.039	0.23	0.12
47+48	0	0	0	0	0	0	0.19	0	0		0	0.056	0.074	0.046
44	0	0	0	0	0	0	0	0	0		0	0	0	0
37+42	0	0.29	0	0	0.42	0	0.12	0.36	0.96		0	0.3	0.58	0.3
41+71	0.26	0.14	0.15	0.19	0.73	0.23	0.42	0.28	0.41		0.43	0.25	0.29	0.25
64	0	0	0.013	0	0	0	0	0.1	0.16		0.2	0.14	0.2	0.15
40	0.6	0.32	0.082	0.56	0.42	0.26	0.37	0.11	0.13		0	0	0	0
74	0	0.16	0	0.11	0	0	0.079	0	0		0	0.24	0.25	0
70+76	0	0.011	0	0	0	0	0	0.043	0.056		0.09	0.14	0.31	0.17
66+95	2.4	1.9	0.79	0	0.79	1.3	1.6	1.8	2		0	0.73	1.4	0.97
91	0.2	0.11	0.057	0.25	0.34	0.31	0	0.16	0.22		0	0.33	0.43	0.25
56+60+89	0	0	0	0	0	0.58	0	0	0		0.37	0.27	0.59	0.26
92+84	0	0	0.074	0	0	0.51	0	0.41	0		0.94	0.33	0.73	0.91
101	0	0	0.24	0	0	0	0	0.5	1.2		0.44	0.3	0.71	0.54
83	0	0	0.023	0	0.14	0	0	0.072	0.11		0.18	0.12	0.17	0.16
97	0	0	0	0	0	0	0	0.14	0.18		0.081	0.062	0.17	0.11
87+81	0	0	0	0.47	0.18	0.47	0	0.32	0.4		0.081	0.29	0.54	0.51
85+136	0.49	0.12	0.078	0.34	0.14	0	0.11	0.2	0.12		0.29	0.19	0.26	0.072
110+77	0.69	0	0.062	0.73	0.31	0.67	0.46	0.68	0.82		0.28	0.29	0.69	0.39
82	0	0	0.016	0	0	0	0	0.062	0.077		0	0	0.11	0
151	0.38	0.14	0	0.24	0	0.24	0	0.081	0.16		0	0.012	0.065	0
135+144+147+124	0	0.01	0	0	0	0	0	0.036	0.13		0	0	0.095	0
149+123+107	0.53	0	0.095	0.43	0	0.54	0.2	0.35	0.54		0.17	0.19	0.5	0.24
118	0	0	0.06	0.39	0	0.3	0.052	0	0.59		0.26	0.24	0.69	0.33
146	0	0	0	0	0	0	0	0.12	0.22		0.17	0.11	0.27	0.19
153+132	0.37	0.081	0.031	0.39	0.19	0.38	0	0.48	0.71		0.3	0.33	0.88	0.43
105	0	0	0	0.14	0.17	0	0	0	0.32		0	0	0	0
141	0.026	0	0.013	0	0	0	0	0.085	0		0.1	0.089	0.22	0.1
137+176+130	0	0.091	0	0	0.071	0.13	0	0.13	0		0.098	0.045	0	0.022
163+138	0.61	0	0.083	0.76	0.48	0.58	0	0.73	1.2		0.54	0.48	1.5	0.61
178+129	0	0	0.05	0	0	0	0	0.048	0.3		0	0	0.22	0.027
187+182	0.26	0	0.087	0.18	0.15	0.28	0.088	0.18	0.38		0.22	0.17	0.34	0.21
183	0	0	0	0	0.12	0.19	0	0.12	0.16		0	0.12	0.27	0.13
185	0.11	0.16	0	0	0	0	0	0	0		0	0.04	0.071	0.03
174	0.32	0	0.028	0.2	0	0.37	0	0.13	0.25		0.11	0.097	0.31	0.099
177	0	0	0	0	0.095	0	0.077	0.13	0.21		0.099	0.075	0.18	0.06
202+171+156	0	0	0	0	0	0	0.052	0.018	0		0	0.12	0	0.18
180	0.43	0.48	0.037	0.46	0.37	0.53	0.16	0.35	0.53		0.36	0.27	0.75	0.25
199	0	0	0	0	0	0	0	0.013	0		0	0	0	0.01
170+190	0.29	0.13	0.22	0.41	0.14	0.38	0.24	0	0.37		0.19	0.13	0.33	0.15
198	0	0	0	0	0	0	0	0	0		0	0	0	0
201	0.059	0	0.019	0	0	0.12	0	0.2	0.36		0.22	0.19	0.38	0.16
203+196	0.14	0.028	0	0.17	0.058	0.21	0.049	0.18	0.4		0.27	0.2	0.53	0.2
195+208	0.057	0	0	0	0.051	0	0	0.04	0		0.07	0.023	0.053	0.02
194	0.1	0.0089	0	0.11	0.043	0.1	0.0083	0.13	0.28		0.15	0.088	0.19	0.049
206	0.1	0	0.021	0.11	0	0.076	0.023	0.12	0.17		0.094	0.085	0.14	0.063
Total PCBs	15	6.7	2.6	12	9.8	15	9.2	14	11		9.1	9	18	10
Homologue Group														
3	5.3	2.4	0.17	4.9	4.1	4.3	3.6	5	2.8		2.3	1.5	2.4	1.2
4	4.5	3	1.2	1.7	2.6	4.4	4	2.6	4		1.1	2.5	4	2.3
5	1.4	0.23	0.61	2.3	1.3	2.3	0.63	2.6	4		2.5	2.1	4.5	3.3
6	1.9	0.32	0.22	1.8	0.75	1.9	0.2	2	3		1.4	1.3	3.5	1.6
7	1.4	0.77	0.42	1.2	0.88	1.7	0.56	0.95	2.2		0.97	0.89	2.5	0.95
8	0.36	0.037	0.019	0.29	0.15	0.44	0.11	0.58	1		0.71	0.62	1.1	0.62
9	0.1	0	0.021	0.11	0	0.076	0.023	0.12	0.17		0.094	0.085	0.14	0.063
Corresponding Laboratory Blank	9/18/2098	9/14/2098	9/18/2098	9/24/2098	9/18/2098	9/24/2098	9/24/2098	10/15/2098	10/15/2098		1/4/2099	1/4/2099	2/9/2099	
Total Suspended Particulate ($\mu g/m^3$)	56.2	38.3	29.6	75.8	26.9	71.6	43.4	50.0	54.5		42.0	43.5	38.7	
Surrogate Recoveries (%)														
#65	85 %	91 %	85 %	80 %	93 %	74 %	82 %	79 %	85 %	73 %	49 %	90 %	89 %	88 %
#166	101 %	105 %	98 %	100 %	100 %	104 %	103 %	111 %	91 %	88 %	59 %	105 %	100 %	98 %

B.1. Sandy Hook Particulate Phase
PCBs (SH-QFF)

Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	SH-QFF 11/24/98	SH-QFF 12/3/98	SH-QFF 12/12/98	SH-QFF 12/21/98	SH-QFF 12/30/98	SH-QFF 1/8/99	SH-QFF 1/17/99	SH-QFF 1/26/99	SH-QFF 2/4/99	SH-QFF 2/13/99	SH-QFF 2/22/99	SH-QFF 3/3/99	SH-QFF 3/12/99	SH-QFF 3/21/99
18	0.54	0.34	0.25	0.18	0.3	0.18	0.61	0.29	0.47	0.89	1.3			
17+15	0.2	0.28	0.33	0.16	0.33	0.37	0	0.45	0.5	0.81	0.53			
16+32	0.39	0.73	0.33	0.28	0.34	0.23	1.3	0.6	0.58	0	1.2			
31	0	0.25	0.21	0.16	0	0.12	0.57	0	0	0.098	0.95			
28	0.85	0.31	0.44	0.43	0	0.25	0.46	0.29	0.24	0.13	1.1			
21+33+53	0	0	0	0	0	0	1.1	0.36	0	0	0.52			
22	0	0	0	0	0	0	0	0	0	0	0			
45	0	0.17	0.2	0	0.13	0	0.43	0	0	0	0			
52+43	0.58	0.9	1.6	0.68	0.88	0.85	2.4	1.5	0	0	2.1			
49	0.18	0.2	0.21	0.088	0.051	0.053	0.44	0.31	0.21	0	0.26			
47+48	0.092	0.13	0.13	0.062	0.078	0.074	0.15	0.34	0.12	0.23	0.13			
44	0.13	0.094	0.26	0.078	0.04	0.082	0.43	0.58	0.071	0.18	0.76			
37+42	0.36	0.45	0.49	0	0.39	0.21	0.48	0.64	0.22	0.5	1.1			
41+71	0.27	0.068	0.37	0.16	0.12	0.13	0.38	0.28	0.19	0.17	1.2			
64	0.14	0.13	0.16	0.092	0.12	0.067	0.19	0.2	0.085	0.11	0.64			
40	0	0	0	0	0	0	0	0	0	0	0.19			
74	0	0.17	0.17	0.07	0.056	0.055	0.28	0.61	0	0	0.41			
70+76	0.22	0.33	0.27	0.21	0.11	0.11	0.33	0.61	0.14	0.18	0.8			
66+95	0.72	1.1	1.4	0.51	0.41	0.28	0.66	2.3	0.51	0.7	1.9			
91	0.34	0.32	0.57	0.15	0.42	0.16	0.61	0.74	0.31	0.23	1.1			
56+60+89	0.39	0.35	0.66	0.13	0.35	0.18	0.57	0.63	0.19	0.24	0.98			
92+84	0.49	0.52	1.1	0	0.24	0.35	0.71	1.3	0.33	0.46	1.2			
101	0.47	0.74	0.9	0.33	0.38	0.27	1	1.4	0.39	0.54	1.2			
83	0.17	0.19	0.35	0.066	0.18	0.097	0.59	0.29	0	0.21	0.14			
97	0.12	0.19	0.17	0.098	0.083	0.087	0.14	0.38	0.087	0.14	0.24			
87+81	0.33	0.59	0.58	0.23	0.23	0.17	0.45	1.1	0.23	0.33	1.4			
85+136	0.24	0.19	0.37	0.11	0.13	0.07	0.4	0.65	0.068	0.35	0.35			
110+77	0.43	0.89	1.2	0.36	0.52	0.41	1.2	1.4	0.53	0.76	1.7			
82	0	0.078	0.15	0.05	0.077	0.073	0.17	0.14	0.053	0.096	0.14			
151	0.028	0.13	0.088	0.043	0.082	0.043	0.14	0.23	0.064	0.16	0.15			
135+144+147+124	0	0.17	0.17	0.061	0.084	0	0.086	0.32	0.07	0.17	0.38			
149+123+107	0.37	0.73	0.94	0.33	0.58	0.4	0.89	1.1	0.47	0.78	1.2			
118	0.54	0.81	1.2	0.32	0.6	0.57	1.4	1.2	0.63	1.1	1.4			
146	0.21	0.2	0	0	0	0.11	0.53	0.33	0.54	0.37	0.24			
153+132	0.59	0.81	1.2	0.28	0.67	0.44	1.2	1.3	0.58	1.1	1.5			
105	0	0	0	0	0	0	0.49	0	0	0	0			
141	0.15	0.14	0.26	0.052	0.19	0.096	0.22	0.33	0.13	0.29	0.37			
137+176+130	0.16	0	0	0	0	0	0	0	0	0	0			
163+138	0.99	1.1	2.2	0.38	1.1	1.1	2	2	0.94	2	2.5			
178+129	0.15	0.067	0.11	0	0.057	0	0.082	0.26	0.064	0.13	0.36			
187+182	0.28	0.21	0	0.088	0.35	0.17	0.29	0.45	0	0.53	0.54			
183	0.23	0.14	0.38	0.031	0.27	0.15	0.26	0.34	0.13	0.36	0.43			
185	0.068	0.043	0.077	0	0.047	0	0.039	0.033	0.034	0.063	0.057			
174	0.22	0.17	0.41	0.041	0.49	0.16	0.41	0.45	0.24	0.47	0.64			
177	0.14	0.097	0.29	0.028	0.32	0.1	0.23	0.33	0.14	0.3	0.47			
202+171+156	0	0	0.32	0	0.34	0.098	0.23	0.26	0.15	0.27	0.54			
180	0.61	0.37	0.96	0.11	1.2	0.4	0.77	1.1	0.57	1.1	1.4			
199	0	0.03	0.067	0	0.041	0.032	0.031	0.079	0.023	0.033	0.092			
170+190	0.28	0.2	0.38	0.068	0.57	0.23	0.35	0.38	0.25	0.48	0.64			
198	0	0	0	0	0	0	0	0	0	0	0			
201	0.32	0.16	0.68	0.079	0.78	0.25	0.38	0.61	0.29	0.47	0.69			
203+196	0.37	0.22	0.78	0.096	0.9	0.31	0.47	0.77	0.35	0.55	0.87			
195+208	0.077	0.052	0.12	0.031	0.29	0.074	0.092	0.1	0.068	0.17	0.14			
194	0.15	0.087	0.3	0.027	0.79	0.12	0.17	0.36	0.16	0.22	0.36			
206	0.13	0.059	0.34	0.031	0.44	0.13	0.13	0.19	0.13	0.13	0.28			
Total PCBs	14	16	24	6.8	16	9.9	27	30	12	18	39			
Homologue Group														
3	2.3	2.4	2.1	1.2	1.4	1.4	4.5	2.6	2	2.4	6.7			
4	2.7	3.7	5.5	2.1	2.3	1.9	6.3	7.4	1.5	1.8	9.3			
5	3.1	4.5	6.7	1.7	2.9	2.3	7.3	8.6	2.6	4.2	8.8			
6	2.5	3.3	4.8	1.1	2.7	2.2	5.1	5.6	2.8	4.8	6.3			
7	2	1.3	2.6	0.37	3.3	1.2	2.4	3.4	1.4	3.4	4.5			
8	0.92	0.54	2.3	0.23	3.1	0.89	1.4	2.2	1	1.7	2.7			
9	0.13	0.059	0.34	0.031	0.44	0.13	0.13	0.19	0.13	0.13	0.28			
Corresponding Laboratory Blank	1/4/2099	2/17/2099	2/17/2099	3/2/2099	3/2/2099	4/12/2099	4/12/2099	4/12/2099	4/12/2099	4/12/2099				
Total Suspended Particulate (μg/m³)	49.2	65.4	54.1	35.2	49.0	62.0	64.8	33.6	615	68.5				
Surrogate Recoveries (%)														
#65	77 %	90 %	91 %	91 %	93 %	101 %	98 %	85 %	100 %	98 %	85 %			
#166	91 %	92 %	101 %	93 %	95 %	107 %	99 %	80 %	104 %	96 %	68 %			

B.1. Sandy Hook Particulate Phase PCBs (SH-QFF)

Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	SH-QFF 3/30/99	SH-QFF 4/8/99
18		
17+15		
16+32		
31		
28		
21+33+53		
22		
45		
52+43		
49		
47+48		
44		
37+42		
41+71		
64		
40		
74		
70+76		
66+95		
91		
56+60+89		
92+84		
101		
83		
97		
87+81		
85+136		
110+77		
82		
151		
135+144+147+124		
149+123+107		
118		
146		
153+132		
105		
141		
137+176+130		
163+138		
178+129		
187+182		
183		
185		
174		
177		
202+171+156		
180		
199		
170+190		
198		
201		
203+196		
195+208		
194		
206		
Total PCBs		
Homologue Group		
3		
4		
5		
6		
7		
8		
9		
Corresponding Laboratory Blank		
Total Suspended Particulate ($\mu g/m^3$)		
Surrogate Recoveries (%)		
#65		
#166		

B.2. Sandy Hook Gas Phase PCBs
(SH-PUF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	SH-PUF 2/4/98	SH-PUF 2/10/98	SH-PUF 2/16/98	SH-PUF 2/22/98	SH-PUF 2/28/98	SH-PUF 3/6/98	SH-PUF 3/12/98	SH-PUF 3/18/98	SH-PUF 3/24/98	SH-PUF 3/30/98	SH-PUF 4/5/98	SH-PUF 4/11/98	SH-PUF 4/17/98	SH-PUF 4/23/98	SH-PUF 4/29/98
18	20	23	15	25	16	10	7.7	23	17	22	16	31	32	27	27
17+15	11	16	10	11	9.3	5.3	4.4	16	12	8.6	11	15	17	18	14
16+32	0	28	17	29	23	13	6.4	32	20	26	18	29	37	34	26
31	12	22	14	23	14	8.3	5.1	21	14	17	13	31	34	31	29
28	10	17	9.4	13	11	6.7	4	15	9.5	15	6.7	15	20	18	16
21+33+53	4.1	12	7.9	11	7.1	2.3	2.2	14	9.3	15	7.1	17	18	18	15
22	0	8.7	3.7	12	9.3	8.8	13	9.4	7.6	16	4	30	24	15	17
45	0	0	0	0	0	0	0	0	0	0	6.3	0	17	0	14
52+43	14	27	18	19	17	11	5.3	21	14	15	15	26	27	27	22
49	7.1	12	9.4	8.7	7.5	5.4	2.1	12	7	6	8.2	14	13	13	9.7
47+48	21	23	23	21	21	12	4.2	26	12	17	17	18	28	24	18
44	9.7	14	10	11	12	8.5	3.1	12	8.4	11	7.4	16	18	17	14
37+42	3.5	6.7	4.3	1.9	4.3	4	3.4	5.3	4.8	5.9	3.3	5.9	5.5	5	5.8
41+71	0	7.9	6	3.1	5.2	6.1	0	6.6	4.7	5.7	5.6	9.3	9.6	8.5	6.8
64	2.7	4	3.1	2.9	3.4	2.1	0.99	3.9	2.7	4	2.1	5.3	5.1	4.9	4.4
40	0	3.1	2.4	0	1.4	1.2	0.53	1.9	1.6	2.7	2	4.2	4.3	4.2	3.6
74	1.6	4.9	2.6	3.7	3.1	2	0.52	3.6	2.9	5.7	2.2	7.6	10	8.5	8.4
70+76	2.3	10	5.8	8.5	5.1	2.8	0.79	6.2	4.7	10	4.3	9.9	13	13	11
66+95	15	41	25	32	24	14	4.1	26	17	29	17	40	44	46	38
91	4.1	6.3	2.8	5.6	3.8	3.4	1.1	6.3	4	7.7	2.8	9.1	9.6	6.3	7.6
56+60+89	0	5.9	2.2	4.5	3.7	1.8	0.84	4.5	2.6	6.5	2	7.5	10	9.7	8.4
92+84	0	11	6.2	8.4	6.4	2.1	0	8.5	4.8	11	4.6	16	15	14	15
101	5.9	14	7	11	7.9	5.6	1.3	9.8	6	9.8	4.7	13	14	11	13
83	0	0.84	0.51	0.47	0	0	0	0	0	1.2	0.34	0.75	1.7	1.2	1.1
97	2.2	2.7	1.3	1.8	1.7	1.6	0.9	2	1.1	2.2	0.74	2.6	2.7	2.4	2.7
87+81	3.6	5.1	2.6	4.1	4	4.1	0	4.8	2.6	4.8	1.8	6.9	5.8	5.3	6
85+136	0	3.5	1.4	1.7	0.46	0.24	0	0.7	1.7	2.3	0.74	3.3	3.6	4.1	4
110+77	9.6	12	6.1	10	8.2	8.2	4.6	8.8	6	12	3.9	12	13	13	14
82	0.13	0.81	0.57	0.62	0.47	0.28	0.055	0.57	0.36	0.77	0.34	0.65	1.1	1.1	1.1
151	0.89	1.4	1	1.3	1.5	0.9	0.35	1	0.66	1.5	0.46	1.2	1.4	1.2	1.4
135+144+147+124	1.8	1.5	1.1	1.4	1.1	1.4	1.1	1.1	0.77	1.7	0.49	1.5	1.8	1.6	1.9
149+123+107	1.8	4.1	2.6	3.6	2.9	2.2	0.49	3.3	1.8	6.5	1.4	3.9	5	4	5.2
118	1.5	4.7	2.4	3.7	2.4	1.9	0.68	2.7	1.4	5.7	1.1	2.8	5.5	4	6.3
146	0	0.89	0.51	0.53	0.55	0	0	0.59	0.12	0	0.11	0.73	1.4	0.79	1.9
153+132	1.6	4.5	2.5	3.7	3.1	2.4	0.35	3.2	1.7	5.9	1.4	3.5	5.4	4.1	5.7
105	0	0	0	0	0.67	0	0	0.82	0	2.2	0.38	0.73	0	0	1.3
141	0.25	0.89	0.49	0.84	0.83	0	0	0	0.45	1.5	0.3	1.3	1.3	1.3	1.5
137+176+130	0.23	0	0.14	0	0	0	0	0	0	0	0	0.069	0	0	0
163+138	1.1	4.4	2	3.2	2.6	2.4	0.31	2.7	1.4	6.7	1.2	3.2	5.3	4	5.7
178+129	0	0.67	0	0.28	0	0	0	0.28	0	0	0	0.29	0.48	0	0.46
187+182	0.44	1.7	2	1.6	1.3	1.2	0	1.1	1.4	1.8	0	2.4	2.2	1.6	2.1
183	0.15	0.34	0.17	0.3	0.33	0.21	0	0.22	0.095	0.77	0.16	0.35	0.52	0.77	0.6
185	0.17	0.059	0.044	0.069	0.066	0.049	0.039	0.063	0.024	0.17	0.029	0.065	0.12	0.82	0.11
174	0.18	0.32	0.22	0.44	0.3	0.26	0.047	0.28	0.15	1.1	0.13	0.36	0.71	0	0.81
177	0	0.19	0.11	0.2	0.23	0.18	0.067	0.17	0.1	0.59	0.085	0.44	0.62	0	0.69
202+171+156	0	0.1	0.03	0.12	0.069	0.095	0.03	0.095	0.052	0.17	0.055	0.13	0.25	0.51	0.31
180	0.1	0.4	0.27	0.38	0.34	0.26	0.043	0.28	0.1	1.7	0.12	0.34	1.1	0.6	1.1
199	0	0	0	0	0.074	0	0	0	0	0.39	0.09	0	0.15	0.48	0.15
170+190	0	0	0	0.089	0.039	0.022	0	0.089	0.024	0.64	0.029	0.078	0.32	0.26	0.35
198	0	0	0	0	0	0	0	0	0	0.028	0	0	0	0	0.098
201	0	0	0.081	0.19	0.11	0.1	0	0.11	0.049	1	0.065	0.15	0.44	0.19	0.5
203+196	0	0	0.07	0.23	0.19	0.12	0	0.12	0.062	0.88	0.16	0.21	0.5	0.21	0.62
195+208	0	0	0	0	0	0	0	0	0	0.097	0.0093	0	0.035	0.091	0.049
194	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0	0	0	0	0	0	0.069	0	0
Total PCBs	169	368	232	306	248	164	80	322	209	330	196	418	486	426	411
Homologue Group															
3	60	133	82	126	94	59	46	137	94	124	79	173	187	166	149
4	74	153	106	114	103	67	23	125	78	113	89	157	199	175	158
5	27	61	31	48	36	27	8.6	45	28	59	21	68	71	63	72
6	7.8	18	10	15	13	9.3	2.6	12	6.9	24	5.3	15	22	17	23
7	1	3.7	2.8	3.4	2.6	2.2	0.2	2.5	1.9	6.9	0.56	4.3	6	4.1	6.2
8	0	0.1	0.18	0.53	0.45	0.32	0.03	0.33	0.16	2.6	0.38	0.49	1.4	1.5	1.7
9	0	0	0	0	0	0	0	0	0	0	0	0	0.069	0	0
Corresponding Laboratory Blank	2/16/98	3/10/98	3/10/98	3/10/98	3/17/98	3/25/98	3/25/98	3/25/98	5/26/98	5/23/98	5/26/98	6/15/98	5/26/98	5/23/98	5/23/98
Surrogate Recoveries (%)															
#65	106 %	109 %	97 %	111 %	109 %	107 %	111 %	119 %	109 %	54 %	101 %	111 %	109 %	105 %	107 %
#166	108 %	105 %	100 %	107 %	108 %	107 %	113 %	110 %	110 %	63 %	100 %	97 %	102 %	104 %	99 %

B.2. Sandy Hook Gas Phase PCBs
(SH-PUF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	SH-PUF 5/5/98	SH-PUF 5/11/98	SH-PUF 5/17/98	SH-PUF 5/23/98	split-top SH-PUF 5/29/98	plit-bottom SH-PUF 5/29/98	SH-PUF 6/4/98	SH-PUF 6/10/98	SH-PUF 6/16/98	SH-PUF 6/22/98	SH-PUF 6/28/98	SH-PUF 7/4/98	day SH-PUF 7/5/98	night SH-PUF 7/5/98	day SH-PUF 7/6/98
18	10	17	22	51	87	62	21	20	81	36	22	52	55	38	28
17+15	7	10	13	36	34	24	16	27	27	0	8.4	29	35	20	18
16+32	18	20	30	70	55	24	29	20	50	0	18	57	86	38	36
31	20	17	26	61	58	15	23	21	47	32	20	64	79	33	31
28	13	11	14	44	43	7.7	18	16	26	17	11	34	42	19	13
21+33+53	9.8	8.6	12	35	37	3.1	12	6.4	22	14	7.7	33	37	18	15
22	8.7	6.8	13	58	51	19	18	16	46	22	30	58	81	28	37
45	12	0	12	47	0	0	15	13	0	9.8	8.6	26	21	20	11
52+43	19	23	23	70	65	4	30	26	44	40	14	66	75	38	29
49	10	13	9.6	31	31	0.81	13	11	24	25	6.6	31	30	19	12
47+48	21	25	12	42	37	0.82	17	8.9	29	22	0	12	34	24	6.9
44	12	12	14	40	41	1.3	16	13	21	21	11	35	39	20	17
37+42	5.7	6.8	5.7	21	24	0	10	5.8	18	13	3	25	27	0	32
41+71	8.2	8.8	9.6	26	22	0.94	11	9.5	17	17	4.3	20	26	4.4	15
64	3.3	3.5	4.5	14	15	0.86	5.4	3.7	8.4	5.9	3.4	10	14	5.6	4.4
40	3.3	3.8	4.1	12	13	0.95	4.8	5.8	8.7	8.8	3.8	11	13	5.2	7.8
74	6.2	6.4	8.1	13	7.7	2.6	4.9	4.7	6.8	12	12	16	19	8.9	12
70+76	9.7	10	11	17	16	0.28	6.6	4.3	9.7	11	12	25	24	18	11
66+95	33	35	40	75	73	3.2	34	27	57	60	43	83	118	59	49
91	5.9	7.6	7	16	16	0.62	4.8	2.3	12	6.6	6.8	20	21	11	18
56+60+89	4.2	7.1	8.8	18	0	0.39	6.6	4.9	9.5	6	7.7	20	24	9	12
92+84	8.6	9.4	12	35	0	0	20	0	0	15	18	29	39	12	14
101	8.9	11	13	28	26	0.67	11	8.5	17	14	9.5	29	40	16	16
83	0.93	1.2	1.3	2.1	10	0	1.1	2.6	6.5	1.5	1.4	2.6	2.9	1.7	1.6
97	1.8	2.2	2.6	6.5	7.9	0	2.3	2.3	4.8	3.4	1.9	7.4	9.2	3.4	4.2
87+81	3.5	3.4	5	14	18	0	4.4	5	12	5	5.9	15	18	8.2	9
85+136	2.2	2.1	2.8	7.1	4.1	0	2.3	0.66	4.5	3.1	0.89	10	14	5	3.8
110+77	9.2	9.7	13	29	39	0.26	11	8.1	21	16	6.5	34	42	16	14
82	0.92	0.76	1	1.8	2.3	0	0.73	0.75	1.7	0.55	0.92	2.1	2.3	0.87	0.59
151	1.1	1.2	1.5	3.7	3.8	0	1.3	1.1	2.5	1.3	1.1	4.4	4.5	1.6	1.5
135+144+147+124	1.3	1.4	1.7	3.4	9.6	0	1.2	0.86	1.4	1.7	1.5	5	5	2	2
149+123+107	3.6	3.7	4.8	12	12	0.13	4	3.6	8.3	5.2	4.2	12	14	4.9	5.9
118	4.4	4.4	5.3	9.6	9.5	0	3.5	3.6	5.9	3.8	0	12	13	0	5.5
146	1.1	0.77	2.1	6.4	9	0	1.1	2.9	11	2.3	0	11	10	0	0
153+132	3.8	3.8	5.5	12	13	0.13	3.5	3.5	8.8	4.5	4.3	12	14	4.5	5.2
105	1.3	0.83	1.7	2.7	2.9	0	0.78	0.61	1.6	0.77	0	4.4	3.8	1.2	2.2
141	0.8	0.7	1.1	3	3.8	0.71	0.97	0.88	2.8	0.9	2	3.7	3.9	1.2	0.76
137+176+130	0	0	0.29	0.23	0.21	0	0	0	0.13	0.049	0	0.26	0.17	0	0.12
163+138	4.3	3.7	5.5	11	12	0	3.7	3.5	8.7	5	4.9	12	14	4.1	5.1
178+129	0.42	0	0.41	1.3	1.2	0	0	0	0.94	0.57	0	1.6	1.5	0.45	1.7
187+182	0.89	1.8	3	4.8	3.9	0	1.6	2.2	3.4	2.8	1.4	5.2	6.1	0	4.4
183	0.38	0.27	0.54	1.4	1.8	0	0.32	0.47	1.4	0.62	0.31	1.7	1.8	0	0.77
185	0.076	0.06	0.12	0.23	0.98	0	0.066	0.12	0.96	0.18	0.086	0.26	0.37	0	0.31
174	0.49	0.37	0.74	1.6	1.5	0	0.4	0.39	1.2	0.7	0.61	1.7	2	0.46	0.62
177	0.48	0.45	0.75	1.3	1.9	0	0.55	0.71	1.5	0.6	0.65	1.3	1.2	0.48	0.39
202+171+156	0.17	0.2	0.28	0.61	0	0	0.18	0	0.3	0.26	0.18	0.62	0	0.13	0
180	0.78	0.56	1.1	2.2	2.8	0	0.52	0.56	1.8	0.94	0.89	2.1	2.1	0.52	0.76
199	0.088	0.057	0.083	0.083	0	0	0	0	0.073	0.046	0.059	0.13	0.23	0	0
170+190	0.28	0.31	0.39	0.58	0.59	0	0.11	0.12	0.37	0.27	0.36	0.52	0.43	0.1	0.17
198	0	0	0.021	0	0	0	0	0	0	0	0.045	0	0	0	0
201	0.38	0.21	0.47	0.96	2.4	0	0.21	0.15	1.7	0.51	0.44	1.1	2.9	0.33	0.46
203+196	0.37	0.26	0.56	1	1.8	0	0.23	0.29	1	0.61	0.53	1.3	1.3	0.44	0.57
195+208	0.035	0.025	0	0.098	0.12	0	0	0	0.062	0	0.052	0.091	0	0	0
194	0	0	0	0	0.1	0	0	0	0	0.092	0.13	0.23	0	0	0
206	0.041	0	0	0	0	0	0	0	0.27	0.096	0.12	0	0	0	0
Total PCBs	303	317	390	999	927	172	392	318	697	473	321	951	1,170	523	516
Homologue Group															
3	93	97	137	375	390	154	148	132	317	135	119	352	442	195	210
4	142	147	158	406	319	16	163	131	234	238	126	355	438	231	187
5	48	52	65	151	135	1.5	62	34	87	70	52	167	206	76	89
6	16	15	23	51	64	0.97	16	16	43	21	18	60	65	18	21
7	3.8	3.8	7	13	15	0	3.6	4.6	12	6.7	4.3	14	15	2	9.1
8	1	0.75	1.4	2.7	4.4	0	0.62	0.44	3.2	1.5	1.4	3.4	4.4	0.9	1
9	0.041	0	0	0	0	0	0	0	0.27	0.096	0.12	0	0	0	0
Corresponding Laboratory Blank	5/23/98	5/23/98	5/23/98	6/15/98	6/15/98	6/15/98	6/15/98	7/2/98	7/2/98	7/2/98	7/12/98	8/20/98	7/30/98	7/18/98	7/30/98
Surrogate Recoveries (%)															
#65	107 %	103 %	99 %	94 %	120 %	90 %	92 %	72 %	93 %	82 %	96 %	94 %	80 %	100 %	78 %
#166	103 %	104 %	99 %	89 %	95 %	106 %	93 %	69 %	106 %	102 %	107 %	96 %	97 %	104 %	96 %

B.2. Sandy Hook Gas Phase PCBs
(SH-PUF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	night SH-PUF 7/6/98	day SH-PUF 7/7/98	night SH-PUF 7/7/98	day SH-PUF 7/8/98	night SH-PUF 7/8/98	day SH-PUF 7/9/98	night SH-PUF 7/9/98	day SH-PUF 7/10/98	night SH-PUF 7/10/98	day SH-PUF 7/11/98	SH-PUF 7/16/98	SH-PUF 7/22/98	SH-PUF 7/28/98	SH-PUF 8/3/98	SH-PUF 8/9/98
18	30	26	41	24	22	51	63	51	37	36	39	58	39		40
17+15	16	15	22	17	18	32	35	34	26	29	16	27	19		18
16+32	29	28	38	28	36	62	60	61	41	54	0	59	27		12
31	21	27	34	24	40	78	58	66	43	47	40	82	34		16
28	15	14	17	14	19	41	36	49	26	32	22	48	19		7.1
21+33+53	12	12	20	19	15	36	35	34	19	23	20	40	16		5.7
22	11	50	60	87	53	77	31	26	35	44	45	44	37		15
45	5	9.6	0	12	15	18	37	24	19	14	0	33	0		0
52+43	27	24	28	20	26	54	54	66	37	39	45	81	33		16
49	9.4	8.6	12	9.3	11	22	26	32	18	22	19	48	13		5.2
47+48	7.2	9.9	17	0	15	14	43	30	19	16	8.9	46	27		6.9
44	14	17	32	20	21	42	34	38	26	26	25	46	18		10
37+42	9	6.6	13	7.7	7.1	12	16	27	10	13	6.3	26	7.3		2.6
41+71	6.5	8.7	12	7.2	9.2	19	15	23	11	14	11	24	8.8		4.6
64	3.9	5.5	7.9	7.3	5.9	12	9	12	8.2	8.8	7.2	13	5.3		3.1
40	3.5	7.1	8.9	5.8	5.8	9.8	8.2	9	7	8.2	6.6	11	6.3		3.7
74	3.6	17	0	0	17	30	13	16	10	9.1	11	18	1.9		0
70+76	14	17	6.6	18	25	41	25	29	15	15	9.4	27	15		2.8
66+95	32	49	46	63	59	103	92	100	53	58	43	75	60		25
91	4.2	6	4.7	4.6	8.4	20	22	15	8.8	7.9	19	23	17		4.3
56+60+89	3.1	9.4	7	0	11	24	10	18	9.8	12	12	21	6		6.1
92+84	20	0	0	0	0	0	21	24	33	35	27	30	14		0
101	7.5	9.4	9.6	7.8	13	25	27	30	16	16	18	37	16		7.1
83	0.96	1.9	1.4	3	3.3	8.9	3.4	3.5	2.1	2.2	1.4	4.1	2		2.3
97	1.5	1.7	1.5	0	2.4	6.2	5.9	6.7	3.6	3.9	7.1	7.9	5.4		0
87+81	5.6	13	0	0	9.7	17	9	9.9	7.9	7.5	15	12	9.5		0
85+136	3.3	0	0	0	1.6	3.1	8.2	15	1.5	2.5	4.8	9.9	5.9		0.98
110+77	8	11	13	0	13	32	25	31	19	20	22	34	19		6.6
82	0.2	0.83	0	0	1.5	2.4	1.5	1.8	1.7	1.1	1.8	2	1.2		1.3
151	1.2	1	0.86	0	1.4	3	3.1	3.3	1.9	1.4	3.3	4.6	2		0.83
135+144+147+124	1.5	0	0	0	2.2	4.5	3.7	4	2	2.1	3.6	5.5	2.6		0.71
149+123+107	4.7	4.1	3.8	2.7	5.4	11	9.2	11	6.4	6.5	9.2	14	6.9		2.9
118	3.1	0	0	0	1.8	0	10	16	6.8	7.1	8.8	13	6.7		2.6
146	1.2	0	0	0	0	0	4.7	2.1	2.9	0	0	2.6	0		0
153+132	3.7	4.5	2.6	3.2	5.4	12	9.4	12	6	6.3	8.6	14	7		3.3
105	0.86	0	0	0	0	0	2.7	3.8	1.7	1.3	2.7	3.2	2.2		0.57
141	0.8	2.9	5.4	0	2.4	3.6	1.9	3	2.1	2.2	2	4.2	1.5		1.6
137+176+130	0	0	0.18	0	0.37	0.78	0.69	0.6	0	0	0.18	0.55	0.15		0.041
163+138	3.6	4.8	3.2	3	5.1	13	8.6	12	5.7	6.4	9.4	16	7.6		3.2
178+129	0	0.48	0	0	0.74	1.5	0.93	0.99	0.76	0.68	1.6	1.4	1.2		0.51
187+182	4.2	2.2	5.4	0	0	3.4	3.3	3.9	3.3	4.1	3.9	5	3.4		2.4
183	0	0.19	0.4	0	0.25	0.97	1.1	1.3	0.47	0.49	1.1	2.2	0.93		0.72
185	0	0.13	0.086	0.13	0.21	0.5	0.18	0.25	0.16	0.13	0	0.33	0.21		0.24
174	0.41	0.52	0	0.27	0.57	1.6	1.2	1.6	0.8	0.8	1.4	2.4	1		0.52
177	0	0.72	0.075	0.55	0.72	1.7	0.96	1.2	0.65	0.87	1.3	1.9	0.97		0.41
202+171+156	0	0.17	0	0.093	0.24	0.49	0.61	0.8	0.32	0.34	0.72	0.91	0.33		0.11
180	0.69	0.78	0.66	0.53	0.74	3.2	1.6	2.4	0.91	1.5	2	3.9	1.5		0.82
199	0	0.073	0	0	0.041	0	0.17	0	0.14	0.11	0	0.26	0.066		0
170+190	0.31	0.29	0.11	0	0.21	0.84	0.4	0.66	0.23	0.28	0.49	0.96	0.44		0.18
198	0	0.035	0	0	0.065	0.067	0	0	0	0	0	0	0		0
201	0	0.44	0.36	0.27	0.31	1.3	0.81	1.1	0.49	0.55	1.1	1.8	0.77		0.56
203+196	0	0.48	0.23	0.31	0.37	1.4	0.88	1.2	0.62	0.55	1.1	1.9	0.84		0.22
195+208	0	0.021	0.067	0	0	0.064	0	0.1	0	0	0.081	0.16	0.088		0
194	0	0.1	0	0.033	0	0.27	0.11	0.18	0.029	0.066	0.19	0.31	0.16		0.038
206	0	0	0	0.12	0	0.17	0.13	0.14	0	0	0.12	0.19	0.091		0.081
Total PCBs	351	429	475	411	513	957	891	964	608	659	565	1,090	532		245
Homologue Group															
3	144	178	244	222	210	389	333	349	237	277	188	385	198		117
4	129	183	177	163	222	388	367	395	233	243	198	444	195		84
5	55	44	30	15	54	115	137	157	102	104	127	176	99		26
6	17	17	16	9	22	47	41	48	27	25	36	61	28		13
7	5.6	5.3	6.7	1.5	3.4	14	9.7	12	7.3	8.9	12	18	9.6		5.8
8	0	1.3	0.66	0.71	1	3.6	2.6	3.4	1.6	1.6	3.1	5.3	2.3		0.93
9	0	0	0	0.12	0	0.17	0.13	0.14	0	0	0.12	0.19	0.091		0.081
Corresponding Laboratory Blank	7/30/98	7/10/98	8/31/98	7/12/98	7/10/98	7/12/98	7/18/98	7/17/98	7/17/98	7/17/98	8/20/98	8/20/98	8/20/98		8/31/98
Surrogate Recoveries (%)															
#65	74 %	94 %	104 %	97 %	78 %	116 %	96 %	94 %	104 %	97 %	119 %	95 %	104 %		93 %
#166	95 %	106 %	106 %	107 %	101 %	106 %	102 %	101 %	102 %	103 %	102 %	101 %	107 %		107 %

B.2. Sandy Hook Gas Phase PCBs
(SH-PUF)
Surrogate Corrected Concentrations
(pg/m^3)

PCB Congener	SH-PUF 8/15/98	SH-PUF 8/21/98	SH-PUF 8/27/98	SH-PUF 9/4/98	SH-PUF 9/13/98	SH-PUF 9/22/98	SH-PUF 10/1/98	SH-PUF 10/10/98	SH-PUF 10/19/98	SH-PUF 10/28/98	SH-PUF 11/6/98	SH-PUF 11/15/98	SH-PUF 11/24/98	SH-PUF 12/3/98	SH-PUF 12/12/98
18	19	104	42	59	21	51	28	alfunction	47	28	22	18	20	54	26
17+15	13	34	18	36	11	25	13		21	12	9.8	9.8	10	29	15
16+32	17	50	35	43	27	49	22		41	24	18	17	20	53	28
31	20	69	48	55	32	66	24		25	15	14	9.9	19	40	0
28	9.8	38	22	28	18	38	13		39	21	16	15	19	47	22
21+33+53	6	34	20	27	13	31	11		16	9.5	10	4.4	8.1	35	15
22	18	63	48	46	33	54	18		0	0	0	0	0	0	0
45	1.6	0	0	0	16	23	0		22	0	7.8	0	0	25	16
52+43	15	61	43	44	36	50	23		44	23	16	17	23	44	25
49	0	24	22	26	14	30	11		25	12	7.4	8.4	11	25	17
47+48	4.5	31	33	23	17	35	12		18	7.6	6.6	9	9	21	3.4
44	15	29	23	26	20	30	14		23	10	9	8.3	12	26	14
37+42	0	18	6.9	9	14	18	8.9		14	6.6	6.2	5.8	8.4	17	8.7
41+71	4.8	19	11	13	11	18	7.9		13	5	4.8	4.8	6.7	13	7.1
64	2.2	12	8.2	7.6	5	9.9	4		9.1	3.9	3.7	3.2	4.6	9.1	4.8
40	4.3	9.2	7.4	7.5	6.5	9.4	2.9		6.9	3.1	2.3	1.7	3.4	5.6	2.3
74	2.9	6.8	9.4	8.6	6.3	14	4.6		7.3	3.1	2.8	2.8	3.8	7.4	3.5
70+76	3.3	20	11	18	12	24	8.6		12	5.7	5	4.1	6.3	14	7.1
66+95	20	83	66	57	46	68	32		45	21	18	16	22	44	22
91	4	22	16	14	12	15	5.1		8.2	4.7	2.4	8.8	2.9	12	5.1
56+60+89	5.8	19	15	14	12	18	6.4		13	5.3	4.6	4.2	6.3	9.2	3.8
92+84	0	0	0	27	16	23	11		19	5.4	6.7	6.5	6.7	16	7.5
101	5.9	46	21	19	17	22	9.1		18	6.9	6.8	5.9	8.2	19	8.5
83	0.71	6.8	3.4	2.2	1.7	2	0.96		1.6	0.81	0.58	0.61	0.8	2	0.87
97	0	9.8	6.8	4.4	6.2	5	1.9		4.3	1.8	1.4	1.2	2	4.6	2
87+81	5.7	21	18	10	9.6	11	3.8		9	3.6	3.7	2.8	3.1	7.7	0
85+136	1.2	9.6	4.8	4.2	5.8	6.6	3.5		5.7	1.7	2.1	2.1	3.2	6.5	2.5
110+77	6.6	36	23	21	19	22	9		15	6.7	5.7	5	7.4	16	6.3
82	0.81	2.6	2.7	1.3	0.77	1.8	0.38		0.9	0.52	0.36	0.27	0.44	0.76	0.3
151	0.77	3.9	1.9	2.8	2.1	3.4	1.1		1.9	0.96	0.66	0.7	0.95	3.2	0.96
135+144+147+124	0.49	4.9	2.4	3.3	2.1	3.9	1		2.1	0	0.78	0.6	0.68	3.3	1
149+123+107	2.6	14	7.2	9.2	6.8	9.8	3.5		5.8	3.4	2.1	2.1	2.7	8.7	2.5
118	2.2	16	7.4	9.4	6.4	10	2.9		5	2.6	2	1.6	2.2	5.9	2.1
146	0	0	0	0	0	5.4	0.68		0	0	0.53	0	1.1	1.6	0.43
153+132	2.7	16	7.8	8.7	7.2	9.8	3.2		5.9	3.6	2	1.9	2.6	8.7	2.2
105	0.48	5.4	2.2	2.9	2.7	4.3	0.68		1.7	0	0	0	0	3.9	0
141	0.84	3.6	3.1	1.8	1.7	2.4	0.77		0.97	0.73	0.39	0.38	0.5	2.3	0.42
137+176+130	0	0.28	0.054	0.14	0.15	0.14	0.049		0	0.81	0.34	0.22	0	0.35	0
163+138	2.6	16	8.3	9.4	7.4	10	3.1		5.3	3	1.6	1.5	2.3	8.6	1.8
178+129	0.31	2.3	1.2	1.4	1.1	1.1	0.27		0.42	0	0	0	0.11	1.2	0
187+182	1.2	4.9	3.3	3.4	3.5	3.9	2.1		1.4	1.1	0.22	0.46	0.52	3	0.31
183	0.42	1.8	0.97	1.3	1.2	1.5	0.31		0.58	0.3	0.13	0.13	0.23	1.8	0.17
185	0	0.61	0.46	0.29	0.2	0.23	0.057		0.1	0	0.023	0	0	0.29	0.049
174	0.4	2.6	1.1	1.4	1.2	1.5	0.36		0.59	0.4	0.13	0.12	0.27	2.4	0.18
177	0.35	1.8	1	0.94	0.89	1.1	0.33		0.47	0	0.15	0.21	0.19	1.6	0.18
202+171+156	0.15	0.77	0.41	0.49	0.38	0.62	0		0.37	0	0.093	0.11	0.12	1.1	0.14
180	0.78	4	1.8	1.7	1.7	2	0.42		0.7	0.27	0.09	0.079	0.22	4	0.12
199	0	0.16	0.054	0.1	0.089	0.11	0		0	0	0	0	0	0.22	0
170+190	0.17	1.2	0.5	0.48	0.49	0.56	0.048		0.22	0	0	0	0	1.1	0
198	0	0	0	0	0	0	0		0	0	0	0	0	0	0
201	0.6	2.1	0.79	0.96	0.76	1.2	0.19		0.3	0.22	0	0.043	0.077	1.8	0
203+196	0.3	1.8	0.71	1	0.92	1.2	0.13		0.39	0	0	0	0.12	2	0
195+208	0.031	0.19	0.064	0.069	0.11	0.096	0		0	0	0	0	0	0.23	0
194	0	0.37	0.093	0.15	0.15	0.3	0		0.031	0	0.012	0.021	0	0.35	0
206	0	0.28	0.078	0.1	0	0.29	0		0.069	0	0	0	0	0.11	0
Total PCBs	225	986	639	712	508	844	330		558	266	226	203	263	671	285
Homologue Group															
3	104	411	240	304	169	333	137		204	116	97	80	105	274	113
4	79	314	250	245	203	328	127		238	101	88	80	108	244	126
5	27	176	105	114	96	123	48		89	35	32	35	37	95	35
6	10	59	31	35	27	45	13		22	12	8.5	7.4	11	37	9.4
7	3.6	19	10	11	10	12	3.9		4.5	2	0.74	1	1.6	15	1
8	1.1	5.4	2.1	2.8	2.4	3.6	0.32		1.1	0.22	0.11	0.18	0.32	5.6	0.14
9	0	0.28	0.078	0.1	0	0.29	0		0.069	0	0	0	0	0.11	0
Corresponding Laboratory Blank	8/31/98	9/8/98	9/8/98	9/30/98	9/30/98	9/30/98	10/21/98		11/24/98	11/24/98	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99
Surrogate Recoveries (%)															
#65	79 %	146 %	155 %	94 %	69 %	101 %	94 %		65 %	13 %	63 %	42 %	100 %	90 %	94 %
#166	110 %	109 %	103 %	100 %	105 %	104 %	96 %		57 %	11 %	56 %	38 %	100 %	91 %	92 %

B.2. Sandy Hook Gas Phase PCBs
(SH-PUF)
Surrogate Corrected Concentrations
(pg/m³)

									Gap in data due to power outage						
PCB Congener	**SH-PUF 12/21/98**	**SH-PUF 12/30/98**	**SH-PUF 1/8/99**	**SH-PUF 1/17/99**	**SH-PUF 1/26/99**	**SH-PUF 2/4/99**	**SH-PUF 2/13/99**	**SH-PUF 2/22/99**	**SH-PUF 3/3/99**	**SH-PUF 3/12/99**	**SH-PUF 3/21/99**	**SH-PUF 3/30/99**	**SH-PUF 4/9/99**	**SH-PUF 4/16/99**	**SH-PUF 4/26/99**
18	9.1	27	16	25	16	32	12	10							
17+15	5.3	16	9.7	14	9	17	7.7	5.1							
16+32	12	36	28	31	26	42	30	11							
31	0	0	0	15	0	14	9.4	5.3							
28	11	19	14	21	13	26	8.6	5.9							
21+33+53	4.7	0	8	11	7.3	29	8.1	4.3							
22	0	0	0	0	0	0	0	0							
45	8.4	20	11	0	11	0	0	0							
52+43	13	24	22	29	18	35	12	9.9							
49	7	12	11	15	11	16	6.3	0							
47+48	1.2	5.4	6.3	4.9	1.6	3.3	2.9	0							
44	7.3	15	11	16	9.1	18	5.1	4.6							
37+42	5.6	11	8.3	12	6.2	8.8	5.2	3.6							
41+71	3.8	6.9	5.9	8.2	5.4	8.1	1.8	2.3							
64	2.3	4.6	3.7	5.1	3.2	5.8	1.8	1.3							
40	1.8	3.4	2.5	5.4	2.1	4.1	1.4	0.57							
74	2.1	3.3	3	6.3	2	9.3	1.4	0.98							
70+76	4.2	8.1	6.2	8.3	4.1	17	3.5	1.4							
66+95	12	25	22	32	13	7.3	11	6.5							
91	3.6	8	6.1	6.6	3.5	0	3	1.6							
56+60+89	2.8	4.6	3.6	4.7	2.5	5.9	2.9	1.3							
92+84	4.5	0	8.2	20	6	0	5.5	2.7							
101	5.7	12	9.6	13	5.3	12	4.9	2.5							
83	0.56	0.96	0.79	0.84	0.45	0	0.41	0.088							
97	1.7	2.5	2.2	2.8	1.3	2.6	1.3	0.33							
87+81	2.6	6.9	4.9	5.9	3	6.7	2.8	0.7							
85+136	1.8	3.8	2.9	4	1.5	4.7	1.4	0							
110+77	5.3	9.6	7.1	11	4.2	11	3.7	1.4							
82	0.37	0.4	0.44	0.54	0.25	0.68	0.13	0.082							
151	0.76	1.1	0.92	1.1	0.45	1.2	0.5	0.22							
135+144+147+124	1	1.1	1.1	1.5	0.57	1.5	0.59	0.14							
149+123+107	2.8	3.4	2.9	3.7	1.5	3.7	1.4	0.56							
118	2.2	2.7	2.4	3.3	1.1	0	0.94	0.31							
146	0.5	0.52	0.54	0	0	0	0	0							
153+132	2.6	2.8	2.4	3.3	1.1	3.6	1.1	0.31							
105	0	0	0	0.75	0	1	0	0							
141	0.46	0.58	0.4	0.61	0.23	1.5	0.24	0.11							
137+176+130	0	0	0	1.3	0	0	0	0							
163+138	2.5	1.9	2	0.63	0.88	3.5	0.7	0.29							
178+129	0	0	0	0	0	0.11	0.055	0							
187+182	0.48	0.4	0.34	0.7	0.094	0.82	0.13	0.12							
183	0.3	0.22	0.15	0.31	0.072	0.45	0	0.049							
185	0.053	0.063	0	0.056	0	0	0.033	0							
174	0.32	0.24	0.19	0.34	0.1	0.38	0.073	0.073							
177	0.23	0.13	0.16	0	0.086	0	0	0							
202+171+156	0.28	0.19	0.16	0.23	0.1	0	0.083	0.05							
180	0.47	0	0.15	0.33	0.078	0.33	0.099	0.084							
199	0	0	0	0	0	0.027	0	0							
170+190	0.1	0	0	0.088	0.05	0.12	0.095	0.035							
198	0	0	0	0	0	0	0	0							
201	0.2	0.12	0	0.15	0.045	0	0.051	0							
203+196	0.22	0	0	0.2	0.058	0.18	0.099	0							
195+208	0	0	0	0	0	0	0.012	0							
194	0	0	0	0.032	0	0	0.027	0.0086							
206	0	0	0	0	0	0	0	0							
Total PCBs	155	300	249	347	193	356	160	85							
Homologue Group															
3	47	108	85	129	78	170	81	45							
4	66	132	108	136	83	129	50	29							
5	28	47	45	68	27	39	24	9.7							
6	11	11	10	12	4.8	15	4.6	1.6							
7	2	1.1	0.98	1.8	0.48	2.2	0.48	0.36							
8	0.7	0.3	0.16	0.62	0.21	0.21	0.27	0.058							
9	0	0	0	0	0	0	0	0							
Corresponding Laboratory Blank	2/15/99	2/15/99	2/15/99	2/24/99		2/24/99	3/8/99	3/8/99							
Surrogate Recoveries (%)															
#65	84 %	109 %	93 %	102 %	105 %	93 %	110 %	95 %							
#166	88 %	99 %	89 %	94 %	97 %	84 %	99 %	93 %							

B.2. Sandy Hook Gas Phase PCBs
(SH-PUF)
Surrogate Corrected Concentrations
(pg/m³)

PCB Congener	SH-PUF 6/1/99	SH-PUF 6/10/99	SH-PUF 6/19/99	SH-PUF 6/28/99	SH-PUF 7/7/99	SH-PUF 7/16/99	Power Out
18	44	12	28	10	33	22	
17+15	32	0	22	5.5	21	77	
16+32	46	12	34	14	38	30	
31	41	11	35	15	35	35	
28	34	10	28	16	38	29	
21+33+53	25	0	22	10	25	21	
22	16	5.3	22	11	27	20	
45	3.3	1.0	3.0	0	4.7	3.6	
52+43	45	15	41	22	47	42	
49	25	8.0	23	19	24	28	
47+48	14	5.1	10	6.7	13	11	
44	23	8.6	25	14	30	26	
37+42	11	5.2	12	8.2	16	15	
41+71	12	4.4	10	5.1	0	13	
64	6.1	2.8	7.3	4.5	13	7.2	
40	2.1	0	2.7	1.8	4.2	2.6	
74	6.4	2.8	5.3	3.6	7.9	5.1	
70+76	13	4.9	12	7.0	15	12	
66+95	39	15	40	23	50	40	
91	2.5	1.4	3.0	1.6	4.7	3.0	
56+60+89	8.5	3.8	11	6.4	14	9.8	
92+84	15	7.4	24	16	30	25	
101	19	6.4	17	10	22	17	
83	1.2	0.71	0.89	0.80	1.7	1.1	
97	3.8	1.4	3.6	2.4	5.2	3.8	
87+81	9.2	0	11	6.2	13	11	
85+136	3.3	0.74	3.1	1.8	3.2	2.7	
110+77	13	5.7	17	11	23	18	
82	0.89	0.38	1.9	1.2	2.0	1.6	
151	3.2	1.5	3.7	3.8	4.0	3.3	
135+144+147+124	3.2	1.2	3.8	2.6	4.0	3.1	
149+123+107	8.9	2.8	12	0	10	9.5	
118	6.1	0	7.6	0	8.8	7.1	
146	1.6	2.5	1.9	4.4	6.1	4.4	
153+132	9.9	3.4	11	8.0	14	10	
105	3.0	1.0	2.8	2.1	0	3.3	
141	2.1	0.74	2.5	1.7	3.0	2.4	
137+176+130	0.44	0	0.74	0.59	1.1	0.74	
163+138	8.0	3.6	11	7.7	13	11	
178+129	1.0	0.49	0	1.1	1.1	1.3	
187+182	1.8	0.83	2.3	1.5	2.9	2.2	
183	1.3	0.40	1.2	0.81	1.6	1.2	
185	0.22	0.085	0.20	0.16	0.33	0.24	
174	1.5	0.57	1.6	1.1	2.1	1.6	
177	1.0	0.46	1.1	0.84	1.4	1.1	
202+171+156	0.85	0.41	1.1	0.75	1.3	1.1	
180	2.50	0.86	2.3	1.7	2.7	2.1	
199	0.14	0.040	0.18	0.092	0.16	0.21	
170+190	0.52	0.25	0.72	0.55	0.79	0.65	
198							
201	1.4	0.44	1.4	1.1	1.3	1.3	
203+196	1.3	0.43	1.3	0.88	1.3	1.3	
195+208	0.23	0.089	0.29	0.18	0.27	0.28	
194	0.18	0.085	0.34	0.18	0.19	0.22	
206	0.15	0.055	0.23	0.14	0.13	0.18	
Total PCBs	576	174	545	297	644	602	
Homologue Group							
3	250	55	202	90	234	249	
4	159	57	150	91	174	160	
5	113	40	128	75	160	132	
6	#REF!	#REF!	#REF!	#REF!	#REF!	#REF!	
7	9.4	3.7	8.7	7.3	12	9.8	
8	4.6	1.7	5.3	3.7	5.4	5.1	
9	0.15	0.055	0.23	0.14	0.13	0.18	
Corresponding Laboratory Blank							
Surrogate Recoveries (%)							
#65	63%	101%	90%	6%	80%	78%	
#166	63%	99%	94%	0%	84%	79%	

B.3. Sandy Hook PCBs in Precipitation (SH-Precip) Surrogate Corrected Concentrations (pg/L)

PCB Congener	SH-Precip 2/3/98	SH-Precip 2/16/98	SH-Precip 2/28/98	SH-Precip 3/15/98	SH-Precip 3/24/98	SH-Precip 4/6/98	SH-Precip 4/22/98	SH-Precip 5/12/98	SH-Precip 5/23/98	SH-Precip 6/4/98	SH-Precip 6/17/98	SH-Precip 6/28/98	SH-Precip 7/16/98
18		0.20	0.031	0.029	0.82			22	0.22	0.018	0.10	0	4.8
17+15		0.11	0.013	0	0.64			0	0.074	0.018	0.031	0.014	0.50
16+32		0	0.014	0.082	0			3.9	0.077	0.014	0.040	0	0
31		0	0	0	0			1.3	0.16	0.016	0	0	0.22
28		0.046	0	0.057	0.037			1.9	0.087	0.011	0.044	0.065	0.12
21+33+53		0.0075	0	0	0			0	0.14	0	0.022	0.012	0
22		0.086	0.024	0	0.23			3.1	0.18	0	0.071	0	0.75
45		0	0	0	0			0	0.052	0	0.031	0.021	0
52+43		0.060	0.040	0.061	0.41			6.5	0.14	0.029	0.10	0	0
49		0.011	0.011	0.0088	0.053			2.6	0.040	0.0063	0.0097	0.0036	0.24
47+48		0.050	0.015	0.022	0.034			0.92	0.044	0	0	0.0023	0.073
44		0.019	0.011	0.016	0.036			1.4	0.11	0.014	0.025	0.0064	0.12
37+42		0	0	0	0.070			1.8	0.057	0	0.028	0.010	0.29
41+71		0.022	0.0080	0.021	0.073			3.9	0.069	0.015	0.014	0	0
64		0	0.00076	0.017	0.012			0	0.030	0	0.0055	0	0
40		0	0.0031	0.0045	0			0.20	0.032	0.0028	0.0041	0	0
74		0	0.011	0.043	0			1.9	0.038	0	0.015	0.0068	0
70+76		0	0.0069	0	0			2.0	0.11	0	0.024	0.0086	0
66+95		0.082	0.080	0	0			8.8	0.21	0.027	0	0	0
91		0.0042	0	0	0.030			0.96	0.049	0	0	0	0
56+60+89		0.050	0.0092	0	0.27			0	0.14	0	0.019	0	0.21
92+84		0	0.0092	0	0			2.6	0.063	0.0083	0.072	0	0
101		0.080	0.019	0.037	0			3.1	0.092	0	0.059	0.022	0.18
83		0	0	0	0			0.69	0.012	0	0.0049	0	0
97		0.0099	0.0047	0.0016	0.026			0.87	0.029	0.0031	0.021	0.0044	0.077
87+81		0.073	0	0	0			0	0.073	0	0.028	0	0.22
85+136		0.018	0.0042	0.0074	0.050			1.3	0.022	0.0035	0.022	0.010	0.100
110+77		0.050	0.023	0.047	0.13			4.0	0.17	0.014	0.072	0.020	0.19
82		0.0011	0.00083	0	0.0084			0.068	0.018	0.0013	0.00057	0.0010	0.019
151		0.0036	0.0023	0.0067	0.017			0.42	0.013	0.0016	0.0076	0.0017	0.046
135+144+147+124		0.0022	0.0053	0	0.021			0.51	0.019	0.0025	0.0065	0.0025	0.070
149+123+107		0.034	0.021	0.044	0.10			3.4	0.096	0	0.041	0.013	0.099
118		0	0.030	0.038	0.11			2.5	0.18	0	0.043	0.018	0
146		0	0	0.010	0			0	0	0	0.019	0.0049	0
153+132		0.060	0.033	0.050	0.055			4.2	0.15	0.010	0.074	0.018	0.23
105		0	0.020	0	0			0	0.14	0	0	0	0
141		0.011	0.0073	0.013	0			0.82	0.034	0.0023	0.015	0.0051	0
137+176+130		0	0.0028	0.013	0			0	0	0	0.020	0.0085	0
163+138		0.10	0.073	0.092	0.23			4.4	0.26	0.022	0.085	0.025	0.18
178+129		0	0	0	0			0	0.011	0	0.0023	0	0
187+182		0.023	0.035	0.017	0.21			2.7	0.045	0.0050	0.029	0.012	0.12
183		0.0092	0.0076	0	0.037			0.80	0.025	0	0.016	0.0040	0
185		0	0.0020	0	0			0.16	0.0042	0.00044	0.0021	0	0
174		0.011	0.0097	0.016	0.058			1.0	0.050	0.0028	0.016	0	0.034
177		0.016	0.010	0.0096	0.029			1.0	0.040	0	0.0099	0.0046	0
202+171+156		0	0.0012	0	0.0063			0	0	0.00029	0.026	0.0078	0
180		0.029	0.040	0.038	0.14			3.4	0.17	0.0088	0.050	0.011	0.072
199		0	0.00093	0.0015	0			0	0.0042	0	0	0	0
170+190		0.0065	0.010	0.021	0.064			0.75	0.086	0.0034	0.027	0.0066	0
198		0	0	0	0			0	0	0	0	0	0
201		0.020	0.016	0.013	0.093			2.1	0.11	0.0046	0.026	0.0094	0.028
203+196		0.015	0.018	0.018	0.097			1.8	0.12	0.0047	0.026	0.0094	0.047
195+208		0	0.0035	0.0045	0.015			0.095	0.025	0.00092	0.0079	0.0013	0.0023
194		0.0045	0.0066	0.0067	0.022			1.0	0.071	0.0030	0.015	0.0048	0.030
206		0.0023	0	0.0029	0			0	0.038	0	0.0092	0	0
Total PCBs		1.3	0.70	0.87	4.2			106	4.2	0.27	1.4	0.37	9.1
Homologue Group													
3		0.45	0.083	0.17	1.8			34	1.0	0.077	0.34	0.10	6.7
4		0.29	0.20	0.19	0.89			28	1.0	0.094	0.25	0.048	0.65
5		0.24	0.11	0.13	0.35			16	0.85	0.030	0.32	0.076	0.78
6		0.21	0.14	0.23	0.43			14	0.57	0.039	0.27	0.078	0.63
7		0.094	0.11	0.10	0.54			9.8	0.43	0.020	0.15	0.038	0.22
8		0.040	0.046	0.044	0.23			5.0	0.33	0.013	0.10	0.033	0.11
9		0.0023	0	0.0029	0			0	0.038	0	0.0092	0	0
Corresponding Laboratory Blank	6/10/98	6/10/98	6/10/98	9/1/98	9/1/98	9/1/98	9/1/98	9/28/98	9/28/98	9/28/98	9/28/98	10/8/98	10/8/98
Volume of Precip (L)	12	15	14	16	2.0	16	26	0.04	7.4	20	4.2	5.1	0.36
Surrogate Recoveries (%)													
#65		65 %	58 %	75 %	34 %			80 %	108 %	96 %	111 %	92 %	86 %
#166		75 %	79 %	74 %	39 %			84 %	99 %	94 %	107 %	93 %	96 %

B.3. Sandy Hook PCBs in Precipitation (SH-Precip) Surrogate Corrected Concentrations (pg/L)

PCB Congener	SH-Precip 7/28/98	SH-Precip 8/9/98	SH-Precip 8/21/98	SH-Precip 9/4/98	SH-Precip 9/22/98	SH-Precip 10/10/98	SH-Precip 10/28/98	SH-Precip 11/15/98	SH-Precip 12/3/98	SH-Precip 12/21/98	SH-Precip 1/8/99	SH-Precip 1/26/99	SH-Precip 2/13/99
18	0.75	0	0		0	0.19	0.094	0.065	0	0.031	0.067	0.035	
17+15	0.096	0	0		0	0	0.12	0.015	0	0	0	0.0081	
16+32	0.020	0	0.016		0.011	0	0	0.058	0	0.026	0.036	0.020	
31	0.038	0.048	0.022		0	0	0	0	0	0	0.014	0.0097	
28	0.018	0.026	0.027		0.022	0.048	0.038	0.047	0.070	0.013	0.027	0.016	
21+33+53	0	0	0		0	0.020	0	0.0072	0	0.0014	0.011	0.0046	
22	0.14	0.084	0.077		0	0	0	0	0	0	0	0	
45	0	0	0		0	0	0.12	0.039	0	0	0	0	
52+43	0	0	0.042		0.020	0.24	0.18	0	0	0	0.056	0.044	
49	0.020	0.015	0.012		0.0051	0	0	0.0018	0	0.0047	0.0048	0.0070	
47+48	0	0.012	0		0	0.017	0.013	0.0053	0	0	0	0.0024	
44	0.033	0.019	0.023		0.0094	0.018	0	0.015	0.029	0.0071	0.011	0.012	
37+42	0	0.022	0.029		0.016	0.028	0.075	0.030	0.076	0	0.014	0.020	
41+71	0	0.031	0.011		0.0034	0.0076	0.024	0.011	0	0.0050	0.020	0.012	
64	0	0	0.011		0.0025	0.0027	0	0.0027	0.022	0.0041	0.014	0.0071	
40	0	0.0012	0		0.00039	0	0	0	0	0	0	0	
74	0	0.037	0.017		0	0.0045	0	0.020	0.053	0.012	0.015	0.0066	
70+76	0	0.063	0.13		0.010	0.016	0.023	0.020	0.034	0.0090	0.020	0.010	
66+95	0	0.18	0.13		0	0	0	0.046	0	0.023	0.026	0.022	
91	0	0	0		0	0	0	0	0	0	0.020	0	
56+60+89	0	0.023	0.034		0.011	0.030	0.14	0.021	0	0	0	0	
92+84	0.046	0.038	0.041		0	0.038	0.082	0	0.21	0	0	0	
101	0.028	0.035	0.057		0.029	0.026	0.067	0.038	0.076	0.014	0.021	0.020	
83	0	0	0		0	0	0	0	0	0	0	0	
97	0.012	0.0092	0.014		0.0053	0.0054	0.020	0.013	0.010	0.0045	0.0037	0.0045	
87+81	0	0.047	0.038		0	0	0	0	0	0	0.017	0.020	
85+136	0.033	0.028	0.031		0.017	0	0	0.040	0	0.0067	0.0067	0.0081	
110+77	0.028	0.050	0.059		0.032	0.034	0.047	0.033	0.045	0.013	0.022	0.018	
82	0.0011	0.0022	0.0033		0.0020	0	0	0.0026	0	0.0025	0.0021	0.0013	
151	0.0040	0.0052	0.0051		0.0049	0.0041	0	0.0039	0	0.0030	0.0027	0.0021	
135+144+147+124	0.0012	0.0054	0.0098		0	0	0	0	0	0.0037	0.0050	0.0058	
149+123+107	0.028	0.026	0.030		0.019	0.046	0	0.027	0.099	0.013	0.016	0.017	
118	0.014	0.027	0.044		0.019	0.036	0.14	0.027	0.088	0.012	0.017	0.022	
146	0	0	0		0.0047	0.0082	0.016	0.0040	0	0	0	0	
153+132	0.032	0.053	0.061		0.033	0.049	0.026	0.046	0.057	0.010	0.013	0.015	
105	0	0	0.037		0	0	0	0	0	0	0	0	
141	0.0074	0.0083	0.011		0.0060	0.011	0.0048	0.0044	0.0068	0.0019	0.0020	0.0036	
137+176+130	0	0	0		0.0059	0.018	0	0.0095	0	0.062	0	0	
163+138	0.036	0.051	0.058		0.044	0.039	0.049	0.039	0.077	0	0.025	0.035	
178+129	0	0	0		0.0016	0.0019	0	0	0	0	0	0	
187+182	0.016	0.049	0.014		0.017	0.018	0	0.012	0.0080	0.0017	0.0024	0	
183	0.0088	0	0.025		0.012	0.0075	0.071	0.0071	0.017	0.0020	0.0028	0.0041	
185	0.0018	0.0036	0.0028		0.0012	0	0	0	0	0	0	0	
174	0.0075	0.0098	0.014		0.010	0.011	0.038	0.011	0.029	0.0031	0	0.0057	
177	0	0.016	0.014		0.0062	0.0061	0.0070	0.0045	0.015	0	0.0030	0.0038	
202+171+156	0	0	0.0020		0	0.0076	0.014	0.0086	0.025	0.0045	0.0070	0.0093	
180	0.021	0.018	0.046		0.026	0.017	0.043	0.019	0.055	0.0046	0.0057	0.011	
199	0	0	0		0	0	0	0	0	0	0.00081	0	
170+190	0	0.0071	0.0024		0.0093	0.012	0.033	0.011	0.028	0.0026	0.0056	0.0063	
198	0	0	0		0	0	0	0	0	0	0	0	
201	0.018	0.015	0.027		0.0081	0.021	0	0	0.015	0.0030	0.0049	0.0036	
203+196	0.0093	0.015	0.034		0.014	0	0.059	0.012	0.031	0.0038	0.0062	0.0085	
195+208	0.0014	0.0024	0.0027		0.0032	0	0	0.0017	0.0088	0.00044	0.00086	0.0015	
194	0	0.0080	0.018		0.0071	0.0059	0	0	0.018	0.0014	0.0020	0.0045	
206	0	0	0		0.0034	0	0	0.0059	0	0.00042	0.00066	0	
Total PCBs	1.5	1.1	1.3		0.45	1.0	1.5	0.79	1.2	0.31	0.55	0.47	
Homologue Group													
3	1.1	0.18	0.17		0.049	0.28	0.33	0.22	0.15	0.072	0.17	0.11	
4	0.053	0.38	0.41		0.062	0.33	0.50	0.18	0.14	0.064	0.17	0.12	
5	0.16	0.24	0.32		0.10	0.14	0.35	0.15	0.43	0.052	0.11	0.094	
6	0.11	0.15	0.18		0.12	0.18	0.097	0.13	0.24	0.094	0.064	0.079	
7	0.055	0.10	0.12		0.083	0.074	0.19	0.065	0.15	0.014	0.019	0.031	
8	0.028	0.041	0.084		0.032	0.034	0.073	0.022	0.097	0.013	0.022	0.027	
9	0	0	0		0.0034	0	0	0.0059	0	0.00042	0.00066	0	
Corresponding Laboratory Blank	10/8/98	10/8/98	11/11/98	11/11/98	11/11/98	3/30/99	3/30/99	3/30/99	3/30/99	3/30/99	4/27/99	4/27/99	4/27/99
Volume of Precip (L)	3.6	2.7	4.8	3.6	10	2.4	2.2	4.7	1.5	23	23	8.3	16
Surrogate Recoveries (%)													
#65	99 %	92 %	101 %		84 %	77 %	46 %	96 %	90 %	94 %	98 %	92 %	
#166	98 %	99 %	98 %		83 %	77 %	44 %	101 %	86 %	79 %	71 %	92 %	

B.3. Sandy Hook PCBs in Precipitation (SH-Precip) Surrogate Corrected Concentrations (pg/L)

PCB Congener	SH-Precip 3/3/99	SH-Precip 3/21/99	SH-Precip 4/8/99	SH-Precip 4/26/99
18	0.058			
17+15	0.013			
16+32	0.024			
31	0.031			
28	0.027			
21+33+53	0.024			
22	0			
45	0.015			
52+43	0.078			
49	0.018			
47+48	0.014			
44	0.034			
37+42	0.026			
41+71	0.012			
64	0.011			
40	0			
74	0.014			
70+76	0.031			
66+95	0.10			
91	0.018			
56+60+89	0.032			
92+84	0.045			
101	0.041			
83	0.0046			
97	0.012			
87+81	0.025			
85+136	0.018			
110+77	0.057			
82	0.0070			
151	0.0085			
135+144+147+124	0.012			
149+123+107	0.048			
118	0.056			
146	0.0085			
153+132	0.051			
105	0			
141	0.011			
137+176+130	0			
163+138	0.089			
178+129	0.0044			
187+182	0.016			
183	0.015			
185	0.0022			
174	0.018			
177	0.013			
202+171+156	0.0084			
180	0.046			
199	0.0017			
170+190	0.021			
198	0			
201	0.025			
203+196	0.028			
195+208	0.0066			
194	0.013			
206	0.013			
Total PCBs	1.3			
Homologue Group				
3	0.20			
4	0.36			
5	0.28			
6	0.23			
7	0.13			
8	0.083			
9	0.013			
Corresponding Laboratory Blank	6/21/99			
Volume of Precip (L)	14			
Surrogate Recoveries (%)				
#65	83 %			
#166	81 %			

C.1. Liberty Science Center Particulate Phase PCBs (LS-QFF)

Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	day LS-QFF 7/5/98	night LS-QFF 7/5/98	day LS-QFF 7/6/98	night LS-QFF 7/6/98	day LS-QFF 7/7/98	night LS-QFF 7/7/98	day LS-QFF 7/8/98	night LS-QFF 7/8/98	day LS-QFF 7/9/98	night LS-QFF 7/9/98	day LS-QFF 7/10/98	night LS-QFF 7/10/98	day LS-QFF 7/11/98
8+5													
18	1.3	1.5	1.3	4.0	1.3	0.85	0.59	1.3	1.9	1.7	2.1	1.4	
17+15	0.53	0.47	0.37	0.30	0.42	0.32	0.36	0.31	0.44	0.35	0.58	0.36	
16+32	1.1	1.5	0.71	0	0.81	0.62	0.74	0.65	0.66	0	0.87	0.57	
31	1.2	1.6	1.9	0.48	1.7	0.53	0	0.81	1.0	0.84	1.5	1.1	
28	0.23	1.3	0.22	0.15	0.19	0.50	0	0.12	0.047	0.30	0.93	0	
21+33+53	0.67	1.3	0.63	1.6	0.68	0.27	0.11	1.2	0.78	1.00	1.2	0.96	
22	0	2.3	0.59	0.83	0.63	0.35	1.4	0.69	0.58	0.52	0.83	0.63	
45	0	0.46	0.25	0.30	0.28	0	0.23	0.33	0.28	0.38	0.37	0	
52+43	2.4	1.3	1.7	1.7	1.9	0	0	2.8	1.1	4.2	2.3	1.9	
49	0.68	1.1	0.46	0.54	0.51	0	0.60	0.76	0.45	1.4	0.63	0.67	
47+48	0	0	0.071	0	0.11	0	0	0.061	0	0	0.42	0	
44	0.34	2.0	0.27	0.43	0.26	0.74	0.30	0.27	0.27	0.75	0.39	0.16	
37+42	0.40	0.42	0.26	0.22	0.20	0.28	0.28	0.26	0.20	0.32	0.30	0.26	
41+71	0.96	1.4	0.76	0.39	0.87	0.52	0.76	0.68	0.83	0.62	0.99	0.79	
64	0.14	0.26	0.095	0.090	0.082	0.065	0.057	0.12	0.12	0.21	0.20	0.046	
40	0	0	0	0	0	0	0	0	0	0.38	0	0	
74	1.3	0.84	0	0.58	0.95	0.96	0	0.35	0.96	0.73	0.81	0.88	
70+76	0.78	1.2	0.94	1.3	0.57	0	0.24	2.4	0.80	1.1	2.5	1.1	
66+95	2.8	6.8	2.4	2.0	2.4	2.6	2.8	2.0	2.5	3.3	4.3	1.8	
91	0	1.1	0.36	0.65	0.66	0	0	0.52	0	0.64	0.64	0	
56+60+89	0.66	1.6	0.79	1.1	0.83	1.4	0.65	0.40	0.93	0.46	0.82	1.0	
92+84	0.52	1.4	0.67	0.72	0.66	0.15	0.51	0.73	0.32	0.76	0.87	0.66	
101	1.3	2.7	1.2	1.1	0.91	0.21	0.84	1.1	1.0	1.5	1.9	0.97	
83	0.078	0	0.12	0.043	0.14	0	0	0.16	0.086	0.11	0.23	0.039	
97	0.30	0.50	0.31	0.15	0.27	0.15	0.19	0.27	0.39	0.44	0.47	0.18	
87+81	0.44	1.4	0.61	0.49	0.30	0.45	0.50	0.46	0.42	0.66	1.1	0.35	
85+136	0.24	0.71	0	0.16	0.14	0	0.36	0.16	0.20	0.31	0.92	0.20	
110+77	1.2	3.6	1.1	1.0	0.86	0.71	1.2	1.1	1.2	1.9	1.9	0.84	
82	0.11	0.46	0.087	0.11	0.088	0.23	0.24	0.10	0.11	0.20	0.12	0.095	
151	0.24	0.74	0.23	0.15	0.18	0.24	0.31	0.19	0.26	0.24	0.65	0.18	
135+144+147+124	0.38	0.60	0.39	0.28	0.35	0.095	0.047	0.43	0.41	0	0.83	0.32	
149+123+107	1.1	2.7	1.2	0.91	0.97	0.62	0.96	1.1	1.3	2.8	2.3	0.84	
118	0	3.1	0.87	0.82	0	0	1.2	0	0	0	0	0	
146	0	0.16	0.44	0	0	0	0	0	0	0	0	0	
153+132	1.1	4.0	1.1	0.94	0.84	0.59	1.2	1.1	1.2	1.5	2.7	0.91	
105	0	1.2	0.28	0.51	0.28	0.026	0.41	0.32	0.33	0.59	0.42	0	
141	0.28	1.0	0.30	0.23	0.24	0.12	0.28	0.28	0.37	0.39	0.85	0.25	
137+176+130	0.22	0.49	0	0.28	0	0.27	0.23	0.26	0	0	0.21	0.19	
163+138	1.6	6.0	1.8	1.8	1.4	1.0	1.8	1.8	1.9	2.6	4.1	1.4	
178+129	0	0.67	0	0	0.28	0	0	0.22	0.24	0.49	0.42	0	
187+182	0.46	1.3	0.55	0.41	0.35	0.25	0.37	0.45	0.54	0.48	1.2	0.50	
183	0.29	1.1	0.25	0	0.17	0	0.31	0.21	0.30	0.34	0.85	0.27	
185	0	0.24	0	0	0	0	0	0	0	0	0.15	0	
174	0.41	1.7	0.43	0.43	0.31	0.18	0.32	0.43	0.55	0.55	1.3	0.38	
177	0.28	1.2	0.31	0.39	0.26	0.24	0.31	0.31	0.41	0.50	0.84	0.31	
202+171+156	0.028	0.56	0.066	0.086	0.039	0.028	0.067	0.076	0.16	0.11	0.32	0.14	
180	0.89	3.1	1.2	1.1	0.80	0.41	0.54	1.1	1.4	1.5	3.4	0.90	
199	0.045	0.19	0	0.024	0	0	0	0.063	0.041	0	0.12	0.065	
170+190	0.53	1.6	0.54	0.64	0.42	0.31	0.40	0.56	0.70	0.69	1.5	0.49	
198	0	0	0	0	0	0	0.016	0	0	0	0	0	
201	0.42	1.6	0.72	1.0	0.45	0.35	0.42	0.62	1.2	0.83	1.7	0.57	
203+196	0.43	1.4	0.73	0.92	0.43	0.28	0.36	0.63	1.1	0.82	1.8	0.59	
195+208	0.12	0.37	0.22	0.20	0.17	0.13	0.18	0.14	0.27	0.27	0.45	0.12	
194	0.22	0	0.40	0.48	0.25	0	0	0.29	0.55	0.41	1.0	0	
206	0.12	0.56	0.35	0.30	0.21	0.12	0.16	0.20	0.60	0.32	0.58	0.13	
Total PCBs	29	75	31	32	27	17	23	31	32	40	58	26	
Total PCBs (with 8+5)													
Homologue Group													
2													
3	5.3	10	6.0	7.6	5.9	3.7	3.4	5.4	5.7	5.0	8.2	5.3	
4	10.0	17	7.8	8.5	8.7	6.3	5.6	10	8.3	13	14	8.3	
5	4.2	16	5.6	5.7	4.3	1.9	5.4	5.0	4.1	7.0	8.6	3.3	
6	5.0	16	5.4	4.6	4.0	2.9	4.9	5.3	5.4	7.6	12	4.1	
7	2.9	11	3.3	3.0	2.6	1.4	2.2	3.3	4.1	4.5	9.6	2.9	
8	1.3	4.2	2.1	2.7	1.3	0.78	1.0	1.8	3.3	2.4	5.4	1.5	
9	0.12	0.56	0.35	0.30	0.21	0.12	0.16	0.20	0.60	0.32	0.58	0.13	
Corresponding Laboratory Blank	7/24/98	7/17/98	7/24/98	7/19/98	7/24/98	7/17/98	7/17/98	7/24/98	7/19/98	7/19/98	7/24/98	7/24/98	
Total Suspended Particulate (mg/m^3)	37.9	42.0	63.5	49.7	58.5	37.6	42.9	54.6	81.4	96.9	103	377	
Surrogate Recoveries (%)													
#23													
#65	93 %	91 %	84 %	78 %	90 %	99 %	98 %	84 %	85 %	93 %	90 %	93 %	
#166	107 %	101 %	96 %	101 %	102 %	101 %	111 %	102 %	105 %	106 %	98 %	109 %	

C.1. Liberty Science Center Particulat
Surrogate Corrected Concentrations (p

PCB Congener	LS-QFF 10/7/98	LS-QFF 10/10/98	LS-QFF 10/13/98	LS-QFF 10/19/98	LS-QFF 10/28/98	LS-QFF 11/6/98	LS-QFF 11/15/98	LS-QFF 11/24/98	LS-QFF 12/3/98	LS-QFF 12/12/98	LS-QFF 12/21/98	LS-QFF 12/30/98	LS-QFF 1/8/99	LS-QFF 1/17/99
8+5														
18	0.72	0.47	0.40	0.69	5.8	1.6	0.80	1.1	4.3	1.0	1.7	0.56	0.66	0.59
17+15	0	0.26	0.21	0.37	3.1	0.78	0.48	0.59	2.9	0.63	1.3	0.78	0.70	0.35
16+32	0.25	0.25	0.29	0.94	7.0	1.1	1.1	2.5	5.4	1.1	2.1	1.6	1.4	0.23
31	0	0	0	0	8.5	0.96	0.69	2.6	6.6	1.4	2.4	1.1	1.3	0.24
28	0.35	0.49	0.39	0.98	9.2	1.4	0.74	1.7	6.8	1.4	2.9	0.79	1.4	0.27
21+33+53	0.11	0	0.18	0.36	7.8	0.42	0.39	0.89	5.8	0.94	1.9	0.95	1.1	0.38
22	0	0	0	0	7.8	0	0	0	0	0	0	0	0	0.44
45	0	0	0	0	1.2	0.43	0	0	1.2	0.87	0.45	0.53	0.60	0.24
52+43	0.56	0.25	0.43	2.4	6.4	2.2	1.7	2.4	8.1	3.2	2.8	2.0	2.3	0
49	0.11	0	0.12	0.61	3.0	0.65	0.54	1.2	2.2	0.76	1.4	0.68	0.66	0.12
47+48	0.10	0.066	0.060	0.16	2.1	0.22	0.13	0.22	1.4	0.28	0.55	0.37	0.39	0.095
44	0.19	0	0.21	1.0	0	1.5	1.2	1.8	4.6	2.3	1.8	1.4	1.6	0.24
37+42	0.20	0.17	0.24	1.1	4.1	1.3	1.1	1.9	4.2	1.5	2.0	1.6	1.5	0.33
41+71	0.074	0	0.22	0.80	3.1	0.81	0.68	1.5	2.1	0.93	1.1	0.66	0.88	0.21
64	0.10	0.18	0.16	0.51	2.4	0.53	0.44	0.85	1.8	0.65	0.70	0.56	0.53	0.13
40	0	0	0	0	1.4	0	0	1.7	0.91	0	0.41	0	0	0
74	0.26	0	0.20	1.0	2.8	0.62	0.73	1.5	1.9	0.66	1.0	0.83	0.71	0.24
70+76	0.20	0.17	0.20	0.76	4.1	1.1	0.81	1.5	3.6	1.5	2.0	1.3	1.4	0.24
66+95	0.57	0.61	1.1	2.8	9.7	4.0	2.9	4.8	8.7	4.3	5.1	3.9	4.3	1.4
91	0	0	0	0.84	1.00	0.84	0.81	1.7	1.2	0.88	0.66	0.85	0.71	0.33
56+60+89	0.29	0.19	0.40	1.5	4.4	1.7	1.4	2.4	4.3	1.7	1.9	1.3	1.9	0.42
92+84	0	0	0	1.5	3.0	1.9	2.0	3.4	3.4	2.7	0	2.0	2.3	1.0
101	0.54	0.38	0.41	1.5	3.0	2.2	1.8	2.9	3.1	2.3	2.5	1.9	2.3	0.90
83	0.15	0	0.11	0	0.38	0.34	0	0.47	0.41	0.40	0.25	0.32	0.38	0.21
97	0.12	0.066	0.088	0.37	0.96	0.76	0.55	1.1	0.86	0.75	0.70	0.59	0.71	0.22
87+81	0.47	0.28	0.52	1.1	2.2	1.7	1.2	2.3	2.5	2.0	2.1	1.6	0	0.65
85+136	0.44	0.12	0	10	1.5	0.85	0.88	1.1	1.6	1.3	1.4	1.0	0.92	0.64
110+77	0.45	0.31	0.46	1.6	4.3	3.2	2.2	2.8	5.1	3.8	4.6	2.8	3.8	1.5
82	0.13	0	0	0.39	0.55	0.40	0.24	0.45	0.59	0.42	0.46	0.25	0.39	0.13
151	0.049	0.027	0	0.25	0.33	0.57	0.29	0.45	0.43	0.42	0.46	0.36	0.33	0.16
135+144+147+124	0.19	0	0.086	0.58	0.54	0.68	0.44	0.78	0.77	0.72	0.81	0.63	0.71	0.26
149+123+107	0.45	0.37	0.27	1.5	1.9	2.0	1.4	1.9	2.8	2.2	2.6	1.8	2.4	1.1
118	0.51	0.30	0.36	1.7	3.4	2.1	1.4	1.8	4.2	2.8	4.2	1.9	3.8	1.6
146	0	0	0	0.57	0.59	0.65	0.37	0.95	0.83	0.59	0.81	0.38	1.00	0.75
153+132	0.50	0.50	0.36	2.7	3.1	3.4	2.2	3.3	4.1	3.1	4.3	2.2	4.1	2.1
105	0	0	0	0	0	0	0	0	0	2.7	0	0	0	0.49
141	0.17	0.13	0.13	0.82	0.80	0.92	0.59	1.1	0.85	0.67	0.92	0.52	0.84	0.053
137+176+130	0.22	0.12	0.14	0	0	0	0.66	0	0	0	0	0	0	0
163+138	0.88	0.67	0.73	3.9	5.7	4.9	3.1	4.6	6.8	4.8	7.7	3.2	6.9	3.3
178+129	0.52	0.25	0.34	0	0.54	0.68	0.55	1.2	0.31	0.27	0.42	0.31	0.34	0.14
187+182	0.15	0.21	0.12	0.82	0.96	1.1	0.66	1.3	1.1	0.82	1.1	0.59	1.1	0.65
183	0	0	0.23	0.87	1.0	1.1	0.66	1.3	0.98	0.72	0.94	0	0	0.49
185	0	0	0.070	0.28	0.26	0.28	0.16	0.37	0.19	0.13	0.17	0.086	0.24	0.14
174	0.20	0.18	0.13	1.00	1.1	1.2	0.76	1.4	1.5	0.88	1.4	0.62	1.0	0.77
177	0.057	0.052	0.037	0.49	0.61	0.83	0.41	0.68	0.99	0.68	1.00	0.52	0.76	0.60
202+171+156	0	0	0.23	0.68	0	0.69	0.38	0.76	0.79	0.49	0.59	0.31	0.59	0.64
180	0.41	0.43	0.33	2.4	3.0	2.8	1.7	3.3	4.4	2.2	3.9	1.4	2.0	1.7
199	0	0.011	0	0	0.10	0.082	0.066	0	0.19	0.11	0.14	0.075	0.13	0.059
170+190	0.28	0.22	0.24	1.1	1.7	1.3	0.79	1.4	2.3	0.86	2.1	0.64	0.71	0.46
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0.11	0.27	0.069	1.2	2.0	1.2	0.80	1.8	2.7	1.2	1.8	0.63	1.0	0.81
203+196	0.23	0.34	0.19	1.5	2.3	1.5	1.0	2.2	3.3	1.4	2.2	0.86	1.2	0.87
195+208	0	0.066	0	0.27	0.34	0.31	0.19	0.45	0.49	0.16	0.39	0.12	0.14	0.15
194	0.13	0.14	0.088	0.61	1.3	0.62	0.42	0.92	1.8	0.51	1.1	0.35	0.36	0.22
206	0.079	0.069	0.074	0.40	1.3	0.38	0.30	0.64	1.8	0.52	0.83	0.32	0.28	0.19
Total PCBs	12	8.6	11	57	144	63	45	80	139	69	86	50	65	29
Total PCBs (with 8+5)														
Homologue Group														
2														
3	1.6	1.6	1.7	4.5	53	7.6	5.3	11	36	7.9	14	7.3	8.0	2.8
4	2.5	1.5	3.1	12	41	14	11	20	41	17	19	14	15	3.3
5	2.8	1.5	1.9	19	20	14	11	18	23	20	17	13	15	7.6
6	2.5	1.8	1.7	10	13	13	9.1	13	17	13	18	9.1	16	7.8
7	1.6	1.3	1.5	7.0	9.1	9.2	5.6	11	12	6.5	11	4.1	6.1	4.9
8	0.46	0.82	0.58	4.3	6.0	4.4	2.9	6.1	9.2	3.9	6.2	2.3	3.4	2.7
9	0.079	0.069	0.074	0.40	1.3	0.38	0.30	0.64	1.8	0.52	0.83	0.32	0.28	0.19
Corresponding Laboratory Blank	10/19/98	10/19/98	1/4/99	2/9/99	2/9/99	1/4/99	1/4/99	2/17/99	2/17/99	2/17/99	2/17/99	3/2/99	3/2/99	3/2/99
Total Suspended Particulate (mg/m^3)	71.5	35.4	35.5	42.0	75.4	38.7	47.3	69.4	93.1	39.1	71.4	55.9	53.7	60.0
Surrogate Recoveries (%)														
#23														
#65	81 %	52 %	80 %	81 %	46 %	66 %	76 %	84 %	79 %	91 %	83 %	92 %	80 %	86 %
#166	87 %	58 %	95 %	98 %	61 %	91 %	88 %	101 %	97 %	96 %	93 %	91 %	93 %	100 %

C.1. **Liberty Science Center Particulat**

Surrogate Corrected Concentrations (p

												assumed volume		
PCB	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**	**LS-QFF**
Congener	**1/26/99**	**2/4/99**	**2/13/99**	**2/22/99**	**3/3/99**	**3/12/99**	**3/21/99**	**3/30/99**	**4/8/99**	**4/17/99**	**4/26/99**	**5/14/99**	**5/23/99**	**6/1/99**
8+5				N/A	N/A					0		3.6	N/A	0.66
18	1.9	0.55	0.31			0.69	0.13	1.4	4.5	0.18		1.7		0.38
17+15	1.5	1.1	0.42			0.69	0.24	1.6	2.6	0		1.7		0
16+32	0	1.5	1.5			1.9	0.35	3.9	6.1	0.67		3.3		0.70
31	0	0.43	0.42			1.5	0.27	3.0	7.5	0.41		2.3		0.69
28	1.1	0.87	0.29			1.3	0.12	2.3	7.7	0.22		1.8		0.61
21+33+53	0.93	1.9	0.43			0.87	0	1.6	6.3	0.30		1.8		0.51
22	0	0	0			0	0	0	0	0.51		2.4		0.52
45	0.77	0	0			0	0	0	1.5	0.013		0.26		0.043
52+43	0	0	1.2			3.1	0	0	6.8	0.65		2.2		0.68
49	0.61	0.51	0.46			0.84	0.18	0.76	0	0		0.96		0.76
47+48	0	0.32	0.12			0.46	0.28	1.1	2.3	0.11		0.82		0.21
44	2.0	0.72	0.45			1.4	0.23	1.9	5.6	0.36		1.8		0.41
37+42	0.96	1.3	0.77			1.2	0.28	2.0	4.7	0.26		1.4		0.28
41+71	0.65	0.66	0.40			0.93	0.12	1.1	3.3	0.29		1.6		0.44
64	0.36	0.43	0.35			0.63	0.098	1.1	2.5	0.11		0.72		0.17
40	0.67	0	0			0	0	0	1.4	0		0.37		0.15
74	0.75	0.72	0.84			0.86	0.27	1.1	2.9	0.13		0.89		0.15
70+76	1.5	0.70	0.76			1.4	0.24	1.6	5.2	0.34		1.8		0.46
66+95	4.4	2.5	2.3			5.3	1.0	5.6	12	0.84		3.9		1.1
91	1.0	0.72	1.0			0.67	0.29	1.2	1.2	0.11		0.39		0.045
56+60+89	1.4	1.1	0.81			2.0	0.39	2.1	6.8	0.33		2.1		0.35
92+84	2.8	2.3	1.2			2.2	0.45	3.1	3.9	0.39		1.3		0.68
101	3.0	1.5	1.3			2.3	0.47	2.9	4.1	0.49		1.5		0.62
83	0.53	0.25	0.30			0.45	0.068	0.41	0.48	0.026		0		0.030
97	0.78	0.26	0.29			0.62	0.12	1.0	1.3	0.12		0.51		0.15
87+81	1.7	0.79	1.4			1.4	0.41	2.6	2.9	0.37		1.1		0.46
85+136	0.62	0.60	0.66			1.3	0.24	1.6	2.7	0.076		0.36		0.070
110+77	4.6	1.9	1.6			3.3	0.65	5.1	6.8	0.66		2.4		0.94
82	0.33	0.30	0.14			0.26	0.092	0.78	0.90	0.093		0.41		0.14
151	0.62	0	0.22			0.60	0.099	0.84	0.81	0.16		0.32		0.20
135+144+147+124	0.57	0.59	0.37			0.66	0.13	1.2	1.1	0.25		0.41		0.22
149+123+107	3.6	3.8	0.92			2.2	0.53	3.4	3.5	0.63		1.4		0.83
118	3.2	3.8	1.0			2.1	0.63	4.3	5.3	0.55		1.6		0.90
146	0.95	0.65	0.15			0.71	0.29	0	1.3	0.25		0.42		0.35
153+132	4.2	2.6	1.4			3.0	0.68	5.2	5.2	0.92		1.9		1.5
105	1.4	1.6	0			1.1	0	3.2	2.9	0.33		1.3		0.66
141	0.73	0.62	0.29			0.73	0.17	1.3	1.2	0.25		0.52		0.35
137+176+130	0	0	0			0	0	0	0	0.054		0.12		0.075
163+138	5.6	4.4	2.0			4.1	1.00	8.3	8.0	1.3		2.6		1.8
178+129	0.29	0.75	0.29			0.32	0.099	0.72	0.45	0		0.15		0
187+182	1.3	0.88	0.37			0.94	0.24	1.4	1.7	0.041		0.37		0.25
183	0.82	0.79	0.37			0.67	0.20	1.1	1.2	0.15		0.30		0.20
185	0.16	0.22	0.043			0.13	0.016	0	0.21	0.018		0.064		0.032
174	0.97	0.92	0.39			0.97	0.17	1.4	2.0	0.25		0.56		0.37
177	0.60	0.81	0.28			0.62	0.14	1.5	1.3	0.18		0.37		0.21
202+171+156	0.56	0.96	0.34			0.37	0.12	0.97	0.97	0.16		0.40		0.11
180	2.3	1.9	0.67			2.1	0.50	3.4	4.7	0.60		1.0		0.88
199	0.098	0.42	0.041			0.10	0.043	0.27	0.13	0.068		0.033		0.054
170+190	0.67	0.79	0.35			0.84	0.24	1.3	2.1	0.31		0.42		0.43
198	0	0	0			0	0	0	0	0		0		0
201	1.0	1.1	0.25			0.73	0.28	1.6	1.7	0.39		0.44		0.54
203+196	1.2	1.3	0.42			0.89	0.52	2.3	2.2	0.41		0.46		0.59
195+208	0.11	0.24	0.071			0.16	0.047	0.35	0.41	0.058		0.073		0.11
194	0.41	0.56	0.14			0.38	0.10	0.66	1.0	0.22		0.17		0.30
206	0.44	0.35	0.11			0.26	0.096	0.51	0.67	0.25		0.087		0.23
Total PCBs	67	54	30			62	13	96	164	16		57		23
Total PCBs (with 8+5)										16		61		24
Homologue Group														
2										0		3.6		0.66
3	6.4	7.7	4.1			8.1	1.4	16	40	2.6		16		3.7
4	13	7.7	7.7			17	2.8	16	51	3.2		17		5.0
5	20	14	8.8			16	3.4	26	32	3.2		11		4.7
6	16	13	5.4			12	2.9	20	21	3.8		7.6		5.4
7	7.1	7.0	2.8			6.6	1.6	11	14	1.5		3.3		2.4
8	3.5	4.6	1.3			2.6	1.1	6.1	6.4	1.3		1.6		1.7
9	0.44	0.35	0.11			0.26	0.096	0.51	0.67	0.25		0.087		0.23
Corresponding Laboratory Blank	4/12/99	4/12/99	4/21/99	4/21/99		5/18/99	5/18/99	5/18/99	5/18/99	7/18/99	7/18/99	7/18/99	7/28/99	7/28/99
Total Suspended Particulate (mg/m³)	73.7	61.4	37.6	55.0		41.6	51.2	66.6	86.7	31.25	72.96	97.91	115.52	92.63
Surrogate Recoveries (%)														
#23														
~~#65~~	~~77 %~~	~~85 %~~	~~92 %~~			~~83 %~~	~~88 %~~	~~109 %~~	~~73 %~~	~~77 %~~		~~74 %~~		~~82 %~~
#166	99 %	95 %	90 %			94 %	90 %	101 %	85 %	86 %		92 %		94 %

C.1. Liberty Science Center Particulat

Surrogate Corrected Concentrations (p

PCB Congener	LS-QFF 6/10/99	LS-QFF 6/19/99	LS-QFF 6/28/99	LS-QFF 7/7/99	LS-QFF 7/16/99	LS-QFF 7/25/99	LS-QFF 8/3/99	LS-QFF 8/30/99	LS-QFF 9/8/99	LS-QFF 9/15/99	LS-QFF 9/27/99	LS-QFF 10/9/99	LS-QFF 10/21/99
8+5	1.0	N/A	2.2	0.88	1.4	0.59	1.0	0.50	0.41	0.23	1.2	0.56	1.5
18	0.23		0.95	0.44	0.99	0.22	0.78	0.56	0.18	0.086	0.98	0.35	0
17+15	0.67		0	0	0	0	0	0	0	0	0	0	0
16+32	0.61		1.1	0.53	1.2	0	0.42	0.41	0.12	0	0.86	0	1.0
31	0.53		1.9	0.75	2.2	0.49	1.9	1.2	0.48	0.38	2.1	0.58	1.8
28	0.41		1.7	0.49	1.5	0.42	1.0	0.66	0.25	0.20	1.1	0.44	1.0
21+33+53	0.37		1.3	0.61	1.5	0.32	0.66	0.33	0.24	0	1.1	0.35	1.0
22	0.88		1.2	0.93	1.6	0.69	0.40	0.61	0.45	0.45	0.41	0.28	0.94
45	0.025		0.20	0.024	0.12	0.044	0.017	0.23	0.047	0	0.10	0.052	0.45
52+43	1.3		1.3	0.99	1.7	0.73	1.9	3.3	0.43	0.36	1.6	0.63	2.4
49	0.80		0.93	1.1	1.5	0.85	1.4	2.6	0.56	0.52	1.2	0.87	1.9
47+48	0.31		0.51	0.29	1.5	0.28	0.70	1.3	0.13	0.11	0.60	0.22	1.6
44	0.60		0.99	0.36	1.2	0.45	0.50	1.3	0.24	0.21	0.78	0.36	1.3
37+42	0.32		0.65	0.26	1.5	0.34	0.14	0.15	0.18	0.094	0.35	0.20	0.51
41+71	0.45		0.69	0.50	1.1	0.37	0.39	0.37	0.25	0.13	0.57	0.27	0.92
64	0.16		0.31	0.15	0.42	0.17	0.079	0.079	0.11	0.075	0.16	0.15	0.41
40	0.12		0.29	0	0.31	0	0	0	0.070	0	0	0.15	2.1
74	0.32		0.39	0.20	0.57	0.17	0.46	0.70	0.11	0.12	0.55	0.21	0.54
70+76	0.72		0.81	0.52	1.1	0.40	0.83	1.3	0.25	0.26	0.99	0.39	1.1
66+95	2.2		2.0	1.5	2.2	1.2	1.5	3.0	0.88	0.75	2.2	0.95	3.2
91	0.21		0.10	0.11	0.25	0.078	0.083	0.20	0.074	0.034	0.10	0.064	0.27
56+60+89	0.69		0.79	0.42	0.81	0.42	0.22	0.74	0.25	0.23	0.30	0.34	0.94
92+84	1.5		0.93	0.70	1.1	0.63	0.43	0	0.47	0.43	0.24	0.42	2.0
101	1.6		0.75	0.68	0.92	0.67	1.0	4.3	0.40	0.38	0.88	0.48	1.9
83	0.093		0.058	0.029	0	0	0	0.14	0	0.079	0.28	0.29	0.14
97	0.41		0.19	0.15	0.23	0.14	0.19	0.73	0.10	0.12	0.29	0.13	0.55
87+81	1.1		0.65	0.51	0.62	0.48	0.42	1.0	0.46	0.44	0.49	0.37	1.5
85+136	0.34		0	0.29	0	0.11	0.16	0.28	0.11	0	0.11	0.078	0.55
110+77	2.1		1.2	1.1	1.6	0.99	0.46	0.89	0.70	0.78	0.69	0.68	2.3
82	0.34		0.17	0.17	0.33	0.16	0.067	0.43	0.11	0.12	0	0.11	0.26
151	0.40		0.19	0.31	0.37	0.33	0.45	3.1	0.13	0.15	0.19	0.19	0.69
135+144+147+124	0.61		0.25	0.30	0.35	0.30	0.42	2.5	0.15	0.20	0.34	0.22	0.82
149+123+107	2.2		0.93	1.2	1.6	1.2	1.7	9.3	0.65	0.96	1.3	0.82	2.8
118	1.9		1.1	1.0	1.6	0.79	1.8	6.2	0.68	1.2	1.8	0.79	2.2
146	0.46		0.28	0.36	0.37	0.39	0.45	2.2	0.25	0.26	0.25	0.18	0.64
153+132	3.1		1.1	1.8	2.8	2.4	2.3	12	0.98	2.0	1.5	1.7	4.3
105	1.1		0.67	0.74	0	0.89	0	0	0.44	0.96	0	0.84	1.1
141	1.1		0.25	0.46	0.51	0.45	0.67	3.7	0.21	0.34	0.38	0.28	1.0
137+176+130	0.17		0.052	0.14	0.14	0.086	0.28	0	0.11	0.25	0.10	0.074	0.20
163+138	3.9		1.8	2.5	2.8	2.3	3.1	15	1.4	3.1	2.4	1.7	5.7
178+129	0.32		0	0.15	0	0.42	0.31	2.1	0	0.23	0	0.26	0.62
187+182	0.51		0.22	0.59	0.42	0.49	0.73	6.3	0.27	0.49	0.40	0.23	1.3
183	0.38		0.17	0.38	0.36	0.33	0.51	3.8	0.17	0.37	0.28	0.21	0.95
185	0.048		0	0.058	0.076	0.059	0.070	0.56	0.022	0.054	0.041	0.033	0.11
174	0.65		0.28	0.71	0.81	0.62	0.65	4.3	0.29	0.65	0.37	0.33	1.3
177	0.36		0.14	0.42	0.52	0.46	0.35	1.7	0.18	0.44	0.22	0.22	0.93
202+171+156	0.50		0.34	0.46	0.59	0.29	0.41	2.1	0.38	0.48	0.28	0.29	0.74
180	1.4		0.75	1.6	1.8	1.5	2.4	18	0.71	1.8	1.1	0.92	3.2
199	0.10		0.023	0.066	0.11	0.10	0.12	0.70	0.027	0.066	0.071	0.046	0.17
170+190	0.66		0.41	0.80	0.87	0.64	0.60	3.1	0.35	0.83	0.38	0.40	1.3
198	0		0	0	0	0	0	0	0	0	0	0	0
201	0.56		0.46	1.2	1.3	0.56	1.4	11	0.49	1.0	0.64	0.62	1.5
203+196	0.62		0.50	1.1	1.4	0.61	1.5	11	0.54	1.1	0.72	0.63	1.8
195+208	0.22		0.16	0.16	0.41	0.15	0.24	2.7	0.088	0.21	0.073	0.078	0.38
194	0.38		0.35	0.52	0.93	0.42	0.83	5.8	0.27	0.53	0.39	0.33	0.77
206	0.26		0.35	0.41	1.2	0.39	0.67	9.4	0.44	0.32	0.29	0.28	0.66
Total PCBs	41		33	31	50	27	38	162	17	24	33	21	68
Total PCBs (with 8+5)	42		35	32	51	28	39	163	17	25	34	22	69
Homologue Group													
2	1.0		2.2	0.88	1.4	0.59	1.0	0.50	0.41	0.23	1.2	0.56	1.5
3	4.0		8.8	4.0	10	2.5	5.3	3.9	1.9	1.2	6.9	2.2	6.3
4	7.7		9.2	6.1	13	5.0	8.1	15	3.3	2.8	9.1	4.6	17
5	11		5.8	5.5	6.7	4.9	4.7	14	3.5	4.5	4.8	4.3	13
6	12		4.8	7.0	9.0	7.5	9.3	47	3.8	7.2	6.4	5.2	16
7	4.3		2.0	4.7	4.9	4.5	5.6	40	2.0	4.9	2.8	2.6	9.7
8	2.4		1.8	3.5	4.8	2.1	4.5	33	1.8	3.5	2.2	2.0	5.4
9	0.26		0.35	0.41	1.2	0.39	0.67	9.4	0.44	0.32	0.29	0.28	0.66
Corresponding Laboratory Blank		7/28/99	8/3/99	8/3/99	9/24/99	9/24/99	10/4/99	10/4/99	10/12/99	10/12/99	12/1/99	12/1/99	12/1/99
Total Suspended Particulate (mg/m³)		62.41	74.4	60.06	105.3	52.66	61.88	196.0	90.42	38.39	38.56	56.80	46.06
Surrogate Recoveries (%)													
#23													
#65	82 %		85 %	73 %	87 %	78 %	87 %	53 %	70 %	66 %	52 %	74 %	56 %
#166	97 %		101 %	88 %	95 %	94 %	67 %	41 %	91 %	83 %	62 %	78 %	73 %

C.1. Liberty Science Center Particulat
Surrogate Corrected Concentrations (p

PCB Congener	LS-QFF 11/2/99	LS-QFF 11/14/99	LS-QFF 11/26/99	LS-QFF 12/8/99	LS-QFF 12/20/99
8+5	0.19	0.60	0.071		
18	0.094	0.46	0.19	1.4	0.24
17+15	0	0	0	9.9	0.98
16+32	0.096	0.44	0.20	2.4	0.76
31	0.22	1.3	0.17	2.5	0.50
28	0.087	0.78	0.11	2.5	0.30
21+33+53	0.12	0.49	0.10	1.9	0
22	0.53	0.65	0.50	2.0	0.61
45	0	0.070	0.023	0.22	0.39
52+43	0.33	1.8	0.42	3.2	0.73
49	0.46	1.3	0.68	2.7	0.53
47+48	0.11	0.37	0.11	1.1	0.089
44	0.13	0.67	0.16	2.9	0.40
37+42	0.059	0.27	0.078	1.2	0.24
41+71	0.091	0.75	0.075	0	0.17
64	0.054	0.18	0.051	0.51	0.052
40	0	0	0	0.35	0
74	0.049	0.37	0.087	1.4	0.23
70+76	0.12	0.80	0.17	2.8	0.41
66+95	0.42	3.2	0.23	7.1	0.95
91	0	0.14	0.026	0.89	0.048
56+60+89	0.10	0.49	0.14	2.7	0.21
92+84	0.13	1.2	0.12	5.2	0.38
101	0.19	2.2	0.29	4.5	0.86
83	0.013	0.059	0.072	0.26	0
97	0.047	0.39	0.065	1.4	0.20
87+81	0.13	1.0	0.20	3.3	0.57
85+136	0.060	0.81	0.043	1.0	0.15
110+77	0.17	1.7	0.17	6.5	0.64
82	0.047	0.35	0.045	1.1	0
151	0.086	2.0	0.13	1.7	0.33
135+144+147+124	0.084	1.6	0.14	2.0	0.44
149+123+107	0.26	6.3	0.57	7.8	1.5
118	0.22	2.1	0.56	5.8	1.2
146	0.044	1.6	0.11	1.3	0
153+132	0.58	8.2	0.72	7.0	1.9
105	0	0.21	0	2.3	0.11
141	0.017	3.1	0.21	3.5	0.70
137+176+130	0.039	0.25	0.058	0.45	0.22
163+138	0.46	1.3	1.1	12	2.8
178+129	0	0	0	0.81	0.39
187+182	0.052	4.5	0.22	2.6	1.1
183	0.074	2.7	0.18	1.5	0.63
185	0.013	0.39	0.031	0.29	0.12
174	0.11	4.4	0.24	2.3	0.83
177	0.094	2.6	0.12	1.6	0.43
202+171+156	0.11	1.8	0.13	1.7	0.40
180	0.30	11	0.69	4.8	2.0
199	0.013	0.30	0.040	0.21	0.063
170+190	0.10	4.2	0.19	2.0	0.47
198	0	0	0	0.00	0.00
201	0.15	3.6	0.46	2.8	1.1
203+196	0.22	4.4	0.52	3.0	1.1
195+208	0.024	0.82	0.078	0.66	0.19
194	0.068	2.4	0.18	1.1	0.41
206	0.090	0.84	0.18	0	0.30
Total PCBs	7.1	93	11	143	29
Total PCBs (with 8+5)	7.3	94	11	143	29
Homologue Group					
2	0.19	0.60	0.071		
3	1.2	4.4	1.3	24	3.6
4	1.9	9.9	2.1	25	4.1
5	1.0	10	1.6	32	4.2
6	1.6	24	3.0	36	7.9
7	0.74	30	1.7	16	5.9
8	0.58	13	1.4	9.5	3.3
9	0.090	0.84	0.18	0	0.30
Corresponding Laboratory Blank		1/13/00	1/13/00	2/9/00	
Total Suspended Particulate (mg/m^3)		63.10	26.43	77.75	
Surrogate Recoveries (%)					
#23					
#65	126 %	59 %	40 %		
#166	140 %	78 %	36 %		

C.2. Liberty Science Center Gas Phase PCBs (LS-PUF)
Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	day LS-PUF 7/5/98	night LS-PUF 7/5/98	day LS-PUF 7/6/98	night LS-PUF 7/6/98	day LS-PUF 7/7/98	night LS-PUF 7/7/98	day LS-PUF 7/8/98	night LS-PUF 7/8/98	day LS-PUF 7/9/98	night LS-PUF 7/9/98	day LS-PUF 7/10/98	night LS-PUF 7/10/98	day LS-PUF 7/11/98	LS-PUF 10/7/98	LS-PUF 10/10/98
8+5															
18	154	126	75	270	49	60	49	89	74	273	43	43			54
17+15	92	91	68	172	33	38	32	47	43	190	32	21			29
16+32	220	153	97	280	64	67	60	107	95	307	69	50			69
31	242	178	79	300	76	67	62	133	118	323	98	56			99
28	160	137	48	162	39	36	33	63	64	192	49	27			51
21+33+53	128	101	43	161	34	30	30	67	61	185	48	25			46
22	164	86	68	142	59	42	38	93	70	214	85	48			76
45	45	53	25	49	19	21	19	31	28	72	19	20			0
52+43	182	180	104	135	60	64	54	74	80	174	52	38			62
49	92	87	36	66	28	31	24	37	32	73	25	18			34
47+48	89	84	28	62	24	28	22	39	37	75	31	28			30
44	114	104	57	91	33	36	30	50	45	121	37	28			42
37+42	75	62	16	55	12	12	16	15	22	37	12	9.6			22
41+71	74	62	33	49	27	28	18	25	21	61	22	13			34
64	40	36	18	30	12	12	10	17	15	43	14	9.8			16
40	29	18	15	19	11	9.2	7.6	9.2	8.5	25	8.9	5.9			10
74	48	44	24	31	32	24	16	34	27	41	34	18			25
70+76	93	91	49	64	57	55	29	60	50	86	62	33			29
66+95	304	320	181	181	146	141	101	147	145	261	144	84			111
91	33	34	19	21	14	12	12	18	24	34	14	12			20
56+60+89	67	44	33	34	32	28	18	31	29	56	34	17			27
92+84	60	52	76	34	28	33	22	30	25	113	31	20			26
101	92	110	62	46	32	31	29	38	44	72	34	23			32
83	5.7	7.0	6.4	3.6	4.0	3.6	2.7	4.3	3.7	15	3.9	2.7			2.3
97	17	20	14	9.5	6.6	6.2	6.1	7.9	9.2	17	6.0	4.2			6.3
87+81	37	36	32	20	16	15	13	20	21	38	16	11			15
85+136	39	36	10	17	6.8	4.9	11	5.8	18	15	8.5	4.3			8.9
110+77	90	86	71	45	34	33	30	42	45	81	35	23			30
82	4.9	4.6	6.7	3.5	4.5	3.6	2.3	4.0	2.9	6.9	3.9	2.1			2.0
151	19	19	9.7	6.7	4.1	3.5	4.0	6.4	7.2	12	8.9	4.1			5.2
135+144+147+124	21	19	11	7.6	4.6	4.0	4.4	7.1	8.2	14	9.4	3.8			4.8
149+123+107	45	42	27	18	13	12	11	15	20	35	22	11			13
118	32	37	37	17	0	0	12	0	0	41	4.8	0			9.3
146	7.1	0	3.8	2.8	3.0	1.9	1.4	0	3.2	6.3	3.4	1.1			1.7
153+132	42	39	28	18	15	13	12	17	21	35	24	11			12
105	7.8	7.7	9.4	5.1	0	0	3.2	0	6.1	12	0	0			3.2
141+179	13	11	8.3	4.8	4.1	3.6	2.8	5.0	6.4	12	7.7	4.0			3.6
137+176+130	2.0	2.7	1.6	1.3	0.86	0.74	0.87	0.97	1.5	2.1	1.4	0.85			0.42
163+138	41	0	29	18	17	14	12	17	22	34	25	11			13
178+129	13	9.8	7.5	6.7	3.8	4.1	3.3	4.6	6.7	9.1	7.9	4.3			4.0
187+182															
183	6.8	5.2	3.2	2.2	1.3	1.2	1.4	1.6	3.5	4.6	3.9	1.3			2.1
185	0.35	0.83	0.61	0.33	0.33	0.26	0.21	0.34	0.62	1.1	0.72	0.26			0.31
174	8.5	6.0	4.9	2.7	2.2	1.8	1.8	2.6	4.2	7.8	5.3	1.9			2.5
177	5.4	3.8	3.6	1.9	2.0	1.6	1.4	2.2	3.0	4.8	3.9	1.5			1.6
202+171+156	2.4	2.1	1.9	1.1	0.79	0.46	0.74	0	1.8	2.7	1.5	0.58			0.87
180	9.6	7.1	5.5	3.7	3.0	2.4	2.2	3.1	6.3	7.9	7.1	2.3			2.9
199	0.51	0.51	0.46	0.23	0.24	0.13	0.11	0.21	0.51	0.62	0.41	0.18			0.17
170+190	2.3	1.5	1.9	0.96	1.1	0.82	0.73	0.88	1.6	2.4	2.2	0.61			0.89
198	0	0	0.079	0	0.066	0.032	0	0.042	0	0.039	0.10	0.056			0
201	2.8	2.2	2.5	1.3	1.2	1.1	0.84	1.2	3.8	3.3	2.5	1.1			1.2
203+196	3.1	2.3	2.5	1.6	1.4	1.1	0.98	1.3	3.8	3.1	2.9	1.0			1.3
195+208	0.35	0.22	0.30	0.064	0.100	0.10	0.11	0.10	0.32	0.38	0.32	0.081			0.086
194	0	0.22	0	0.48	0	0	0	0	0.75	0	0	0			0.21
206	0.13	0.086	0.42	0.27	0.26	0.15	0.084	0.098	0.36	0.68	0.26	0.16			0.13
Total PCBs	3,080	2,660	1,600	2,680	1,070	1,040	876	1,430	1,400	3,450	1,220	756			1,100
Total PCBs (with 8+5)															
Homologue Group															
2	na	na	na	na	na	na	na	na	na	na	na	na			na
3	1,240	934	494	1,540	366	352	320	616	549	1,720	435	279			446
4	1,180	1,120	604	813	479	474	349	555	519	1,090	484	312			423
5	419	430	344	223	145	142	144	171	199	443	157	102			155
6	191	133	119	78	61	52	48	69	90	150	101	47			53
7	50	38	30	20	15	14	12	17	28	41	34	13			16
8	9.2	7.6	7.7	4.9	3.8	3.0	2.8	2.9	11	10	7.7	3.0			3.9
9	0.13	0.086	0.42	0.27	0.26	0.15	0.084	0.098	0.36	0.68	0.26	0.16			0.13
Corresponding Laboratory Blank	7/30/98	7/17/98	7/17/98	7/17/98	7/10/98	7/12/98	7/18/98	7/10/98	7/18/98	7/18/98	7/12/98	7/12/98		10/21/98	10/21/98
Surrogate Recoveries (%)															
#23															
#65	82 %	87 %	104 %	102 %	104 %	109 %	98 %	124 %	96 %	144 %	110 %	112 %			129 %
#166	91 %	98 %	102 %	102 %	106 %	107 %	102 %	108 %	103 %	103 %	106 %	104 %			100 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener	LS-PUF 10/13/98	LS-PUF 10/19/98	LS-PUF 10/28/98	LS-PUF 11/6/98	LS-PUF 11/15/98	LS-PUF 11/24/98	LS-PUF 12/3/98	LS-PUF 12/12/98	LS-PUF 12/21/98	LS-PUF 12/30/98	LS-PUF 1/8/99	LS-PUF 1/17/99	LS-PUF 1/26/99	LS-PUF 2/4/99	LS-PUF 2/13/99
8+5															
18	52	111	284	52	44	39	186	84	112	10	59	49	49	46	11
17+15	31	50	179	27	19	18	109	48	68	6.6	36	31	29	29	5.3
16+32	54	99	322	51	35	32	197	80	122	9.9	68	60	57	60	11
31	39	56	280	32	23	35	157	43	91	8.2	41	33	22	0	4.3
28	42	63	242	37	25	32	162	56	99	7.2	44	42	30	0	6.8
21+33+53	27	48	219	29	18	24	132	42	76	4.9	35	41	23	28	5.7
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	0.0
45	24	39	71	0	15	17	53	23	35	5.1	21	0	17	2.5	0
52+43	40	59	164	31	25	31	115	41	74	7.1	42	47	32	36	7.5
49	18	28	89	16	12	15	54	24	39	3.4	21	22	18	0	3.8
47+48	17	17	67	13	7.1	7.9	63	17	30	2.4	10	9.9	8.1	11	0.96
44	24	42	148	22	15	22	93	28	55	4.5	30	29	19	27	4.4
37+42	21	29	153	15	12	20	69	18	42	3.2	22	23	12	21	3.7
41+71	17	24	81	14	8.9	15	45	15	32	2.0	13	16	12	15	1.9
64	9.7	15	58	8.8	6.2	10	34	9.9	19	1.4	9.0	10	6.6	8.2	1.4
40	6.0	9.3	33	5.5	4.8	6.6	17	4.7	9.8	0	5.8	5.8	6.2	6.9	0.86
74	7.1	11	41	6.2	4.4	8.0	26	6.8	15	1.1	6.8	7.7	3.9	7.9	1.4
70+76	11	21	74	11	8.9	15	47	13	29	1.8	15	17	7.8	13	1.9
66+95	40	65	180	33	29	41	124	39	81	5.8	44	54	30	47	7.1
91	12	27	0	8.8	8.0	7.0	24	8.2	18	1.2	11	16	12	13	1.7
56+60+89	12	22	64	9.1	7.9	15	37	7.8	18	0.96	8.4	15	4.6	7.3	1.2
92+84	18	40	84	16	15	17	60	13	39	2.6	23	36	17	26	3.7
101	17	32	67	14	14	16	48	14	33	1.9	19	26	14	18	2.5
83	1.7	2.6	0	0	1.0	1.3	4.3	1.2	3.5	0.19	1.6	2.4	0.75	1.5	0.15
97	4.0	6.4	18	2.3	2.4	3.6	11	3.2	7.9	0.52	4.2	5.9	2.5	3.7	0.46
87+81	8.4	18	38	6.0	7.1	8.7	27	0	16	0	9.3	14	6.6	9.2	1.2
85+136	6.2	11	20	3.6	4.5	6.4	20	5.0	12	0.55	5.8	8.1	3.5	3.7	1.1
110+77	16	26	72	9.7	12	16	52	11	32	1.2	16	22	8.7	17	2.1
82	1.2	1.0	5.8	0.24	0.43	0.80	3.3	0.50	2.0	0.068	0.89	0.83	0.17	0.99	0.11
151	2.3	4.2	7.5	1.6	1.9	1.8	5.5	1.4	4.1	0.18	1.9	2.5	1.1	2.4	0.31
135+144+147+124	2.5	3.9	8.7	1.3	1.7	1.9	7.0	1.5	5.2	0.21	2.1	3.1	0.84	2.2	0.32
149+123+107	7.0	11	22	3.8	4.8	5.3	17	4.0	13	0.50	5.1	8.0	2.7	6.4	0.92
118	5.5	7.0	26	2.4	3.0	5.2	19	3.6	13	0.36	4.7	6.6	1.8	5.1	0.61
146	1.5	2.1	5.1	0.74	0.80	1.3	3.2	0.63	2.6	0	0.73	1.3	0	0	0.045
153+132	7.5	11	26	3.5	4.6	5.7	20	3.4	13	0.32	4.0	7.9	2.4	6.1	0.64
105	1.7	2.3	12	0	0	4.8	12	0	5.5	0	0	4.1	0	1.7	0
141+179	1.4	2.5	5.4	0.80	1.2	1.4	3.9	0.74	2.8	0.062	0.77	1.5	0.62	1.5	0.16
137+176+130	0.78	0	0	0.32	0.42	0	0	0	0	0	0	0	0.22	0	0
163+138	7.3	9.4	30	2.6	4.0	6.0	24	3.0	14	0.30	2.8	7.0	1.4	5.4	0.51
178+129	1.7	2.8	5.0	0.65	1.1	1.4	4.1	0.43	2.4	0.016	0.38	1.5	0.30	1.4	0.19
187+182															
183	0.91	1.4	3.3	0.38	0.63	0.74	2.6	0.30	1.4	0	0.24	0.74	0.17	0.64	0.065
185	0.19	0.34	0.79	0.091	0.14	0.16	0.48	0	0.31	0	0.065	0.19	0	0	0.019
174	0.98	1.8	3.7	0.38	0.65	0.75	3.3	0.31	1.9	0.066	0.21	0.88	0.14	0.69	0.089
177	0.75	0.99	2.3	0.20	0.37	0.47	1.9	0.17	1.1	0.099	0.18	0.57	0.10	0	0
202+171+156	0.55	0.78	1.6	0.17	0.30	0.35	1.3	0.22	0.70	0.033	0.18	0.64	0	0.29	0.060
180	1.3	2.0	5.7	0.26	0.70	0.87	4.7	0.26	2.2	0.068	0.18	0.92	0	0.62	0.10
199	0.075	0.16	0.33	0.032	0.051	0.053	0.30	0.037	0.26	0	0	0.096	0	0.10	0
170+190	0.38	0.49	1.8	0.084	0.15	0.21	1.2	0.068	0.61	0.025	0	0.34	0.082	0	0.034
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0.50	0.94	2.7	0.079	0.25	0.31	1.4	0.10	0.82	0	0	0.33	0.040	0.21	0
203+196	0.58	1.1	2.9	0.12	0.33	0.45	1.7	0.16	0.91	0	0	0.42	0.11	0.29	0
195+208	0	0.043	0.20	0	0	0	0.084	0	0.066	0	0	0.028	0	0.012	0
194	0.069	0.085	0.38	0	0.021	0.032	0.12	0	0.17	0	0	0.049	0	0.034	0
206	0.032	0.086	0.30	0	0.015	0.038	0.075	0	0.049	0	0	0.019	0	0.019	0
Total PCBs	622	1,040	3,230	492	412	517	2,110	677	1,300	97	644	693	464	501	97
Total PCBs (with 8+5)															
Homologue Group															
2	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
3	267	457	1,680	242	176	200	1,010	372	610	50	306	278	222	190	47
4	226	353	1,070	169	145	201	708	229	438	36	224	235	164	182	32
5	90	173	341	63	67	86	280	60	182	8.7	95	141	67	101	14
6	30	44	104	15	20	23	81	15	55	1.6	17	31	9.3	24	2.9
7	6.8	10	24	2.2	4.3	4.5	20	1.7	11	0.27	1.3	5.8	0.80	4.0	0.56
8	1.8	3.1	8.1	0.40	0.95	1.2	4.9	0.52	2.9	0.033	0.18	1.6	0.15	0.94	0.060
9	0.032	0.086	0.30	0	0.015	0.038	0.075	0	0.049	0	0	0.019	0	0.019	0
Corresponding Laboratory Blank	11/24/98	11/24/98	11/24/98	2/8/99	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/8/99	2/15/99	2/24/99	2/24/99	2/24/99	2/24/99
Surrogate Recoveries (%)															
#23															
#65	91 %	95 %	93 %	98 %	97 %	87 %	98 %	108 %	100 %	111 %	103 %	100 %	110 %	102 %	102 %
#166	91 %	84 %	95 %	86 %	86 %	77 %	86 %	100 %	102 %	101 %	99 %	92 %	95 %	96 %	96 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener	LS-PUF 2/22/99	LS-PUF 3/3/99	LS-PUF 3/12/99	LS-PUF 3/21/99	LS-PUF 3/30/99	LS-PUF 4/8/99	LS-PUF 4/17/99	LS-PUF 4/26/99	LS-PUF 5/14/99	LS-PUF 5/23/99	LS-PUF 6/1/99	LS-PUF 6/10/99	LS-PUF 6/19/99	LS-PUF 6/28/99	LS-PUF 7/7/99	LS-PUF 7/16/99
8+5										N/A	187	N/A	N/A	436	353	188
18	26	27	21	16	125	85	46	55	44		104			294	161	184
17+15	13	18	13	8.9	78	50	26	34	26		98			207	256	222
16+32	29	30	24	19	127	97	48	68	44		130			343	144	229
31	23	13	19	16	86	82	30	55	39		128			353	149	259
28	21	20	17	14	78	74	35	52	34		92			255	108	173
21+33+53	17	14	11	8.5	65	58	30	37	26		81			233	92	160
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		64			170	62	130
45	5.9	4.1	9.3	0	30	27	0	21	7.3		11			31	12	22
52+43	20	26	17	19	64	68	31	48	30		126			195	109	162
49	9.9	12	7.5	8.2	30	33	13	22	12		85			110	56	80
47+48	7.4	6.8	5.3	3.7	24	24	7.8	16	11		34			69	33	48
44	12	16	11	12	44	46	18	33	18		84			144	73	114
37+42	7.4	14	7.7	15	43	37	16	32	14		31			73	32	57
41+71	6.4	9.5	5.4	6.2	26	22	11	18	10		46			89	0	70
64	4.2	5.3	3.7	3.8	16	16	8.0	12	6.7		20			41	29	31
40	2.1	3.5	2.3	2.5	8.8	8.7	4.2	6.9	3.2		11			18	0	15
74	2.4	4.4	2.7	3.6	12	13	5.4	9.7	6.3		16			27	17	23
70+76	3.5	7.1	3.8	6.4	22	25	11	18	11		37			55	34	45
66+95	14	27	14	23	62	75	32	53	29		117			158	103	146
91	1.5	7.1	1.5	0	0	28	8.9	21	5.9		11			11	7.5	11
56+60+89	1.7	7.6	4.4	3.5	20	23	10	17	11		30			44	26	40
92+84	3.2	14	7.8	14	33	34	14	24	12		65			63	47	78
101	3.6	12	5.1	11	28	35	13	24	13		45			51	45	51
83	0.067	0.92	0.34	0.85	2.5	2.9	1.2	2.0	0.83		2.3			2.7	1.2	2.2
97	0.31	2.7	0.91	2.5	6.1	8.2	3.4	5.1	2.9		8.2			11	8.4	10
87+81	0	6.0	2.3	5.6	13	15	8.0	11	6.6		26			30	23	33
85+136	1.1	4.1	2.1	3.4	11	14	5.2	8.8	3.6		6.9			7.4	7.9	12
110+77	1.2	11	3.9	10	23	33	14	21	9.8		44			54	37	56
82	0.058	0.74	0.22	0.65	0.92	2.0	0.69	1.2	0.76		5.2			7.0	3.1	6.1
151	0.24	1.7	0.70	1.8	3.2	5.7	1.8	3.7	1.7		9.4			12	9.1	9.7
135+144+147+124	0.13	1.9	0.62	1.9	3.5	6.4	2.2	3.9	2.0		9.4			12	35	9.1
149+123+107	0.46	5.5	1.8	5.1	8.2	15	5.5	10	4.7		32			40	24	35
118	0.20	4.2	1.0	4.0	6.4	12	4.6	8.0	4.4		22			31	15	26
146	0	0.91	0.13	0.71	1.0	3.3	0.81	1.9	0.97		3.4			6.3	6.8	5.1
153+132	0.21	5.5	1.3	4.9	7.5	17	6.0	10	4.4		34			41	25	36
105	0.061	1.8	0	1.5	2.5	4.5	2.2	3.9	1.5		10			11	5.1	12
141+179	0	0.35	0.29	1.2	1.6	3.8	1.2	2.3	1.0		7.1			2.9	6.9	8.4
137+176+130	0.12	0.18	0	0	0	0	0	0	0		1.8			1.9	2.1	2.9
163+138	0	5.8	0.98	5.1	6.9	18	6.1	11	4.2		31			40	25	38
178+129	0.14	1.3	0.34	1.2	1.3	3.8	1.1	2.3	0.75		5.0			3.5	4.4	4.9
187+182											6.3			8.7	7.2	8.1
183	0	0.68	0.13	0.60	0.83	2.3	0.66	1.4	0.51		0			4.9	4.2	4.4
185	0	0.15	0.045	0.15	0.16	0.47	0.15	0.30	0.11		0.65			0.73	0.71	0.70
174	0	0.90	0.16	0.77	0.93	2.9	0.89	1.8	0.46		5.2			6.2	5.1	6.4
177	0	0	0	0	0.57	1.7	0.50	1.1	0.30		3.7			4.0	3.0	4.3
202+171+156	0.060	0.38	0.12	0.35	0.56	1.6	0.58	1.1	0.19		3.5			2.4	1.9	4.7
180	0.059	1.2	0.16	0.96	1.1	4.0	1.1	2.5	0.53		8.1			11	7.3	10
199	0	0.076	0	0.063	0.071	0.25	0.068	0.15	0		0.48			0.78	0.57	0.76
170+190	0.021	0.42	0.12	0	0.39	1.2	0.32	0.73	0.086		2.7			3.6	2.1	2.9
198	0	0	0	0	0	0	0	0	0						0	
201	0.034	0.41	0.059	0	0.26	1.4	0.34	0.80	0.18		3.9			6.9	3.8	6.6
203+196	0.041	0.52	0.044	0.44	0.36	1.6	0.41	0.94	0.37		3.9			7.1	3.9	6.5
195+208	0	0.041	0	0.024	0.060	0.12	0.026	0.18	0		0.34			1.2	0.63	1.0
194	0	0.059	0	0.052	0.048	0.20	0.052	0.12	0		0.81			1.5	0.65	1.0
206	0	0.015	0	0	0.016	0.11	0.018	0.052	0		0.48			1.2	0.49	0.79
Total PCBs	240	359	232	270	1,130	1,150	489	797	466		1762			3406	1876	2716
Total PCBs (with 8+5)											1949			3842	2229	2904
Homologue Group																
2	na	na	na	na	na	na	na	na	na		187			436	353	188
3	137	136	113	97	604	484	231	332	227		728			1928	1003	1415
4	90	129	87	93	359	380	152	276	155		507			836	492	660
5	11	65	25	54	126	189	75	131	62		375			435	200	448
6	1.2	22	5.9	21	32	69	24	43	19		141			170	135	164
7	0.22	5.0	1.0	4.2	6.0	18	5.1	12	3.1		29			39	34	39
8	0.13	1.5	0.22	0.93	1.4	5.3	1.5	3.2	0.74		16			23	12	23
9	0	0.015	0	0	0.016	0.11	0.018	0.052	0		0			1.2	0.49	0.79
Corresponding Laboratory Blank	3/8/99	4/14/99	4/14/99	4/14/99	4/14/99	6/15/99	36326	36326	6/15/99	7/12/99	7/12/99	7/12/99		7/27/99	7/27/99	8/16/99
Surrogate Recoveries (%)																
#23																
#65	94 %	94 %	97 %	81 %	105 %	98 %	106 %	92 %	98 %		111 %			100 %	93 %	86 %
#166	92 %	93 %	93 %	82 %	96 %	98 %	98 %	92 %	97 %		91 %			91 %	83 %	79 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener	LS-PUF 7/25/99	LS-PUF 8/3/99	LS-PUF 8/30/99	LS-PUF 9/8/99	LS-PUF 9/15/99	LS-PUF 9/27/99	LS-PUF 10/9/99	LS-PUF 10/21/99	LS-PUF 11/2/99	LS-PUF 11/14/99	LS-PUF 11/26/99	LS-PUF 12/8/99	LS-PUF 12/20/99
8+5	68	638	115	284	190	134	432	208	65	99	70		
18	72	311	103	163	228	59	207	84	36	43	46	71	45
17+15	231	392	662	1134	299	158	413	126	169	27	81	42	26
16+32	109	250	103	151	247	62	193	84	42	46	50	91	55
31	121	263	108	158	271	63	158	66	36	36	51	59	41
28	120	175	81	102	189	57	128	55	37	38	47	55	44
21+33+53	79	148	52	83	135	38	97	42	23	29	30	43	29
22	83	76	39	57	104	30	67	31	19	23	23	33	25
45	18	20	9.9	13	25	6.4	14	7.4	9.3	4.7	17	10	6.4
52+43	131	160	84	109	188	56	97	47	42	32	60	53	50
49	63	83	45	64	94	29	50	25	24	18	41	29	35
47+48	37	50	28	34	50	18	31	15	12	11	19	14	13
44	91	104	53	73	139	38	65	33	28	23	38	33	31
37+42	43	37	25	33	47	22	30	15	15	13	20	18	17
41+71	45	60	34	39	73	22	37	14	17	11	24	14	14
64	28	24	15	19	32	12	17	9.5	8.8	8.3	10	11	10
40	12	0	0	0	0	5.5	0	3.7	4.3	3.6	4.6	3.6	5.4
74	20	22	13	15	29	8.7	13	6.3	6.5	5.7	9.4	7.4	8.8
70+76	42	43	26	29	60	17	25	12	12	11	18	14	16
66+95	139	130	104	91	190	55	73	39	44	33	64	40	49
91	10	8.7	8.4	6.9	13	4.9	5.5	2.9	3.2	3.1	5.1	2.7	4.9
56+60+89	34	29	23	25	44	16	20	10	12	9.6	16	12	12
92+84	60	54	53	68	91	29	37	19	26	16	39	20	26
101	55	53	43	43	78	22	28	16	19	14	27	15	21
83	2.1	1.9	1.5	3.6	1.7	1.0	0.92	0.56	0.77	0.94	1.5	1.8	1.0
97	11	9.3	7.3	9.5	15	5.0	4.9	2.9	4.2	3.0	5.6	3.1	4.9
87+81	29	24	22	48	48	13	15	7.7	9.7	7.5	12	0	11
85+136	12	10	13	8.9	18	3.5	4.7	3.0	2.4	2.3	4.9	4.2	3.6
110+77	53	41	35	38	66	22	24	13	19	13	25	12	20
82	5.0	2.3	0.87	3.8	5.0	2.2	2.1	0.88	1.7	1.0	2.2	0.87	1.9
151	14	9.7	3.7	9.2	14	4.1	4.4	2.7	3.4	2.7	4.5	1.9	3.9
135+144+147+124	12	8.5	8.4	8.0	14	4.3	4.2	2.3	3.2	2.4	4.6	1.7	3.9
149+123+107	39	28	26	27	45	13	13	6.5	9.5	6.6	14	4.4	9.0
118	22	18	12	20	34	11	10	4.1	7.5	4.8	10	3.3	6.8
146	7.7	4.7	5.5	7.2	7.5	3.5	4.0	2.8	2.8	2.8	3.8	2.0	3.7
153+132	38	26	23	26	38	13	14	6.1	9.2	7.1	14	5.3	10
105	8.2	4.3	3.7	6.6	9.9	4.0	3.7	1.4	3.0	1.8	3.2	1.1	3.9
141+179	10	7.4	6.5	6.2	9.9	3.0	3.4	1.7	2.2	1.9	3.4	1.5	2.9
137+176+130	3.0	2.7	2.0	2.8	4.7	1.0	1.1	0.42	0.48	0.53	1.0	0.41	0.66
163+138	39	30	23	29	44	14	14	5.7	9.9	6.8	15	3.7	11
178+129	5.1	0	3.8	5.8	4.9	2.0	0	0.82	1.1	0.62	1.4	0	0.43
187+182	9.3	6.9	5.5	6.2	8.8	2.7	2.9	1.0	1.6	1.5	2.7	1.4	2.6
183	5.3	4.0	3.1	3.4	5.2	1.6	1.7	0.76	1.1	0.94	1.6	0.76	1.6
185	0.89	0.69	0.57	0.57	0.84	0.26	0.28	0.13	0.10	0.16	0.26	0.085	0.28
174	7.4	5.4	4.7	4.2	6.9	2.0	2.3	1.0	2.0	1.2	2.2	1.1	4.6
177	4.5	3.3	2.7	2.7	4.3	1.4	1.4	0.57	0.91	0.70	1.4	1.4	0.96
202+171+156	3.8	3.4	2.1	3.7	5.2	1.5	0.91	0.38	0.81	0.60	1.3	0.86	0.88
180	11	7.3	5.5	5.9	9.5	2.9	2.8	0.92	1.9	1.2	2.7	1.8	1.8
199	0.68	0.46	0.36	0.52	0.65	0.22	0.20	0.065	0.12	0.10	0.23	0.30	0
170+190	3.1	2.2	1.4	1.8	2.4	0.90	0.87	0.22	0.69	0.34	0.83	0.48	0.95
198													
201	4.6	3.0	2.0	4.0	3.8	1.3	1.4	0.39	0.96	0.56	1.2	0.77	1.8
203+196	4.7	3.1	2.0	4.2	4.1	1.4	1.4	0.42	1.0	0.59	1.2	1.1	1.2
195+208	0.78	0.52	0.49	0.75	0.68	0.27	0.28	0.084	0.23	0.11	0.23	0	0.00
194	0.83	0.51	0.22	0.73	0.71	0.25	0.20	0.05	0.23	0.074	0.20	0.12	1.2
206	0.50	0.26	0.27	0.78	0.46	0.16	0.12	0.020	0.17	0.13	0.12	0	0.36
Total PCBs	2010	2761	1939	2809	3059	963	1944	830	747	533	882	750	702
Total PCBs (with 8+5)	2078	3399	2054	3094	3249	1097	2376	1038	812	632	952		
Homologue Group													
2	68	638	115	284	190	134	432	208	65	99	70		
3	859	1651	1173	1882	1520	488	1292	503	377	255	348	414	281
4	520	601	335	425	741	228	376	186	180	140	262	241	251
5	411	362	303	354	576	178	213	112	144	103	203	64	106
6	182	132	114	129	203	62	66	32	45	35	68	21	45
7	43	28	26	29	40	13	11	5.3	8.7	6.3	12	7.1	13.3
8	18	13	8.6	16	18	5.8	5.2	1.6	4.0	2.4	5.2	3.1	5.2
9	0.50	0.26	0.27	0.78	0.46	0.16	0.12	0.020	0.17	0.13	0.12	0	0.36
Corresponding Laboratory Blank	8/16/99	9/7/99	9/29/99	10/4/99	10/4/99	10/25/99	10/25/99	11/22/99	11/22/99				
Surrogate Recoveries (%)													
#23													
#65	85 %	80 %	60 %	81 %	78 %	90 %	86 %	83 %	87 %	89 %	86 %		
#166	82 %	79 %	67 %	80 %	83 %	82 %	81 %	79 %	82 %	84 %	85 %		

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener
8+5
18
17+15
16+32
31
28
21+33+53
22
45
52+43
49
47+48
44
37+42
41+71
64
40
74
70+76
66+95
91
56+60+89
92+84
101
83
97
87+81
85+136
110+77
82
151
135+144+147+124
149+123+107
118
146
153+132
105
141+179
137+176+130
163+138
178+129
187+182
183
185
174
177
202+171+156
180
199
170+190
198
201
203+196
195+208
194
206
Total PCBs
Total PCBs (with 8+5)
Homologue Group
2
3
4
5
6
7
8
9
Corresponding Laboratory Blank
Surrogate Recoveries (%)
#23
#65
#166

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener
8+5
18
17+15
16+32
31
28
21+33+53
22
45
52+43
49
47+48
44
37+42
41+71
64
40
74
70+76
66+95
91
56+60+89
92+84
101
83
97
87+81
85+136
110+77
82
151
135+144+147+124
149+123+107
118
146
153+132
105
141+179
137+176+130
163+138
178+129
187+182
183
185
174
177
202+171+156
180
199
170+190
198
201
203+196
195+208
194
206
Total PCBs
Total PCBs (with 8+5)
Homologue Group
2
3
4
5
6
7
8
9
Corresponding Laboratory Blank
Surrogate Recoveries (%)
#23
#65
#166

C.3. Liberty Science Center PCBs in Precipitation (LS-Precip)
Surrogate Corrected Concentrations (ng/L)

PCB Congener	LS-Precip 1/8/99	LS-Precip 1/26/99	LS-Precip 2/13/99	LS-Precip 3/3/99	LS-Precip 3/21/99	LS-Precip 4/8/99	LS-Precip 4/26/99	LS-Precip 5/14/99	LS-Precip 6/1/99	LS-Precip 6/19/99	LS-Precip 7/7/99	LS-Precip 7/25/99	LS-Precip 8/12/99	LS-Precip 8/30/99	LS-Precip 9/15/99
8+5						0.49	0.57	0.52	0.79	0.28	0.17	0.44	0.050	0.071	0.094
18	0.058	0.052	0.057	0.051	0.16	0.25	0.28	0.040	0.064	0.084	0.077	0.17	0.021	0.019	0.0087
17+15	0.038	0.018	0.030	0.027	0.10	0	0.27	0	0	0	0	0	0	0	0
16+32	0.078	0.040	0.083	0.058	0.28	0.37	0.44	0.051	0.093	0.29	0.093	0.21	0.030	0.029	0.0084
31	0.079	0.026	0.065	0.042	0.28	0.49	0.84	0.060	0.11	0.26	0.13	0.30	0.033	0.033	0.012
28	0.083	0.043	0.11	0.039	0.28	0.41	0.70	0.050	0.10	0.27	0.11	0.31	0.031	0.030	0.012
21+33+53	0.058	0.019	0.073	0.031	0.21	0.41	0.58	0.049	0.075	0.22	0.086	0.25	0.024	0.025	0.0088
22	0	0	0	0	0	0.39	0.62	0.040	0.073	0.19	0.065	0.22	0.019	0.022	0.0058
45	0	0	0	0.020	0.070	0.068	0.092	0.0081	0.0092	0.023	0.012	0.031	0.0029	0.0029	0.00088
52+43	0.12	0	0.15	0.093	0.32	0.40	0.84	0.082	0.14	0.27	0.13	0.29	0.033	0.035	0.013
49	0.040	0.0096	0.028	0.021	0.13	0.24	0.63	0.044	0.20	0.33	0.18	0.33	0.032	0.026	0.010
47+48	0.023	0.0087	0.013	0.015	0.11	0.16	0.36	0.049	0.065	0.063	0.050	0.12	0.012	0.0088	0.0045
44	0.13	0.053	0.088	0.050	0.24	0.41	0.86	0.069	0.11	0.23	0.11	0.28	0.027	0.036	0.011
37+42	0.073	0.032	0.062	0.027	0.18	0.29	0.61	0.034	0.069	0.14	0.052	0.14	0.013	0.017	0.0071
41+71	0.050	0.018	0.056	0.015	0.12	0.33	0.63	0.031	0.051	0.13	0.054	0.14	0.017	0.017	0.0051
64	0.036	0.015	0.037	0.011	0.094	0.15	0.25	0.016	0.037	0.069	0.032	0.088	0.0085	0.0087	0.0034
40	0.026	0.0052	0.013	0	0.057	0.092	0.15	0.014	0.018	0.033	0.010	0.032	0.0053	0.0034	0.0012
74	0.044	0.016	0.047	0.015	0.11	0.19	0.51	0.028	0.051	0.10	0.044	0.12	0.012	0.010	0.0041
70+76	0.100	0.036	0.089	0.036	0.22	0.35	0.93	0.052	0.089	0.19	0.075	0.22	0.024	0.022	0.0087
66+95	0.28	0.10	0.26	0.097	0.54	0.78	2.2	0.25	0.22	0.48	0.19	0.55	0.059	0.058	0.021
91	0.047	0	0	0.047	0.063	0.054	0.15	0	0	0.035	0.0062	0.040	0	0.0023	0.00093
56+60+89	0.11	0.045	0.11	0.022	0.28	0.45	1.2	0.072	0.082	0.19	0.068	0.21	0.020	0.021	0.0069
92+84	0.17	0.047	0.11	0.13	0.25	0.25	0.92	0.046	0.093	0.17	0.063	0.16	0.024	0.032	0.0075
101	0.18	0.077	0.16	0.025	0.24	0.20	0.72	0.045	0.10	0.21	0.080	0.24	0.030	0.027	0.010
83	0.016	0.0081	0.017	0.0050	0.023	0.030	0.12	0.010	0.0058	0.011	0.051	0.019	0.0041	0.0025	0.0023
97	0.054	0.019	0.046	0.014	0.076	0.074	0.23	0	0.026	0.057	0.022	0.067	0.0082	0.010	0.0026
87+81	0.15	0.055	0.12	0.034	0.17	0.15	0.56	0.031	0.070	0.13	0.061	0.15	0.015	0.020	0.0067
85+136	0.080	0.037	0.083	0.021	0.13	0.023	0.18	0.0076	0.0056	0.010	0.0034	0.011	0.0010	0.0074	0.00079
110+77	0.29	0.12	0.23	0.069	0.38	0.36	1.3	0.076	0.14	0.28	0.10	0.30	0.034	0.048	0.013
82	0.028	0.012	0.019	0	0.053	0.066	0.24	0.014	0.021	0.044	0.018	0.040	0.0050	0.0069	0.0021
151	0.043	0.019	0.067	0.012	0.049	0.039	0.23	0.022	0.031	0.046	0.035	0.077	0.0096	0.010	0.0041
135+144+147+124	0.071	0.030	0.088	0.018	0.081	0.057	0.30	0.016	0.032	0.048	0.025	0.080	0.0093	0.010	0.0033
149+123+107	0.17	0.090	0.23	0.061	0.19	0.22	1.0	0.050	0.10	0.17	0.071	0.26	0.029	0.037	0.0087
118	0.22	0.12	0.21	0.063	0.26	0.26	1.2	0.052	0.12	0.21	0.096	0.28	0.032	0.036	0.011
146	0.049	0.026	0.076	0.012	0.066	0.055	0.38	0.052	0.056	0.065	0.032	0.090	0.015	0.018	0.0053
153+132	0.26	0.16	0.34	0.070	0.34	0.31	1.9	0.098	0.16	0.23	0.12	0.43	0.046	0.055	0.015
105	0.16	0	0.23	0	0.30	0.22	1.1	0.042	0.11	0.12	0	0	0	0.025	0.0072
141	0.076	0.039	0.092	0.020	0.078	0.059	0.31	0.022	0.037	0.056	0.026	0.095	0.012	0.013	0.0035
137+176+130	0	0	0	0.0091	0.034	0	0	0	0	0	0	0	0	0	0.00059
163+138	0.41	0.29	0.53	0.12	0.56	0.39	2.2	0.12	0.23	0.34	0.16	0.51	0.063	0.070	0.020
178+129	0.034	0.021	0.045	0	0.031	0.025	0.16	0.0078	0.015	0.012	0.023	0.067	0.0036	0	0
187+182	0.11	0.045	0.12	0.026	0.086	0.061	0.41	0.024	0.051	0.065	0.026	0.12	0.013	0.018	0.0045
183	0.075	0.038	0.10	0.019	0.066	0.037	0.27	0.017	0.035	0.036	0.025	0.084	0.009	0.0086	0.0029
185	0.016	0.0059	0.016	0.0054	0.016	0.0077	0.041	0	0.0059	0.0059	0.0043	0.016	0.0020	0.0021	0.00053
174	0.14	0.058	0.16	0.030	0.10	0.075	0.45	0.027	0.071	0.094	0.069	0.17	0.021	0.020	0.0069
177	0.090	0.041	0	0.022	0.070	0.046	0.34	0.017	0.047	0.15	0.10	0.096	0.011	0.012	0.0036
202+171+156	0.054	0.022	0.091	0.021	0.038	0.067	0.34	0.020	0.050	0.072	0.046	0.093	0.010	0.013	0.0040
180	0.27	0.15	0.34	0	0.41	0.19	1.3	0.069	0.17	0.22	0.11	0.36	0.043	0.049	0.0142
199	0.026	0.0056	0.016	0.0024	0.0076	0	0.033	0	0.0060	0.0045	0.0022	0.014	0.0013	0.0025	0.00073
170+190	0.12	0.071	0.17	0.032	0.13	0.086	0.55	0.028	0.058	0.095	0.037	0.14	0.016	0.021	0.0052
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0.27	0.073	0.12	0.029	0.13	0.088	0.55	0.029	0.054	0.12	0.064	0.20	0.025	0.027	0.0054
203+196	0.26	0.088	0.16	0.042	0.14	0.10	0.61	0.032	0.076	0.14	0.060	0.22	0.028	0.030	0.012
195+208	0.084	0.013	0.036	0.0085	0.018	0.024	0.25	0.0069	0.015	0.028	0.013	0.045	0.008	0.0080	0.0041
194	0.12	0.034	0.077	0.017	0.062	0.042	0.31	0.015	0.036	0.068	0.035	0.11	0.014	0.016	0.0046
206	0.12	0.035	0.035	0.0098	0.059	0.029	0.19	0.011	0.062	0.060	0.026	0.080	0.014	0.015	0.0022
Total PCBs	5.7	2.4	5.5	1.7	8.5	10	33	2.2	3.9	7.2	3.3	8.9	1.0	1.1	0.36
Total PCBs (with 8+5)						11	33	2.7	4.7	7.5	3.4	9.3	1.1	1.2	0.45
Homologue Group															
2						0.49	0.57	0.52	0.79	0.28	0.17	0.44	0.050	0.071	0.094
3	0.47	0.23	0.48	0.27	1.5	2.6	4.3	0.33	0.58	1.5	0.61	1.6	0.17	0.18	0.063
4	0.95	0.31	0.89	0.40	2.3	3.6	8.6	0.71	1.1	2.1	0.95	2.4	0.25	0.25	0.090
5	1.4	0.49	1.2	0.41	1.9	1.7	6.7	0.32	0.68	1.3	0.50	1.3	0.15	0.22	0.063
6	1.1	0.65	1.4	0.32	1.4	1.1	6.4	0.38	0.65	1.0	0.47	1.5	0.18	0.21	0.060
7	0.85	0.43	0.96	0.13	0.90	0.53	3.6	0.19	0.45	0.67	0.40	1.1	0.12	0.13	0.038
8	0.82	0.24	0.51	0.12	0.40	0.33	2.1	0.11	0.24	0.44	0.22	0.67	0.087	0.096	0.031
9	0.12	0.035	0.035	0.0098	0.059	0.029	0.19	0.011	0.062	0.060	0.026	0.080	0.014	0.015	0.0022
Corresponding Laboratory Blank	4/27/99	4/27/99	4/27/99	6/21/99	6/21/99	6/21/99	6/21/99	7/13/99	7/13/99	7/13/99	8/19/99	9/14/99	9/14/99	11/3/99	11/3/99
Volume of Precip. (L)	24	67	10	10	9.1	8.32	3.80	17.38	3.00	1.94	8.64	2.10	20.40	37.21	37.72
Surrogate Recoveries (%)															
#23								2 %	1 %	3 %	1 %				
#65	80 %	84 %	70 %	88 %	89 %	80 %	81 %	89 %	80 %	79 %	81 %	78 %	83 %	82 %	76 %
#166	85 %	79 %	55 %	91 %	87 %	91 %	89 %	91 %	88 %	82 %	87 %	86 %	87 %	86 %	78 %

C.3. Liberty Science Center PCBs in
Surrogate Corrected Concentrations (

PCB Congener	LS-Precip 10/9/99	LS-Precip 11/2/99	LS-Precip 11/26/99	LS-Precip 12/20/99
8+5	1.1	0.088	0.093	0.090
18	0.030	0.032	0.041	0.028
17+15	0.053	0.062	0.073	0
16+32	0.055	0.042	0.050	0.040
31	0.063	0.051	0.065	0.063
28	0.066	0.056	0.057	0.055
21+33+53	0.045	0.040	0.044	0.042
22	0.049	0.032	0.050	0.024
45	0.0050	0.0035	0.0045	0.0053
52+43	0.081	0.061	0.086	0.091
49	0.074	0.059	0.088	0.12
47+48	0.029	0.025	0.065	0.031
44	0.089	0.053	0.068	0.075
37+42	0.063	0.036	0.032	0.026
41+71	0.035	0.029	0.040	0.035
64	0.024	0.017	0.018	0.015
40	0.011	0.0082	0.0079	0.0072
74	0.029	0.020	0.025	0.034
70+76	0.052	0.042	0.058	0.067
66+95	0.13	0.11	0.16	0.16
91	0.0056	0.0043	0.012	0.0069
56+60+89	0.050	0.047	0.058	0.052
92+84	0.083	0.048	0.088	0.055
101	0.059	0.054	0.084	0.10
83	0.016	0.0049	0.0076	0.0089
97	0.015	0.016	0.022	0.027
87+81	0.054	0.041	0.055	0.059
85+136	0.051	0.0088	0.013	0.013
110+77	0.085	0.086	0.12	0.11
82	0.017	0.016	0.023	0.015
151	0.030	0.022	0.028	0.044
135+144+147+124	0.024	0.021	0.031	0.040
149+123+107	0.071	0.061	0.11	0.13
118	0.065	0.064	0.097	0.11
146	0.052	0.038	0.036	0.035
153+132	0.13	0.12	0.18	0.22
105	0.051	0.050	0.076	0.045
141	0.036	0.028	0.038	0.058
137+176+130	0.010	0.0058	0.020	0.014
163+138	0.15	0.15	0.23	0.27
178+129	0.026	0.016	0.042	0.035
187+182	0.050	0.037	0.051	0.086
183	0.032	0.022	0.032	0.052
185	0.0064	0.0041	0.0051	0.0081
174	0.061	0.048	0.056	0.10
177	0.032	0.027	0.031	0.050
202+171+156	0.029	0.026	0.037	0.041
180	0.084	0.10	0.13	0.21
199	0.0058	0	0.0054	0.0064
170+190	0.055	0.046	0.057	0.077
198	0	0	0	0
201	0.091	0.048	0.070	0.094
203+196	0.10	0.059	0.078	0.12
195+208	0.023	0.016	0.017	0.025
194	0.051	0.029	0.040	0.055
206	0.032	0.018	0.027	0.028
Total PCBs	2.8	2.2	3.1	3.4
Total PCBs (with 8+5)	3.9	2.3	3.2	3.5
Homologue Group				
2	1.1	0.088	0.093	0.090
3	0.42	0.35	0.41	0.28
4	0.61	0.48	0.68	0.69
5	0.50	0.39	0.60	0.55
6	0.50	0.44	0.67	0.81
7	0.35	0.30	0.41	0.61
8	0.30	0.18	0.25	0.34
9	0.032	0.018	0.027	0.028
Corresponding Laboratory Blank	11/3/99	1/4/00	1/4/00	3/6/00
Volume of Precip. (L)	5.50	13.34	15.54	7.70
Surrogate Recoveries (%)				
#23				
#65	83 %	81 %	85 %	80 %
#166	81 %	86 %	89 %	83 %

C.2. Liberty Science Center Gas Phase PCBs (LS-PUF)
Surrogate Corrected Concentrations (pg/m³)

PCB Congener	day LS-PUF 7/5/98	night LS-PUF 7/5/98	day LS-PUF 7/6/98	night LS-PUF 7/6/98	day LS-PUF 7/7/98	night LS-PUF 7/7/98	day LS-PUF 7/8/98	night LS-PUF 7/8/98	day LS-PUF 7/9/98	night LS-PUF 7/9/98	day LS-PUF 7/10/98	night LS-PUF 7/10/98	day LS-PUF 7/11/98
8+5													
18	154	126	75	270	49	60	49	89	74	273	43	43	
17+15	92	91	68	172	33	38	32	47	43	190	32	21	
16+32	220	153	97	280	64	67	60	107	95	307	69	50	
31	242	178	79	300	76	67	62	133	118	323	98	56	
28	160	137	48	162	39	36	33	63	64	192	49	27	
21+33+53	128	101	43	161	34	30	30	67	61	185	48	25	
22	164	86	68	142	59	42	38	93	70	214	85	48	
45	45	53	25	49	19	21	19	31	28	72	19	20	
52+43	182	180	104	135	60	64	54	74	80	174	52	38	
49	92	87	36	66	28	31	24	37	32	73	25	18	
47+48	89	84	28	62	24	28	22	39	37	75	31	28	
44	114	104	57	91	33	36	30	50	45	121	37	28	
37+42	75	62	16	55	12	12	16	15	22	37	12	9.6	
41+71	74	62	33	49	27	28	18	25	21	61	22	13	
64	40	36	18	30	12	12	10	17	15	43	14	9.8	
40	29	18	15	19	11	9.2	7.6	9.2	8.5	25	8.9	5.9	
74	48	44	24	31	32	24	16	34	27	41	34	18	
70+76	93	91	49	64	57	55	29	60	50	86	62	33	
66+95	304	320	181	181	146	141	101	147	145	261	144	84	
91	33	34	19	21	14	12	12	18	24	34	14	12	
56+60+89	67	44	33	34	32	28	18	31	29	56	34	17	
92+84	60	52	76	34	28	33	22	30	25	113	31	20	
101	92	110	62	46	32	31	29	38	44	72	34	23	
83	5.7	7.0	6.4	3.6	4.0	3.6	2.7	4.3	3.7	15	3.9	2.7	
97	17	20	14	9.5	6.6	6.2	6.1	7.9	9.2	17	6.0	4.2	
87+81	37	36	32	20	16	15	13	20	21	38	16	11	
85+136	39	36	10	17	6.8	4.9	11	5.8	18	15	8.5	4.3	
110+77	90	86	71	45	34	33	30	42	45	81	35	23	
82	4.9	4.6	6.7	3.5	4.5	3.6	2.3	4.0	2.9	6.9	3.9	2.1	
151	19	19	9.7	6.7	4.1	3.5	4.0	6.4	7.2	12	8.9	4.1	
135+144+147+124	21	19	11	7.6	4.6	4.0	4.4	7.1	8.2	14	9.4	3.8	
149+123+107	45	42	27	18	13	12	11	15	20	35	22	11	
118	32	37	37	17	0	0	12	0	0	41	4.8	0	
146	7.1	0	3.8	2.8	3.0	1.9	1.4	0	3.2	6.3	3.4	1.1	
153+132	42	39	28	18	15	13	12	17	21	35	24	11	
105	7.8	7.7	9.4	5.1	0	0	3.2	0	6.1	12	0	0	
141+179	13	11	8.3	4.8	4.1	3.6	2.8	5.0	6.4	12	7.7	4.0	
137+176+130	2.0	2.7	1.6	1.3	0.86	0.74	0.87	0.97	1.5	2.1	1.4	0.85	
163+138	41	0	29	18	17	14	12	17	22	34	25	11	
178+129	13	9.8	7.5	6.7	3.8	4.1	3.3	4.6	6.7	9.1	7.9	4.3	
187+182													
183	6.8	5.2	3.2	2.2	1.3	1.2	1.4	1.6	3.5	4.6	3.9	1.3	
185	0.35	0.83	0.61	0.33	0.33	0.26	0.21	0.34	0.62	1.1	0.72	0.26	
174	8.5	6.0	4.9	2.7	2.2	1.8	1.8	2.6	4.2	7.8	5.3	1.9	
177	5.4	3.8	3.6	1.9	2.0	1.6	1.4	2.2	3.0	4.8	3.9	1.5	
202+171+156	2.4	2.1	1.9	1.1	0.79	0.46	0.74	0	1.8	2.7	1.5	0.58	
180	9.6	7.1	5.5	3.7	3.0	2.4	2.2	3.1	6.3	7.9	7.1	2.3	
199	0.51	0.51	0.46	0.23	0.24	0.13	0.11	0.21	0.51	0.62	0.41	0.18	
170+190	2.3	1.5	1.9	0.96	1.1	0.82	0.73	0.88	1.6	2.4	2.2	0.61	
198	0	0	0.079	0	0.066	0.032	0	0.042	0	0.039	0.10	0.056	
201	2.8	2.2	2.5	1.3	1.2	1.1	0.84	1.2	3.8	3.3	2.5	1.1	
203+196	3.1	2.3	2.5	1.6	1.4	1.1	0.98	1.3	3.8	3.1	2.9	1.0	
195+208	0.35	0.22	0.30	0.064	0.100	0.10	0.11	0.10	0.32	0.38	0.32	0.081	
194	0	0.22	0	0.48	0	0	0	0	0.75	0	0	0	
206	0.13	0.086	0.42	0.27	0.26	0.15	0.084	0.098	0.36	0.68	0.26	0.16	
Total PCBs	3,080	2,660	1,600	2,680	1,070	1,040	876	1,430	1,400	3,450	1,220	756	
Total PCBs (with 8+5)													
Homologue Group													
2	na	na	na	na	na	na	na	na	na	na	na	na	
3	1,240	934	494	1,540	366	352	320	616	549	1,720	435	279	
4	1,180	1,120	604	813	479	474	349	555	519	1,090	484	312	
5	419	430	344	223	145	142	144	171	199	443	157	102	
6	191	133	119	78	61	52	48	69	90	150	101	47	
7	50	38	30	20	15	14	12	17	28	41	34	13	
8	9.2	7.6	7.7	4.9	3.8	3.0	2.8	2.9	11	10	7.7	3.0	
9	0.13	0.086	0.42	0.27	0.26	0.15	0.084	0.098	0.36	0.68	0.26	0.16	
Corresponding Laboratory Blank	7/30/98	7/17/98	7/17/98	7/17/98	7/10/98	7/12/98	7/18/98	7/10/98	7/18/98	7/18/98	7/12/98	7/12/98	
Surrogate Recoveries (%)													
#23													
#65	82 %	87 %	104 %	102 %	104 %	109 %	98 %	124 %	96 %	144 %	110 %	112 %	
#166	91 %	98 %	102 %	102 %	106 %	107 %	102 %	108 %	103 %	103 %	106 %	104 %	

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener	LS-PUF 10/7/98	LS-PUF 10/10/98	LS-PUF 10/13/98	LS-PUF 10/19/98	LS-PUF 10/28/98	LS-PUF 11/6/98	LS-PUF 11/15/98	LS-PUF 11/24/98	LS-PUF 12/3/98	LS-PUF 12/12/98	LS-PUF 12/21/98	LS-PUF 12/30/98	LS-PUF 1/8/99
8+5													
18		54	52	111	284	52	44	39	186	84	112	10	59
17+15		29	31	50	179	27	19	18	109	48	68	6.6	36
16+32		69	54	99	322	51	35	32	197	80	122	9.9	68
31		99	39	56	280	32	23	35	157	43	91	8.2	41
28		51	42	63	242	37	25	32	162	56	99	7.2	44
21+33+53		46	27	48	219	29	18	24	132	42	76	4.9	35
22		76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45		0	24	39	71	0	15	17	53	23	35	5.1	21
52+43		62	40	59	164	31	25	31	115	41	74	7.1	42
49		34	18	28	89	16	12	15	54	24	39	3.4	21
47+48		30	17	17	67	13	7.1	7.9	63	17	30	2.4	10
44		42	24	42	148	22	15	22	93	28	55	4.5	30
37+42		22	21	29	153	15	12	20	69	18	42	3.2	22
41+71		34	17	24	81	14	8.9	15	45	15	32	2.0	13
64		16	9.7	15	58	8.8	6.2	10	34	9.9	19	1.4	9.0
40		10	6.0	9.3	33	5.5	4.8	6.6	17	4.7	9.8	0	5.8
74		25	7.1	11	41	6.2	4.4	8.0	26	6.8	15	1.1	6.8
70+76		29	11	21	74	11	8.9	15	47	13	29	1.8	15
66+95		111	40	65	180	33	29	41	124	39	81	5.8	44
91		20	12	27	0	8.8	8.0	7.0	24	8.2	18	1.2	11
56+60+89		27	12	22	64	9.1	7.9	15	37	7.8	18	0.96	8.4
92+84		26	18	40	84	16	15	17	60	13	39	2.6	23
101		32	17	32	67	14	14	16	48	14	33	1.9	19
83		2.3	1.7	2.6	0	0	1.0	1.3	4.3	1.2	3.5	0.19	1.6
97		6.3	4.0	6.4	18	2.3	2.4	3.6	11	3.2	7.9	0.52	4.2
87+81		15	8.4	18	38	6.0	7.1	8.7	27	0	16	0	9.3
85+136		8.9	6.2	11	20	3.6	4.5	6.4	20	5.0	12	0.55	5.8
110+77		30	16	26	72	9.7	12	16	52	11	32	1.2	16
82		2.0	1.2	1.0	5.8	0.24	0.43	0.80	3.3	0.50	2.0	0.068	0.89
151		5.2	2.3	4.2	7.5	1.6	1.9	1.8	5.5	1.4	4.1	0.18	1.9
135+144+147+124		4.8	2.5	3.9	8.7	1.3	1.7	1.9	7.0	1.5	5.2	0.21	2.1
149+123+107		13	7.0	11	22	3.8	4.8	5.3	17	4.0	13	0.50	5.1
118		9.3	5.5	7.0	26	2.4	3.0	5.2	19	3.6	13	0.36	4.7
146		1.7	1.5	2.1	5.1	0.74	0.80	1.3	3.2	0.63	2.6	0	0.73
153+132		12	7.5	11	26	3.5	4.6	5.7	20	3.4	13	0.32	4.0
105		3.2	1.7	2.3	12	0	0	4.8	12	0	5.5	0	0
141+179		3.6	1.4	2.5	5.4	0.80	1.2	1.4	3.9	0.74	2.8	0.062	0.77
137+176+130		0.42	0.78	0	0	0.32	0.42	0	0	0	0	0	0
163+138		13	7.3	9.4	30	2.6	4.0	6.0	24	3.0	14	0.30	2.8
178+129		4.0	1.7	2.8	5.0	0.65	1.1	1.4	4.1	0.43	2.4	0.016	0.38
187+182													
183		2.1	0.91	1.4	3.3	0.38	0.63	0.74	2.6	0.30	1.4	0	0.24
185		0.31	0.19	0.34	0.79	0.091	0.14	0.16	0.48	0	0.31	0	0.065
174		2.5	0.98	1.8	3.7	0.38	0.65	0.75	3.3	0.31	1.9	0.066	0.21
177		1.6	0.75	0.99	2.3	0.20	0.37	0.47	1.9	0.17	1.1	0.099	0.18
202+171+156		0.87	0.55	0.78	1.6	0.17	0.30	0.35	1.3	0.22	0.70	0.033	0.18
180		2.9	1.3	2.0	5.7	0.26	0.70	0.87	4.7	0.26	2.2	0.068	0.18
199		0.17	0.075	0.16	0.33	0.032	0.051	0.053	0.30	0.037	0.26	0	0
170+190		0.89	0.38	0.49	1.8	0.084	0.15	0.21	1.2	0.068	0.61	0.025	0
198		0	0	0	0	0	0	0	0	0	0	0	0
201		1.2	0.50	0.94	2.7	0.079	0.25	0.31	1.4	0.10	0.82	0	0
203+196		1.3	0.58	1.1	2.9	0.12	0.33	0.45	1.7	0.16	0.91	0	0
195+208		0.086	0	0.043	0.20	0	0	0	0.084	0	0.066	0	0
194		0.21	0.069	0.085	0.38	0	0.021	0.032	0.12	0	0.17	0	0
206		0.13	0.032	0.086	0.30	0	0.015	0.038	0.075	0	0.049	0	0
Total PCBs		1,100	622	1,040	3,230	492	412	517	2,110	677	1,300	97	644
Total PCBs (with 8+5)													
Homologue Group													
2		na	na	na	na	na	na	na	na	na	na	na	na
3		446	267	457	1,680	242	176	200	1,010	372	610	50	306
4		423	226	353	1,070	169	145	201	708	229	438	36	224
5		155	90	173	341	63	67	86	280	60	182	8.7	95
6		53	30	44	104	15	20	23	81	15	55	1.6	17
7		16	6.8	10	24	2.2	4.3	4.5	20	1.7	11	0.27	1.3
8		3.9	1.8	3.1	8.1	0.40	0.95	1.2	4.9	0.52	2.9	0.033	0.18
9		0.13	0.032	0.086	0.30	0	0.015	0.038	0.075	0	0.049	0	0
Corresponding Laboratory Blank	10/21/98	10/21/98	11/24/98	11/24/98	11/24/98	2/8/99	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/8/99	2/15/99
Surrogate Recoveries (%)													
#23													
#65		129 %	91 %	95 %	93 %	98 %	97 %	87 %	98 %	108 %	100 %	111 %	103 %
#166		100 %	91 %	84 %	95 %	86 %	86 %	77 %	86 %	100 %	102 %	101 %	99 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener	LS-PUF 1/17/99	LS-PUF 1/26/99	LS-PUF 2/4/99	LS-PUF 2/13/99	LS-PUF 2/22/99	LS-PUF 3/3/99	LS-PUF 3/12/99	LS-PUF 3/21/99	LS-PUF 3/30/99	LS-PUF 4/8/99	LS-PUF 4/17/99	LS-PUF 4/26/99	LS-PUF 5/14/99	LS-PUF 5/23/99
8+5														N/A
18	49	49	46	11	26	27	21	16	125	85	46	55	44	
17+15	31	29	29	5.3	13	18	13	8.9	78	50	26	34	26	
16+32	60	57	60	11	29	30	24	19	127	97	48	68	44	
31	33	22	0	4.3	23	13	19	16	86	82	30	55	39	
28	42	30	0	6.8	21	20	17	14	78	74	35	52	34	
21+33+53	41	23	28	5.7	17	14	11	8.5	65	58	30	37	26	
22	0.0	0.0	6.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
45	0	17	2.5	0	5.9	4.1	9.3	0	30	27	0	21	7.3	
52+43	47	32	36	7.5	20	26	17	19	64	68	31	48	30	
49	22	18	0	3.8	9.9	12	7.5	8.2	30	33	13	22	12	
47+48	9.9	8.1	11	0.96	7.4	6.8	5.3	3.7	24	24	7.8	16	11	
44	29	19	27	4.4	12	16	11	12	44	46	18	33	18	
37+42	23	12	21	3.7	7.4	14	7.7	15	43	37	16	32	14	
41+71	16	12	15	1.9	6.4	9.5	5.4	6.2	26	22	11	18	10	
64	10	6.6	8.2	1.4	4.2	5.3	3.7	3.8	16	16	8.0	12	6.7	
40	5.8	6.2	6.9	0.86	2.1	3.5	2.3	2.5	8.8	8.7	4.2	6.9	3.2	
74	7.7	3.9	7.9	1.4	2.4	4.4	2.7	3.6	12	13	5.4	9.7	6.3	
70+76	17	7.8	13	1.9	3.5	7.1	3.8	6.4	22	25	11	18	11	
66+95	54	30	47	7.1	14	27	14	23	62	75	32	53	29	
91	16	12	13	1.7	1.5	7.1	1.5	0	0	28	8.9	21	5.9	
56+60+89	15	4.6	7.3	1.2	1.7	7.6	4.4	3.5	20	23	10	17	11	
92+84	36	17	26	3.7	3.2	14	7.8	14	33	34	14	24	12	
101	26	14	18	2.5	3.6	12	5.1	11	28	35	13	24	13	
83	2.4	0.75	1.5	0.15	0.067	0.92	0.34	0.85	2.5	2.9	1.2	2.0	0.83	
97	5.9	2.5	3.7	0.46	0.31	2.7	0.91	2.5	6.1	8.2	3.4	5.1	2.9	
87+81	14	6.6	9.2	1.2	0	6.0	2.3	5.6	13	15	8.0	11	6.6	
85+136	8.1	3.5	3.7	1.1	1.1	4.1	2.1	3.4	11	14	5.2	8.8	3.6	
110+77	22	8.7	17	2.1	1.2	11	3.9	10	23	33	14	21	9.8	
82	0.83	0.17	0.99	0.11	0.058	0.74	0.22	0.65	0.92	2.0	0.69	1.2	0.76	
151	2.5	1.1	2.4	0.31	0.24	1.7	0.70	1.8	3.2	5.7	1.8	3.7	1.7	
135+144+147+124	3.1	0.84	2.2	0.32	0.13	1.9	0.62	1.9	3.5	6.4	2.2	3.9	2.0	
149+123+107	8.0	2.7	6.4	0.92	0.46	5.5	1.8	5.1	8.2	15	5.5	10	4.7	
118	6.6	1.8	5.1	0.61	0.20	4.2	1.0	4.0	6.4	12	4.6	8.0	4.4	
146	1.3	0	0	0.045	0	0.91	0.13	0.71	1.0	3.3	0.81	1.9	0.97	
153+132	7.9	2.4	6.1	0.64	0.21	5.5	1.3	4.9	7.5	17	6.0	10	4.4	
105	4.1	0	1.7	0	0.061	1.8	0	1.5	2.5	4.5	2.2	3.9	1.5	
141+179	1.5	0.62	1.5	0.16	0	0.35	0.29	1.2	1.6	3.8	1.2	2.3	1.0	
137+176+130	0	0.22	0	0	0.12	0.18	0	0	0	0	0	0	0	
163+138	7.0	1.4	5.4	0.51	0	5.8	0.98	5.1	6.9	18	6.1	11	4.2	
178+129	1.5	0.30	1.4	0.19	0.14	1.3	0.34	1.2	1.3	3.8	1.1	2.3	0.75	
187+182														
183	0.74	0.17	0.64	0.065	0	0.68	0.13	0.60	0.83	2.3	0.66	1.4	0.51	
185	0.19	0	0	0.019	0	0.15	0.045	0.15	0.16	0.47	0.15	0.30	0.11	
174	0.88	0.14	0.69	0.089	0	0.90	0.16	0.77	0.93	2.9	0.89	1.8	0.46	
177	0.57	0.10	0	0	0	0	0	0	0.57	1.7	0.50	1.1	0.30	
202+171+156	0.64	0	0.29	0.060	0.060	0.38	0.12	0.35	0.56	1.6	0.58	1.1	0.19	
180	0.92	0	0.62	0.10	0.059	1.2	0.16	0.96	1.1	4.0	1.1	2.5	0.53	
199	0.096	0	0.10	0	0	0.076	0	0.063	0.071	0.25	0.068	0.15	0	
170+190	0.34	0.082	0	0.034	0.021	0.42	0.12	0	0.39	1.2	0.32	0.73	0.086	
198	0	0	0	0	0	0	0	0	0	0	0	0	0	
201	0.33	0.040	0.21	0	0.034	0.41	0.059	0	0.26	1.4	0.34	0.80	0.18	
203+196	0.42	0.11	0.29	0	0.041	0.52	0.044	0.44	0.36	1.6	0.41	0.94	0.37	
195+208	0.028	0	0.012	0	0	0.041	0	0.024	0.060	0.12	0.026	0.18	0	
194	0.049	0	0.034	0	0	0.059	0	0.052	0.048	0.20	0.052	0.12	0	
206	0.019	0	0.019	0	0	0.015	0	0	0.016	0.11	0.018	0.052	0	
Total PCBs	693	464	501	97	240	359	232	270	1,130	1,150	489	797	466	
Total PCBs (with 8+5)														
Homologue Group														
2	na	na	na	na	na	na	na	na	na	na	na	na	na	
3	278	222	190	47	137	136	113	97	604	484	231	332	227	
4	235	164	182	32	90	129	87	93	359	380	152	276	155	
5	141	67	101	14	11	65	25	54	126	189	75	131	62	
6	31	9.3	24	2.9	1.2	22	5.9	21	32	69	24	43	19	
7	5.8	0.80	4.0	0.56	0.22	5.0	1.0	4.2	6.0	18	5.1	12	3.1	
8	1.6	0.15	0.94	0.060	0.13	1.5	0.22	0.93	1.4	5.3	1.5	3.2	0.74	
9	0.019	0	0.019	0	0	0.015	0	0	0.016	0.11	0.018	0.052	0	
Corresponding Laboratory Blank	2/24/99	2/24/99	2/24/99	2/24/99	3/8/99	4/14/99	4/14/99	4/14/99	4/14/99	6/15/99	36326	36326	6/15/99	7/12/99
Surrogate Recoveries (%)														
#23														
#65	100 %	110 %	102 %	102 %	94 %	94 %	97 %	81 %	105 %	98 %	106 %	92 %	98 %	
#166	92 %	95 %	96 %	96 %	92 %	93 %	93 %	82 %	96 %	98 %	98 %	92 %	97 %	

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener	LS-PUF 6/1/99	LS-PUF 6/10/99	LS-PUF 6/19/99	LS-PUF 6/28/99	LS-PUF 7/7/99	LS-PUF 7/16/99	LS-PUF 7/25/99	LS-PUF 8/3/99	LS-PUF 8/30/99	LS-PUF 9/8/99	LS-PUF 9/15/99	LS-PUF 9/27/99	LS-PUF 10/9/99	LS-PUF 10/21/99
8+5	187	N/A	N/A	436	353	188	68	638	115	284	190	134	432	208
18	104			294	161	184	72	311	103	163	228	59	207	84
17+15	98			207	256	222	231	392	662	1134	299	158	413	126
16+32	130			343	144	229	109	250	103	151	247	62	193	84
31	128			353	149	259	121	263	108	158	271	63	158	66
28	92			255	108	173	120	175	81	102	189	57	128	55
21+33+53	81			233	92	160	79	148	52	83	135	38	97	42
22	64			170	62	130	83	76	39	57	104	30	67	31
45	11			31	12	22	18	20	9.9	13	25	6.4	14	7.4
52+43	126			195	109	162	131	160	84	109	188	56	97	47
49	85			110	56	80	63	83	45	64	94	29	50	25
47+48	34			69	33	48	37	50	28	34	50	18	31	15
44	84			144	73	114	91	104	53	73	139	38	65	33
37+42	31			73	32	57	43	37	25	33	47	22	30	15
41+71	46			89	0	70	45	60	34	39	73	22	37	14
64	20			41	29	31	28	24	15	19	32	12	17	9.5
40	11			18	0	15	12	0	0	0	0	5.5	0	3.7
74	16			27	17	23	20	22	13	15	29	8.7	13	6.3
70+76	37			55	34	45	42	43	26	29	60	17	25	12
66+95	117			158	103	146	139	130	104	91	190	55	73	39
91	11			11	7.5	11	10	8.7	8.4	6.9	13	4.9	5.5	2.9
56+60+89	30			44	26	40	34	29	23	25	44	16	20	10
92+84	65			63	47	78	60	54	53	68	91	29	37	19
101	45			51	45	51	55	53	43	43	78	22	28	16
83	2.3			2.7	1.2	2.2	2.1	1.9	1.5	3.6	1.7	1.0	0.92	0.56
97	8.2			11	8.4	10	11	9.3	7.3	9.5	15	5.0	4.9	2.9
87+81	26			30	23	33	29	24	22	48	48	13	15	7.7
85+136	6.9			7.4	7.9	12	12	10	13	8.9	18	3.5	4.7	3.0
110+77	44			54	37	56	53	41	35	38	66	22	24	13
82	5.2			7.0	3.1	6.1	5.0	2.3	0.87	3.8	5.0	2.2	2.1	0.88
151	9.4			12	9.1	9.7	14	9.7	3.7	9.2	14	4.1	4.4	2.7
135+144+147+124	9.4			12	35	9.1	12	8.5	8.4	8.0	14	4.3	4.2	2.3
149+123+107	32			40	24	35	39	28	26	27	45	13	13	6.5
118	22			31	15	26	22	18	12	20	34	11	10	4.1
146	3.4			6.3	6.8	5.1	7.7	4.7	5.5	7.2	7.5	3.5	4.0	2.8
153+132	34			41	25	36	38	26	23	26	38	13	14	6.1
105	10			11	5.1	12	8.2	4.3	3.7	6.6	9.9	4.0	3.7	1.4
141+179	7.1			2.9	6.9	8.4	10	7.4	6.5	6.2	9.9	3.0	3.4	1.7
137+176+130	1.8			1.9	2.1	2.9	3.0	2.7	2.0	2.8	4.7	1.0	1.1	0.42
163+138	31			40	25	38	39	30	23	29	44	14	14	5.7
178+129	5.0			3.5	4.4	4.9	5.1	0	3.8	5.8	4.9	2.0	0	0.82
187+182	6.3			8.7	7.2	8.1	9.3	6.9	5.5	6.2	8.8	2.7	2.9	1.0
183	0			4.9	4.2	4.4	5.3	4.0	3.1	3.4	5.2	1.6	1.7	0.76
185	0.65			0.73	0.71	0.70	0.89	0.69	0.57	0.57	0.84	0.26	0.28	0.13
174	5.2			6.2	5.1	6.4	7.4	5.4	4.7	4.2	6.9	2.0	2.3	1.0
177	3.7			4.0	3.0	4.3	4.5	3.3	2.7	2.7	4.3	1.4	1.4	0.57
202+171+156	3.5			2.4	1.9	4.7	3.8	3.4	2.1	3.7	5.2	1.5	0.91	0.38
180	8.1			11	7.3	10	11	7.3	5.5	5.9	9.5	2.9	2.8	0.92
199	0.48			0.78	0.57	0.76	0.68	0.46	0.36	0.52	0.65	0.22	0.20	0.065
170+190	2.7			3.6	2.1	2.9	3.1	2.2	1.4	1.8	2.4	0.90	0.87	0.22
198					0									
201	3.9			6.9	3.8	6.6	4.6	3.0	2.0	4.0	3.8	1.3	1.4	0.39
203+196	3.9			7.1	3.9	6.5	4.7	3.1	2.0	4.2	4.1	1.4	1.4	0.42
195+208	0.34			1.2	0.63	1.0	0.78	0.52	0.49	0.75	0.68	0.27	0.28	0.084
194	0.81			1.5	0.65	1.0	0.83	0.51	0.22	0.73	0.71	0.25	0.20	0.05
206	0.48			1.2	0.49	0.79	0.50	0.26	0.27	0.78	0.46	0.16	0.12	0.020
Total PCBs	1762			3406	1876	2716	2010	2761	1939	2809	3059	963	1944	830
Total PCBs (with 8+5)	1949			3842	2229	2904	2078	3399	2054	3094	3249	1097	2376	1038
Homologue Group														
2	187			436	353	188	68	638	115	284	190	134	432	208
3	728			1928	1003	1415	859	1651	1173	1882	1520	488	1292	503
4	507			836	492	660	520	601	335	425	741	228	376	186
5	375			435	200	448	411	362	303	354	576	178	213	112
6	141			170	135	164	182	132	114	129	203	62	66	32
7	29			39	34	39	43	28	26	29	40	13	11	5.3
8	16			23	12	23	18	13	8.6	16	18	5.8	5.2	1.6
9	0			1.2	0.49	0.79	0.50	0.26	0.27	0.78	0.46	0.16	0.12	0.020
Corresponding Laboratory Blank	7/12/99	7/12/99		7/27/99	7/27/99	8/16/99	8/16/99	9/7/99	9/29/99	10/4/99	10/4/99	10/25/99	10/25/99	11/22/99
Surrogate Recoveries (%)														
#23														
#65	111 %			100 %	93 %	86 %	85 %	80 %	60 %	81 %	78 %	90 %	86 %	83 %
#166	91 %			91 %	83 %	79 %	82 %	79 %	67 %	80 %	83 %	82 %	81 %	79 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

PCB Congener	LS-PUF 11/2/99	LS-PUF 11/14/99	LS-PUF 11/26/99	LS-PUF 12/8/99	LS-PUF 12/20/99
8+5	65	99	70		
18	36	43	46	71	45
17+15	169	27	81	42	26
16+32	42	46	50	91	55
31	36	36	51	59	41
28	37	38	47	55	44
21+33+53	23	29	30	43	29
22	19	23	23	33	25
45	9.3	4.7	17	10	6.4
52+43	42	32	60	53	50
49	24	18	41	29	35
47+48	12	11	19	14	13
44	28	23	38	33	31
37+42	15	13	20	18	17
41+71	17	11	24	14	14
64	8.8	8.3	10	11	10
40	4.3	3.6	4.6	3.6	5.4
74	6.5	5.7	9.4	7.4	8.8
70+76	12	11	18	14	16
66+95	44	33	64	40	49
91	3.2	3.1	5.1	2.7	4.9
56+60+89	12	9.6	16	12	12
92+84	26	16	39	20	26
101	19	14	27	15	21
83	0.77	0.94	1.5	1.8	1.0
97	4.2	3.0	5.6	3.1	4.9
87+81	9.7	7.5	12	0	11
85+136	2.4	2.3	4.9	4.2	3.6
110+77	19	13	25	12	20
82	1.7	1.0	2.2	0.87	1.9
151	3.4	2.7	4.5	1.9	3.9
135+144+147+124	3.2	2.4	4.6	1.7	3.9
149+123+107	9.5	6.6	14	4.4	9.0
118	7.5	4.8	10	3.3	6.8
146	2.8	2.8	3.8	2.0	3.7
153+132	9.2	7.1	14	5.3	10
105	3.0	1.8	3.2	1.1	3.9
141+179	2.2	1.9	3.4	1.5	2.9
137+176+130	0.48	0.53	1.0	0.41	0.66
163+138	9.9	6.8	15	3.7	11
178+129	1.1	0.62	1.4	0	0.43
187+182	1.6	1.5	2.7	1.4	2.6
183	1.1	0.94	1.6	0.76	1.6
185	0.10	0.16	0.26	0.085	0.28
174	2.0	1.2	2.2	1.1	4.6
177	0.91	0.70	1.4	1.4	0.96
202+171+156	0.81	0.60	1.3	0.86	0.88
180	1.9	1.2	2.7	1.8	1.8
199	0.12	0.10	0.23	0.30	0
170+190	0.69	0.34	0.83	0.48	0.95
198					
201	0.96	0.56	1.2	0.77	1.8
203+196	1.0	0.59	1.2	1.1	1.2
195+208	0.23	0.11	0.23	0	0.00
194	0.23	0.074	0.20	0.12	1.2
206	0.17	0.13	0.12	0	0.36
Total PCBs	747	533	882	750	702
Total PCBs (with 8+5)	812	632	952		
Homologue Group					
2	65	99	70		
3	377	255	348	414	281
4	180	140	262	241	251
5	144	103	203	64	106
6	45	35	68	21	45
7	8.7	6.3	12	7.1	13.3
8	4.0	2.4	5.2	3.1	5.2
9	0.17	0.13	0.12	0	0.36
Corresponding Laboratory Blank	11/22/99				
Surrogate Recoveries (%)					
#23					
#65	87 %	89 %	86 %		
#166	82 %	84 %	85 %		

C.3. Liberty Science Center PCBs in Precipitation (LS-Precip)
Surrogate Corrected Concentrations (ng/L)

PCB Congener	LS-Precip 1/8/99	LS-Precip 1/26/99	LS-Precip 2/13/99	LS-Precip 3/3/99	LS-Precip 3/21/99	LS-Precip 4/8/99	LS-Precip 4/26/99	LS-Precip 5/14/99	LS-Precip 6/1/99	LS-Precip 6/19/99	LS-Precip 7/7/99	LS-Precip 7/25/99	LS-Precip 8/12/99	LS-Precip 8/30/99	LS-Precip 9/15/99
8+5						0.49	0.57	0.52	0.79	0.28	0.17	0.44	0.050	0.071	0.094
18	0.058	0.052	0.057	0.051	0.16	0.25	0.28	0.040	0.064	0.084	0.077	0.17	0.021	0.019	0.0087
17+15	0.038	0.018	0.030	0.027	0.10	0	0.27	0	0	0	0	0	0	0	0
16+32	0.078	0.040	0.083	0.058	0.28	0.37	0.44	0.051	0.093	0.29	0.093	0.21	0.030	0.029	0.0084
31	0.079	0.026	0.065	0.042	0.28	0.49	0.84	0.060	0.11	0.26	0.13	0.30	0.033	0.033	0.012
28	0.083	0.043	0.11	0.039	0.28	0.41	0.70	0.050	0.10	0.27	0.11	0.31	0.031	0.030	0.012
21+33+53	0.058	0.019	0.073	0.031	0.21	0.41	0.58	0.049	0.075	0.22	0.086	0.25	0.024	0.025	0.0088
22	0	0	0	0	0	0.39	0.62	0.040	0.073	0.19	0.065	0.22	0.019	0.022	0.0058
45	0	0	0	0.020	0.070	0.068	0.092	0.0081	0.0092	0.023	0.012	0.031	0.0029	0.0029	0.00088
52+43	0.12	0	0.15	0.093	0.32	0.40	0.84	0.082	0.14	0.27	0.13	0.29	0.033	0.035	0.013
49	0.040	0.0096	0.028	0.021	0.13	0.24	0.63	0.044	0.20	0.33	0.18	0.33	0.032	0.026	0.010
47+48	0.023	0.0087	0.013	0.015	0.11	0.16	0.36	0.049	0.065	0.063	0.050	0.12	0.012	0.0088	0.0045
44	0.13	0.053	0.088	0.050	0.24	0.41	0.86	0.069	0.11	0.23	0.11	0.28	0.027	0.036	0.011
37+42	0.073	0.032	0.062	0.027	0.18	0.29	0.61	0.034	0.069	0.14	0.052	0.14	0.013	0.017	0.0071
41+71	0.050	0.018	0.056	0.015	0.12	0.33	0.63	0.031	0.051	0.13	0.054	0.14	0.017	0.017	0.0051
64	0.036	0.015	0.037	0.011	0.094	0.15	0.25	0.016	0.037	0.069	0.032	0.088	0.0085	0.0087	0.0034
40	0.026	0.0052	0.013	0	0.057	0.092	0.15	0.014	0.018	0.033	0.010	0.032	0.0053	0.0034	0.0012
74	0.044	0.016	0.047	0.015	0.11	0.19	0.51	0.028	0.051	0.10	0.044	0.12	0.012	0.010	0.0041
70+76	0.100	0.036	0.089	0.036	0.22	0.35	0.93	0.052	0.089	0.19	0.075	0.22	0.024	0.022	0.0087
66+95	0.28	0.10	0.26	0.097	0.54	0.78	2.2	0.25	0.22	0.48	0.19	0.55	0.059	0.058	0.021
91	0.047	0	0	0.047	0.063	0.054	0.15	0	0	0.035	0.0062	0.040	0	0.0023	0.00093
56+60+89	0.11	0.045	0.11	0.022	0.28	0.45	1.2	0.072	0.082	0.19	0.068	0.21	0.020	0.021	0.0069
92+84	0.17	0.047	0.11	0.13	0.25	0.25	0.92	0.046	0.093	0.17	0.063	0.16	0.024	0.032	0.0075
101	0.18	0.077	0.16	0.025	0.24	0.20	0.72	0.045	0.10	0.21	0.080	0.24	0.030	0.027	0.010
83	0.016	0.0081	0.017	0.0050	0.023	0.030	0.12	0.010	0.0058	0.011	0.051	0.019	0.0041	0.0025	0.0023
97	0.054	0.019	0.046	0.014	0.076	0.074	0.23	0	0.026	0.057	0.022	0.067	0.0082	0.010	0.0026
87+81	0.15	0.055	0.12	0.034	0.17	0.15	0.56	0.031	0.070	0.13	0.061	0.15	0.015	0.020	0.0067
85+136	0.080	0.037	0.083	0.021	0.13	0.023	0.18	0.0076	0.0056	0.010	0.0034	0.011	0.0010	0.0074	0.00079
110+77	0.29	0.12	0.23	0.069	0.38	0.36	1.3	0.076	0.14	0.28	0.10	0.30	0.034	0.048	0.013
82	0.028	0.012	0.019	0	0.053	0.066	0.24	0.014	0.021	0.044	0.018	0.040	0.0050	0.0069	0.0021
151	0.043	0.019	0.067	0.012	0.049	0.039	0.23	0.022	0.031	0.046	0.035	0.077	0.0096	0.010	0.0041
135+144+147+124	0.071	0.030	0.088	0.018	0.081	0.057	0.30	0.016	0.032	0.048	0.025	0.080	0.0093	0.010	0.0033
149+123+107	0.17	0.090	0.23	0.061	0.19	0.22	1.0	0.050	0.10	0.17	0.071	0.26	0.029	0.037	0.0087
118	0.22	0.12	0.21	0.063	0.26	0.26	1.2	0.052	0.12	0.21	0.096	0.28	0.032	0.036	0.011
146	0.049	0.026	0.076	0.012	0.066	0.055	0.38	0.052	0.056	0.065	0.032	0.090	0.015	0.018	0.0053
153+132	0.26	0.16	0.34	0.070	0.34	0.31	1.9	0.098	0.16	0.23	0.12	0.43	0.046	0.055	0.015
105	0.16	0	0.23	0	0.30	0.22	1.1	0.042	0.11	0.12	0	0	0	0.025	0.0072
141	0.076	0.039	0.092	0.020	0.078	0.059	0.31	0.022	0.037	0.056	0.026	0.095	0.012	0.013	0.0035
137+176+130	0	0	0	0.0091	0.034	0	0	0	0	0	0	0	0	0	0.00059
163+138	0.41	0.29	0.53	0.12	0.56	0.39	2.2	0.12	0.23	0.34	0.16	0.51	0.063	0.070	0.020
178+129	0.034	0.021	0.045	0	0.031	0.025	0.16	0.0078	0.015	0.012	0.023	0.067	0.0036	0	0
187+182	0.11	0.045	0.12	0.026	0.086	0.061	0.41	0.024	0.051	0.065	0.026	0.12	0.013	0.018	0.0045
183	0.075	0.038	0.10	0.019	0.066	0.037	0.27	0.017	0.035	0.036	0.025	0.084	0.009	0.0086	0.0029
185	0.016	0.0059	0.016	0.0054	0.016	0.0077	0.041	0	0.0059	0.0059	0.0043	0.016	0.0020	0.0021	0.00053
174	0.14	0.058	0.16	0.030	0.10	0.075	0.45	0.027	0.071	0.094	0.069	0.17	0.021	0.020	0.0069
177	0.090	0.041	0	0.022	0.070	0.046	0.34	0.017	0.047	0.15	0.10	0.096	0.011	0.012	0.0036
202+171+156	0.054	0.022	0.091	0.021	0.038	0.067	0.34	0.020	0.050	0.072	0.046	0.093	0.010	0.013	0.0040
180	0.27	0.15	0.34	0	0.41	0.19	1.3	0.069	0.17	0.22	0.11	0.36	0.043	0.049	0.0142
199	0.026	0.0056	0.016	0.0024	0.0076	0	0.033	0	0.0060	0.0045	0.0022	0.014	0.0013	0.0025	0.00073
170+190	0.12	0.071	0.17	0.032	0.13	0.086	0.55	0.028	0.058	0.095	0.037	0.14	0.016	0.021	0.0052
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0.27	0.073	0.12	0.029	0.13	0.088	0.55	0.029	0.054	0.12	0.064	0.20	0.025	0.027	0.0054
203+196	0.26	0.088	0.16	0.042	0.14	0.10	0.61	0.032	0.076	0.14	0.060	0.22	0.028	0.030	0.012
195+208	0.084	0.013	0.036	0.0085	0.018	0.024	0.25	0.0069	0.015	0.028	0.013	0.045	0.008	0.0080	0.0041
194	0.12	0.034	0.077	0.017	0.062	0.042	0.31	0.015	0.036	0.068	0.035	0.11	0.014	0.016	0.0046
206	0.12	0.035	0.035	0.0098	0.059	0.029	0.19	0.011	0.062	0.060	0.026	0.080	0.014	0.015	0.0022
Total PCBs	5.7	2.4	5.5	1.7	8.5	10	33	2.2	3.9	7.2	3.3	8.9	1.0	1.1	0.36
Total PCBs (with 8+5)						11	33	2.7	4.7	7.5	3.4	9.3	1.1	1.2	0.45
Homologue Group															
2						0.49	0.57	0.52	0.79	0.28	0.17	0.44	0.050	0.071	0.094
3	0.47	0.23	0.48	0.27	1.5	2.6	4.3	0.33	0.58	1.5	0.61	1.6	0.17	0.18	0.063
4	0.95	0.31	0.89	0.40	2.3	3.6	8.6	0.71	1.1	2.1	0.95	2.4	0.25	0.25	0.090
5	1.4	0.49	1.2	0.41	1.9	1.7	6.7	0.32	0.68	1.3	0.50	1.3	0.15	0.22	0.063
6	1.1	0.65	1.4	0.32	1.4	1.1	6.4	0.38	0.65	1.0	0.47	1.5	0.18	0.21	0.060
7	0.85	0.43	0.96	0.13	0.90	0.53	3.6	0.19	0.45	0.67	0.40	1.1	0.12	0.13	0.038
8	0.82	0.24	0.51	0.12	0.40	0.33	2.1	0.11	0.24	0.44	0.22	0.67	0.087	0.096	0.031
9	0.12	0.035	0.035	0.0098	0.059	0.029	0.19	0.011	0.062	0.060	0.026	0.080	0.014	0.015	0.0022
Corresponding Laboratory Blank	4/27/99	4/27/99	4/27/99	6/21/99	6/21/99	6/21/99	6/21/99	7/13/99	7/13/99	7/13/99	8/19/99	9/14/99	9/14/99	11/3/99	11/3/99
Volume of Precip. (L)	24	67	10	10	9.1	8.32	3.80	17.38	3.00	1.94	8.64	2.10	20.40	37.21	37.72
Surrogate Recoveries (%)															
#23								2 %	1 %	3 %	1 %				
#65	80 %	84 %	70 %	88 %	89 %	80 %	81 %	89 %	80 %	79 %	81 %	78 %	83 %	82 %	76 %
#166	85 %	79 %	55 %	91 %	87 %	91 %	89 %	91 %	88 %	82 %	87 %	86 %	87 %	86 %	78 %

C.3. Liberty Science Center PCBs in
Surrogate Corrected Concentrations (

PCB Congener	LS-Precip 10/9/99	LS-Precip 11/2/99	LS-Precip 11/26/99	LS-Precip 12/20/99
8+5	1.1	0.088	0.093	0.090
18	0.030	0.032	0.041	0.028
17+15	0.053	0.062	0.073	0
16+32	0.055	0.042	0.050	0.040
31	0.063	0.051	0.065	0.063
28	0.066	0.056	0.057	0.055
21+33+53	0.045	0.040	0.044	0.042
22	0.049	0.032	0.050	0.024
45	0.0050	0.0035	0.0045	0.0053
52+43	0.081	0.061	0.086	0.091
49	0.074	0.059	0.088	0.12
47+48	0.029	0.025	0.065	0.031
44	0.089	0.053	0.068	0.075
37+42	0.063	0.036	0.032	0.026
41+71	0.035	0.029	0.040	0.035
64	0.024	0.017	0.018	0.015
40	0.011	0.0082	0.0079	0.0072
74	0.029	0.020	0.025	0.034
70+76	0.052	0.042	0.058	0.067
66+95	0.13	0.11	0.16	0.16
91	0.0056	0.0043	0.012	0.0069
56+60+89	0.050	0.047	0.058	0.052
92+84	0.083	0.048	0.088	0.055
101	0.059	0.054	0.084	0.10
83	0.016	0.0049	0.0076	0.0089
97	0.015	0.016	0.022	0.027
87+81	0.054	0.041	0.055	0.059
85+136	0.051	0.0088	0.013	0.013
110+77	0.085	0.086	0.12	0.11
82	0.017	0.016	0.023	0.015
151	0.030	0.022	0.028	0.044
135+144+147+124	0.024	0.021	0.031	0.040
149+123+107	0.071	0.061	0.11	0.13
118	0.065	0.064	0.097	0.11
146	0.052	0.038	0.036	0.035
153+132	0.13	0.12	0.18	0.22
105	0.051	0.050	0.076	0.045
141	0.036	0.028	0.038	0.058
137+176+130	0.010	0.0058	0.020	0.014
163+138	0.15	0.15	0.23	0.27
178+129	0.026	0.016	0.042	0.035
187+182	0.050	0.037	0.051	0.086
183	0.032	0.022	0.032	0.052
185	0.0064	0.0041	0.0051	0.0081
174	0.061	0.048	0.056	0.10
177	0.032	0.027	0.031	0.050
202+171+156	0.029	0.026	0.037	0.041
180	0.084	0.10	0.13	0.21
199	0.0058	0	0.0054	0.0064
170+190	0.055	0.046	0.057	0.077
198	0	0	0	0
201	0.091	0.048	0.070	0.094
203+196	0.10	0.059	0.078	0.12
195+208	0.023	0.016	0.017	0.025
194	0.051	0.029	0.040	0.055
206	0.032	0.018	0.027	0.028
Total PCBs	2.8	2.2	3.1	3.4
Total PCBs (with 8+5)	3.9	2.3	3.2	3.5
Homologue Group				
2	1.1	0.088	0.093	0.090
3	0.42	0.35	0.41	0.28
4	0.61	0.48	0.68	0.69
5	0.50	0.39	0.60	0.55
6	0.50	0.44	0.67	0.81
7	0.35	0.30	0.41	0.61
8	0.30	0.18	0.25	0.34
9	0.032	0.018	0.027	0.028
Corresponding Laboratory Blank	11/3/99	1/4/00	1/4/00	3/6/00
Volume of Precip. (L)	5.50	13.34	15.54	7.70
Surrogate Recoveries (%)				
#23				
#65	83 %	81 %	85 %	80 %
#166	81 %	86 %	89 %	83 %

D.1. Lower Hudson River Estuary Particulate Phase PCBs (Raritan Bay: RB-QFF)(New York Harbor: NH-QFF)

Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	day RB-QFF 7/5/98	day RB-QFF 7/6/98	day RB-QFF 7/7/98	morning NH-QFF 7/10/98	afternoon NH-QFF 7/10/98
18	0.48	0.38	0.70	3.0	2.6
17+15	0.38	0.25	0.21	0.52	0.83
16+32	0.61	0.48	0.53	2.1	11
31	1.1	0.31	0.65	4.0	0
28	0.25	0.34	0.11	1.1	0
21+33+53	0.33	0.71	0	3.3	10
22	1.8	2.9	1.3	2.9	14
45	0.20	0.35	0	1.2	0
52+43	0.95	1.0	0.90	2.8	4.4
49	0.77	0.45	0.29	1.1	2.2
47+48	0.27	0	0	0.58	0
44	0.27	0.94	0.95	1.1	2.4
37+42	0.39	0	0.25	0.67	1.4
41+71	0.74	0	0.22	1.7	3.2
64	0.31	0.39	0.15	0.44	0.92
40	0.31	0.40	0.23	0	2.0
74	0.13	0.66	0	1.4	2.0
70+76	0.061	0	0.37	2.4	3.5
66+95	1.7	2.2	1.7	5.3	9.3
91	0.18	0.084	0.051	0	0
56+60+89	0.14	0.29	0	2.7	3.9
92+84	0.41	0.22	0.17	1.9	1.8
101	0.80	0.44	0.53	2.2	3.3
83	0.15	0	0.022	0.13	0.11
97	0.30	0.12	0.013	0.71	0.77
87+81	0.43	0.26	0.29	0.95	1.2
85+136	0.039	0.038	0.052	0.37	0
110+77	0.92	0.37	0.22	3.2	4.3
82	0.061	0.049	0.029	0.36	0.47
151	0.15	0.054	0.084	0.34	0.38
135+144+147+124	0.18	0.050	0.12	0.66	0.54
149+123+107	0.58	0.27	0.40	1.7	1.7
118	0.53	0.19	0	0	0
146	0.079	0	0	0	0
153+132	0.85	0.30	0.24	2.3	2.5
105	0.17	0.11	0	0	0
141	0.15	0.050	0.056	0.60	0.40
137+176+130	0	0	0.49	0	0.45
163+138	1.1	0.61	0.24	4.4	4.2
178+129	0.15	0.059	0	0.21	0
187+182	0.35	0.24	0	0.73	0.85
183	0.21	0.072	0.028	0.39	0.29
185	0	0	0	0.082	0
174	0.22	0.069	0.024	0.66	0.63
177	0.11	0	0	0.50	0.53
202+171+156	0	0	0	0.16	0.23
180	0.66	0	0.14	1.9	1.8
199	0.0063	0	0	0.072	0.095
170+190	0.30	0.056	0.17	0.76	1.2
198	0	0.011	0	0	0
201	0.40	0.10	0.067	1.6	1.3
203+196	0.47	0.084	0.048	1.4	1.2
195+208	0.16	0.049	0.046	0.22	0.26
194	0.20	0.078	0	0.54	0.74
206	0.19	0.074	0	0.53	0.57
Total PCBs	22	16	12	68	106
Homologue Group					
3	5.3	5.3	3.8	18	41
4	5.8	6.7	4.8	21	34
5	4.0	1.9	1.4	9.9	12
6	3.1	1.3	1.6	10	10
7	2.0	0.50	0.36	5.3	5.3
8	1.2	0.33	0.16	4.0	3.8
9	0.19	0.074	0	0.53	0.57
Corresponding Laboratory Blank	8/6/98	7/17/98	7/24/98	7/19/98	7/19/98
Total Suspended Particulate (µg/m^3)	49.9	56.2	59.6	107	122
Surrogate Recoveries (%)					
#65	82 %	93 %	97 %	94 %	89 %
#166	95 %	108 %	111 %	108 %	102 %

D.2. Lower Hudson River Estuary Gas Phase PCBs (Raritan Bay: RB-PUF)(New York Harbor: NH-PUF)
Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	day RB-PUF 7/5/98	day RB-PUF 7/6/98	day RB-PUF 7/7/98	morning NH-PUF 7/10/98	afternoon NH-PUF 7/10/98
18	88	49	36	218	291
17+15	64	31	25	151	203
16+32	127	60	37	251	322
31	135	57	30	276	360
28	75	35	23	168	218
21+33+53	80	25	11	143	193
22	128	43	29	131	187
45	30	26	16	43	54
52+43	108	58	27	164	205
49	55	31	14	86	110
47+48	51	30	12	98	118
44	65	32	18	110	137
37+42	37	20	10	74	83
41+71	54	23	12	76	94
64	23	12	7.1	38	48
40	20	11	5.5	24	34
74	73	14	10.0	46	58
70+76	91	14	9.5	75	88
66+95	201	48	41	208	244
91	21	13	5.8	37	37
56+60+89	44	15	7.0	47	57
92+84	70	20	25	42	47
101	39	18	9.7	49	55
83	6.1	1.5	2.0	4.7	5.0
97	7.9	3.8	2.0	12	13
87+81	21	9.6	6.4	23	26
85+136	5.8	5.2	0.94	19	18
110+77	51	19	11	53	60
82	4.5	1.3	1.2	3.9	5.5
151	4.7	2.0	0.73	5.9	6.6
135+144+147+124	5.2	1.8	1.4	5.9	6.7
149+123+107	14	6.4	3.7	17	19
118	3.8	6.0	3.6	17	19
146	3.2	0.93	0.48	2.5	3.0
153+132	15	6.6	3.7	17	20
105	0	1.8	1.3	4.7	6.6
141	5.4	1.3	1.8	3.8	3.8
137+176+130	0.88	0.078	0	0.77	1.1
163+138	17	6.9	3.8	16	19
178+129	2.0	0.80	0.49	1.7	1.6
187+182	3.9	6.5	3.0	7.0	7.9
183	1.3	0.84	0.31	1.9	1.8
185	0.29	0.096	0	0.38	0.28
174	2.0	0.76	0.52	2.2	2.4
177	2.0	0.73	0.60	1.6	1.7
202+171+156	0.86	0.28	0.25	1.5	1.5
180	3.3	1.0	0.53	3.4	3.4
199	0.21	0	0	0.37	0.40
170+190	0.81	0.26	0.28	0.83	0.70
198	0.098	0	0	0	0
201	1.4	0.60	0.37	2.9	2.2
203+196	1.6	0.69	0.66	3.0	2.4
195+208	0.11	0	0	0.20	0.10
194	0.21	0	0	0.29	0.14
206	0.15	0	0	0.39	0
Total PCBs	1,860	768	471	2,790	3,500
Homologue Group					
3	734	317	202	1,410	1,860
4	816	312	178	1,020	1,250
5	228	100	68	266	292
6	66	26	16	69	78
7	16	11	5.8	19	20
8	4.5	1.6	1.3	8.2	6.8
9	0.15	0	0	0.39	0
Corresponding Laboratory Blank	7/10/98	7/30/98	7/10/98	7/17/98	7/18/98
Surrogate Recoveries (%)					
#65	126 %	89 %	100 %	99 %	100 %
#166	105 %	94 %	104 %	104 %	103 %

D.3. Lower Hudson River Estuary Water Particulate Phase PCBs (Raritan Bay: RB-GFF)(New York Harbor: NH-GFF)
Surrogate Corrected Concentrations (pg/L)

PCB Congener	day RB-GFF 7/5/98	day RB-GFF 7/6/98	day RB-GFF 7/7/98	morning NH-GFF 7/10/98	afternoon NH-GFF 7/10/98
18	51	50	42	84	274
17+15	40	40	30	42	52
16+32	68	68	53	61	189
31	138	156	116	230	367
28	111	116	86	155	289
21+33+53	40	39	31	59	158
22	42	0	0	0	165
45	28	26	21	21	150
52+43	149	134	118	136	162
49	102	102	87	95	130
47+48	111	103	87	104	162
44	113	106	86	93	141
37+42	88	74	60	70	133
41+71	105	104	85	102	157
64	32	29	24	28	37
40	25	25	26	18	0
74	51	57	33	90	116
70+76	133	179	123	158	243
66+95	357	426	326	385	548
91	34	30	26	35	38
56+60+89	72	83	87	81	140
92+84	0	83	67	75	75
101	100	101	92	102	135
83	13	12	9.8	12	13
97	21	20	16	29	34
87+81	33	33	31	37	54
85+136	32	34	32	32	43
110+77	127	108	90	122	190
82	3.7	0	6.2	7.8	6.5
151	17	22	14	19	22
135+144+147+124	23	21	17	21	26
149+123+107	50	49	39	58	84
118	79	79	61	98	143
146	19	17	16	21	25
153+132	66	69	56	83	108
105	18	26	26	33	34
141	12	13	9.8	16	21
137+176+130	2.2	1.6	1.5	2.4	2.7
163+138	92	94	71	111	168
178+129	8.3	6.1	4.0	8.1	15
187+182	21	20	19	27	38
183	11	10	7.6	14	22
185	1.3	1.3	3.6	2.0	2.4
174	13	13	10.0	16	24
177	13	12	9.9	15	26
202+171+156	6.4	6.1	4.1	8.6	12
180	33	31	24	43	72
199	1.2	0.71	0.89	1.7	0
170+190	14	12	9.3	18	30
198	0	0	0	0	0
201	17	17	14	26	47
203+196	17	15	12	25	48
195+208	3.6	2.5	2.3	3.8	7.9
194	7.3	6.5	5.4	11	21
206	8.8	8.5	5.0	17	33
Total PCBs	2,770	2,890	2,330	3,160	5,240
Homologue Group					
3	578	543	419	701	1,630
4	1,280	1,380	1,100	1,310	1,990
5	460	525	457	584	766
6	281	284	224	332	457
7	115	105	87	143	230
8	52	48	39	76	136
9	8.8	8.5	5.0	17	33
Corresponding Laboratory Blank	8/10/98	8/10/98	8/10/98	8/10/98	8/10/98
Volume of Water (L)	35	39	49	30	23
Surrogate Recoveries (%)					
#65	40 %	40 %	30 %	42 %	52 %
#166	68 %	68 %	53 %	61 %	189 %

D.4. Lower Hudson River Estuary Dissolved Phase PCBs (Raritan Bay: RB-XAD)(New York Harbor: NH-XAD)
Surrogate Corrected Concentrations (pg/L)

PCB Congener	day RB-XAD 7/5/98	day RB-XAD 7/6/98	day RB-XAD 7/7/98	morning NH-XAD 7/10/98	afternoon NH-XAD 7/10/98
18	97	89	83	157	162
17+15	73	54	60	114	103
16+32	121	121	151	225	183
31	85	116	143	300	250
28	63	103	102	223	158
21+33+53	43	73	68	124	111
22	76	0	88	162	161
45	33	28	22	75	75
52+43	105	135	111	237	275
49	55	64	112	138	122
47+48	64	75	102	177	168
44	67	88	61	147	163
37+42	25	61	31	102	116
41+71	41	61	55	132	163
64	14	30	20	50	53
40	17	18	19	45	51
74	22	0	25	72	89
70+76	38	32	62	138	178
66+95	133	91	165	369	447
91	3.3	6.0	8.1	20	34
56+60+89	31	64	61	101	209
92+84	29	32	27	83	133
101	29	27	38	70	91
83	3.2	4.4	11	9.6	13
97	5.6	9.3	7.8	22	27
87+81	15	8.9	21	32	41
85+136	11	16	44	12	25
110+77	27	48	37	87	115
82	2.7	4.8	2.6	6.6	16
151	1.7	3.5	3.6	5.4	13
135+144+147+124	0	3.1	3.6	3.0	9.1
149+123+107	7.8	10	13	21	39
118	0	13	0	0	87
146	0	0	0	0	14
153+132	9.7	15	9.7	23	53
105	0	17	0	0	64
141	0	2.1	1.6	3.1	11
137+176+130	0	0	0	0	0
163+138	9.0	9.5	10	25	72
178+129	0	0	0.54	0	0
187+182	3.0	0	1.8	6.3	11
183	0.99	0.67	0.87	2.7	5.0
185	0	0.34	0	0	1.3
174	0.58	1.4	0.89	2.2	7.5
177	0	0	0	0	4.4
202+171+156	0	0	0.19	0.39	0
180	1.7	1.7	0	5.2	16
199	0	0	0	0	0.44
170+190	0.65	0	1.4	1.4	5.8
198	0	0	0	0	0
201	0.96	0	3.0	2.7	6.3
203+196	0.96	1.9	1.0	1.3	5.5
195+208	0	0	0.78	0.86	1.2
194	0	0	0	0	2.3
206	0	0	0	0	0.080
Total PCBs	1,360	1,540	1,790	3,530	4,160
Homologue Group					
3	582	617	726	1,410	1,250
4	620	685	816	1,680	1,990
5	125	186	197	343	647
6	28	43	42	80	210
7	7.0	4.2	5.5	18	51
8	1.9	1.9	5.1	5.2	16
9	0	0	0	0	0.080
Corresponding Laboratory Blank	7/28/98	7/28/98	7/28/98	7/28/98	7/28/98
Volume of Water (L)	35	39	49	30	23
Surrogate Recoveries (%)					
#65	82 %	93 %	95 %	97 %	101 %
#166	66 %	50 %	104 %	104 %	93 %

A.1. Laboratory Blanks Particulate Phase PCBs (LB-QFF)
Surrogate Corrected Concentrations (ng)

PCB Congener	LB-QFF 10/16/97	LB-QFF 11/5/97	LB-QFF 2/16/98	LB-QFF 3/5/98	LB-QFF 3/11/98	LB-QFF 3/27/98	LB-QFF 5/27/98	LB-QFF 6/1/98	LB-QFF 6/29/98	LB-QFF 7/1/98	LB-QFF 7/15/98	LB-QFF 7/17/98	LB-QFF 7/19/98
18	0	0	0	0	0.063	0.084	0.021	0.020	0.012	1.1	0.55	0.020	0
17+15	0	0.025	0	0	0.017	0.017	0.0030	0.0027	0.0060	0.35	0	0	0
16+32	0	0	0	0	0.060	0	0	0	0	1.2	0.45	0.042	0
31	0	0.030	0.10	0.040	0.078	0.12	0	0	0	1.5	0.46	0.013	0
28	0	0.016	0.11	0.014	0.052	0.069	0	0.010	0	0.42	0.15	0.011	0
21+33+53	0	0.0083	0.16	0	0.043	0.045	0.012	0	0	0	0.25	0.065	0.059
22	0	0	0	0	0.037	0.027	0	0	0.079	0	0	0.11	0.089
45	0	0.0032	0	0	0	0	0	0	0	0.20	0	0	0
52+43	0	0	0	0	0.081	0.039	0.0096	0	0	0.68	0.44	0.038	0.055
49	0	0	0	0	0.023	0.028	0.0055	0.014	0.016	0.18	0.20	0.0066	0.0035
47+48	0	0	0	0.021	0.022	0	0	0	0	0.16	0.24	0	0
44	0	0.014	0	0.016	0.071	0.063	0.015	0.0053	0.015	0.72	0.45	0.015	0
37+42	0	0	0	0	0.011	0	0.0059	0	0.012	0.26	0.15	0.0062	0.0070
41+71	0	0	0	0	0.0082	0	0.0049	0.0022	0	0.48	0.14	0	0
64	0	0	0.033	0	0.017	0.015	0.0080	0.0034	0	0.18	0.14	0	0.0054
40	0	0	0	0	0	0	0.0032	0	0.0056	0.21	0.12	0	0.0037
74	0	0	0	0	0.020	0.010	0.020	0	0	0	0	0	0
70+76	0	0	0	0	0.030	0	0.028	0	0	0.13	0	0.019	0
66+95	0	0	0	0	0.18	0	0.091	0	0	1.2	1.4	0.11	0
91	0	0	0	0	0.012	0.018	0	0.0021	0.0055	0	0.053	0.0066	0
56+60+89	0	0	0	0	0.040	0	0.025	0.0039	0	0	0.16	0.013	0
92+84	0	0	0	0	0	0	0.030	0.0042	0	0.063	0.21	0.018	0.0083
101	0	0	0.087	0	0.062	0.077	0.049	0.0066	0.022	0.24	0.29	0.049	0.097
83	0	0	0	0	0	0	0	0	0	0	0	0	0
97	0	0	0	0	0.014	0.012	0.0067	0.00096	0	0.012	0	0	0
87+81	0	0	0	0	0.064	0.070	0	0	0	0.14	0.074	0	0
85+136	0	0	0	0	0.023	0.0073	0	0	0	0.12	0.050	0	0
110+77	0	0	0.12	0	0.068	0.082	0.065	0.016	0.0079	0.13	0.16	0.0076	0.0049
82	0	0	0	0	0.0070	0	0.0058	0	0	0.089	0.037	0	0
151	0	0	0	0	0.0063	0	0.0068	0	0.0018	0.100	0.064	0	0
135+144+147+124	0	0.0047	0	0	0.0093	0	0.0072	0.0042	0	0	0.094	0	0
149+123+107	0	0	0	0	0.019	0	0.024	0	0	0.19	0.16	0.0057	0
118	0	0	0	0	0.017	0	0	0	0	0.089	0.033	0	0.0097
146	0	0	0	0	0	0	0.0025	0	0.0064	0	0.042	0	0
153+132	0	0	0	0	0.022	0	0	0	0	0	0.18	0	0
105	0	0	0	0	0.0089	0	0	0	0	0	0	0	0
141	0	0	0	0	0.0050	0.0054	0.0044	0	0	0	0.030	0	0
137+176+130	0	0	0	0	0	0	0	0	0	0	0	0	0
163+138	0	0	0	0	0.025	0.021	0.021	0.0044	0	0	0.20	0	0
178+129	0	0	0	0	0	0	0	0	0	0	0	0	0
187+182	0	0	0	0	0	0	0	0	0	0	0.21	0	0
183	0	0	0	0	0.0026	0	0.0033	0	0	0	0	0	0
185	0	0	0	0	0.0010	0	0	0.00036	0	0	0	0	0
174	0	0	0	0	0	0	0.0038	0	0	0	0	0	0
177	0	0	0	0	0	0	0	0.0013	0	0	0	0	0
202+171+156	0	0	0	0.010	0	0	0	0.00046	0	0	0	0	0
180	0	0	0	0	0	0.0097	0	0.0012	0	0	0	0	0
199	0	0	0	0	0	0	0	0	0	0	0	0	0
170+190	0	0	0	0	0.0036	0.027	0	0.0014	0	0	0	0	0
198	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0	0	0	0	0	0	0	0	0	0	0	0	0
203+196	0	0	0	0	0	0	0	0	0	0	0	0	0
195+208	0	0	0	0	0	0	0	0	0	0	0	0	0
194	0	0	0	0	0	0	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0	0	0	0	0	0	0
Total PCBs	0	0.100	0.61	0.10	1.2	0.85	0.48	0.11	0.19	10	7.2	0.55	0.34
Homologue Group													
3	0	0.078	0.37	0.054	0.36	0.36	0.042	0.033	0.11	4.9	2.0	0.26	0.15
4	0	0.017	0.033	0.038	0.49	0.15	0.21	0.029	0.037	4.1	3.3	0.20	0.067
5	0	0	0.20	0	0.28	0.27	0.16	0.030	0.035	0.88	0.90	0.082	0.12
6	0	0.0047	0	0	0.087	0.027	0.067	0.0086	0.0082	0.29	0.77	0.0057	0
7	0	0	0	0	0.0073	0.036	0.0072	0.0043	0	0	0.21	0	0
8	0	0	0	0.010	0	0	0	0.00046	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0
Surrogate Recoveries (%)													
#65	84%	90%	100%	102%	99%	72%	93%	104%	89%	75%	80%	95%	99%
#166	94%	103%	99%	100%	91%	83%	99%	113%	93%	81%	84%	101%	102%

A.1. Laboratory Blanks Particulate Phase PCBs (LB-QFF) Surrogate Corrected Concentrations (ng)

PCB Congener	LB-QFF 7/24/98	LB-QFF 8/6/98	LB-QFF 9/14/98	LB-QFF 9/18/98	LB-QFF 9/24/98	LB-QFF 10/15/98	LB-QFF 10/19/98	LB-QFF 1/4/99	LB-QFF 2/9/99	LB-QFF 2/17/99	LB-QFF 3/2/99	LB-QFF 4/12/99	LB-QFF 4/21/99
18	0.019	0.013	0.15	0	0.17	0.030	0.012	0	0	0	0		0
17+15	0	0.0023	0.20	0	0.041	0	0	0	0	0	0		0
16+32	0	0.0075	0.50	0	0.17	0	0	0	0	0	0		0
31	0	0	0	0	0	0	0	0	0	0	0		0
28	0	0	0	0	0.010	0.012	0.011	0	0	0	0		0
21+33+53	0	0.0061	0.098	0	0	0.0089	0.0085	0.0089	0	0	0		0.014
22	0.015	0.0065	0	0	0	0	0	0	0	0	0		0
45	0	0	0	0	0.033	0	0	0	0	0	0		0
52+43	0.021	0.036	0.37	0	0.26	0.037	0.024	0.028	0.021	0	0		0
49	0.0037	0	0.16	0	0.089	0	0	0	0	0	0		0
47+48	0	0	0	0	0.054	0.0072	0	0.088	0	0	0.027		0.031
44	0	0.0038	0.32	0	0.11	0.012	0	0.016	0	0	0		0
37+42	0.0069	0.0043	0	0.020	0.040	0.0075	0.0048	0	0	0	0		0
41+71	0	0	0.048	0	0.044	0	0	0	0	0	0		0
64	0.0014	0	0.010	0	0.017	0	0	0	0	0	0		0
40	0.0038	0.0021	0.041	0	0.0050	0	0	0	0	0	0		0
74	0	0.0066	0.089	0	0.049	0	0	0	0	0	0		0
70+76	0	0.0055	0	0	0.080	0.0056	0.0032	0.0080	0	0	0		0
66+95	0	0.031	0.58	0.020	0.35	0	0	0	0	0	0		0
91	0	0	0.029	0	0.040	0	0	0	0	0	0		0
56+60+89	0	0	0	0	0	0	0	0	0	0	0		0
92+84	0.0060	0.016	0.13	0	0.13	0.016	0.019	0	0	0	0		0
101	0.0090	0.012	0	0.047	0.13	0.016	0.0087	0.016	0.0077	0	0.010		0.0077
83	0	0	0.010	0.0018	0.0056	0.0030	0	0	0	0	0		0
97	0	0.0042	0.023	0	0.015	0	0.0015	0	0	0	0		0
87+81	0	0	0	0	0	0	0	0	0	0	0		0
85+136	0	0	0.0057	0	0.0038	0	0	0	0	0	0		0
110+77	0.0055	0.0038	0.070	0.0098	0.073	0.0095	0.0057	0.015	0.0050	0	0.0062		0.0056
82	0	0	0	0	0	0	0	0	0	0	0.0048		0
151	0	0	0.029	0	0	0	0	0	0	0	0		0
135+144+147+124	0	0	0.017	0	0	0	0	0	0	0	0		0
149+123+107	0	0.0033	0.036	0	0.037	0	0	0.0097	0	0	0		0
118	0	0	0.045	0	0.065	0	0	0.013	0	0	0		0
146	0	0	0.016	0	0	0	0	0	0	0	0		0
153+132	0	0.0028	0.012	0	0	0.0079	0.0040	0.0094	0.0051	0	0		0
105	0	0	0	0	0	0	0	0	0	0	0		0
141	0	0	0	0	0	0	0	0	0	0	0		0
137+176+130	0.023	0	0	0	0	0.020	0.034	0	0	0	0		0
163+138	0	0	0	0	0	0.0043	0	0.016	0	0	0		0.0079
178+129	0	0	0	0	0	0	0	0	0	0	0		0
187+182	0	0	0	0	0	0	0	0	0	0	0		0
183	0	0	0	0	0	0	0	0	0	0	0		0
185	0	0	0	0.0038	0	0	0	0	0	0	0		0
174	0	0	0	0	0	0	0	0	0	0	0		0
177	0.0058	0	0	0.011	0	0	0	0	0	0	0		0
202+171+156	0.0025	0	0	0	0	0	0	0.0096	0	0	0		0.0078
180	0	0.0049	0.014	0.0044	0	0	0	0	0	0	0		0
199	0	0	0	0	0	0	0	0	0	0	0		0
170+190	0	0	0	0	0	0	0	0.0043	0	0	0		0
198	0	0	0	0	0	0	0	0	0	0	0		0
201	0	0.0045	0	0	0	0	0	0	0	0	0		0
203+196	0	0	0	0	0	0	0	0	0	0	0		0
195+208	0	0	0	0	0	0	0	0	0	0	0		0
194	0	0	0	0	0	0.00075	0	0	0	0	0		0
206	0	0	0	0	0	0	0	0	0	0	0		0
Total PCBs	0.12	0.18	3.0	0.12	2.0	0.20	0.14	0.24	0.038	0	0.048		0.074
Homologue Group													
3	0.041	0.039	0.95	0.020	0.43	0.058	0.037	0.0089	0	0	0		0.014
4	0.030	0.085	1.6	0.020	1.1	0.062	0.027	0.14	0.021	0	0.027		0.031
5	0.021	0.036	0.31	0.059	0.46	0.044	0.035	0.044	0.013	0	0.021		0.013
6	0.023	0.0061	0.11	0	0.037	0.033	0.038	0.035	0.0051	0	0		0.0079
7	0.0058	0.0049	0.014	0.019	0	0	0	0.0043	0	0	0		0
8	0.0025	0.0045	0	0	0	0.00075	0	0.0096	0	0	0		0.0078
9	0	0	0	0	0	0	0	0	0	0	0		0
Surrogate Recoveries (%)													
#65	105%	98%	96%	96%	97%	92%	88%	108%	84%	79%	85%		66%
#166	101%	101%	101%	101%	102%	92%	91%	108%	84%	80%	87%		61%

A.1. Laboratory Blanks Particulate Phase PCBs (LB-QFF)
Surrogate Corrected Concentrations (ng)

PCB Congener	LB-QFF 5/18/99
18	0
17+15	0
16+32	0
31	0
28	0
21+33+53	0.014
22	0
45	0
52+43	0
49	0
47+48	0.046
44	0
37+42	0
41+71	0
64	0
40	0
74	0
70+76	0
66+95	0
91	0
56+60+89	0
92+84	0
101	0.0087
83	0
97	0
87+81	0
85+136	0
110+77	0
82	0
151	0
135+144+147+124	0
149+123+107	0
118	0
146	0
153+132	0
105	0
141	0
137+176+130	0
163+138	0
178+129	0
187+182	0
183	0
185	0
174	0
177	0
202+171+156	0
180	0
199	0
170+190	0
198	0
201	0
203+196	0
195+208	0
194	0
206	0
Total PCBs	0.068
Homologue Group	
3	0.014
4	0.046
5	0.0087
6	0
7	0
8	0
9	0
Surrogate Recoveries (%)	
#65	85%
#166	81%

A.2. Laboratory Blanks
Gas Phase PCBs (LB-PUF)
Surrogate Corrected
Concentrations (ng)

PCB Congener	LB-PUF 10/14/97	LB-PUF 10/22/97	LB-PUF 10/28/97	LB-PUF 11/9/97	LB-PUF 2/16/98	LB-PUF 3/5/98	LB-PUF 3/10/98	LB-PUF 3/18/98	LB-PUF 5/23/98	LB-PUF 5/26/98	LB-PUF 6/15/98	LB-PUF 7/2/98	LB-PUF 7/10/98	LB-PUF 7/12/98	LB-PUF 7/15/98
8+5															
18	21	0	0	0	0	0	0	0	0	0	0	0.050	0	0	0.038
17+15	0	0	0	0	0	0	0	0	0	0	0	0.019	0	0	0.016
16+32	0	0	0	0	0	0	0	0	0	0	0.0041	0.043	0	0	0.032
31	0	0	0	0	0	0	0	0	0	0	0	0.050	0	0	0.038
28	0	0	0	0	0	0	0	0	0	0	0	0.021	0	0	0.022
21+33+53	6.8	0	0	0	0	0	0	0	0	0	0	0.030	0	0	0.010
22	0	0	0	0	0	0	0	0	0	0	0	0.029	0	0	0.016
45	0	0	0	0	0	0	0	0	0	0	0	0.020	0	0	0.0082
52+43	0	0	0	0	0	0	0	0	0	0	0	0.065	0	0	0.029
49	0	0	0	0	0	0	0	0	0	0	0	0.023	0	0	0.012
47+48	1.1	0.092	0	0	0	0	0	0	0	0	0	0.024	0	0	0.016
44	0	0	0	0	0	0	0.088	0	0	0	0	0.038	0	0	0.021
37+42	0	0	0	0	0	0	0	0	0	0	0	0.016	0	0	0.017
41+71	0.80	0	0	0	0	0	0	0	0	0	0	0.012	0	0	0.0039
64	0.30	0	0	0	0	0	0	0	0	0	0	0.0082	0	0	0.0046
40	0	0	0	0	0	0	0	0	0	0	0	0.0097	0	0	0.0051
74	0.050	0.086	0	0	0	0	0	0	0	0	0	0	0	0	0
70+76	0	0	0	0	0	0	0	0	0	0	0	0.020	0	0	0.018
66+95	0	0.045	0.099	0	0	0	0	0	0	0	0	0.085	0	0	0.052
91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56+60+89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92+84	0	0	0	0	0	0	0	0	0	0	0	0.014	0	0	0.012
101	0	0	0	0	0	0	0	0	0	0	0	0.034	0.036	0	0.022
83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	0	0.078	0	0	0	0.031	0	0	0	0	0	0.0018	0	0	0
87+81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85+136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110+77	0	0	0	0	0	0	0	0.087	0	0	0	0.011	0	0	0.0073
82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
151	0	0.21	0.14	0	0	0	0	0	0	0	0	0.0053	0	0	0.0033
135+144+147+124	0	0	0	0	0	0	0	0	0	0	0	0.0089	0	0	0
149+123+107	0	0	0	0	0	0	0	0	0	0	0	0.017	0	0	0.0097
118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
153+132	0	0	0	0	0	0	0	0	0	0	0	0.021	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
137+176+130	0	0	0	0	0	0	0	0	0	0	0	0.0012	0	0	0
163+138	0	0	0	0	0	0	0	0	0	0	0	0.018	0	0	0
178+129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
187+182	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
185	0	0.014	0	0	0	0	0	0	0	0	0	0	0	0	0
174	0	0	0	0	0	0	0	0	0	0	0	0.0027	0	0	0
177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202+171+156	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0	0	0	0	0.0081	0	0	0
199	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170+190	0	0	0	0	0	0	0	0	0	0	0	0.0013	0	0	0
198	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
203+196	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
195+208	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total PCBs	30	0.53	0.24	0	0	0.031	0.088	0.087	0	0	0.0041	0.71	0.036	0	0.41
Homologue Group															
3	28	0	0	0	0	0	0	0	0	0	0.0041	0.26	0	0	0.19
4	2.2	0.22	0.099	0	0	0	0.088	0	0	0	0	0.30	0	0	0.17
5	0	0.078	0	0	0	0.031	0	0.087	0	0	0	0.061	0.036	0	0.042
6	0	0.21	0.14	0	0	0	0	0	0	0	0	0.071	0	0	0.013
7	0	0.014	0	0	0	0	0	0	0	0	0	0.012	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Surrogate Recoveries (%)															
#65	89%	78%	82%	98%	87%	97%	93%	96%	98%	97%	90%	71%	97%	95%	85%
#166	102%	99%	104%	99%	97%	103%	104%	107%	94%	98%	95%	87%	101%	96%	97%

A.2. Laboratory Blanks
Gas Phase PCBs (LB-PUF)
Surrogate Corrected
Concentrations (ng)

Ne

PCB Congener	LB-PUF 7/17/98	LB-PUF 7/18/98	LB-PUF 7/30/98	LB-PUF 8/20/98	LB-PUF 8/31/98	LB-PUF 9/8/98	LB-PUF 9/30/98	LB-PUF 10/21/98	LB-PUF 11/24/98	LB-PUF 1/5/99	LB-PUF 2/8/99	LB-PUF 2/15/99	LB-PUF 2/24/99	LB-PUF 3/8/99	LB-PUF 4/14/99
8+5															
18	0	0.034	0	0	0	0	0	0	0.044	0		0	0	0	0
17+15	0	0.037	0	0	0	0	0	0	0.059	0		0	0	0.072	0
16+32	0	0.10	0	0.15	0	0	0	0	0.16	0		0	0.13	0.065	0.10
31	0	0	0	0	0	0	0	0	0	0		0	0	0	0
28	0	0	0	0	0	0	0	0	0	0		0	0	0	0
21+33+53	0	0	0	0.12	0	0	0	0	0.070	0		0.11	0.31	0.060	0
22	0	0	0	0.24	0	1.5	0	0.14	0	0		0	0	0	0
45	0	0	0	0.16	0	0.22	0	0	0.12	0		0	0	0.13	0.14
52+43	0	0	0	0.15	0	0	0	0	0.11	0		0	0.61	0	0
49	0	0	0	0	0	0	0	0	0	0		0	0.084	0	0
47+48	0	0	0	0	0	0	0	0	0	0		0	0	0	0
44	0	0	0	0	0	0	0	0	0	0		0	0	0	0
37+42	0	0	0	0	0	0	0	0	0	0		0	0	0	0
41+71	0	0	0	0	0	0	0	0	0	0		0	0	0	0
64	0	0	0	0	0.087	0.036	0	0	0	0		0	0	0	0
40	0	0	0	0	0	0	0	0	0	0		0	0	0	0
74	0	0	0	0.56	0	0	0	0	0	0		0	0	0	0
70+76	0	0	0	0	0	0	0	0	0	0		0	0	0	0
66+95	0	0	0	0.100	0.43	0.32	0	0	0	0		0	0	0	0
91	0	0	0	0.070	0	0	0	0	0	0		0	0	0	0
56+60+89	0	0	0	0	0	0	0	0	0	0		0	0	0	0
92+84	3.1	0	0	0.023	0	0	0	0	0	0		0	0	0	0
101	0	0	0	0.085	0	0.063	0	0	0.037	0		0	0	0	0
83	0	0	0	0	0	0	0	0	0	0		0	0	0	0
97	0	0	0	0.023	1.4	0.055	0	0	0	0		0	0	0	0
87+81	0	0	0	0	0	0	0	0	0	0		0	0	0	0
85+136	0	0	0	0	0	0	0	0	0	0		0	0	0	0
110+77	0	0	0	0	0	0	0	0	0	0		0	0	0	0
82	0	0	0	0	0	0	0	0	0	0		0	0	0	0
151	0	0	0	0	0	0.037	0	0	0	0		0	0	0	0
135+144+147+124	0	0	0	0	0	0	0	0	0	0		0	0	0	0
149+123+107	0	0	0	0	0	0	0	0	0	0		0	0	0	0
118	0	0	0	0	0	0	0	0	0	0		0	0	0	0
146	0	0	0	0	0	0	0	0	0	0		0	0	0	0
153+132	0	0	0	0	0	0	0	0	0.033	0		0	0	0	0
105	0	0	0	0	0	0	0	0	0	0		0	0	0	0
141	0	0	0	0	0	0	0	0	0	0		0	0	0	0
137+176+130	0	0	0	0	0	0	0	0	0.011	0		0	0	0	0
163+138	0	0	0	0	0	0	0	0	0	0		0	0	0	0
178+129	0	0	0	0	0	0	0	0	0	0		0	0	0	0
187+182	0	0	0	0	0	0	0	0	0	0		0	0	0	0
183	0	0	0	0	0	0	0	0	0	0		0	0	0	0
185	0	0	0	0	0	0	0	0	0	0		0	0	0	0
174	0	0	0	0	0	0	0	0	0	0		0	0	0	0
177	0	0	0	0	0	0	0	0	0	0		0	0	0	0
202+171+156	0	0	0	0	0	0.026	0	0	0	0		0	0	0	0
180	0	0	0	0	0	0	0	0	0	0		0	0	0	0
199	0	0	0	0	0	0	0	0	0	0		0	0	0	0
170+190	0	0	0	0	0	0	0	0	0	0		0	0	0	0
198	0	0	0	0	0	0	0	0	0	0		0	0	0	0
201	0	0	0	0	0	0	0	0	0	0		0	0	0	0
203+196	0	0	0	0	0	0	0	0	0	0		0	0	0	0
195+208	0	0	0	0	0	0	0	0	0	0		0	0	0	0
194	0	0	0	0	0	0	0	0	0.040	0		0	0	0	0
206	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Total PCBs	3.1	0.18	0	1.7	2.0	2.3	0	0.14	0.68	0		0.11	1.1	0.33	0.24
Homologue Group															
3	0	0.18	0	0.50	0	1.5	0	0.14	0.34	0		0.11	0.45	0.20	0.10
4	0	0	0	0.97	0.52	0.57	0	0	0.23	0		0	0.69	0.13	0.14
5	3.1	0	0	0.20	1.4	0.12	0	0	0.037	0		0	0	0	0
6	0	0	0	0	0	0.037	0	0	0.044	0		0	0	0	0
7	0	0	0	0	0	0	0	0	0	0		0	0	0	0
8	0	0	0	0	0	0.026	0	0	0.040	0		0	0	0	0
9	0	0	0	0	0	0	0	0	0	0		0	0	0	0
Surrogate Recoveries (%)															
#65	93%	99%	96%	93%	98%	112%	100%	83%	75%	80%		70%	91%	93%	85%
#166	98%	102%	100%	97%	101%	106%	101%	85%	93%	83%		90%	97%	104%	94%

A.2. Laboratory Blanks
Gas Phase PCBs (LB-PUF)
Surrogate Corrected
Concentrations (ng) ew High-Resolution GC/ECD Instrument

PCB Congener	LB-PUF 6/15/99	LB-PUF 7/12/99	LB-PUF 7/27/99	LB-PUF 8/16/99	LB-PUF 9/7/99	LB-PUF 9/29/99	LB-PUF 10/25/99	LB-PUF 11/22/99	LB-PUF 12/1/99
8+5		0.000064	0	0.42	0.18	0.12	0.18	0.050	0.041
18	0	0.000013	0	0.12	0.047	0.027	0.091	0.037	0.044
17+15	0	0	0	0.086	0.068	0.086	0.068	0.069	0.092
16+32	0	0.000040	0.67	0.21	0.15	0.27	0.71	0.099	0.063
31	0	0	0	0.084	0.041	0.017	0.11	0.027	0
28	0	0.00028	0.30	0.087	0.066	0.19	0.13	0.053	0.090
21+33+53	0.46	0	0.83	0.075	0.098	0.82	0.13	0.073	0.023
22	0	0	0	0.19	0.047	0.017	0.017	0	0.0065
45	0.66	0.00028	0	0	0	0	0.032	0	0.0074
52+43	0.63	0	0	0.0097	0.45	0.88	0.93	0.14	0.038
49	0.14	0.00037	0.59	0.11	0.18	0.43	0.43	0.27	0.099
47+48	0.32	0.000096	0.36	0.33	0.19	0.13	0.22	0.073	0.063
44	0	0.000021	0.052	0.13	0.082	0.065	0.21	0.065	0.083
37+42	0	0.000082	0.021	0.038	0.040	0.34	0	0.049	0
41+71	0	0	0	0.037	0	0	0	0	0
64	0	0	0	0.016	0.019	0	0.097	0	0.049
40	0	0.000035	0.065	0	0.012	0.036	0	0.0047	0
74	0	0.0000066	0.015	0.033	0.035	0.026	0.073	0.026	0.025
70+76	0	0.00016	0.21	0.090	0.038	0.088	0.084	0.048	0.014
66+95	0	0.00018	0.13	0.16	0.12	0.13	0.24	0.097	0.095
91	0	0	0	0.012	0.0087	0.028	0	0	0.0063
56+60+89	0	0.000024	0.042	0.031	0.022	0.054	0.041	0.017	0.014
92+84	0	0.000084	0	0.036	0.017	0	0	0.029	0.024
101	0	0.000066	0.075	0.043	0.029	0.075	0.071	0.035	0.023
83	0	0	0	0	0.049	0.12	0.0075	0	0
97	0	0.00033	0.29	0.016	0.023	0.14	0.031	0.050	0.0093
87+81	0	0.00030	0.73	0.31	0.30	0.33	0	0.24	0.32
85+136	0	0	0	0	0	0	0	0	0
110+77	0	0.000055	0.047	0.028	0.016	0.036	0.032	0.018	0.018
82	0	0	0	0.013	0	0.075	0.040	0.12	0
151	0	0.000017	0.0088	0.015	0.014	0.045	0.018	0.034	0.024
135+144+147+124	0	0.000045	0.027	0.048	0.021	0.032	0.032	0.022	0.069
149+123+107	0	0	0.016	0.030	0.045	0	0.051	0.028	0.025
118	0	0	0	0.071	0.044	0	0.069	0.043	0.055
146	0	0	0	0.069	0	0.019	0.016	0.011	0.012
153+132	0	0.000017	0.022	0.024	0.026	0.036	0.041	0.031	0.024
105	0	0	0.031	0	0	0	0	0	0.012
141	0	0	0.0033	0	0	0.0053	0	0	0
137+176+130	0	0	0	0	0	0	0	0	0
163+138	0	0	0	0	0	0	0.021	0	0
178+129	0	0	0	0	0	0	0.038	0	0
187+182	0	0	0	0	0	0	0	0	0
183	0	0	0.024	0	0	0	0	0	0
185	0	0	0	0	0	0	0	0	0
174	0	0.00012	0.051	0.046	0	0.091	0.026	0.074	0
177	0	0	0.019	0.0033	0.034	0.030	0.030	0	0.041
202+171+156	0	0	0	0.017	0.020	0.019	0.020	0.017	0.019
180	0	0	0	0.014	0	0.060	0.0053	0.024	0
199	0	0	0	0	0.0035	0.0078	0	0.0029	0.0073
170+190	0	0	0	0	0.0021	0.0032	0	0	0
198	0	0	0	0	0	0	0	0	0
201	0	0.00010	0.13	0	0.0037	0.014	0.023	0.013	0
203+196	0	0	0	0.034	0.030	0.029	0.035	0.015	0.038
195+208	0	0.0000089	0	0.027	0.011	0.075	0.0080	0.0099	0
194	0	0	0	0	0	0	0.015	0.0015	0
206	0	0	0	0	0	0	0	0	0
Total PCBs	2.2	0.0027	4.7	2.7	2.4	4.9	4.2	2.0	1.5
Homologue Group									
3	0.46	0.00042	1.8	0.90	0.56	1.8	1.3	0.41	0.32
4	1.8	0.0012	1.5	0.94	1.1	1.8	2.4	0.74	0.49
5	0	0.00084	1.2	0.53	0.49	0.80	0.25	0.53	0.47
6	0	0.000080	0.078	0.19	0.10	0.14	0.18	0.13	0.15
7	0	0.00012	0.094	0.064	0.036	0.18	0.10	0.098	0.041
8	0	0.00011	0.13	0.078	0.068	0.15	0.10	0.059	0.064
9	0	0	0	0	0	0	0	0	0
Surrogate Recoveries (%)									
#65	92%			80%	82%	79%	71%	80%	79%
#166	73%			86%	82%	83%	82%	85%	83%

A.3. Laboratory Blanks
PCBs in Precipitation (LB-Precip)

Surrogate Corrected Concentrations (ng)

PCB Congener	LB-Precip 6/10/98	LB-Precip 9/1/98	LB-Precip 9/28/98	LB-Precip 10/8/98	LB-Precip 11/11/98	LB-Precip 3/30/99	LB-Precip 4/27/99	LB-Precip 6/21/99	LB-Precip 7/13/99	LB-Precip 8/19/99
18	0.13	0		0	0	0	0	0.0032	0.0024	0.042
17+15	0.29	0		0	0	0	0	0.0029	0.0022	0
16+32	0.029	0		0	0	0	0	0.0037	0.0028	0.051
31	0	0		0.12	0	0	0	0.013	0.018	0.10
28	0	0		0.019	0.062	0.087	0	0.010	0.019	0.10
21+33+53	0	0.015		0	0	0	0	0.0026	0.0020	0.0027
22	0.093	0		0.23	0	0	0	0.0030	0.024	0.043
45	0	0		0	0	0	0	0.0022	0.0016	0.0022
52+43	0	0		0	0.40	0	0	0.0030	0.0023	0.11
49	0	0		0.041	0	0	0	0.0017	0.0013	0.0017
47+48	0.046	0		0.025	0	0.036	0	0.012	0.095	0.089
44	0	0		0	0.14	0.023	0	0.070	0.056	0.16
37+42	0	0		0	0.088	0.033	0	0.062	0.057	0.095
41+71	0	0		0	0	0	0	0.0040	0.0030	0.020
64	0	0		0	0	0	0	0.0011	0.00080	0.018
40	0	0		0	0	0	0	0.0018	0.0014	0.0019
74	0.26	0		0	0	0	0	0.012	0.018	0.030
70+76	0	0.021		0	0	0	0	0.019	0.017	0.048
66+95	0	0		0	0	0	0	0.030	0.013	0.10
91	0	0		0	0	0	0	0.0019	0.079	0.0020
56+60+89	0.029	0		0	0	0	0	0.0015	0.0011	0.043
92+84	0	0		0	0	0	0	0.0039	0.0029	0.0040
101	0.011	0.054		0	0	0	0	0.0076	0.0012	0.051
83	0	0		0	0	0	0	0.0013	0.0010	0.32
97	0	0		0	0	0	0	0.0011	0.00080	0.0011
87+81	0	0		0	0	0	0	0.0011	0.00086	0.050
85+136	0	0		0	0	0	0	0.0017	0.0013	0.053
110+77	0	0		0	0	0	0	0.0098	0.012	0.031
82	0	0		0	0	0	0	0.0011	0.063	0.040
151	0	0		0	0	0	0	0.029	0.0010	0.026
135+144+147+124	0	0		0	0	0	0	0.0015	0.014	0.018
149+123+107	0	0.071		0.011	0	0.043	0	0.018	0.044	0.0012
118	0	0		0	0	0.039	0	0.072	0.086	0.040
146	0	0		0.0034	0	0	0	0.0013	0.020	0.0011
153+132	0	0.011		0	0	0	0	0.0080	0.0018	0.010
105	0	0		0	0	0	0	0.0012	0.00094	0.013
141	0.010	0		0	0	0	0	0.0070	0.0013	0.0028
137+176+130	0	0		0	0	0	0	0	0.00063	0.00068
163+138	0	0.0072		0.0076	0.27	0.013	0	0.039	0.049	0.019
178+129	0	0		0	0.47	0	0	0.0016	0.0013	0.0014
187+182	0	0		0	0	0	0	0.0011	0.00086	0.00094
183	0	0		0	0	0	0	0.0012	0.00095	0.0010
185	0	0		0	0	0	0	0.00071	0.00055	0.00060
174	0	0		0	0	0	0	0.044	0.045	0.060
177	0	0		0	0	0	0	0.0013	0.0010	0.0011
202+171+156	0	0		0	0	0	0	0.011	0.025	0.011
180	0	0		0	0	0	0	0.017	0.016	0.036
199	0	0		0	0	0	0	0.0010	0.0066	0.00088
170+190	0	0		0	0	0	0	0.0022	0.00069	0.0045
198	0	0		0	0	0	0	0	0	0
201	0	0		0	0.31	0	0	0.016	0.070	0.015
203+196	0	0		0	0	0	0	0.0074	0.017	0.0068
195+208	0	0		0	0	0	0	0.0024	0.00064	0.00070
194	0	0		0	0	0	0	0.0010	0.00073	0.0010
206	0	0		0	0	0	0	0.0010	0.0022	0.0011
Total PCBs	0.89	0.18		0.46	1.7	0.27	0	0.58	0.91	1.9
Homologue Group										
3	0.53	0.015		0.37	0.15	0.12	0	0.10	0.13	0.44
4	0.33	0.021		0.066	0.54	0.058	0	0.16	0.21	0.62
5	0.011	0.054		0	0	0.039	0	0.10	0.25	0.60
6	0.010	0.089		0.022	0.27	0.056	0	0.10	0.13	0.079
7	0	0		0	0.47	0	0	0.069	0.066	0.11
8	0	0		0	0.31	0	0	0.038	0.12	0.035
9	0	0		0	0	0	0	0.0010	0.0022	0.0011
Surrogate Recoveries (%)										
#65	90%	80%		94%	96%	90%	89%	72%	62%	77%
#166	101%	80%		99%	96%	85%	89%	77%	63%	79%

A.4. Laboratory Blanks PCBs
Particulate Phase In Water (LB-GFF)
Surrogate Corrected Concentrations
(ng)

PCB Congener	LB-GFF 8/10/98
18	0.041
17+15	0
16+32	0.016
31	0
28	0
21+33+53	0.071
22	0.13
45	0
52+43	0
49	0
47+48	0
44	0
37+42	0.018
41+71	0
64	0
40	0
74	0
70+76	0
66+95	0.070
91	0
56+60+89	0
92+84	0
101	0.0076
83	0
97	0
87+81	0
85+136	0
110+77	0
82	0
151	0
135+144+147+124	0
149+123+107	0.0030
118	0
146	0
153+132	0
105	0
141	0
137+176+130	0
163+138	0.0075
178+129	0
187+182	0
183	0
185	0
174	0
177	0
202+171+156	0
180	0
199	0
170+190	0
198	0
201	0
203+196	0
195+208	0
194	0
206	0
Total PCBs	0.37
Homologue Group	
3	0.28
4	0.070
5	0.0076
6	0.010
7	0
8	0
9	0
Surrogate Recoveries (%)	
#65	34%
#166	37%

A.5. Laboratory Blanks PCBs
Dissolved Phase In Water (LB-XAD)
Surrogate Corrected Concentrations
(ng)

PCB Congener	LB-XAD 7/28/98
18	5.0
17+15	0.64
16+32	1.9
31	1.6
28	0.87
21+33+53	1.2
22	0
45	0
52+43	2.2
49	0.70
47+48	0
44	1.3
37+42	0.59
41+71	0
64	0.49
40	0.37
74	0
70+76	0.85
66+95	0
91	0
56+60+89	0
92+84	0
101	1.2
83	0
97	0.45
87+81	0.76
85+136	0.19
110+77	2.2
82	0
151	0
135+144+147+124	0
149+123+107	0.43
118	0
146	0.14
153+132	0.79
105	0
141	0
137+176+130	0
163+138	1.6
178+129	0
187+182	0.11
183	0
185	0
174	0.10
177	0
202+171+156	0
180	0
199	0
170+190	0
198	0
201	0.042
203+196	0.046
195+208	0
194	0
206	0
Total PCBs	26
Homologue Group	
3	12
4	6.0
5	4.8
6	3.0
7	0.21
8	0.088
9	0
Surrogate Recoveries (%)	
#65	61%
#166	102%

B.1. Matrix Spikes Particulate Phase
PCBs (MS-QFF)
Surrogate Corrected Recoveries (%)

PCB Congener	MS-QFF 3/11/98	MS-QFF 6/1/98	MS-QFF 7/1/98	MS-QFF 7/19/98	MS-QFF 9/14/98	MS-QFF 9/24/98	MS-QFF 10/19/98	MS-QFF 2/17/99
18		85%	97%	107%	119%	105%	115%	106%
17+15		83%	86%	55%	109%	73%	118%	113%
16+32		94%	87%	98%	145%	90%	113%	108%
31		122%	139%	217%	193%	174%	113%	125%
28		93%	100%	115%	98%	114%	107%	117%
21+33+53		107%	108%	142%	85%	123%	106%	118%
22		132%	114%	55%	116%	93%		
45		98%	95%	24%	79%	40%	101%	118%
52+43		85%	102%	175%	149%	106%	104%	138%
49		103%	108%	99%	149%	114%	108%	122%
47+48		108%	135%	95%	157%	209%	107%	123%
44		97%	105%	184%	132%	108%	108%	119%
37+42		87%	101%	130%	116%	96%	111%	117%
41+71		116%	125%	117%	156%	192%	112%	130%
64		109%	101%	77%	106%	75%	110%	125%
40		114%	115%	38%	146%	137%	114%	141%
74		176%	104%	155%			117%	137%
70+76		155%	132%	400%	199%	128%	114%	130%
66+95		140%	117%	450%	209%	172%	116%	132%
91		116%	116%	31%	134%	117%	126%	153%
56+60+89		149%	132%	223%	116%	162%	120%	133%
92+84		149%	104%	90%	134%	70%	128%	145%
101		110%	114%	111%	169%	753%	119%	138%
83		120%	68%	6%	157%	89%	121%	165%
97		195%	124%	38%	154%	115%	129%	156%
87+81		85%	117%	44%	124%	82%	131%	152%
85+136		56%	114%	83%	134%	115%	125%	154%
110+77		163%	117%	152%	168%	125%	139%	146%
82		90%	108%	13%			103%	119%
151		73%	86%	55%	81%	82%	94%	119%
135+144+147+124		87%	96%	33%	94%	19%	98%	127%
149+123+107		77%	89%	100%	92%	87%	97%	127%
118		95%	105%	50%	149%	131%	98%	142%
146		85%	100%	18%	111%	89%	100%	148%
153+132		81%	88%	120%	93%	89%	99%	124%
105		86%	101%	22%	130%	131%	126%	
141		82%	93%	63%	92%	92%	102%	75%
137+176+130		76%	122%	12%	71%	96%	135%	147%
163+138		89%	98%	106%	99%	101%	105%	122%
178+129		84%	94%	42%	104%	73%	108%	133%
187+182		75%	89%	123%	84%	82%	104%	125%
183		86%	95%	77%	99%	97%	106%	127%
185		91%	97%	20%	103%	103%	105%	125%
174		86%	94%	124%	95%	106%	109%	123%
177		91%	96%	68%	98%	78%	110%	129%
202+171+156		90%	95%	36%	100%	100%	108%	135%
180		97%	96%	253%	98%	98%	108%	125%
199		97%	94%	20%	96%	98%	120%	115%
170+190		105%	102%	72%	107%	109%	112%	114%
198		103%		5%	96%	89%	110%	
201		93%	98%	177%	96%	96%	110%	121%
203+196		96%	99%	180%	100%	98%	111%	120%
195+208		106%	105%	38%	109%	112%	115%	109%
194		106%	108%	85%	106%	108%	115%	116%
206		94%	104%	35%	111%	107%	112%	113%
Total PCBs		103%	104%	99%	120%	118%	112%	128%
Homologue Group								
3		100%	104%	115%	123%	109%	112%	115%
4		111%	105%	157%	133%	120%	102%	119%
5		105%	99%	53%	132%	157%	112%	134%
6		72%	86%	56%	81%	73%	92%	110%
7		89%	95%	98%	99%	94%	108%	125%
8		86%	86%	68%	88%	88%	99%	102%
9		94%	104%	35%	111%	107%	112%	113%
Corresponding Laboratory Blank	3/11/98	6/1/98	7/1/98	7/19/98	9/14/98	9/24/98	10/19/98	2/17/99
Surrogate Recoveries (%)								
#65		103%	96%	81%	96%	65%	52%	103%
#166		105%	102%	95%	102%	96%	61%	79%

B.2. Matrix Spikes Gas Phase PCBs (MS-PUF)
Surrogate Corrected Recoveries (%)

PCB Congener	MS-PUF 3/10/98	MS-PUF 3/25/98	MS-PUF 7/2/98	MS-PUF 7/12/98	MS-PUF 7/15/98	MS-PUF 7/18/98	MS-PUF 9/30/98	MS-PUF 2/15/99	MS-PUF 3/8/99	MS-PUF 9/7/99	MS-PUF 11/22/99
18	93%	103%	101%	109%	111%	98%	113%	86%	104%	110%	87%
17+15	89%	104%	82%	82%	84%	98%	103%	64%	98%	114%	83%
16+32	102%	124%	59%	109%	99%	87%	102%	106%	108%	133%	106%
31	117%	105%	105%	115%	121%	103%	118%	102%	107%	99%	111%
28	88%	87%	26%	49%	92%	101%	106%	90%	104%	110%	99%
21+33+53	106%	102%	102%	117%	113%	88%	111%	251%	101%	133%	113%
22	95%	136%	209%	101%	97%	77%	94%	0%	0%	110%	123%
45	134%	199%	124%	91%	120%	83%	84%	154%	110%	97%	87%
52+43	116%	102%	107%	111%	100%	101%	110%	110%	108%	134%	155%
49	143%	108%	138%	116%	114%	103%	125%	90%	106%	148%	166%
47+48	126%	106%	147%	120%	87%	107%	116%	91%	104%	120%	137%
44	128%	116%	104%	111%	87%	100%	112%	91%	106%	117%	127%
37+42	112%	108%	79%	93%	0%	94%	107%	87%	104%	121%	116%
41+71	142%	113%	114%	123%	117%	102%	121%	114%	101%	120%	136%
64	133%	108%	94%	116%	93%	102%	114%	91%	110%	113%	116%
40	151%	107%	84%	108%	114%	82%	118%	89%	103%	112%	94%
74	115%	113%	235%	163%	102%	103%	102%		111%	113%	144%
70+76	136%	113%	111%	120%	100%	100%	113%	89%	111%	110%	140%
66+95	126%	107%	100%	122%	99%	98%	107%	127%	112%	112%	138%
91	173%	116%	125%	127%	64%	106%	107%	140%	93%	101%	132%
56+60+89	132%	103%	90%	110%	87%	134%	107%	52%	105%	105%	121%
92+84	146%	86%	88%	171%	0%	101%	141%	98%	102%	126%	131%
101	146%	107%	139%	116%	95%	110%	114%	90%	106%	132%	159%
83	188%	112%	110%	129%	226%	115%	135%	0%	134%	511%	234%
97	159%	110%	111%	111%	97%	106%	113%	102%	115%	166%	181%
87+81	235%	168%	176%	99%	60%	104%	81%	78%	0%	171%	325%
85+136	152%	150%	116%	109%	65%	104%	113%	84%	107%	33%	48%
110+77	172%	125%	102%	126%	101%	112%	136%	107%	116%	123%	144%
82	99%	94%	81%	111%	136%	78%	106%	101%	102%	109%	130%
151	100%	103%	113%	112%	89%	101%	106%	87%	106%	106%	112%
135+144+147+124	103%	103%	109%	106%	100%	104%	106%	86%	103%	112%	110%
149+123+107	99%	103%	110%	107%	100%	105%	106%	88%	107%	110%	111%
118	89%	101%	105%	103%	86%	94%	103%	87%	104%	123%	125%
146	117%	116%	107%	89%	94%	92%	101%	70%	108%	120%	120%
153+132	100%	105%	108%	108%	96%	105%	105%	88%	18%	108%	115%
105	81%	124%	77%	121%	88%	66%	90%	75%	44%	99%	88%
141	102%	109%	111%	111%	76%	103%	108%	86%	108%	106%	112%
137+176+130	101%	101%	108%	87%	0%	99%	91%	99%	119%	102%	94%
163+138	114%	108%	109%	95%	108%	105%	102%	84%	107%	107%	113%
178+129	102%	107%	107%	105%	59%	100%	102%	84%	103%	99%	117%
187+182	140%	133%	149%	146%	112%	140%	144%	93%	108%	81%	112%
183	105%	104%	106%	108%	102%	109%	107%	83%	104%	106%	120%
185	96%	106%	72%	103%	93%	113%	106%	81%	108%	105%	114%
174	107%	107%	111%	105%	74%	106%	109%	86%	105%	109%	129%
177	107%	111%	110%	107%	74%	107%	109%	86%	108%	112%	120%
202+171+156	94%	128%	110%	103%	0%	104%	109%	89%	109%	107%	134%
180	110%	109%	112%	109%	90%	107%	111%	88%	108%	99%	162%
199	90%	117%	116%	104%	0%	107%	110%	78%	105%	102%	108%
170+190	109%	109%	94%	110%	61%	101%	113%	90%	104%	102%	107%
198	204%	109%	96%	91%	0%	88%	93%	0%	0%	0%	0%
201	113%	107%	112%	107%	79%	108%	112%	88%	105%	104%	115%
203+196	117%	106%	113%	110%	56%	109%	112%	90%	107%	105%	115%
195+208	102%	106%	111%	112%	98%	104%	116%	90%	100%	108%	115%
194	89%	111%	115%	108%	102%	105%	114%	86%	104%	102%	109%
206	65%	121%	133%	105%	0%	105%	117%	77%	98%	109%	116%
Total PCBs	120%	113%	111%	110%	84%	102%	110%	89%	98%	117%	123%
Homologue Group											
3	100%	109%	95%	97%	90%	93%	107%	98%	91%	116%	105%
4	122%	107%	111%	109%	94%	93%	102%	92%	99%	108%	120%
5	137%	108%	103%	110%	85%	91%	103%	80%	85%	141%	141%
6	93%	94%	97%	90%	74%	91%	92%	76%	86%	97%	99%
7	109%	111%	108%	112%	83%	111%	112%	86%	106%	102%	122%
8	101%	98%	97%	92%	42%	91%	96%	65%	79%	79%	87%
9	65%	121%	133%	105%	0%	105%	117%	77%	98%	109%	116%
Surrogate Recoveries (%)											
#65	118%	100%	83%	101%	78%	97%	101%	86%	92%		
#166	95%	107%	88%	102%	89%	99%	99%	93%	98%		

B.3. Matrix Spikes PCBs GF/F (MS-GFF)
Surrogate Corrected Recoveries (%)

PCB Congener	MS-GFF 8/10/98
18	111%
17+15	90%
16+32	100%
31	155%
28	103%
21+33+53	122%
22	110%
45	97%
52+43	130%
49	123%
47+48	113%
44	110%
37+42	100%
41+71	151%
64	103%
40	125%
70+76	180%
66+95	162%
91	108%
56+60+89	135%
92+84	99%
101	127%
83	140%
97	144%
87+81	121%
85+136	141%
110+77	131%
82	74%
151	88%
135+144+147+124	104%
149+123+107	95%
118	115%
146	112%
153+132	95%
105	139%
141	96%
137+176+130	79%
163+138	103%
178+129	95%
187+182	88%
183	101%
185	87%
174	94%
177	97%
202+171+156	105%
180	97%
199	102%
170+190	89%
198	106%
201	93%
203+196	97%
195+208	99%
194	99%
206	87%
Total PCBs	110%
Homologue Group	
3	111%
4	119%
5	112%
6	86%
7	93%
8	88%
9	87%
Surrogate Recoveries (%)	
#65	72%
#166	78%

B.4. Matrix Spikes PCBs XAD (MS-Precip)
Surrogate Corrected Recoveries (%)

PCB Congener	MS-XAD 9/28/98
18	101%
17+15	81%
16+32	90%
31	127%
28	82%
21+33+53	104%
22	108%
45	72%
52+43	113%
49	115%
47+48	127%
44	98%
37+42	82%
41+71	121%
64	90%
40	87%
74	145%
70+76	178%
66+95	147%
91	108%
56+60+89	171%
92+84	125%
101	121%
83	282%
97	109%
87+81	82%
85+136	90%
110+77	112%
82	102%
151	77%
135+144+147+124	85%
149+123+107	85%
118	86%
146	79%
153+132	88%
105	119%
141	89%
137+176+130	65%
163+138	90%
178+129	89%
187+182	82%
183	93%
185	97%
174	88%
177	92%
202+171+156	97%
180	90%
199	94%
170+190	95%
198	88%
201	87%
203+196	93%
195+208	94%
194	91%
206	93%
Total PCBs	104%
Homologue Group	
3	97%
4	113%
5	111%
6	73%
7	91%
8	81%
9	93%
Surrogate Recoveries (%)	
#65	100%
#166	99%

C.1. Field Blanks Particulate Phase
PCBs (FB-QFF)
Surrogate Corrected Concentrations
(ng)

PCB Congener	NB FB-QFF 10/6/97	NB FB-QFF 10/17/97 (Passive 4days)	NB FB-QFF 10/28/97	NB FB-QFF 11/3/97	NB FB-QFF 11/25/97	NB FB-QFF 1/12/98	NB FB-QFF 1/23/98	NB FB-QFF 7/7/98	NB FB-QFF 7/10/98	NB FB-QFF 10/19/98	NB FB-QFF 2/22/99	SH FB-QFF 1/29/98	SH FB-QFF 2/10/98	SH FB-QFF 6/22/98
18	0.19	0.20	0.30	0.29	0.076		0.041	0.36		0.029	0.026	0.34	0.091	0.025
17+15	0	0.14	0.21	0.088	0.021		0.0090	0.090		0.0050	0.075	0.15	0.038	0
16+32	0	0	0.34	0.24	0.055		0	0.48		0.042	0	0.21	0	0.12
31	0.21	0.21	0.35	0.22	0.067		0.051	0.42		0	0	0.32	0.13	0
28	0.23	0.21	0.25	0.15	0.037		0.054	0.18		0.070	0.031	0.21	0.037	0
21+33+53	0.054	0.20	0.21	0.24	0.052		0	0.34		0.013	0.029	0.27	0	0
22	0	0.19	0.12	0.046	0.035		0.019	0		0	0	0	0.063	0.18
45	0	0	0.055	0	0		0	0.10		0	0	0	0	0
52+43	0	0.069	0.11	0	0.072		0.026	0.35		0.044	0	0.22	0.027	0.13
49	0.072	0.098	0.13	0.064	0.021		0.022	0.16		0.0061	0	0.15	0.032	0.0067
47+48	0.072	0.084	0.098	0.087	0.020		0	0.14		0.010	0.036	0.28	0.038	0
44	0.62	1.2	1.7	0.59	0.058		0.037	0.51		0.013	0.023	1.3	0.087	0
37+42	0	0	0	0	0		0.025	0.28		0.0074	0.039	0	0	0.023
41+71	0.053	0.043	0.037	0.059	0		0.0047	0.058		0	0.021	0.073	0	0
64	0.094	0.095	0.11	0.11	0.018		0.0096	0.10		0.0013	0.0049	0.14	0.0058	0
40	0	0	0	0	0		0	0		0	0	0	0	0.021
74	0.11	0.18	0.12	0.052	0		0.0041	0.024		0	0	0	0	0
70+76	0	0.19	0.27	0.12	0.041		0.058	0.37		0.0095	0.011	0.27	0.018	0
66+95	0.12	0	0.12	0.52	0		0.28	0.64		0.045	0	1.0	0	0
91	0	0.030	0.032	0.036	0		0.011	0.060		0	0	0	0	0.0070
56+60+89	0.089	0	0	0	0		0.019	0		0.0049	0	0	0	0
92+84	0	0.16	0	0	0		0.060	0.23		0.026	0.052	0.45	0	0
101	0.069	0.18	0.15	0.065	0		0.048	0.21		0.027	0.032	0.46	0.054	0
83	0	0	0	0	0		0	0.024		0	0	0.021	0	0
97	0.035	0.065	0.030	0.042	0.0071		0.0046	0.070		0.0047	0.0073	0.095	0.0028	0
87+81	0.069	0.14	0.100	0.13	0		0	0		0	0	0.14	0.063	0
85+136	0	0	0	0.036	0		0.021	0.12		0.0086	0.0094	0.049	0	0
110+77	0.16	0.26	0.12	0.22	0		0.053	0.15		0.017	0.023	0.43	0.034	0
82	0	0	0.0086	0	0		0.0044	0		0	0.016	0.045	0.0055	0
151	0	0.076	0.028	0	0		0.0043	0.055		0.0022	0.0048	0.066	0.0069	0.0022
135+144+147+124	0.015	0.061	0.044	0.030	0		0	0		0	0	0.095	0	0
149+123+107	0.048	0.26	0.079	0.13	0		0.023	0.12		0	0	0.19	0.016	0.0083
118	0	0.19	0.048	0.13	0		0	0		0.0049	0	0	0.015	0.0055
146	0	0.042	0.016	0	0		0.0024	0		0.0014	0	0	0	0
153+132	0.16	0.70	0.16	0.20	0.022		0.010	0.13		0.0088	0.0076	0.24	0	0.0060
105	0	0.17	0	0	0		0	0		0	0	0	0	0
141	0.013	0	0.020	0.044	0.0056		0.0033	0		0.0013	0.0029	0.055	0.0022	0
137+176+130	0	0.055	0	0	0		0	0		0	0	0	0	0
163+138	0.12	0.46	0.087	0.28	0		0.024	0		0.0076	0.018	0.28	0.022	0
178+129	0	0.058	0	0	0		0	0		0	0	0	0	0
187+182	0.014	0.39	0.089	0.062	0		0	0		0	0.0056	0.067	0.037	0
183	0.024	0.19	0.022	0.032	0		0	0		0	0.0039	0	0	0
185	0	0.054	0.0072	0	0		0.0015	0		0	0	0	0.0045	0
174	0	0.26	0.020	0.067	0		0.0029	0		0	0.0023	0.038	0.011	0
177	0	0.13	0	0.011	0		0	0		0	0.0038	0	0	0
202+171+156	0.027	0.051	0.0079	0	0		0	0		0.0023	0.0062	0.0099	0	0
180	0.038	0.68	0.038	0.15	0		0.0040	0		0.0014	0	0.080	0.013	0
199	0	0	0	0	0		0	0		0	0.0057	0	0	0
170+190	0.050	0.39	0.024	0.048	0		0.0031	0		0	0.032	0.015	0.0042	0
198	0	0	0	0	0		0	0		0	0	0	0	0
201	0	0.44	0.012	0.062	0		0	0		0.0010	0	0.028	0	0
203+196	0.022	0.51	0.017	0.069	0		0	0		0	0	0.030	0	0
195+208	0	0.28	0	0.0030	0		0	0		0	0	0	0	0
194	0	0.21	0	0.044	0		0	0		0	0	0	0	0
206	0	0.19	0	0	0		0	0		0	0	0	0	0
Total PCBs	2.8	9.7	5.7	4.8	0.61		0.94	5.8		0.41	0.53	7.9	0.85	0.53
Homologue Group														
3	0.68	1.1	1.8	1.3	0.34		0.20	2.1		0.17	0.20	1.5	0.36	0.35
4	1.2	1.9	2.7	1.6	0.23		0.46	2.5		0.13	0.095	3.5	0.21	0.16
5	0.33	1.2	0.49	0.66	0.0071		0.20	0.86		0.089	0.14	1.7	0.17	0.012
6	0.35	1.7	0.44	0.69	0.028		0.067	0.30		0.021	0.033	0.93	0.046	0.016
7	0.13	2.2	0.20	0.37	0		0.012	0		0.0014	0.048	0.20	0.070	0
8	0.049	1.5	0.037	0.18	0		0	0		0.0034	0.012	0.068	0	0
9	0	0.19	0	0	0		0	0		0	0	0	0	0
Corresponding Laboratory Blank	10/16/97	11/5/97	11/5/97	3/25/198	2/16/98		3/27/98	7/15/98	7/15/98	2/9/99	4/21/99	2/16/98	3/11/98	7/1/98
Surrogate Recoveries (%)														
#65	84%	111%	92%	94%	97%		98%	80%		87%	81%	93%	86%	87%
#166	94%	149%	104%	111%	103%		100%	85%		87%	97%	109%	105%	95%

C.1. Field Blanks Particulate Phase
PCBs (FB-QFF)
Surrogate Corrected Concentrations
(ng)

PCB Congener	SH FB-QFF 7/7/98	SH FB-QFF 7/11/98	SH FB-QFF 10/19/98	SH FB-QFF 2/13/99	LS FB-QFF 7/7/98	LS FB-QFF 7/10/98	LS FB-QFF 2/22/99	NH FB-QFF 7/10/98
18	0	0.034	0.022	0.024	0.013	0.11	0.017	0.037
17+15	0	0.011	0.0067	0	0.0061	0	0	0.018
16+32	0.019	0.015	0.032	0.052	0.0055	0.18	0.022	0.049
31	0	0.038	0	0	0	0.20	0	0
28	0	0.012	0.020	0.031	0	0	0.043	0
21+33+53	0	0.026	0.011	0.044	0.021	0.068	0.022	0.069
22	0.037	0.025	0	0	0	0.072	0	0.14
45	0	0.0058	0	0	0	0	0	0.011
52+43	0	0.040	0.048	0	0.044	0.061	0	0.043
49	0.0040	0.0032	0.0057	0	0.0043	0.030	0	0.016
47+48	0	0	0.012	0.026	0	0	0	0.022
44	0.0080	0.0057	0.014	0.021	0.0051	0	0	0.027
37+42	0.0073	0.0080	0.0060	0.040	0.0069	0.084	0	0.015
41+71	0	0	0.0059	0	0	0.14	0	0.034
64	0	0.0021	0	0.0080	0	0	0.0026	0.0045
40	0.0059	0.0042	0	0	0	0	0	0
74	0	0	0	0	0	0.083	0	0
70+76	0	0.039	0.0096	0.020	0	0.032	0.012	0.064
66+95	0	0.054	0	0	0.070	0.068	0	0.093
91	0.0044	0.0052	0.0060	0	0	0	0	0.025
56+60+89	0	0.0058	0.0065	0.0068	0.0060	0	0	0.018
92+84	0.0096	0.010	0.023	0.046	0.0068	0	0	0.026
101	0.017	0.017	0.024	0.032	0.017	0.089	0.023	0.032
83	0	0	0.0032	0	0	0	0	0
97	0	0	0.0035	0.0071	0.0026	0.0084	0	0.0033
87+81	0	0	0	0	0	0	0	0
85+136	0	0	0.0046	0	0	0	0.017	0
110+77	0.0097	0.0076	0.019	0.017	0.010	0.018	0	0.026
82	0	0	0	0	0	0	0	0.0023
151	0	0.0020	0	0	0.0016	0.017	0	0.0050
135+144+147+124	0	0	0	0	0	0	0	0
149+123+107	0.0070	0.0036	0.012	0.032	0.0079	0.013	0.030	0.0084
118	0	0.0050	0.0081	0	0	0.023	0.026	0.012
146	0	0	0	0	0	0.0092	0	0
153+132	0.0048	0.0082	0	0.0060	0.0093	0.021	0.0074	0
105	0	0	0	0	0	0	0	0
141	0.0023	0	0.0035	0	0.0026	0	0	0
137+176+130	0	0.026	0	0	0	0	0	0
163+138	0	0	0.017	0.010	0.011	0.014	0.011	0.0084
178+129	0	0	0	0	0	0	0	0
187+182	0	0	0	0.0049	0	0	0.0090	0
183	0	0	0	0	0	0	0	0
185	0	0	0	0	0	0	0	0
174	0	0	0.0040	0	0	0.0028	0	0
177	0	0	0	0	0	0	0	0
202+171+156	0	0	0.0058	0	0	0	0	0
180	0	0	0.0057	0	0.0025	0.024	0	0
199	0	0	0	0	0	0	0	0
170+190	0	0	0.0062	0	0	0	0.021	0.0018
198	0	0	0	0	0	0	0	0
201	0	0	0.0028	0	0	0.0070	0	0
203+196	0	0	0	0	0	0	0	0
195+208	0	0	0	0	0	0	0	0
194	0	0	0.0013	0	0	0	0	0
206	0	0	0	0	0	0	0	0
Total PCBs	0.14	0.41	0.35	0.43	0.25	1.4	0.26	0.82
Homologue Group								
3	0.063	0.17	0.098	0.19	0.052	0.72	0.10	0.33
4	0.018	0.16	0.10	0.082	0.13	0.42	0.014	0.33
5	0.040	0.045	0.092	0.10	0.036	0.14	0.066	0.13
6	0.014	0.039	0.033	0.048	0.032	0.073	0.049	0.022
7	0	0	0.016	0.0049	0.0025	0.027	0.030	0.0018
8	0	0	0.0099	0	0	0.0070	0	0
9	0	0	0	0	0	0	0	0
Corresponding Laboratory Blank	7/17/98	7/24/98	2/9/99	4/12/99	7/19/98	8/6/98	4/21/99	
Surrogate Recoveries (%)								
#65	98%	97%	94%	94%	85%	82%	96%	101%
#166	98%	99%	95%	83%	101%	91%	95%	101%

C.3. Field Blank PCBs Particulate Phase In Water (FB-GFF) Surrogate Corrected Concentrations (ng)

PCB Congener	FB-GFF July-98
18	0.041
17+15	0
16+32	0.016
31	0
28	0
21+33+53	0.071
22	0.13
45	0
52+43	0
49	0
47+48	0
44	0
37+42	0.018
41+71	0
64	0
40	0
74	0
70+76	0
66+95	0.070
91	0
56+60+89	0
92+84	0
101	0.0076
83	0
97	0
87+81	0
85+136	0
110+77	0
82	0
151	0
135+144+147+124	0
149+123+107	0.0030
118	0
146	0
153+132	0
105	0
141	0
137+176+130	0
163+138	0.0075
178+129	0
187+182	0
183	0
185	0
174	0
177	0
202+171+156	0
180	0
199	0
170+190	0
198	0
201	0
203+196	0
195+208	0
194	0
206	0
Total PCBs	0.37
Homologue Group	
3	0.28
4	0.070
5	0.0076
6	0.010
7	0
8	0
9	0
Corresponding Laboratory Blank	8/10/98
Surrogate Recoveries (%)	
#65	34%
#166	37%

C.2. Field Blanks Gas Phase PCBs (FB-PUF) Surrogate Corrected Concentrations (ng)

PCB Congener	NB FB-PUF 10/28/97	NB FB-PUF 11/3/97	NB FB-PUF 11/25/97	NB FB-PUF 12/18/97	NB FB-PUF 1/12/98	NB FB-PUF 7/7/98	NB FB-PUF 7/10/98	NB FB-PUF 10/19/98	NB FB-PUF 2/22/99	SH FB-PUF 1/29/98	SH FB-PUF 2/10/98	SH FB-PUF 6/22/98	SH FB-PUF 7/7/98
18		0	0	0	0	0.62	0.059	0.063	0.071	0	0	0	0
17+15		0	0	0	0	0.18	0.019	0.074	0.15	0	0	0	0
16+32		0	0.047	0	0	0.56	0.050	0.064	0.089	0	0	0	0
31		0	0	0	0	0.51	0.063	0	0	0	0	0	0
28		0	0	0	0	0.19	0.031	0	0.040	0	0	0	0
21+33+53		0	0	0	0	0.36	0.033	0.35	0.17	0	0	0	0
22		0	0	0	0	0.31	0.027	0	0	0	0	0.31	0
45		0	0	0	0	0.37	0.011	0	0.088	0	0	0.30	0
52+43		0	0	0	0	0.66	0.053	0.48	0	0	0	0.11	0
49		0	0	0.063	0	0.22	0.021	0.13	0	0	0.080	0.053	0
47+48		0	0	0	0	0.27	0.019	0	0	0	0	0	0
44		0.80	0	0	0.22	0.38	0	0	0	0	0.33	0	0
37+42		0.075	0	0	0	0.097	0.021	0	0.036	0	0	0.031	0
41+71		0	0	0	0	0	0	0	0	0	0	0	0
64		0	0	0	0	0.078	0	0	0	0	0.078	0	0
40		0	0	0	0	0.15	0.0081	0	0	0	0	0.037	0
74		0	0	0	0	0.068	0	0	0	0	0	0	0
70+76		0	0	0	0	0	0.018	0	0	0	0	0	0
66+95		0	0	0	0	1.2	0.080	0	0	0	0	0	0
91		0	0	0	0	0	0	0	0	0	0	0	0
56+60+89		0	0	0	0	0.13	0.013	0	0	0	0	0	0
92+84		0	0	0	0	0.16	0.021	0	0	0	0	0	0
101		0	0	0	0	0.31	0.029	0	0.047	0	0	0.024	0.067
83		0	0	0	0	0	0.0050	0	0	0	0	0	0
97		0	0	0	0	0	0.0024	0	0	0	0.22	0.053	0
87+81		0.62	0	0.27	0	0	0	0	0	0	0	0	0
85+136		0	0	0	0	0.046	0.0084	0	0	0	0	0	0
110+77		0	0	0	0	0.14	0.013	0	0	0	0.86	0	0
82		0	0	0	0	0.038	0	0	0	0	0	0	0
151		0	0	0	0	0.074	0.0040	0	0	0	0	0.036	0
135+144+147+124		0	0	0	0	0.16	0	0.025	0	0	0	0	0
149+123+107		0	0	0	0	0.22	0.017	0	0	0	0	0	0
118		0	0	0	0.10	0	0	0	0	0	0	0.023	0
146		0	0	0	0	0.067	0.0028	0	0	0	0	0	0
153+132		0	0	0	0	0.22	0.018	0.030	0.020	0	0	0	0
105		0	0	0	0	0	0	0	0	0	0	0	0
141		0	0	0	0	0.017	0.0024	0	0	0	0	0	0
137+176+130		0	0	0	0	0	0	0	0	0	0	0	0
163+138		0	0	0	0	0	0.013	0	0	0	0	0	0
178+129		0	0	0	0	0	0	0	0	0	0	0	0
187+182		0	0	0	0	0	0	0	0	0	0	0	0
183		0	0	0	0	0	0	0	0	0	0	0	0
185		0	0	0	0	0	0	0	0	0	0	0	0
174		0	0	0	0	0.045	0	0	0	0	0	0	0
177		0	0	0	0	0	0	0	0	0	0	0	0
202+171+156		0	0	0	0	0	0	0	0	0	0	0	0
180		0	0	0	0	0	0.0042	0	0	0	0	0	0
199		0	0	0	0	0	0	0	0	0	0	0	0
170+190		0	0	0	0	0	0	0	0	0	0	0	0
198		0	0	0	0	0	0	0	0	0	0	0	0
201		0	0	0	0	0	0	0	0	0	0	0	0
203+196		0	0	0	0	0	0	0	0	0	0	0	0
195+208		0	0	0	0	0.24	0	0	0	0	0	0	0
194		0	0	0	0	0.094	0	0	0	0	0	0	0
206		0	0	0	0	0	0	0	0	0	0	0	0
Total PCBs		1.5	0.047	0.34	0.32	8.2	0.67	1.2	0.71	0	1.6	0.97	0.067
Homologue Group													
3		0.075	0.047	0	0	2.8	0.30	0.55	0.55	0	0	0.34	0
4		0.80	0	0.063	0.22	3.5	0.22	0.61	0.088	0	0.49	0.50	0
5		0.62	0	0.27	0.10	0.69	0.079	0	0.047	0	1.1	0.10	0.067
6		0	0	0	0	0.75	0.057	0.055	0.020	0	0	0.036	0
7		0	0	0	0	0.045	0.0042	0	0	0	0	0	0
8		0	0	0	0	0.34	0	0	0	0	0	0	0
9		0	0	0	0	0	0	0	0	0	0	0	0
Corresponding Laboratory	11/9/97		3/10/98	3/18/98	2/16/98	7/15/98	7/15/98	11/24/98	3/8/99	2/16/98	2/16/97	7/2/98	7/18/98
Surrogate Recoveries (%)													
#65		96%	93%	97%	92%	76%	78%	79%	91%	89%	85%	92%	99%
#166		107%	105%	107%	101%	84%	90%	85%	99%	101%	91%	102%	106%

C.2. Field Blanks Gas Phase PCBs (FB-PUF) Surrogate Corrected Concentrations (ng)

PCB Congener	SH FB-PUF 7/11/98	SH FB-PUF 10/19/98	SH FB-PUF 2/13/99	LS FB-PUF 7/7/98	LS FB-PUF 7/10/99	LS FB-PUF 2/2/99
18	0	0.097	0	0	0	0
17+15	0	0.054	0	0	0	0.11
16+32	0	0	0	0	0	0.16
31	0	0	0	0	0	0
28	0	0	0	0	0	0
21+33+53	0	0	0	0	0	0.059
22	0	0	0	0	0	0
45	0	0	0	0	0	0.061
52+43	0	0.12	0	0	0	0.27
49	0	0	0	0	0	0
47+48	0	0.018	0	0	0	0
44	0	0	0	0	0	0.023
37+42	0	0.020	0	0	0.044	0
41+71	0	0	0	0	0	0.019
64	0	0	0	0	0.10	0
40	0	0	0	0	0	0
74	0	0	0	0	0	0
70+76	0	0	0	0	0	0
66+95	0	0	0	0	0	0
91	0	0	0	0	0.16	0
56+60+89	0	0	0	0	0	0
92+84	0	0	0	0	0	0
101	0	0	0	0	0	0.025
83	0	0	0	0	0	0
97	0	0	0	0	0	0
87+81	0	0	0	0	0	0
85+136	0	0	0	0	0	0
110+77	0	0.019	0	0	0	0
82	0	0	0	0	0	0
151	0	0	0	0	0	0
135+144+147+124	0	0	0	0	0	0.021
149+123+107	0	0	0	0	0	0
118	0	0	0	0	0	0
146	0	0	0	0	0	0
153+132	0	0.033	0	0	0	0.039
105	0	0	0	0	0	0
141	0	0	0	0	0	0
137+176+130	0	0	0	0	0	0.043
163+138	0	0	0	0	0	0
178+129	0	0	0	0	0	0
187+182	0	0	0	0	0	0
183	0	0	0	0	0	0
185	0	0	0	0	0	0
174	0	0	0	0	0	0
177	0	0	0	0	0	0
202+171+156	0	0	0	0	0	0
180	0	0	0	0	0	0
199	0	0	0	0	0	0
170+190	0	0	0	0	0	0
198	0	0	0	0	0	0
201	0	0	0	0	0	0
203+196	0	0	0	0	0	0
195+208	0	0	0	0	0	0
194	0	0	0	0	0	0
206	0	0	0	0	0	0
Total PCBs	0	0.36	0	0	0.31	0.84
Homologue Group						
3	0	0.17	0	0	0.044	0.33
4	0	0.14	0	0	0.10	0.38
5	0	0.019	0	0	0.16	0.025
6	0	0.033	0	0	0	0.10
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
Corresponding Laboratory	7/17/98	11/24/98	3/8/99	7/8/98	7/17/98	3/8/99
Surrogate Recoveries (%)						
#65	99%	89%		97%	96%	90%
#166	101%	93%		95%	106%	94%

C.4. Field Blank PCBs Dissolved Phase In Water (FB-XAD) Surrogate Corrected Concentrations (ng)

PCB Congener	FB-XAD July-98
18	0
17+15	0
16+32	0.28
31	0.12
28	0.19
21+33+53	0.11
22	0
45	0
52+43	0
49	0
47+48	0
44	0.021
37+42	0
41+71	0.096
64	0.0060
40	0
74	0.072
70+76	0.028
66+95	0
91	0
56+60+89	0.039
92+84	0
101	0.12
83	0
97	0.077
87+81	0
85+136	0
110+77	0
82	0.0060
151	0
135+144+147+124	0
149+123+107	0.095
118	0.053
146	0
153+132	0
105	0
141	0.018
137+176+130	0
163+138	0
178+129	0
187+182	0
183	0
185	0
174	0.043
177	0
202+171+156	0.047
180	0
199	0.0081
170+190	0
198	0
201	0.033
203+196	0
195+208	0
194	0
206	0
Total PCBs	1.5
Homologue Group	
3	0.69
4	0.26
5	0.26
6	0.11
7	0.043
8	0.088
9	0
Corresponding Laboratory Blank	7/28/98
Surrogate Recoveries (%)	
#65	115%
#166	101%

Appendix – Chlordanes

I. Chlordane Concentrations: Air, Precipitation, and Water
   A. New Brunswick
      A.1. Air Samples– Particulate Phase (QFFs)
      A.2. Air Samples – Gas Phase (PUFs)
      A.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   B. Sandy Hook
      B.1. Air Samples– Particulate Phase (QFFs)
      B.2. Air Samples – Gas Phase (PUFs)
      B.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   C. Liberty Science Center
      C.1. Air Samples– Particulate Phase (QFFs)
      C.2. Air Samples – Gas Phase (PUFs)
      C.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   D. Lower Hudson River Estuary
      D.1. Air Samples– Particulate Phase (QFFs)
      D.2. Air Samples – Gas Phase (PUFs)
      D.3. Water Samples – Particulate Phase (GF/Fs)
      D.4. Water Samples – Gas Phase (XAD)

II. Laboratory Quality Assurance
   A. Laboratory Blanks
      A.1. Laboratory QFF Blanks – Air Particulate Phase
      A.2. Laboratory PUF Blanks – Air Gas Phase
      A.3. Laboratory XAD Blanks – Precipitation Particulate + Dissolved
      A.4. Laboratory GF/F Blank – Water Particulate Phase
      A.5. Laboratory XAD Blank – Water Dissolved Phase
   B. Matrix Spikes – Performance Standards
      B.1 Matrix Spikes – QFF media
      B.2. Matrix Spikes – PUF media
      B.3. Matrix Spike – GF/F media
      B.4. Matrix Spike – XAD media
   C. Field Blanks
      C.1. Field QFF Blanks – Air Particulate Phase
      C.2. Field PUF Blanks – Air Gas Phase
      C.3. Field GF/F Blank – Water Particulate Phase
      C.4. Field XAD Blank – Water Dissolved Phase

A.1. New Brunswick Particulate Phase Chlordanes (NB-QFF) Concentrations (pg/m³)

Chordane	NB-QFF 10/5/97	NB-QFF 10/8/97	NB-QFF 10/9/97	NB-QFF 10/12/97	NB-QFF 10/13/97	NB-QFF 10/15/97	NB-QFF 10/16/97	NB-QFF 10/21/97	NB-QFF 10/28/97	duplicate NB-QFF 10/29/97
oxychlordane	0.11	NQ	NQ	0.11	0.11	0.13	0.16	0.22	0.14	0.18
trans chlordane	0.41	1.2	1.2	1.2	1.0	0.79	1.2	0.84	0.91	0.56
mc5	0.073	0.40	0.40	0.3	0.29	0.10	0.28	0.18	0.16	0.10
cis chlordane	0.18	1.1	1.1	1.2	0.98	0.53	1.2	0.75	0.71	0.49
trans nonachlor	0.11	0.94	1.0	0.5	0.50	0.28	0.91	0.70	0.63	0.33
cis nonachlor	0.051	0.55	0.69	0.3	0.30	0.23	0.36	0.17	0.29	0.18
Total Chlordanes	0.7	3.7	3.9	3.2	2.8	1.8	3.6	2.5	2.5	1.6
Corresponding Laboratory Blank	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97
Total Suspended Particulate (µg/m³)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A.1. New Brunswick Particulate Phase
Concentrations (pg/m^3)

Chordane	duplicate NB-QFF 10/29/97	duplicate NB-QFF 11/2/97	duplicate NB-QFF 11/2/97	NB-QFF 11/6/97	NB-QFF 11/12/97	NB-QFF 11/18/97	NB-QFF 11/24/97	NB-QFF 11/30/97	NB-QFF 12/6/97	NB-QFF 12/12/97
oxychlordane		0.11	0.11	0.60	2.0	0.52	0.56	0.52	0.67	0.36
trans chlordane		0.50	0.49	2.6	12	5.6	2.2	2.2	3.0	3.0
mc5		0.11	0.10	0.56	1.8	0.91	0.34	0.53	0.41	0.43
cis chlordane		0.45	0.42	2.6	8.0	3.0	1.3	2.5	2.1	2.3
trans nonachlor		0.32	0.34	1.7	5.6	2.8	1.1	1.6	1.7	1.6
cis nonachlor		0.13	0.11	0.56	0.33	1.1	0.25	1.4	0.30	0.32
Total Chlordanes	0.0	1.4	1.4	7.4	26.0	12.5	4.8	7.7	7.1	7.2
Corresponding Laboratory Blank	11/5/97	3/5/98	3/5/98	2/16/98	3/27/98	3/27/98	3/5/98	2/16/98	3/27/98	3/5/98
Total Suspended Particulate (μg/m^3)	NA	22.9	21.7	43.7	35.4	55.4	15.7	52.2	19.9	29.5

A.1. New Brunswick Particulate Phase Concentrations (pg/m^3)

Chordane	NB-QFF 12/18/97	NB-QFF 12/24/97	NB-QFF 12/30/97	NB-QFF 1/5/98	NB-QFF 1/11/98	NB-QFF 1/17/98	NB-QFF 1/23/98	NB-QFF 1/29/98	NB-QFF 2/4/98	NB-QFF 2/10/98
oxychlordane	0.28	0.40	0.51	0.18	1.6		0.46	0.77	0.68	2.5
trans chlordane	5.7	3.7	1.5	1.9	11		3.5	8.2	10	32
mc5	1.0	0.57	0.32	0.50	1.5		0.47	1.2	1.6	4.2
cis chlordane	3.6	2.4	1.0	1.5	8.1		2.2	4.7	6.3	19
trans nonachlor	2.9	1.9	0.58	0.87	6.1		1.7	4.2	5.1	16
cis nonachlor	1.1	0.56	0.10	0.94	0.66		0.34	0.91	1.3	2.5
Total Chlordanes	13.3	8.5	3.2	5.3	25.6	0.0	7.7	17.9	23.1	68.6
Corresponding Laboratory Blank	2/16/98	3/5/98	3/5/98	2/16/98	3/5/98	3/5/98	3/25/98	3/11/98	2/16/98	3/11/98
Total Suspended Particulate (μg/m^3)	57.8	24.8	12.0	1.8	30.0	31.5	7.2	29.4	24.5	68.0

A.1. New Brunswick Particulate Phase Concentrations (pg/m^3)

Chordane	NB-QFF 2/16/98	NB-QFF 2/22/98	NB-QFF 2/28/98	NB-QFF 3/6/98	NB-QFF 3/12/98	NB-QFF 3/18/98	NB-QFF 3/24/98	NB-QFF 3/30/98	NB-QFF 4/5/98	NB-QFF 4/11/98
oxychlordane	0.30	0.42	0.30	0.47	0.40	0.26	0.34	0.11	0.65	1.0
trans chlordane	2.0	2.8	2.5	3.4	3.3	6.4	7.5	1.3	1.2	6.4
mc5	0.43	0.47	0.40	0.70	0.58	0.84	1.0	0.22	0.29	1.0
cis chlordane	1.7	2.2	1.9	2.5	2.7	4.8	5.0	1.6	1.0	4.1
trans nonachlor	1.1	1.5	1.3	2.2	2.0	3.4	3.7	1.4	0.86	3.3
cis nonachlor	0.37	0.52	0.40	0.78	0.23	1.1	1.1	0.20	0.28	0.70
Total Chlordanes	5.2	7.0	6.1	8.9	8.2	15.7	17.3	4.5	3.4	14.5
Corresponding Laboratory Blank	3/11/98	3/11/98	3/11/98	3/11/98	3/27/98	3/27/98	3/27/98	5/27/98	6/1/98	6/29/98
Total Suspended Particulate (µg/m^3)	29.2	23.0	22.8	21.5	19.6	18.8	30.0	60.9	13.9	22.9

A.1. New Brunswick Particulate Phase Concentrations (pg/m³)

Chordane	NB-QFF 4/17/98	NB-QFF 4/23/98	NB-QFF 4/29/98	NB-QFF 5/5/98	NB-QFF 5/11/98	NB-QFF 5/17/98	NB-QFF 5/23/98	NB-QFF 5/29/98	NB-QFF 6/4/98	NB-QFF 6/10/98
oxychlordane	0.41	0.20	0.35	0.19	0.34	0.53	0.60	0.11	0.60	0.35
trans chlordane	0.77	0.44	1.2	1.7	1.9	1.2	3.2	2.6	1.2	1.8
mc5	0.17	0.10	0.53	0.39	0.42	0.38	0.60	0.39	0.14	0.45
cis chlordane	0.54	0.40	0.85	1.4	1.4	1.1	2.1	3.2	1.2	1.4
trans nonachlor	0.55	0.46	0.85	1.0	1.1	1.1	2.1	3.1	1.2	1.2
cis nonachlor	0.16	0.12	0.27	0.43	0.28	0.33	0.42	0.47	0.14	0.28
Total Chlordanes	2.0	1.4	3.1	4.5	4.7	3.9	7.8	9.3	3.8	4.6
Corresponding Laboratory Blank	5/27/98	6/1/98	5/27/98	5/27/98	6/1/98	5/27/98	6/1/98	6/29/98	6/29/98	6/29/98
Total Suspended Particulate (µg/m³)	27.4	25.3	88.1	64.9	48.5	69.0	39.1	196.1	24.4	51.8

A.1. New Brunswick Particulate Phase Concentrations (pg/m^3)

Chordane	NB-QFF 6/16/98	NB-QFF 6/22/98	NB-QFF 6/25/98	day NB-QFF 6/26/98	night NB-QFF 6/26/98	NB-QFF 6/28/98	NB-QFF 7/4/98	10% day NB-QFF 7/5/98	10% night NB-QFF 7/5/98	10% day NB-QFF 7/6/98
oxychlordane	0.11	0.44	0.11	0.55	0.89	0.45	0.12	Too	Sample	Too
trans chlordane	0.82	2.6	5.1	3.7	3.3	2.0	0.69	Little	Missing	Little
mc5	0.11	0.45	0.92	0.71	0.70	0.50	0.17	sample		sample
cis chlordane	0.46	1.8	3.7	2.5	2.3	1.5	0.48	To		To
trans nonachlor	0.43	1.6	3.6	2.3	2.3	1.7	0.46	quantify		quantify
cis nonachlor	0.15	0.41	0.73	0.50	0.64	0.47	0.16			
Total Chlordanes	1.9	6.4	13.0	9.0	8.6	5.6	1.8			
Corresponding Laboratory Blank	7/1/98	7/1/98	7/1/98	7/1/98	7/1/98	8/6/98	8/6/98	7/15/98		7/15/98
Total Suspended Particulate (μg/m^3)	58.3	58.9	41.4	86.2	73.2	28.7	NA	27.8		35.9

A.1. New Brunswick Particulate Phase

Concentrations (pg/m³)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
	night	**day**	**night**	**day**	**night**	**day**	**night**	**day**	**night**	**day**
	NB-QFF	**NB-QFF**	**NB-QFF**	**NB-QFF**	**NB-QFF**	**NB-QFF**	**NB-QFF**	**NB-QFF**	**NB-QFF**	**NB-QFF**
Chordane	**7/6/98**	**7/7/98**	**7/7/98**	**7/8/98**	**7/8/98**	**7/9/98**	**7/9/98**	**7/10/98**	**7/10/98**	**7/11/98**
oxychlordane	Too	Too	Too	Too	Too	Too	Too	Too	Too	Too
trans chlordane	Little	Little	Little	Little	Little	Little	Little	Little	Little	Little
mc5	sample	sample	sample	sample	sample	sample	sample	sample	sample	sample
cis chlordane	To	To	To	To	To	To	To	To	To	To
trans nonachlor	quantify	quantify	quantify	quantify	quantify	quantify	quantify	quantify	quantify	quantify
cis nonachlor										
Total Chlordanes										
Corresponding Laboratory Blank	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98
Total Suspended Particulate (μg/m³)	33.7	46.4	349.8	35.0	36.3	45.4	75.0	50.5	31.0	39.2

A.1. New Brunswick Particulate Phase Concentrations (pg/m^3)

Chordane	NB-QFF 7/16/98	NB-QFF 7/22/98	NB-QFF 7/28/98	NB-QFF 8/3/98	NB-QFF 8/9/98	NB-QFF 8/15/98	NB-QFF 8/21/98	NB-QFF 8/27/98	NB-QFF 9/2/98	NB-QFF 9/4/98
oxychlordane	Sample	0.12	0.11	0.68	0.93	0.95	0.91	1.3	0.34	1.0
trans chlordane	Missing	1.3	1.4	1.9	0.81	2.0	3.5	2.3	2.7	0.79
mc5		0.25	0.29	0.46	0.12	0.08	0.72	0.80	0.47	0.41
cis chlordane		0.83	1.0	1.5	0.67	1.4	2.1	1.8	1.8	0.66
trans nonachlor		0.66	0.82	1.3	0.58	1.1	1.7	1.4	1.5	0.67
cis nonachlor		0.13	0.27	0.26	0.19	0.28	0.33	0.31	0.38	0.16
Total Chlordanes		2.9	3.4	4.9	2.2	4.8	7.7	5.9	6.4	2.3
Corresponding Laboratory Blank		9/14/98	9/14/98	9/14/98	9/18/98	9/24/98	9/24/98	9/18/98	10/15/98	9/24/98
Total Suspended Particulate (μg/m^3)		27.6	70.3	58.1	51.3	36.9	27.7	46.9	47.2	54.1

A.1. New Brunswick Particulate Phase Concentrations (pg/m^3)

Chordane	NB-QFF 9/8/98	NB-QFF 9/13/98	NB-QFF 9/19/98	NB-QFF 9/22/98	NB-QFF 9/25/98	NB-QFF 10/1/98	NB-QFF 10/7/98	NB-QFF 10/10/98	NB-QFF 10/13/98	NB-QFF 10/19/98
oxychlordane	1.2	0.58	0.31	0.30	0.22	0.29	0.80	0.24	0.14	0.38
trans chlordane	2.1	2.9	2.8	1.6	2.1	1.3	1.1	0.54	1.1	1.5
mc5	0.46	0.53	0.37	0.31	0.35	0.22	0.31	0.11	0.18	0.27
cis chlordane	1.4	1.9	1.6	1.3	1.4	0.88	0.80	0.39	0.76	1.1
trans nonachlor	1.3	1.6	1.2	1.0	1.1	0.75	0.66	0.34	0.63	0.95
cis nonachlor	0.34	0.40	0.23	0.33	0.33	0.13	0.22	0.09	0.14	0.32
Total Chlordanes	5.1	6.7	5.7	4.2	4.9	3.1	2.8	1.4	2.6	3.9
Corresponding Laboratory Blank	9/24/98	9/24/98	10/15/98	10/15/98	10/15/98	10/15/98	10/19/98	10/19/98	1/4/99	2/9/99
Total Suspended Particulate (μg/m^3)	24.4	42.0	14.5	52.4	47.9	45.1	44.2	18.5	33.9	55.4

A.1. New Brunswick Particulate Phase Concentrations (pg/m^3)

Chordane	NB-QFF 10/28/98	NB-QFF 11/6/98	NB-QFF 11/15/98	NB-QFF 11/24/98	NB-QFF 12/3/98	NB-QFF 12/12/98	NB-QFF 12/21/98	NB-QFF 12/30/98	NB-QFF 1/8/99	NB-QFF 1/17/99
oxychlordane	0.15	0.45	0.38	0.69	0.17	1.4	0.39	1.2	0.11	0.26
trans chlordane	0.75	3.9	3.7	2.8	1.7	9.0	2.0	4.7	0.59	3.6
mc5	0.11	0.55	0.52	0.41	0.31	1.3	0.37	0.68	0.073	0.59
cis chlordane	0.47	2.2	2.2	2.0	1.3	6.0	1.3	3.6	1.1	2.1
trans nonachlor	0.45	1.9	6.4	1.4	1.1	4.3	1.2	2.4	0.92	1.7
cis nonachlor	0.14	0.36	0.36	0.18	0.39	0.51	0.35	0.17	0.051	0.58
Total Chlordanes	1.8	8.5	12.6	6.4	4.6	19.7	4.9	10.9	2.7	8.0
Corresponding Laboratory Blank	2/9/99	1/4/99	1/4/99	2/17/99	2/17/99	2/17/99	3/2/99	3/2/99	3/2/99	3/2/99
Total Suspended Particulate (μg/m^3)	35.0	40.4	34.1	21.9	58.8	42.9	77.5	24.0	78.2	55.4

A.1. New Brunswick Particulate Phase Concentrations (pg/m^3)

Chordane	NB-QFF 1/26/99	NB-QFF 2/4/99	NB-QFF 2/13/99	NB-QFF 2/22/99	NB-QFF 3/3/99	NB-QFF 3/12/99	NB-QFF 3/21/99	NB-QFF 3/30/99
oxychlordane	0.90	0.45	0.82	1.0	0.43	0.45	0.58	0.67
trans chlordane	9.3	2.2	3.0	7.0	2.6	1.1	2.3	4.6
mc5	1.4	0.39	0.46	1.0	0.4	0.19	0.34	0.64
cis chlordane	6.3	1.3	2.0	5.4	1.7	0.85	1.5	3.0
trans nonachlor	4.3	1.2	1.6	3.4	1.5	0.59	1.4	2.1
cis nonachlor	0.73	0.33	0.21	0.33	0.32	0.07	0.30	0.27
Total Chlordanes	20.7	5.0	6.9	16.1	6.1	2.6	5.5	10.0
Corresponding Laboratory Blank	4/12/99	4/12/99	4/21/99	4/21/99	4/21/99	5/18/99	5/18/99	5/18/99
Total Suspended Particulate (μg/m^3)	45.6	39.7	26.1	34.6	33.0	16.9	45.5	28.1

A.2. New Brunswick Gas Phase Chlordanes (NB-PUF)
Concentrations (pg/m^3)

Compound	NB-PUF 10/5/97	NB-PUF 10/8/97	NB-PUF 10/9/97	NB-PUF 10/12/97	NB-PUF 10/13/97	NB-PUF 10/15/97	NB-PUF 10/16/97	Split PUF top NB-PUF 10/21/97	Split PUF bottom NB-PUF 10/21/97	NB-PUF 10/28/97
oxychlordane	15	NQ	NQ	10	14	11	10	4.6	0.10	3.6
trans chlordane	58	78	111	36	54	40	46	8.6	0.087	7.2
mc5	8.2	11	20	6.0	10	6.1	6.1	1.7	0.028	1.3
cis chlordane	79	69	103	40	67	44	51	12	0.11	9.3
trans nonachlor	46	39	65	18	36	20	30	6.1	0.035	5.1
cis nonachlor	3.7	3.7	8.1	1.9	3.0	1.9	2.3	0.47	0.032	0.30
Total Chlordanes	186	190	287	97	160	106	129	27	0.26	22
Corresponding Laboratory Blank	10/14/97	10/2/97	10/22/97	10/28/97	10/22/97	10/28/97	10/28/97	10/22/97	10/22/97	11/9/97

A.2. New Brunswick Gas Phase Chlo
Concentrations (pg/m^3)

Compound	Duplicate Samples NB-PUF 10/29/97	NB-PUF 10/29/97	Duplicate Samples NB-PUF 11/2/97	NB-PUF 11/2/97	NB-PUF 11/6/97	NB-PUF 11/12/97	NB-PUF 11/18/97	NB-PUF 11/24/97	NB-PUF 11/30/97	NB-PUF 12/6/97
oxychlordane	NQ	NQ	5.8	7.9	6.4	2.6	3.0	3.1	4.0	1.0
trans chlordane	33	31	16	15	27	5.3	13	14	32	4.9
mc5	4.6	4.2	2.1	2.9	4.3	0.8	1.6	2.1	4.8	0.77
cis chlordane	28	28	19	19	27	6.3	14	10	25	4.6
trans nonachlor	17	17	11	11	15	3.1	6.6	5.1	13	2.6
cis nonachlor	1.7	1.3	0.45	1.1	1.1	0.12	0.16	0.64	1.1	0.15
Total Chlordanes	79	78	47	46	71	15	34	30	71	12
Corresponding Laboratory Blank	11/9/97	11/9/97	11/9/97	11/9/97	3/5/98	3/5/98	3/5/98	3/5/98	3/17/98	3/5/98

**A.2. New Brunswick Gas Phase Chlo
Concentrations (pg/m³)**

Compound	NB-PUF 12/12/97	NB-PUF 12/18/97	NB-PUF 12/24/97	NB-PUF 12/30/97	NB-PUF 1/5/98	NB-PUF 1/11/98	NB-PUF 1/17/98	NB-PUF 1/23/98	NB-PUF 1/29/98	NB-PUF 2/4/98
oxychlordane	3.4	3.7	3.0	1.7	11	1.1	1.8	0.10	0.10	0.10
trans chlordane	18	29	13	6.2	78	4.9	15	38	19	12
mc5	1.9	3.1	1.5	1.0	9.2	0.82	1.8	4.5	2.9	2.1
cis chlordane	16	26	15	5.5	69	5.5	14	33	18	12
trans nonachlor	12	13	8	3.1	39	2.4	6.3	20	8.9	5.8
cis nonachlor	0.29	0.35	0.10	0.23	1.6	0.15	0.22	1.6	0.59	0.33
Total Chlordanes	46	68	36	15	187	13	36	93	47	30
Corresponding Laboratory Blank	3/10/98	3/5/98	2/16/98	3/10/98	3/17/98	3/17/98	2/16/98	2/16/98	2/16/98	3/17/98

A.2. New Brunswick Gas Phase Chlo
Concentrations (pg/m³)

Compound	NB-PUF 2/10/98	NB-PUF 2/16/98	NB-PUF 2/22/98	NB-PUF 2/28/98	NB-PUF 3/6/98	NB-PUF 3/12/98	NB-PUF 3/18/98	NB-PUF 3/24/98	NB-PUF 3/30/98	NB-PUF 4/5/98
oxychlordane	2.0	2.4	2.5	8.1	5.3	0.29	5.6	1.4	17	4.3
trans chlordane	18	21	21	39	22	1.8	44	12	87	7.7
mc5	2.0	2.8	3.0	5.3	3.5	0.028	5.1	2.0	16	1.5
cis chlordane	17	17	20	34	21	2.1	41	11	75	7.0
trans nonachlor	7.7	9.2	11	18	13	1.0	22	6.6	53	5.2
cis nonachlor	0.18	0.51	0.62	1.2	0.62	0.05	0.94	0.33	5.6	0.31
Total Chlordanes	43	48	53	93	57	4.9	109	30	220	20
Corresponding Laboratory Blank	3/17/98	3/10/98	3/17/98	3/10/98	3/17/98	3/17/98	5/23/98	5/26/98	5/26/98	5/26/98

A.2. New Brunswick Gas Phase Chlo Concentrations (pg/m^3)

Compound	NB-PUF 4/11/98	NB-PUF 4/17/98	NB-PUF 4/23/98	NB-PUF 4/29/98	NB-PUF 5/5/98	NB-PUF 5/11/98	NB-PUF 5/17/98	NB-PUF 5/23/98	NB-PUF 5/29/98	NB-PUF 6/4/98
oxychlordane	8.1	5.0	7.1	14	21	9.1	27	13	23	13
trans chlordane	22	13	24	48	131	44	81	22	88	14
mc5	3.3	2.4	7.3	0.8	19	7.0	14	3.8	18	3.0
cis chlordane	20	11	19	31	106	37	73	18	68	13
trans nonachlor	12	9.1	14	20	70	22	50	12	46	11
cis nonachlor	0.7	0.75	0.87	2.2	6.8	2.0	4.6	1.0	5.3	0.77
Total Chlordanes	54	34	58	101	314	105	208	53	208	38
Corresponding Laboratory Blank	5/23/98	5/23/98	5/26/98	5/26/98	5/23/98	5/23/98	6/15/98	6/15/98	6/15/98	6/15/98

A.2. New Brunswick Gas Phase Chlo
Concentrations (pg/m³)

Compound	NB-PUF 6/10/98	NB-PUF 6/16/98	NB-PUF 6/22/98	NB-PUF 6/25/98	Split PUF day-top NB-PUF 6/26/98	Split PUF day-bottom NB-PUF 6/26/98	night NB-PUF 6/26/98	NB-PUF 6/28/98	NB-PUF 7/4/98	10% day NB-PUF 7/5/98
oxychlordane	7.2	33	29	71	47	1.3	44	19	41	14
trans chlordane	29	94	98	168	113	1.0	199	54	137	20
mc5	5.4	18	18	42	25	0.069	30	11	24	4.6
cis chlordane	24	83	95	108	103	0.18	163	50	114	21
trans nonachlor	14	64	62	82	81	0.10	110	36	87	17
cis nonachlor	1.6	8.0	6.2	16	9.2	0.032	9.5	3.2	7.1	1.6
Total Chlordanes	69	248	262	375	305	1.3	481	143	346	60
Corresponding Laboratory Blank	7/2/98		7/2/98	7/2/98	7/2/98	7/2/98	8/20/98	8/20/98	7/15/98	7/15/98

A.2. New Brunswick Gas Phase Chlo

Concentrations (pg/m³) Compound	10% night NB-PUF 7/5/98	10% day NB-PUF 7/6/98	10% night NB-PUF 7/6/98	10% day NB-PUF 7/7/98	10% night NB-PUF 7/7/98	10% day NB-PUF 7/8/98	10% night NB-PUF 7/8/98	10% day NB-PUF 7/9/98	10% night NB-PUF 7/9/98	10% day NB-PUF 7/10/98
oxychlordane	11	26	Too Little	31	Too Little	Too Little	Too Little	17	49	23
trans chlordane	41	83	Sample to	84	Sample to	Sample to	Sample to	28	153	26
mc5	5.4	15	Quantify	17	Quantify	Quantify	Quantify	6.4	23	6.8
cis chlordane	35	77		81				29	130	26
trans nonachlor	21	54		60				25	96	26
cis nonachlor	1.0	4.1		5.2				2.3	7.5	2.2
Total Chlordanes	98	218		231				84	387	81
Corresponding Laboratory Blank	7/15/98	7/15/98		7/15/98				7/15/98	7/15/98	7/15/98

A.2. New Brunswick Gas Phase Chlo
Concentrations (pg/m³)

Compound	10% night NB-PUF 7/10/98	10% day NB-PUF 7/11/98	NB-PUF 7/16/98	NB-PUF 7/22/98	NB-PUF 7/28/98	NB-PUF 8/3/98	NB-PUF 8/9/98	NB-PUF 8/15/98	NB-PUF 8/21/98	NB-PUF 8/27/98
oxychlordane	6.8	Too Little	35	43	22	36	24	27	19	36
trans chlordane	14	Sample to	109	88	87	94	98	93	61	159
mc5	2.4	Quantify	21	18	18	17	19	17	7.7	28
cis chlordane	13		97	80	78	87	93	83	43	147
trans nonachlor	9.1		70	65	54	60	63	56	29	91
cis nonachlor	0.56		7.2	6.5	6.2	4.4	5.5	4.8	2.4	7.9
Total Chlordanes	36		283	239	225	245	259	237	135	405
Corresponding Laboratory Blank	7/15/98		8/20/98	8/31/98	8/31/98	8/31/98	9/8/98	9/8/98	9/8/98	9/8/98

A.2. New Brunswick Gas Phase Chlo
Concentrations (pg/m^3)

Compound	NB-PUF 9/2/98	NB-PUF 9/4/98	NB-PUF 9/8/98	NB-PUF 9/13/98	NB-PUF 9/19/98	NB-PUF 9/22/98	NB-PUF 9/25/98	NB-PUF 10/1/98	NB-PUF 10/7/98	NB-PUF 10/10/98
oxychlordane	29	37	23	29	1.0	21	25	7.1	13	14
trans chlordane	95	126	34	103	5.7	80	88	14	66	38
mc5	14	21	6.5	18	0.71	13	13	2.5	10	6.6
cis chlordane	80	118	31	96	5.3	71	72	12	51	33
trans nonachlor	52	75	25	64	3.0	51	47	9.0	31	23
cis nonachlor	3.9	5.6	1.6	4.9	0.06	4.4	3.5	0.62	2.5	2.1
Total Chlordanes	232	323	92	268	14	206	210	36	150	96
Corresponding Laboratory Blank	9/8/98	9/30/98	9/30/98	9/30/98	9/30/98	9/30/98	10/21/98	10/21/98	10/21/98	11/24/98

A.2. New Brunswick Gas Phase Chlo
Concentrations (pg/m³)

Compound	NB-PUF 10/13/98	NB-PUF 10/19/98	NB-PUF 10/28/98	NB-PUF 11/6/98	NB-PUF 11/15/98	NB-PUF 11/24/98	NB-PUF 12/3/98	NB-PUF 12/12/98	NB-PUF 12/21/98	NB-PUF 12/30/98
oxychlordane	12	15	8.5	2.8	4.6	1.1		2.8	10	0.16
trans chlordane	53	32	26	8.1	14	4.2		20	61	0.43
mc5	8.4	4.9	4.0	1.1	1.9	0.69		2.2	8.8	0.075
cis chlordane	44	27	21	7.4	12	3.7		15	47	0.34
trans nonachlor	28	19	15	4.2	7.0	2.3		8.3	32	0.20
cis nonachlor	2.3	1.2	1.2	0.094	0.32	0.23		0.34	2.6	0.032
Total Chlordanes	127	79	63	20	33	10		44	142	1.0
Corresponding Laboratory Blank	11/24/98	11/24/98	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/8/99	2/15/99	2/15/99

A.2. New Brunswick Gas Phase Chlo Concentrations (pg/m³)

Compound	NB-PUF 1/8/99	NB-PUF 1/17/99	NB-PUF 1/26/99	NB-PUF 2/4/99	NB-PUF 2/13/99	NB-PUF 2/22/99	NB-PUF 3/3/99	NB-PUF 3/12/99	NB-PUF 3/21/99	NB-PUF 3/30/99
oxychlordane	0.42		1.6	3.0	0.79	0.10	6.8	0.83	7.5	3.8
trans chlordane	47		6.2	14	1.5	0.32	29	2.0	32	16
mc5	6.6		0.74	1.6	0.23	0.073	4.8	0.55	4.7	2.4
cis chlordane	28		5.3	14	1.2	0.26	25	1.5	26	13
trans nonachlor	20		3.1	9.1	0.68	0.15	18	1.3	19	8.5
cis nonachlor	6.4		0.18	0.29	0.043	0.032	1.4	0.12	1.3	0.63
Total Chlordanes	102		15	37	3.4	0.77	74	5	78	39
Corresponding Laboratory Blank	2/15/99	2/15/99	2/24/99	2/24/99	3/8/99	4/14/99	4/14/99	4/14/99	4/14/99	6/15/99

A.3. New Brunswick Chlordanes in Precipitation (NB-Precip)
Concentrations (pg/L)

Compound	NB-Precip 1/24/98	NB-Precip 2/3/98	NB-Precip 2/11/98	NB-Precip 2/16/98	NB-Precip 2/28/98	NB-Precip 3/12/98	NB-Precip 3/24/98	NB-Precip 4/5/98	NB-Precip 4/17/98	NB-Precip 4/29/98	NB-Precip 5/12/98	NB-Precip 5/23/98
oxychlordane	2.1	2.1	15	15	3.9	2.1	12	2.1	2.1	Sample	4142	14
trans chlordane	750	179	119	62	31	83	80	39	128	Lost	1180	62
mc5	352	86	78	41	15	49	47	35	89		1229	40
cis chlordane	749	187	116	57	27	94	91	53	122		930	57
trans nonachlor	513	116	55	27	14	44	49	26	64		8491	34
cis nonachlor	487	72	9.4	20	13	21	15	13	44		965	19
Total Chlordanes	2499	555	300	167	85	242	235	131	358		11566	171
Corresponding Laboratory Blank	6/10/98	9/1/98	6/10/98	6/10/98	6/10/98	9/1/98	9/1/98	9/1/98	9/1/98		9/28/98	9/28/98
Volume of Precip. (L)	0.1	6.2	3.6	16.9	8.7	13.3	8.6	13.1	7.7		0.050	9.5

A.3. New Brunswick Chlordanes in P
Concentrations (pg/L)

Compound	NB-Precip 6/4/98	NB-Precip 6/17/98	NB-Precip 6/28/98	NB-Precip 7/9/98	NB-Precip 7/22/98	NB-Precip 8/3/98	NB-Precip 8/15/98	NB-Precip 8/21/98	NB-Precip 9/4/98	NB-Precip 9/22/98	NB-Precip 10/10/98	NB-Precip 10/28/98
oxychlordane	15	16	14	112	19	2.1	12	15	43	184	2.1	2.1
trans chlordane	46	55	57	179	110	105	54	61	85	69	88	134
mc5	40	43	43	117	85	65	42	42	68	127	49	71
cis chlordane	48	60	56	194	125	109	60	68	97	95	92	125
trans nonachlor	24	37	34	170	69	71	34	40	64	152	48	71
cis nonachlor	16	30	19	92	27	33	15	23	32	58	23	23
Total Chlordanes	133	182	166	635	331	317	164	191	278	374	252	353
Corresponding Laboratory Blank	9/28/98	10/8/98	10/8/98	10/8/98	10/8/98	10/8/98	11/11/98	11/11/98	11/11/98	11/11/98	3/30/99	3/30/99
Volume of Precip. (L)	21.8	4.4	5.4	0.8	2.3	1.4	4.0	9.2	10.2	10.4	2.0	2.1

A.3. New Brunswick Chlordanes in P
Concentrations (pg/L)

Compound	NB-Precip 11/15/98	NB-Precip 12/3/98	NB-Precip 12/21/98	NB-Precip 1/8/99	NB-Precip 1/26/99	NB-Precip 2/13/99	NB-Precip 3/3/99	NB-Precip 3/21/99
oxychlordane	31	2.1	Column	5.2	6.3	Sample	4.6	2.1
trans chlordane	116	23	Broke	73	55	Combined	54	94
mc5	54	11		30	32	with other	36	47
cis chlordane	102	21		62	52	Sample	48	88
trans nonachlor	62	13		36	30		30	51
cis nonachlor	24	5.7		11	11		14	20
Total Chlordanes	304	63		182	148		146	252
Corresponding Laboratory Blank	3/30/99	3/30/99		4/27/99	4/27/99		6/21/99	6/21/99
Volume of Precip. (L)	4.0	15.2		29.2	8.3		14.1	2.0

B.1. Sandy Hook Particulate Phase Chlordanes (SH-QFF)

Concentrations (pg/m^3)

Compound	SH-QFF 2/4/98	SH-QFF 2/10/98	SH-QFF 2/16/98	SH-QFF 2/22/98	SH-QFF 2/28/98	SH-QFF 3/6/98	SH-QFF 3/12/98	SH-QFF 3/18/98	SH-QFF 3/24/98	SH-QFF 3/30/98	SH-QFF 4/5/98
oxychlordane	NQ	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.39
trans chlordane	4.9	2.2	1.9	1.9	1.9	1.9	1.9	6.9	2.7	1.9	2.4
mc5	0.84	0.35	0.33	0.33	0.33	0.33	0.33	1.2	0.56	0.37	0.43
cis chlordane	2.8	2.0	2.0	2.0	2.0	2.0	2.0	3.9	2.1	2.0	2.0
trans nonachlor	2.2	1.2	0.88	0.88	0.88	0.88	1.3	2.5	1.6	1.4	1.2
cis nonachlor	0.88	0.42	0.13	0.13	0.40	0.15	0.13	0.54	0.52	0.34	0.30
Total Chlordane	10.7	5.8	4.9	4.9	5.1	4.9	5.3	13.8	6.8	5.5	5.9
Corresponding Laboratory Blank	2/16/98	3/11/98	3/11/98	3/11/98	3/11/98	3/11/98	3/27/98	3/27/98	5/27/98	5/27/98	6/1/98
Total Suspended Particulate (μg/m^3)	49.02	36.16	30.92	30.73	31.40	30.29	11.200	35.86	26.75	57.09	16.600

B.1. Sandy Hook Particulate Phase Chlo
Concentrations (pg/m³)

Compound	SH-QFF 4/11/98	SH-QFF 4/17/98	SH-QFF 4/23/98	SH-QFF 4/29/98	SH-QFF 5/5/98	SH-QFF 5/11/98	SH-QFF 5/17/98	SH-QFF 5/23/98	SH-QFF 5/29/98	SH-QFF 6/4/98	SH-QFF 6/10/98
oxychlordane	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
trans chlordane	5.8	1.9	12	1.9	1.9	1.9	1.9	3.9	1.9	2.3	1.9
mc5	0.86	0.33	1.2	0.33	0.33	0.33	0.36	0.69	0.33	0.44	0.33
cis chlordane	3.7	2.0	5.7	2.0	2.0	2.0	2.0	2.6	2.0	2.0	2.0
trans nonachlor	2.7	1.1	4.0	0.88	0.88	0.88	0.90	1.7	0.88	1.1	0.88
cis nonachlor	0.63	1.4	0.54	0.32	0.13	0.13	0.35	0.60	0.26	0.34	0.13
Total Chlordane	13	6.3	22	5.0	4.9	4.9	5.1	8.7	5.0	5.7	4.9
Corresponding Laboratory Blank	5/27/98	6/29/98	6/1/98	5/27/98	6/1/98	6/1/98	5/27/98	6/29/98	6/29/98	6/29/98	6/29/98
Total Suspended Particulate (μg/m³)	29.52	38.21	22.30	96.34	26.90	62.04	55.01	96.53	72.43	46.4900	37.21

B.1. Sandy Hook Particulate Phase Chlo
Concentrations (pg/m³)

Compound	SH-QFF 6/16/98	SH-QFF 6/22/98	SH-QFF 6/28/98	SH-QFF 7/4/98	day SH-QFF 7/5/98	night SH-QFF 7/5/98	day SH-QFF 7/6/98	night SH-QFF 7/6/98	day SH-QFF 7/7/98	night SH-QFF 7/7/98	day SH-QFF 7/8/98
oxychlordane	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
trans chlordane	1.9	1.9	1.9	1.9	3.5	3.6	1.9	1.9	1.9	1.9	2.8
mc5	0.33	0.33	0.33	0.35	0.47	0.33	0.33	0.33	0.33	0.33	0.40
cis chlordane	2.0	2.0	2.0	2.0	2.8	2.7	2.0	2.0	2.0	2.0	2.0
trans nonachlor	0.88	0.88	0.88	0.90	2.1	1.6	0.91	0.88	0.88	0.88	1.4
cis nonachlor	0.17	0.13	0.19	0.36	0.35	0.13	0.25	0.13	0.13	0.13	0.35
Total Chlordane	4.9	4.9	4.9	5.1	8.7	8.0	5.0	4.9	4.9	4.9	6.6
Corresponding Laboratory Blank	7/1/98	7/1/98	8/6/98	8/6/98	8/6/98	7/19/98	8/6/98	7/15/98	7/24/98	7/24/98	7/19/98
Total Suspended Particulate (μg/m³)	63.03	43.63	219.07	74.50	59.25	58.64	52.74	83.79	42.14	39.97	31.77

B.1. Sandy Hook Particulate Phase Chlo

Concentrations (pg/m³)

Compound	night SH-QFF 7/8/98	day SH-QFF 7/9/98	night SH-QFF 7/9/98	day SH-QFF 7/10/98	night SH-QFF 7/10/98	day SH-QFF 7/11/98	SH-QFF 7/16/98	SH-QFF 7/22/98	SH-QFF 7/28/98	SH-QFF 8/3/98	SH-QFF 8/9/98
oxychlordane	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
trans chlordane	1.9	4.7	1.9	1.9	1.9	1.9	2.1	2.0	1.9	1.9	1.9
mc5	0.33	0.96	0.33	0.59	0.33	0.33	0.46	0.40	0.33	0.44	0.33
cis chlordane	2.0	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
trans nonachlor	0.88	1.7	0.88	0.88	0.88	0.88	1.1	1.0	0.88	1.0	0.88
cis nonachlor	0.31	0.63	0.13	0.29	0.14	0.21	0.38	0.31	0.20	0.32	0.13
Total Chlordane	5.0	9.1		5.0	4.9	4.9	5.6	5.3	4.9	5.2	4.9
Corresponding Laboratory Blank	8/6/98	7/17/98		7/17/98	7/17/98	8/6/98	9/14/98	9/14/98	9/14/98	9/18/98	9/14/98
Total Suspended Particulate (μg/m³)	65.78	73.03		47.22	47.66	61.40	52.47	70.21	51.7	56.24	38.25

B.1. Sandy Hook Particulate Phase Chlo Concentrations (pg/m³)

Compound	SH-QFF 8/15/98	SH-QFF 8/21/98	SH-QFF 8/27/98	SH-QFF 9/4/98	SH-QFF 9/13/98	SH-QFF 9/22/98	SH-QFF 10/1/98	SH-QFF 10/10/98	SH-QFF 10/19/98	SH-QFF 10/28/98	SH-QFF 11/6/98
oxychlordane	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
trans chlordane	1.9	2.6	1.9	1.9	1.9	1.9	1.9	17	1.9	1.9	2.0
mc5	0.33	0.71	0.33	0.33	0.33	0.33	0.33	4.6	0.33	0.33	0.40
cis chlordane	2.0	2.0	2.0	2.0	2.0	2.0	2.0	12	2.0	2.0	2.0
trans nonachlor	0.88	1.4	0.88	0.88	0.88	0.88	0.88	8.7	0.88	0.95	1.1
cis nonachlor	0.13	0.53	0.19	0.26	0.13	0.19	0.20	2.3	0.25	0.25	0.33
Total Chlordane	4.9	6.4	4.9	5.0	4.9	4.9	4.9	39.8	5.0	5.0	5.4
Corresponding Laboratory Blank	9/18/98	9/24/98	9/18/98	9/24/98	9/24/98	10/15/98	10/15/98		1/4/99	1/4/99	2/9/99
Total Suspended Particulate (μg/m³)	29.64	75.82	26.91	71.58	43.42	50.04	54.53		42.02	43.54	38.69

B.1. Sandy Hook Particulate Phase Chlo
Concentrations (pg/m³)

Compound	SH-QFF 11/15/98	SH-QFF 11/24/98	SH-QFF 12/3/98	SH-QFF 12/12/98	SH-QFF 12/21/98	SH-QFF 12/30/98	SH-QFF 1/8/99	SH-QFF 1/17/99	SH-QFF 1/26/99	SH-QFF 2/4/99	SH-QFF 2/13/99
oxychlordane	0.35	0.35	0.50	0.35	0.35	0.35	0.35	0.35	1.8	0.35	0.49
trans chlordane	2.7	1.9	3.0	5.1	1.9	2.1	1.9	4.1	9.6	2.7	8.7
mc5	0.45	0.35	0.50	0.80	0.33	0.40	0.33	0.61	1.3	0.36	1.1
cis chlordane	2.0	2.0	2.3	3.1	2.0	2.0	2.0	2.5	6.0	2.0	4.5
trans nonachlor	1.3	1.0	1.7	2.5	0.88	0.88	0.93	2.2	4.2	1.5	3.1
cis nonachlor	0.23	0.27	0.23	0.58	0.16	0.40	0.31	0.63	0.56	0.37	0.57
Total Chlordane	6.2	5.2	7.2	11	4.9	5.3	5.1	9.4	20	6.5	16.9
Corresponding Laboratory Blank		1/4/99	2/17/99	2/17/99	3/2/99	3/2/99	4/12/99	4/12/99	4/12/99	4/12/99	4/12/99
Total Suspended Particulate (μg/m³)		49.21	65.36	54.1	35.20	49.03	62.0	64.83	33.64	63.64	68.52

B.1. Sandy Hook Particulate Phase Chlo
Concentrations (pg/m³)

Compound	SH-QFF 2/22/99	SH-QFF 3/3/99	SH-QFF 3/12/99	SH-QFF 3/21/99	SH-QFF 3/30/99
oxychlordane	Power	Power	Power	Power	Power
trans chlordane	Outage	Outage	Outage	Outage	Outage
mc5					
cis chlordane					
trans nonachlor					
cis nonachlor					
Total Chlordane					
Corresponding Laboratory Blank					
Total Suspended Particulate (μg/m³)					

B.2. Sandy Hook Gas Phase Chlordanes (SH-PUF)

Concentrations (pg/m^3)

Compound	SH-PUF 2/4/98	SH-PUF 2/10/98	SH-PUF 2/16/98	SH-PUF 2/22/98	SH-PUF 2/28/98	SH-PUF 3/6/98	SH-PUF 3/12/98	SH-PUF 3/18/98	SH-PUF 3/24/98	SH-PUF 3/30/98	SH-PUF 4/5/98
oxychlordane	1.0	2.0	1.0	5.1	1.0	1.0	0.091	2.0	0.58	4.1	0.65
trans chlordane	16	23	9	21	17	14	0.93	31	12	35	5.3
mc5	2.2	2.6	1.5	3.0	2.1	2.2	0.20	3.6	1.9	6.5	0.93
cis chlordane	13	19	9.0	20	13	12	0.95	25	11	29	4.7
trans nonachlor	6.2	11	5.1	12	6.9	6.9	0.48	13	5.9	20	2.6
cis nonachlor	0.46	0.56	0.45	0.61	0.57	0.61	0.060	0.83	0.29	1.9	0.19
Total Chlordane	36	53	24	53	37	34	2.4	70	30	86	13
Corresponding Laboratory Blank	2/16/98	3/10/98	3/10/98	3/10/98	3/17/98	3/25/98	3/25/98	3/25/98	5/26/98	5/23/98	5/26/98

B.2. Sandy Hook Gas Phase Chlorda
Concentrations (pg/m³)

Compound	SH-PUF 4/11/98	SH-PUF 4/17/98	SH-PUF 4/23/98	SH-PUF 4/29/98	SH-PUF 5/5/98	SH-PUF 5/11/98	SH-PUF 5/17/98	SH-PUF 5/23/98	split-top SH-PUF 5/29/98	plit-bottom SH-PUF 5/29/98	SH-PUF 6/4/98
oxychlordane	3.0	5.3	3.1	2.8	4.9	4.2	3.8	7.9	16	0.091	3.1
trans chlordane	30	40	25	17	38	36	23	73	99	0.036	16
mc5	4.0	6.4	3.7	2.7	5.8	5.7	4.5	14	16	0.073	3.3
cis chlordane	23	32	20	16	31	32	20	57	84	0.026	15
trans nonachlor	12	21	12	11	18	19	12	32	59	0.017	10
cis nonachlor	0.57	1.9	0.89	0.82	2.3	2.0	1.3	3.8	2.7	0.020	0.87
Total Chlordane	66	95	58	44	90	88	57	165	245	0.10	41
Corresponding Laboratory Blank	6/15/98	5/26/98	5/23/98	5/23/98	5/23/98	5/23/98	5/23/98	6/15/98	6/15/98	6/15/98	6/15/98

B.2. Sandy Hook Gas Phase Chlorda Concentrations (pg/m³)

Compound	SH-PUF 6/10/98	SH-PUF 6/16/98	SH-PUF 6/22/98	SH-PUF 6/28/98	SH-PUF 7/4/98	day SH-PUF 7/5/98	night SH-PUF 7/5/98	day SH-PUF 7/6/98	night SH-PUF 7/6/98	day SH-PUF 7/7/98	night SH-PUF 7/7/98
oxychlordane	2.8	19	5.5	6.4	15	8.3	3.9	4.8		3.3	3.9
trans chlordane	12	98	17	40	94	40	26	23		13	11
mc5	2.5	17	3.7	7.8	15	7.9	4.0	4.5		2.7	2.8
cis chlordane	10	85	21	36	80	39	22	22		16	14
trans nonachlor	5.9	60	13	23	51	22	12	13		10	8
cis nonachlor	1.4	6.4	1.8	3.1	5.8	3.4	1.2	1.9		1.0	1.0
Total Chlordane	29	249	53	101	230	104	61	60		40	33
Corresponding Laboratory Blank	7/2/98	7/2/98	7/2/98	7/12/98	8/20/98	7/30/98	7/18/98	7/30/98	7/30/98	7/10/98	8/31/98

B.2. Sandy Hook Gas Phase Chlordane Concentrations (pg/m³)

Compound	day SH-PUF 7/8/98	night SH-PUF 7/8/98	day SH-PUF 7/9/98	night SH-PUF 7/9/98	day SH-PUF 7/10/98	night SH-PUF 7/10/98	day SH-PUF 7/11/98	SH-PUF 7/16/98	SH-PUF 7/22/98	SH-PUF 7/28/98	SH-PUF 8/3/98
oxychlordane	3.2	7.5	17	22	12	3.4	6.0	25	31	17	0.17
trans chlordane	11	39	69	116	59	21	26	194	148	121	0.62
mc5	2.9	6.1	14	18	12	3.4	6.1	33	29	23	0.13
cis chlordane	11	37	68	98	53	19	26	152	130	100	0.65
trans nonachlor	6	23	48	64	35	11	17	106	98	68	0.44
cis nonachlor	1.0	1.1	4.3	4.8	3.5	0.80	1.9	11	10	8.0	0.020
Total Chlordane	29	99	189	283	151	52	71	464	385	298	1.7
Corresponding Laboratory Blank	7/12/98	7/10/98	7/12/98	7/18/98	7/17/98	7/17/98	7/17/98	8/20/98	8/20/98	8/20/98	

B.2. Sandy Hook Gas Phase Chlorda Concentrations (pg/m³)

Compound	SH-PUF 8/9/98	SH-PUF 8/15/98	SH-PUF 8/21/98	SH-PUF 8/27/98	SH-PUF 9/4/98	SH-PUF 9/13/98	SH-PUF 9/22/98	SH-PUF 10/1/98	SH-PUF 10/10/98	SH-PUF 10/19/98	SH-PUF 10/28/98
oxychlordane	4.4	4.8	24	15	20	13	17	3.1	0.091	4.8	3.3
trans chlordane	32	30	165	97	106	75	116	16	5.1	25	21
mc5	5.7	5.7	25	17	17	13	18	3.0	1.3	4.3	3.3
cis chlordane	28	26	143	88	71	65	94	14	3.9	22	17
trans nonachlor	18	18	91	56	62	44	63	9	2.7	14	11
cis nonachlor	1.6	2.0	7.9	7.1	6.0	4.5	6.1	0.92	0.77	1.2	0.99
Total Chlordane	79	76	406	248	246	188	279	40	12	62	50
Corresponding Laboratory Blank	8/31/98	8/31/98	9/8/98	9/8/98	9/30/98	9/30/98	9/30/98	10/21/98		11/24/98	11/24/98

B.2. Sandy Hook Gas Phase Chlorda
Concentrations (pg/m^3)

Compound	SH-PUF 11/6/98	SH-PUF 11/15/98	SH-PUF 11/24/98	SH-PUF 12/3/98	SH-PUF 12/12/98	SH-PUF 12/21/98	SH-PUF 12/30/98	SH-PUF 1/8/99	SH-PUF 1/17/99	SH-PUF 1/26/99	SH-PUF 2/4/99
oxychlordane	0.86	1.2	1.4	5.0	1.7	2.2	2.0	1.2	1.9	Vial Broke	2.5
trans chlordane	5.3	6.4	7.0	37	15	17	27	14	23	Sample	18
mc5	0.84	1.1	1.2	5.3	1.9	2.5	2.9	1.6	2.8	Lost	2.2
cis chlordane	4.7	5.0	6.5	28	12	13	20	10	18		14
trans nonachlor	2.5	2.9	3.8	18	6.8	8.4	12	6.4	10		8.8
cis nonachlor	0.10	0.25	0.21	1.7	0.26	0.87	0.30	0.33	0.35		0.47
Total Chlordane	13	14	17	85	34	39	59	31	52		41
Corresponding Laboratory Blank	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/15/99	2/15/99	2/15/99	2/24/99		2/24/99

B.2. Sandy Hook Gas Phase Chlorda Concentrations (pg/m³)

Compound	SH-PUF 2/13/99	SH-PUF 2/22/99	SH-PUF 3/3/99	SH-PUF 3/12/99	SH-PUF 3/21/99	SH-PUF 3/30/99
oxychlordane	0.65	Power	Power	Power	Power	Power
trans chlordane	5.7	Outage	Outage	Outage	Outage	Outage
mc5	0.70					
cis chlordane	4.6					
trans nonachlor	2.2					
cis nonachlor	0.056					
Total Chlordane	12					
Corresponding Laboratory Blank	3/8/99					

B.3. Sandy Hook Chlordanes in Precipitation (SH-Precip)
Concentrations (pg/L)

Compound	SH-Precip 2/3/98	SH-Precip 2/16/98	SH-Precip 2/28/98	SH-Precip 3/15/98	SH-Precip 3/24/98	SH-Precip 4/6/98	SH-Precip 4/22/98	SH-Precip 5/12/98	SH-Precip 5/23/98	SH-Precip 6/4/98
oxychlordane	4.7	2.1	2.1	2.1	2.1	2.1		608	51	4.3
trans chlordane	47	37	21	59	72	78		3219	237	38
mc5	32	30	13	33	26	46		1490	173	31
cis chlordane	56	48	25	57	60	81		2620	231	39
trans nonachlor	28	21	12	25	46	41		1849	116	15
cis nonachlor	13	8.7	6.0	15	13	19		865	67	11
Total Chlordane	144	114	64	156	192	218		8553	651	104
Corresponding Laboratory Blank	6/10/98	6/10/98	6/10/98	9/1/98	9/1/98	9/1/98	9/1/98	9/28/98	9/28/98	9/28/98
Volume of Precip (L)	12.1	15.4	14.5	16.2	2.0	16.4	26.2	0.04	7.4	20.0

B.3. Sandy Hook Chlordanes in Prec
Concentrations (pg/L)

Compound	SH-Precip 6/17/98	SH-Precip 6/28/98	SH-Precip 7/16/98	SH-Precip 7/28/98	SH-Precip 8/9/98	SH-Precip 8/21/98	SH-Precip 9/4/98	SH-Precip 9/22/98	SH-Precip 10/10/98	SH-Precip 10/28/98
oxychlordane	14	5.5	2.1	4.7	2.1	2.1	11	2	2.1	2.1
trans chlordane	105	31	335	31	67	72	112	45	51	59
mc5	59	16	184	23	32	48	76	34	26	25
cis chlordane	107	34	255	31	68	79	123	50	49	44
trans nonachlor	56	22	180	14	36	49	71	28	24	30
cis nonachlor	36	12	102	10	19	23	40	16	16	11
Total Chlordane	303	99	872	85	190	222	346	139	140	144
Corresponding Laboratory Blank	9/28/98	10/8/98	10/8/98	10/8/98	10/8/98	11/11/98	11/11/98	11/11/98	3/30/99	3/30/99
Volume of Precip (L)	4.2	5.1	0.4	3.6	2.7	4.8	3.6	10.2	2.4	2.2

B.3. Sandy Hook Chlordanes in Prec
Concentrations (pg/L)

Compound	SH-Precip 11/15/98	SH-Precip 12/3/98	SH-Precip 12/21/98	SH-Precip 1/8/99	SH-Precip 1/26/99	SH-Precip 2/13/99	SH-Precip 3/3/99	SH-Precip 3/21/99
oxychlordane	2.1	2.1	2.1	13	2.1	Sample	4.2	Power
trans chlordane	44	90	27	41	37	Combined	53	Out
mc5	17	35	17	23	26	with other	29	
cis chlordane	38	78	29	42	33	Sample	52	
trans nonachlor	22	36	12	22	15		33	
cis nonachlor	3.2	18	6.7	8.1	8.9		13	
Total Chlordane	106	222	74	113	95		150	
Corresponding Laboratory Blank	3/30/99	3/30/99	3/30/99	4/27/99	4/27/99	4/27/99	6/21/99	
Volume of Precip (L)	4.7	1.5	23.1	22.5	8.3	15.9	13.8	

C.1. Liberty Science Center Particulate Phase Chlordane (LS-QFF)

Concentrations (pg/m³)

Compound	day LS-QFF 7/5/98	night LS-QFF 7/5/98	day LS-QFF 7/6/98	night LS-QFF 7/6/98	day LS-QFF 7/7/98	night LS-QFF 7/7/98	day LS-QFF 7/8/98	night LS-QFF 7/8/98	day LS-QFF 7/9/98	night LS-QFF 7/9/98
oxychlordane	0.37	0.085	1.2	sample	0.61	0.085	0.085	3.4	2.5	1.3
trans chlordane	1.2	5.0	1.4	missing	1.0	1.4	1.6	3.5	1.8	4.1
mc5	0.27	0.90	0.61		0.31	0.25	0.28	0.68	0.63	0.94
cis chlordane	0.84	1.1	1.0		0.75	0.47	0.41	2.3	1.5	2.6
trans nonachlor	0.62	0.60	0.70		0.49	0.29	0.20	1.6	1.0	2.1
cis nonachlor	0.22	1.3	0.24		0.16	0.26	0.28	0.46	0.42	0.64
Total Chlordane	2.8	8.0	3.3	0.0	2.4	2.4	2.5	8.0	4.8	9.4
Corresponding Laboratory Blank	7/24/98	7/17/98	7/24/98	7/19/98	7/24/98	7/17/98	7/17/98	7/24/98	7/19/98	7/19/98
Total Suspended Particulate (μg/m³)	37.9	42.0	63.5	49.7	58.5	37.6	42.9	54.6	81.4	96.9

C.1. Liberty Science Center Particulate Concentrations (pg/m^3)

Compound	day LS-QFF 7/10/98	night LS-QFF 7/10/98	day LS-QFF 7/11/98	LS-QFF 10/7/98	LS-QFF 10/10/98	LS-QFF 10/13/98	LS-QFF 10/19/98	LS-QFF 10/28/98	LS-QFF 11/6/98
oxychlordane	0.68	0.26	sample too	sample	0.085	0.085	0.28	0.085	0.28
trans chlordane	1.6	2.4	short to	missing	0.85	0.62	4.1	1.9	7.0
mc5	0.42	0.39	quantify		0.18	0.12	0.64	0.34	1.1
cis chlordane	1.3	1.5			0.50	0.47	2.7	1.3	4.7
trans nonachlor	0.8	1.0			0.38	0.32	1.9	1.0	3.0
cis nonachlor	0.27	0.33			0.16	0.12	0.75	0.49	0.73
Total Chlordane	3.9	5.3		0.0	1.9	1.5	9.3	4.6	15.4
Corresponding Laboratory Blank	7/24/98	7/24/98	7/17/98	10/19/98	10/19/98	1/4/99	2/9/99	2/9/99	1/4/99
Total Suspended Particulate (μg/m^3)	103	51.4	377	71.5	35.4	35.5	42.0	75.4	38.7

C.1. Liberty Science Center Particulate Concentrations (pg/m³)

Compound	LS-QFF 11/15/98	LS-QFF 11/24/98	LS-QFF 12/3/98	LS-QFF 12/12/98	LS-QFF 12/21/98	LS-QFF 12/30/98	LS-QFF 1/8/99	LS-QFF 1/17/99	LS-QFF 1/26/99	LS-QFF 2/4/99
oxychlordane	0.36	0.29	0.16	0.37	sample	0.62	0.19	0.085	0.37	0.27
trans chlordane	4.7	5.0	3.5	7.9	missing	5.9	4.9	2.4	11.6	3.5
mc5	0.75	0.83	0.74	1.2		0.88	1.0	0.40	2.5	0.69
cis chlordane	2.9	3.4	2.6	4.9		4.6	3.4	1.7	8.1	2.5
trans nonachlor	2.1	2.3	1.9	3.5		2.7	2.4	1.2	5.4	1.8
cis nonachlor	0.58	0.64	0.83	0.86		0.36	0.77	0.54	1.0	0.77
Total Chlordane	10.3	11.4	8.9	17.2	0.0	13.6	11.5	5.9	26.0	8.5
Corresponding Laboratory Blank	1/4/99	2/17/99	2/17/99	2/17/99	2/17/99	3/2/99	3/2/99	3/2/99	4/12/99	4/12/99
Total Suspended Particulate (μg/m³)	47.3	69.4	93.1	39.1	71.4	55.9	53.7	60.0	73.7	61.4

C.1. Liberty Science Center Particulate Concentrations (pg/m^3)

Compound	LS-QFF 2/13/99	LS-QFF 2/22/99	LS-QFF 3/3/99	LS-QFF 3/12/99	LS-QFF 3/21/99	LS-QFF 3/30/99
oxychlordane	1.0	0.46	0.17	0.47	0.37	0.35
trans chlordane	5.5	5.7	0.91	5.4	2.7	6.4
mc5	0.78	0.87	0.13	0.86	0.38	1.1
cis chlordane	2.6	3.4	0.57	3.7	1.9	4.6
trans nonachlor	2.5	2.0	0.46	2.2	1.4	3.1
cis nonachlor	0.31	0.34	0.09	0.42	0.22	0.81
Total Chlordane	10.9	11.4	2.0	11.7	6.2	14.9
Corresponding Laboratory Blank	4/21/99	4/21/99	4/21/99	5/18/99	5/18/99	5/18/99
Total Suspended Particulate (µg/m^3)	37.6	55.0		41.6	51.2	66.6

C.2. Liberty Science Center Gas Phase Chlordane (LS-PUF)

Concentrations (pg/m^3)

Compound	day LS-PUF 7/5/98	night LS-PUF 7/5/98	day LS-PUF 7/6/98	night LS-PUF 7/6/98	day LS-PUF 7/7/98	night LS-PUF 7/7/98	day LS-PUF 7/8/98	night LS-PUF 7/8/98	day LS-PUF 7/9/98	night LS-PUF 7/9/98
oxychlordane	12	10	6.7	7.4	5.3	4.3	4.2	9.2	16	22
trans chlordane	66	109	52	76	44	47	42	87	91	173
mc5	12	15	9.1	12	8.1	8.1	7.1	13	16	27
cis chlordane	62	88	52	63	41	40	36	73	85	148
trans nonachlor	38	49	31	37	25	22	22	41	53	91
cis nonachlor	3.8	3.9	2.4	3.4	2.2	2.1	2.3	3.4	5.3	7.1
Total Chlordane	169	250	137	180	112	111	102	205	234	420
Corresponding Laboratory Blank	7/30/98	7/17/98	7/17/98	7/17/98	7/10/98	7/12/98	7/18/98	7/10/98	7/18/98	7/18/98

C.2. Liberty Science Center Gas Phase Concentrations (pg/m^3)

Compound	day LS-PUF 7/10/98	night LS-PUF 7/10/98	day LS-PUF 7/11/98	LS-PUF 10/7/98	LS-PUF 10/10/98	LS-PUF 10/13/98	LS-PUF 10/19/98	LS-PUF 10/28/98	LS-PUF 11/6/98
oxychlordane	8.8	5.8		1.4	6.1	2.2	4.0	4.9	1.2
trans chlordane	59	52		14	49	19	29	40	12
mc5	11	8.4		3.0	7.3	3.4	4.1	5.7	1.6
cis chlordane	54	43		12	41	17	25	32	10
trans nonachlor	32	23		6.8	25	10	14	21	5
cis nonachlor	3.2	1.8		1.1	2.1	1.2	0.9	1.8	0.23
Total Chlordane	149	119		34	116	48	69	95	28
Corresponding Laboratory Blank	7/12/98	7/12/98		10/21/98	10/21/98	11/24/98	11/24/98	11/24/98	2/8/99

C.2. Liberty Science Center Gas Phase Concentrations (pg/m^3)

Compound	LS-PUF 11/15/98	LS-PUF 11/24/98	LS-PUF 12/3/98	LS-PUF 12/12/98	LS-PUF 12/21/98	LS-PUF 12/30/98	LS-PUF 1/8/99	LS-PUF 1/17/99	LS-PUF 1/26/99	LS-PUF 2/4/99
oxychlordane	2.1	1.2	5.2	2.0	4.3	0.17	1.3	1.4	1.1	2.5
trans chlordane	15	8.7	47	18	44	0.71	22	25	10	29
mc5	2.0	1.3	6.8	2.1	6.2	0.12	2.3	2.5	1.0	3.3
cis chlordane	12	6.6	36	14	34	0.61	16	19	8.2	23
trans nonachlor	7	3.7	23	8	22	0.37	9.0	11	4.3	14
cis nonachlor	0.40	0.24	2	0.26	2	0.080	0.20	0.46	0.11	0.49
Total Chlordane	34	19	109	41	102	2	47	55	22	66
Corresponding Laboratory Blank	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/8/99	2/15/99	2/24/99	2/24/99	2/24/99

C.2. Liberty Science Center Gas Phase Concentrations (pg/m^3)

Compound	LS-PUF 2/13/99	LS-PUF 2/22/99	LS-PUF 3/3/99	LS-PUF 3/12/99	LS-PUF 3/21/99	LS-PUF 3/30/99
oxychlordane	0.41	0.033	1.8	0.64	1.5	1.8
trans chlordane	1.9	0.26	17	3.0	12	16
mc5	0.24	0.06	2.5	0.43	1.8	2.1
cis chlordane	1.9	0.23	14	2.8	10	13
trans nonachlor	1.0	0.16	8.3	1.4	5.6	7.3
cis nonachlor	0.038	0.036	0.63	0.062	0.46	0.31
Total Chlordane	5	1	39	7	27	36
Corresponding Laboratory Blank	2/24/99	3/8/99	4/14/99	4/14/99	4/14/99	4/14/99

C.3. Liberty Science Center Chlordane in Precipitation (LS-Precip) Concentrartions (pg/L)

Compound	LS-Precip 1/8/99	LS-Precip 1/26/99	LS-Precip 2/13/99	LS-Precip 3/3/99	LS-Precip 3/21/99
oxychlordane	2.1	2.1	2.1	2.1	2.1
trans chlordane	103	54	97	65	87
mc5	37	33	51	40	46
cis chlordane	94	45	91	65	88
trans nonachlor	71	21	49	28	49
cis nonachlor	13	12	16	12	18
Total Chlordane	280	131	253	170	243
Corresponding Laboratory Blank	4/27/99	4/27/99	4/27/99	6/21/99	6/21/99
Volume of Precip. (L)	24.5	6.7	10.1	10.2	9.1

D.1. Lower Hudson River Estuary Particulate Phase Chlordane (Raritan Bay: RB-PUF)(New York Harbor: NH-PUF) Concentrations (pg/m^3)

Compound	day RB-QFF 7/5/98	day RB-QFF 7/6/98	day RB-QFF 7/7/98	morning NH-QFF 7/10/98	afternoon NH-QFF 7/10/98
oxychlordane	0.5			0.4	0.4
trans chlordane	2.8	1.1	0.4	2.9	2.9
mc5	0.5	0.3	0.1	0.7	0.5
cis chlordane	2.0	1.1	0.3	2.4	2.1
trans nonachlor	1.4	0.6	0.2	1.7	1.2
cis nonachlor	0.5	0.2	0.1	0.7	0.6
Total Chlordane	6.7	2.9	1.0	7.7	6.8
Corresponding Laboratory Blank	8/6/98	7/17/98	7/24/98	7/19/98	7/19/98
Total Suspended Particulate (μg/m^3)	50	56	60	107	122

D.2. Lower Hudson River Estuary Gas Phase Chlordane (Raritan Bay: RB-PUF)(New York Harbor: NH-PUF) Concentrations (pg/m^3)

Compound	day RB-PUF 7/5/98	day RB-PUF 7/6/98	day RB-PUF 7/7/98	morning NH-PUF 7/10/98	afternoon NH-PUF 7/10/98
oxychlordane	13	10	5	6	6
trans chlordane	64	47	35	32	38
mc5	13	8	7	6	7
cis chlordane	55	42	28	30	36
trans nonachlor	30	22	15	16	21
cis nonachlor	4	3	2	2	2
Total Chlordane	153	114	80	79	98
Corresponding Laboratory Blank	7/10/98	7/30/98	7/10/98	7/17/98	7/18/98

D.3. Lower Hudson River Estuary Water Particulate Phase Chlordane (Raritan Bay: RB-GFF)(New York Harbor: NH-GFF) Concentrations (pg/L)

Compound	day RB-GFF 7/5/98	day RB-GFF 7/6/98	day RB-GFF 7/7/98	morning NH-GFF 7/10/98	afternoon NH-GFF 7/10/98
oxychlordane	2	3	4	0	0
trans chlordane	38	36	28	20	24
mc5	21	21	18	6	7
cis chlordane	43	42	34	18	20
trans nonachlor	23	24	18	13	15
cis nonachlor	12	14	10	7	7
Total Chlordane	116	116	90	57	66
Corresponding Laboratory Blank	8/10/98	8/10/98	8/10/98	8/10/98	8/10/98
Volume of Water (L)	35	39	49	30	23

D.4. Lower Hudson River Estuary Dissolved Phase Chlordanes (Raritan Bay: RB-XAD)(New York Harbor: NH-XAD) Concentrations (pg/L)

Compound	day RB-XAD 7/5/98	day RB-XAD 7/6/98	day RB-XAD 7/7/98	morning NH-XAD 7/10/98	afternoon NH-XAD 7/10/98
oxychlordane	5	6	5	4	7
trans chlordane	16	26	22	50	50
mc5	20	25	22	34	32
cis chlordane	25	34	30	61	58
trans nonachlor	6	9	9	20	21
cis nonachlor	3	5	4	10	10
Total Chlordane	50	73	66	141	138
Corresponding Laboratory Blank	7/28/98	7/28/98	7/28/98	7/28/98	7/28/98
Volume of Water (L)	35	39	49	30	23

C.1. Field Blanks Particulate Phase Chlordanes (FB-QFF)

Mass (pg)

Chlordane	NB FB-QFF 10/6/97	NB FB-QFF 10/28/97	NB FB-QFF 11/3/97	NB FB-QFF 11/25/97	NB FB-QFF 1/12/98	NB FB-QFF 1/23/98	NB FB-QFF 7/7/98	NB FB-QFF 7/10/98	NB FB-QFF 10/19/98	NB FB-QFF 2/22/99	no-flow SH FB-QFF 1/29/98	SH FB-QFF 2/10/98	SH FB-QFF 6/22/98
oxychlordane	29	10			31	12				37	152	21	15
trans chlordane	153	13			9	5				14	871	50	3
mc5	29	13			9	5				9	154	6	2
cis chlordane	69	7			10	6				12	918	12	4
trans nonachlor	42	9			7	5				9	408	4	1
cis nonachlor	20	3			9	6				5	61	5	2
Total Chlordanes	284	32			35	22				86	2565	98	27
Corresponding Laboratory Blank	10/16/97	11/5/97	3/25/98	2/16/98	3/27/98	3/27/98	7/15/98	7/15/98	2/9/99	4/21/99	2/16/98	3/11/98	7/1/98

C.1. Field Blanks Particulate Phase Ch
Mass (pg)

Chlordane	SH FB-QFF 7/7/98	SH FB-QFF 7/11/98	SH FB-QFF 10/19/98	SH FB-QFF 2/13/99	LS FB-QFF 7/7/98	LS FB-QFF 7/10/98	LS FB-QFF 2/22/99	LHRE FB-QFF 7/10/98
oxychlordane	7	10	17	89	6	31	8	22
trans chlordane	17	17	10	4	3	11	16	12
mc5	11	31	8	13	9	1	10	14
cis chlordane	3	11	18	10	3	8	12	8
trans nonachlor	2	3	8	6	1	7	6	4
cis nonachlor	1	2	3	2	1	4	6	3
Total Chlordanes	42	72	65	124	24	62	59	64
Corresponding Laboratory Blank	7/17/98	7/24/98	2/9/99	4/12/99	7/19/98	8/6/98	4/21/99	7/19/98

C.2. Field Blanks Gas Phase Chlordanes (FB-PUF)
Mass (pg)

Chlordane	NB FB-PUF 10/28/97	NB FB-PUF 11/3/97	NB FB-PUF 11/25/97	NB FB-PUF 12/18/97	NB FB-PUF 1/12/98	NB FB-PUF 7/7/98	NB FB-PUF 7/10/98	NB FB-PUF 10/19/98	NB FB-PUF 2/22/99	SH FB-PUF 1/29/98	SH FB-PUF 2/10/98	SH FB-PUF 6/22/98
oxychlordane	sample	39	34	12	27	6	5	7	17	27	26	5
trans chlordane	missing	7	6	8	7	11	8	13	19	7	16	9
mc5		9	7	5	7	2	5	1	11	7	9	2
cis chlordane		11	10	6	8	10	4	8	15	8	11	8
trans nonachlor		8	6	5	6	6	4	7	9	6	5	7
cis nonachlor		12	10	6	8	1	1	4	8	8	3	1
Total Chlordane		38	32	25	29	28	17	32	51	29	35	26
Corresponding Laboratory Blank		11/9/97	3/10/98	3/18/98	2/16/98	7/15/98	7/15/98	11/24/98	3/8/99	2/16/98	2/16/97	7/2/98

C.2. Field Blanks Gas Phase Chlordane
Mass (pg)

Chlordane	SH FB-PUF 7/7/98	SH FB-PUF 7/11/98	SH FB-PUF 10/19/98	SH FB-PUF 2/13/99	LS FB-PUF 7/7/98	LS FB-PUF 7/10/99	LS FB-PUF 2/2/99	NH FB-PUF 7/10/98
oxychlordane	24	12	34					14
trans chlordane	8	13	8					11
mc5	32	5	5					33
cis chlordane	5	9	4					6
trans nonachlor	3	3	4					3
cis nonachlor	6	2	4					4
Total Chlordane	22	27	20	0	0	0	0	24
Corresponding Laboratory Blank	7/18/98	7/17/98	11/24/98	3/8/99	7/8/98	7/17/98	3/8/99	7/28/98

C.3. Field Blank Chlordanes Particulate Phase In Water (FB-GFF)
Mass(pg)

Chlordane	FB-GFF July-98
oxychlordane	33
trans chlordane	14
mc5	9
cis chlordane	10
trans nonachlor	6
cis nonachlor	4
Total Chlordanes	34
Corresponding Laboratory Blank	8/10/98

C.4. Field Blank Chlordanes Dissolved Phase In Water (FB-XAD) Concentrations (pg)

Chlordane	FB-XAD July-98
oxychlordane	7
trans chlordane	9
mc5	2
cis chlordane	8
trans nonachlor	7
cis nonachlor	3
Total Chlordanes	28
Corresponding Laboratory Blank	7/28/98

A.1. Laboratory Blanks Particulate Phase Chlordanes (LB-QFF)
Mass (pg)

Chlordane	LB-QFF 10/16/97	LB-QFF 11/5/97	LB-QFF 2/16/98	LB-QFF 3/5/98	LB-QFF 3/11/98	LB-QFF 3/27/98	LB-QFF 5/27/98	LB-QFF 6/1/98	LB-QFF 6/29/98	LB-QFF 7/1/98
oxychlordane	57	27	23	25	29	15	34	24	31	25
trans chlordane	10	8	6	5	16	6	12	5	5	8
mc5	12	5	6	6	8	7	10	5	5	6
cis chlordane	16	8	6	7	9	8	12	6	5	6
trans nonachlor	11	7	5	5	6	6	10	4	6	5
cis nonachlor	16	7	8	7	7	8	15	6	10	8
Total Chlordane	53	29	25	23	37	29	49	21	26	26

A.1. Laboratory Blanks Particulate Ph
Mass (pg)

Chlordane	LB-QFF 7/15/98	LB-QFF 7/17/98	LB-QFF 7/19/98	LB-QFF 7/24/98	LB-QFF 8/6/98	LB-QFF 9/14/98	LB-QFF 9/18/98	LB-QFF 9/24/98	LB-QFF 10/15/98	LB-QFF 10/19/98
oxychlordane	18	15	49	13	42	44	21	31	16	29
trans chlordane	8	4	19	14	12	6	4	7	8	12
mc5	5	20	8	22	6	33	28	19	27	22
cis chlordane	4	5	3	11	8	8	12	5	10	6
trans nonachlor	4	1	2	4	5	4	3	3	5	4
cis nonachlor	6	4	7	3	8	8	5	7	8	5
Total Chlordane	21	14	31	31	33	27	25	23	31	27

A.1. Laboratory Blanks Particulate Ph
Mass (pg)

Chlordane	LB-QFF 1/4/99	LB-QFF 2/9/99	LB-QFF 2/17/99	LB-QFF 3/2/99	LB-QFF 4/12/99	LB-QFF 4/21/99	LB-QFF 5/18/99
oxychlordane	37	27	28	52	29	27	15
trans chlordane	13	4	13	12	3	7	11
mc5	19	11	13	13	3	14	10
cis chlordane	7	6	10	9	5	6	7
trans nonachlor	2	3	2	2	2	4	6
cis nonachlor	3	4	3	4	4	2	5
Total Chlordane	26	17	28	27	13	19	29

A.2. Laboratory Blanks Gas Phase Chlordanes (LB-PUF)
Mass (pg)

Chlordane	LB-PUF 10/14/97	LB-PUF 10/22/97	LB-PUF 10/28/97	LB-PUF 11/9/97	LB-PUF 2/16/98	LB-PUF 3/5/98	LB-PUF 3/10/98	LB-PUF 3/18/98	LB-PUF 5/23/98	LB-PUF 5/26/98
oxychlordane	63	85	47		12	15	26	13	17	11
trans chlordane	11	15	15		22	11	5	5	6	4
mc5	14	19	8		8	12	6	6	6	3
cis chlordane	18	25	8		16	31	7	7	7	3
trans nonachlor	12	16	3		3	4	5	5	3	3
cis nonachlor	19	25	5		5	5	7	7	4	3
Total Chlordane	60	82	30		45	51	24	24	20	13

A.2. Laboratory Blanks Gas Phase Chl
Mass (pg)

Chlordane	LB-PUF 6/15/98	LB-PUF 7/2/98	LB-PUF 7/10/98	LB-PUF 7/12/98	LB-PUF 7/15/98	LB-PUF 7/17/98	LB-PUF 7/18/98	LB-PUF 7/30/98	LB-PUF 8/20/98	LB-PUF 8/31/98
oxychlordane	25	10	40	16	26	11	8	9	12	18
trans chlordane	28	2	5	3	12	6	16	3	4	6
mc5	12	2	5	3	2	25	18	4	4	6
cis chlordane	23	2	6	3	6	7	10	3	4	6
trans nonachlor	9	1	2	3	11	8	5	3	3	4
cis nonachlor	2	2	3	3	3	3	4	1	3	5
Total Chlordane	62	7	16	12	32	25	35	9	14	21

A.2. Laboratory Blanks Gas Phase Chl
Mass (pg)

Chlordane	LB-PUF 9/8/98	LB-PUF 9/30/98	LB-PUF 10/21/98	LB-PUF 11/24/98	LB-PUF 1/5/99	LB-PUF 2/8/99	LB-PUF 2/15/99	LB-PUF 2/24/99	LB-PUF 3/8/99	LB-PUF 4/14/99
oxychlordane	33	44	8	13	44	18	15	13	23	26
trans chlordane	9	7	14	48	38	6	9	25	15	4
mc5	67	20	22	24	40	9	3	4	9	20
cis chlordane	4	15	6	46	32	7	8	10	15	7
trans nonachlor	3	2	5	21	16	7	3	7	5	10
cis nonachlor	6	2	5	7	6	7	5	4	5	6
Total Chlordane	23	26	30	122	91	27	25	46	40	27

A.2. Laboratory Blanks Gas Phase Chl
Mass (pg)

Chlordane	LB-PUF 6/15/99	LB-PUF 7/12/99	LB-PUF 7/27/99
oxychlordane	6	14	19
trans chlordane	24	14	10
mc5	4	9	7
cis chlordane	16	14	9
trans nonachlor	11	15	2
cis nonachlor	4	5	4
Total Chlordane	55	48	25

A.3. Laboratory Blanks Chlordanes in Precipitation (LB-Precip)
Mass (pg)

Chlordane	LB-Precip 6/10/98	LB-Precip 9/1/98	LB-Precip 9/28/98	LB-Precip 10/8/98	LB-Precip 11/11/98	LB-Precip 3/30/99	LB-Precip 4/27/99
oxychlordane	6		14		8	8	
trans chlordane	33		4		24	9	
mc5	4		4		12	11	
cis chlordane	3		5		21	4	
trans nonachlor	2		3		6	2	
cis nonachlor	1		3		2	2	
Total Chlordane	39		15		54	16	

A.4. Laboratory Blanks Chlordanes Particulate Phase In Water (LB-GFF)
Mass (pg)

Chlordane	LB-GFF 8/10/98
oxychlordane	11
trans chlordane	27
mc5	8
cis chlordane	20
trans nonachlor	4
cis nonachlor	7
Total Chlordane	57.2

A.5. Laboratory Blanks Chlordanes Dissolved Phase In Water (LB-XAD) Mass (pg)

Chlordane	LB-XAD 7/28/98
oxychlordane	12
trans chlordane	3
mc5	3
cis chlordane	36
trans nonachlor	33
cis nonachlor	2
Total Chlordane	74

Appendix – Organochlorine Pesticides (OCs)

I. OC Concentrations: Air, Precipitation, and Water
   A. New Brunswick
      A.1. Air Samples– Particulate Phase (QFFs)
      A.2. Air Samples – Gas Phase (PUFs)
      A.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   B. Sandy Hook
      B.1. Air Samples– Particulate Phase (QFFs)
      B.2. Air Samples – Gas Phase (PUFs)
      B.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   C. Liberty Science Center
      C.1. Air Samples– Particulate Phase (QFFs)
      C.2. Air Samples – Gas Phase (PUFs)
      C.3. Precipitation Samples – Particulate + Dissolved Phase (XAD)
   D. Lower Hudson River Estuary
      D.1. Air Samples– Particulate Phase (QFFs)
      D.2. Air Samples – Gas Phase (PUFs)
      D.3. Water Samples – Particulate Phase (GF/Fs)
      D.4. Water Samples – Gas Phase (XAD)

II. Laboratory Quality Assurance
   A. Laboratory Blanks
      A.1. Laboratory QFF Blanks – Air Particulate Phase
      A.2. Laboratory PUF Blanks – Air Gas Phase
      A.3. Laboratory XAD Blanks – Precipitation Particulate + Dissolved
      A.4. Laboratory GF/F Blank – Water Particulate Phase
      A.5. Laboratory XAD Blank – Water Dissolved Phase
   B. Matrix Spikes – Performance Standards
      B.1 Matrix Spikes – QFF media
      B.2. Matrix Spikes – PUF media
      B.3. Matrix Spike – GF/F media
      B.4. Matrix Spike – XAD media
   C. Field Blanks
      C.1. Field QFF Blanks – Air Particulate Phase
      C.2. Field PUF Blanks – Air Gas Phase
      C.3. Field GF/F Blank – Water Particulate Phase
      C.4. Field XAD Blank – Water Dissolved Phase

A.1. New Brunswick Particulate Phase Organochlorine Pesticides (NB-QFF)
Surrogate Corrected Concentrations (ng/m^3)

Organochlorine Pesticide	NB-QFF 10/5/97	NB-QFF 10/8/97	NB-QFF 10/9/97	NB-QFF 10/12/97	NB-QFF 10/13/97	NB-QFF 10/15/97	NB-QFF 10/16/97	NB-QFF 10/21/97	NB-QFF 10/28/97	duplicate NB-QFF 10/29/97	duplicate NB-QFF 10/29/97	duplicate NB-QFF 11/2/97
HCB	Pesticides	Pesticides	0.15	Pesticides	Pesticides	Pesticides	Pesticides	Pesticides	Pesticides	0.23	Pesticides	0.17
Heptachlor	not	not	0.52	not	not	not	not	not	not	0.090	not	0.10
4,4 DDE	quantified	quantified	41	quantified	quantified	quantified	quantified	quantified	quantified	2.3	quantified	2.1
2,4 DDT			0							0		NQ
4,4 DDT			12							0		NQ
Mirex			0.62							0		0
										0		
Total			54							2.7		2.3
Corresponding Laboratory Blank	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	11/5/97	3/5/98
Total Suspended Particulate (mg/m^3)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	22.9
Surrogate Recoveries (%)												
PCB 65			93 %							156 %		93 %
PCB 166			85 %							124 %		107 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	duplicate NB-QFF 11/2/97	NB-QFF 11/6/97	NB-QFF 11/12/97	NB-QFF 11/18/97	NB-QFF 11/24/97	NB-QFF 11/30/97	NB-QFF 12/6/97	NB-QFF 12/12/97	NB-QFF 12/18/97	NB-QFF 12/24/97	NB-QFF 12/30/97	NB-QFF 1/5/98
HCB	0.19	Pesticides	0.66	1.1	0.21	Pesticides	0	0.20	Pesticides	0.10	0.12	Pesticides
Heptachlor	0.15	not	0.15	0	0.086	not	0	0.081	not	0.13	0.42	not
4,4 DDE	1.9	quantified	4.7	5.1	1.7	quantified	1.7	2.1	quantified	1.8	3.0	quantified
2,4 DDT	NQ		1.1	1.2	NQ		0	NQ		NQ	NQ	
4,4 DDT	NQ		6.6	15	NQ		2.8	NQ		NQ	NQ	
Mirex	0		0	0.12	0.028		0.12	0.011		0.010	0.015	
Total	2.2		13	22	2.0		4.6	2.3		2.1	3.5	
Corresponding Laboratory Blank	3/5/98	2/16/98	3/27/98	3/27/98	3/5/98	2/16/98	3/27/98	3/5/98	2/16/98	3/5/98	3/5/98	2/16/98
Total Suspended Particulate (mg/m^3)	21.7	43.7	35.4	55.4	15.7	52.2	19.9	29.5	57.8	24.8	12.0	1.8
Surrogate Recoveries (%)												
PCB 65	96 %		98 %	106 %	129 %		108 %	91 %		96 %	111 %	
PCB 166	102 %		121 %	127 %	111 %		111 %	95 %		99 %	108 %	

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 1/11/98	NB-QFF 1/17/98	NB-QFF 1/23/98	NB-QFF 1/29/98	NB-QFF 2/4/98	NB-QFF 2/10/98	NB-QFF 2/16/98	NB-QFF 2/22/98	NB-QFF 2/28/98	NB-QFF 3/6/98	NB-QFF 3/12/98	NB-QFF 3/18/98
HCB	0.48	0.31	0.071	0.075	Pesticides	0.30	0.059	0.034	0.014	0.076	0.53	0.097
Heptachlor	0.43	0.98	0.11	0.26	not	1.7	0.094	0.11	0.10	0.045	0	0.21
4,4 DDE	4.8	3.3	1.3	7.4	quantified	8.1	0.78	1.3	0.80	4.4	9.4	1.5
2,4 DDT	NQ	NQ	0.160	1.1		2.4	0.14	0.25	0.19	0	0.71	0.44
4,4 DDT	NQ	NQ	1.5	14		14	2.6	3.7	2.3	8.9	4.8	4.8
Mirex	0.074	0.073	0.042	0.046		0	0.016	0.013	0.0065	0.026	0	0.035
Total	5.8	4.7	3.2	23		26	3.7	5.4	3.5	13	16	7.1
Corresponding Laboratory Blank	3/5/98	3/5/98	3/25/98	3/11/98	2/16/98	3/11/98	3/11/98	3/11/98	3/11/98	3/11/98	3/27/98	3/27/98
Total Suspended Particulate (mg/m^3)	30.0	31.5	7.2	29.4	24.5	68.0	29.2	23.0	22.8	21.5	19.6	18.8
Surrogate Recoveries (%)												
PCB 65	102 %	119 %	102 %	101 %		104 %	100 %	92 %	85 %	100 %	106 %	86 %
PCB 166	110 %	108 %	108 %	101 %		126 %	107 %	113 %	106 %	119 %	121 %	103 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 3/24/98	NB-QFF 3/30/98	NB-QFF 4/5/98	NB-QFF 4/11/98	NB-QFF 4/17/98	NB-QFF 4/23/98	NB-QFF 4/29/98	NB-QFF 5/5/98	NB-QFF 5/11/98	NB-QFF 5/17/98	NB-QFF 5/23/98	NB-QFF 5/29/98
HCB	0.23	0.12	0.063	0.12	0.051	0.12	0.22	0.13	0.058	0.17	0.068	1.8
Heptachlor	0.33	0.049	0.088	0.89	0.059	0.024	0	0	0.10	0.077	0.23	1.4
4,4 DDE	11	3.8	3.4	4.3	3.3	5.0	4.9	1.1	0.76	2.0	3.0	14
2,4 DDT	1.2	0.90	0.67	1.7	0.58	0.75	0.93	0.55	0.28	0.38	0.82	3.9
4,4 DDT	15	6.3	3.3	9.8	3.1	5.7	8.6	2.0	1.9	3.4	4.9	27
Mirex	0.056	0.12	0.057	0	0.028	0.058	0.079	0	0.016	0.068	0.013	0.67
Total	27	11	7.6	17	7.1	12	15	3.7	3.1	6.1	9.0	49
Corresponding Laboratory Blank	3/27/98	5/27/98	6/1/98	6/29/98	5/27/98	6/1/98	5/27/98	5/27/98	6/1/98	5/27/98	6/1/98	6/29/98
Total Suspended Particulate (mg/m^3)	30.0	60.9	13.9	22.9	27.4	25.3	88.1	64.9	48.5	69.0	39.1	196.1
Surrogate Recoveries (%)												
PCB 65	96 %	99 %	93 %	99 %	101 %	93 %	100 %	92 %	98 %	93 %	98 %	87 %
PCB 166	100 %	112 %	101 %	98 %	106 %	103 %	103 %	123 %	109 %	106 %	111 %	102 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 6/4/98	NB-QFF 6/10/98	NB-QFF 6/16/98	NB-QFF 6/22/98	NB-QFF 6/25/98	day NB-QFF 6/26/98	night NB-QFF 6/26/98	NB-QFF 6/28/98	NB-QFF 7/4/98	10% day NB-QFF 7/5/98	10% night NB-QFF 7/5/98	10% day NB-QFF 7/6/98
HCB	0	2.7	0.75	0	0.035	2.1	0	0.16	0.82	0.85	1.2	0.12
Heptachlor	0.56	1.5	0.30	0.68	1.4	0.77	0.51	0.31	0.094	0	0	0
4,4 DDE	3.8	1.2	2.2	1.2	9.9	14	6.1	5.8	1.1	3.8	5.5	7.3
2,4 DDT	1.0	0.18	0.58	0.32	2.4	2.5	2.1	1.1	0.15	0	0	0
4,4 DDT	6.8	2.3	4.2	1.8	11	22	18	0	0	0	0	0
Mirex	0	0	0	0	0	0	0	0.046	0	0	0	0.28
Total	12	7.9	8.0	4.0	25	41	27	7.4	2.2	4.7	6.7	7.7
Corresponding Laboratory Blank	6/29/98	6/29/98	7/1/98	7/1/98	7/1/98	7/1/98	7/1/98	8/6/98	8/6/98	7/15/98		7/15/98
Total Suspended Particulate (mg/m^3)	24.4	51.8	58.3	58.9	41.4	86.2	73.2	28.7	NA	27.8		35.9
Surrogate Recoveries (%)												
PCB 65	91 %	81 %	67 %	90 %	81 %	94 %	101 %	97 %	80 %	80 %	64 %	81 %
PCB 166	116 %	94 %	71 %	109 %	102 %	102 %	105 %	102 %	93 %	85 %	71 %	91 %

A.1. New Brunswick Particulate Phase

Surrogate Corrected Concentrations (ng	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%		
	night	day	night	day	night	day	night	day	night	day		
	NB-QFF	NB-QFF	NB-QFF	NB-QFF	NB-QFF	NB-QFF	NB-QFF	NB-QFF	NB-QFF	NB-QFF	NB-QFF	NB-QFF
Organochlorine Pesticide	**7/6/98**	**7/7/98**	**7/7/98**	**7/8/98**	**7/8/98**	**7/9/98**	**7/9/98**	**7/10/98**	**7/10/98**	**7/11/98**	**7/16/98**	**7/22/98**
HCB	0.24	6.4	Too Little	1.9	1.7	0.29	0.69	0.58	0.92	0.43	0.46	0.39
Heptachlor	0	1.4	Mass to	0	0	0	0	0	0	0	0.20	0.22
4,4 DDE	12	0	Quantify	2.4	3.4	9.7	5.2	2.7	0	8.4	1.6	1.3
2,4 DDT	0.030	0		0	0	0	0	0	0	0	0.65	0.42
4,4 DDT	0	0		0	0	0	0	0	0	0	3.5	1.8
Mirex	0	0		0	0	0.024	0	0	0.095	0.034	0	0
Total	12	7.8		4.3	5.2	10	5.8	3.3	1.0	8.9	6.4	4.1
Corresponding Laboratory Blank	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98		9/14/98
Total Suspended Particulate (mg/m^3)	33.7	46.4	349.8	35.0	36.3	45.4	75.0	50.5	31.0	39.2		27.6
Surrogate Recoveries (%)												
PCB 65	99 %	21 %		68 %	71 %	73 %	69 %	69 %	68 %	33 %	111 %	97 %
PCB 166	88 %	24 %		83 %	86 %	83 %	75 %	87 %	60 %	47 %	92 %	105 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 7/28/98	NB-QFF 8/3/98	NB-QFF 8/9/98	NB-QFF 8/15/98	NB-QFF 8/21/98	NB-QFF 8/27/98	NB-QFF 9/2/98	NB-QFF 9/4/98	NB-QFF 9/8/98	NB-QFF 9/13/98	NB-QFF 9/19/98	NB-QFF 9/22/98
HCB	0.38	0	0.14	1.9	0.13	0.15	0.25	0	3.8	0.088	0.022	0.46
Heptachlor	0.24	0.29	0.24	0	0	0.32	0.29	0	0	0.22	0.18	0.27
4,4 DDE	2.6	1.4	1.7	1.5	1.3	1.4	1.8	1.6	1.1	1.9	0.45	1.7
2,4 DDT	0.56	0.47	0.32	0.65	0.81	0.52	0.72	0.18	0.66	0.47	0.33	0.43
4,4 DDT	4.3	3.3	2.8	4.6	2.0	4.4	3.2	2.1	2.6	1.7	0.95	2.2
Mirex	0	0	0.037	0.0067	0.034	0	0	0	0.028	0.087	0.030	0.061
Total	8.1	5.5	5.3	8.7	4.2	6.8	6.3	3.9	8.2	4.5	2.0	5.1
Corresponding Laboratory Blank	9/14/98	9/14/98	9/18/98	9/24/98	9/24/98	9/18/98	10/15/98	9/24/98	9/24/98	9/24/98	10/15/98	10/15/98
Total Suspended Particulate (mg/m^3)	70.3	58.1	51.3	36.9	27.7	46.9	47.2	54.1	24.4	42.0	14.5	52.4
Surrogate Recoveries (%)												
PCB 65	98 %	95 %	96 %	84 %	83 %	93 %	98 %	75 %	89 %	51 %	98 %	74 %
PCB 166	104 %	111 %	103 %	99 %	97 %	105 %	107 %	92 %	105 %	53 %	101 %	106 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 9/25/98	NB-QFF 10/1/98	NB-QFF 10/7/98	NB-QFF 10/10/98	NB-QFF 10/13/98	NB-QFF 10/19/98	NB-QFF 10/28/98	NB-QFF 11/6/98	NB-QFF 11/15/98	NB-QFF 11/24/98	NB-QFF 12/3/98	NB-QFF 12/12/98
HCB	0.085	0.39	1.1	0.27	0.28	0.55	0.57	0.86	0.41	0.42	0.61	2.7
Heptachlor	0.10	0.30	0.19	0.42	0.20	0.25	0.26	0.87	0.45	0.59	0.75	0.90
4,4 DDE	1.6	2.5	2.4	0.68	1.4	1.7	0.65	2.1	2.1	1.7	1.4	3.8
2,4 DDT	0.45	0.97	0.45	0.16	0.38	0.57	0.20	1.0	0.96	1.9	0.79	1.8
4,4 DDT	3.1	3.6	3.2	0.77	0.93	0.66	4.2	3.0	3.0	1.5	4.9	7.6
Mirex	0.085	0	0	0	0	0.011	0	0	0.013	0.0078	0.12	0.054
Total	5.5	7.8	7.3	2.3	3.2	3.8	5.9	7.9	7.0	6.1	8.5	17
Corresponding Laboratory Blank	10/15/98	10/15/98	10/19/98	10/19/98	1/4/99	2/9/99	2/9/99	1/4/99	1/4/99	2/17/99	2/17/99	2/17/99
Total Suspended Particulate (mg/m^3)	47.9	45.1	44.2	18.5	33.9	55.4	35.0	40.4	34.1	21.9	58.8	42.9
Surrogate Recoveries (%)												
PCB 65	97 %	65 %	72 %	86 %	87 %	82 %	79 %	80 %	74 %	104 %	104 %	108 %
PCB 166	104 %	73 %	84 %	88 %	89 %	89 %	96 %	95 %	86 %	114 %	107 %	88 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 12/21/98	NB-QFF 12/30/98	NB-QFF 1/8/99	NB-QFF 1/17/99	NB-QFF 1/26/99	NB-QFF 2/4/99	NB-QFF 2/13/99	NB-QFF 2/22/99	NB-QFF 3/3/99	NB-QFF 3/12/99	NB-QFF 3/21/99	NB-QFF 3/30/99
HCB	0.24	1.4	0.39	0.38	1.2	0.42	0.32	1.0	0.26	0.24	0.29	0.54
Heptachlor	0.60	1.2	1.7	0.58	3.0	0.52	0.45	1.7	0.39	0.58	0.62	0.64
4,4 DDE	1.7	2.6	0	1.4	6.2	0.99	1.5	2.6	3.2	1.1	1.7	4.9
2,4 DDT	0.77	0.78	0	0.71	3.6	0.55	0.81	1.1	0.75	0.49	0.67	1.6
4,4 DDT	1.3	1.6	0	1.8	4.9	0.41	0	1.1	3.6	1.1	1.7	2.6
Mirex	0.094	0.047	0	0.24	0.13	0.10	0.094	0.18	0.061	0.035	0.065	0.12
Total	4.8	7.7	2.0	5.1	19	3.0	3.2	7.7	8.2	3.5	5.0	10
Corresponding Laboratory Blank	3/2/99	3/2/99	3/2/99	3/2/99	4/12/99	4/12/99	4/21/99	4/21/99	4/21/99	5/18/99	5/18/99	5/18/99
Total Suspended Particulate (mg/m^3)	77.5	24.0	78.2	55.4	45.6	39.7	26.1	34.6	33.0	16.9	45.5	28.1
Surrogate Recoveries (%)												
PCB 65	94 %	80 %	86 %	38 %	81 %	96 %	92 %	90 %	88 %	89 %	93 %	83 %
PCB 166	93 %	107 %	97 %	36 %	82 %	102 %	84 %	113 %	94 %	81 %	90 %	90 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 4/8/99	day early NB-QFF 4/16/99	NB-QFF 4/26/99	NB-QFF 5/5/99	NB-QFF 5/14/99	NB-QFF 5/23/99	NB-QFF 6/1/99	NB-QFF 6/10/99	NB-QFF 6/19/99	NB-QFF 6/28/99	NB-QFF 7/7/99
HCB	0.59	0	0.23	0	0	0	0	0	0.18	0.045	0.16
Heptachlor	0.97	0.21	0.44	0.34	1.0	0.13	0.39	0.34	0.47	0.16	0.23
4,4 DDE	3.4	2.1	1.7	1.4	1.3	0.38	2.1	2.1	1.0	1.5	1.4
2,4 DDT	4.5	0.14	0.046	0	0	0	0	0	0	0.14	0
4,4 DDT	7.4	0	0	0	0	0	0	0	0.16	0.10	0
Mirex	0.21	0	0	0	0	0	0	0	0	0	0
Total	17	2.5	2.4	1.7	2.3	0.52	2.5	2.4	1.9	1.9	1.8
Corresponding Laboratory Blank	5/18/99										
Total Suspended Particulate (mg/m^3)	70.0	37.6	61.0	106.6	54.2	68.0	89.2	67.1	44.8	52.1	50.3
Surrogate Recoveries (%)											
PCB 65	83 %	85 %	66 %	69 %	70 %	71 %	88 %	56 %	78 %	79 %	62 %
PCB 166	88 %	88 %	89 %	82 %	85 %	98 %	94 %	78 %	98 %	98 %	84 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 7/16/99	NB-QFF 7/25/99	NB-QFF 8/3/99	NB-QFF 8/30/99	NB-QFF 9/8/99	NB-QFF 9/15/99	NB-QFF 9/27/99	NB-QFF 10/21/99	NB-QFF 11/2/99	NB-QFF 11/14/99	NB-QFF 11/26/99
HCB	0.16	0.17	0.27	0.13	0.10	0.074	0.061	0.19	0.080	0.36	0.12
Heptachlor	0.26	0.22	0.24	0.21	0.19	0.16	0.19	0.42	0.14	0.23	0.15
4,4 DDE	1.9	1.1	0.98	1.2	0.88	0.46	0.71	1.7	0.94	0.65	0.37
2,4 DDT	0.16	0.063	0	0.062	0.19	0.093	0.097	0.064	0.11	0	0.066
4,4 DDT	0.097	0.18	0.11	0	0.54	0	0	0	0.11	0	0.13
Mirex	0	0	0	0	0	0	0	0	0	0	0
Total	2.6	1.7	1.6	1.6	1.9	0.79	1.1	2.4	1.4	1.2	0.84
Corresponding Laboratory Blank											
Total Suspended Particulate (mg/m^3)	102.1	43.9	33.0	35.2	69.3	50.0	40.6	26.8	24.2	47.5	19.9
Surrogate Recoveries (%)											
PCB 65	88 %	77 %	89 %	74 %	73 %	69 %	62 %	73 %	58 %	63 %	51 %
PCB 166	100 %	85 %	95 %	91 %	81 %	90 %	78 %	78 %	62 %	77 %	59 %

A.1. New Brunswick Particulate Phase
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	NB-QFF 12/8/99	NB-QFF 12/20/99
HCB	0.55	0.18
Heptachlor	0.47	0.088
4,4 DDE	3.6	0.17
2,4 DDT	0.36	0.026
4,4 DDT	2.1	0
Mirex	0	0
Total	7.1	0.46
Corresponding Laboratory Blank		
Total Suspended Particulate (mg/m^3)	39.1	23.0
Surrogate Recoveries (%)		
PCB 65	80 %	73 %
PCB 166	93 %	82 %

A.2. New Brunswick Gas Phase Organochlorine Pesticides (NB-PUF)
Surrogate Corrected Concentrations (ng/m^3)

Organochlorine Pesticide	NB-PUF 10/5/97	NB-PUF 10/8/97	NB-PUF 10/9/97	NB-PUF 10/12/97	NB-PUF 10/13/97	NB-PUF 10/15/97	NB-PUF 10/16/97	Split PUF top NB-PUF 10/21/97	Split PUF bottom NB-PUF 10/21/97
HCB	Pesticides	Pesticides	14	Pesticides	15	38	Pesticides	Pesticides	39
Heptachlor	not	not	168	not	134	102	not	not	457
4,4 DDE	quantified	quantified	470	quantified	110	40	quantified	quantified	923
2,4 DDT			0		0	0			0
4,4 DDT			60		18	8.4			74
Mirex			5.6		4.5	7.9			32
Total			718		282	197			1526
Corresponding Laboratory Blank	10/14/97	10/2/97	10/22/97	10/28/97	10/22/97	10/28/97	10/28/97	10/22/97	10/22/97
Surrogate Recoveries (%)									
PCB 65			320 %		338 %	140 %			59 %
PCB 166			83 %		87 %	87 %			68 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 10/28/97	Duplicate Samples NB-PUF 10/29/97	NB-PUF 10/29/97	Duplicate Samples NB-PUF 11/2/97	NB-PUF 11/2/97	NB-PUF 11/6/97	NB-PUF 11/12/97	NB-PUF 11/18/97	NB-PUF 11/24/97
HCB	Pesticides	15	Pesticides	73	Pesticides	51	89	72	49
Heptachlor	not	151	not	197	not	22	21	65	6
4,4 DDE	quantified	65	quantified	60	quantified	17	5.9	11	3.6
2,4 DDT		3.6		0		NQ	NQ	NQ	NQ
4,4 DDT		10		7.4		NQ	NQ	NQ	NQ
Mirex		0.086		7.0		0.084	0	0.016	0.017
Total		245		344		90	116	148	58
Corresponding Laboratory Blank	11/9/97	11/9/97	11/9/97	11/9/97	11/9/97	3/5/98	3/5/98	3/5/98	3/5/98
Surrogate Recoveries (%)									
PCB 65		185 %		76 %		119 %	114 %	114 %	107 %
PCB 166		108 %		94 %		102 %	106 %	107 %	100 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 11/30/97	NB-PUF 12/6/97	NB-PUF 12/12/97	NB-PUF 12/18/97	NB-PUF 12/24/97	NB-PUF 12/30/97	NB-PUF 1/5/98	NB-PUF 1/11/98	NB-PUF 1/17/98
HCB	36	62	7.0	105	53	N/A	6.6	67	52
Heptachlor	60	11	2.0	81	31		8.1	21	40
4,4 DDE	21	7.6	0.7	18	15		2.6	10	10
2,4 DDT	NQ	0.32	NQ	NQ	NQ		NQ	0.40	0.53
4,4 DDT	NQ	0.97	NQ	NQ	NQ		NQ	1.6	1.6
Mirex	0.21	0	0	0	0.083		0	0	0
Total	117	82	10	204	99		17	100	105
Corresponding Laboratory Blank	3/17/98	3/5/98	3/10/98	3/5/98	2/16/98	3/10/98	3/17/98	3/17/98	2/16/98
Surrogate Recoveries (%)									
PCB 65	45 %	106 %	107 %	112 %	126 %		111 %	106 %	115 %
PCB 166	37 %	111 %	104 %	109 %	108 %		106 %	107 %	107 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 1/23/98	NB-PUF 1/29/98	NB-PUF 2/4/98	NB-PUF 2/10/98	NB-PUF 2/16/98	NB-PUF 2/22/98	NB-PUF 2/28/98	NB-PUF 3/6/98	NB-PUF 3/12/98
HCB	N/A	N/A	N/A	62	68	50	67	64	64
Heptachlor				54	22	24	43	29	11
4,4 DDE				10	12	6.1	25	22	4.3
2,4 DDT				0.47	0	NQ	1.9	NQ	0.084
4,4 DDT				0	3.3	NQ	7.3	NQ	0.66
Mirex				0	0.089	0	0.10	0	0.0089
Total				126	106	80	144	115	80
Corresponding Laboratory Blank	2/16/98	2/16/98	3/17/98	3/17/98	3/10/98	3/17/98	3/10/98	3/17/98	3/17/98
Surrogate Recoveries (%)									
PCB 65				97 %	118 %	104 %	137 %	107 %	105 %
PCB 166				108 %	108 %	105 %	110 %	107 %	107 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 3/18/98	NB-PUF 3/24/98	NB-PUF 3/30/98	NB-PUF 4/5/98	NB-PUF 4/11/98	NB-PUF 4/17/98	NB-PUF 4/23/98	NB-PUF 4/29/98	NB-PUF 5/5/98
HCB	77	86	17	6.9	70	44	54	0	4.3
Heptachlor	54	23	77	0.90	62	19	37	65	11
4,4 DDE	21	28	426	2.1	40	144	65	233	11
2,4 DDT	2.1	1.6	26	0.21	3.8	14	8.1	15	1.9
4,4 DDT	5.6	3.0	46	0.28	4.1	13	8.0	23	2.4
Mirex	0.12	0	1.9	0.021	0.16	0.37	0.24	0.43	0.079
Total	159	142	593	10	181	234	172	336	31
Corresponding Laboratory Blank	5/23/98	5/26/98	5/26/98	5/26/98	5/23/98	5/23/98	5/26/98	5/26/98	5/23/98
Surrogate Recoveries (%)									
PCB 65	138 %	110 %	100 %	109 %	116 %	96 %	103 %	109 %	109 %
PCB 166	109 %	109 %	111 %	104 %	100 %	101 %	96 %	98 %	101 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 5/11/98	NB-PUF 5/17/98	NB-PUF 5/23/98	NB-PUF 5/29/98	NB-PUF 6/4/98	NB-PUF 6/10/98	NB-PUF 6/16/98	NB-PUF 6/22/98	NB-PUF 6/25/98
HCB	52	23	61	107	66	31	507	371	484
Heptachlor	30	63	57	132	35	76	154	69	134
4,4 DDE	30	136	91	368	87	114	637	126	783
2,4 DDT	6.2	14	7.5	38	6.3	10	45	10	50
4,4 DDT	6.5	12	11	67	9.9	25	140	24	102
Mirex	0.27	1.0	0.23	1.0	0.18	0.53	0.72	0.77	1.1
Total	125	249	228	714	206	256	1484	601	1554
Corresponding Laboratory Blank	5/23/98	6/15/98	6/15/98	6/15/98	6/15/98	7/2/98		7/2/98	7/2/98
Surrogate Recoveries (%)									
PCB 65	108 %	72 %	114 %	93 %	96 %	38 %	121 %	178 %	120 %
PCB 166	101 %	70 %	102 %	88 %	83 %	47 %	102 %	107 %	106 %

A.2. New Brunswick Gas Phase Organ

Surrogate Corrected Concentrations (r Organochlorine Pesticide	Split PUF day-top NB-PUF 6/26/98	Split PUF day-bottom NB-PUF 6/26/98	night NB-PUF 6/26/98	NB-PUF 6/28/98	NB-PUF 7/4/98	10% day NB-PUF 7/5/98	10% night NB-PUF 7/5/98	10% day NB-PUF 7/6/98	10% night NB-PUF 7/6/98
HCB	240	165	1015	31	23	37	106	53	91
Heptachlor	44	36	360	67	80	0	0	0	0
4,4 DDE	614	1.5	1243	298	364	171	98	161	175
2,4 DDT	53	0.21	76	21	23	0	0	0	0
4,4 DDT	108	0.059	179	20	5.4	0	0	0	0
Mirex	1.1	0	0.90	0.37	0.83	0.44	0	0.83	0
Total	1060	203	2875	438	496	208	203	214	265
Corresponding Laboratory Blank	7/2/98	7/2/98	8/20/98	8/20/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98
Surrogate Recoveries (%)									
PCB 65	106 %	84 %	151 %	97 %	79 %	83 %	59 %	74 %	80 %
PCB 166	101 %	98 %	100 %	104 %	82 %	105 %	73 %	95 %	97 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	10% day NB-PUF 7/7/98	10% night NB-PUF 7/7/98	10% day NB-PUF 7/8/98	10% night NB-PUF 7/8/98	10% day NB-PUF 7/9/98	10% night NB-PUF 7/9/98	10% day NB-PUF 7/10/98	10% night NB-PUF 7/10/98	10% day NB-PUF 7/11/98
HCB	N/A	109	64	7.4	42	67	43	72	42
Heptachlor		84	0	0	0	0	0	1.4	0
4,4 DDE		24	171	13	283	184	207	82	152
2,4 DDT		0	0	0	0	0	0	0	0
4,4 DDT		0	0	0	0	0	0	0	0
Mirex		0	0.54	0	0.43	1.1	0.48	0.26	0.44
Total		218	236	21	325	252	250	156	195
Corresponding Laboratory Blank	7/15/98	7/15/98			7/15/98	7/15/98	7/15/98	7/15/98	7/15/98
Surrogate Recoveries (%)									
PCB 65		96 %	87 %	71 %	79 %	90 %	76 %	86 %	69 %
PCB 166		104 %	113 %	102 %	99 %	66 %	100 %	102 %	84 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 7/16/98	NB-PUF 7/22/98	NB-PUF 7/28/98	NB-PUF 8/3/98	NB-PUF 8/9/98	NB-PUF 8/15/98	NB-PUF 8/21/98	NB-PUF 8/27/98	NB-PUF 9/2/98
HCB	27	27	23	470	208	168	357	247	248
Heptachlor	129	140	93	206	105	108	86	104	79
4,4 DDE	566	391	444	260	292	224	106	160	106
2,4 DDT	37	25	30	18	17	19	9.4	24	17
4,4 DDT	42	16	24	46	43	45	22	53	36
Mirex	0.57	0.80	0.43	0.38	0.76	0.36	0.23	0.93	0.33
Total	802	599	614	1001	666	564	580	590	485
Corresponding Laboratory Blank	8/20/98	8/31/98	8/31/98	8/31/98	9/8/98	9/8/98	9/8/98	9/8/98	9/8/98
Surrogate Recoveries (%)									
PCB 65	106 %	93 %	97 %	190 %	171 %	173 %	138 %	196 %	175 %
PCB 166	99 %	104 %	99 %	117 %	108 %	104 %	105 %	110 %	108 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 9/4/98	NB-PUF 9/8/98	NB-PUF 9/13/98	NB-PUF 9/19/98	NB-PUF 9/22/98	NB-PUF 9/25/98	NB-PUF 10/1/98	NB-PUF 10/7/98	NB-PUF 10/10/98
HCB	345	34	149	N/A	52	370	47	22	28
Heptachlor	120	28	68		50	175	21	0	26
4,4 DDE	161	80	89		117	220	34	77	47
2,4 DDT	17	6.8	12		14	17	3.6	7.7	6.6
4,4 DDT	30	8.2	21		21	40	3.0	12	8.3
Mirex	0.54	0.16	0.39		1.5	0.50	0.13	0.19	0.12
Total	673	158	340		254	822	110	120	116
Corresponding Laboratory Blank	9/30/98	9/30/98	9/30/98	9/30/98	9/30/98	10/21/98	10/21/98	10/21/98	11/24/98
Surrogate Recoveries (%)									
PCB 65	200 %	91 %	138 %		101 %	168 %	101 %	118 %	93 %
PCB 166	108 %	97 %	100 %		90 %	107 %	100 %	96 %	99 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 10/13/98	NB-PUF 10/19/98	NB-PUF 10/28/98	NB-PUF 11/6/98	NB-PUF 11/15/98	NB-PUF 11/24/98	NB-PUF 12/3/98	NB-PUF 12/12/98	NB-PUF 12/21/98
HCB	34	53	32	174	64	120	49	80	35
Heptachlor	54	79	37	34	41	15	108	95	68
4,4 DDE	65	78	75	11	19	7	96	28	88
2,4 DDT	6.2	9.0	6.8	1.5	3.0	1.6	11	3.0	10
4,4 DDT	7.7	7.0	7.8	0.70	2.0	2.0	5.7	0.75	5.5
Mirex	0.16	0.19	0.16	0.079	0.12	0.07	0.28	0.075	0.35
Total	168	227	159	221	129	146	271	207	207
Corresponding Laboratory Blank	11/24/98	11/24/98	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/8/99	2/15/99
Surrogate Recoveries (%)									
PCB 65	76 %	65 %	83 %	113 %	89 %	93 %	99 %	109 %	90 %
PCB 166	83 %	66 %	93 %	96 %	83 %	81 %	92 %	98 %	96 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 12/30/98	NB-PUF 1/8/99	NB-PUF 1/17/99	NB-PUF 1/26/99	NB-PUF 2/4/99	NB-PUF 2/13/99	NB-PUF 2/22/99	NB-PUF 3/3/99	NB-PUF 3/12/99
HCB	60	76	104	76	141	62	57	54	74
Heptachlor	10	6.5	61	60	48	8.2	11	25	5.4
4,4 DDE	0	0	17	12	19	3.6	0	50	2.6
2,4 DDT	0	0	4.0	2.0	3.3	0	0.29	4.5	0.82
4,4 DDT	0	0	1.5	0.23	2.9	0.14	0.067	4.0	0.45
Mirex	0	0	0.18	0.070	0.15	0	0.021	0.17	0.062
Total	70	83	188	151	214	74	69	138	83
Corresponding Laboratory Blank	2/15/99	2/15/99	2/15/99	2/24/99	2/24/99	3/8/99	4/14/99	4/14/99	4/14/99
Surrogate Recoveries (%)									
PCB 65	95 %	85 %	92 %	100 %	95 %	98 %	103 %	95 %	91 %
PCB 166	97 %	94 %	91 %	94 %	94 %	99 %	98 %	95 %	94 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 3/21/99	NB-PUF 3/30/99	NB-PUF 4/9/99	NB-PUF 4/16/99	NB-PUF 4/26/99	NB-PUF 5/5/99	NB-PUF 5/14/99	NB-PUF 5/23/99	NB-PUF 6/1/99
HCB	56	72	71			45	94		0.00
Heptachlor	32	66	36			98	58		63
4,4 DDE	37	30	73			134	54		90
2,4 DDT	5.2	4.3	13			12	5.2		1.3
4,4 DDT	4.5	2.9	9.9			8.6	5.0		0.57
Mirex	0	0.34	0.22			0.45	0.31		0.13
Total	135	175	203			298			155
Corresponding Laboratory Blank	4/14/99	6/15/99	6/15/99	6/15/99	6/15/99	6/15/99	6/15/99	7/12/99	7/12/99
Surrogate Recoveries (%)									
PCB 65	80 %	108 %	97 %			89 %			88 %
PCB 166	85 %	101 %	95 %			96 %			91 %

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 6/10/99	NB-PUF 6/19/99	NB-PUF 6/28/99	NB-PUF 7/7/99	NB-PUF 7/16/99	NB-PUF 7/25/99	NB-PUF 8/3/99	NB-PUF 8/12/99	NB-PUF 8/21/99
HCB		34	19	19	17	17	27		
Heptachlor		67	45	41	79	30	58		
4,4 DDE		139	366	210	339	237	86		
2,4 DDT		0.00	13	7.4	5.0	8.8	3.5		
4,4 DDT		3.1	0.60	6.7	2.9	7.6	5.4		
Mirex		0.21	0.35	0	0.25	0.00	0.00		
Total	0	242	444	284	443	300	180	0	0
Corresponding Laboratory Blank	7/12/99	7/12/99	7/27/99	7/27/99	8/16/99	8/16/99	9/7/99	9/7/99	9/29/99
Surrogate Recoveries (%)									
PCB 65		91 %	80 %	84 %	74 %	73 %	107 %		
PCB 166		93 %	89 %	84 %	77 %	76 %	84 %		

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 8/30/99	NB-PUF 9/8/99	NB-PUF 9/15/99	NB-PUF 9/27/99	NB-PUF 10/9/99	NB-PUF 10/21/99	NB-PUF 11/2/99	NB-PUF 11/14/99	NB-PUF 11/26/99
HCB	15	33	19	28	51	32	62	12	
Heptachlor	47	42	75	74	42	24	18	16	
4,4 DDE	51	221	67	82	32	70	41	68	
2,4 DDT	2.2	9.2	1.2	1.6	1.9	4.1	1.8	3.7	
4,4 DDT	0.00	12	0.00	1.5	0.11	0.00	1.2	0.36	
Mirex	0.13	0.00	0.00	0.10	0.048	0.00	0.00	0.14	
Total	117	317	163	188	126	129	123	101	
Corresponding Laboratory Blank	9/29/99								
Surrogate Recoveries (%)									
PCB 65	83 %	114 %	99 %	81 %	82 %	79 %	83 %	32 %	
PCB 166	87 %	80 %	80 %	81 %	85 %	80 %	85 %	48 %	

A.2. New Brunswick Gas Phase Organ
Surrogate Corrected Concentrations (n

Organochlorine Pesticide	NB-PUF 12/8/99	NB-PUF 12/20/99
HCB	63	74
Heptachlor	69	58
4,4 DDE	21	50
2,4 DDT	2.2	5.9
4,4 DDT	0.96	3.2
Mirex	0.12	0.20
Total	156	192
Corresponding Laboratory Blank		
Surrogate Recoveries (%)		
PCB 65	87 %	86 %
PCB 166	86 %	79 %

A.3. New Brunswick Organochlorine Pesticides in Precipitation (NB-Precip)
Surrogate Corrected Concentrations (pg/L)

Organochlorine Pesticide	NB-Precip 1/24/98	NB-Precip 2/3/98	NB-Precip 2/11/98	NB-Precip 2/16/98	NB-Precip 2/28/98	NB-Precip 3/12/98	NB-Precip 3/24/98	NB-Precip 4/5/98	NB-Precip 4/17/98	NB-Precip 4/29/98
HCB	72	0	13	13	8.5	N/A	3840	6289	371	Sample
Heptachlor	569	29	23	11	0		291	199	59	Lost
4,4 DDE	0	276	130	68	392		1885	1001	181	
2,4 DDT	4631	554	153	73	24		311	297	79	
4,4 DDT	0	825	214	241	58		3506	2606	472	
Mirex	0	0	0	0	0		19	23	1.4	
Total	5273	1684	534	406	483		9852	10416	1164	
Corresponding Laboratory Blank	6/10/98	9/1/98	6/10/98	6/10/98	6/10/98	9/1/98	9/1/98	9/1/98	9/1/98	
Volume of Precip. (L)	0.13	6.2	3.6	17	8.7	13	8.6	13	7.7	
Surrogate Recoveries (%)										
PCB 65	62 %	78 %	93 %	95 %	60 %		73 %	68 %	69 %	
PCB 166	75 %	66 %	97 %	113 %	107 %		82 %	78 %	74 %	

A.3. New Brunswick Organochlorine
Surrogate Corrected Concentrations (

Organochlorine Pesticide	NB-Precip 5/12/98	NB-Precip 5/23/98	NB-Precip 6/4/98	NB-Precip 6/17/98	NB-Precip 6/28/98	NB-Precip 7/9/98	NB-Precip 7/22/98	NB-Precip 8/3/98	NB-Precip 8/15/98	NB-Precip 8/21/98
HCB	281	155	9.4	6.3	N/A	25	158	26	6.0	7.1
Heptachlor	968	99	6.3	16		5.2	39	45	8.3	11
4,4 DDE	44241	1517	84	91		723	331	457	75	108
2,4 DDT	1082	294	16	26		223	74	108	24	31
4,4 DDT	4885	3383	98	171		925	292	407	91	0
Mirex	208	0	1.5	7.0		0	0	12	0	1.4
Total	51665	5448	215	318		1902	894	1055	203	159
Corresponding Laboratory Blank	9/28/98	9/28/98	9/28/98	10/8/98	10/8/98	10/8/98	10/8/98	10/8/98	11/11/98	11/11/98
Volume of Precip. (L)	0.050	9.5	22	4.4	5.4	0.77	2.3	1.4	4.0	9.2
Surrogate Recoveries (%)										
PCB 65	95 %	32 %	102 %	91 %		91 %	97 %	76 %	97 %	85 %
PCB 166	94 %	33 %	99 %	103 %		109 %	103 %	92 %	100 %	94 %

A.3. New Brunswick Organochlorine
Surrogate Corrected Concentrations (

Organochlorine Pesticide	NB-Precip 9/4/98	NB-Precip 9/22/98	NB-Precip 10/10/98	NB-Precip 10/28/98	NB-Precip 11/15/98	NB-Precip 12/3/98	NB-Precip 12/21/98	NB-Precip 1/8/99	NB-Precip 1/26/99	NB-Precip 2/13/99
HCB	6.2	0	41	N/A	35	16	Column	52	28	Sample
Heptachlor	14	8.0	28		34	10	Broke	19	15	Combined
4,4 DDE	467	4608	151		177	24		39	42	with other
2,4 DDT	34	41	29		31	11		35	23	Sample
4,4 DDT	181	300	107		111	48		175	157	
Mirex	0.59	0	3.4		2.4	0.83		1.6	0	
Total	702	4957	359		392	111		321	266	
Corresponding Laboratory Blank	11/11/98	11/11/98	3/30/99	3/30/99	3/30/99	3/30/99		4/27/99	4/27/99	
Volume of Precip. (L)	10	10	2.0	2.1	4.0	15		29	8.3	
Surrogate Recoveries (%)										
PCB 65	100 %	115 %	86 %		80 %	95 %		85 %	89 %	
PCB 166	101 %	100 %	93 %		77 %	63 %		68 %	82 %	

A.3. New Brunswick Organochlorine
Surrogate Corrected Concentrations (

Organochlorine Pesticide	NB-Precip 3/3/99	NB-Precip 3/21/99	NB-Precip 4/8/99	NB-Precip 4/26/99	NB-Precip 5/14/99	NB-Precip 6/1/99	NB-Precip 6/19/99	NB-Precip 7/7/99	NB-Precip 8/12/99	NB-Precip 8/30/99
HCB	38	65	30	95	21	33	54	87	7.2	7.3
Heptachlor	22	0	18	18	8.7	14	27	40	5.7	4.9
4,4 DDE	0	78	125	204	47	110	188	298	26	34
2,4 DDT	19	68	62	130	37	84	170	254	20	22
4,4 DDT	93	191	249	439	88	164	191	355	0	22
Mirex	0	17	0	17	0	0	0	0	0.52	0
Total	173	419	484	903	201	405	630	1035	59	90
Corresponding Laboratory Blank	6/21/99	6/21/99	6/21/99	6/21/99						
Volume of Precip. (L)	14	2	10.8	1.75	18.4	1.6	5.56	2.1	10	33.45
Surrogate Recoveries (%)										
PCB 65	87 %	82 %	91 %	82 %	80 %	69 %	73 %	79 %	80 %	82 %
PCB 166	87 %	88 %	93 %	90 %	89 %	84 %	79 %	78 %	88 %	89 %

A.3. New Brunswick Organochlorine
Surrogate Corrected Concentrations (

Organochlorine Pesticide	NB-Precip 9/15/99	NB-Precip 10/9/99	NB-Precip 11/2/99	NB-Precip 11/26/99	NB-Precip 12/20/99
HCB	3.4	31	15	20	25
Heptachlor	1.5	15	10	27	12
4,4 DDE	8.6	60	50	84	79
2,4 DDT	4.6	43	40	62	41
4,4 DDT	7.4	89	23	97	0
Mirex	0	0	0	0	0
Total	25	238	138	290	157
Corresponding Laboratory Blank					
Volume of Precip. (L)	13.3	9.2	0.6	26.3	7.8
Surrogate Recoveries (%)					
PCB 65	84 %	77 %	78 %	88 %	69 %
PCB 166	91 %	83 %	84 %	87 %	70 %

B.1. Sandy Hook Particulate Phase Organochlorine Pesticides (SH-QFF)
Surrogate Corrected Concentrations (ng/m^3)

Organochlorine Pesticide	SH-QFF 2/4/98	SH-QFF 2/10/98	SH-QFF 2/16/98	SH-QFF 2/22/98	SH-QFF 2/28/98	SH-QFF 3/6/98	SH-QFF 3/12/98	SH-QFF 3/18/98	SH-QFF 3/24/98	SH-QFF 3/30/98
HCB	N/A	0	0.045	0	0.022	0	0.18	0.13	0.19	0
Heptachlor		0.93	0.29	0.87	0.30	0	0.81	0	0.12	0.27
4,4 DDE		0.55	0	0.88	0.43	0.18	2.0	2.7	0.86	1.3
2,4 DDT		0.11	0.038	0	0.25	0.050	0	0.88	0.37	0
4,4 DDT		1.7	0	1.9	2.3	0	2.5	7.7	2.4	2.8
Mirex		0.025	0	0.024	0.012	0.010	0	0.091	0.040	0
Total		3.3	0.37	3.7	3.3	0.24	6.0	11	4.0	4.4
Corresponding Laboratory Blank	2/16/98	3/11/98	3/11/98	3/11/98	3/11/98	3/11/98	3/27/98	3/27/98	5/27/98	5/27/98
Total Suspended Particulate (µg/m^3)	49.0	36.2	30.9	30.7	31.4	30.3	11.2	35.9	26.8	57.1
Surrogate Recoveries (%)										
PCB 65		102 %	93 %	107 %	105 %	100 %	81 %	83 %	88 %	95 %
PCB 166		112 %	109 %	135 %	114 %	114 %	103 %	125 %	105 %	116 %

B.1. Sandy Hook Particulate Phase Org
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	**SH-QFF 4/5/98**	**SH-QFF 4/11/98**	**SH-QFF 4/17/98**	**SH-QFF 4/23/98**	**SH-QFF 4/29/98**	**SH-QFF 5/5/98**	**SH-QFF 5/11/98**	**SH-QFF 5/17/98**	**SH-QFF 5/23/98**	**SH-QFF 5/29/98**
HCB	0.068	0.068	1.1	0.066	0.065	0.024	0.089	0.31	2.4	0
Heptachlor	0.11	0.10	0.31	1.2	0.082	0.026	2.8	0.26	0.67	0.27
4,4 DDE	2.0	1.1	1.1	1.7	0.84	0.060	0.34	0.76	1.5	1.2
2,4 DDT	1.3	1.0	0.49	1.2	0.36	0.027	0.14	0.41	0.94	0.65
4,4 DDT	4.4	5.2	10	4.8	2.6	0.11	0.57	2.4	6.0	4.0
Mirex	0.046	0.19	0.098	0	0	0.0018	0.011	0.071	0	0
Total	7.9	7.7	13	9.0	3.9	0.25	3.9	4.189	12	6.1
Corresponding Laboratory Blank	6/1/98	5/27/98	6/29/98	6/1/98	5/27/98	6/1/98	6/1/98	5/27/98	6/29/98	6/29/98
Total Suspended Particulate ($\mu g/m^3$)	16.6	29.5	38.2	22.3	96.3	26.9	62.0	55.0	96.5	72.4
Surrogate Recoveries (%)										
PCB 65	96 %	95 %	77 %	88 %	88 %	93 %	83 %	89 %	57 %	101 %
PCB 166	115 %	109 %	95 %	112 %	113 %	110 %	109 %	117 %	74 %	118 %

B.1. Sandy Hook Particulate Phase Org
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	SH-QFF 6/4/98	SH-QFF 6/10/98	SH-QFF 6/16/98	SH-QFF 6/22/98	SH-QFF 6/28/98	SH-QFF 7/4/98	day SH-QFF 7/5/98	night SH-QFF 7/5/98	day SH-QFF 7/6/98	10% night SH-QFF 7/6/98
HCB	1.0	0	0.79	0.38	0.088	N/A	0.80	0.22	0.68	3.0
Heptachlor	0.48	0	0.18	0.065	0.16		0.61	0.72	0.089	0
4,4 DDE	3.4	0.11	0.47	0.082	0.50		1.1	0.84	0.73	0
2,4 DDT	1.7	0	0.29	0.059	0.23		0.80	1.7	0.39	0
4,4 DDT	8.5	0.66	1.8	0.58	0.28		0	2.3	0.33	0
Mirex	0	0	0	0.077	0.082		0.16	0.12	0.092	0
Total	15	1.1	3.6	1.2	1.3		3.5	5.9	2.3	3.0
Corresponding Laboratory Blank	6/29/98	6/29/98	7/1/98	7/1/98	8/6/98	8/6/98	8/6/98	7/19/98	8/6/98	7/15/98
Total Suspended Particulate ($\mu g/m^3$)	46.5	37.2	63.0	43.6	219	74.5	59.3	58.6	52.7	83.8
Surrogate Recoveries (%)										
PCB 65	83 %	83 %	94 %	98 %	80 %		93 %	91 %	79 %	70 %
PCB 166	100 %	107 %	109 %	108 %	101 %		107 %	108 %	99 %	77 %

B.1. Sandy Hook Particulate Phase Org
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	day SH-QFF 7/7/98	night SH-QFF 7/7/98	day SH-QFF 7/8/98	night SH-QFF 7/8/98	day SH-QFF 7/9/98	night SH-QFF 7/9/98	day SH-QFF 7/10/98	night SH-QFF 7/10/98	day SH-QFF 7/11/98	SH-QFF 7/16/98
HCB	0.11	0.15	0.077	0.21	0.082	0.093	0.27	0.11	0.25	0.43
Heptachlor	2.2	0.13	0	0.25	0.21	0.56	0	0.42	0.13	0.27
4,4 DDE	0.47	0.32	0	0.80	1.3	1.6	2.1	0.98	0.99	0.80
2,4 DDT	0.48	0.22	0.20	0.62	0.35	1.1	1.4	1.2	0.75	0.38
4,4 DDT	0	0.44	0	0.13	2.9	4.6	6.4	3.3	0.19	2.0
Mirex	0.11	0.077	0.059	0.049	0.030	0.076	0.038	0.034	0	0
Total	3.4	1.3	0.33	2.1	4.8	8.2	10	6.1	2.3	3.9
Corresponding Laboratory Blank	7/24/98	7/24/98	7/19/98	8/6/98	7/17/98	7/17/98	7/17/98	7/17/98	8/6/98	9/14/98
Total Suspended Particulate (μg/m^3)	42.1	40.0	31.8	65.8	73.0	78.9	47.2	47.7	61.4	52.5
Surrogate Recoveries (%)										
PCB 65	84 %	89 %	89 %	80 %	95 %	95 %	88 %	97 %	73 %	81 %
PCB 166	108 %	98 %	104 %	101 %	107 %	101 %	105 %	102 %	90 %	109 %

B.1. Sandy Hook Particulate Phase Org
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	SH-QFF 7/22/98	SH-QFF 7/28/98	SH-QFF 8/3/98	SH-QFF 8/9/98	SH-QFF 8/15/98	SH-QFF 8/21/98	SH-QFF 8/27/98	SH-QFF 9/4/98	SH-QFF 9/13/98	SH-QFF 9/22/98
HCB	0.11	0	1.5	0.94	0.14	0	0.95	0	1.2	0.58
Heptachlor	0.17	0	0	0	0.089	0	0	0	0	0.13
4,4 DDE	0.63	0.56	0.33	0.21	0.036	0.41	0.18	1.0	0	0.59
2,4 DDT	0.35	0	0.61	0.24	0.068	0.69	0	0.81	0	0.40
4,4 DDT	1.4	1.8	2.2	0.64	0.24	2.2	0.77	3.8	0.72	2.4
Mirex	0	0.025	0	0	0	0	0.024	0	0.044	0
Total	2.7	2.4	4.6	2.0	0.57	3.3	1.9	5.6	1.9	4.1
Corresponding Laboratory Blank	9/14/98	9/14/98	9/18/98	9/14/98	9/18/98	9/24/98	9/18/98	9/24/98	9/24/98	10/15/98
Total Suspended Particulate ($\mu g/m^3$)	70.2	51.7	56.2	38.3	29.6	75.8	26.9	71.6	43.4	50.0
Surrogate Recoveries (%)										
PCB 65	92 %	81 %	85 %	91 %	85 %	80 %	93 %	74 %	82 %	79 %
PCB 166	105 %	96 %	101 %	105 %	98 %	100 %	100 %	104 %	103 %	111 %

B.1. Sandy Hook Particulate Phase Org
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	SH-QFF 10/1/98	SH-QFF 10/10/98	SH-QFF 10/19/98	SH-QFF 10/28/98	SH-QFF 11/6/98	SH-QFF 11/15/98	SH-QFF 11/24/98	SH-QFF 12/3/98	SH-QFF 12/12/98	SH-QFF 12/21/98
HCB	0.16	Missing	0.33	0.21	0.31	0.56	0.41	0.37	0.26	0.50
Heptachlor	0.28	Sample	0.18	0.22	0.23	0.40	0.23	0.43	0.24	0.97
4,4 DDE	2.5		0.90	0.98	2.0	1.1	1.3	4.2	1.1	1.5
2,4 DDT	1.2		0.24	0.98	0.86	0.47	0.79	1.9	0.82	1.4
4,4 DDT	6.4		1.2	2.5	2.0	2.2	1.6	4.5	1.8	7.3
Mirex	0.059		0	0	0.065	0.0081	0.0058	0.074	0.024	0.17
Total	11		2.9	4.9	5.5	4.8	4.3	11	4.3	12
Corresponding Laboratory Blank	10/15/98		1/4/99	1/4/99	2/9/99		1/4/99	2/17/99	2/17/99	3/2/99
Total Suspended Particulate (μg/m^3)	54.5		42.0	43.5	38.7		49.2	65.4	54.1	35.2
Surrogate Recoveries (%)										
PCB 65	85 %		49 %	90 %	89 %	88 %	77 %	90 %	91 %	83 %
PCB 166	91 %		59 %	105 %	100 %	98 %	91 %	92 %	93 %	93 %

B.1. Sandy Hook Particulate Phase Org
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	SH-QFF 12/30/98	SH-QFF 1/8/99	SH-QFF 1/17/99	SH-QFF 1/26/99	SH-QFF 2/4/99	SH-QFF 2/13/99	SH-QFF 2/22/99	SH-QFF 3/3/99	SH-QFF 3/12/99	SH-QFF 3/21/99
HCB		0.33	0.36	0.93	0.32	0.22	1.8	Power Outage	Power Outage	Power Outage
Heptachlor		0.26	0.57	1.6	0.50	0.28	0.64			
4,4 DDE		0.46	1.1	2.2	1.3	0.87	1.3			
2,4 DDT		0.69	3.3	1.3	0.83	0.85	1.2			
4,4 DDT		1.5	0.66	2.7	2.1	1.9	5.9			
Mirex		0.042	0.30	0.25	0.095	0.082	0.055			
Total		3.3	3.7	8.9	5.1	4.2	11			
Corresponding Laboratory Blank	3/2/99	4/12/99	4/12/99	4/12/99	4/12/99	4/12/99				
Total Suspended Particulate ($\mu g/m^3$)	49.0	62.0	64.8	33.6	615	68.5				
Surrogate Recoveries (%)										
PCB 65		101 %	98 %	85 %	100 %	98 %	85 %			
PCB 166		107 %	99 %	80 %	104 %	96 %	68 %			

B.1. Sandy Hook Particulate Phase Org
Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	SH-QFF 3/30/99	SH-QFF 4/8/99	SH-QFF 5/14/99	SH-QFF 5/23/99	SH-QFF 6/1/99	SH-QFF 6/10/99	SH-QFF 6/19/99	SH-QFF 6/28/99	SH-QFF 7/7/99	SH-QFF 7/16/99
HCB	Power	Power	0	0.13	0	0	0	0.088	0.30	0.19
Heptachlor	Outage	Outage	0.37	0.12	0.14	0.13	0.12	0.12	0.26	0.20
4,4 DDE			0	0.79	1.6	0.91	0.72	0.31	0.49	2.5
2,4 DDT			0	0.15	0	0.11	0.13	0.040	0.046	0
4,4 DDT			0.33	0	0.24	0	0.14	0	0	0.34
Mirex			0	0	0	0	0	0	0	0
Total			0.70	1.2	2.0	1.2	1.1	0.56	1.1	3.2
Corresponding Laboratory Blank										
Total Suspended Particulate ($\mu g/m^3$)			118.2	78.3	96.4	65.7	69.2	64.8	48.2	88.8
Surrogate Recoveries (%)										
PCB 65			75 %	79 %	70 %	68 %	94 %	78 %	71 %	67 %
PCB 166			84 %	81 %	89 %	90 %	98 %	98 %	80 %	89 %

B.2. Sandy Hook Gas Phase Organochlorine Pesticides (SH-PUF)

Surrogate Corrected Concentrations (ng/m³)

Organochlorine Pesticide	**SH-PUF 2/4/98**	**SH-PUF 2/10/98**	**SH-PUF 2/16/98**	**SH-PUF 2/22/98**	**SH-PUF 2/28/98**	**SH-PUF 3/6/98**	**SH-PUF 3/12/98**	**SH-PUF 3/18/98**	**SH-PUF 3/24/98**	**SH-PUF 3/30/98**
HCB	N/A	4.9	55	62	48	46	56	56	73	15
Heptachlor		3.0	4.9	29	28	11	4	27	12	48
4,4 DDE		0.59	4.9	14.15	6.5	4.8	1.0	8.1	5.6	73
2,4 DDT		NQ	NQ	NQ	1.3	0.70	0.015	1.8	0.79	10
4,4 DDT		NQ	NQ	NQ	4.0	3.0	1.4	3.6	1.4	11
Mirex		0.013	0.043	0.013	0.049	0.11	0.013	0.080	0.071	0.80
Total		8.4	65	105	88	65	63	96	93	158
Corresponding Laboratory Blank	2/16/98	3/10/98	3/10/98	3/10/98	3/17/98	3/25/98	3/25/98	3/25/98	5/26/98	5/23/98
Total Suspended Particulate (μg/m³)										
Surrogate Recoveries (%)										
PCB 65		109 %	97 %	111 %	109 %	107 %	111 %	119 %	109 %	54 %
PCB 166		105 %	100 %	107 %	108 %	107 %	113 %	110 %	110 %	63 %

B.2. Sandy Hook Gas Phase Organoc

Surrogate Corrected Concentrations

Organochlorine Pesticide	SH-PUF 4/5/98	SH-PUF 4/11/98	SH-PUF 4/17/98	SH-PUF 4/23/98	SH-PUF 4/29/98	SH-PUF 5/5/98	SH-PUF 5/11/98	SH-PUF 5/17/98	SH-PUF 5/23/98	split-top SH-PUF 5/29/98
HCB	51	71	43	58	32	7.7	46	3.7	38	90
Heptachlor	8.8	61	33	22	43	14	16	1.4	119	66
4,4 DDE	7.0	13	28	21	35	15	11	2.0	49	91
2,4 DDT	1.4	4.1	7.5	6.9	7.1	4.3	3.3	0.53	15	22
4,4 DDT	1.1	3.9	10	9.3	11	4.8	2.0	0.59	29	55
Mirex	0.047	0.19	0.25	0.13	0.28	0.22	0.26	0.025	0.47	0.53
Total	69	153	122	117	128	46	78	8.2	250	325
Corresponding Laboratory Blank	5/26/98	6/15/98	5/26/98	5/23/98	5/23/98	5/23/98	5/23/98	5/23/98	6/15/98	6/15/98
Total Suspended Particulate (μg/m^3)										
Surrogate Recoveries (%)										
PCB 65	101 %	111 %	109 %	105 %	107 %	107 %	103 %	99 %	98 %	120 %
PCB 166	100 %	97 %	102 %	104 %	99 %	103 %	104 %	99 %	98 %	95 %

B.2. Sandy Hook Gas Phase Organoc

Surrogate Corrected Concentrations

Organochlorine Pesticide	plit-bottom SH-PUF 5/29/98	SH-PUF 6/4/98	SH-PUF 6/10/98	SH-PUF 6/16/98	SH-PUF 6/22/98	SH-PUF 6/28/98	SH-PUF 7/4/98	day SH-PUF 7/5/98	night SH-PUF 7/5/98	day SH-PUF 7/6/98
HCB	131	98	191	308	23	13	53	55	77	50
Heptachlor	48	31	24	64	23	26	79	42	35	20
4,4 DDE	0.55	29	13	46	14	31	59	64	20	28
2,4 DDT	0.11	7.9	3.1	12	4.0	7.0	20	19	7.1	6.8
4,4 DDT	0.011	12	7.2	40	1.5	0.011	22	15	0.011	3.9
Mirex	0.013	0.15	0.087	0.64	0.33	0.21	0.54	0.36	0.099	0.23
Total	179	178	239	472	66	77	235	195	139	109
Corresponding Laboratory Blank	6/15/98	6/15/98	7/2/98	7/2/98	7/2/98	7/12/98	8/20/98	7/30/98	7/18/98	7/30/98
Total Suspended Particulate ($\mu g/m^3$)										
Surrogate Recoveries (%)										
PCB 65	90 %	92 %	72 %	93 %	82 %	96 %	94 %	80 %	100 %	78 %
PCB 166	106 %	93 %	69 %	106 %	102 %	107 %	96 %	97 %	104 %	96 %

B.2. Sandy Hook Gas Phase Organoc

Surrogate Corrected Concentrations

Organochlorine Pesticide	night SH-PUF 7/6/98	day SH-PUF 7/7/98	night SH-PUF 7/7/98	day SH-PUF 7/8/98	night SH-PUF 7/8/98	day SH-PUF 7/9/98	night SH-PUF 7/9/98	day SH-PUF 7/10/98	night SH-PUF 7/10/98	day SH-PUF 7/11/98
HCB	5.3	41	240	45	333	44	56	35	59	36
Heptachlor	0.17	17	0.17	3.8	35	28	116	38	39	19
4,4 DDE	2.4	25	20	0.013	30	82	78	80	35	63
2,4 DDT	0.015	3.9	3.9	2.6	9.0	17	18	28	0.015	21
4,4 DDT	0.011	10	6.1	8.2	19	40	0.68	2.3	25	34
Mirex	0.013	0.24	0.16	0.16	0.013	0.46	0.44	0.45	0.24	0.28
Total	7.9	97	271	60	426	211	269	184	158	173
Corresponding Laboratory Blank	7/30/98	7/10/98	8/31/98	7/12/98	7/10/98	7/12/98	7/18/98	7/17/98	7/17/98	7/17/98
Total Suspended Particulate ($\mu g/m^3$)										
Surrogate Recoveries (%)										
PCB 65	74 %	94 %	104 %	97 %	78 %	116 %	96 %	94 %	104 %	97 %
PCB 166	95 %	106 %	106 %	107 %	101 %	106 %	102 %	109 %	102 %	103 %

B.2. Sandy Hook Gas Phase Organoc

Surrogate Corrected Concentrations

Organochlorine Pesticide	SH-PUF 7/16/98	SH-PUF 7/22/98	SH-PUF 7/28/98	SH-PUF 8/3/98	SH-PUF 8/9/98	SH-PUF 8/15/98	SH-PUF 8/21/98	SH-PUF 8/27/98	SH-PUF 9/4/98	SH-PUF 9/13/98
HCB	22	21	17	Vial Broke	146	38	213	144	83	13
Heptachlor	127	135	93	Sample	35	19	119	46	45	45
4,4 DDE	48	84	48	Lost	14	17	50	30	37	30
2,4 DDT	14	17	12		4.0	3.1	21	9.6	16	8.9
4,4 DDT	24	0.011	16		7.5	9.0	42	18	21	12
Mirex	0.53	0.70	0.34		0.16	0.16	0.56	0.38	0.43	0.34
Total	236	258	186		207	85	446	247	203	109
Corresponding Laboratory Blank	8/20/98	8/20/98	8/20/98		8/31/98	8/31/98	9/8/98	9/8/98	9/30/98	9/30/98
Total Suspended Particulate ($\mu g/m^3$)										
Surrogate Recoveries (%)										
PCB 65	119 %	95 %	104 %		93 %	79 %	146 %	155 %	94 %	69 %
PCB 166	102 %	101 %	107 %		107 %	110 %	109 %	103 %	100 %	105 %

B.2. Sandy Hook Gas Phase Organoc

Surrogate Corrected Concentrations

Organochlorine Pesticide	SH-PUF 9/22/98	SH-PUF 10/1/98	SH-PUF 10/10/98	SH-PUF 10/19/98	SH-PUF 10/28/98	SH-PUF 11/6/98	SH-PUF 11/15/98	SH-PUF 11/24/98	SH-PUF 12/3/98	SH-PUF 12/12/98
HCB	48	36	Power	42	66	60	64	53	42	64
Heptachlor	57	17	Outage	30	24	13	14	12	77	60
4,4 DDE	56	23		24	14	5.3	8.6	10	36	11
2,4 DDT	20	6.7		5.0	4.2	1.6	2.0	1.7	4.9	1.8
4,4 DDT	30	7.6		4.5	2.6	0.58	1.5	0.86	2.8	0.011
Mirex	0.48	0.11		0.013	0.013	0.050	0.084	0.10	0.26	0.089
Total	210	90		105	111	80	90	78	163	137
Corresponding Laboratory Blank	9/30/98	10/21/98		11/24/98	11/24/98	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99
Total Suspended Particulate ($\mu g/m^3$)										
Surrogate Recoveries (%)										
PCB 65	101 %	94 %		65 %	13 %	63 %	42 %	100 %	90 %	94 %
PCB 166	104 %	96 %		57 %	11 %	56 %	38 %	100 %	91 %	92 %

B.2. Sandy Hook Gas Phase Organoc

Surrogate Corrected Concentrations

Organochlorine Pesticide	SH-PUF 12/21/98	SH-PUF 12/30/98	SH-PUF 1/8/99	SH-PUF 1/17/99	SH-PUF 1/26/99	SH-PUF 2/4/99	SH-PUF 2/13/99	SH-PUF 2/22/99	SH-PUF 3/3/99	SH-PUF 3/12/99
HCB	29	88	66	77	74	143	0.33	63	786	0.69
Heptachlor	21	78	26	37	44	33	0.17	7.2	52	2.7
4,4 DDE	14	10	7.8	10	7.4	15	0.013	1.3	88	0.013
2,4 DDT	3.4	2.8	2.7	3.6	2.0	4.7	0.015	0.48	27	0.015
4,4 DDT	3.1	0.85	0.81	3.9	1.3	4.1	0.011	0.44	12	0.16
Mirex	0.15	0.10	0.12	0.12	0.069	0.14	0.020	0.022	0.96	1.3
Total	70	180	104	133	128	199	0.6	72	966	4.9
Corresponding Laboratory Blank	2/15/99	2/15/99	2/15/99	2/24/99		2/24/99	3/8/99	3/8/99	4/14/99	4/14/99
Total Suspended Particulate ($\mu g/m^3$)										
Surrogate Recoveries (%)										
PCB 65	84 %	109 %	93 %	102 %	105 %	93 %	85 %	95 %	89 %	98 %
PCB 166	88 %	99 %	89 %	94 %	97 %	84 %	92 %	93 %	96 %	103 %

B.2. Sandy Hook Gas Phase Organoc

Surrogate Corrected Concentrations

Organochlorine Pesticide	SH-PUF 3/21/99	SH-PUF 3/30/99	SH-PUF 4/9/99	SH-PUF 4/16/99	SH-PUF 4/26/99	SH-PUF 5/5/99	SH-PUF 5/14/99	SH-PUF 5/23/99	SH-PUF 6/1/99	SH-PUF 6/10/99
HCB	Power	Power	Power	Power	Power	Power			30	25
Heptachlor	Outage	Outage	Outage	Outage	Outage	Outage			27	11
4,4 DDE									27	12
2,4 DDT									1.7	2.5
4,4 DDT									0.52	1.2
Mirex									0.24	0
Total									86	52
Corresponding Laboratory Blank							7/12/99	7/12/99	7/12/99	7/27/99
Total Suspended Particulate (µg/m^3)										
Surrogate Recoveries (%)										
PCB 65									63 %	101 %
PCB 166									63 %	99 %

B.2. Sandy Hook Gas Phase Organoc

Surrogate Corrected Concentrations

	no surrogate				GAP
	SH-PUF	**SH-PUF**	**SH-PUF**	**SH-PUF**	**SH-PUF**
Organochlorine Pesticide	**6/19/99**	**6/28/99**	**7/7/99**	**7/16/99**	**DATA**
HCB	18	12	27	18	
Heptachlor	61	33	41	41	
4,4 DDE	39	50	61	64	
2,4 DDT	1.2	5.0	11	3.0	
4,4 DDT	0.83	1.4	12	0.84	
Mirex	0	0.41	0.36	0.26	
Total	119	102	152	127	
Corresponding Laboratory Blank	7/27/99	7/27/99	8/16/99	8/16/99	
Total Suspended Particulate (µg/m^3)					
Surrogate Recoveries (%)					
PCB 65	90 %	6 %	80 %	78 %	
PCB 166	94 %	0 %	84 %	79 %	

B.3. Sandy Hook Organochlorine Pesticides in Precipitation (SH-Precip)
Surrogate Corrected Concentrations (pg/L)

Organochlorine Pesticide	SH-Precip 2/3/98	SH-Precip 2/16/98	SH-Precip 2/28/98	SH-Precip 3/15/98	SH-Precip 3/24/98	SH-Precip 4/6/98	SH-Precip 4/22/98	SH-Precip 5/12/98	SH-Precip 5/23/98	SH-Precip 6/4/98
HCB	20	296	14	243	432	453		29	59	240
Heptachlor	14	19	9.3	33	100	97		71	21	106
4,4 DDE	0	0	21	63	221	51		208	611	438
2,4 DDT	48	24	38	49	122	20		117	101	202
4,4 DDT	0	132	5.1	212	655	261		493	611	1305
Mirex	0	0	2.6	0	0	4.9		0	0	0
Total	81	471	90	600	1530	887		918	1404	2292
Corresponding Laboratory Blank	6/10/98	6/10/98	6/10/98	9/1/98	9/1/98	9/1/98	9/1/98	9/28/98	9/28/98	9/28/98
Volume of Precip (L)	12	15	14	16	2.0	16	26	0.04	7.4	20
Surrogate Recoveries (%)										
PCB 65	62 %	65 %	58 %	75 %	34 %	71 %		80 %	108 %	96 %
PCB 166	75 %	75 %	79 %	74 %	39 %	83 %		84 %	99 %	94 %

B.3. Sandy Hook Organochlorine Pe
Surrogate Corrected Concentrations (

Organochlorine Pesticide	SH-Precip 6/17/98	SH-Precip 6/28/98	SH-Precip 7/16/98	SH-Precip 7/28/98	SH-Precip 8/9/98	SH-Precip 8/21/98	SH-Precip 9/4/98	SH-Precip 9/22/98	SH-Precip 10/10/98	SH-Precip 10/28/98
HCB	27	10	30	55	0	12		9	96	157
Heptachlor	0	8	136	37	14	15		12	35	55
4,4 DDE	81	35	222	221	55	75		84	62	281
2,4 DDT	53	18	182	116	40	49		50	40	56
4,4 DDT	255	67	1164	531	136	1441		242	115	0
Mirex	0	7	0	0	0	0.97		0	0	0
Total	417	145	1735	960	245	1593		397	348	548
Corresponding Laboratory Blank	9/28/98	10/8/98	10/8/98	10/8/98	10/8/98	11/11/98	11/11/98	11/11/98	3/30/99	3/30/99
Volume of Precip (L)	4.2	5.1	0.36	3.6	2.7	4.8	3.6	10	2.4	2.2
Surrogate Recoveries (%)										
PCB 65	111 %	92 %	86 %	99 %	92 %	101 %		84 %	77 %	46 %
PCB 166	107 %	93 %	96 %	98 %	99 %	98 %		83 %	77 %	44 %

B.3. Sandy Hook Organochlorine Pe
Surrogate Corrected Concentrations (

Organochlorine Pesticide	SH-Precip 11/15/98	SH-Precip 12/3/98	SH-Precip 12/21/98	SH-Precip 1/8/99	SH-Precip 1/26/99	SH-Precip 2/13/99	SH-Precip 3/3/99	SH-Precip 3/21/99	SH-Precip 4/8/99	SH-Precip 4/26/99
HCB	226	264	124	71	50	Sample	26	Power	Power	Power
Heptachlor	47	0	10	11	13	Combined	20	Out	Out	Out
4,4 DDE	74	0	14	8.4	39	with other	103			
2,4 DDT	25	45	17	16	27	Sample	59			
4,4 DDT	70	179	23	109	167		145			
Mirex	3.6	0	0	0.71	0		0			
Total	445	488	187	216	296		353			
Corresponding Laboratory Blank	3/30/99	3/30/99	3/30/99	4/27/99	4/27/99	4/27/99	6/21/99			
Volume of Precip (L)	4.7	1.5	23	23	8.3	16	14			
Surrogate Recoveries (%)										
PCB 65	96 %	90 %	94 %	98 %	92 %		83 %			
PCB 166	101 %	86 %	79 %	71 %	92 %		81 %			

C.1. Liberty Science Center Particulate Phase Organochlorine Pesticides (LS-QFF)

Surrogate Corrected Concentrations (ng/m^3)

Organochlorine Pesticide	day LS-QFF 7/5/98	night LS-QFF 7/5/98	day LS-QFF 7/6/98	night LS-QFF 7/6/98	day LS-QFF 7/7/98	night LS-QFF 7/7/98	day LS-QFF 7/8/98	night LS-QFF 7/8/98	day LS-QFF 7/9/98	night LS-QFF 7/9/98
HCB	0.12	0.22	0.31	0.13	0.23	0.14	0.13	0.28	0.25	0.20
Heptachlor	0.34	0.71	0.52	0.51	0.49	0.52	0.34	0.66	0.33	0.65
4,4 DDE	0.81	1.3	0.58	0.63	0.61	0.61	0.69	0.66	0.75	1.3
2,4 DDT	0.67	3.1	0.81	0.88	0.91	1.6	1.7	1.0	0.93	1.5
4,4 DDT	0.51	11	0.0029	1.4	0.52	4.7	7.1	0.0029	0.63	0.31
Mirex	0.10	0.15	0.13	0.13	0.14	0.10	0.11	0.079	0.13	0.14
Total	2.6	17	2.3	3.6	2.9	7.6	10	2.7	3.0	4.1
Corresponding Laboratory Blank	7/24/98	7/17/98	7/24/98	7/19/98	7/24/98	7/17/98	7/17/98	7/24/98	7/19/98	7/19/98
Total Suspended Particulate (mg/m^3)	37.9	42.0	63.5	49.7	58.5	37.6	42.9	54.6	81.4	96.9
Surrogate Recoveries (%)										
PCB 65	93 %	91 %	84 %	78 %	90 %	99 %	98 %	84 %	85 %	93 %
PCB 166	107 %	101 %	96 %	101 %	102 %	101 %	111 %	102 %	105 %	106 %

C.1. Liberty Science Center Particulate

Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	day LS-QFF 7/10/98	night LS-QFF 7/10/98	day LS-QFF 7/11/98	LS-QFF 10/7/98	LS-QFF 10/10/98	LS-QFF 10/13/98	LS-QFF 10/19/98	LS-QFF 10/28/98	LS-QFF 11/6/98
HCB	0.41	0.31	missing	0.40	0.19	0.18	0.53	0.39	0.74
Heptachlor	0.49	0.54	sample	0.52	0.52	0.23	0.74	0.080	1.0
4,4 DDE	0.84	1.2	too	0.78	0.0028	0.41	1.5	2.9	2.0
2,4 DDT	1.0	1.5	short	0.21	0.31	0.24	1.6	1.4	2.4
4,4 DDT	0.0029	1.7		1.5	1.2	1.2	4.7	1.2	9.9
Mirex	0.11	0.12		0.0017	0.0017	0.0017	0.0017	0.0017	0.0017
Total	2.9	5.3		3.4	2.2	2.3	9.1	6.0	16
Corresponding Laboratory Blank	7/24/98	7/24/98		10/19/98	10/19/98	1/4/99	2/9/99	2/9/99	1/4/99
Total Suspended Particulate (mg/m^3)	103	377		71.5	35.4	35.5	42.0	75.4	38.7
Surrogate Recoveries (%)									
PCB 65	90 %	90 %		81 %	52 %	80 %	81 %	46 %	66 %
PCB 166	98 %	98 %		87 %	58 %	95 %	98 %	61 %	91 %

C.1. Liberty Science Center Particulate

Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	LS-QFF 11/15/98	LS-QFF 11/24/98	LS-QFF 12/3/98	LS-QFF 12/12/98	LS-QFF 12/21/98	LS-QFF 12/30/98	LS-QFF 1/8/99	LS-QFF 1/17/99	LS-QFF 1/26/99	LS-QFF 2/4/99
HCB	0.61	1.5	0.58	0.44	Not	0.70	0.36	0.33	3.8	2.1
Heptachlor	0.67	0.83	2.5	1.5	Available	1.1	0.91	0.26	1.4	0.58
4,4 DDE	1.6	2.7	2.0	2.2		2.7	2.2	1.1	5.2	1.6
2,4 DDT	1.8	2.5	1.8	2.4		2.9	0.0022	2.3	5.1	2.7
4,4 DDT	1.2	4.2	7.0	3.3		15	5.7	5.2	3.0	10
Mirex	0.0017	0.0017	0.27	0.14		0.14	0.0017	0.18	0.17	0.0017
Total	6.0	12	14	10		22	9.1	9.3	19	17
Corresponding Laboratory Blank	1/4/99	2/17/99	2/17/99	2/17/99	2/17/99	3/2/99	3/2/99	3/2/99	4/12/99	4/12/99
Total Suspended Particulate (mg/m^3)	47.3	69.4	93.1	39.1	71.4	55.9	53.7	60.0	73.7	61.4
Surrogate Recoveries (%)										
PCB 65	76 %	84 %	79 %	91 %		92 %	80 %	86 %	77 %	85 %
PCB 166	88 %	101 %	97 %	96 %		91 %	93 %	100 %	99 %	95 %

C.1. Liberty Science Center Particulate

Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	LS-QFF 2/13/99	LS-QFF 2/22/99	LS-QFF 3/3/99	LS-QFF 3/12/99	LS-QFF 3/21/99	LS-QFF 3/30/99	LS-QFF 4/8/99	LS-QFF 4/17/99	LS-QFF 4/26/99	LS-QFF 5/14/99
HCB	1.9	Not	Went Dry	0.75	0.12	2.0	0.57	0.058		0.17
Heptachlor	0.66	Available	During	1.3	0.37	0.82	2.5	0.19		0.47
4,4 DDE	2.6		Roto-evap	3.4	0.62	2.6	2.0	0.25		0.63
2,4 DDT	2.0			3.1	0.79	3.0	2.1	0.078		0.14
4,4 DDT	5.2			6.4	2.0	9.7	5.7	0.0029		0.0029
Mirex	0.11			2.5	0.092	0.28	0.23	0.0017		0.026
Total	13			17	4.0	18	13	0.58	0.00	1.43
Corresponding Laboratory Blank	4/21/99	4/21/99		5/18/99	5/18/99	5/18/99	5/18/99	7/18/99	7/18/99	7/18/99
Total Suspended Particulate (mg/m^3)	37.6	55.0		41.6	51.2	66.6	86.7	31.25	72.96	97.91
Surrogate Recoveries (%)										
PCB 65	92 %			83 %	88 %	109 %	73 %	77 %		74 %
PCB 166	90 %			94 %	90 %	101 %	85 %	86 %		92 %

C.1. Liberty Science Center Particulate

Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	LS-QFF 5/23/99	LS-QFF 6/1/99	LS-QFF 6/10/99	LS-QFF 6/19/99	LS-QFF 6/28/99	LS-QFF 7/7/99	LS-QFF 7/16/99	LS-QFF 7/25/99	LS-QFF 8/3/99	LS-QFF 8/30/99
HCB		0.10	0.13		0.11	0.40	0.25	0.10	0.093	0.29
Heptachlor		0.13	0.21		0.15	0.22	0.27	0.14	0.20	0.54
4,4 DDE		0.72	0.57		0.69	0.39	0.45	0.25	0.34	0.84
2,4 DDT		0.26	0.43		0.20	0.20	0.30	0.15	0.11	0.0022
4,4 DDT		0.18	0.0029		0.0029	0.16	0.13	0.0029	0.0029	0.0029
Mirex		0.028	0.0017		0.016	0.0017	0.0017	0.0017	0.0017	0.0017
Total	0.00	1.43	1.34	0.00	1.2	1.4	1.4	0.64	0.75	1.7
Corresponding Laboratory Blank	7/28/99	7/28/99		7/28/99	8/3/99	8/3/99	9/24/99	9/24/99	10/4/99	10/4/99
Total Suspended Particulate (mg/m^3)	115.52	92.63		62.41	74.4	60.06	105.3	52.66	61.88	196.0
Surrogate Recoveries (%)										
PCB 65		82 %	82 %		85 %	73 %	87 %	78 %	87 %	53 %
PCB 166		94 %	97 %		101 %	88 %	95 %	94 %	67 %	41 %

C.1. Liberty Science Center Particulate

Surrogate Corrected Concentrations (ng

Organochlorine Pesticide	LS-QFF 9/8/99	LS-QFF 9/15/99	LS-QFF 9/27/99	LS-QFF 10/9/99	LS-QFF 10/21/99	LS-QFF 11/2/99	LS-QFF 11/14/99	LS-QFF 11/26/99	LS-QFF 12/8/99	LS-QFF 12/20/99
HCB	0.10	0.084	0.074	0.15	0.24	0.065	0.19	0.065		
Heptachlor	0.11	0.12	0.13	0.17	0.50	0.067	0.31	0.054		
4,4 DDE	0.73	0.29	0.20	0.37	1.6	0.12	0.63	0.082		
2,4 DDT	0.27	0.19	0.0022	0.12	0.43	0.041	0.24	0.045		
4,4 DDT	0.31	0.0029	0.0029	0.0029	0.0029	0.041	10	0.0029		
Mirex	0.0017	0.0017	0.0017	0.0017	0.050	0.009	0.0017	0.0017		
Total	1.5	0.69	0.41	0.80	2.8	0.34	12	0.25		
Corresponding Laboratory Blank	10/12/99	10/12/99	12/1/99	12/1/99	12/1/99		1/13/00	1/13/00	2/9/00	
Total Suspended Particulate (mg/m^3)	90.42	38.39	38.56	56.80	46.06		63.10	26.43	77.75	
Surrogate Recoveries (%)										
PCB 65	70 %	66 %	52 %	74 %	56 %	126 %	59 %	40 %		
PCB 166	91 %	83 %	62 %	78 %	73 %	140 %	78 %	36 %		

C.2. Liberty Science Center Gas Phase Organochlorine Pesticides (LS-PUF)
Surrogate Corrected Concentrations (ng/m^3)

Organochlorine Pesticide	day LS-PUF 7/5/98	night LS-PUF 7/5/98	day LS-PUF 7/6/98	night LS-PUF 7/6/98	day LS-PUF 7/7/98	night LS-PUF 7/7/98	day LS-PUF 7/8/98	night LS-PUF 7/8/98	day LS-PUF 7/9/98	night LS-PUF 7/9/98
HCB	34	43	49	54	41	46	51	91	35	5.3
Heptachlor	42	86	38	69	43	44	27	77	50	17
4,4 DDE	36	41	25	26	17	26	24	32	30	5.5
2,4 DDT	23	25	20	13	12	19	17	20	18	3.1
4,4 DDT	5.3	53	28	2.2	18	23	7.3	28	3.4	4.6
Mirex	0.78	0.77	0.65	0.36	0.31	0.48	0.37	0.54	0.66	0.20
Total	141	249	160	163	131	158	127	248	137	35
Corresponding Laboratory Blank	7/30/98	7/17/98	7/17/98	7/17/98	7/10/98	7/12/98	7/18/98	7/10/98	7/18/98	7/18/98
Surrogate Recoveries (%)										
PCB 65	82 %	87 %	104 %	102 %	104 %	109 %	98 %	124 %	98 %	144 %
PCB 166	91 %	98 %	102 %	102 %	106 %	107 %	102 %	108 %	102 %	103 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

Organochlorine Pesticide	day LS-PUF 7/10/98	night LS-PUF 7/10/98	day LS-PUF 7/11/98	LS-PUF 10/7/98	LS-PUF 10/10/98	LS-PUF 10/13/98	LS-PUF 10/19/98	LS-PUF 10/28/98	LS-PUF 11/6/98
HCB	29	60	missing	13	18	25	54	60	59
Heptachlor	35	43	sample	16	30	22	60	160	33
4,4 DDE	27	27	too	21	19	17	21	41	7.2
2,4 DDT	17	13	short	5.5	12	8.0	8.1	13	2.3
4,4 DDT	27	18		6.2	15	6.5	5.2	9.0	0.14
Mirex	0.59	0.34		0.26	0.31	0.18	0.25	0.42	0.11
Total	135	162		63	94	79	148	283	102
Corresponding Laboratory Blank	7/12/98	7/12/98		10/21/98	10/21/98	11/24/98	11/24/98	11/24/98	2/8/99
Surrogate Recoveries (%)									
PCB 65	110 %	112 %		51 %	129 %	91 %	95 %	93 %	98 %
PCB 166	106 %	104 %		76 %	100 %	91 %	84 %	95 %	86 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

Organochlorine Pesticide	LS-PUF 11/15/98	LS-PUF 11/24/98	LS-PUF 12/3/98	LS-PUF 12/12/98	LS-PUF 12/21/98	LS-PUF 12/30/98	LS-PUF 1/8/99	LS-PUF 1/17/99	LS-PUF 1/26/99	LS-PUF 2/4/99
HCB	55	58	63	68	32	64	72	68	95	82
Heptachlor	30	24	109	69	63	11	46	44	46	56
4,4 DDE	11	8.0	24	8.6	29	1.1	13	21	10	18
2,4 DDT	4.0	3.0	7.2	2.3	11	0.0076	4.9	7.9	2.4	7.8
4,4 DDT	2.3	2.0	6.5	0.0089	0.83	0.15	0.73	3.7	1.1	5.0
Mirex	0.16	0.10	0.38	0.093	0.37	0.0060	0.15	0.21	0.10	0.23
Total	102	95	210	148	136	76	137	144	154	169
Corresponding Laboratory Blank	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/8/99	2/15/99	2/24/99	2/24/99	2/24/99
Surrogate Recoveries (%)										
PCB 65	97 %	87 %	98 %	108 %	100 %	111 %	103 %	100 %	110 %	102 %
PCB 166	86 %	77 %	86 %	100 %	102 %	101 %	99 %	92 %	95 %	96 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

Organochlorine Pesticide	LS-PUF 2/13/99	LS-PUF 2/22/99	LS-PUF 3/3/99	LS-PUF 3/12/99	LS-PUF 3/21/99	LS-PUF 3/30/99	LS-PUF 4/8/99	LS-PUF 4/17/99	LS-PUF 4/26/99	LS-PUF 5/14/99
HCB	59	112	40	69	49	68	56	51	52	
Heptachlor	10	12	18	14	20	49	33	34	34	
4,4 DDE	1.4	0.19	0.0062	3.6	9.0	12	19	13	15	
2,4 DDT	0.63	0.28	6.7	1.0	4.6	3.6	8.3	4.0	5.4	
4,4 DDT	0.38	0.0089	3.9	0.0089	2.8	1.8	2.5	1.8	2.2	
Mirex	0.0060	0.0060	0.18	0.63	0.0060	0.12	0.28	0.32	0.25	
Total	71	124	68	89	85	134	119	104	108	
Corresponding Laboratory Blank	2/24/99	3/8/99	4/14/99	4/14/99	4/14/99	4/14/99	6/15/99	6/15/99	6/15/99	
Surrogate Recoveries (%)										
PCB 65	102 %	94 %	94 %	49 %	41 %	105 %	98 %	106 %	92 %	
PCB 166	96 %	92 %	93 %	47 %	41 %	96 %	98 %	98 %	92 %	

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

Organochlorine Pesticide	LS-PUF 5/23/99	LS-PUF 6/1/99	LS-PUF 6/10/99	LS-PUF 6/28/99	LS-PUF 7/7/99	LS-PUF 7/16/99	LS-PUF 7/25/99	LS-PUF 8/3/99	LS-PUF 8/30/99	LS-PUF 9/8/99
HCB		28		14	26	17	18	26	29	19
Heptachlor		93		41	49	62	49	50	28	54
4,4 DDE		43		81	34	46	40	25	26	200
2,4 DDT		0.0076		2.0	5.5	0.0076	4.1	3.7	7.0	11.7
4,4 DDT		1.0		0.0089	1.9	0.0089	3.0	0.0089	3.5	4.6
Mirex		0.22		0.18	0	0.0060	0.37	0.0060	0.31	0.57
Total		164		139	139	125	115	105	94	289
Corresponding Laboratory Blank		7/12/99		7/27/99		8/16/99	8/16/99	9/7/99	9/29/99	10/4/99
Surrogate Recoveries (%)										
PCB 65		111 %		100 %	93 %	86 %	85 %	80 %	60 %	81 %
PCB 166		91 %		91 %	83 %	79 %	82 %	79 %	67 %	80 %

C.2. Liberty Science Center Gas Pha
Surrogate Corrected Concentrations

Organochlorine Pesticide	LS-PUF 9/15/99	LS-PUF 9/27/99	LS-PUF 10/9/99	LS-PUF 10/21/99	LS-PUF 11/2/99	LS-PUF 11/14/99	LS-PUF 11/26/99
HCB	0	23	47	56	33	45	29
Heptachlor	47	22	72	42	21	23	30
4,4 DDE	50	32	29	14	30	15	29
2,4 DDT	5.0	4.7	2.8	2.6	6.8	2.7	5.1
4,4 DDT	3.0	2.5	0.0089	0.22	0.22	0.22	0.0089
Mirex	0.0060	0.26	0.27	0.11	0.06	0.10	0.19
Total	106	84	151	115	91	85	94
Corresponding Laboratory Blank	10/4/99	1/0/00	1/0/00	1/0/00	1/0/00	1/0/00	1/0/00
Surrogate Recoveries (%)							
PCB 65	78 %	90 %	86 %	83 %	87 %	89 %	86 %
PCB 166	83 %	82 %	81 %	79 %	82 %	84 %	85 %

C.3. Liberty Science Center Organochlorine Pesticides in Precipitation (LS-Precip)
Surrogate Corrected Concentrations (pg/L)

Organochlorine Pesticides	LS-Precip 1/8/99	LS-Precip 1/26/99	LS-Precip 2/13/99	LS-Precip 3/3/99	LS-Precip 3/21/99	LS-Precip 4/8/99	LS-Precip 4/26/99	LS-Precip 5/14/99	LS-Precip 6/1/99	LS-Precip 6/19/99	LS-Precip 7/7/99	LS-Precip 7/25/99
HCB	40	27	35	24	46	30	Sampling	21	33	54	87	55
Heptachlor	0	0	0	28	81	18	error	9	14	27	40	44
4,4 DDE	73	24	29	42	96	125		47	110	188	298	239
2,4 DDT	88	58	107	52	121	62		37	84	170	254	145
4,4 DDT	231	240	544	163	454	249		88	164	191	355	21
Mirex	0	0	7.8	0	0	0		0	0	0	0	11
Total	432	350	723	309	799			201	405	630	1035	515
Corresponding Laboratory Blank	4/27/99	4/27/99	4/27/99	6/21/99	6/21/99	6/21/99	6/21/99	7/13/99	7/13/99	7/13/99	8/19/99	9/14/99
Volume of Precip. (L)	24	67	10	10	9.1	8.32	3.80	17.38	3.00	1.94	8.64	2.10
Surrogate Recoveries (%)												
#23								2 %	1 %	3 %	1 %	
#65	80 %	84 %	70 %	88 %	89 %	80 %	81 %	89 %	80 %	79 %	81 %	78 %
#166	85 %	79 %	55 %	91 %	87 %	91 %	89 %	91 %	88 %	82 %	87 %	86 %

C.3. Liberty Science Center Organochlorine Pe
Surrogate Corrected Concentrations (pg/L)

Organochlorine Pesticides	LS-Precip 8/12/99	LS-Precip 8/30/99	LS-Precip 9/15/99	LS-Precip 10/9/99	LS-Precip 11/2/99	LS-Precip 11/26/99	LS-Precip 12/20/99
HCB	7.2	7.3	3.4	31	15	20	25
Heptachlor	5.7	4.9	1.5	15	10	27	12
4,4 DDE	26	34	8.6	60	50	84	79
2,4 DDT	20	22	4.6	43	40	62	41
4,4 DDT	0	22	7.4	89	23	97	0
Mirex	0.52	0	0	0	0	0	0
Total	59	90	25	238	138	290	157
Corresponding Laboratory Blank	9/14/99	11/3/99	11/3/99	11/3/99	1/4/00	1/4/00	3/6/00
Volume of Precip. (L)	20.40	37.21	37.72	5.50	13.34	15.54	7.70
Surrogate Recoveries (%)							
#23							
#65	83 %	82 %	76 %	83 %	81 %	85 %	80 %
#166	87 %	86 %	78 %	81 %	86 %	89 %	83 %

D.1. Lower Hudson River Estuary Particulate Phase Organochlorine Pesticides (Raritan Bay: RB-QFF)(New York Harbor: NH-QFF)

Surrogate Corrected Concentrations (ng/m^3)

Organochlorine Pesticide	day RB-QFF 7/5/98	day RB-QFF 7/6/98	day RB-QFF 7/7/98	morning NH-QFF 7/10/98	afternoon NH-QFF 7/10/98
HCB	0.21	0.10	0.10	0.24	0.24
Heptachlor	0.21	0.37	0.31	0.59	0
4,4 DDE	0.73	0.21	0	1.1	1.2
2,4 DDT	0.37	0.26	0.11	1.1	1.1
4,4 DDT	0.084	0.59	0.78	0	1.9
Mirex	0.12	0.0079	0.092	0.16	0.19
Total	1.7	1.5	1.4	3.2	4.6
Corresponding Laboratory Blank	8/6/98	7/17/98	7/24/98	7/19/98	7/19/98
Total Suspended Particulate (μg/m^3)	49.9	56.2	59.6	107	122
Surrogate Recoveries (%)					
PCB 65	82 %	93 %	97 %	94 %	89 %
PCB 166	95 %	108 %	111 %	108 %	102 %

D.2. Lower Hudson River Estuary Gas Phase Organochlorine Pesticides (Raritan Bay: RB-PUF)(New York Harbor: NH-PUF)
Surrogate Corrected Concentrations (ng/m^3)

Organochlorine Pesticide	day RB-PUF 7/5/98	day RB-PUF 7/6/98	day RB-PUF 7/7/98	morning NH-PUF 7/10/98	afternoon NH-PUF 7/10/98
HCB	266	47	41	29	76
Heptachlor	26	39	28	35	16
4,4 DDE	29	15	12	27	24
2,4 DDT	9.6	5.9	0	17	5.3
4,4 DDT	15	5.5	7.9	27	3.4
Mirex	0.33	0.18	0.19	0.59	0.43
Total	346	112	89	135	126
Corresponding Laboratory Blank	7/10/98	7/30/98	7/10/98	7/17/98	7/18/98
Surrogate Recoveries (%)					
PCB 65	126 %	89 %	100 %	110 %	100 %
PCB 166	105 %	94 %	104 %	106 %	103 %

D.3. Lower Hudson River Estuary Water Particulate Phase Organochlorine Pesticides (Raritan Bay: RB-GFF)(New York Harbor: NH-GFF) Surrogate Corrected Concentrations (ng/L)

Organochlorine Pesticide	day RB-GFF 7/5/98	day RB-GFF 7/6/98	day RB-GFF 7/7/98	morning NH-GFF 7/10/98	afternoon NH-GFF 7/10/98
HCB	7.1	16	8.3	11	37
Heptachlor	0	0	0	0	0
4,4 DDE	122	306	95	89	110
2,4 DDT	8.8	11	4.4	5.6	11
4,4 DDT	0	0	0	0	0
Mirex	1.7	0	1.0	2.6	3.5
Total	139	333	109	108	162
Corresponding Laboratory Blank	8/10/98	8/10/98	8/10/98	8/10/98	8/10/98
Volume of Water (L)	35	39	49	30	23
Surrogate Recoveries (%)					
PCB 65	78 %	77 %	67 %	82 %	65 %
PCB 166	89 %	88 %	74 %	92 %	86 %

D.4. Lower Hudson River Estuary Dissolved Phase Organochlorine Pesticides (Raritan Bay: RB-XAD)(New York Harbor: NH-XAD) Surrogate Corrected Concentrations (ng/L)

Organochlorine Pesticide	day RB-XAD 7/5/98	day RB-XAD 7/6/98	day RB-XAD 7/7/98	morning NH-XAD 7/10/98	afternoon NH-XAD 7/10/98
HCB	6.3	10	19	36	30
Heptachlor	0	11	0	0	15
4,4 DDE	49	36	49	73	80
2,4 DDT	2.5	0	2.8	6.5	10
4,4 DDT	1.1	13	3.4	1.3	6.8
Mirex	0	0	0	1.9	1.3
Total	59	71	75	119	143
Corresponding Laboratory Blank	7/28/98	7/28/98	7/28/98	7/28/98	7/28/98
Volume of Water (L)	35	39	49	30	23
Surrogate Recoveries (%)					
PCB 65	82 %	93 %	95 %	97 %	101 %
PCB 166	66 %	50 %	104 %	104 %	93 %

A.1. Laboratory Blanks Particulate Phase
Organochlorine Pesticides (LB-QFF)

Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	LB-QFF 10/16/97	LB-QFF 11/5/97	LB-QFF 2/16/98	LB-QFF 3/5/98	LB-QFF 3/11/98	LB-QFF 3/27/98	LB-QFF 5/27/98	LB-QFF 6/1/98	LB-QFF 6/29/98	LB-QFF 7/1/98	LB-QFF 7/15/98	LB-QFF 7/17/98	LB-QFF 7/19/98	LB-QFF 7/24/98
HCB	Sample	Sample	Sample	0.058	0.019	0.13	0.0218	0.022	0.06	Sample	0.14	0.080	0.0084	0.028
Heptachlor	Missing	Missing	Missing	0	0.051	0	0.0049	0.000	0.015	Missing	0	0.009	0.0134	0.017
4,4 DDE				0	0	0	0.0000	0.000	0		0	0.000	0.0040	0
2,4 DDT				NQ	0	0	0.0059	0.000	0		0	0.000	0.0065	0
4,4 DDT				NQ	0	0	0.0080	0.000	0		0	0	0.0000	0
Mirex				0	0	0	0.0000	0.000	0		0	0	0.0000	0
Total														
Surrogate Recoveries (%)														
PCB 65				102 %	99 %	72 %	93 %	104 %	89 %		80 %	95 %	99 %	105 %
PCB 166				100 %	91 %	83 %	99 %	113 %	93 %		84 %	101 %	102 %	101 %

A.1. Laboratory Blanks Particulate Phase
Organochlorine Pesticides (LB-QFF)

Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	LB-QFF 8/6/98	LB-QFF 9/14/98	LB-QFF 9/18/98	LB-QFF 9/24/98	LB-QFF 10/15/98	LB-QFF 10/19/98	LB-QFF 1/4/99	LB-QFF 2/9/99	LB-QFF 2/17/99	LB-QFF 3/2/99	LB-QFF 4/12/99	LB-QFF 4/21/99	LB-QFF 5/18/99
HCB	0.20	0	0.03	0.3	0.077	0.041	0.036	0.041	0.070	0.071	Sample	0.070	0.056
Heptachlor	0.014	0.08	0	0.06	0.017	0.011	0.017	0.0082	0	0	Missing	0.13	0.094
4,4 DDE	0	0	0.003	0.004	0	0	0	0	0	0		0	0
2,4 DDT	0	0	0	0	0	0	0	0	0	0		0	0
4,4 DDT	0	0	0	0	0	0	0.010	0	0	0		0	0
Mirex	0	0.013	0.02	0	0	0	0	0	0	0		0	0
Total													
Surrogate Recoveries (%)													
PCB 65	98 %	96 %	96 %	97 %	92 %	88 %	108 %	84 %	79 %	85 %		66 %	85 %
PCB 166	101 %	101 %	101 %	102 %	92 %	91 %	108 %	84 %	80 %	87 %		61 %	81 %

A.2. Laboratory Blanks Gas Phase Organochlorine Pesticides (LB-PUF) Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	LB-PUF 10/14/97	LB-PUF 10/22/97	LB-PUF 10/28/97	LB-PUF 11/9/97	LB-PUF 2/16/98	LB-PUF 3/5/98	LB-PUF 3/10/98	LB-PUF 3/18/98	LB-PUF 5/23/98	LB-PUF 5/26/98	LB-PUF 6/15/98	LB-PUF 7/2/98	LB-PUF 7/10/98	LB-PUF 7/12/98	LB-PUF 7/15/98
HCB	Pesiticides	Pesiticides	Pesiticides	Pesiticides	Pesiticides	0	0	0	0	Pesiticides	0	0	0.021	0	0
Heptachlor	not	not	not	not	not	0	0	0	0	not	0	0.27	0.009	0.006	0
4,4 DDE	quantified	quantified	quantified	quantified	quantified	0	0	0	0	quantified	0.010	0.08	0	0	0
2,4 DDT						NQ	NQ	0	0		0	0	0	0	0
4,4 DDT						NQ	NQ	0	0		0	0	0	0	0
Mirex						0	0	0	0		0	0	0	0	0
Surrogate Recoveries (%)															
PCB 65						97 %	93 %	96 %	98 %		90 %	97 %	97 %	95 %	85 %
PCB 166						103 %	104 %	107 %	94 %		95 %	101 %	101 %	96 %	97 %

LB-PUF 7/17/98	LB-PUF 7/18/98	LB-PUF 7/30/98	LB-PUF 8/20/98	LB-PUF 8/31/98	LB-PUF 9/8/98	LB-PUF 9/30/98	LB-PUF 10/21/98	LB-PUF 11/24/98	LB-PUF 1/5/99	LB-PUF 2/8/99	LB-PUF 2/15/99	LB-PUF 2/24/99	LB-PUF 3/8/99	LB-PUF 4/14/99	LB-PUF 6/15/99	LB-PUF 7/12/99	LB-PUF 7/27/99
0	0.022	0	0.0080	0	0	0	0	0.061	0.19	0.17	0.042	0.069	0	0	0	Not yet quantified	Not yet quantified
0	0.06	0	0.067	0	0.08	0.032	0.041	0	0.13	0	0	0.19	0	0	0		
0	0	0	0.040	0.11	0.048	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0.04	0.017	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
93 %	99 %	96 %	93 %	98 %	112 %	100 %	83 %	75 %	80 %	89 %	70 %	91 %	93 %	85 %	92 %		
98 %	102 %	100 %	97 %	101 %	106 %	101 %	85 %	93 %	83 %	92 %	90 %	97 %	104 %	94 %	73 %		

A.3. Laboratory Blanks Organochlorine Pesticides in Precipitation (LB-Precip)
Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	LB-Precip 6/10/98	LB-Precip 9/1/98	LB-Precip 9/28/98	LB-Precip 10/8/98	LB-Precip 11/11/98	LB-Precip 3/30/99	LB-Precip 4/27/99	LB-Precip 6/21/99
HCB	0	0.059	N/A	0.022	0.054	0.023	0	N/A
Heptachlor	0.050	0		0	0	0.042	0	
4,4 DDE	0	0		0	0	0	0	
2,4 DDT	0	0		0	0	0	0	
4,4 DDT	0	0.0072		0	0	0.012	0	
Mirex	0	0		0	0	0	0	
Surrogate Recoveries (%)								
PCB 65	90 %	80 %		94 %	96 %	90 %	89 %	
PCB 166	101 %	80 %		99 %	96 %	85 %	89 %	

A.4. Laboratory Blanks Organochlorine Pesticides Particulate Phase In Water (LB-GFF) Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	LB-GFF 8/10/98
HCB	0
Heptachlor	0.025
4,4 DDE	0
2,4 DDT	0
4,4 DDT	0
Mirex	0
Surrogate Recoveries (%)	
PCB 65	34 %
PCB 166	37 %

A.5. Laboratory Blanks Organochlorine Pesticides Dissolved Phase In Water (LB-XAD) Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	LB-XAD 7/28/98
HCB	2.5
Heptachlor	0
4,4 DDE	99
2,4 DDT	0
4,4 DDT	0.53
Mirex	0
Surrogate Recoveries (%)	
PCB 65	61 %
PCB 166	102 %

B.1. Matrix Spikes Particulate Phase Organochlorine Pesticides (MS-QFF)
Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	MS-QFF 3/11/98	MS-QFF 6/1/98	MS-QFF 7/1/98	MS-QFF 7/28/98	MS-QFF 9/14/98	MS-QFF 9/24/98	MS-QFF 10/19/98	MS-QFF 2/17/99
HCB	90.53 %	79.21 %	N/A	45.24 %	76.36 %	88.81 %	63.85 %	82.93 %
Heptachlor	0.00 %	104.26 %		19.20 %	99.20 %	94.36 %	54.05 %	99.65 %
4,4 DDE	89.20 %	164.01 %		81.08 %	105.98 %	103.26 %	50.17 %	51.30 %
2,4 DDT	59.92 %	99.89 %		64.66 %	91.50 %	1152.29 %	51.47 %	88.34 %
4,4 DDT	109.80 %	112.97 %		8.37 %	99.99 %	95.17 %	48.52 %	59.16 %
Mirex	85.59 %	73.82 %		90.70 %	90.39 %	84.98 %	58.96 %	90.94 %
Corresponding Laboratory Blank	3/11/98	6/1/98	7/1/98	7/28/98	9/14/98	9/24/98	10/19/98	2/17/99
Surrogate Recoveries (%)								
PCB 65	104.36 %	102.90 %		80.81 %	96.28 %	64.71 %	51.92 %	102.87 %
PCB 166	102.41 %	105.44 %		95.11 %	101.90 %	95.62 %	61.01 %	79.04 %

B.2. Matrix Spikes Gas Phase Organochlorine Pesticides (MS-PUF)
Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	MS-PUF 3/10/98	MS-PUF 3/25/98	MS-PUF 7/2/98	MS-PUF 7/12/98	MS-PUF 7/15/98	MS-PUF 7/18/98	MS-PUF 8/31/98	MS-PUF 9/30/98	MS-PUF 2/15/99	MS-PUF 3/8/99
HCB	Pesticides	Pesticides	Pesticides	89.01 %	7.46 %	85.02 %	36.21 %	84.04 %	Not yet	110.31 %
Heptachlor	not	not	not	102.85 %	0.00 %	92.53 %	43.93 %	94.46 %	quantified	114.08 %
4,4 DDE	quantified	quantified	quantified	88.32 %	9.24 %	69.50 %	33.08 %	88.19 %		74.14 %
2,4 DDT				98.33 %	0.00 %	86.86 %	41.63 %	91.42 %		108.55 %
4,4 DDT				71.91 %	0.00 %	4.26 %	43.38 %	71.97 %		84.27 %
Mirex				106.95 %	8.17 %	104.53 %	40.40 %	105.89 %		118.62 %
Corresponding Laboratory Blank	3/8/99	7/27/99	9/6/99	11/22/99						
Surrogate Recoveries (%)										
PCB 65				100.96 %	77.72 %	97.40 %	105.10 %	101.42 %		92.40 %
PCB 166				101.66 %	89.35 %	99.12 %	103.15 %	99.24 %		98.06 %

Alternate clean-up removed pesticides

B.3. Matrix Spikes Organochlorine Pesticides GF/F (MS-GFF)
Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	MS-GFF 9/28/98
HCB	81.10 %
Heptachlor	106.82 %
4,4 DDE	76.57 %
2,4 DDT	89.32 %
4,4 DDT	40.06 %
Mirex	87.11 %
Surrogate Recoveries (%)	
PCB 65	71.61 %
PCB 166	78.12 %

B.4. Matrix Spikes Organochlorine Pesticides XAD (MS-Precip)
Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	MS-XAD 9/28/98
HCB	69.44 %
Heptachlor	83.16 %
4,4 DDE	105.97 %
2,4 DDT	82.00 %
4,4 DDT	61.08 %
Mirex	79.96 %
Surrogate Recoveries (%)	
PCB 65	99.57 %
PCB 166	98.93 %

C.1. Field Blanks Particulate Phase Organochlorine Pesticides (FB-QFF) Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	NB FB-QFF 10/6/97	NB FB-QFF 10/17/97 (Passive 4days)	NB FB-QFF 10/28/97	NB FB-QFF 11/3/97	NB FB-QFF 11/25/97	NB FB-QFF 1/12/98	NB FB-QFF 1/23/98	NB FB-QFF 7/7/98	NB FB-QFF 7/10/98	NB FB-QFF 10/19/98	NB FB-QFF 2/22/99
HCB	Pesticides	2.2	Pesticides	0.11	Pesticides	Sample	0.096	0.48	1.1	0.36	0.19
Heptachlor	not	20	not	0	not	Missing	0.081	0.034	0	0.089	0.187
4,4 DDE	quantified	9.8	quantified	0.92	quantified		0	0	0	0	0
2,4 DDT		0		0.099			0	0	0	0	0
4,4 DDT		1.2		1.3			0.0081	0	0	0	0.027
Mirex		0.30		0.058			0.0076	0	0	0	0.020
Total		33		2.5			0.19	0.52	1.1	0.45	0.42
Corresponding Laboratory Blank	10/16/97	11/5/97	11/5/97	3/25/198	2/16/98		3/27/98	7/15/98	7/15/98	2/9/99	4/21/99
Surrogate Recoveries (%)											
PCB 65		111 %		94 %			98 %	80 %	68 %	87 %	81 %
PCB 166		149 %		111 %			100 %	85 %	72 %	87 %	97 %

C.1. Field Blanks Particulate Phase Organochlorine Pesticides (FB-QFF) Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	SH FB-QFF 1/29/98	SH FB-QFF 2/10/98	SH FB-QFF 6/22/98	SH FB-QFF 7/7/98	SH FB-QFF 7/11/98	SH FB-QFF 10/19/98	SH FB-QFF 2/13/99	LS FB-QFF 7/7/98	LS FB-QFF 7/10/98	LS FB-QFF 2/22/99	NH FB-QFF 7/10/98
HCB	N/A	0.046	0.18	0.13	0.17	0.19	0.26	0.058		0.20	0.20
Heptachlor		0	0.035	0.041	0.060	0.062	0.13	0.053		0.13	0.11
4,4 DDE		0.066	0	0	0	0.019	0	0		0	0.042
2,4 DDT		0	0	0	0	0	0	0		0	0
4,4 DDT		0	0	0	0	0	0.0075	0		0	0.069
Mirex		0	0.025	0	0	0	0	0		0	0
Total		0.11	0.24	0.17	0.23	0.28	0.39	0.11		0.33	0.43
Corresponding Laboratory Blank	2/16/98	3/11/98	7/1/98	7/17/98	7/24/98	2/9/99	4/12/99	7/19/98	8/6/98	4/21/99	
Surrogate Recoveries (%)											
PCB 65		86 %	87 %	98 %	97 %	94 %	94 %	85 %		96 %	101 %
PCB 166		105 %	95 %	98 %	99 %	95 %	83 %	101 %		95 %	101 %

C.2. Field Blanks Gas Phase
Organochlorine Pesticides (FB-PUF)
Surrogate Corrected Concentrations
(ng)

Organochlorine Pesticide	NB FB-PUF 10/28/97	NB FB-PUF 11/3/97	NB FB-PUF 11/25/97	NB FB-PUF 12/18/97	NB FB-PUF 1/12/98	NB FB-PUF 7/7/98	NB FB-PUF 7/10/98	NB FB-PUF 10/19/98	NB FB-PUF 2/22/99	SH FB-PUF 1/29/98	SH FB-PUF 2/10/98	SH FB-PUF 6/22/98
HCB	N/A	0	0	0.075	0	1.1	0.089	0.065	Not yet	N/A	N/A	0
Heptachlor		0	0	0	0	0	0	0	quantified			0.37
4,4 DDE		0	0	0	0	0	0	0				0
2,4 DDT		NQ	NQ	0	NQ	0	0	0				0
4,4 DDT		NQ	NQ	0	NQ	0	0	0				0
Mirex		0	0	0	0	0	0	0				0
Total		0	0	0.075	0	1.1	0.089	0.065				0.37
Corresponding Laboratory Blank	11/9/97		3/10/98	3/18/98	2/16/98	7/15/98	7/15/98	11/24/98	3/8/99	2/16/98	2/16/97	7/2/98
Surrogate Recoveries (%)												
PCB 65		96 %	93 %	97 %	98 %	76 %	78 %	79 %				92 %
PCB 166		107 %	105 %	107 %	112 %	84 %	90 %	85 %				102 %

C.2. Field Blanks Gas Phase
Organochlorine Pesticides (FB-PUF)
Surrogate Corrected Concentrations
(ng)

Organochlorine Pesticide	SH FB-PUF 7/7/98	SH FB-PUF 7/11/98	SH FB-PUF 10/19/98	SH FB-PUF 2/13/99	LS FB-PUF 7/7/98	LS FB-PUF 7/10/99	LS FB-PUF 2/2/99	NH FB-PUF 7/10/98
HCB	0	0	0.17	0.26	0	0	Not yet	0
Heptachlor	0	0	0.079	0.13	0	0	quantified	0
4,4 DDE	0	0	0	0	0	0		0
2,4 DDT	0	0	0	0	0	0		0
4,4 DDT	0	0	0	0.0075	0	0		0
Mirex	0	0	0	0	0	0		0
Total	0	0	0.25	0.39	0	0		0
Corresponding Laboratory Blank	7/18/98	7/17/98	11/24/98	3/8/99	7/8/98	7/17/98	3/8/99	
Surrogate Recoveries (%)								
PCB 65	99 %	99 %	89 %	94 %	97 %	96 %		97 %
PCB 166	106 %	101 %	93 %	83 %	95 %	106 %		96 %

C.3. Field Blank Organochlorine Pesticides Particulate Phase In Water (FB-GFF)
Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	FB-GFF July-98
HCB	N/A
Heptachlor	
4,4 DDE	
2,4 DDT	
4,4 DDT	
Mirex	
Corresponding Laboratory Blank	8/10/98
Surrogate Recoveries (%)	
PCB 65	
PCB 166	

C.4. Field Blank Organochlorine Pesticides Dissolved Phase In Water (FB-XAD) Surrogate Corrected Concentrations (ng)

Organochlorine Pesticide	FB-XAD July-98
HCB	0.57
Heptachlor	0.43
4,4 DDE	1.4
2,4 DDT	0
4,4 DDT	0.14
Mirex	0
Total	2.5
Corresponding Laboratory Blank	7/28/98
Surrogate Recoveries (%)	
PCB 65	115 %
PCB 166	101 %

Appendix – Alkylphenols (APs)

A.1. New Brunswick Particulate Phase Alkylphenols (NB-QFF) Concentrations (ng/m^3)

Alkylphenol	NB-QFF 6/4/98	NB-QFF 6/10/98	NB-QFF 6/16/98	NB-QFF 6/22/98	NB-QFF 6/25/98	day NB-QFF 6/26/98	night NB-QFF 6/26/98	NB-QFF 6/28/98	NB-QFF 7/4/98	day NB-QFF 7/5/98	night NB-QFF 7/5/98	day NB-QFF 7/6/98
tert-Octylphenol	0.015	0.018	0.023					0.0074	0.0074			
Nonylphenols												
NP1	0.068	0.069	0.057					0.017	0.0074			
NP2	0.096	0.096	0.0074					0.017	0.0074			
NP3	0.039	0.054	0.0074					0.0095	0.0074			
NP4	0.025	0.031	0.0074					0.0074	0.0074			
NP5	0.041	0.045	0.0074					0.0074	0.0074			
NP6	0.016	0.021	0.0074					0.0074	0.0074			
NP7	0.034	0.044	0.0074					0.0074	0.0074			
NP8	0.015	0.0074	0.0074					0.0074	0.0074			
NP9	0.038	0.038	0.040					0.0074	0.0074			
NP10+11	0.041	0.048	0.0074					0.0074	0.0074			
Total NPs	0.37	0.41	0.15					0.087	0.067			
Corresponding Lab Blank	6/29/98	6/29/98	7/1/98	7/1/98	7/1/98	7/1/98	7/1/98	8/6/98	8/6/98	7/15/98	7/15/98	7/15/98
Total Suspended Particulate (μg/m^3)	24	52	58	59	41	86	73	29	NA	28	28	36

A.1. New Brunswick Particulate Phase AI Concentrations (ng/m^3)

Alkylphenol	night NB-QFF 7/6/98	day NB-QFF 7/7/98	night NB-QFF 7/7/98	day NB-QFF 7/8/98	night NB-QFF 7/8/98	day NB-QFF 7/9/98	night NB-QFF 7/9/98	day NB-QFF 7/10/98	night NB-QFF 7/10/98	day NB-QFF 7/11/98	NB-QFF 7/16/98	NB-QFF 7/22/98
tert-Octylphenol											0.0088	0.011
Nonylphenols												
NP1											0.057	0.027
NP2											0.053	0.035
NP3											0.034	0.013
NP4											0.017	0.013
NP5											0.037	0.012
NP6											0.0086	0.0074
NP7											0.025	0.017
NP8											0.0074	0.047
NP9											0.098	0.015
NP10+11											0.053	0.037
Total NPs											0.34	0.19
Corresponding Lab Blank	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	9/14/98	9/14/98
Total Suspended Particulate (μg/m^3)	34	46	350	35	36	45	75	51	31	39	73	28

A.1. New Brunswick Particulate Phase AI
Concentrations (ng/m³)

Alkylphenol	NB-QFF 7/28/98	NB-QFF 8/3/98	NB-QFF 8/9/98	NB-QFF 8/15/98	NB-QFF 8/21/98	NB-QFF 8/27/98	NB-QFF 9/4/98	NB-QFF 9/13/98	NB-QFF 9/22/98	NB-QFF 10/1/98	NB-QFF 10/10/98	NB-QFF 10/19/98
tert-Octylphenol	0.0074	0.0083	0.0074	0.0074	0.0074	0.0087	0.0074	0.0074	0.0074	0.0074	0.011	0.18
Nonylphenols												
NP1	0.061	0.019	0.023	0.018	0.0084	0.024	0.0074	0.021	0.024	0.016	0.064	0.32
NP2	0.030	0.012	0.017	0.017	0.0074	0.026	0.0074	0.022	0.0074	0.0074	0.083	0.44
NP3	0.023	0.015	0.0074	0.015	0.012	0.014	0.0074	0.021	0.0074	0.0074	0.059	0.15
NP4	0.0081	0.0074	0.0074	0.0074	0.0063	0.011	0.0074	0.0074	0.0074	0.0074	0.032	0.16
NP5	0.0074	0.0079	0.0074	0.012	0.0076	0.013	0.0074	0.017	0.0074	0.0074	0.028	0.14
NP6	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.015	0.080
NP7	0.021	0.012	0.0074	0.017	0.0086	0.017	0.011	0.017	0.011	0.0074	0.028	0.19
NP8	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	nd	0.0074	0.0074	0.0074	0.083
NP9	0.014	0.012	0.0074	0.010	0.0047	0.016	0.0078	0.011	0.023	0.012	0.041	0.24
NP10+11	0.0074	0.0074	0.0074	0.011	0.0074	0.013	0.011	0.012	0.0074	0.0074	0.024	0.19
Total NPs	0.18	0.100	0.091	0.110	0.070	0.14	0.071	0.12	0.102	0.080	0.36	1.8
Corresponding Lab Blank	9/14/98	9/14/98	9/18/98	9/24/98	9/24/98	9/18/98	9/24/98	9/24/98	10/15/98	10/15/98	10/19/98	2/9/99
Total Suspended Particulate (μg/m³)	70	58	51	37	28	47	54	42	52	45	19	55

A.1. New Brunswick Particulate Phase AI Concentrations (ng/m^3)

Alkylphenol	NB-QFF 10/28/98	NB-QFF 11/6/98	NB-QFF 11/15/98	NB-QFF 11/24/98	NB-QFF 12/3/98	NB-QFF 12/12/98	NB-QFF 12/21/98	NB-QFF 12/30/98
tert-Octylphenol	0.18	0.035	0.031	0.016	0.0074	0.056	0.0074	0.0074
Nonylphenols								
NP1	0.94	0.11	0.13	0.072	0.040	0.27	0.068	0.026
NP2	1.3	0.14	0.13	0.083	0.030	0.32	0.036	0.021
NP3	0.45	0.048	0.044	0.024	0.0070	0.12	0.030	0.0077
NP4	0.51	0.048	0.042	0.028	0.011	0.12	0.014	0.0077
NP5	0.46	0.047	0.041	0.026	0.010	0.11	0.011	0.011
NP6	0.38	0.030	0.028	0.016	0.0074	0.062	0.0074	0.0074
NP7	0.53	0.061	0.054	0.033	0.016	0.13	0.022	0.011
NP8	0.33	0.015	0.017	0.011	nd	0.069	nd	nd
NP9	0.74	0.064	0.063	0.039	0.015	0.15	0.010	0.0081
NP10+11	0.70	0.052	0.047	0.036	0.0074	0.14	0.0085	0.0074
Total NPs	5.7	0.56	0.54	0.33	0.1	1.4	0.21	0.11
Corresponding Lab Blank	2/9/99	1/4/99	1/4/99	2/17/99	2/17/99	2/17/99	3/2/99	3/2/99
Total Suspended Particulate (μg/m^3)	35	40	34	22	59	43	78	24

A.2. New Brunswick Gas Phase Alkylphenols (NB-PUF)
Concentrations (ng/m^3)

Alkylphenol	NB-PUF 6/4/98	NB-PUF 6/10/98	NB-PUF 6/16/98	NB-PUF 6/22/98	NB-PUF 6/25/98	day-top NB-PUF 6/26/98	day-bottom NB-PUF 6/26/98	night NB-PUF 6/26/98	NB-PUF 6/28/98	NB-PUF 7/4/98	day NB-PUF 7/5/98	night NB-PUF 7/5/98	day NB-PUF 7/6/98
tert-Octylphenol	0.07	0.05	1.3	0.0019					0.29	2.5			
Nonylphenols													
NP1	0.10	0.056	1.1	0.20					1.3	2.5			
NP2	0.30	0.16	3.6	0.66					4.1	7.2			
NP3	0.14	0.078	1.6	0.31					2.0	3.4			
NP4	0.043	0.018	0.55	0.10					0.61	1.0			
NP5	0.13	0.075	1.4	0.29					1.9	3.0			
NP6	0.037	0.021	0.42	0.075					0.50	0.92			
NP7	0.12	0.070	1.3	0.23					1.7	3.7			
NP8	0.11	0.0019	1.5	0.24					0.0019	10			
NP9	0.054	0.029	0.63	0.10					0.82	1.5			
NP10+11	0.53	0.0689	6.3	0.99					13	48			
Total NPs	1.6	0.58	18	3.2					26	81			
Corresponding Lab Blank	6/15/98	7/2/98	7/2/98	7/2/98					8/20/98	7/15/98	7/15/98	7/15/98	7/15/98

A.2. New Brunswick Gas Concentrations (ng/m^3)

Alkylphenol	night NB-PUF 7/6/98	day NB-PUF 7/7/98	night NB-PUF 7/7/98	day NB-PUF 7/8/98	night NB-PUF 7/8/98	day NB-PUF 7/9/98	night NB-PUF 7/9/98	day NB-PUF 7/10/98	night NB-PUF 7/10/98	day NB-PUF 7/11/98	NB-PUF 7/16/98	NB-PUF 7/22/98	NB-PUF 7/28/98
tert-Octylphenol											0.66	2.0	0.60
Nonylphenols													
NP1											3.1	3.5	0.065
NP2											10	12	1.52
NP3											5.1	4.8	0.69
NP4											1.6	1.8	0.22
NP5											5.4	4.8	0.62
NP6											1.4	1.3	0:19
NP7											4.5	4.5	0.71
NP8											0.0019	6.5	1.2
NP9											1.9	2.5	0.28
NP10+11											4.3	35	4.3
Total NPs											38	76	9.8
Corresponding Lab Blank	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	7/15/98	8/20/98	8/20/98	8/31/98	8/31/98

A.2. New Brunswick Gas Concentrations (ng/m^3)

Alkylphenol	NB-PUF 8/3/98	NB-PUF 8/9/98	NB-PUF 8/15/98	NB-PUF 8/21/98	NB-PUF 8/27/98	NB-PUF 9/4/98	NB-PUF 9/13/98	NB-PUF 9/22/98	NB-PUF 10/1/98	NB-PUF 10/10/98	NB-PUF 10/19/98	NB-PUF 10/28/98	NB-PUF 11/6/98
tert-Octylphenol	0.026	0.30	0.24	0.55	0.29	0.14	0.23		0.070	0.17	0.31	0.0091	0.033
Nonylphenols													
NP1	1.4	0.49	0.27	2.1	0.38	0.40	0.87		0.22	0.72	0.55	1.1	0.062
NP2	4.7	1.6	0.87	6.8	1.2	1.3	3.2		0.28	0.96	0.72	1.5	0.085
NP3	2.3	0.80	0.42	3.1	0.6	0.66	1.9		0.12	0.42	0.32	0.71	0.039
NP4	0.70	0.25	0.12	1.1	0.18	0.18	0.56		0.094	0.35	0.25	0.54	0.027
NP5	2.4	0.83	0.44	3.4	0.63	0.69	2.5		0.12	0.40	0.31	0.68	0.035
NP6	0.67	0.22	0.11	1.1	0.16	0.15	0.55		0.066	0.22	0.16	0.43	0.017
NP7	2.3	0.76	0.36	3.8	0.58	0.62	1.6		0.14	0.42	0.30	0.95	0.033
NP8	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019		0.020	0.15	0.17	0.49	0.017
NP9	0.96	0.31	0.16	1.7	0.23	0.22	0.64		0.14	0.45	0.11	0.77	0.034
NP10+11	2.3	0.76	0.36	4.4	0.60	0.62	1.7		0.12	0.43	0.29	1.0	0.032
Total NPs	18	6.00	3.1	28	4.6	4.8	13.407		1.3	4.5	3.2	8.2	0.38
Corresponding Lab Blank	8/31/98	9/8/98	9/8/98	9/8/98	9/8/98	9/30/98	9/30/98	9/30/98	10/21/98	11/24/98	11/24/98	1/5/99	1/5/99

A.2. New Brunswick Gas Concentrations (ng/m³)

Alkylphenol	NB-PUF 11/15/98	NB-PUF 11/24/98	NB-PUF 12/3/98	NB-PUF 12/12/98	NB-PUF 12/21/98	NB-PUF 12/30/98
tert-Octylphenol	0.050	0.045	0.14	0.10	0.19	0.010
Nonylphenols						
NP1	0.076	0.32	0.040	0.12	0.85	0.019
NP2	0.095	0.40	0.15	0.12	1.05	0.026
NP3	0.039	0.17	0.021	0.075	0.48	0.011
NP4	0.026	0.14	0.052	0.035	0.36	0.0082
NP5	0.036	0.16	0.072	0.067	0.46	0.011
NP6	0.018	0.073	0.031	0.029	0.24	0.0067
NP7	0.036	0.14	0.081	0.073	0.53	0.014
NP8	0.014	0.091	0.021	0.027	0.23	0.0043
NP9	0.038	0.18	0.057	0.056	0.46	0.013
NP10+11	0.037	0.15	0.064	0.055	0.56	0.014
Total NPs	0.41	1.8	0.59	0.66	5.2	0.13
Corresponding Lab Blank	1/5/99	2/8/99	2/8/99	2/8/99	2/15/99	2/15/99

B.1. Sandy Hook Particulate Phase Alkylphenols (SH-QFF)
Concentrations (ng/m^3)

							day	night	day	night	day	night	day	night
Alkylphenol	**SH-QFF 6/4/98**	**SH-QFF 6/10/98**	**SH-QFF 6/16/98**	**SH-QFF 6/22/98**	**SH-QFF 6/28/98**	**SH-QFF 7/4/98**	**SH-QFF 7/5/98**	**SH-QFF 7/5/98**	**SH-QFF 7/6/98**	**SH-QFF 7/6/98**	**SH-QFF 7/7/98**	**SH-QFF 7/7/98**	**SH-QFF 7/8/98**	**SH-QFF 7/8/98**
***tert*-Octylphenol**	0.015	0.011	na	na	0.022	0.0074	na	na	na		na	na	na	na
Nonylphenols														
NP1	0.18	0.58	0.69	0.39	1.1	0.028	7.6	4.8	3.1		0.34	0.93	0.40	2.0
NP2	0.27	0.85	1.1	0.60	1.7	0.037	9.8	7.3	4.3		0.44	1.5	0.56	2.8
NP3	0.099	0.28	0.36	0.20	0.64	0.019	3.2	2.7	1.6		0.24	0.49	0.22	0.90
NP4	0.094	0.33	0.41	0.22	0.65	0.011	3.5	2.8	1.6		0.14	0.53	0.20	1.0
NP5	0.094	0.28	0.34	0.19	0.60	0.015	3.2	2.6	1.6		0.21	0.44	0.24	0.85
NP6	0.053	0.16	0.18	0.10	0.31	0.0074	2.2	1.7	0.89		0.095	0.20	0.11	0.48
NP7	0.086	0.24	0.26	0.14	0.48	0.019	3.8	2.6	1.6		0.22	0.41	0.20	0.87
NP8	0.032	0.18	0.21	0.24	nd	0.14	3.6	1.6	1.4		0.079	0.0074	0.0074	0.95
NP9	0.12	0.43	0.52	0.30	1.0	0.018	5.6	3.9	2.4		0.16	0.61	0.29	1.5
NP10+11	0.15	0.74	0.67	0.38	0.76	0.052	9.0	5.1	4.0		0.36	0.36	0.22	1.1
Total NPs	1.2	4.1	4.7	2.8	7.2	0.3	51	35	23		2.3	5.5	2.5	12
Corresponding Lab Blank	6/29/98	6/10/98	7/1/98	7/1/98	8/6/98	8/6/98	8/6/98	7/17/98	7/17/98	7/17/98	7/24/98	7/24/98	7/19/98	8/6/98
Total Suspended Particulate (μg/m^3)	46	37	63	44	219	75	59	59	53	84	42	40	32	66

B.1. Sandy Hook Particulate Phas
Concentrations (ng/m³)

	day	night	day	night	day									
Alkylphenol	**SH-QFF 7/9/98**	**SH-QFF 7/9/98**	**SH-QFF 7/10/98**	**SH-QFF 7/10/98**	**SH-QFF 7/11/98**	**SH-QFF 7/16/98**	**SH-QFF 7/22/98**	**SH-QFF 7/28/98**	**SH-QFF 8/3/98**	**SH-QFF 8/9/98**	**SH-QFF 8/15/98**	**SH-QFF 8/21/98**	**SH-QFF 8/27/98**	**SH-QFF 9/4/98**
***tert*-Octylphenol**	na	na	na	na	na	0.63	0.023	0.011	0.012	0.014	0.0074	0.0074	0.0074	0.0078
Nonylphenols														
NP1	0.31	0.11	1.1	0.17	0.92	1.7	0.46	0.26	0.27	0.47	0.23	0.016	0.19	0.19
NP2	0.44	0.092	1.4	0.26	1.3	2.2	0.67	0.38	0.39	0.74	0.36	0.051	0.29	0.27
NP3	0.15	0.0074	0.55	0.094	0.47	0.92	0.24	0.14	0.14	0.25	0.12	0.0074	0.096	0.12
NP4	0.16	0.030	0.51	0.10	0.50	0.77	0.26	0.15	0.14	0.30	0.14	0.0074	0.11	0.098
NP5	0.14	0.0074	0.51	0.11	0.46	0.86	0.21	0.13	0.12	0.24	0.100	0.0074	0.089	0.11
NP6	0.10	0.0074	0.32	0.055	0.24	0.43	0.13	0.064	0.070	0.16	0.61	0.0074	0.048	0.044
NP7	0.13	0.0074	0.49	0.092	0.45	0.83	0.21	0.12	0.11	0.22	0.11	0.0074	0.070	0.092
NP8	0.0074	0.0074	0.24	0.050	0.0074	0.0074	0.84	0.48	0.30	0.0074	0.28	0.0074	0.25	0.26
NP9	0.19	0.053	0.79	0.15	0.80	0.95	0.36	0.20	0.19	0.50	0.17	0.010	0.14	0.11
NP10+11	0.0074	0.0074	1.0	0.25	1.4	1.5	0.66	0.37	0.32	0.35	0.30	0.0074	0.22	0.17
Total NPs	1.6	0.33	6.9	1.3	6.5	10	4.0	2.3	2.0	3.2	2.4	0.128	1.5	1.5
Corresponding Lab Blank	7/17/98	7/17/98	7/17/98	7/17/98	8/6/98	9/14/98	9/14/98	9/14/98	9/18/98	9/14/98	9/18/98	9/24/98	9/18/98	9/24/98
Total Suspended Particulate (μg/m³)	73	79	47	48	61	52	70	52	56	38	30	76	27	72

B.1. Sandy Hook Particulate Phas
Concentrations (ng/m^3)

Alkylphenol	SH-QFF 9/13/98	SH-QFF 9/22/98	SH-QFF 10/1/98	SH-QFF 10/10/98	SH-QFF 10/19/98	SH-QFF 10/28/98	SH-QFF 11/6/98	SH-QFF 11/15/98	SH-QFF 11/24/98	SH-QFF 12/3/98	SH-QFF 12/12/98	SH-QFF 12/21/98	SH-QFF 12/30/98
tert-Octylphenol	0.0074	0.0074	0.0074		0.014	0.0074	0.0081	0.011	0.0077	0.016	0.022	0.012	0.0074
Nonylphenols													
NP1	0.071	0.051	0.012		0.22	0.086	0.15	0.043	0.22	0.17	0.24	0.097	0.027
NP2	0.11	0.072	0.012		0.32	0.13	0.21	0.15	0.31	0.24	0.33	0.138	0.030
NP3	0.077	0.098	0.0074		0.12	0.018	0.076	0.065	0.11	0.091	0.12	0.047	0.013
NP4	0.025	0.016	0.0074		0.11	0.038	0.079	0.049	0.116	0.092	0.13	0.0492	0.008
NP5	0.055	0.030	0.0074		0.12	0.018	0.074	0.059	0.11	0.084	0.112	0.0429	0.016
NP6	0.015	0.0074	0.0074		0.055	0.022	0.038	0.037	0.070	0.041	0.06	0.025	0.01
NP7	0.069	0.037	0.010		0.12	0.018	0.075	0.072	0.14	0.11	0.12	0.046	0.023
NP8	0.0074	0.0074	0.0074		0.019	0.012	0.027	0.026	0.060	0.051	0.037	0.021	0.0074
NP9	0.036	0.023	0.0074		0.15	0.057	0.10	0.064	0.15	0.11	0.16	0.065	0.012
NP10+11	0.021	0.0074	0.0074		0.096	0.027	0.094	0.067	0.16	0.094	0.14	0.056	0.018
Total NPs	0.49	0.35	0.086		1.3	0.42	0.92	0.63	1.4	1.1	1.4	0.59	0.16
Corresponding Lab Blank	9/24/98	10/15/98	10/15/98	10/19/98	1/4/99	1/4/99	2/9/99	2/9/99	1/4/99	2/17/99	2/17/99	3/2/99	3/2/99
Total Suspended Particulate (μg/m^3)	43	50	55	na	42	44	39	30	49	65	54	35	49

B.2. Sandy Hook Gas Phase Alkylphenols (SH-PUF)
Concentrations (ng/m^3)

Alkylphenol	SH-PUF 6/4/98	SH-PUF 6/10/98	SH-PUF 6/16/98	SH-PUF 6/22/98	SH-PUF 6/28/98	SH-PUF 7/4/98	day SH-PUF 7/5/98	night SH-PUF 7/5/98	day SH-PUF 7/6/98	night SH-PUF 7/6/98	day SH-PUF 7/7/98	night SH-PUF 7/7/98	day SH-PUF 7/8/98	night SH-PUF 7/8/98	day SH-PUF 7/9/98
tert-Octylphenol		0.0019	na	0.75	na		na	na	na		na	na	na	na	na
Nonylphenols															
NP1		0.40	1.4	4.6	2.0		9.2	1.2	4.9		0.73	3.0	1.2	0.27	1.3
NP2		0.58	1.8	6.2	3.0		13	1.5	7.2		0.91	4.0	1.6	0.32	1.6
NP3		0.27	0.87	2.6	1.3		5.1	0.67	2.8		0.46	1.9	0.70	0.18	0.81
NP4		0.20	0.67	2.6	1.2		5.3	0.52	2.7		0.29	1.5	0.62	0.11	0.51
NP5		0.25	0.84	2.6	1.2		5.1	0.63	2.8		0.42	1.9	0.70	0.16	0.80
NP6		0.14	0.48	1.3	0.57		3.0	0.34	1.5		0.22	0.86	0.40	0.069	0.35
NP7		0.24	0.80	2.4	1.0		4.2	0.76	2.5		0.44	1.6	0.67	0.16	0.79
NP8		0.0019	0.34	0.067	0.42		0.0019	0.32	0.0019		0.16	1.1	0.28	0.044	0.66
NP9		0.22	0.80	3.8	1.5		6.7	0.81	3.5		0.41	1.8	0.84	0.12	0.66
NP10+11		0.37	1.2	5.9	2.2		4.3	0.68	3.14		0.85	2.9	1.5	0.26	2.0
Total NPs		2.7	9.2	32	14		56	7.5	31		4.9	21	8.5	1.7	9.5
Corresponding Lab Blank	6/15/98	7/2/98	7/2/98	7/2/98	7/12/98	8/20/98	7/30/98	7/18/98	7/30/98	7/30/98	7/10/98	8/31/98	7/12/98	7/10/98	7/12/98

B.2. Sandy Hook Gas Pha

Concentrations (ng/m^3)

Alkylphenol	night SH-PUF 7/9/98	day SH-PUF 7/10/98	night SH-PUF 7/10/98	day SH-PUF 7/11/98	SH-PUF 7/16/98	SH-PUF 7/22/98	SH-PUF 7/28/98	SH-PUF 8/3/98	SH-PUF 8/9/98	SH-PUF 8/15/98	SH-PUF 8/21/98	SH-PUF 8/27/98	SH-PUF 9/4/98	SH-PUF 9/13/98
tert-Octylphenol	na	na	na	na	0.052	0.17	0.33	0.0019	0.093	0.43	0.17	0.073	0.59	0.75
Nonylphenols														
NP1	0.31	0.76	0.11	1.0	0.58	1.5	0.16	0.0019	1.0	0.67	0.22	0.43	0.40	0.44
NP2	0.37	1.1	0.16	1.3	0.89	1.7	2.1	0.0019	1.4	0.91	0.29	0.57	0.80	0.68
NP3	0.21	0.41	0.081	0.61	0.29	0.82	0.86	0.0019	0.73	0.38	0.16	0.31	0.41	0.41
NP4	0.13	0.42	0.049	0.46	0.35	0.57	0.78	0.0019	0.48	0.32	0.10	0.20	0.33	0.21
NP5	0.19	0.41	0.071	0.58	0.27	0.74	0.82	0.0019	0.72	0.39	0.16	0.31	0.49	0.48
NP6	0.083	0.21	0.040	0.24	0.14	0.35	0.40	0.0019	0.27	0.17	0.067	0.12	0.21	0.043
NP7	0.21	0.37	0.080	0.57	0.27	0.79	0.81	0.0019	0.68	0.33	0.16	0.29	0.30	0.13
NP8	0.069	0.31	0.027	0.0019	0.19	0.44	0.35	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019
NP9	0.15	0.62	0.061	0.56	0.48	0.72	0.97	0.0019	0.56	0.39	0.11	0.24	0.34	0.15
NP10+11	0.36	0.96	0.22	0.87	0.86	1.4	1.0	0.0019	0.61	0.54	0.15	0.29	0.14	0.14
Total NPs	2.1	5.6	0.90	6.1	4.3	9.1	8.3	0.019	6.5	4.1	1.4	2.8	3.4	2.7
Corresponding Lab Blank	7/18/98	7/17/98	7/17/98	7/17/98	8/20/98	8/20/98	8/20/98	8/20/98	8/31/98	8/31/98	9/8/98	9/8/98	9/30/98	9/30/98

B.2. Sandy Hook Gas Pha
Concentrations (ng/m^3)

Alkylphenol	SH-PUF 9/22/98	SH-PUF 10/1/98	SH-PUF 10/10/98	SH-PUF 10/19/98	SH-PUF 10/28/98	SH-PUF 11/6/98	SH-PUF 11/15/98	SH-PUF 11/24/98	SH-PUF 12/3/98	SH-PUF 12/12/98	SH-PUF 12/21/98	SH-PUF 12/30/98
tert-Octylphenol	0.31	0.031	1.0	0.14	0.045	0.0040	0.020	0.032	0.054	0.086	0.053	0.11
Nonylphenols												
NP1	0.22	0.043	0.39	0.10	0.048	0.0045	0.020	0.022	0.10	0.036	0.14	0.089
NP2	0.30	0.075	0.71	0.14	0.069	0.0061	0.027	0.029	0.11	0.042	0.18	0.10
NP3	0.22	0.036	0.22	0.079	0.041	0.0035	0.016	0.025	0.083	0.032	0.087	0.051
NP4	0.10	0.018	0.21	0.037	0.015	0.0025	0.0059	0.0083	0.034	0.0081	0.062	0.031
NP5	0.26	0.034	0.24	0.072	0.033	0.0037	0.011	0.022	0.073	0.030	0.077	0.043
NP6	0.025	0.019	0.0019	0.038	0.026	0.0019	0.0053	0.0083	0.044	0.010	0.044	0.023
NP7	0.18	0.039	0.30	0.084	0.042	0.0058	0.014	0.019	0.11	0.039	0.10	0.062
NP8	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.0019	0.021	0.022
NP9	0.074	0.024	0.33	0.044	0.021	0.0040	0.0069	0.0065	0.032	0.014	0.083	0.041
NP10+11	0.082	0.030	0.0019	0.059	0.024	0.0055	0.0096	0.012	0.064	0.023	0.093	0.050
Total NPs	1.5	0.32	2.4	0.65	0.32	0.039	0.12	0.15	0.65	0.24	0.89	0.51
Corresponding Lab Blank	9/30/98	10/21/98	10/21/98	11/24/98	11/24/98	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/15/99	2/15/99

C.1. Liberty Science Center Particulate Phase Alkylphenols (LS-QFF)

Concentrations (ng/m^3)

Alkylphenol	day LS-QFF 7/5/98	night LS-QFF 7/5/98	day LS-QFF 7/6/98	night LS-QFF 7/6/98	day LS-QFF 7/7/98	night LS-QFF 7/7/98	day LS-QFF 7/8/98	night LS-QFF 7/8/98	day LS-QFF 7/9/98	night LS-QFF 7/9/98	day LS-QFF 7/10/98	night LS-QFF 7/10/98	day LS-QFF 7/11/98	LS-QFF 10/10/98	LS-QFF 10/19/98
tert-Octylphenol	na	na	na	na	na	na	na	na	na	na	na	na	na	0.0074	0.038
Nonylphenols															
NP1	1.2	1.3	0.59	0.39	0.32	0.33	0.29	0.48	0.35	0.17	0.66	0.32	3.0	0.11	0.23
NP2	1.8	2.0	0.95	0.60	0.60	0.50	0.43	0.79	0.54	0.27	1.1	0.50	5.3	0.15	0.32
NP3	0.60	0.66	0.31	0.22	0.15	0.16	0.13	0.26	0.18	0.082	0.34	0.16	2.0	0.13	0.11
NP4	0.70	0.73	0.39	0.19	0.18	0.17	0.14	0.26	0.19	0.088	0.44	0.18	2.2	0.05	0.12
NP5	0.60	0.66	0.30	0.23	0.12	0.16	0.14	0.36	0.23	0.073	0.33	0.17	2.2	0.018	0.11
NP6	0.33	0.35	0.20	0.083	0.070	0.088	0.08	0.14	0.11	0.11	0.23	0.10	1.2	0.010	0.086
NP7	0.67	0.61	0.26	0.39	0.20	0.15	0.13	0.85	0.28	0.14	0.58	0.15	1.5	0.017	0.18
NP8	0.38	0.54	0.23	0.0074	0.093	0.10	0.14	0.12	0.20	0.089	0.23	0.091	0.81	0.012	0.082
NP9	1.0	1.1	0.52	0.35	0.22	0.24	0.20	0.34	0.32	0.12	0.61	0.25	2.7	0.13	0.17
NP10+11	1.2	1.6	1.5	0.55	0.42	0.37	0.42	0.57	0.57	0.64	0.99	0.40	2.4	0.025	0.17
Total NPs	8.6	9.5	5.2	3.0	2.4	2.3	2.1	4.2	3.0	1.8	5.5	2.3	23	0.65	1.6
Corresponding Lab Blank	7/24/98	7/17/98	7/24/98	7/19/98	7/24/98	7/17/98	7/17/98	7/24/98	7/19/98	7/19/98	7/24/98	7/24/98	7/17/98	10/19/98	2/9/99
Total Suspended Particulate (μg/m^3)	38	42	64	50	59	38	43	55	81	97	100	51	380	35	42

C.1. Liberty Science Cent
Concentrations (ng/m³)

Alkylphenol	LS-QFF 10/28/98	LS-QFF 11/6/98	LS-QFF 11/15/98	LS-QFF 11/21/98	LS-QFF 12/3/98	LS-QFF 12/12/98	LS-QFF 12/21/98	LS-QFF 12/30/98
tert-Octylphenol	0.0094	0.060	0.044	0.027	0.029	0.073	0.013	0.044
Nonylphenols								
NP1	0.043	0.29	0.18	0.16	0.14	0.28	0.045	0.69
NP2	0.093	0.39	0.24	0.21	0.18	0.38	0.067	0.89
NP3	0.0074	0.14	0.093	0.077	0.067	0.14	0.013	0.37
NP4	0.021	0.13	0.082	0.076	0.072	0.14	0.011	0.29
NP5	0.018	0.13	0.084	0.073	0.061	0.13	0.017	0.36
NP6	0.012	0.088	0.054	0.056	0.047	0.10	0.0080	0.31
NP7	0.092	0.16	0.13	0.10	0.11	0.073	0.030	0.55
NP8	0.015	0.042	0.023	0.035	0.095	0.068	0.0074	0.21
NP9	0.023	0.18	0.12	0.11	0.10	0.19	0.020	0.52
NP10+11	0.019	0.17	0.12	0.11	0.094	0.18	0.014	0.60
Total NPs	0.34	1.7	1.1	1.0	0.97	1.7	0.23	4.8
Corresponding Lab Blank	2/9/99	1/4/99	1/4/99	2/17/99	2/17/99	2/17/99	2/17/99	3/2/99
Total Suspended Particulate (μg/m³)	75	39	47	69	93	39	71	56

C.2. Liberty Science Center Gas Phase Alkylphenols (LS-PUF) Concentrations (ng/m^3)

Alkylphenol	day **LS-PUF 7/5/98**	night **LS-PUF 7/5/98**	day **LS-PUF 7/6/98**	night **LS-PUF 7/6/98**	day **LS-PUF 7/7/98**	night **LS-PUF 7/7/98**	day **LS-PUF 7/8/98**	night **LS-PUF 7/8/98**	day **LS-PUF 7/9/98**	night **LS-PUF 7/9/98**	day **LS-PUF 7/10/98**	night **LS-PUF 7/10/98**	day **LS-PUF 7/11/98**	**LS-PUF 10/10/98**	**LS-PUF 10/19/98**
***tert*-Octylphenol**	na	na	na	na	na	na	na	na	na	na	na	na	na	0.25	0.14
Nonylphenols															
NP1	0.53	0.0019	0.27	0.32	0.49	0.16	0.12	0.18	1.3	0.94	0.18	0.010	0.16	0.31	0.36
NP2	0.77	0.0019	0.33	0.43	0.69	0.21	0.17	0.28	1.6	1.2	0.31	0.0094	0.24	0.41	0.43
NP3	0.36	0.0019	0.18	0.24	0.37	0.12	0.093	0.15	0.70	0.56	0.14	0.0072	0.11	0.25	0.22
NP4	0.25	0.0019	0.10	0.13	0.22	0.071	0.050	0.084	0.45	0.36	0.11	0.0027	0.10	0.16	0.13
NP5	0.34	0.0019	0.16	0.22	0.36	0.11	0.078	0.15	0.60	0.51	0.14	0.0050	0.11	0.22	0.20
NP6	0.13	0.0019	0.06	0.088	0.14	0.058	0.035	0.06	0.28	0.27	0.050	0.0023	0.055	0.11	0.090
NP7	0.28	0.0019	0.16	0.36	0.32	0.13	0.076	0.14	1.35	0.56	0.10	0.0054	0.075	0.24	0.20
NP8	0.0019	0.0019	0.052	0.0019	0.063	0.04	0.0019	0.030	0.25	0.23	0.0019	0.0019	0.0019	0.07	0.034
NP9	0.24	0.0019	0.13	0.14	0.21	0.080	0.047	0.078	0.55	0.49	0.087	0.0041	0.084	0.23	0.16
NP10+11	0.0019	0.0019	0.35	0.14	1.47	0.10	0.093	0.074	1.1	0.67	0.19	0.020	0.074	0.31	0.16
Total NPs	2.9	0.019	1.8	2.1	4.3	1.1	0.76	1.2	8.1	5.8	1.3	0.068	1.0	2.3	2.0
Corresponding Lab Blank	7/30/98	7/17/98	7/17/98	7/17/98	7/10/98	7/12/98	7/18/98	7/10/98	7/18/98	7/18/98	7/12/98	7/12/98	7/10/98	10/21/98	11/24/98

C.2. Liberty Science Center
Concentrations (ng/m³)

Alkylphenol	LS-PUF 10/28/98	LS-PUF 11/6/98	LS-PUF 11/15/98	LS-PUF 11/24/98	LS-PUF 12/3/98	LS-PUF 12/12/98	LS-PUF 12/21/98	LS-PUF 12/30/98
tert-Octylphenol	0.74	0.038	0.063	0.030	0.32	0.11	0.15	0.012
Nonylphenols								
NP1	2.7	0.029	0.083	0.057	0.70	0.10	0.47	0.024
NP2	3.6	0.033	0.11	0.073	0.92	0.12	0.63	0.033
NP3	1.5	0.019	0.051	0.036	0.42	0.065	0.32	0.014
NP4	1.2	0.010	0.031	0.023	0.34	0.044	0.24	0.010
NP5	1.5	0.016	0.050	0.033	0.40	0.059	0.31	0.014
NP6	0.77	0.0062	0.024	0.012	0.22	0.030	0.16	0.0080
NP7	1.3	0.017	0.047	0.034	0.43	0.061	0.33	0.017
NP8	0.85	0.0078	0.0082	0.0039	0.21	0.012	0.12	0.0076
NP9	1.3	0.012	0.038	0.03	0.42	0.051	0.26	0.018
NP10+11	1.8	0.013	0.040	0.024	0.40	0.054	0.28	0.018
Total NPs	17	0.16	0.48	0.32	4.5	0.60	3.1	0.16
Corresponding Lab Blank	11/24/98	2/8/99	1/5/99	1/5/99	1/5/99	2/8/99	2/8/99	2/8/99

D.1. Lower Hudson River Estuary Particulate Phase Alkylphenols (Raritan Bay: RB-QFF)(New York Harbor: NH-QFF)

Concentrations (ng/m^3)

Alkylphenol	day RB-QFF 7/5/98	day RB-QFF 7/6/98	day RB-QFF 7/7/98	day NH-QFF 7/10/98	evening NH-QFF 7/10/98
tert-Octylphenol	na	na	na	na	
Nonylphenols					
NP1	0.83	2.0	0.81	0.44	
NP2	1.5	3.7	1.6	0.68	
NP3	0.44	1.1	0.47	0.26	
NP4	0.60	1.5	0.58	0.26	
NP5	0.44	1.2	0.46	0.30	
NP6	0.24	0.55	0.23	0.14	
NP7	0.44	0.83	0.39	0.30	
NP8	0.33	0.29	0.23	0.09	
NP9	0.64	1.4	0.62	0.36	
NP10+11	1.5	1.3	0.87	0.74	
Total NPs	6.9	14	6.3	3.6	
Corresponding Lab Blank	8/6/98	7/17/98	7/24/98	7/19/98	7/19/98
Total Suspended Particulate (μg/m^3)	50	56	60	110	120

D.2. Lower Hudson River Estuary Gas Phase Alkylphenols (Raritan Bay: RB-PUF)(New York Harbor: NH-PUF) Concentrations (ng/m^3)

Alkylphenol	day **RB-PUF** **7/5/98**	day **RB-PUF** **7/6/98**	day **RB-PUF** **7/7/98**	day **NH-PUF** **7/10/98**	evening **NH-PUF** **7/10/98**
***tert*-Octylphenol**	**na**	**na**	**na**	**na**	**na**
Nonylphenols					
NP1	0.35	0.19	10	3.0	0.34
NP2	0.51	0.37	17	6.1	0.59
NP3	0.27	0.14	5.6	2.2	0.29
NP4	0.16	0.15	5.8	2.1	0.20
NP5	0.26	0.21	5.3	2.2	0.28
NP6	0.13	0.091	2.80	0.78	0.12
NP7	0.27	0.11	4.8	1.1	0.21
NP8	0.089	0.0019	2.8	0.54	0.0019
NP9	0.16	0.11	5.5	1.3	0.12
NP10+11	0.44	0.11	9.1	1.84	0.027
Total NPs	2.6	1.5	69	21	2.2
Corresponding Lab Blank	7/10/98	7/30/98	7/10/98	7/17/98	7/18/98

D.3. Lower Hudson River Estuary Water Particulate Phase Alkylphenols (Raritan Bay: RB-GFF)(New York Harbor: NH-GFF) Concentrations (ng/L)

Alkylphenol	day **RB-GFF** **7/5/98**	day **RB-GFF** **7/6/98**	day **RB-GFF** **7/7/98**	day **NH-GFF** **7/10/98**	evening **NH-GFF** **7/10/98**
***tert*-Octylphenol**	0.064	0.035	0.036	0.15	
Nonylphenols					
NP1	0.72	0.47	0.74	4.3	
NP2	0.33	0.23	0.39	2.6	
NP3	0.24	0.15	0.23	1.1	
NP4	0.32	0.19	0.37	2.4	
NP5	0.24	0.15	0.20	1.1	
NP6	0.35	0.21	0.26	1.6	
NP7	0.48	0.28	0.32	1.7	
NP8	0.0074	0.0074	0.0074	0.25	
NP9	0.67	0.51	0.56	4.2	
NP10+11	0.56	0.36	0.39	2.3	
Total NPs	3.9	2.6	3.5	22	
Corresponding Lab Blank	8/10/98	8/10/98	8/10/98	8/10/98	8/10/98
Volume of Water (L)	35	39	49	30	23

D.4. Lower Hudson River Estuary Dissolved Phase Alkylphenols (Raritan Bay: RB-XAD)(New York Harbor: NH-XAD) Concentrations (ng/L)

Alkylphenol	day **RB-XAD** **7/5/98**	day **RB-XAD** **7/6/98**	day **RB-XAD** **7/7/98**	day **NH-XAD** **7/10/98**	evening **NH-XAD** **7/10/98**
***tert*-Octylphenol**	1.3	na	na	na	102
Nonylphenols					
NP1	2.9				17
NP2	0.88				9.0
NP3	1.0				6.9
NP4	0.56				7.8
NP5	0.93				8.4
NP6	0.79				7.3
NP7	1.7				10
NP8	0.023				0.023
NP9	1.4				16
NP10+11	1.5				12
Total NPs	**12**	**24**	**49**	**61**	**95**
Corresponding Lab Blank	7/28/98	7/28/98	7/28/98	7/28/98	7/28/98
Volume of Water (L)	35	39	49	30	23

A.1. Laboratory Blanks Particulate Phase Alkylphenols (LB-QFF) Mass (ng)

Alkylphenol	LB-QFF 6/29/98	LB-QFF 7/1/98	LB-QFF 7/15/98	LB-QFF 7/17/98	LB-QFF 7/19/98	LB-QFF 7/24/98	LB-QFF 8/6/98	LB-QFF 9/14/98	LB-QFF 9/18/98	LB-QFF 9/24/98
tert-Octylphenol			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Nonylphenols										
NP1			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP2			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP3			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP4			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP5			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP6			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP7			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP8			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP9			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
NP10+11			4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total NPs			40	40	40	40	40	40	40	40

A.1. Laboratory Blanks Particulate Phase Alkylphenols (LB-QFF) Mass (ng)

Alkylphenol	LB-QFF 10/15/98	LB-QFF 10/19/98	LB-QFF 1/4/99	LB-QFF 2/9/99	LB-QFF 2/17/99	LB-QFF 3/2/99
tert-Octylphenol	4.0	4.0	4.0	4.0		
Nonylphenols						
NP1	4.0	4.0	4.0	4.0		
NP2	4.0	4.0	4.0	4.0		
NP3	4.0	4.0	4.0	4.0		
NP4	4.0	4.0	4.0	4.0		
NP5	4.0	4.0	4.0	4.0		
NP6	4.0	4.0	4.0	4.0		
NP7	4.0	4.0	4.0	4.0		
NP8	4.0	4.0	4.0	4.0		
NP9	4.0	4.0	4.0	4.0		
NP10+11	4.0	4.0	4.0	4.0		
Total NPs	40	40	40	40		

A.2. Laboratory Blanks Gas Phase Alkylphenols (LB-PUF)
Mass (ng)

Alkylphenol	LB-PUF 6/15/98	LB-PUF 7/2/98	LB-PUF 7/10/98	LB-PUF 7/12/98	LB-PUF 7/15/98	LB-PUF 7/17/98	LB-PUF 7/18/98	LB-PUF 7/30/98	LB-PUF 8/20/98	LB-PUF 8/31/98
tert-Octylphenol			na	na	na	na	na	na	1.0	1.0
Nonylphenols										
NP1			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP2			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP3			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP4			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP5			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP6			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP7			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP8			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP9			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP10+11			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total NPs			10	10	10	10	10	10	10	10

A.2. Laboratory Blanks Gas Phase
Mass (ng)

Alkylphenol	LB-PUF 9/4/98	LB-PUF 9/30/98	LB-PUF 10/19/98	LB-PUF 10/21/98	LB-PUF 11/24/98	LB-PUF 1/5/99	LB-PUF 2/8/99	LB-PUF 2/15/99
tert-Octylphenol	1.0	1.0		1.0	1.0	1.0	1.0	
Nonylphenols								
NP1	1.0	1.0		1.0	1.0	1.0	1.0	
NP2	1.0	1.0		1.0	1.0	1.0	1.0	
NP3	1.0	1.0		1.0	1.0	1.0	1.0	
NP4	1.0	1.0		1.0	1.0	1.0	1.0	
NP5	1.0	1.0		1.0	1.0	1.0	1.0	
NP6	1.0	1.0		1.0	1.0	1.0	1.0	
NP7	1.0	1.0		1.0	1.0	1.0	1.0	
NP8	1.0	1.0		1.0	1.0	1.0	1.0	
NP9	1.0	1.0		1.0	1.0	1.0	1.0	
NP10+11	1.0	1.0		1.0	1.0	1.0	1.0	
Total NPs	10	10		10	10	10	10	

A.3. Laboratory Blanks Alkylphenols Dissolved Phase In Water (LB-XAD)
Mass (ng)

Alkylphenol	LB-XAD 7/28/98
tert-Octylphenol	na
Nonylphenols	
NP1	0
NP2	1.1
NP3	0
NP4	0
NP5	0
NP6	4.5
NP7	0
NP8	0
NP9	2.6
NP10+11	0
Total NPs	8
Average Volume Colected in Samples (L)	35.2
Detection Limit for Total NPs (ng/L)	0.23
Detection Limit for NP Isomers (ng/L)	0.023

A.4. Laboratory Blanks Alkylphenols Particulate Phase In Water (LB-GFF)
Mass (ng)

Alkylphenol	LB-GFF 8/10/98
tert-Octylphenol	na
Nonylphenols	
NP1	0.0023
NP2	0.0023
NP3	0.0023
NP4	0.0023
NP5	0.0023
NP6	0.0023
NP7	0.0023
NP8	0.0023
NP9	0.0023
NP10+11	0.0023
Total NPs	0.023
Detection Limit	0.0023

B.1. Field Blanks Particulate Phase Alkylphenols (LS-QFF)
Mass (ng)

Alkylphenol	NB FB-QFF 7/7/98	NB FB-QFF 7/10/98	NB FB-QFF 10/19/98	SH FB-QFF 7/7/98	SH FB-QFF 7/11/98	SH FB-QFF 10/19/98	LS FB-QFF 7/7/98	LS FB-QFF 7/10/99	NH FB-QFF 7/10/98
tert-Octylphenol	0.0074	na	0.0074	na	na	1.6	na	na	
Nonylphenols									
NP1	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.057	
NP2	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.032	
NP3	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.010	
NP4	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.026	
NP5	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.015	
NP6	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.010	
NP7	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.015	
NP8	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	
NP9	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.047	
NP10+11	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	0.0074	
Total NPs	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.21	
Corresponding Lab Blank	na	na	2/9/99	7/17/98	7/24/98	2/9/99	7/19/98	8/6/98	

B.2. Field Blanks Gas Phase Alkylphenols (FB-PUF)
Mass (ng)

Alkylphenol	NB FB-PUF 6/22/98	NB FB-PUF 7/7/98	NB FB-PUF 7/10/98	NB FB-PUF 10/19/98	SH FB-PUF 6/22/98	SH FB-PUF 7/7/98	SH FB-PUF 7/11/98	SH FB-PUF 10/19/98	LS FB-PUF 7/7/98	LS FB-PUF 7/10/99	NH FB-PUF 7/10/98
tert-Octylphenol	na			1.0	1.0	na	1.0	1.6	na	na	na
Nonylphenols											
NP1	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP2	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP3	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP4	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP5	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP6	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP7	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP8	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP9	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NP10+11	1.0			1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total NPs	10			10	10	10	10	10	10	10	10
Corresponding Lab Blank	8/6/98			11/24/98	8/6/98	7/18/99	7/18/99	11/24/98	7/18/99	8/6/98	7/19/98

Appendix A.1. Quality Assurance Aspects-Organics

Table 1: Average Mass in Lab Blanks and Average Recovery from Matrix Spikes (%)

	Average Mass in Lab Blanks				Average Matrix Spike Recovery (%)			
Compound	**QFF**	**PUF**	**XAD**	**GFF**	**QFF**	**PUF**	**XAD**	**GFF**
PCBs	pg	pg	pg	pg				
8+5		0.11	0.086			92%		
18	0.087	0.012	0.0059	0.041	111%	101%	111%	101%
17+15	0.026	0.018	0.00063	0	103%	92%	90%	81%
16+32	0.093	0.086	0.0072	0.016	114%	108%	100%	90%
31	0.090	0.0089	0.019	0	151%	106%	155%	127%
28	0.034	0.031	0.026	0	109%	99%	103%	82%
21+33+53	0.031	0.10	0.0010	0.071	108%	127%	122%	104%
22	0.014	0.015	0.0088	0.13	104%	75%	110%	108%
45	0.0091	0.0016	0.00066	0	85%	104%	97%	72%
52+43	0.082	0.11	0.016	0	124%	118%	130%	113%
49	0.028	0.065	0.00068	0	123%	124%	123%	115%
47+48	0.027	0.045	0.028	0	149%	109%	113%	127%
44	0.071	0.020	0.047	0	117%	105%	110%	98%
37+42	0.021	0.019	0.036	0.018	110%	90%	100%	82%
41+71	0.028	0.0010	0.0029	0	147%	112%	151%	121%
64	0.017	0.0051	0.0025	0	104%	105%	103%	90%
40	0.015	0.0031	0.00063	0	134%	101%	125%	87%
74	0.0075	0.0085	0.0067	0	127%	110%		145%
70+76	0.012	0.022	0.012	0	143%	108%	180%	178%
66+95	0.15	0.039	0.016	0.070	157%	111%	162%	147%
91	0.0064	0.0039	0.0092	0	133%	103%	108%	108%
56+60+89	0.0093	0.0078	0.0051	0	133%	100%	135%	171%
92+84	0.025	0.0037	0.0012	0	119%	100%	99%	125%
101	0.048	0.013	0.0085	0.0076	295%	114%	127%	121%
83	0.00078	0.0067	0.035	0	133%	175%	140%	282%
97	0.0034	0.030	0.00037	0	138%	128%	144%	109%
87+81	0.013	0.072	0.0066	0	122%	132%	121%	82%
85+136	0.0081	0	0.0070	0	132%	74%	141%	90%
110+77	0.033	0.0081	0.0066	0	145%	117%	131%	112%
82	0.0055	0.0068	0.012	0	111%	105%	74%	102%
151	0.0080	0.0050	0.0063	0	94%	101%	88%	77%
135+144+147+124	0.0052	0.0070	0.0038	0	85%	102%	104%	85%
149+123+107	0.019	0.0058	0.013	0.0030	101%	103%	95%	85%
118	0.010	0.0086	0.025	0	130%	103%	115%	86%
146	0.0026	0.0034	0.0031	0	112%	103%	112%	79%
153+132	0.0094	0.0081	0.0029	0	101%	91%	95%	88%
105	0.00034	0.0011	0.0017	0	129%	79%	139%	119%
141	0.0017	0.00022	0.0012	0	90%	99%	96%	89%
137+176+130	0.0030	0	0.00015	0	112%	86%	79%	65%
163+138	0.012	0.00053	0.027	0.0075	107%	103%	103%	90%
178+129	0	0.00096	0.00054	0	104%	95%	95%	89%
187+182	0.0081	0	0.00036	0	99%	110%	88%	82%
183	0.00023	0.00061	0.00036	0	108%	103%	101%	93%
185	0.00020	0	0.00021	0	109%	101%	87%	97%
174	0.00015	0.0087	0.019	0	108%	102%	94%	88%
177	0.00070	0.0039	0.00039	0	104%	101%	97%	92%
202+171+156	0.0012	0.0037	0.0052	0	111%	94%	105%	97%
180	0.0013	0.0045	0.0077	0	107%	107%	97%	90%
199	0	0.00081	0.00095	0	107%	88%	102%	94%
170+190	0.0014	0.00013	0.00082	0	111%	96%	89%	95%
198	0	0	0	0	98%	23%	106%	88%
201	0.00017	0.0049	0.014	0	106%	101%	93%	87%
203+196	0	0.0049	0.0039	0	107%	99%	97%	93%
195+208	0	0.0039	0.00042	0	111%	104%	99%	94%
194	0.000029	0.00049	0.00030	0	111%	102%	99%	91%
206	0	0.000073	0.00048	0	111%	90%	87%	93%

Appendix A.1. Quality Assurance Aspects-Organics

Table 1 continued: Average Mass in Lab Blanks and Average Recovery from Matrix Spikes (%)

	Average Mass in Lab Blanks				Average Recovery (%)			
Compound	**QFF**	**PUF**	**XAD**	**GFF**	**QFF**	**PUF**	**XAD**	**GFF**
PAHs	**ng**	**ng**	**ng**	**ng**				
FLUOR	0.31	0.78	0.97	0.79	59%	63%	71%	73%
PHEN	7.6	10	36	2.0	71%	65%	67%	82%
ANTHR	0.10	0.085	2.0	0.12	68%	68%	73%	78%
1MeFLUOR	0.40	0.31	4.8	1.6	68%	68%	69%	81%
DBT	0.11	0.16	0.22	0.18	68%	58%	73%	82%
4,5MePHEN	0.051	0.52	0.27	0.067	68%	68%	72%	79%
MePHENs	0.58	34	7.0	2.0	67%	72%	73%	81%
MeDBTs	0.11	0.11	0.69	0.12	77%	59%	NA	82%
FLANT	0.16	0.33	1.6	0.44	80%	73%	77%	84%
PYR	0.21	0.20	0.72	0.41	81%	73%	76%	85%
3,6DMPHEN	0.039	0.082	0.31	0.12	80%	81%	83%	82%
BaF	0.020	0.034	0.58	0.075	79%	73%	89%	84%
BbF	0.019	0.023	0.10	0.016	77%	69%	91%	81%
RET	0.22	0.21	0.75	0.40	82%	74%	77%	84%
BNT	0.031	0.030	0.77	0.11	83%	83%	87%	86%
CPcdP	0.049	0.068	0.041	0.0075	53%	78%	NA	NA
BaA	0.034	0.029	0.087	0.11	72%	75%	108%	83%
CHRY	0.039	0.035	0.53	0.14	84%	78%	107%	84%
TRI	0.060	0.060	0.015	0.0034	NA	NA	104%	15%
BbkFLANT	0.068	0.051	0.31	0.097	79%	79%	109%	84%
BeP	0.046	0.081	0.88	0.044	87%	84%	66%	91%
BaP	0.060	0.070	0.31	0.024	71%	80%	68%	92%
PERYL	0.028	0.054	0.35	0.021	64%	85%	61%	85%
INDENO	0.023	0.021	0.086	0.036	80%	83%	65%	81%
BghiP	0.029	0.016	0.12	0.029	79%	78%	64%	88%
DBacahA	0.019	0.022	0.085	0.011	77%	75%	62%	86%
COR	0.038	0.052	0.11	0.025	73%	75%	66%	89%
OC Pesticides	**pg**	**pg**	**pg**	**pg**				
HCB	0.069	0.035	0.27	0	75 %	81 %	81 %	69 %
Heptachlor	0.025	0.12	0.019	0.025	78 %	90 %	107 %	83 %
4,4 DDE	0.00051	0.015	0.0067	0	92 %	71 %	77 %	106 %
2,4 DDT	0.00059	0.0012	0.00033	0	76 %	85 %	89 %	82 %
4,4 DDT	0.00088	0.012	0.056	0	76 %	55 %	40 %	61 %
Mirex	0.0013	0.0079	0.00041	0	82 %	95 %	87 %	80 %
oxychlordane	0.029	0.023	0.0091	0.011				
trans chlordane	0.0088	0.013	0.018	0.027				
mc5	0.013	0.013	0.0077	0.0075				
cis chlordane	0.0076	0.012	0.0081	0.020				
trans nonachlor	0.0045	0.0066	0.0032	0.0039				
cis nonachlor	0.0066	0.0054	0.0020	0.0069				

Appendix A.1. Quality Assurance Aspects-Organics
Table 3: Detection Limits (Mass Units)

Compound	QFF	PUF	XAD	GFF
PCBs				
18	4.8E-01	9.2E-01	4.9E-02	1.0E-01
17+15	2.6E-01	2.8E-01	4.2E-03	3.7E-02
16+32	5.4E-01	7.6E-01	6.1E-02	3.2E-02
31	5.8E-01	1.2E+00	1.2E-01	2.2E-02
28	3.7E-01	3.5E-01	1.4E-01	2.3E-02
21+33+53	4.3E-01	6.6E-01	4.7E-03	1.6E-01
22	2.7E-01	7.1E-01	6.1E-02	2.9E-01
45	1.7E-01	6.4E-01	3.7E-03	2.9E-03
52+43	3.6E-01	1.0E+00	1.3E-01	4.5E-03
49	2.1E-01	3.1E-01	3.1E-03	2.9E-03
47+48	2.9E-01	5.4E-01	1.7E-01	3.0E-02
44	2.0E+00	1.2E+00	2.2E-01	8.0E-02
37+42	2.8E-01	1.3E-01	1.5E-01	5.9E-02
41+71	1.6E-01	7.6E-02	2.2E-02	6.7E-03
64	2.1E-01	1.2E-01	2.0E-02	1.3E-03
40	3.8E-02	2.9E-01	3.1E-03	2.7E-03
74	2.6E-01	2.7E-01	4.2E-02	2.6E-02
70+76	4.4E-01	7.2E-02	6.2E-02	2.3E-02
66+95	1.2E+00	3.0E+00	1.2E-01	2.1E-01
91	7.6E-02	6.4E-01	8.7E-02	1.4E-02
56+60+89	1.0E-01	3.2E-01	5.1E-02	3.3E-03
92+84	4.9E-01	3.9E-01	6.7E-03	3.3E-02
101	4.2E-01	3.9E-01	6.5E-02	4.3E-02
83	5.0E-02	2.0E-02	3.5E-01	2.6E-03
97	1.1E-01	4.3E-01	1.8E-03	8.1E-03
87+81	2.1E-01	1.2E+00	5.6E-02	2.0E-03
85+136	1.5E-01	1.1E-01	5.9E-02	2.9E-03
110+77	4.5E-01	1.5E+00	3.7E-02	2.6E-02
82	6.2E-02	1.5E-01	8.2E-02	2.6E-03
151	1.0E-01	1.4E-01	4.3E-02	2.1E-03
135+144+147+124	1.4E-01	3.1E-01	2.5E-02	3.1E-03
149+123+107	2.8E-01	5.5E-01	6.4E-02	3.4E-02
118	2.3E-01	2.2E-01	1.3E-01	3.4E-03
146	6.4E-02	1.7E-01	2.3E-02	1.8E-02
153+132	6.2E-01	3.0E-01	1.5E-02	3.3E-02
105	6.8E-01	3.2E-03	1.5E-02	4.5E-03
141	6.7E-02	4.1E-02	8.8E-03	9.8E-03
137+176+130	1.0E-01	1.7E-01	1.0E-03	1.7E-03
163+138	5.1E-01	5.2E-02	8.8E-02	4.3E-02
178+129	2.3E-01	2.9E-03	2.8E-03	3.2E-03
187+182	4.4E-01	4.0E-02	1.8E-03	1.3E-02
183	2.8E-01	1.8E-03	2.0E-03	2.3E-03
185	9.2E-02	3.8E-02	1.1E-03	1.5E-03
174	3.0E-01	1.8E-01	9.2E-02	2.0E-03
177	2.6E-01	1.2E-02	2.2E-03	1.4E-02
202+171+156	6.8E-02	1.1E-02	3.2E-02	1.8E-03
180	6.9E-01	1.7E-02	4.6E-02	1.1E-02
199	2.3E-02	2.4E-03	7.4E-03	2.2E-03
170+190	3.9E-01	4.0E-04	5.5E-03	1.9E-03
198	1.0E-05	5.0E-02	0.0E+00	1.9E-03
201	5.6E-01	1.5E-02	8.5E-02	3.7E-03
203+196	7.7E-01	1.5E-02	2.2E-02	3.6E-03
195+208	7.3E-01	9.6E-01	2.8E-03	2.3E-03
194	4.2E-01	3.8E-01	1.7E-03	2.4E-03
206	7.6E-01	7.4E-02	2.8E-03	2.6E-03

Appendix A.1. Quality Assurance Aspects-Organics

Compound	QFF	PUF	XAD	GFF
PAHs				
FLUOR	1.5E+01	6.5E+00	1.3E+00	1.4E+00
PHEN	1.7E+01	1.1E+01	1.1E+02	3.0E+00
ANTHR	1.8E+00	1.2E+00	7.5E+00	1.9E-01
1MeFLUOR	5.3E+00	5.1E+00	6.7E+00	1.7E+00
DBT	7.4E+00	2.6E+00	4.9E-01	6.6E-01
4,5MePHEN	2.6E+00	1.3E+00	4.1E-01	2.1E-01
MePHENs	6.5E+00	4.6E+01	6.9E+00	3.4E+00
MeDBTs	3.9E+00	1.8E+00	9.1E-01	5.9E-01
FLANT	2.3E+01	2.4E+00	1.1E+00	1.3E+00
PYR	1.7E+01	1.9E+00	7.9E-01	4.1E-01
3,6DMPHEN	2.3E+00	1.3E+00	2.7E-01	4.8E-01
BaF	3.5E+00	9.8E-01	1.3E-01	2.5E-01
BbF	1.5E+00	8.2E-01	1.1E-01	8.5E-03
RET	9.1E+00	1.7E+00	4.6E-01	6.0E-01
BNT	9.9E-01	4.1E-01	1.3E-01	3.5E-01
CPcdP	1.3E+00	6.4E-01	7.5E-02	3.4E-02
BaA	5.2E+00	2.2E+01	1.0E-01	5.5E-01
CHRY	1.1E+01	8.6E-01	4.6E-01	2.5E-01
TRI	8.1E-01	5.9E-01	4.8E-02	3.8E-04
BbkFLANT	1.2E+01	1.0E+00	1.1E+00	5.6E-01
BeP	9.9E+00	1.1E+00	5.0E+00	2.3E-01
BaP	7.4E+00	9.1E-01	8.5E-01	1.7E-01
PERYL	2.6E+00	8.8E-01	2.3E+00	3.5E-02
INDENO	8.7E+00	2.7E+00	1.1E-01	2.7E-02
BghiP	8.1E+00	1.0E+00	1.0E-01	3.3E-02
DBacahA	2.6E+00	1.2E+00	9.4E-02	1.5E-02
COR	4.6E+00	1.2E+00	7.3E-02	2.2E-02
OC Pesticides				
HCB	3.4E-01	3.6E-01	3.2E-01	1.9E-03
Heptachlor	1.3E-01	3.9E-01	2.5E-01	9.8E-02
4,4 DDE	7.6E-01	1.7E-02	7.8E-01	2.8E-03
2,4 DDT	1.0E-01	1.9E-02	6.1E-02	2.4E-03
4,4 DDT	1.0E+00	1.0E-02	8.3E-02	2.9E-03
Mirex	4.7E-02	1.9E-02	6.3E-05	2.6E-03
oxychlordane	2.3E-04	1.1E-04	7.2E-04	3.3E-03
trans chlordane	7.1E-04	5.7E-05	9.1E-04	1.4E-03
mc5	1.6E-04	1.7E-04	2.2E-04	8.7E-04
cis chlordane	7.1E-04	4.7E-05	8.2E-04	1.0E-03
trans nonachlor	3.2E-04	3.2E-05	7.0E-04	6.3E-04
cis nonachlor	5.5E-05	3.2E-05	3.2E-04	4.1E-04

Color codes:

Black = DL based on the mean mass of the compound in the field blank plus three times the stadnard deviation about that mean.

Blue = Because the mass of the compound was zero in all of the field blanks or because of low surrogate recoveries, DL is based on the mean mass in the laboratory blanks plus three deviation of the mean.

Green = Because the mass of the compound in all field and lab blanks was zero, DL is based on the theoretical instrument DL, defined as the mass of three times the smallest integrata

Appendix A.1. Quality Assurance Aspects-Organics

Table 4: Mean and Median Surrogate Recoveries with Standard Deviations (stdev) and Number of Samples (n)

	QFF				PUF				XAD				GFF			
Surrogate	**median**	**mean**	**stdev**	**n**	**median**	**mean**	**stdev**	**n**	**median**	**mean**	**stdev**	**n**	**median**	**mean**	**stdev**	**n**
PCB #65	89%	88%	15%	273	96%	100%	31%	320	84%	84%	14%	96	40%	43%	13%	8
PCB #166	100%	98%	15%	273	98%	95%	13%	320	87%	86%	14%	96	64%	74%	49%	8
d_{10}-Anthracene	71%	72%	18%	324	82%	84%	16%	334	72%	79%	21%	123	71%	77%	24%	10
d_{10}-Fluoranthene	83%	86%	14%	324	86%	88%	14%	334	77%	83%	18%	123	78%	84%	22%	10
d_{10}-Benzo[e]pyrene	91%	94%	13%	324	88%	90%	15%	334	86%	91%	19%	123	93%	95%	11%	10

Liberty Science Meteorological Data -- January 1 ,2000 -

Newark

Date	WS(4m) (deg)	WD(4m) (deg)	Temp (deg C)	Pressure (mb)	Rel Hum (%)
10/1/98	6.56	310.00	14.78	1012.72	40.84
10/7/98	3.15	190.00	17.06	1022.38	79.88
10/10/98	5.72	330.00	16.05	1011.45	84.16
10/13/98	4.07	180.00	15.89	1014.53	85.88
10/19/98	4.32	295.00	16.37	1015.85	57.92
10/28/98	5.14	260.00	13.64	1008.83	78.84
11/6/98	4.79	310.00	4.89	1018.42	55.24
11/15/98	5.16	300.00	9.76	1011.03	48.00
11/24/98	5.14	320.00	9.50	1018.81	45.84
12/3/98	4.96	260.00	15.59	1011.68	59.04
12/12/98	3.83	250.00	4.51	1024.52	69.56
12/21/98	5.19	190.00	12.28	1015.78	86.40
12/30/98	8.52	330.00	-6.25	1013.38	47.32
1/8/99	2.39	105.00	11.72	N/A	84.40
1/17/99	7.98	30.00	-0.78	N/A	67.40
1/26/99	5.04	290.00	12.74	N/A	40.52
2/4/99	5.33	330.00	6.08	N/A	73.68
2/13/99	7.20	320.00	-0.78	N/A	54.64
2/22/99	6.96	40.00	-5.69	N/A	34.16
3/3/99	8.27	170.00	9.32	N/A	85.56
3/12/99	8.50	350.00	-0.02	N/A	50.84
3/21/99	7.28	160.00	7.70	N/A	79.08
3/30/99	6.30	320.00	12.70	N/A	26.00
4/8/99	6.40	270.00	20.36	N/A	32.56
4/17/99	6.54	280.00	10.56	N/A	50.60
4/26/99	8.52	50.00	16.37	N/A	29.96
5/5/99	2.50	160.00	17.63	1014.87	74.36
5/14/99	3.63	175.00	14.10	1024.18	45.60
5/23/99	2.92	130.00	16.61	1006.73	95.54
6/1/99	4.75	100.00	13.11	1014.53	43.28
6/10/99	3.99	270.00	19.30	1026.01	65.69
6/19/99	2.63	120.00	17.30	1028.55	95.06
6/28/99	6.56	270.00	18.50	1003.78	45.50
7/7/99	4.82	310.00	27.54	1010.92	38.48
7/16/99	5.04	260.00	28.14	1018.88	54.92
7/25/99	4.16	335.00	30.49	1005.56	43.16
8/3/99	3.05	225.00	25.62	N/A	50.52
8/12/99	3.05	180.00	26.91	N/A	73.04
8/21/99	4.28	40.00	17.32	N/A	83.42
8/30/99	7.20	50.00	18.91	N/A	55.16
9/8/99	2.66	190.00	24.71	1009.71	86.96
9/15/99	4.69	60.00	20.26	1014.20	96.92
9/27/99	2.70	170.00	20.52	1026.24	87.32
10/9/99	3.50	250.00	18.27	1021.24	84.00
10/21/99	1.85	30.00	13.19	1023.45	89.32
11/2/99	3.42	265.00	4.78	1021.59	40.68
11/14/99	6.38	50.00	5.91	1014.66	90.44
11/26/99	6.11	260.00	-0.18	1004.09	53.80
12/3/99	4.09	250.00	26.79	1017.96	79.52
12/8/99	4.73	310.00	27.51	1010.71	38.41
12/20/99	3.46	90.00	25.97	1017.99	60.26

New Brunswick Meteorological Data -- January 5 -December 31, 1998

Date	WS(10m) (m/s)	WD(10m) (deg) (median wind dir.)	Temp (deg C)	Pressure (mb)	Rel Hum (%)
1/5/98	1.14128	75	1.31028	1020.92	95.324
1/11/98	1.63448	263.8	2.64424	1018.936	55.6168
1/17/98	1.2298	48.32	0.91592	1009.264	77.2592
1/23/98	2.46888	312.1	0.61268	1008.264	95.712
1/29/98	0.8218	215.6	3.79304	1003.08	69.3816
2/4/98	6.05424	40.84	1.47104	1000.982	84.2524
2/10/98	0.78636	81.5	-2.11636	1019.244	90.336
2/16/98	3.07724	75.4	3.10608	1025.376	71.596
2/22/98	1.78108	131	6.0368	1014.592	62.2232
2/28/98	1.91552	64.94	4.04196	1005.168	91.412
3/6/98	2.68176	83	7.02644	1018.512	78.8956
3/12/98	3.15136	182.3	2.0628	1014.168	63.2452
3/18/98	2.00828	59.63	-1.05156	1013.472	98.008
3/24/98	1.3402	258.9	4.07196	1027.088	50.074
3/30/98	2.82856	213.4	23.2988	1009.936	59.17
4/5/98	2.33356	313	8.1162	1004.352	50.9768
4/11/98	1.2796	184.3	8.26524	1017.22	54.99
4/17/98	1.9904	271.6	14.0816	1015.056	62.436
4/23/98	1.53252	317.6	9.82944	1002.972	78.6272
4/29/98	1.50148	221.3	16.3236	1015.84	64.802
5/5/98	1.6828	70.8	9.46528	1011.9	95.832
5/11/98	4.18592	52.14	9.87052	1007.592	85.432
5/17/98	1.46468	245.4	14.29764	1014.324	75.2108
5/23/98	1.25476	274.1	16.00052	1010.6	57.6748
5/29/98	1.33712	256.9	20.564	1011.912	74.938
6/4/98	1.81288	275.8	14.5264	1005.084	57.7668
6/10/98	1.83772	95.5	16.6504	1017.792	78.5624
6/16/98	1.8118	239.5	20.6704	1004.712	77.9896
6/22/98	1.34216	93.6	18.0692	1017.784	90.644
36168	0.67472	180.1	-3.51908	1023.952	50.3232
1/17/99	1.23236	180	2.35832	1012.536	70.4996
1/26/99	0.39952	336.6	-3.001	1020.108	89.4736
2/4/99	0.212058824	159.2	-0.21959	1012.27059	#DIV/0!
2/13/99	2.04996	180	7.38716	1007.356	#DIV/0!
2/22/99	2.2454	0.192	-3.1644	1012.352	#DIV/0!
3/3/99	0.8776	177.7	4.25732	1007.676	#DIV/0!
3/13/99	1.66488	359.7	3.92452	1015.904	#DIV/0!
3/21/99	1.74104	180.1	2.62344	1003.9124	#DIV/0!
3/30/99	1.22476	180.1	9.97572	1020.284	#DIV/0!
4/8/99	1.161	0.077	19.0236	1004.948	#DIV/0!
4/16/99	0.95004	180	-0.81916	999.002	#DIV/0!
4/26/99	2.02392	0.185	15.3932	1007.204	#DIV/0!
5/5/99	0.6684	180	15.68564	1012.904	79.399
6/10/99	2.12236	90.1	16.048	1023.924	#DIV/0!
~~6/19/99~~	~~1.24916~~	~~115.6~~	~~17.57192~~	~~1026.924~~	~~#DIV/0!~~
6/28/99	2.38592	209.3	25.2972	1003.54	#DIV/0!
7/7/99	1.60356	268.1	25.8476	1010.56	#DIV/0!

New Brunswick Meteorological Data -- January 5 -December 31, 1998

Date	WS(10m) (m/s)	WD(10m) (deg) (median wind dir.)	Temp (deg C)	Pressure (mb)	Rel Hum (%)
8/3/99	1.05928	206.7	22.214	1016.1	66.33
8/12/99	1.6174	173	25.8412	1012.948	76.7064
8/21/99	1.32428	16.93	15.7712	1013.248	88.22
8/30/99	2.89648	24.77	18.144	1019.204	62.9652
9/15/99	2.37884	42.85	9.1788	1011.796	95.916
9/27/99	1.12096	123.5	17.306	1024.428	85.2088
10/9/99	1.10144	218	14.4356	1019.148	87.1284
10/21/99	1.71776	207.2	9.3422	998.3392	82.108
11/2/99	3.55476	247	5.92788	1008.66	57.7384
11/14/99	2.44064	300.6	3.95288	999.4896	51.1828
11/25/99	2.45092	177.7	17.16336	1008.664	91.048
12/8/99	0.63136	164.1	2.875	1019.328	78.8956
12/20/99	1.88072	282.8	3.41788	1016.736	58.566

Sandy Hook Meteorological Data --- January 1 -2000
JFK

Date	WS(4m) (m/s)	WD(4m) (deg) median	Temp (deg C)	Pressure (mb)	Rel Hum (%)
2/10/98	2.18	100.00	4.51	1022.78	86.11
2/16/98	5.86	80.00	3.52	1027.78	72.00
2/22/98	3.72	320.00	6.17	1018.08	66.00
2/28/98	3.97	100.00	7.28	1009.01	85.67
3/6/98	3.92	170.00	4.94	1022.63	74.33
3/12/98	5.46	190.00	-1.85	1027.86	47.67
3/18/98	3.72	40.00	4.20	1016.99	95.22
3/24/98	4.52	105.00	4.26	1030.34	49.00
3/30/98	4.07	180.00	14.88	1011.19	76.33
4/5/98	7.45	320.00	9.01	1006.49	40.22
4/11/98	3.58	140.00	8.58	1020.75	58.44
4/17/98	5.56	290.00	12.35	1016.69	62.67
4/23/98	7.25	320.00	10.00	1004.61	75.78
4/29/98	5.06	190.00	14.44	1017.48	71.11
5/5/98	3.53	100.00	14.07	1014.58	96.11
5/11/98	9.98	50.00	12.16	1010.93	78.89
5/17/98	2.43	160.00	16.36	1015.97	73.00
5/23/98	5.51	230.00	19.63	1012.36	40.22
5/29/98	5.31	250.00	22.53	1012.55	70.67
6/4/98	7.60	310.00	16.79	1006.42	36.11
6/10/98	3.58	100.00	17.28	1020.07	84.56
6/16/98	4.12	180.00	21.42	1005.44	84.89
6/22/98	3.53	140.00	20.12	1018.79	91.00
6/28/98	4.92	200.00	19.69	1016.35	77.44
6/28/98	3.58	290.00	22.43	1012.46	76.05
ensive (A=day, B=night):					
7/5/98 A	5.81	190.00	26.25	1014.22	50.50
7/5/98 B	2.79	40.00	20.14	1018.62	62.50
7/6/98 A	5.47	155.00	23.06	1020.57	66.00
7/6/98 B	2.46	170.00	19.58	1020.23	85.50
7/7/98 A	4.02	140.00	21.94	1018.54	67.50
7/7/98 B	2.23	235.00	20.00	1016.34	81.25
7/8/98 A	3.46	125.00	19.44	1013.38	75.25
7/8/98 B	2.23	85.00	18.75	1011.26	77.00
7/9/98 A	6.37	235.00	24.72	1009.65	67.25
7/9/98 B	4.25	250.00	22.36	1008.89	86.50
7/10/98 A	6.93	325.00	27.64	1008.97	37.75
7/10/98 B	5.92	325.00	20.28	1011.85	48.50
7/11/98 A	8.16	315.00	26.53	1010.75	33.00
7/16/98	4.07	190.00	24.75	1011.23	83.67
7/22/98	4.72	260.00	29.69	1010.48	58.78
7/28/98	6.36	190.00	24.63	1011.42	82.67
8/3/98	3.23	210.00	23.83	1021.20	66.56

Sandy Hook Meteorological Data --- January 1 -2000
JFK

Date	WS(4m) (m/s)	WD(4m) (deg) median	Temp (deg C)	Pressure (mb)	Rel Hum (%)
8/21/98	3.53	100.00	24.26	1018.91	71.11
8/27/98	4.87	60.00	25.00	1016.27	77.11
9/4/98	4.87	280.00	23.02	1011.53	64.78
9/13/98	3.58	160.00	21.54	1017.21	84.33
9/22/98	5.91	350.00	17.78	1009.95	73.00
10/1/98	9.04	300.00	16.11	1012.02	35.89
10/10/98	6.11	330.00	16.17	1010.89	83.00
10/19/98	4.97	290.00	16.91	1015.59	53.11
10/28/98	5.86	250.00	13.27	1008.74	82.11
11/6/98	4.57	310.00	5.49	1017.92	54.22
11/15/98	6.41	280.00	10.37	1010.74	49.11
11/24/98	5.96	310.00	9.01	1018.94	44.22
12/3/98	5.36	240.00	14.07	1011.87	62.44
12/12/98	5.36	240.00	5.99	1024.17	59.00
12/30/98	8.24	180.00	11.17	1015.63	88.22
1/8/99	4.74	215.00	8.02	1018.48	78.81
1/17/99	6.63	300.00	4.32	1007.64	64.36
1/26/99	3.72	270.00	-1.41	1022.90	63.80
2/4/99	7.45	310.00	6.00	1012.00	74.36
2/13/99	7.90	300.00	-0.56	1018.98	52.68
2/22/99	7.98	350.00	-6.64	1026.71	32.00
3/3/99	11.38	130.00	8.46	999.11	82.24
3/12/99	8.72	330.00	-0.03	1013.51	54.20
5/14/99	3.33	120.00	12.11	1024.58	61.04
5/23/99	3.02	100.00	15.45	1007.47	96.92
6/1/99	4.34	190.00	22.67	1015.27	70.80
6/10/99	4.38	75.00	16.73	1026.29	70.08
6/19/99	3.33	150.00	19.81	1028.99	72.56
6/28/99	6.67	180.00	23.90	1004.54	89.76
7/7/99	5.17	250.00	26.36	1010.99	51.76
7/16/99	5.41	210.00	26.48	1019.41	66.40
7/25/99	4.09	275.00	28.74	1005.61	51.40

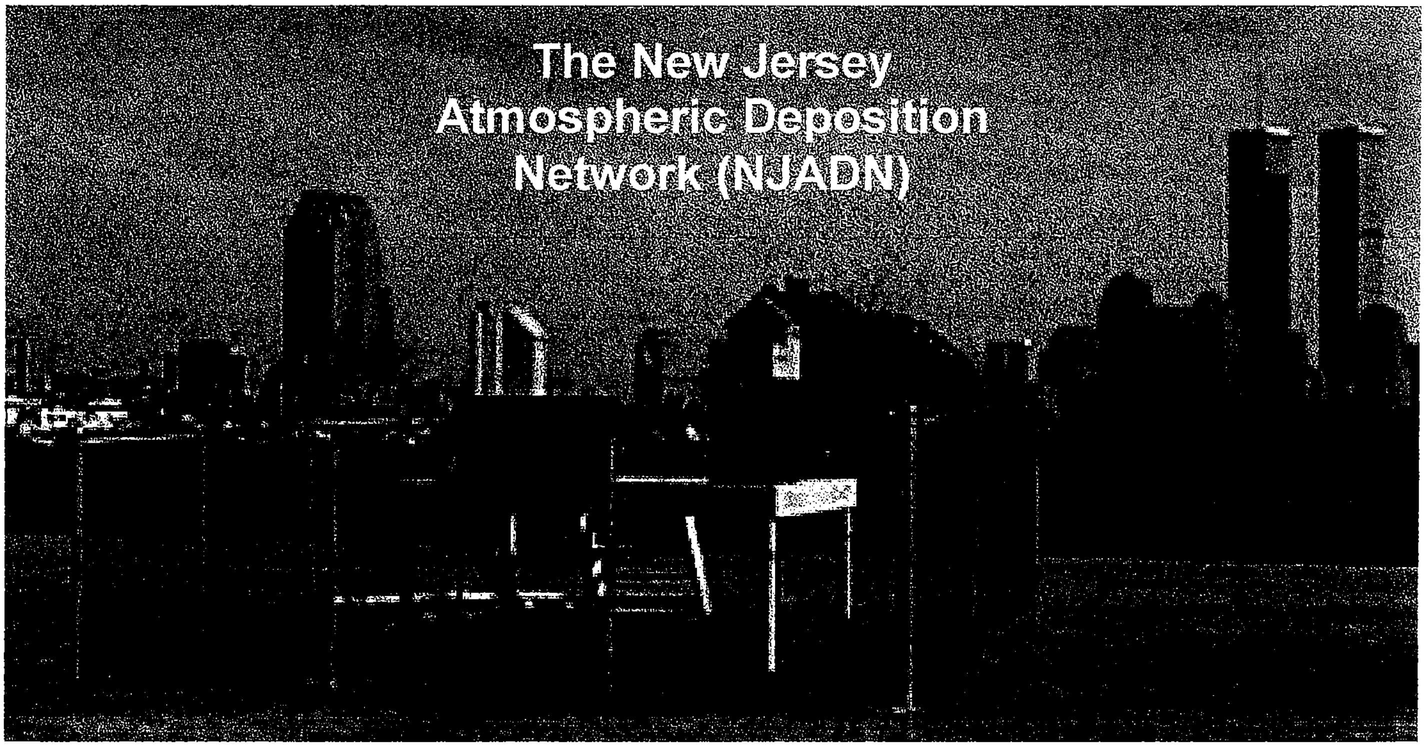
Addendum to the Final Report to the

Hudson River Foundation (HRF)

Atmospheric Deposition Monitoring in the Hudson River Estuary

Grant 002/98R

Dennis Suszkowski, Project Officer



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January, 2002

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Description of the New Jersey Atmospheric Deposition Network

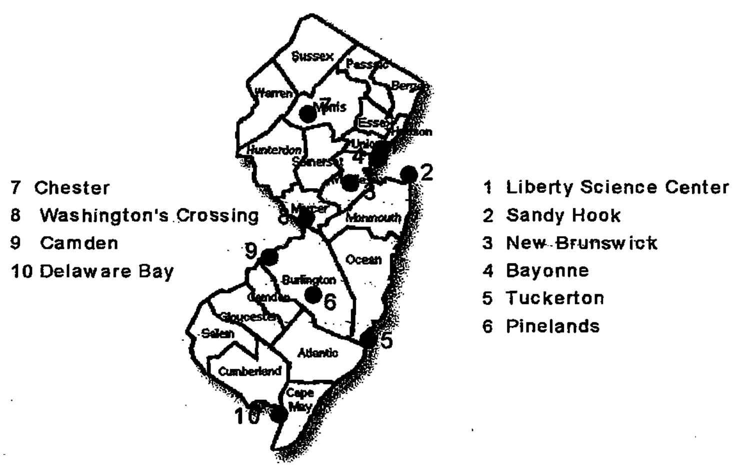
General Description

The New Jersey Atmospheric Deposition Network (NJADN) was initiated in October 1997 with the establishment of a suburban master monitoring and research site at the New Brunswick meteorological station/Rutgers Gardens near Rutgers University. In February 1998, an identical site was established at Sandy Hook to reflect the marine influence on the atmospheric signals and deposition at a coastal site on the NY-NJ Harbor Estuary (HE) and Raritan Bay. In July 1998, a site was established at the Liberty Science Center in Jersey City to reflect the urban/industrial influence on atmospheric concentrations and deposition in the area of the HE. The Hudson River Foundation and the NJ Sea Grant Program funded these initial efforts.

In late 1998, the NJ Department of Environmental Protection (NJDEP) funded a major expansion of the NJADN. The NJADN (total of nine sites) encompasses sites from Chester in the northwest sector of New Jersey to Cape May on Delaware Bay, and from Tuckerton on the eastern shore north of Atlantic City to Camden in the heart of the urban-industrial complex of Camden-Philadelphia. As part of another study on potential PCB emissions from stabilized harbor sediment, additional air measurements were conducted from November 1999 to December 2000 at Bayonne, NJ.

We sought to establish another site north of New York City with the assistance of USEPA Region II funding through the Hudson River Foundation, but suitable sites and/or collaborators were not found that satisfied established criteria. We suggest that the Chester site, located in a clean air vector for New Jersey, will provide the data necessary to look at upwind effects. This addendum to the Hudson River Foundation report provides the raw PCB and PAH concentration data currently available from samples taken at the Chester air sampling station from May 2000 to May 2001.

New Jersey Atmospheric Deposition Network



Organics Data from the Chester, NJ Sampling Station

Section 1: PAH data

A. Particulate Phase PAH Concentrations

B. Gas Phase PAH Concentrations

C. PAH Concentrations in Precipitation

D. Particulate Phase PAH Masses in Field Blanks

E. Gas Phase PAH Masses in Field Blanks

Section 2: PCB data

A. Particulate Phase PCB Concentrations

B. Gas Phase PCB Concentrations

C. PCB Concentrations in Precipitation

D. Particulate Phase PCB Masses in Field Blanks

E. Gas Phase PCB Masses in Field Blanks

Section 3: PM2.5 data

* **Paul Brunciak** was killed in a swimming accident on November 20, 2000 in Australia within two months of the completion of his Ph.D. thesis. He assisted in the initial development of NJADN and its implementation.

Chester Particulate Phase PAHs (XQ-QFF)

Surrogate Corrected Concentrations (ng/m³)

PAH	XQ-QFF 5/24/00	XQ-QFF 6/5/00	XQ-QFF 6/17/00	XQ-QFF 6/29/00	XQ-QFF 7/11/00	XQ-QFF 7/23/00	XQ-QFF 8/4/00	XQ-QFF 8/16/00	XQ-QFF 8/28/00	XQ-QFF 9/9/00	XQ-QFF 9/21/00	XQ-QFF 10/3/00
Fluorene	0.0035	0.0075	0.0029	0.0075	0.0047	0.0048	0.0026	0.0025	0.0043	0.0039	0.0035	0.0050
Phenanthrene	0.029	0.065	0.029	0.051	0.017	0.029	0.022	0.023	0.042	0.041	0.025	0.047
Anthracene	0.0033	0.013	0.0045	0.0080	0.0035	0.0049	0.0037	0.0049	0.0074	0.0074	0.0026	0.0074
1Methylfluorene	0.0080	0.0054	0.0082	0.0091	0.0074	0.0072	0.0066	0.0058	0.0049	0.0037	0.0039	0.011
Dibenzothiophene	0.0019	0.0054	0.0017	0.0063	0.0047	0.0028	0.0018	0.0018	0.0026	0.0025	0.0042	0.0041
4,5-Methylenephenanthrene	0.0030	0.0133	0.0031	0.0054	0.0020	0.0029	0.0027	0.0028	0.0046	0.0058	0.0025	0.0069
Methylphenanthrenes	0.045	0.058	0.046	0.078	0.028	0.044	0.036	0.028	0.051	0.051	0.064	0.079
Methyldibenzothiophenes	0.0048	0.0067	0.0057	0.0069	0.0050	0.0085	0.0041	0.0039	0.0040	0.0042	0.0039	0.0059
Fluoranthene	0.036	0.11	0.033	0.072	0.030	0.041	0.026	0.036	0.058	0.064	0.040	0.074
Pyrene	0.029	0.087	0.035	0.054	0.033	0.038	0.029	0.032	0.039	0.057	0.033	0.063
3,6-Dimethylphenanthrene	0.003	0.0040	0.0023	0.0042	0.0029	0.0037	0.0026	0.0027	0.0037	0.0037	0.0018	0.0048
Benzo[a]fluorene	0.007	0.019	0.0051	0.011	0.0039	0.0056	0.0042	0.0050	0.0093	0.013	0.0053	0.073
Benzo[b]fluorene	0.003	0.0083	0.0032	0.0038	0.0020	0.0020	0.0017	0.0021	0.0039	0.0052	0.0035	0.011
Retene	0.030	0.019	0.037	0.038	0.052	0.045	0.043	0.031	0.010	0.027	0.030	0.045
Benzo[b]naphtho[2,1-d]thiophene	0.0056	0.013	0.0036	0.0081	0.0021	0.0045	0.0032	0.0052	0.0072	0.0083	0.0053	0.017
Cyclopenta[cd]pyrene	0.0007	0.0055	0.0013	0.0023	0.0018	0.0023	0.0013	0.0059	0.0025	0.0021	0.0031	0.0044
Benz[a]anthracene	0.0079	0.024	0.0065	0.010	0.0035	0.0045	0.0039	0.0065	0.0091	0.012	0.0086	0.0053
Chrysene/Triphenylene	0.027	0.059	0.023	0.036	0.012	0.019	0.016	0.025	0.036	0.050	0.031	0.020
Naphthacene	0.0010	0.00002	0.0001	0.00002	0.00002	0.00002	0.00002	0.00001	0.00001	0.00001	0.00001	0.0003
Benzo[b+k]fluoranthene	0.047	0.081	0.035	0.044	0.013	0.021	0.024	0.033	0.046	0.060	0.043	0.0001
Benzo[e]pyrene	0.018	0.052	0.019	0.025	0.011	0.017	0.015	0.021	0.025	0.031	0.025	0.042
Benzo[a]pyrene	0.0084	0.033	0.34	0.013	0.068	0.010	0.0077	0.014	0.012	0.019	0.017	0.025
Perylene	0.0007	0.0083	0.30	0.0013	0.0024	0.0014	0.0009	0.0044	0.0027	0.0034	0.0045	0.0063
Indeno[1,2,3-cd]pyrene	0.048	0.076	0.034	0.022	0.006	0.010	0.014	0.028	0.033	0.039	0.029	0.12
Benzo[g,h,i]perylene	0.013	0.048	0.010	0.022	0.005	0.010	0.010	0.036	0.025	0.031	0.019	0.048
Dibenzo[a,h+a,c]anthracene	0.0007	0.0028	0.0010	0.0013	0.0004	0.0005	0.0007	0.0007	0.0014	0.0014	0.0006	0.0026
Coronene	0.020	0.028	0.009	0.024	0.0072	0.012	0.011	0.035	0.037	0.021	0.007	0.014
Total PAHs	0.41	0.86	1.00	0.56	0.33	0.35	0.29	0.39	0.48	0.57	0.42	0.74
Sample Volume (m³)	690	751	646	611	708	623	710	691	867	786	775	741
Corresponding Laboratory Blank	9/11/00	9/25/00	10/2/00	10/9/00	10/9/00	10/16/00A	10/16/00A	2/13/01	2/13/01	2/27/01	3/21/01	3/28/01
Total Suspended Particulate (μg/m³)	33	38	35	40	18	32	20	26	54	94	25	45
Surrogate Recoveries (%)												
d10-Anthracene	62%	49%	24%	59%	35%	46%	63%	89%	84%	81%	91%	83%
d10-Fluoranthene	75%	46%	33%	72%	34%	47%	74%	93%	98%	93%	99%	90%
d10-Benzo[e]pyrene	95%	40%	39%	71%	29%	38%	72%	98%	102%	96%	104%	123%

Chester Gas Phase PAHs (XQ-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	XQ-PUF 5/24/00	XQ-PUF 6/5/00	XQ-PUF 6/17/00	XQ-PUF 6/29/00	XQ-PUF 7/11/00	XQ-PUF 7/23/00	XQ-PUF 8/4/00	XQ-PUF 8/16/00	XQ-PUF 8/28/00	XQ-PUF 9/9/00	XQ-PUF 9/21/00	XQ-PUF 10/3/00	XQ-PUF 10/15/00
Fluorene	0.87	1.1	0.81	1.5	0.79	1.8	0.65	0.78	0.88	2.2	0.65	1.2	No
Phenanthrene	3.6	5.3	5.4	7.3	3.8	5.3	3.2	4.0	9.9	8.8	1.7	3.3	Sample
Anthracene	0.055	0.040	0.099	0.094	0.051	0.054	0.039	0.063	0.068	0.073	0.034	0.049	
1Methylfluorene	0.47	0.62	0.31	0.69	0.40	0.37	0.19	0.27	0.59	0.66	0.40	0.95	
Dibenzothiophene	0.46	0.65	0.49	0.83	0.39	0.66	0.35	0.44	1.0	1.3	0.19	0.40	
4,5-Methylenephenanthrene	0.18	0.27	0.29	0.33	0.19	0.22	0.16	0.22	0.64	0.35	0.096	0.20	
Methylphenanthrenes	1.7	1.96	1.88	2.68	1.07	2.30	1.26	2.25	5.3	2.9	1.1	2.9	
Methyldibenzothiophenes	0.35	0.39	0.33	0.57	0.31	0.51	0.22	0.41	0.68	0.63	0.38	0.57	
Fluoranthene	0.70	0.85	0.97	1.1	0.53	0.69	0.48	0.62	1.8	1.4	0.22	0.37	
Pyrene	0.31	0.28	0.36	0.39	0.27	0.32	0.19	0.35	0.58	0.41	0.11	0.22	
3,6-Dimethylphenanthrene	0.10	0.094	0.082	0.13	0.073	0.097	0.061	0.12	0.20	0.12	0.045	0.14	
Benzo[a]fluorene	0.045	0.019	0.034	0.022	0.0084	0.011	0.0090	0.011	0.055	0.037	0.0041	0.021	
Benzo[b]fluorene	0.0045	0.0018	0.0065	0.0075	0.0027	0.0032	0.0037	0.0043	0.015	0.0089	0.0017	0.0056	
Retene	0.092	0.020	0.074	0.043	0.047	0.054	0.052	0.054	0.062	0.064	0.012	0.063	
Benzo[b]naphtho[2,1-d]thiophene	0.0094	0.0032	0.0076	0.0034	0.014	0.0018	0.0018	0.0024	0.0075	0.0084	0.0011	0.0040	
Cyclopenta[cd]pyrene	0.012	0.0036	0.00004	0.00001	0.00002	0.00004	0.00002	0.0003	0.00002	0.00002	0.00003	0.0003	
Benz[a]anthracene	0.0085	0.0012	0.0080	0.0013	0.0009	0.0010	0.0007	0.0004	0.0004	0.0004	0.0002	0.0003	
Chrysene/Triphenylene	0.021	0.011	0.025	0.010	0.0057	0.0077	0.0057	0.0066	0.011	0.015	0.0015	0.0049	
Naphthacene	0.0001	0.0001	0.0001	0.00002	0.00003	0.0001	0.00003	0.00005	0.00003	0.00004	0.0001	0.0001	
Benzo[b+k]fluoranthene	0.0013	0.0005	0.0020	0.0007	0.00001	0.0007	0.0006	0.0014	0.0005	0.0008	0.0003	0.0009	
Benzo[e]pyrene	0.00055	0.0005	0.0009	0.0004	0.00002	0.00004	0.00001	0.0007	0.0003	0.0004	0.0005	0.0011	
Benzo[a]pyrene	0.00021	0.0002	0.0003	0.0004	0.00001	0.0000	0.0004	0.0007	0.0002	0.0001	0.0006	0.0011	
Perylene	0.00002	0.00005	0.00004	0.00001	0.00002	0.00004	0.00001	0.00002	0.00001	0.00001	0.00003	0.00005	
Indeno[1,2,3-cd]pyrene	0.0002	0.0007	0.0005	0.0002	0.0005	0.0011	0.0004	0.0007	0.0001	0.0001	0.0002	0.0004	
Benzo[g,h,i]perylene	0.0001	0.0003	0.0002	0.0001	0.0002	0.0006	0.0002	0.0003	0.0001	0.0001	0.0002	0.0003	
Dibenzo[a,h+a,c]anthracene	0.0001	0.0004	0.0003	0.0001	0.0003	0.0010	0.0003	0.0006	0.0001	0.0001	0.0002	0.0003	
Coronene	0.0010	0.0012	0.0028	0.0019	0.0035	0.0044	0.0026	0.0026	0.0005	0.0005	0.0008	0.0012	
Total PAHs	9.1	12	11	16	8.0	12	6.9	9.6	22	19	5.0	11	
Sample Volume (m^3)	690	751	646	611	708	623	710	691	867	786	775	741	
Corresponding Laboratory Blank	7/5/00a	7/10/00	7/13/00	7/25/00	7/31/00	9/12/00	8/8/00	9/12/00	9/25/00	9/25/00	10/9/00	10/9/00	
Surrogate Recoveries (%)													
d10-Anthracene	92%	83%	89%	84%	84%	85%	77%	85%	84%	82%	74%	76%	
d10-Fluoranthene	82%	80%	88%	86%	87%	83%	78%	82%	73%	73%	70%	71%	
d10-Benzo[e]pyrene	91%	97%	88%	104%	120%	118%	94%	106%	86%	84%	89%	98%	

Chester Gas Phase PAHs (XQ-PUF)

Surrogate Corrected Concentrations (ng/m^3)

PAH	XQ-PUF 10/27/00	XQ-PUF 11/8/00	XQ-PUF 11/20/00	XQ-PUF 12/2/01T	XQ-PUF 12/2/00B	XQ-PUF 12/2/00
Fluorene	0.99	2.6	1.9	0.68	0.025	0.30
Phenanthrene	4.3	5.2	2.7	1.2	0.012	0.5
Anthracene	0.079	0.305	0.070	0.00002	0.0006	0.0003
1Methylfluorene	0.78	1.3	0.68	0.18	0.0018	0.078
Dibenzothiophene	0.61	0.62	0.26	0.042	0.0011	0.019
4,5-Methylenephenanthrene	0.23	0.35	0.22	0.070	0.0010	0.030
Methylphenanthrenes	7.2	3.5	1.7	0.35	0.0080	0.15
Methyldibenzothiophenes	0.45	0.52	0.23	0.023	0.0016	0.011
Fluoranthene	0.62	0.74	0.49	0.14	0.0033	0.060
Pyrene	0.28	0.46	0.24	0.021	0.0024	0.011
3,6-Dimethylphenanthrene	0.12	0.20	0.082	0.0065	0.0006	0.0032
Benzo[a]fluorene	0.039	0.072	0.032	0.0018	0.000	0.0009
Benzo[b]fluorene	0.012	0.023	0.0097	0.0005	0.0001	0.0003
Retene	0.038	0.064	0.019	0.0011	0.0004	0.0007
Benzo[b]naphtho[2,1-d]thiophene	0.0049	0.0058	0.0012	0.0003	0.0001	0.0002
Cyclopenta[cd]pyrene	0.00001	0.0057	0.00001	0.00002	0.0001	0.00008
Benz[a]anthracene	0.0011	0.0064	0.0003	0.0001	0.0001	0.0001
Chrysene/Triphenylene	0.0169	0.0238	0.0052	0.0005	0.0002	0.0003
Naphthacene	0.00003	0.0001	0.00003	0.0001	0.0001	0.0001
Benzo[b+k]fluoranthene	0.0014	0.0011	0.0004	0.0004	0.0005	0.0004
Benzo[e]pyrene	0.0008	0.0008	0.0004	0.0005	0.0005	0.0005
Benzo[a]pyrene	0.0003	0.0005	0.00001	0.00004	0.0003	0.0002
Perylene	0.00001	0.00003	0.00002	0.00004	0.00003	0.00004
Indeno[1,2,3-cd]pyrene	0.00002	0.00002	0.00003	0.0005	0.0003	0.0004
Benzo[g,h,i]perylene	0.00002	0.0001	0.00003	0.0001	0.0001	0.0001
Dibenzo[a,h+a,c]anthracene	0.00004	0.0001	0.0001	0.0002	0.0001	0.0002
Coronene	0.0001	0.0001	0.0001	0.0012	0.0008	0.0010
Total PAHs	16	16	8.7	2.7	0.062	1.2
Sample Volume (m^3)	800	758	792	783	783	783
Corresponding Laboratory Blank	1/2/01	1/8/01	1/22/01	1/30/01	1/30/01	1/30/01
Surrogate Recoveries (%)						
d10-Anthracene	94%	84%	78%	58%	68%	64%
d10-Fluoranthene	88%	82%	79%	72%	78%	75%
d10-Benzo[e]pyrene	98%	84%	74%	73%	75%	74%

Chester Precipitation PAHs (XQ-Precip)
Surrogate Corrected Concentrations (ng/L)

PAH	XQ-Precip 7/21/00	XQ-Precip 8/16/00	XQ-Precip 9/8/00	XQ-Precip 10/3/00	XQ-Precip 11/8/00
Fluorene	1.7	4.7	1.9	2.8	2.0
Phenanthrene	9.1	41	12	20	12
Anthracene	0.83	5.4	1.0	2.2	0.80
1Methylfluorene	0.85	10	0.54	1.6	0.67
Dibenzothiophene	0.85	2.5	1.3	1.5	1.0
4,5-Methylenephenanthrene	0.54	3.8	0.43	1.9	0.84
Methylphenanthrenes	4.5	29	3.0	12	5.9
Methyldibenzothiophenes	0.23	1.1	0.37	0.52	0.056
Fluoranthene	7.0	52	9.4	26	9.9
Pyrene	3.6	36	4.7	16	5.4
3,6-Dimethylphenanthrene	0.25	1.6	0.24	0.64	0.28
Benzo[a]fluorene	0.74	7.2	0.52	3.3	0.87
Benzo[b]fluorene	0.25	1.9	0.18	0.86	0.26
Retene	0.64	7.5	0.41	0.55	0.25
Benzo[b]naphtho[2,1-d]thiophene	0.74	2.0	0.91	3.2	0.65
Cyclopenta[cd]pyrene	0.18	0.20	0.17	0.31	0.11
Benz[a]anthracene	0.92	13	0.83	5.0	0.64
Chrysene/Triphenylene	2.9	32	3.8	13	3.3
Naphthacene	0.33	0	0	0	0
Benzo[b+k]fluoranthene	4.3	43	4.6	20	3.2
Benzo[e]pyrene	2.0	21	2.0	9.0	2.2
Benzo[a]pyrene	1.2	16	1.1	5.7	1.5
Perylene	0.52	7.1	2.1	3.2	0.93
Indeno[1,2,3-cd]pyrene	2.1	14	2.9	9.7	1.4
Benzo[g,h,i]perylene	1.6	16	1.8	6.6	1.9
Dibenzo[a,h+a,c]anthracene	0.11	1.1	2.1	0.80	0.069
Coronene	1.4	2.1	1.6	2.1	0.23
Total PAHs	49	370	60	169	57
Sample Volume (L)	29	1.3	11	3.8	11
Corresponding Laboratory Blank	9/26/00	9/26/00	9/26/00	9/26/00	12/6/00
Surrogate Recoveries (%)					
d10-Anthracene	81%	75%	67%	68%	87%
d10-Fluoranthene	86%	84%	78%	75%	96%
d10-Benzo[e]pyrene	98%	99%	90%	92%	87%

Chester Particle Phase PAHs in Field Blanks (XQF-FB)
Surrogate Corrected Concentrations (ng/L)

PAH	XQF-Field Blank 6/17/00
Fluorene	1.7
Phenanthrene	3.1
Anthracene	0.27
1Methylfluorene	4.1
Dibenzothiophene	0.19
4,5-Methylenephenanthrene	0.32
Methylphenanthrenes	4.4
Methyldibenzothiophenes	0.88
Fluoranthene	1.0
Pyrene	2.7
3,6-Dimethylphenanthrene	0.35
Benzo[a]fluorene	0.021
Benzo[b]fluorene	0.020
Retene	8.3
Benzo[b]naphtho[2,1-d]thiophene	0.014
Cyclopenta[cd]pyrene	0.018
Benz[a]anthracene	0.097
Chrysene/Triphenylene	0.087
Naphthacene	0.039
Benzo[b+k]fluoranthene	0.16
Benzo[e]pyrene	0.43
Benzo[a]pyrene	0.29
Perylene	0.017
Indeno[1,2,3-cd]pyrene	0.079
Benzo[g,h,i]perylene	0.037
Dibenzo[a,h+a,c]anthracene	0.052
Coronene	0.20
Total PAHs	29
Corresponding Laboratory Blank	10/2/00
Surrogate Recoveries (%)	
d10-Anthracene	29%
d10-Fluoranthene	37%
d10-Benzo[e]pyrene	36%

Chester Gas Phase PAHs in Field Blanks (XQP-FB)
Surrogate Corrected Concentrations (ng/L)

PAH	XQP-Field Blank 6/17/00	XQP-Field Blank 11/20/00	XQP-Field Blank 5/7/01
Fluorene	2.1	7.2	0.51
Phenanthrene	12	18	1.2
Anthracene	0.28	0.15	0.043
1Methylfluorene	0.70	1.5	0.21
Dibenzothiophene	1.0	1.9	0.0038
4,5-Methylenephenanthrene	0.64	1.0	0.11
Methylphenanthrenes	1.7	7.8	1.1
Methyldibenzothiophenes	1.0	1.9	0.0039
Fluoranthene	2.1	2.7	0.23
Pyrene	0.95	2.5	0.18
3,6-Dimethylphenanthrene	0.16	0.44	0.0049
Benzo[a]fluorene	0.018	0.026	0.0051
Benzo[b]fluorene	0.016	0.024	0.0051
Retene	0.18	0.022	0.0051
Benzo[b]naphtho[2,1-d]thiophene	0.012	0.016	0.0039
Cyclopenta[cd]pyrene	0.034	0.021	0.0045
Benz[a]anthracene	0.010	0.012	0.0031
Chrysene/Triphenylene	0.0083	0.010	0.0028
Naphthacene	0.074	0.064	0.013
Benzo[b+k]fluoranthene	0.017	0.017	0.0054
Benzo[e]pyrene	0.036	0.039	0.0086
Benzo[a]pyrene	0.036	0.030	0.0072
Perylene	0.047	0.036	0.0088
Indeno[1,2,3-cd]pyrene	0.63	0.062	0.044
Benzo[g,h,i]perylene	0.23	0.072	0.010
Dibenzo[a,h+a,c]anthracene	0.38	0.14	0.021
Coronene	3.3	0.19	0.076
Total PAHs	28	46	3.8
Corresponding Laboratory Blank	10/2/00	7/16/01	7/19/01
Surrogate Recoveries (%)			
d10-Anthracene	65%	72%	89%
d10-Fluoranthene	75%	79%	102%
d10-Benzo[e]pyrene	109%	74%	101%

Chester Particulate Phase PCBs (XQ-QFF)

Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	XQ-QFF 5/24/00	XQ-QFF 6/5/00	XQ-QFF 6/17/00	XQ-QFF 6/29/00	XQ-QFF 7/11/00	XQ-QFF 7/23/00	XQ-QFF 8/4/00	XQ-QFF 8/16/00	XQ-QFF 8/28/00	XQ-QFF 9/9/00	XQ-QFF 9/21/00	XQ-QFF 10/3/00	XQ-QFF 10/15/00
8+5	0	0	0	0	0	0	0	0	0	0	0	0	NO
18	0	0.066	0.067	0	0	0.18	0	0	0	0	0	0.13	SAMPLE
17+15	0	0	0	0	0	0	0	0	0	0	0	0	
16+32	0	0	0	0	0	0	0	0	0	0	0.26	0	
31	0.29	0.49	0.23	0.32	0.27	0.41	0	0.18	0	0	0	0	
28	0	0	0	0	0	0	0	0	0	0	0	0	
21+33+53	0	0	0	0	0	0	0	0	0	0	0	0	
22	0.53	0.17	0.28	0.29	0.15	0.14	0	0.058	0.17	0.13	0.13	0.44	
45	0	0	0	0	0	0	0	0	0	0	0	0	
46	0	0	0	0	0	0	0	0	0	0	0	0	
52+43	0.13	0.22	0.19	0.11	0.13	0.41	0.084	0.065	0.14	0.16	0.20	0.33	
49	0.077	0.13	0.11	0	0	0.18	0	0	0.101	0.079	0.070	0.17	
47+48	0.094	0.063	0.050	0.073	0	0	0	0	0.048	0	0.047	0	
44	0.10	0.17	0	0	0	0.47	0	0	0.068	0	0.13	0	
37+42	0.026	0	0	0	0	0	0	0	0	0	0	0	
41+71	0.089	0.24	0.11	0.11	0	0.12	0.071	0.066	0	0.12	0.20	0	
64	0.023	0.031	0.025	0.025	0	0.041	0.018	0.014	0	0.031	0.023	0	
40	0	0	0	0	0	0	0	0	0	0	0	0	
74	0.038	0	0.077	0	0	0.038	0	0	0.032	0	0	0	
70+76	0.049	0.13	0.070	0.055	0.044	0.14	0.025	0.036	0.089	0.059	0.044	0	
66+95 (later)	0.23	0.39	0.29	0.16	0.058	0.34	0.092	0.074	0.29	0.19	0.14	0	
91	0	0	0	0	0	0	0	0	0	0	0	0	
56+60+89	0.072	0.12	0.051	0.095	0.077	0.11	0.039	0.052	0.083	0.071	0.076	0.060	
92+84	0.10	0.28	0.12	0.12	0.12	0.20	0.062	0.091	0.14	0.16	0.18	0.095	
101	0.086	0.15	0.12	0.10	0.073	0.19	0.054	0.062	0.16	0.11	0.16	0.12	
99	0	0.070	0.14	0.079	0.035	0.066	0.017	0.018	0.056	0.048	0.026	0.030	
83	0	0	0	0	0	0	0	0	0	0	0	0	
97	0.019	0.060	0.028	0	0.033	0.038	0	0.013	0.051	0.035	0.036	0.025	
87+81	0	0	0	0	0	0	0	0	0	0	0	0	
85+136	0.043	0.24	0.078	0.21	0.31	0	0.015	0.092	0.074	0.47	0.28	0.052	
110+77	0.058	0.27	0.12	0.12	0	0.23	0.047	0.046	0.21	0	0.10	0.087	
82	0	0.051	0.016	0.023	0.011	0.016	0	0	0.018	0.037	0.018	0.018	
151	0.081	0.085	0.088	0.073	0.052	0.077	0.038	0.041	0.061	0.059	0.037	0.053	
?135+144+147+124	0.030	0.092	0.031	0.062	0.047	0.063	0.036	0.021	0.059	0.056	0.033	0.048	
149+123+107	0.046	0.26	0.089	0.075	0.026	0.085	0.033	0.035	0	0.13	0.064	0.11	
118	0	0	0	0	0	0	0	0	0	0	0	0	
146	0	0.084	0	0.061	0.040	0.031	0.014	0.024	0.081	0.072	0.045	0.044	
153+132	0.038	0.27	0.075	0.11	0.035	0.060	0.027	0.034	0.16	0.13	0.065	0.096	
105	0	0	0	0	0	0	0	0	0	0	0	0	
141+179	0.0	0.093	0.030	0.045	0	0.037	0	0.018	0.052	0.045	0.032	0.057	
137+176+130 late	0	0	0	0	0	0	0	0	0	0	0	0	
163+138	0.073	0.48	0.15	0.17	0.093	0.12	0.060	0.070	0.33	0.30	0.15	0.20	
158	0.014	0.046	0.019	0.023	0.025	0.019	0.00	0.018	0.038	0.039	0.027	0.022	
178+129	0	0	0	0	0	0	0	0	0	0	0	0	
187+182	0.695	0.070	0.057	0	0	0	0	0	0.033	0.038	0.030	0.046	
183	0	0.080	0.024	0	0	0.016	0	0	0.057	0.055	0	0.044	
128	0	0.056	0.0089	0	0	0.009	0	0	0.021	0.0299	0.014	0	
185	0	0.027	0	0	0	0	0	0	0.0076	0	0	0	
174	0.032	0.10	0.021	0.031	0.015	0.0503	0.022	0	0.079	0.046	0.069	0.031	
177	0	0.087	0	0	0	0	0	0	0.054	0.046	0.022	0	
?202+171+156 (late	0	0.12	0	0.032	0	0	0	0	0.046	0.034	0.035	0.016	
180	0.031	0.29	0.060	0.072	0.036	0.045	0.031	0	0.15	0.095	0.075	0.095	
199	0	0.030	0.033	0.025	0.012	0.018	0	0	0.015	0.020	0.011	0.011	
170+190	0.018	0.13	0.024	0.038	0.022	0.032	0.012	0	0.065	0.068	0.032	0.031	
201	0.023	0.13	0.030	0.042	0	0.026	0.020	0	0.075	0.065	0.18	0.075	
203+196	1.4	0.15	0.23	0.052	0	0.029	0.029	0	0.091	0.083	0.13	0.092	
195+208	0.031	0.044	0.026	0.023	0	0.038	0.027	0	0.031	0.036	0.071	0.045	
194	0	0.088	0.020	0.027	0.020	0.018	0.018	0	0.049	0.044	0.051	0.031	
206	0.016	0.059	0.014	0.025	0.017	0.020	0.016	0	0.018	0.043	0.011	0.033	
Total PCBs	4.6	6.2	3.2	2.9	1.7	4.1	0.91	1.1	3.3	3.2	3.3	2.7	
Homologue Group													
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0.85	0.72	0.58	0.60	0.42	0.72	0	0.24	0.17	0.13	0.39	0.57	
4	0.68	1.1	0.68	0.47	0.25	1.52	0.24	0.23	0.56	0.53	0.79	0.56	
5	0.50	1.3	0.83	0.61	0.33	1.08	0.27	0.31	0.92	0.58	0.66	0.37	
6	0.33	1.7	0.57	0.83	0.63	0.497	0.22	0.35	0.88	1.3	0.75	0.68	
7	0.76	0.65	0.16	0.10	0.051	0.11	0.053	0	0.38	0.28	0.20	0.22	
8	1.5	0.69	0.36	0.24	0.055	0.16	0.11	0	0.37	0.35	0.51	0.30	
9	0.016	0.059	0.014	0.025	0.017	0.020	0.016	0	0.018	0.043	0.011	0.033	
Corresponding Laboratory Blank	9/11/00	9/25/00	10/2/00	10/9/00	10/9/00	10/16/00	10/16/00	2/13/01	2/20/01	2/27/01	3/20/01	3/28/01	
Total Suspended Particulate (μg/m^3)	33	38	35	40	18	32	20	26	54	94	25	45	
Surrogate Recoveries (%)													
#23	73%	83%	57%	73%	81%	71%	73%	84%	84%	87%	86%	86%	
#65	72%	80%	60%	71%	74%	67%	70%	75%	82%	82%	81%	75%	
#166	92%	98%	85%	88%	95%	74%	88%	83%	101%	101%	98%	85%	

Chester Particulate Phase PCBs (XQ-QFF)

Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	XQ-QFF 10/27/00	XQ-QFF 11/8/00	XQ-QFF 11/20/00	XQ-QFF 12/2/00	XQ-QFF 12/14/00	XQ-QFF 1/7/01	XQ-QFF 1/19/01	XQ-QFF 1/31/01	XQ-QFF 2/12/01	XQ-QFF 2/24/01	XQ-QFF 3/8/01	XQ-QFF 3/20/01	XQ-QFF 4/1/01
8+5	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0
17+15	0	0	0	0	0	0	0	0	0	0	0	0	0
16+32	0	0	1.8	0.895	1.7	0	0.50	0.43	1.2	0.81	0.25	0	0
31	0	0	0	0	0	0	0.24	0.53	1.2	0.57	0.62	0	0.31
28	0	0	0	0	0	0	0	0	0	0	0	0	0
21+33+53	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0.34	0.68	1.3	0.24	0.68	1.08	0.28	0.22	1.03	0.78	0.37	1.2	0.22
45	0	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0
52+43	0.27	0.77	1.003	0.29	0.54	1.02	0.21	0.31	0.82	0.64	0.45	0.64	0.18
49	0.14	0.21	0.14	0.087	0.095	0.21	0.092	0.099	0.18	0.076	0	0.12	0.088
47+48	0.082	0.12	0.13	0.088	0.069	0.19	0.053	0.081	0	0.034	0	0	0.031
44	0	0	0	0	0	0.098	0.052	0	0	0	0	0	0
37+42	0	0	0	0	0	0	0	0	0	0	0	0	0
41+71	0	0.64	0.60	0.15	0.28	0.48	0.18	0.30	0.59	0.27	0.39	0.68	0
64	0	0.080	0.082	0.036	0.031	0.076	0.041	0.047	0.080	0.029	0.059	0.080	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0	0	0	0	0	0	0
70+76	0.054	0.088	0.076	0.077	0.044	0.201	0.051	0.055	0.072	0.032	0.19	0.19	0.052
66+95 (later)	0.195	0.40	0.34	0.24	0.21	0.75	0.198	0.23	0.43	0.20	0.35	0.45	0.25
91	0	0	0	0	0	0	0	0	0	0	0	0	0
56+60+89	0.084	0.11	0.13	0.085	0	0.203	0.071	0.084	0.11	0	0.094	0.16	0.049
92+84	0.18	0.33	0.21	0.23	0.102	0.57	0.10	0.083	0.25	0.14	0.14	0.31	0.097
101	0.12	0.14	0.15	0.16	0.088	0.49	0.088	0.077	0.18	0.088	0.13	0.28	0.084
99	0.048	0.036	0.060	0.039	0.024	0.31	0.039	0.042	0	0.026	0.050	0.079	0.032
83	0	0	0	0	0	0	0	0	0	0	0	0	0
97	0.041	0.054	0.063	0.048	0.039	0.16	0.032	0.025	0	0.037	0.04	0.073	0.030
87+81	0	0	0	0	0	0	0	0	0	0	0	0	0
85+136	0.25	0.20	0.16	0.15	0.101	0.20	0.20	0.15	0.26	0.17	0.18	0.39	0.12
110+77	0.16	0.22	0.25	0.19	0.12	0.87	0.14	0.13	0.31	0.16	0.18	0.38	0.13
82	0.025	0.039	0.050	0.032	0.020	0.13	0.024	0.020	0.070	0.037	0.031	0.065	0.026
151	0.042	0.062	0.066	0.12	0.035	0.19	0.037	0.034	0.085	0.055	0.041	0.088	0.033
?135+144+147+124	0.11	0.15	0.18	0.16	0.14	0.32	0.14	0.11	0.21	0.16	0.14	0.22	0.097
149+123+107	0.102	0.17	0.17	0.11	0.073	0.603	0.086	0.066	0.21	0.12	0.11	0.28	0.069
118	0	0	0	0	0	0	0	0	0	0	0	0	0
146	0.033	0.084	0.11	0.11	0.047	0.203	0.052	0.033	0.14	0.15	0.067	0.15	0.063
153+132	0.21	0.30	0.27	0.14	0.099	0.82	0.13	0.064	0.49	0.28	0.20	0.46	0.066
105	0	0	0	0	0	0.32	0	0	0	0	0	0	0
141+179	0.045	0.064	0.080	0.042	0.029	0.18	0.046	0.032	0.10	0.062	0.049	0.13	0.029
137+176+130 late	0	0	0	0	0	0	0	0	0	0	0	0	0
163+138	0.25	0.38	0.49	0.16	0.13	0.97	0.21	0.17	0.63	0.44	0.34	0.84	0.19
158	0.039	0.046	0.055	0.021	0.015	0.14	0.035	0.024	0.072	0.042	0.049	0.042	0.024
178+129	0	0	0	0	0	0	0	0	0	0.032	0	0	0
187+182	0.020	0.056	0.044	0.028	0.023	0.12	0.021	0.00	0.045	0.037	0.035	0.089	0
183	0.042	0.054	0.061	0.037	0.027	0.12	0.061	0.026	0.071	0.061	0.059	0.10	0.034
128	0.020	0.041	0.056	0.011	0.012	0.089	0.016	0.014	0.092	0.048	0.040	0.076	0.018
185	0.00	0.00	0	0	0	0	0	0	0	0	0	0	0
174	0.044	0.069	0.11	0.035	0.017	0.22	0.12	0.051	0.20	0.081	0.067	0.17	0.042
177	0.028	0.051	0.061	0.016	0.021	0.12	0.032	0.029	0.071	0.057	0.046	0.11	0.041
?202+171+156 (late	0.044	0.043	0.076	0.032	0.019	0.10	0.033	0.030	0.105	0.052	0.060	0.102	0.027
180	0.12	0.204	0.22	0.043	0.073	0.28	0.12	0.085	0.31	0.14	0.19	0.44	0.078
199	0.016	0.025	0.018	0.0092	0.0099	0.035	0.016	0.0065	0.026	0.016	0.016	0.025	0.013
170+190	0.058	0.091	0.096	0.017	0.028	0.092	0.050	0.033	0.14	0.065	0.077	0.19	0.042
201	0.066	0.14	0.15	0.019	0.047	0.17	0.071	0.054	0.15	0.074	0.090	0.21	0.051
203+196	0.070	0.16	0.17	0.051	0.073	0.19	0.085	0.068	0.19	0.094	0.16	0.22	0.086
195+208	0.064	0.070	0.064	0.030	0.031	0.076	0.058	0.036	0.073	0.051	0.045	0.070	0.043
194	0.052	0.077	0.088	0.0086	0.023	0.089	0.038	0.031	0.13	0.021	0.043	0.11	0.023
206	0.055	0.093	0.095	0.011	0.021	0.085	0.030	0.038	0.062	0.023	0.045	0.059	0.022
Total PCBs	3.5	6.5	9.3	4.2	5.2	13	4.1	3.9	10	6.3	5.5	9.3	2.8
Homologue Group													
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0.34	0.68	3.1	1.1	2.4	1.1	1.0	1.2	3.4	2.2	1.2	1.2	0.54
4	0.62	2.0	2.2	0.81	1.1	2.5	0.76	0.98	1.9	1.1	1.2	1.9	0.402
5	0.77	1.2	1.1	0.93	0.60	3.6	0.63	0.61	1.2	0.69	0.93	1.6	0.65
6	1.1	1.5	1.6	1.02	0.68	3.7	0.95	0.70	2.3	1.53	1.22	2.7	0.71
7	0.26	0.43	0.50	0.16	0.16	0.98	0.35	0.19	0.69	0.41	0.40	0.91	0.195
8	0.37	0.61	0.66	0.17	0.23	0.76	0.35	0.26	0.81	0.37	0.49	0.92	0.28
9	0.055	0.093	0.10	0.011	0.021	0.085	0.030	0.038	0.062	0.023	0.045	0.059	0.022
Corresponding Laboratory Blank	7/16/01	7/16/01	7/16/01	7/16/01	7/16/01	7/16/01	7/16/01	7/16/01	7/19/01	7/19/01	7/19/01	7/19/01	7/19/01
Total Suspended Particulate (μg/m^3)	48	41	33	11	14	39	17	28	30	25	NA	31	27
Surrogate Recoveries (%)													
#23	85%	82%	84%	82%	80%	84%	80%	89%	93%	85%	84%	87%	77%
#65	81%	83%	87%	75%	78%	86%	79%	84%	84%	83%	85%	89%	83%
#166	99%	98%	98%	95%	93%	99%	99%	93%	94%	97%	99%	98%	96%

Chester Particulate Phase PCBs (XQ-QFF)

Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	XQ-QFF 4/13/01	XQ-QFF 4/25/01	XQ-QFF 5/7/01
8+5	0	0	0
18	0	0	0
17+15	0	0	0
16+32	0	0	0
31	0.41	0	0
28	0	0	0
21+33+53	0	0	0
22	0.24	0.58	0.26
45	0	0	0
46	0	0	0
52+43	0.45	0.58	0.46
49	0.11	0.11	0.14
47+48	0	0.079	0
44	0	0	0
37+42	0	0	0
41+71	0.35	0.44	0.13
64	0.046	0.0396	0.028
40	0	0	0
74	0	0	0
70+76	0.030	0.054	0.17
66+95 (later)	0.21	0.28	0.79
91	0	0	0
56+60+89	0.038	0.086	0.23
92+84	0.11	0.14	0.62
101	0.097	0.11	0.55
99	0.14	0.048	0.17
83	0	0	0
97	0.076	0.051	0.13
87+81	0	0	0
85+136	0.33	0.23	0.18
110+77	0.085	0.15	0.55
82	0.032	0.033	0.079
151	0.032	0.038	0.084
?135+144+147+124	0.083	0.13	0.21
149+123+107	0.055	0.091	0.31
118	0	0	0
146	0.018	0.044	0.075
153+132	0.066	0.099	0.38
105	0	0	0
141+179	0.022	0.049	0.068
137+176+130 late	0	0	0
163+138	0.11	0.28	0.47
158	0.022	0.047	0.054
178+129	0	0	0
187+182	0.016	0.046	0.032
183	0	0.030	0.050
128	0.013	0.025	0.046
185	0	0	0
174	0.082	0.029	0.057
177	0.00	0.029	0.046
?202+171+156 (late	0.00	0.043	0.050
180	0.046	0.099	0.16
199	0.055	0.0087	0.019
170+190	0.026	0.0503	0.085
201	0.013	0.040	0.074
203+196	0.054	0.12	0.087
195+208	0.10	0.047	0.042
194	0	0.018	0.054
206	0.031	0.019	0.043
Total PCBs	3.6	4.4	7.002
Homologue Group			
2	0	0	0
3	0.65	0.58	0.26
4	1.02	1.4	1.2
5	0.75	0.81	2.9
6	0.75	1.03	1.9
7	0.14	0.23	0.34
8	0.25	0.33	0.41
9	0.031	0.019	0.043
Corresponding Laboratory Blank	7/19/01	7/19/01	7/19/01
Total Suspended Particulate (μg/m^3)	22	35	38
Surrogate Recoveries (%)			
#23	85%	94%	88%
#65	80%	91%	86%
#166	98%	98%	91%

Chester Gas Phase PCBs (XQ-PUF)
Surrogate Corrected Concentrations (pg/m³)

PCB Congener	XQ-PUF 5/24/00	XQ-PUF 6/5/00	XQ-PUF 6/17/00	XQ-PUF 6/29/00	XQ-PUF 7/11/00	XQ-PUF 7/23/00	XQ-PUF 8/4/00	XQ-PUF 8/16/00	XQ-PUF 8/28/00	XQ-PUF 9/9/00	XQ-PUF 9/21/00	XQ-PUF 10/3/00	XQ-PUF 10/15/00	XQ-PUF 10/27/00
8+5	19	42	19	60	11	29	11	14	39	61	12	21	NO	33
18	12	21	11	34	6.7	14	7.1	8.0	32	32	5.7	12	SAMPLE	18
17+15	0	13	0	0	0	0	4.8	0	20	21	4.0	8.0		11
16+32	13	22	12	32	3.8	14	5.8	8.2	30	30	4.7	10		15
31	10	16	14	27	6.9	15	7.6	7.6	41	36	5.3	12		19
28	8.7	11	9.8	16	2.7	8.3	5.6	5.6	23	19	3.3	7.0		9.3
21+33+53	0	0	0	0	0	0	0	4.6	0	0	0	0		0
22	6.3	9.8	7.0	22	2.5	4.6	2.6	5.02	15	15	1.5	3.7		10
45	1.4	1.9	1.5	3.4	0.3	1.3	1.3	0.85	3.2	2.97	0.59	1.03		1.5
46	1.3	1.9	1.4	2.5	0.1	1.4	0.29	0.81	1.8	1.6	0.26	0.48		1.0
52+43	14	19	15	26	7.1	15	7.3	6.8	41	33	4.2	7.6		14
49	8.3	14	10	12	5.5	7.0	5.5	4.4	20	15	1.9	3.6		7.0
47+48	3.8	4.9	3.9	6.0	2.0	3.8	2.4	1.8	11	8.7	1.2	2.2		4.2
44	14	12	9.4	19	2.7	7.9	4.3	4.9	25	20	2.5	4.9		9.1
37+42	4.4	6.6	4.4	9.7	0.4	3.4	2.6	2.6	15	13	1.4	2.7		6.8
41+71	4.3	5.6	4.6	7.5	0.9	2.8	1.9	2.1	12	11	1.2	2.2		3.9
64	2.6	3.4	2.6	5.4	0.5	2.1	1.4	1.5	7.0	5.5	0.79	1.6		3.4
40	0	0	0	0	0	0	0	1.4	0	0	0	0		0
74	2.9	3.0	2.7	3.8	1.4	2.3	1.3	1.2	6.6	5.4	0.81	1.3		2.4
70+76	6.8	6.8	5.5	8.3	1.9	4.2	2.6	2.4	13	11	1.3	2.4		5.3
66+95	20	21	17	27	5.4	14	7.3	7.8	44	35	4.0	7.2		15
91	1.6	1.9	0.96	2.4	0.28	1.5	0	0.84	3.4	3.4	0.24	0.5		1.4
56+60+89	5.9	4.7	3.8	6.5	0.87	2.5	2.1	2.2	10	8.3	0.93	1.8		4.3
92+84	11	10	7.9	14	0.54	4.4	3.5	4.5	20	16	1.5	3.2		7.2
101	14	9.9	8.1	12	3.7	6.3	4.3	3.6	21	17	2.1	3.4		7.0
99	4.1	3.2	2.1	6.7	1.0	1.5	1.0	0.8	5.3	4.8	0.55	1.0		2.2
83	0.85	1.0	0.55	0.83	0	0	0	0.24	1.4	1.0	1.2	0.25		0.47
97	3.3	2.1	1.8	2.6	0.63	1.3	0.88	0.79	4.7	3.8	0.44	0.79		1.6
87+81	0	0	0	0	0	0	0	2.3	0	0	0	0		0
85+136	1.8	1.2	1.0	0	0.27	0.76	0	0.63	3.2	2.8	0.34	0.67		1.2
110+77	16	8.7	7.1	12	1.3	4.6	4.2	3.5	20	17	1.9	3.6		7.3
82	1.2	0.64	0.5	1.3	0.053	0.3	0.29	0.35	1.6	1.3	0.15	0.25		0.62
151	3.1	1.8	2.3	2.4	0.82	1.4	0.70	1.0	3.3	2.8	0.38	0.704		1.0
135+144+147+124	3.1	1.7	1.3	2.6	0.67	0.95	0.57	0.71	3.4	2.7	0.32	0.52		0.999
149+123+107	9.4	4.4	4.0	5.4	1.9	2.7	1.7	1.8	9.4	7.7	0.85	1.5		2.24
118	0	0	0	0	0	0	0	1.3	0	0	0	0		0
146	3.8	2.9	2.3	5.0	0.35	0.93	0.80	2.0	3.0	3.3	0.22	0.45		2.2
153+132	12	4.3	4.0	5.6	1.6	2.5	1.8	1.9	6.1	6.9	0.87	1.4		2.4
105	3.3	1.1	0.90	1.8	0	0	0	0.67	1.9	2.1	0	0		0
141	3.0	1.3	1.3	1.6	0.58	0.91	0.51	0.54	2.4	1.9	0.24	0.42		0.60
137+176+130	0	0	0	0	0	0	0	0.16	0	0	0	0		0
163+138	12	4.3	4.5	5.7	1.6	2.8	1.7	2.0	7.8	6.5	0.79	1.4		2.6
158	1.4	0.47	0.48	0.78	0.17	0.32	0.16	0.17	0.8	0.68	0.07	0.13		0.20
178+129	1.6	0.56	0.59	0.86	0.23	0.34	0.28	0.31	0.98	0.84	0.14	0.19		0.34
187+182	2.3	1.1	1.2	1.4	0.73	0.89	0	0.52	2.3	1.6	0	0		0
183	1.1	0.52	0.65	0.81	0.37	0.42	0.29	0.29	0.91	0.79	0.074	0.15		0.22
128	0.76	0.301	0.25	0.43	0.016	0.096	0.12	0.14	0.57	0.55	0.032	0.094		0.24
185	0.28	0.13	0.18	0.14	0.078	0.10	0.049	0.062	0.198	0.14	0.026	0.050		0.060
174	0.25	1.4	1.1	0.91	0.44	0.86	0.32	0.48	1.2	1.0	0.21	0.37		0.53
177	0.86	0.51	0.52	0.55	0.37	0.404	0.21	0.19	0.70	0.598	0.12	0.19		0.23
202+171+156	1.0	0.46	0.57	0.71	0.22	0.31	0.15	0.28	0.60	0.57	0.11	0.17		0.16
180	1.6	1.00	1.4	1.5	0.75	0.82	0.34	0.42	1.4	1.3	0.16	0.2997		0.37
199	0.12	0.053	0.084	0.067	0.049	0.055	0.034	0.044	0.13	0.13	0	0.039		0
170+190	0.38	0.25	0.39	0.32	0.12	0.18	0.095	0.12	0.37	0.34	0.044	0.081		0.12
201	0.59	0.40	0.89	0.65	0.41	0.53	0.22	0.28	0.73	0.69	0.10	0.21		0.21
203+196	0.70	0.40	0.95	0.75	0.56	0.63	0.22	0.28	0.73	0.73	0.14	0.22		0.22
195+208	0.11	0.081	0.11	0.14	0.100	0.13	0.058	0.075	0.14	0.16	0.030	0.059		0.064
194	0.066	0.045	0.082	0.079	0.061	0.088	0.026	0.040	0.10	0.11	0.027	0.051		0.039
206	0.041	0.023	0.35	0.079	0.045	0.071	0.032	0	0.10	0.11	0.013	0.031		0
Total PCBs	255	267	195	361	72	162	98	113	502	437	59	115		206
Total PCBs (with 8+5)	274	310	214	421	83	192	110	127	540	498	71	136		239
Homologue Group														
2	19	42	19	60	11	29	11	14	39	61	12	21		33
3	55	100	57	141	23	59	36	42	177	167	26	56		91
4	65	77	61	101	23	51	30	30	150	123	16	29		57
5	75	60	46	81	13	33	22	27	124	102	12	20		43
6	50	23	22	30	7.9	13	8.1	11	40	36	4.1	7.3		14
7	8.0	5.2	5.7	6.2	3.0	3.8	1.5	2.3	7.7	6.3	0.73	1.3		1.8
8	3.0	1.7	3.1	2.7	1.5	1.9	0.80	1.1	2.8	2.7	0.46	0.83		0.81
9	0.041	0.023	0.4	0.08	0.045	0.07	0.032	0	0.10	0.11	0.013	0.031		0
Corresponding Laboratory Blank	7/5/00A	7/10/00	7/13/00	7/25/00	7/31/00	8/8/00	8/23/00	9/12/00	9/25/00	9/25/00	10/9/00	10/9/00		1/2/01
Sample Volume (m³)	690	751	646	611	708	623	710	691	867	786	775	741		800
Surrogate Recoveries (%)														
#23							73%	81%	84%	82%	82%	79%		
#65	74%	79%	72%	82%	70%	67%	75%	79%	90%	86%	86%	80%		90%
#166	75%	78%	76%	75%	64%	68%	89%	99%	92%	90%	96%	90%		99%

Chester Gas Phase PCBs (XQ-PUF)

Surrogate Corrected Concentrations (pg/m³)

PCB Congener	XQ-PUF 11/8/00	XQ-PUF 11/20/00	Top of Split PUF only! XQ-PUF 12/2/01	Bottom of Split PUF only! XQ-PUF 12/2/01	XQ-PUF 12/14/01	XQ-PUF 1/7/01	XQ-PUF 1/19/01	XQ-PUF 1/31/01	XQ-PUF 2/12/01	XQ-PUF 2/24/01	XQ-PUF 3/8/01	XQ-PUF 3/20/01	XQ-PUF 4/1/01	XQ-PUF 4/13/01
8+5	29	14	2.7	0.11	11	13	26	12	197	8.5	16	21	28	8.0
18	13	8.7	2.6	0	4.0	6.4	8.2	4.9	15	3.5	5.9	7.7	9.8	4.3
17+15	8.3	4.6	1.4	0	2.4	5.4	6.5	0	0	0	0	4.3	7.9	2.9
16+32	10	4.7	0.99	0	4.1	8.4	8.7	5.1	0	3.8	8.2	11	10	5.0
31	13	5.5	1.5	0	3.0	4.2	5.8	3.7	5.4	2.6	5.2	6.7	7.0	3.4
28	5.5	2.7	0.42	0	2.6	3.4	4.4	2.8	5.0	2.4	4.5	5.8	5.9	2.9
21+33+53	0	0	0	0	2.2	3.0	3.5	2.4	1.7	2.1	3.7	4.2	4.8	2.5
22	4.6	2.7	0.22	0	1.6	2.0	2.2	1.7	6.1	1.4	2.9	4.4	6.4	2.9
45	0.99	1.9	0.069	0	0.34	0.51	0.23	0.4	0.0	0.38	0.51	0.83	0.72	0.46
46	0.56	0.35	0	0	0	0	0.53	0.3	1.6	0.40	0.54	1.00	1.0	0.36
52+43	8.5	3.7	0.88	0	3.7	5.2	8.3	4.2	7.3	3.2	5.7	7.7	8.7	3.3
49	4.2	1.8	0.53	0	2.9	2.2	5.1	2.9	6.2	1.8	5.7	13	14	10
47+48	2.8	1.3	0.24	0	0.99	1.2	1.7	1.0	4.4	0.84	1.6	1.9	2.2	0.88
44	4.8	0	0.62	0	2.2	2.8	4.1	2.1	3.4	1.8	3.2	4.6	5.3	2.2
37+42	3.2	3.2	0	0	1.1	1.3	1.6	1.1	2.1	1.0	1.9	2.9	3.4	1.5
41+71	2.6	4.3	0	0	0.86	1.1	1.7	0.902	1.8	0.74	1.5	1.8	2.3	1.0
64	1.9	0.21	0.24	0	0.67	0.78	0.98	0.53	1.6	0.55	0.96	1.4	1.5	0.75
40	0	0	0	0	0.079	0.11	0.069	0.11	0.062	0.29	0.21	0.27	0.27	0.14
74	1.7	0.69	0.14	0	0.63	0.78	1.2	0.64	1.1	0.48	0.87	1.1	1.2	0.57
70+76	2.8	1.3	0.13	0	0.95	1.5	2.3	1.1	1.6	0.75	1.5	1.96	2.3	0.96
66+95	7.8	3.7	0.66	0.099	3.6	4.8	7.7	3.5	3.9	2.7	5.2	7.1	8.3	3.6
91	0.61	0.29	0	0	0.27	0.26	0.68	0.23	0.0	0.26	0.34	0.60	0.82	0.20
56+60+89	2.4	0.96	0.12	0	0.82	0.84	1.3	0.68	0.0	0.64	1.2	1.8	2.2	1.1
92+84	7.3	1.8	0.28	0	1.8	2.0	2.7	1.4	0.0	1.6	2.3	4.5	5.2	2.2
101	3.8	1.5	0.25	0	1.7	2.4	4.4	1.9	1.97	1.3	2.4	3.6	4.1	1.7
99	1.1	0.36	0.083	0	0.42	0.71	1.4	0.58	0.0	0.32	0.69	1.0	1.0	0.47
83	0	0	0	0	0.081	0	0.18	0.13	0	0.045	0.11	0.17	0	0
97	0.80	0.34	0.047	0	0.32	0.45	0.89	0.38	0.55	0.23	0.50	0.75	0.87	0.37
87+81	0	0	0	0	2.0	1.4	3.0	1.2	1.6	1.0	1.5	2.1	2.2	1.2
85+136	0.0	0.34	0.0	0	0.23	0.33	0.57	0.26	0.0	0.19	0.37	0.72	0.60	0.25
110+77	3.6	1.5	0.16	0	1.2	1.4	2.5	1.2	1.4	0.92	1.8	2.98	3.4	1.5
82	0.31	0.11	0.0	0	0.070	0.068	0.083	0.051	0	0.069	0.11	0.24	0.30	0.15
151	0.53	0.20	0.0	0	0.36	0.42	0.72	0.41	0.34	0.26	0.46	0.76	0.74	0.58
135+144+147+124	0.43	0.21	0.090	0	0.27	0.31	0.67	0.33	3.8	0.17	0.37	0.56	0.74	0.36
149+123+107	1.2	0.47	0	0	0.59	0.74	1.6	0.75	0.59	0.44	0.93	1.4	1.8	0.85
118	0	0	0	0	0.43	0.63	1.2	0.65	0.54	0.30	0.75	1.0	1.3	0.67
146	0.77	0.52	0	0	0.18	0.14	0.28	0.17	0	0.17	0.43	1.1	1.6	0.99
153+132	1.1	0.46	0.040	0.073	0.56	0.62	1.3	0.66	0.67	0.35	0.85	1.4	1.7	0.94
105	0	0	0	0	0	0	0	0	0	0.00	0	0	0.48	0.24
141	0.31	0.11	0	0	0.14	0.17	0.39	0.19	0	0.085	0.24	0.38	0.45	0.25
137+176+130	0	0	0	0	0.041	0.044	0.12	0.045	0	0.018	0.063	0.076	0.11	0
163+138	1.1	0.44	0	0	0.52	0.60	1.3	0.73	1.2	0.24	0.79	1.2	1.6	0.95
158	0.091	0.047	0	0	0.060	0.075	0.16	0.085	0.17	0.033	0.10	0.14	0.18	0.088
178+129	0.16	0.080	0	0	0.079	0.099	0.16	0.11	0	0.040	0.14	0.19	0.26	0.18
187+182	0	0	0	0	0.13	0.12	0.29	0.18	0	0.069	0.17	0.26	0.31	0.19
183	0.083	0	0	0	0.072	0.068	0.14	0.085	0	0	0.10	0.17	0.18	0.11
128	0.079	0	0	0	0.021	0.018	0	0.017	0	0.016	0.035	0.062	0.13	0.067
185	0.0097	0	0	0	0.012	0.017	0.028	0.0202	0	0.015	0.015	0.027	0.0	0.024
174	0.28	0.12	0	0	0.13	0.12	0.15	0.15	0	0.061	0.14	0.27	0.23	0.25
177	0.14	0.067	0.046	0	0.094	0.068	0.11	0.092	0	0.056	0.097	0.12	0.16	0.13
202+171+156	0.084	0	0.034	0.022	0.051	0.065	0.11	0.087	0	0.025	0.072	0.12	0.16	0.13
180	0.15	0	0	0	0.081	0.087	0.204	0.12	0	0.016	0.10	0.19	0.24	0.16
199	0	0	0	0	0.007	0.0086	0.019	0.014	0	0	0.015	0.016	0.0	0.018
170+190	0.047	0	0	0	0.0205	0.013	0.044	0.029	0	0	0.018	0.036	0.062	0.054
201	0.10	0	0	0	0.030	0.043	0.085	0.067	0	0.014	0.034	0.072	0.107	0.099
203+196	0.13	0	0.027	0.016	0.067	0.061	0.105	0.105	0	0.031	0.071	0.12	0.14	0.15
195+208	0.040	0	0	0.014	0.013	0.027	0.030	0.028	0	0.021	0.025	0.032	0.048	0.079
194	0	0	0	0	0.027	0.0077	0.015	0.016	0	0	0.0083	0.0060	0.032	0.022
206	0	0	0	0	0.0058	0.0039	0.0061	0.0067	0	0	0.0061	0	0.010	0.018
Total PCBs	123	61	12	0.22	51	70	102	52	81	40	77	118	136	66
Total PCBs (with 8+5)	152	76	15	0.34	62	83	128	65	279	48	93	139	164	74
Homologue Group														
2	29	14	2.7	0.11	11	13	26	12	197	8.5	16	21	28	8.0
3	58	32	7.2	0	21	34	41	22	35	17	32	47	55	25
4	33	17	2.98	0	14	17	27	15	29	12	23	37	41	22
5	25	9.6	1.5	0.099	12	14	25	11	10	8.7	16	24	28	12
6	5.6	2.8	0.16	0.073	2.98	3.5	7.1	3.6	6.8	2.0	4.6	7.8	9.6	5.3
7	0.82	0.26	0.046	0	0.595	0.57	1.1	0.75	0	0.26	0.76	1.2	1.4	1.0
8	0.4001	0.073	0.062	0.053	0.22	0.23	0.40	0.35	0	0.091	0.24	0.397	0.57	0.55
9	0	0	0	0	0.0058	0.0039	0.0061	0.0067	0	0	0.0061	0	0.010	0.018
Corresponding Laboratory Blank	1/8/01	1/22/01	1/30/01	1/30/01	3/6/01	3/20/01	3/28/01	3/28/01	4/3/01	4/10/01	4/17/01	4/17/01	5/15/01	5/15/01
Sample Volume (m³)	758	792	783	783	792	765	734	780	778	766	745	697	716	839
Surrogate Recoveries (%)														
#23					85%	84%	87%	91%	78%	90%	91%	96%	93%	91%
#65	85%	97%	85%	92%	89%	85%	85%	91%	75%	94%	93%	100%	95%	91%
#166	97%	101%	94%	103%	92%	94%	92%	90%	97%	96%	94%	101%	99%	97%

Chester Gas Phase PCBs (XQ-PUF)
Surrogate Corrected Concentrations (pg/m^3)

PCB Congener	XQ-PUF 4/25/01	XQ-PUF 5/7/01
8+5	8.5	25
18	4.8	12
17+15	2.9	7.7
16+32	4.9	13
31	2.7	8.2
28	1.9	5.9
21+33+53	1.9	4.9
22	1.6	6.2
45	0.46	0.93
46	0.31	1.0
52+43	2.97	9.9
49	4.5	7.8
47+48	0.81	2.1
44	1.6	5.5
37+42	0.99	2.9
41+71	0.69	3.1
64	0.52	1.6
40	0.13	0.37
74	0.46	1.1
70+76	0.75	2.4
66+95	2.9	8.5
91	0.28	0.97
56+60+89	0.74	2.2
92+84	1.7	5.0
101	1.4	4.5
99	0.39	1.3
83	0.094	0
97	0.27	0.91
87+81	1.1	2.34
85+136	0.23	0.80
110+77	1.1	3.9
82	0.085	0.30
151	0.36	0.76
135+144+147+124	0.21	0.71
149+123+107	0.54	1.8
118	0.41	1.3
146	0.46	1.0
153+132	0.53	1.9
105	0	0.66
141	0.13	0.49
137+176+130	0.0402	0.11
163+138	0.54	1.7
158	0.055	0.19
178+129	0.075	0.24
187+182	0.12	0.38
183	0.058	0.21
128	0.033	0.12
185	0.016	0.039
174	0.11	0.27
177	0.086	0.19
202+171+156	0.0598	0.16
180	0.087	0.34
199	0.0	0.036
170+190	0.023	0.089
201	0.035	0.15
203+196	0.075	0.18
195+208	0.030	0.044
194	0.0091	0.0202
206	0.0065	0.013
Total PCBs	49	140
Total PCBs (with 8+5)	58	165
Homologue Group		
2	8.5	25
3	22	61
4	14	38
5	9.7	30
6	3.1	9.6
7	0.56	1.7
8	0.23	0.68
9	0.0065	0.013
Corresponding Laboratory Blank	5/21/01	5/21/01
Sample Volume (m^3)	800	768
Surrogate Recoveries (%)		
#23	90%	87%
#65	92%	86%
#166	97%	101%

Chester PCBs in Precipitation (XQ-Precip)
Surrogate Corrected Concentrations (pg/L)

PCB Congener	XQ-Precip 7/21/00	XQ-Precip 8/16/00	XQ-Precip 9/8/00	XQ-Precip 10/3/00	XQ-Precip 11/8/00	XQ-Precip 11/20/00	XQ-Precip 12/13/00	XQ-Precip 1/5/01	XQ-Precip 2/1/01	XQ-Precip 3/20/01	XQ-Precip 4/16/01	XQ-Precip 5/7/01
8+5	0.026	0.12	1.4	0.039	0.019	0.021	0	No	0.016	0.016	0	0
18	0.0062	0.041	0.033	0.013	0.0042	0.0095	0.0030	Sample	0.0090	0.0076	0.055	0.0021
17+15	0	0	0	0	0	0.0035	0		0	0.0043	0	0
16+32	0.0037	0.049	1.3	0.015	0.0093	0.0097	0.0028		0.018	0.011	0	0.0037
31	0.013	0.098	0.011	0.031	0.011	0.014	0.0053		0.011	0.012	0.039	0.0075
28	0.0080	0.10	0.018	0.029	0.0073	0.014	0.0025		0.0096	0.0098	0.075	0.0026
21+33+53	0.0062	0.057	0.0058	0.024	0.0082	0.0095	0.0017		0.0067	0.0075	0.039	0.0029
22	0.0072	0.048	0.024	0.015	0.0092	0.0062	0.0018		0.0089	0.011	0	0.0035
45	0.0051	0.0079	0	0	0.0049	0.0017	0		0.0011	0	0	0
46	0	0.0056	0	0	0.0028	0	0		0.0095	0	0	0
52+43	0.011	0.20	0.25	0.062	0.044	0.038	0.024		0.016	0.017	0.21	0.014
49	0.0069	0	0.022	0.061	0.053	0.2003	0.108		0.022	0.037	0.36	0
47+48	0.0037	0.11	0.0070	0.034	0.028	0.026	0.018		0.0049	0.0063	0.17	0.0054
44	0.0079	0.076	0.059	0.024	0.0099	0.010	0.0024		0.0080	0.010	0.043	0.0014
37+42	0.0045	0.045	0.66	0.013	0.0056	0.0047	0.0012		0.0064	0.0070	0	0
41+71	0.0041	0.028	0	0.011	0.0049	0.0076	0.0022		0.0072	0.0052	0.042	0
64	0.0020	0.025	0.011	0.0096	0.0031	0.0033	0		0.0038	0.0040	0.019	0
40	0.13	0.017	0.0067	0.0029	0.0011	0.00071	0		0.00078	0.00088	0	0
74	0.0036	0.045	0.042	0.017	0.0048	0.0064	0.0030		0.0052	0.0043	0.034	0.0037
70+76	0.0041	0.060	0	0.024	0.0067	0.012	0.0046		0.0099	0.0090	0.053	0.0046
66+95	0.016	0.19	0.010	0.069	0.019	0.030	0.0084		0.029	0.028	0.17	0.021
91	0	0.0078	0.023	0.032	0.00069	0.0017	0		0.0020	0.0027	0	0
56+60+89	0.0051	0.066	0	0.015	0.0073	0.0078	0.0017		0.0096	0.011	0.051	0.0023
92+84	0.011	0.10	0.032	0.108	0.019	0.012	0		0.018	0.024	0.10	0.0032
101	0.0075	0.084	0.027	0.013	0.0086	0.018	0.010		0.013	0.017	0.073	0.0090
99	0.0019	0.030	0.030	0	0.0026	0.0061	0.0053		0.0039	0.0051	0.032	0.0031
83	0.0025	0.0077	0	0	0.0029	0.0013	0		0	0	0	0
97	0.0060	0.023	0.0015	0.010	0.0043	0.0044	0.0021		0.0035	0.0041	0.018	0.0018
87+81	0.018	0.067	0	0.033	0.0083	0.015	0.0060		0.011	0.011	0.075	0.0092
85+136	0.00045	0.0028	0	0	0	0.0025	0		0.0035	0.0046	0.034	0.0021
110+77	0.011	0.12	0.0046	0.045	0.014	0.020	0.0016		0.018	0.023	0.094	0.0060
82	0.0016	0.039	0.046	0.010	0.0022	0.0013	0.0020		0.0023	0.0031	0	0.0012
151	0.0029	0.044	0	0.012	0.0030	0.0060	0.0051		0.0058	0.0065	0.050	0.0034
135+144+147+124	0	0.022	0	0.011	0.0032	0.0064	0.0058		0.0054	0.0069	0.077	0.0028
149+123+107	0.0090	0.10	0	0.045	0.012	0.016	0.011		0.012	0.014	0.105	0.0090
118	0.0099	0.18	0.012	0.052	0.017	0.022	0.018		0.015	0.019	0.17	0.011
146	0.011	0.052	0.012	0.0052	0.019	0.0044	0.0026		0.013	0.022	0.039	0.00805
153+132	0.019	0.080	0.020	0.052	0.012	0.020	0.0021		0.01997	0.021	0.091	0.0097
105	0.013	0	0	0	0	0	0		0	0.012	0	0
141	0.0027	0.029	0.0099	0.022	0.0034	0.0055	0.0044		0.0048	0.0052	0.033	0.0037
137+176+130	0.00025	0.0044	0	0.0030	0	0.0018	0.0009		0.00097	0.0012	0	0.00078
163+138	0.017	0.18	0.0092	0.083	0.016	0.033	0.015		0.026	0.032	0.15	0.016
158	0.0016	0.021	0	0.0093	0.0021	0.0045	0.0025		0.0032	0.0038	0.014	0.0026
178+129	0	0.020	0	0.0042	0.00096	0.0047	0		0.034	0.0049	0.019	0
187+182	0.0034	0	0	0.014	0	0.0030	0.0020		0.0048	0.0051	0	0.0066
183	0.0023	0.021	0	0.011	0.0025	0.0052	0.0034		0.0032	0.0043	0.022	0.0054
128	0.0014	0.014	0.0026	0.0053	0.0015	0.0012	0		0.0023	0.0041	0.011	0
185	0.0004	0.0075	0.0041	0.0029	0.00039	0	0.0017		0	0.00084	0	0.0106
174	0.0037	0.093	0	0.035	0.00405	0.0078	0.0033		0.0067	0.0061	0.078	0.0020
177	0.0020	0.052	0	0	0	0.0049	0.0024		0.0045	0.0048	0.033	0.0019
202+171+156	0.0047	0.033	0	0	0	0.0058	0.0027		0.0047	0.0053	0.038	0.0022
180	0.010	0.13	0	0.050	0.0097	0.016	0.010		0.012	0.014	0.090	0.0092
199	0.00026	0.0019	0.039	0	0	0.0008	0		0.00075	0.0012	0.0071	0.00050
170+190	0.0041	0.046	0.0028	0.046	0.0033	0.0065	0.0015		0.0055	0.0061	0.039	0.0027
201	0.0074	0.066	0.017	0.033	0.0056	0.010	0.0058		0.0083	0.0094	0.14	0.0056
203+196	0.0076	0.077	0.0091	0.028	0.0065	0.013	0.0096		0.013	0.011	0.14	0.016
195+208	0.0017	0.018	0.00087	0.025	0.0011	0.0032	0.0031		0.0027	0.0040	0.070	0.0029
194	0.0048	0.049	0	0.012	0.0019	0.0051	0.0029		0.0043	0.0038	0.049	0.0027
206	0.0037	0.040	0.0022	0.012	0.0040	0.0051	0.0031		0.0048	0.0052	0.22	0.0040
Total PCBs	0.45	3.1	2.8	1.3	0.44	0.71	0.34		0.49	0.53	3.5	0.25
Total PCBs (with 8+5)	0.48	3.3	4.2	1.3	0.46	0.73	0.34		0.51	0.55	3.5	0.25
Homologue Group												
2	0.026	0.12	1.4	0	0.019	0.021	0		0.016	0.016	0	0
3	0.049	0.44	2.09	0.14	0.055	0.072	0.018		0.070	0.070	0.21	0.022
4	0.18	0.64	0.40	0.26	0.17	0.31	0.16		0.099	0.11	0.98	0.031
5	0.099	0.84	0.19	0.37	0.099	0.13	0.053		0.12	0.15	0.73	0.065
6	0.066	0.55	0.054	0.25	0.072	0.10	0.049		0.098	0.12	0.61	0.058
7	0.022	0.32	0.0041	0.12	0.018	0.041	0.023		0.065	0.040	0.24	0.036
8	0.031	0.29	0.069	0.14	0.018	0.044	0.026		0.039	0.041	0.49	0.032
9	0.0037	0.040	0.0022	0.012	0.0040	0.0051	0.0031		0.0048	0.0052	0.22	0.0040
Corresponding Laboratory Blank	9/26/00	9/26/00	9/26/00	9/26/00	9/26/00	2/6/01	2/6/01		3/14/01	5/22/01	5/22/01	6/17/01
Volume of Precip. (L)	29	1.3	11	3.8	11	7.1	12		8.7	19	1.6	22
Surrogate Recoveries (%)												
#23	82%	82%	72%	81%	86%	92%	60%		81%	75%	24%	84%
#65	88%	83%	81%	83%	92%	93%	57%		82%	77%	25%	81%
#166	91%	93%	73%	86%	95%	92%	41%		86%	77%	26%	77%

Chester Particle Phase PCBs in Field Blanks (XQF-FB)
Surrogate Corrected Masses (pg)

PCB Congener	XQF-Field Blank 6/17/00	XQF-Field Blank 11/20/00	XQF-Field Blank 5/7/01
8+5	12	165	150
18	4.0	70	27
17+15	3.9	60	40
16+32	4.5	77	85
31	87	95	34
28	49	69	21
21+33+53	0	0	0
22	4.0	26	30
45	2.8	2.1	2.0
46	3.1	2.3	2.1
52+43	59	72	58
49	2.1	33	46
47+48	37	30	30
44	73	1.9	83
37+42	2.9	2.0	1.9
41+71	5.3	65	3.7
64	7.8	34	0.79
40	0	0	0
74	2.0	1.4	1.3
70+76	95	32	29
66+95	59	92	65
91	2.6	1.9	1.9
56+60+89	18	29	1.2
92+84	30	24	32
101	42	49	22
99	9.0	13	6.2
83	1.6	1.4	1.3
97	13	15	9.2
87+81	0	0	0
85+136	2.2	50	55
110+77	26	56	22
82	1.4	4.6	4.5
151	1.3	21	13
135+144+147+124	1.6	90	98
149+123+107	13	38	12
118	0	0	0
146	1.5	11	6.3
153+132	9.5	26	0.86
105	1.4	0.94	1.2
141+179	0.86	1.8	0.63
137+176+130	0	0	0
163+138	14	33	12
158	1.3	5.9	0.98
178+129	1.8	1.2	1.3
187+182	1.1	5.3	0.82
183	1.3	5.3	0.94
128	0.84	3.8	0.59
185	0.79	0.52	0.57
174	46	120	60
177	1.4	0.92	1.0
202+171+156	0.93	0.60	9.9
180	1.1	0.70	0.76
199	1.1	4.7	4.2
170+190	21	4.6	0.61
201	1.8	8.8	1.2
203+196	1.7	5.9	1.2
195+208	8.8	12	10
194	0.89	0.58	0.63
206	0.95	0.61	0.66
Total PCBs	783	1412	955
Total PCBs (with 8+5)	795	1577	1105
Homolog group			
2	12	165	150
3	155	399	239
4	306	301	258
5	186	258	165
6	46	281	200
7	54	134	65
8	36	37	28
9	0.95	0.61	0.66
Corresponding Laboratory Blank	10/2/00	7/16/01	7/19/01
Surrogate Recoveries (%)			
#23	61%	80%	82%
#65	61%	77%	79%
#166	80%	100%	94%

Chester Gas Phase PCBs in Field Blanks (XQP-FB)
Surrogate Corrected Masses (pg)

PCB Congener	XQP-Field Blank 6/17/00	XQP-Field Blank 11/20/00	XQP-Field Blank 5/7/01
8+5	126	279	66
18	15	136	20
17+15	7.0	73	4.7
16+32	107	0	22
31	38	15	4.7
28	21	100	2.9
21+33+53	0	0	4.2
22	7.2	12	5.0
45	5.2	6.2	3.5
46	5.7	7.9	3.9
52+43	6.9	97	306
49	4.0	31	21
47+48	109	78	110
44	5.3	6.4	17
37+42	5.3	8.0	3.5
41+71	11	16	6.1
64	2.4	3.1	1.6
40	0	0	1.4
74	3.6	6.2	25
70+76	3.4	4.7	18
66+95	158	129	117
91	5.0	7.2	3.5
56+60+89	3.5	5.7	2.4
92+84	8.8	9.8	6.6
101	3.7	4.5	2.5
99	2.9	4.4	1.9
83	3.2	5.0	2.2
97	2.5	3.7	7.1
87+81	0	0	380
85+136	4.2	6.0	2.8
110+77	3.7	5.4	2.4
82	2.6	6.4	1.9
151	3.0	3.0	2.0
135+144+147+124	3.5	4.7	2.4
149+123+107	3.4	20	2.2
118	0	0	2.1
146	3.0	4.2	2.1
153+132	2.6	49	1.7
105	3.0	5.0	2.1
141+179	1.9	2.1	1.3
137+176+130	0	0	1.4
163+138	3.2	4.0	2.1
158	2.6	2.3	2.2
178+129	3.7	4.2	2.7
187+182	2.5	1.9	33
183	2.8	3.0	1.93
128	2.0	4.2	1.11
185	1.6	2.0	1.16
174	2.8	3.1	1.83
177	3.1	20	2.08
202+171+156	26	7.4	19
180	2.6	2.6	8.7
199	2.4	2.8	1.7
170+190	2.1	2.4	1.3
201	4.0	3.7	2.5
203+196	3.9	21	2.4
195+208	22	16	20
194	2.1	2.2	1.3
206	2.1	2.4	1.3
Total PCBs	666	982	1233
Total PCBs (with 8+5)	791	1261	1299
Homolog group			
2	0	0	66
3	318	610	67
4	166	273	515
5	200	248	529
6	23	32	21
7	41	25	51
8	40	68	48
9	2.1	2.2	1.3
Corresponding Laboratory Blank	7/13/00	1/22/01	6/8/01
Surrogate Recoveries (%)			
#23	64%	87%	89%
#65	70%	88%	92%
#166	71%	97%	96%

Mass of Particulate Matter ≤2.5 µm ($PM_{2.5}$)

Filter code	Sample date	Pre-weight (mg)	Post-weight (mg)	Mass (mg)	PM2.5 Flow Rate (L/min)	PM 2.5 Volume (m3)	PM2.5 (µg/m3)
P052400W	6/17/00	147.517	147.925	0.408	10	14.052	29
P052400K	6/29/00	147.516	147.935	0.419	10	14.394	29
P070600W	7/11/00	146.527	146.77	0.243	10	14.2872	17
P052400E	7/23/00	149.089	149.38	0.291	10	14.202	20
P072800W	8/4/00	145.494	145.751	0.257	10	14.334	18
P072800H	8/16/00	146.566	146.837	0.271	10	13.956	19
P072800FF	8/28/00	147.791	148.465	0.674	10	14.088	48
P081800G	9/9/00	145.123	145.776	0.653	10	14.424	45
P092000W	9/21/00	146.575	146.729	0.154	10	13.686	11
P081800C	10/3/00	146.383	146.843	0.46	10	13.788	33
P102400I	10/27/00	148.019	148.248	0.229	10	14.136	16
P102400S	11/8/00	146.362	146.665	0.303	10	13.398	23
P101300 P	11/20/00	146.496	146.96	0.464	10	14.172	33
P081800 F	12/2/00	144.934	144.993	0.059	10	14.37	4
P112800 DD	12/14/00	146.408	146.663	0.255	10	14.178	18
P112800A	1/7/01	146.045	146.371	0.326	10	14.412	23
P112800N	1/19/01	146.373	146.566	0.193	10	13.656	14
P112800 H	1/31/01	146.673	146.961	0.288	10	14.322	20
P011901 H	2/12/01	144.041	144.259	0.218	10	14.286	15
P011901 BB	2/24/01	144.079	144.274	0.195	10	14.07	14
P011901 N	3/8/01	145.684	145.955	0.271	10	13.68	20
P011901G	3/20/01	145.25	145.468	0.218	10	14.07	15
P032301 D	4/1/01	144.413	144.789	0.376	10	14.448	26
P032301J	4/13/01	142.792	142.965	0.173	10	13.944	12
P041101 I	4/25/01	146.202	146.42	0.218	10	14.316	15
P041101Q	5/7/01	143.17	143.364	0.194	10	14.28	14

(3)

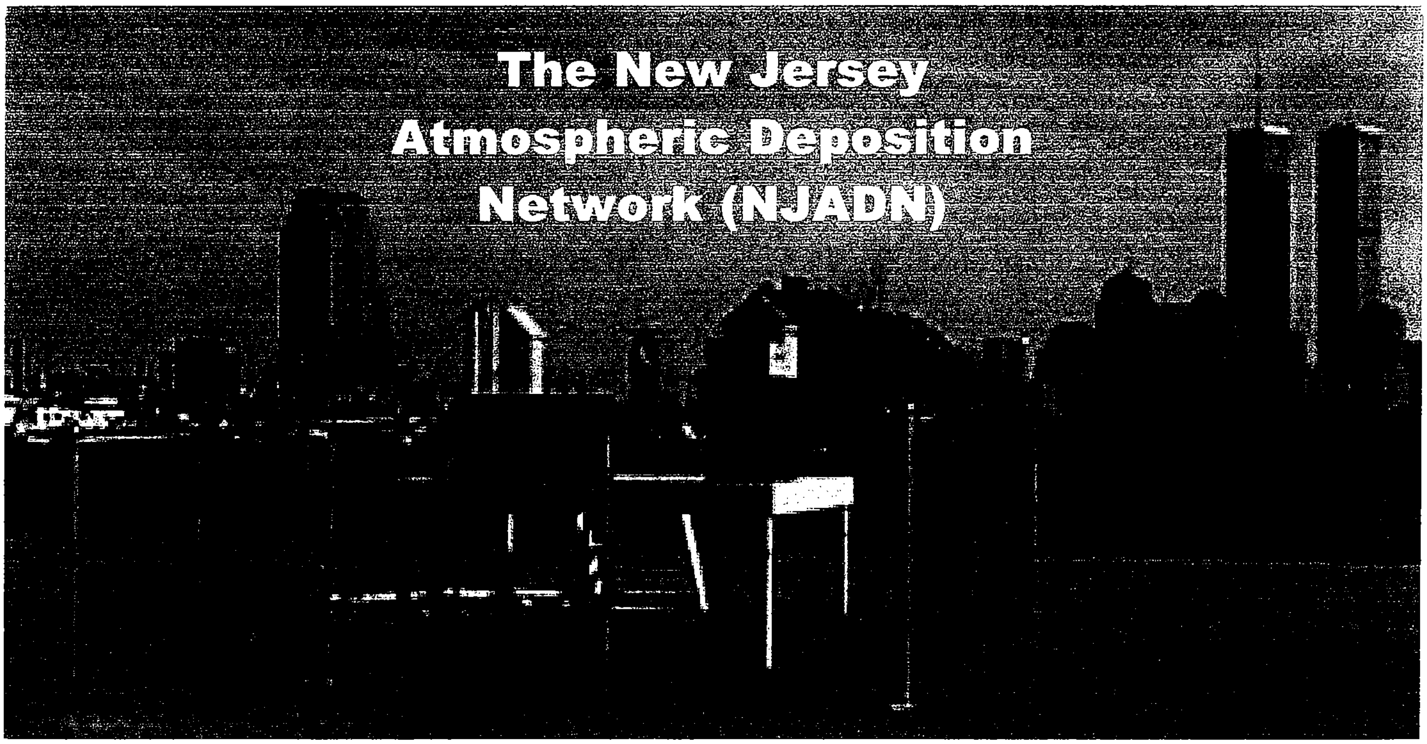
Addendum to the Final Report to the

Hudson River Foundation (HRF)

Atmospheric Deposition Monitoring in the Hudson River Estuary: Dioxin and Furan Data

Grant 002/98R

Dennis Suszkowski, Project Officer



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Dioxin and Furan Data from the NJADN

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Evidence for Dynamic Air–Water Exchange of PCDD/Fs: A Study in the Raritan Bay/Hudson River Estuary

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The first detailed evidence for dynamic air–water exchange of polychlorinated dibenzo-*p*-dioxins and furans (PCDD/Fs) is presented. Samples of air (340–380 m^3) and water (33–60 L) were taken simultaneously during July 1998 at two sites in the lower Hudson River Estuary, NY. The atmospheric gas and particulate phases and the aqueous dissolved and particulate phases were analyzed for di- to octa-CDD/Fs. All the homologue groups were routinely detected by HRGC-HRMS, with detection limits for the homologue groups ~1 pg/sample. Cl_2DDs, OCDD, and Cl_2DFs were the most abundant homologues in the water, and the Cl_2DDs were the most abundant in the air (4.3–7.6 pg/m^3). The Cl_2DD/Fs and $Cl_{7/8}DD/Fs$ were 25–53% and 78–99% associated with the water particulate phase, respectively. The likelihood of sampling artifacts influencing the apparent dissolved/particulate partitioning of the higher chlorinated congeners is discussed. Water concentrations were constant over the sampling period, while atmospheric concentrations varied with air mass origin. The fugacity ratios between the dissolved phase in water and the gas phase in air were usually >1, implying a net volatilization flux. Evidence for outgassing of the lower chlorinated homologues, obtained by the simultaneous measurement of air over adjacent land and water, provided further support for the outgassing of the lower chlorinated homologues from the water body.

Introduction

Polychlorinated dibenzo-*p*-dioxins and furans (PCDD/Fs) are ubiquitous contaminants that are released into the environment as byproducts of incomplete combustion or as chemical impurities. Atmospheric transport is believed to be the major pathway for their distribution away from sources (*1, 2*). Municipal, medical, and chemical waste incinerators were identified as the major sources of PCDD/Fs to the contemporary environment and have since been regulated with regard to their emissions or shut down in many industrialized countries, such as Germany, the U.K., and the U.S.A. (*3–5*). As these major sources have been reduced, diffuse sources of PCDD/Fs, such as domestic burning and vehicular traffic, have become proportionally more important to the current emissions to the atmosphere (*6*). Unclear as yet is the extent to which previously deposited PCDD/Fs present in the key environmental compartments of soils and sediments are now subject to recycling into the atmosphere. Discussions have also centered around possible natural sources of PCDD/Fs (e.g. refs *7–10*). The role of air–water diffusive exchange in large aquatic systems as a source or sink for PCDD/Fs has not been investigated to our knowledge, although this process is important for other semivolatile compounds, such as polychlorinated biphenyls (PCBs) (*11–15*), polynuclear aromatic hydrocarbons (PAHs) (*15, 16*), and nonylphenols (*17*). Hence the extent to which current ambient air levels are maintained by air-surface exchange is clearly of considerable significance.

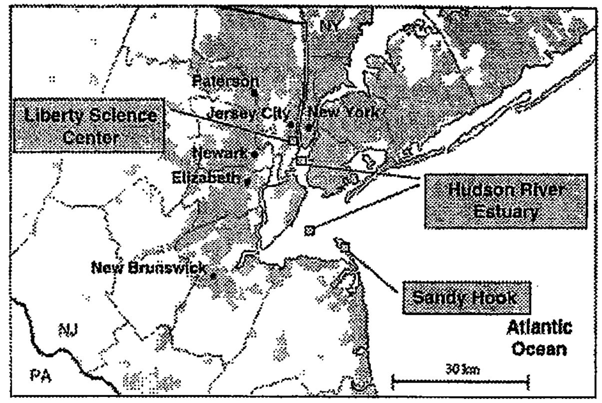

FIGURE 1. Map of the lower Hudson River Estuary. Shaded areas indicate urban areas by population density. Adapted map courtesy of *The National Atlas, USGS.*

The lower Hudson River Estuary and Raritan Bay (HRE/RB) near the New York–New Jersey area in the U.S. (NY–NJ) receives freshwater input mainly from the Hudson, Hackensack, and Passaic rivers; it remains a brackish water body (see Figure 1). The concentrations of many contaminants in samples from within the HRE have consistently been among the highest measured at U.S. sites (*18*). Dioxin contamination of the Newark Bay, associated with discharges from the Lister Avenue Superfund site, occurred in the 1960/1970s and stimulated measurements of 2,3,7,8-TCDD in animals and sediments of the area (e.g. refs *19* and *20*). The importance of wastewater treatment discharges, combined sewer overflows, and atmospheric deposition to the overall contamination of the HRE/RB have been discussed (*21–24*). Recent studies comparing concentrations of OCDD and 2,3,7,8-TCDD in sediments found a strong decrease over time with levels of 2,3,7,8-TCDD in the mid-1980s lower by a factor of 3–15 compared to the mid-1960s (*25*).

This study of air–water exchange in the HRE/RB establishes fugacity ratios for PCDD/Fs across a water surface. The sampling site was chosen because of its contamination history, proximity to major urban and industrial centers, and the support offered by an in-place air toxics network (*26*). Simultaneous air and water samples were analyzed for a full range of PCDD/Fs, including $Cl_{2/3}DD/Fs$. The magnitude of Henry's Law constants (1–7 Pa*m^3/mol) and octanol–water coefficients (log K_{ow} 4.9–6.4) for $Cl_{2/3}DD/Fs$ makes them susceptible to water–air exchange (*27, 28*), similar to the 1–4 Cl-substituted PCBs for which air–water exchange

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TABLE 1. Summary of Four Sampling Events in the Raritan Bay/Hudson River Estuary

date	July 5	July 6	July 7	July 10
position	40°30.308′N, 74°05.802′W	40°30.396′N, 74°05.771′W	40°30.550′N, 74°05.720′W	40°39.174′N, 74°02.327′W
surface temp (°C)	20.3–22.6	19.9–22.0	21.4–22.9	20.0–20.3
mean SPM (mg/L)	5.59	6.40	4.17	7.87
(f_{oc})	(0.34)	(0.34)	(0.32)	(0.09)
mean DOC (mg/L)	4.04	4.41	3.71	4.90
water vol (L)	39	33	51	60
amount SPM (mg)	218	211	213	472
air temp (°C)	21.7–27.0	20.3–24.9	20.9–24.8	23.6–26.1
air mass origin	Northwest (Canada)	Northeast (Canada)	local (still air)	Northwest (Canada)
air vol (m^3)	384	342	352	370

processes have been quantified (*14*). Recently, the air–water exchange of nonylphenols has been studied for the lower HRE, depicting net volatilization from the water surface (*17*). Broman et al. (*29*) estimated fugacity ratios for PCDD/Fs in waters of the Baltic Sea based on coastal air and water column measurements and derived a net gaseous flux into the Baltic Sea. In this study, measurements in the HRE/RB indicate that outgassing from the Bay can act as a source of some PCDD/Fs to the atmosphere.

Uncertainties remain over the amount of PCDD/Fs in the "truly dissolved phase", since it is difficult to assess the importance of binding to dissolved organic carbon (DOC) for these compounds. Only the "truly" dissolved phase participates in the approach to air–water equilibrium. However, the observed changes in PCDD/F concentrations of an air mass sampled prior to and after passage over the lower Bay provides strong evidence that volatilization of some PCDD/Fs from the water body occurs.

Materials and Methods

The Hudson River drainage area above the New York metropolitan area covers 34 300 km^2. The lower Hudson River (Albany to New York City) is 240 km long and consists of a mixed estuary, in part because of marine infusion and tidal influences. The salt front limit can extend up the river 110 km, depending on the freshwater flow (*30*). The HRE is bordered by the densely urbanized and industrialized areas of New York City, CT, and northern NJ, and in prevailing transport regime downwind of other large atmospheric emission sources: Philadelphia, PA, Wilmington, DE, and the Baltimore–Washington complex. Except for Chesapeake Bay (see 31), there is little information on atmospheric concentrations, deposition, and fate of persistent organic pollutants (POPs) in the Mid-Atlantic States.

Simultaneous air and water sampling on the HRE/RB was performed aboard the RV *Walford* in July 1998. Air and water samples were taken simultaneously, while the boat was anchored at the sampling station, with the bow facing into the wind. The first three samples were taken in the Raritan Bay, and the fourth one was taken in the New York Harbor area (see Figure 1 and Table 1 for details). Samples were processed at Rutgers University immediately following collection and later analyzed at Lancaster University.

Air samples were collected from the bow, with a modified organics Hi-Vol sampler (Graseby) equipped with quartz fiber filter (20 × 24 cm) and polyurethane foam (10 × 8 cm diameter). Each sample consisted of ca. 350 m^3 of air sampled at calibrated flow rates of ~0.8 m^3/min. Filters were precombusted at 400 °C for 4 h, equilibrated in constant humidity before and after deployment in the field, and weighed. PUFs were cleaned by successive 24 h extraction in acetone and petroleum ether and dried in glass vacuum desiccators.

Water samples were collected using an Infiltrex 100 in situ water sampler operating at ~400 mL/min and equipped with a glass fiber filter followed by a XAD-2 resin column. In total, 40–60 L water were sampled, yielding between 200 and 400 mg of suspended particulate matter. GFFs were precombusted at 400 °C for 4 h, and XAD was cleaned by successive 24 h extractions with methanol, acetone, hexane, acetone, and methanol in a Soxhlet and rinsed several times with deionized water. Additional details can be found in Zhang et al. (*14*).

Additional water samples were taken for total suspended particulate material (SPM), dissolved organic carbon (DOC), and particulate organic carbon (POC) determination. SPM samples were analyzed for inorganic and organic carbon and nitrogen (CHN). Analysis of DOC and CHN were performed by Analytical Services of the Chesapeake Biological Laboratory, University of Maryland. Air and water temperature, wind speed, and direction were recorded throughout the sampling interval (see Table 1). Further meteorological information was obtained from Newark airport, ca. 20 km from the coast.

Additional air samples (consecutive 12-h day–night) were taken at two land-based sites during the sampling campaign, while the over-water samples were being collected. The sites were chosen to represent the coastal environment and the urban NJ–NY area. Sandy Hook is located on a barrier spit separating Raritan Bay from the Atlantic Ocean, and the "Liberty Science Center" (LSC) is in the heart of the metropolitan NY and NJ industrial region (see Figure 1).

Analytical Procedure. For the air samples the GFFs were extracted with toluene and the PUFs in DCM in a Soxhlet apparatus. The extracts were reduced to ~1 mL, transferred into gas chromatographic (GC) vials, and transported to Lancaster University. They were cleaned-up on a mixed silica-column and fractionated on a basic alumina column. Water GFFs were extracted in acetone–hexane (1:1) followed by toluene, while the XAD resins were extracted in acetone–hexane (1:1) and partitioned against water. The extracts were cleaned-up as described above. $^{13}C_{12}$-labeled PCDD/Fs standards (Promochem, Welwyn Garden City, AL7 1EP, U.K.) were added to the XAD-resin before deployment in the water; GFFs and PUFs were spiked prior to extraction in the laboratory. Field and laboratory blanks were routinely included (one in 10 each) and treated as the other samples.

All samples were analyzed by HRGC/HRMS on a Micromass Autospec Ultima, operated at a resolving power of ~10 000 (for details see ref *32*). Homologue groups were quantified relative to a full suite of $^{13}C_{12}$-labeled congeners on a 30m, DB-5 column; the 2,3,7,8-substituted congeners were separated and quantified on a 60 m SP-2331 column. Mean recoveries of the various $^{13}C_{12}$-labeled congeners were generally 50–100% but were 50–65% in the first three XAD-samples. At detection limits of ~0.1–0.6 pg/sample for the 2,3,7,8-substituted congeners (based on the noise of the baseline), only trace amounts of $Cl_{7/8}$DDs were detected in the blanks. Method detection limits for the homologue groups, expressed as the mean blank level plus three times its standard deviation, were generally ~1–2 pg/sample but

TABLE 2. Mean Concentrations in the Suspended Particulate Matter (SPM) and Apparent Dissolved Phase for the Raritan Bay ($n = 3$), Hudson River, and Field Blank (F.Bl.)

homologue groups	SPM (pg/g SPM) Raritan Bay mean	SD (%)	Hudson	F.Bl.	dissolved phase (fg/L) Raritan Bay mean	SD (%)	Hudson	F.Bl.
Cl_2DFs	430	28	800	26	3200	14	5900	270
Cl_3DFs	27	23	600	2.9	940	14	2900	84
Cl_4DFs	130	17	310	0.9	230	6	560	23
Cl_5DFs	80	13	160	1.2	200	24	100	4.1
Cl_6DFs	74	14	150	1.5	88	22	38	3.3
Cl_7DFs	110	9	240	1.0	27	35	nd[a]	0.2
OCDF	80	23	180	2.3	38	22	16	7.7
Cl_2DDs	3600	5	1900	7.6	27000	37	44000	170
Cl_3DDs	87	11	140	0.9	400	26	1400	7.8
Cl_4DDs	61	12	130	0.7	79	19	360	4.6
Cl_5DDs	20	24	47	0.4	42	18	88	4.2
Cl_6DDs	150	12	280	0.7	250	36	350	2.5
Cl_7DDs	410	12	860	5.2	540	28	830	45
OCDD	1900	12	3600	21.8	1500	39	1400	132
ΣTEQ[b]	23	17	33	1.7	25	37	17	0.4

[a] Not detected, nd. [b] I-TEQ, ref *33*.

TABLE 3. Measurements of PCDD/Fs in Water Samples

location	particle-fraction $\Sigma Cl_{4-8}DD/Fs$	particle-fraction ΣI-TEQ	dissolved phase, fg/L $\Sigma Cl_{4-8}DD/Fs$	dissolved phase, fg/L ΣI-TEQ	sample volume, L	amount SPM, g
River Elbe, Germany[a]	3000–6400 pg/g	41–73 pg/g	210–280	4–17	~390	~29–43
Fraser River, Canada[b]				14–33	100	
Baltic Sea, Sweden[c]	27–61 pg/g DOC	0.1–0.6 pg/g DOC	36–260	0.4–3.6	~2000	~12
Japanese coastal sea[d]	1.2–2.9 pg/L		100		~1000	
Raritan Bay[e]	2970 pg/g	23 pg/g	2940	25	~40	~0.2
Hudson River[e]	5430 pg/g	33 pg/g	2350	17	~60	~0.4

[a] Reference *33*. [b] Reference *34*. [c] Reference *28*. [d] Reference *36*. [e] This study.

higher for OCDD (13 pg/sample) and $Cl_{1/2}DFs$ (6 and 60 pg/sample).

Results and Discussion

Water Samples. In the SPM of the Raritan Bay water samples (ca. 210–470 mg/sample), virtually all PCDD/F homologue groups and 2,3,7,8-substituted congeners were measured at above detection limits with good reproducibility ($n = 3$). Average standard deviations were ±15% for the homologue groups and ±17% for the individual 2,3,7,8-substituted congeners. Concentrations ranged from 20 pg/g SPM for Cl_5-DDs to >3000 pg/g SPM for Cl_2DDs (see Table 2). Expressed in pg/L, concentrations in the solid-phase ranged from 0.08 to 0.15 pg/L for Cl_5DDs up to 15–24 pg/L for Cl_2DDs. Concentrations in the apparent dissolved phase were lower, ranging from 40 fg/L for Cl_5DDs to greater than 40 000 fg/L for Cl_2DDs. Figure 2 shows the mean concentrations (in pg/L) for the Raritan Bay samples, with error bars representing single standard deviations. The apparent dissolved and particulate phases were dominated by Cl_2DDs. Both phases had similar concentrations for the lower chlorinated CDFs, while the higher chlorinated PCDD/Fs were found mostly in the particulate phase.

Toxic Equivalents (ΣTEQ) in the Water Samples. The concept of ΣTEQ was derived for the biological/biochemical responses to 2,3,7,8-TCDD and similar pollutants. It is now common practice to calculate the ΣTEQ in abiotic matrices to compare the contamination of samples. Concentrations of ΣTEQ (I-TEQ, ref *33*) associated with the SPM ranged from 20 to 33 pg/g SPM (85–160 fg ΣTEQ/L). Contributions to the ΣTEQ in the SPM were dominated by 2,3,7,8-TCDD and 2,3,4,7,8-PeCDF, both accounting for ~20%. Interestingly, similar concentrations were reported for a sediment sample (in pg/g dry weight) from the main stem of the Hudson River taken in 1996 (site 8 in ref *25*, courtesy of R. Bopp). 2,3,4,7,8-PeCDF was more abundant in the sediment (43 pg/g compared to 12 pg/g SPM in the water), while all the other 2,3,7,8-substituted congeners agreed well, with an average 24% difference between the two samples (*34*). Concentrations in the apparent dissolved phase were lower with 17–25 fg ΣTEQ/L. 2,3,7,8-TCDF, 2,3,4,7,8-PeCDF, and, when detected, 2,3,7,8-TCDD were the major contributors to the ΣTEQ in the apparent dissolved phase.

There are limited data with which to compare PCDD/F concentrations in water (see Table 3). Homologue and ΣTEQ concentrations (per g SPM) were similar to those found in the River Elbe and the Fraser River. Concentrations of homologue groups in the dissolved phase exceeded those for the Elbe by factors of ~2–10 for the homologue groups, while the ΣTEQ was similar (*35, 36*). Concentration per g SPM were higher in the Hudson River by a factor of ~2, with concentrations of PCDD/Fs in the apparent dissolved phase being higher in the Raritan Bay by ~2 times (see Table 2). Enhanced analytical sensitivity enabled us to work with substantially smaller sample volumes and mass of particulate matter than many others (see Table 3).

Apparent Distribution in the Water Column. The average percent particulate phase followed the sequence (%PCDDs/%PCDFs) Cl_1DFs (26) < Cl_2DD/Fs (38/47) < Cl_3DD/Fs (52/62) < Cl_4DD/Fs (80/76) < Cl_5DD/Fs (75/84) < Cl_6DD/Fs (79/86) < Cl_7DD/Fs (83/96) < OCDD/F (90/96). For the same number of chlorines per group, PCDDs were generally less associated with the particulate fraction, with the exception of Cl_4DD/Fs.

Air Samples. Atmospheric concentrations of PCDD/Fs varied strongly over the course of the sampling campaign,

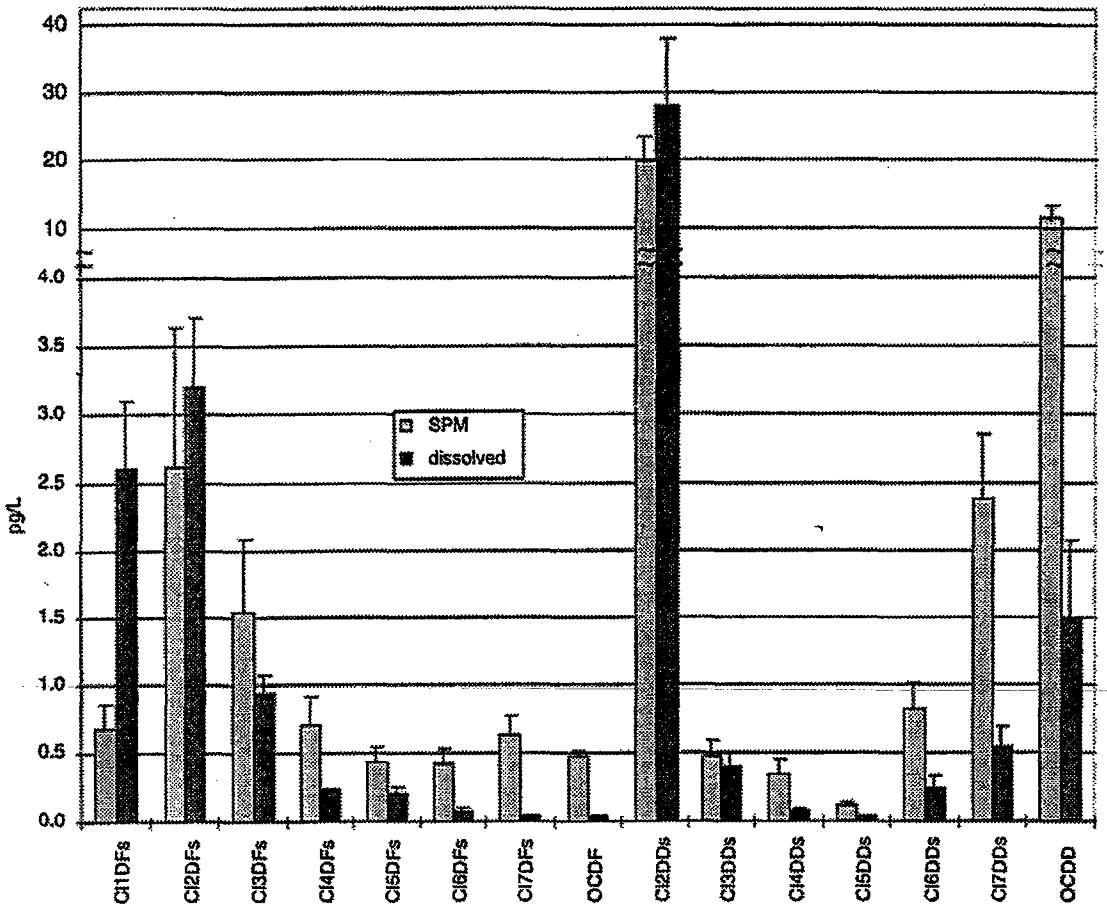

FIGURE 2. Mean PCDD/F homologue group concentrations in the particle and apparent dissolved phase in the Raritan Bay (in pg/L; note: broken *y*-axis).

TABLE 4: Atmospheric PCDD/F Concentrations and Field Blank (F.Bl.) Data in the Gaseous and the Particle-Bound Phase over Water on the Raritan Bay and the Hudson River (fg/m³)

homologue groups	gaseous phase					particle-bound phase				
	Raritan Bay			Hudson		Raritan Bay			Hudson	
	July 5	July 6	July 7	July 10	F.Bl.	July 5	July 6	July 7	July 10	F.Bl.
Cl_1DFs	1100	2000	750	890	9.1	21	18	16	19	13
Cl_2DFs	2000	2800	620	1400	10	36	26	20	23	19
Cl_3DFs	540	2100	190	820	0.9	20	29	9.2	19	1.7
Cl_4DFs	120	1400	57	170	0.6	21	53	7.4	19	1.0
Cl_5DFs	42	370	25	65	0.2	18	57	6.5	24	0.2
Cl_6DFs	13	50	7.8	24	0.5	18	58	10	39	0.6
Cl_7DFs	0.5	1.8	0.5	2.7	0.1	13	21	6.1	40	0.9
OCDF	1.2	1.4	1.3	2.5	0.4	7.4	5.1	2.2	40	0.9
Cl_2DDs	7300	6500	4200	7500	1.8	110	80	74	34	9.3
Cl_3DDs	90	230	33	160	0.6	9.0	4.4	5.7	3.6	0.4
Cl_4DDs	27	300	12	46	0.4	10	14	2.6	5.7	0.5
Cl_5DDs	5.4	140	2.7	4.2	1.0	5.4	23	1.8	4.2	0.1
Cl_6DDs	2.0	23	1.0	8.6	0.0	17	62	5.2	14	0.0
Cl_7DDs	2.1	2.0	2.3	2.1	0.9	34	36	9.0	41	1.2
OCDD	8.5	10	9.3	8.8	5.2	99	72	19	130	6.1
ΣTEQ	1.0	13	0.4	3.0	~0.1	2.5	7.2	1.1	3.4	~0.1

with $\Sigma Cl_{1-8}DD/Fs$ occurring at 12, 17, 6.1, and 12 pg/m³ (ΣTEQ 4.0, 21, 2.1, and 6.1 fg/m³), for the samples taken on July 5, 6, 7, and 10, respectively (see Table 4). The first and last sample were characterized by northwesterly winds from the heart of the urban-industrial area. The highest atmospheric concentrations derived from the NY metropolitan region (NE) on July 6, and the lowest concentration occurred under calm atmospheric conditions. Over-water ambient PCDD/F concentrations were dominated by the gaseous Cl_2DDs (4.2−7.6 pg/m³) and $Cl_{1-3}DFs$ (0.2−2.8 pg/m³). Concentrations of Cl_2-DDs were consistently high, regardless of the wind direction, whereas $Cl_{1-3}DFs$ varied strongly with wind direction (see Table 4). Compared to measurements in the U.K. and Ireland, the over-water samples in this study showed slightly higher concentrations of Cl_3DD/Fs, but Cl_2DDs were higher by a factor of ~50 (*32*). $Cl_{4-8}DD/Fs$ were low for samples taken close to a major urban/industrial conglomeration; similar concentrations have been reported for rural areas in the

United States (see ref *38* and references therein) at the end of the 1980s. The contribution to ΣTEQ was similar to that found in the apparent dissolved phase: Two congeners, namely 2,3,4,7,8-PeCDF and 2,3,7,8-TCDF, each contributed >10% to the ΣTEQ for all samples; 2,3,7,8-TCDD contributed >10% for the first and third sampling event.

Ambient Gas-Particle Distribution. Cl_{1-4}DD/Fs were <30% particle-associated, with Cl_{6-8}DD/Fs >50% in the apparent particle phase, consistent with other distribution studies reported for such warm periods (*38*) (%PCDDs/%PCDFs): Cl_1DFs (2) ~ Cl_2DD/Fs (2/2) < Cl_3DD/Fs (7/3) < Cl_4DD/Fs (15/10) < Cl_5DD/Fs (39/23) < Cl_6DD/Fs (77/58) < Cl_7DD/Fs (91/94) < OCDD/F (85/80). In contrast to their distribution in the water column, atmospheric PCDD/Fs were predominantly in the gaseous phase, and PCDDs had a higher particulate-bound fraction than PCDFs. The ambient ΣTEQ was evenly distributed between the two phases, with 35–61% occurring in the particle-bound fraction.

Partitioning in the Water Column. The calculation of net air–water exchange ratios for PCDD/Fs requires water concentrations in the truly dissolved phase. Differences between truly and "apparent" dissolved phase may be due to the passage of colloids/dissolved organic carbon through the GFF onto the XAD-column. Measurements of PCDD/Fs in the dissolved phase are also complicated because of the low levels of PCDD/Fs in water, in general, and low water solubilities, especially of the higher chlorinated PCDD/Fs. The extent to which the "dissolved" phase in the water is affected by partitioning to DOC is uncertain. The few studies on the aquatic fate of PCDD/Fs do not report detection of OCDD in the truly dissolved fraction, only associated with DOC (*39*). PCDD/Fs bound to DOC were not bioavailable (*40*) and would not be readily available for air–water exchange processes.

It is appropriate to first consider the potential importance of sampling artifacts. As expected, the fraction of particle-bound PCDD/Fs increased with increasing degree of chlorination (with the exception of Cl_4DDs, see above), pointing toward a good separation of the phases. Apparent (organic C normalized) partition coefficients (K_{oc}^{app}, in L/g) were calculated for the water samples using eq 1

$$K_{oc}^{app} = C_{SPM}/C^{app}_{diss}/f_{oc} \qquad (1)$$

where C_{SPM} is the PCDD/F particulate concentration (fg/g SPM), C^{app}_{diss} is the apparent dissolved concentration of PCDD/Fs (fg/L), and f_{oc} is the fractional organic carbon content in the SPM.

Investigations of the sorption of hydrophobic organic compounds onto natural sediments as summarized by Schwarzenbach et al. (*41* and references therein) demonstrate a linear relationship between K_{oc} and K_{ow} in the water column:

$$\log K_{oc} = \log K_{ow} - 0.21 \qquad (2)$$

Calculated K_{oc}^{app} values agreed within a factor of 2–5 with K_{oc} values predicted from eq 2 for the Cl_{1-4}DD/Fs. However, the K_{oc}^{app} values for the Cl_{5-8}DD/Fs were lower by an order of magnitude than the predicted values. We interpret this observation as suggestive of a sampling artifact for the Cl_{5-8}DD/Fs in the operational separation of dissolved and particulate phases.

A partitioning coefficient for PCDD/Fs onto DOC (K_{DOC}) is defined as

$$K_{DOC} = C_{DOC}/C_{diss} \qquad (3)$$

with C_{DOC} the concentration of PCDD/Fs bound to DOC (fg/g DOC) and C_{diss} the PCDD/F concentration in the truly dissolved phase (fg/L). Correcting for the amount of PCDD/Fs bound to DOC is problematic since there are no literature data available for PCDD/F-K_{DOC} values. However, K_{DOC} is about 5–10 times lower than K_{oc} values (*42, 43*). Freidig et al. reports a linear relationship between log K_{ow} and log K_{DOC} (*42*), with

$$\log K_{DOC} = 0.67 {*} \log K_{ow} + 1.46 \qquad (4)$$

Based on reported log K_{ow} values and our measured concentrations of [POC], [DOC], and apparent dissolved PCDD/F concentrations, the theoretical partitioning onto DOC, POC, and truly dissolved phase may be calculated. Thus c_{diss} and c_{DOC} were calculated and compared to c^{app}_{diss}. There was good agreement between the predicted and measured apparent dissolved phase for the higher chlorinated PCDFs, while c^{app}_{diss} were lower than predicted for Cl_{1-2}DFs by a factor of ~2–3 (see Figure 3). Cl_{2-4}DDs showed good agreement with the predicted concentrations, while Cl_{5-8}DDs had a ~50% higher concentration than predicted in c^{app}_{diss}. Clearly, the linear relationship between K_{DOC} and K_{ow} derived in eq 4 does not satisfactorily explain the partitioning of PCDD/Fs in the water column, as the calculated partitioning to DOC accounted for only ~50% of the Cl_{5-8}DDs detected in the c^{app}_{diss}. In particular, the high concentrations of OCDD in c^{app}_{diss} point toward a sampling artifact.

Air–Water Exchange. The direction of net air–water exchange may be determined by calculating dissolved/gas-phase fugacity ratios

$$fw/fa = \alpha = C_{diss} {*} H/C_{gas} {*} R {*} T \qquad (5)$$

where α is the fugacity ratio, *fw* and *fa* are the fugacities in water and air, respectively, *H* is Henry's law constant (HLC), *T* the temperature (K), and *R* the universal gas constant. Equilibrium between the atmospheric and dissolved phase yields α = 1. Net volatilization occurs when α >1 and deposition (i.e. absorption) when α < 1. HLCs at 298 K were used since air and water temperatures during the sampling campaign ranged only from 20 to 27 °C.

With few exceptions the calculated fugacity ratio values were >1, indicating net volatilization of PCDD/Fs from the HRE/RB (Figure 4). The exception was the second sampling event, characterized by high ambient air concentrations, when xa6w/xa6a ratios were <1 for the Cl_{3-6}DFs and Cl_{4-5}DDs. Fugacity ratios were highest for Cl_{6-8}DDs and OCDF with α >5–10, while Cl_{2-5}DD/Fs had α of up to 5–7.

Uncertainties in the calculation of the fugacity ratios stem from (i) the analytical precision in determining C_{diss} and C_{gas}; (ii) the operational separation of the dissolved phase; and (iii) the uncertainty in HLC values and their temperature-dependency. Our analytical precision was ~15% SD for the three water samples taken in Raritan Bay and comparable to what we presented earlier for five air samples taken concurrently (SD of ~10% for 700 m^3 each, ref *32*). We employed the appropriate HLC-values reported by Govers and Krop (*28*). However, there is on average a factor of 2 difference between values by Govers and Krop (*28*) and those recommended by Mackay et al. (*27*); the dominating quantifiable uncertainty for α stems from the HLCs. Hence, the uncertainty in the fugacity ratios will be on the order of ~2, as indicated by a gray shaded background in Figure 4. However, most fugacity ratios exceeded that uncertainty range, indicating net water-to-air exchange.

Evidence of the real importance of air-to-water exchange was the dominance of Cl_2DDs in both the apparent dissolved and gas phases and the high concentrations of lower chlorinated furans (and by direct evidence discussed in the next section). This is consistent with the types of chemical profiles observed for PCBs (*10, 14*) and PAHs (*15*). We note, however, that PCDD/Fs bound to particles undergo a net,

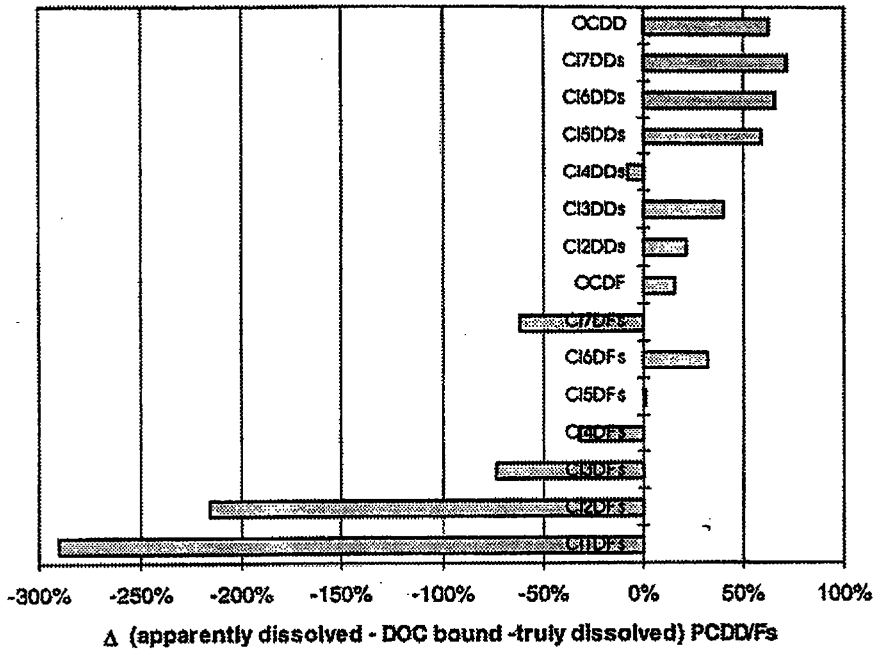

FIGURE 3. Difference between apparent dissolved PCDD/Fs and calculated truly dissolved and [DOC]-bound PCDD/Fs. A negative Δ value means that the calculated distribution accounted for more PCDD/Fs in the truly dissolved phase and [DOC]-bound than was detected in the apparent dissolved phase. A positive balance, e.g., for OCDD, means that the calculated distribution of PCDD/Fs in the truly dissolved phase and [DOC]-bound accounted for roughly half the amount of OCDD detected in the apparent dissolved phase.

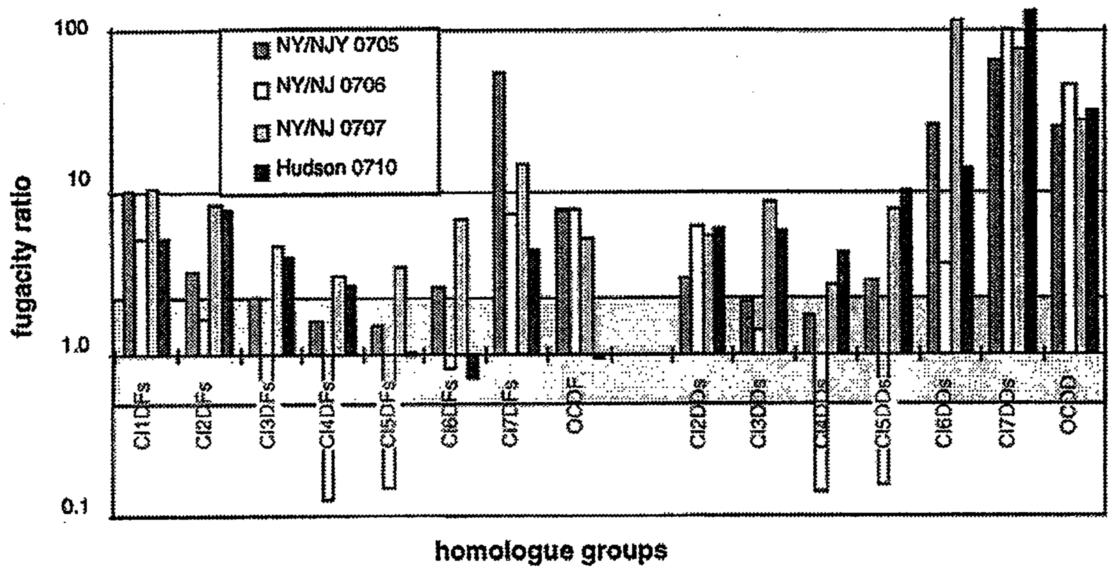

FIGURE 4. Water—air fugacity ratios for PCDD/F homologue groups for the Raritan Bay/Hudson River Estuary (gray shaded background indicates estimated uncertainty range for equilibrium, i.e., ± 100%).

one-dimensional flux into the water by means of wet and dry deposition.

Evidence for Net Outgassing from Measured Changes in the Gas Phase over the Raritan Bay. The fugacity ratios presented are strong evidence that lower chlorinated PCDD/Fs undergo a net gas-phase flux out of the water column during the study period. Further direct evidence comes from the air measurement program. Three sampling events are of interest in this discussion, taken on the day (0800–2000 h), night (2000–0800 h), and day (0800–2000 h) of July 10 and 11, 1999. With winds from the NW the air mass passed consecutively over the urban site, the lower Bay and the coastal site. We were therefore able to measure the changes in PCDD/F concentrations prior to (at LSC) and after crossing over the Bay (Sandy Hook). Back-trajectories showed the air mass moving to New York from the northwest and local wind readings were consistent at ~340°. The distance between the two land sites is ca. 30 km, which combined with wind speeds of 7.5, 5.0, and 7.6 m/s on the different events gave an average travel time of 1.1–1.6 h for the air masses between the sites. Comparing the PCDD/F profiles at the two sites relative to air–water exchange is valid if the following assumptions hold: (i) A well mixed air mass arrived at the urban sampling site. PCDD/F concentrations at the LSC site depended on the wind direction, suggestive that the site was not surrounded by major sources. (ii) PCDD/F air emissions were dominated locally by air–water exchange. Ambient air concentrations were generally low for the vicinity to the urban/industrial NY–NJ area, suggesting that even though additional sources cannot be ruled out they were minimal

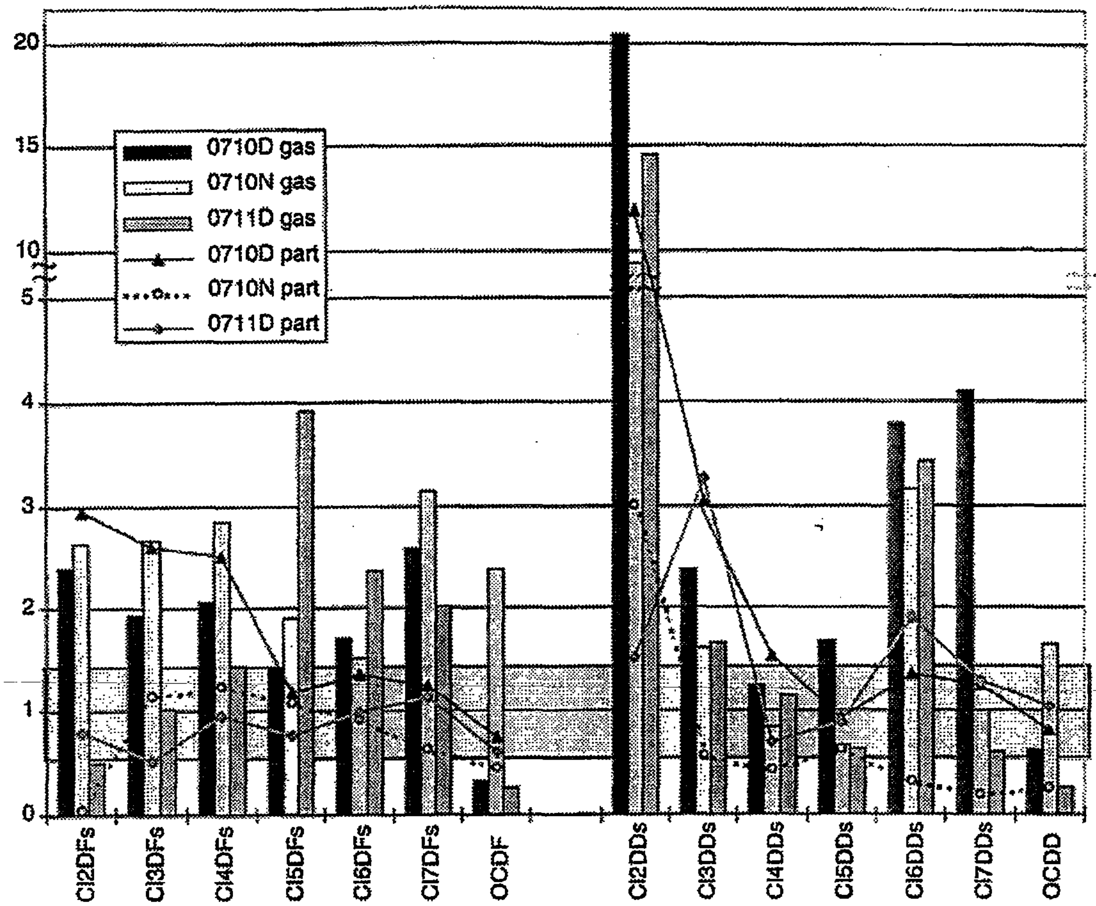

FIGURE 5. Ratios of observed changes in the gas phase and PCDD/Fs on particles at the coastal site over concentrations at the urban/industrial site (shaded gray area indicates estimated analytical uncertainty range, i.e., ± 40%; note: broken *y*-axis).

(*34*). (iii) The signal received at the coastal site reflects the air mass derived from the urban/industrial site following transport across the water. The coastal site was affected by a diurnal sea-breeze as a function of the relative temperature changes of land and ocean during the course of a day. This may have the effect of diluting the signal coming from the NY/NJ area with air from the ocean. (iv) Degradation/depletion reactions in the gas phase were negligible compared to the air–water exchange.

What would we expect to observe if our assumptions were true? It is hypothesized that (i) PCDD/Fs in the gas phase of the air mass would reflect the air–water exchange with the lower Bay, with increasing concentrations for the lower chlorinated congeners; (ii) total suspended particle (TSP) concentrations in the air would decrease due to deposition over the Bay; and (iii) particle-bound PCDD/F concentrations per g TSP would not be likely to vary significantly, depending on the kinetics of exchange from a modified gas phase.

The observed changes, expressed as the ratio of the concentrations measured at the coastal site over the urban/industrial site, are shown in Figure 5. Whereas most gas-phase PCDD/Fs ratios are >1, the predominantly particle-bound PCDD/Fs did not change much (ratios of ~1). The uncertainty in the ratios (±40%) is included as a gray shaded background which arises from the analytical uncertainty in determining ambient PCDD/Fs (estimated as a SD = 25%).

The key observations are as follows: (i) Highest Cl_2DD concentrations were found over water. This, together with the fugacity ratios, indicates net volatilization from the water surface. (ii) On the three events on July 10/11, gas-phase concentrations of $Cl_{2-7}DFs$ and $Cl_{2-6}DDs$ increased from the industrial to the coastal site. The $Cl_{4-5}DDs$ on the night of July 10, and Cl_5DDs and Cl_2DFs on the day of July 11, were exceptions to this (see Figure 5). (iii) TSP concentrations decreased from the urban to the coastal site, probably due to deposition of particles during transport across the Bay (data not shown). (iv) Concentrations of PCDD/Fs per g TSP increased for $Cl_{2-4}DD/Fs$ for the day time sample on July 10; for the other homologue groups and the other samples concentrations per g TSP remained roughly constant (see Figure 5). A priori the change in PCDD/F concentrations on particles in equilibrium with the gas depended on kinetic constraints. Based on our observations, wind speeds of 5–7.5 m/s were not sufficient to create significant marine aerosol, so that only deposition should have affected the TSP (see also ref *44*). If, however, there was sufficient enrichment of PCDD/Fs in the gas phase during the passage over the water, there would be a tendency for PCDD/Fs to partition onto particles to reach gas-particle equilibrium. (v) The Cl_2DDs were the homologue group with the greatest increases in the gas phase *and* the only homologue group with increasing concentrations in the particulate phase per g TSP for the three samples.

Together this provides support for the hypothesis that Raritan Bay acted as a net source of lower chlorinated PCDD/Fs to the local atmosphere during this sampling period. Particularly strong evidence stems from (i) the Cl_2DDs being most abundant over the water itself; (ii) the calculated fugacity ratios; (iii) the observed changes in the gas phase; and (iv) increasing concentrations on particles. Fugacities and observed changes point toward evaporation of a full range of PCDFs and many PCDDs as well, similar to the story for PCBs (*13–15*). However, uncertainties remain over the effective partitioning of PCDD/Fs in the water column and therefore about the "real" fugacities for mainly the higher chlorinated PCDD/Fs. If our observed changes in the gas phase reflect a true picture, then evaporation is a key process influencing PCDD/Fs up to $Cl_{6/7}$DD/F homologues. This is of course only part of the story, as dry and wet particle deposition of PCDD/Fs into the Bay also occurs. What is unknown at present is the origin of the PCDD/Fs in the water. Key possibilities are remobilization of PCDD/Fs from sediments or discharges into the Hudson–Raritan Bay area. Similarly the cause of the elevated concentrations of Cl_2DDs in the water and the atmosphere is unknown.

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New Brunswick Dioxin and Furan Data													
Sample Date	7/5/98 day	7/5/98 night	7/6/98 day	7/6/98 night	7/7/98 day	7/7/98 night	7/8/98 day	7/8/98 night	7/9/98 day	7/9/98 night	7/10/98 day	7/10/98 night	7/11/98 day
Sample Code	A0705D	A0705N	A0706D	A0706N	A0707D		A0708D	A0708N	A0709D	A0709N	A0710D	A0710N	A0711D
Phase (gas or particle)	gas	gas	gas	gas	gas		gas	gas	gas	gas	gas	gas	gas
Air volume(1000m3)	0.3628	0.3408	0.3373	0.3444	0.345		0.3311	0.3527	0.3766	0.3373	0.3384	0.3417	0.3441
Concentration Data in fg/m3													
2,3,7,8-TCDF	2.9	Samples	120	8.7	95.8	Sample	20	9.6	15	9.0	10	2.6	6.0
1,2,3,7,8-PeCDF	1.7	07/05/98 day	36	3.2	30.2	lost	4.3	3.2	8.0	3.6	5.1	1.7	3.1
2,3,4,7,8-PeCDF	0.9	and	26	2.5	11.9		2.2	1.4	4.9	2.8	3.5	0.6	1.7
1,2,3,4,7,8-HxCDF	0.6	07/05/98 night	4.0	0.8	1.1		ND	ND	2.1	1.3	2.1	1.1	1.8
1,2,3,6,7,8-HxCDF	0.6	are combined for the	3.5	0.7	1.4		0.5	0.5	1.9	1.2	1.5	0.5	0.9
1,2,3,7,8,9-HxCDF	ND	2,3,7,8 substituted congeners	ND	ND	ND		ND	0.3	ND	ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	0.4		ND	1.4	ND		0.7	ND	0.9	0.6	ND	1.2	0.8
1,2,3,4,6,7,8-HpCDF	ND	The Data	ND	0.6	ND		ND	ND	ND	1.0	ND	ND	ND
1,2,3,4,7,8,9-HpCDF	ND	is presented	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND
		in the											
2,3,7,8-TCDD	0.2	column	0.9	ND	0.7		0.6	ND	0.3	0.3	ND	ND	ND
1,2,3,7,8-PeCDD	ND	to the left!	2.8	0.6	1.2		ND	ND	0.8	0.8	ND	ND	ND
1,2,3,4,7,8-HxCDD	ND	←	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND
1,2,3,6,7,8-HxCDD	ND		ND	ND	ND		ND	ND	0.5	ND	ND	ND	ND
1,2,3,7,8,9-HxCDD	ND		ND	0.6	ND		ND	ND	ND	ND	ND	ND	ND
1,2,3,4,6,7,8-HpCDD	ND		ND	ND	ND		99	ND	ND	ND	ND	ND	ND
Mono-Furans	959	1148	4429	2416	9260		2463	1413	1652	3188	944	1335	1198
Di-Furans	476	849	6481	1030	11678		2624	1057	1379	1251	672	414	408
Tri-Furans	182	262	3780	456	4469		1113	465	522	420	295	135	171
Tetra-Furans	113	95	2057	214	1762		649	232	384	212	200	71	105
Penta-Furans	51	28	459	48	369		83	49	130	63	81	19	47
Hexa-Furans	16	5	47	9.0	21		7	7	29	15	21	6	14
Hepta-Furans	2	2	3	0.2	3		1	1	2	2	3	3	3
1,2,3,4,6,7,8-HpCDF	0.2	2	3	0.2	2		1	1	2	2	2	3	2
1,2,3,4,7,8,9-HpCDF	0.5	0.04	0.04	0.04	0.5		0.1	0.2	0.04	0.04	0.04	0.04	0.4
OCDF	3	0.8	2.5	2	2		1	0.5	1	0.5	0.5	0.5	1
Mono-Dioxins	3	6	30	19	40		13	11	17	23	8	14	9
Di-Dioxins	75	159	339	156	327		450	453	96	261	76	81	61
Tri-Dioxins	11	12	149	17	119		44	22	14	19	13	7	8
Tetra-Dioxins	9	8	211	24	173		50	26	29	30	16	6	15
Penta-Dioxins	7	3	78	10	56		11	7	20	13	11	4	9
Hexa-Dioxins	7	2	7	2	7		2	2	13	4	7	4	3
Hepta-Dioxins	9	1	2	2	11		2	1	7	3	9	3	5
1,2,3,4,6,7,8-HpCDD	4	1	2	1	5		1	1	4	2	3	2	2
OCDD	22	6	9	12	30		7	5	11	5	13	12	8
13C12 Recoveries (%)													
13C-2,8-DiCDF	60	28	53	77	54		59	56	74	78	65	65	63
13C-2,3,7,8-TCDF	69	49	64	89	70		81	75	72	86	62	78	76
13C-1,2,3,7,8-PeCDF	85	68	78	105	89		102	92	83	98	74	88	91
13C-2,3,4,7,8-PeCDF	82	73	81	110	97		105	99	85	101	77	94	92
13C-1,2,3,4,7,8-HxCDF	90	93	89	115	109		113	106	87	101	82	97	105
13C-1,2,3,6,7,8-HxCDF	90	93	89	115	109		113	106	87	101	82	97	105
13C-2,3,4,6,7,8-HxCDF	94	94	80	118	112		108	107	78	105	81	97	103
13C-1,2,3,7,8,9-HxCDF	98	95	83	120	119		111	95	92	108	92	102	109
13C-1,2,3,4,6,7,8-HpCDF	101	98	92	122	120		102	96	98	108	92	111	127
13C-1,2,3,4,7,8,9-HpCDF	99	89	90	125	114		97	82	89	108	80	101	115
13C-OCDF	93	80	89	113	122		72	68	90	98	81	104	109
13C-2,7-DiCDD	52	27	50	72	63		62	67	73	72	56	59	57
13C-2,3,7-TrCDD	62	43	59	79	63		83	78	75	78	58	66	66
13C-2,3,7,8-TCDD	62	27	26	56	55		67	37	84	73	66	71	69
13C-1,2,3,7,8-PeCDD	88	82	87	114	100		117	107	89	102	80	95	96
13C-1,2,3,4,7,8-HxCDD	93	96	91	117	115		113	107	89	103	83	95	105
13C-1,2,3,6,7,8-HxCDD	93	96	91	117	116		113	107	89	103	83	95	105
13C-1,2,3,7,8,9-HxCDD	102	92	97	124	115		119	108	96	121	93	108	115
13C-1,2,3,4,6,7,8-HpCDD	104	96	95	125	120		94	83	95	102	89	105	121
13C-OCDD	96	87	94	113	130		72	67	90	104	88	110	121
13C-2,3,7,8-TCDF	63	Sample Recoveries	70	89	70		76	76	74	71	64	78	76
13C-1,2,3,7,8-PeCDF	79	07/05/98 day	94	109	95		100	96	102	96	94	103	104
13C-2,3,4,7,8-PeCDF	72	and	83	101	84		85	86	82	76	75	86	84
13C-1,2,3,4,7,8-HxCDF	76	07/05/98 night	87	96	83		91	90	101	94	96	103	104
13C-1,2,3,6,7,8-HxCDF	76	are combined for the	89	99	88		91	92	99	91	95	103	106
13C-1,2,3,7,8,9-HxCDF	75	2,3,7,8 substituted congeners	67	71	63		78	72	117	105	103	119	116
13C-2,3,4,6,7,8-HxCDF	76		88	100	86		86	88	87	81	84	95	92
13C-1,2,3,4,6,7,8-HpCDF	81	←	60	54	52		72	70	141	137	142	152	160
13C-1,2,3,4,7,8,9-HpCDF	72		7	3	4		19		154	154	145		
13C-2,3,7,8-TCDD	51		29	57	51		57	36	75	70	65	76	71
13C-1,2,3,7,8-PeCDD	73		88	103	88		91	94	84	83	78	92	88
13C-1,2,3,4,7,8-HxCDD	76		91	108	93		91	95	89	86	87	99	96
13C-1,2,3,6,7,8-HxCDD	78		95	112	93		92	98	90	88	89	101	96
13C-1,2,3,7,8,9-HxCDD	79		101	114	94		107	101	90	103	88	97	99
13C-1,2,3,4,6,7,8-HpCDD	73		0.9	91			0.8		80	80	77	93	90

ND= not detected in samples

New Brunswick Dioxin and Furan Data													
Sample Date	7/5/98 day	7/5/98 night	7/6/98 day	7/6/98 night	7/7/98 day	7/7/98 night	7/8/98 day	7/8/98 night	7/9/98 day	7/9/98 night	7/10/98 day	7/10/98 night	7/11/98 day
Sample Code	A0705D	A0705N	A0706D	A0706N	A0707D		A0708D	A0708N	A0709D	A0709N	A0710D	A0710N	A0711D
Phase	particle	particle	particle	particle	particle		particle	particle	particle	particle	particle	particle	particle
Air volume(1000m3)	0.3628	0.3408	0.3373	0.3444	0.345		0.3311	0.3527	0.3766	0.3373	0.3364	0.3417	0.3441
Concentration Data in fg/m3													
2,3,7,8-TCDF	0.6	**Samples**	9.5	7.4	Sample	Sample	22	4.9	2.8	4.4	1.9	1.5	ND
1,2,3,7,8-PeCDF	0.9	**07/05/98 day**	11	4.8	not	lost	16	3.7	4.8	6.3	2.3	9.2	ND
2,3,4,7,8-PeCDF	0.8	**and**	22	5.5	Quantified		19	3.4	4.8	6.2	1.8	11	ND
1,2,3,4,7,8-HxCDF	1.0	**07/05/98 night**	16	3.5			8.7	4.0	7.1	11	2.8	44	6.2
1,2,3,6,7,8-HxCDF	0.9	**are combined for the**	14	3.4			7.4	2.9	6.3	11	2.9	28	5.8
1,2,3,7,8,9-HxCDF	ND	**2,3,7,8 substituted congeners**	3.2	ND			0.6	ND	0.8	ND	ND	2.0	ND
2,3,4,6,7,8-HxCDF	1.4		17	2.6			6.1	3.1	9.9	9.6	3.4	29	ND
1,2,3,4,6,7,8-HpCDF	ND	**The Data**	ND	ND			15	ND	33	ND	ND	178	ND
1,2,3,4,7,8,9-HpCDF	ND	**is presented**	ND	ND			ND	ND	ND	ND	ND	26	ND
		in the											
2,3,7,8-TCDD	0.1	**column**	0.7	0.5			0.4	ND	1.0	0.4	ND	0.5	ND
1,2,3,7,8-PeCDD	0.6	**to the left!**	2.9	2.5			2.6	1.4	1.4	2.6	1.1	1.5	ND
1,2,3,4,7,8-HxCDD	0.6	←	1.9	1.4			1.8	0.8	1.8	3.3	1.3	5.2	ND
1,2,3,6,7,8-HxCDD	1.1		6.6	3.3			4.3	1.8	2.8	6.5	1.7	13	ND
1,2,3,7,8,9-HxCDD	0.8		3.0	2.9			2.5	ND	1.7	5.7	2.0	8.1	ND
1,2,3,4,6,7,8-HpCDD	ND		40	30			ND	ND	18	62	28	100	ND
Mono-Furans	9	23	23	15	107		25	15	16	26	18	14	78
Di-Furans	15	21	30	28	9744		40	23	30	84	36	23	123
Tri-Furans	6	13	35	28	65		49	19	20	28	10	16	16
Tetra-Furans	10	32	98	76	81		189	41	31	57	19	46	12
Penta-Furans	10	36	121	74	267		180	44	45	64	22	110	22
Hexa-Furans	14	25	144	53	278		98	41	83	121	41	311	28
Hepta-Furans	12	23	54	27	19		27	24	51	99	39	292	0.21
1,2,3,4,6,7,8-HpCDF	6	13	31	13	32		14	9	30	53	20	175	10
1,2,3,4,7,8,9-HpCDF	1	ND	2	2	ND		1	1	4	8	3	33	ND
OCDF	6	10	12	11	12		10	7	25	53	22	127	6
Mono-Dioxins	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND
Di-Dioxins	4	8	8	8	32		22	9	14	12	7	7	30
Tri-Dioxins	1	2	4	3	3		3	3	5	2	1	4	4
Tetra-Dioxins	2	5	13	11	20		15	5	5	7	1	18	3
Penta-Dioxins	7	16	30	28	63		52	14	11	18	11	46	8
Hexa-Dioxins	9	50	106	42	105		34	20	35	56	17	147	24
Hepta-Dioxins	37	103	99	62	94		36	14	60	128	70	193	44
1,2,3,4,6,7,8-HpCDD	17	46	39	30	33		14	7	23	59	26	103	22
OCDD	100	155	210	116	278		56	38	80	278	156	232	126
13C12 Recoveries (%)													
13C-2,8-DiCDF	76	65	74	66	11		70	76	57	45	71	66	12
13C-2,3,7,8-TCDF	79	77	78	84	15		79	86	78	53	86	68	16
13C-1,2,3,7,8-PeCDF	90	85	82	95	20		96	96	95	59	88	79	19
13C-2,3,4,7,8-PeCDF	92	92	90	94	20		102	98	104	65	97	79	20
13C-1,2,3,4,7,8-HxCDF	89	88	82	98	20		97	89	109	64	88	76	22
13C-1,2,3,6,7,8-HxCDF	89	88	82	98	20		97	89	109	64	88	76	22
13C-2,3,4,6,7,8-HxCDF	89	87	82	98	17		95	86	107	64	88	77	21
13C-1,2,3,7,8,9-HxCDF	90	102	88	109	20		112	93	111	74	91	86	22
13C-1,2,3,4,6,7,8-HpCDF	95	102	83	114	18		111	93	136	74	91	87	22
13C-1,2,3,4,7,8,9-HpCDF	87	102	87	105	16		102	82	120	76	86	82	20
13C-OCDF	80	100	81	100	10		98	74	133	72	76	78	17
13C-2,7-DiCDD	72	68	73	62	11		68	73	66	42	65	65	13
13C-2,3,7-TrCDD	73	72	73	73	15		73	81	66	46	74	66	17
13C-2,3,7,8-TCDD	67	78	70	75	12		85	85	25	50	77	63	13
13C-1,2,3,7,8-PeCDD	98	95	95	106	22		103	102	109	63	89	82	21
13C-1,2,3,4,7,8-HxCDD	91	95	82	102	20		98	86	116	66	84	77	24
13C-1,2,3,6,7,8-HxCDD	91	95	82	102	20		98	86	116	66	84	77	24
13C-1,2,3,7,8,9-HxCDD	99	108	95	119	22		121	103	124	73	95	93	28
13C-1,2,3,4,6,7,8-HpCDD	91	103	95	113	15		109	86	131	77	90	79	22
13C-OCDD	85	106	90	110	11		105	76	140	73	78	79	19

ND = not detected in samples

Sandy Hook Dioxin and Furan Data													
Sample Date	7/5/98 day	7/5/98 night	7/6/98 day	7/6/98 night	7/7/98 day	7/7/98 night	7/8/98 day	7/8/98 night	7/9/98 day	7/9/98 night	7/10/98 day	7/10/98 night	7/11/98 day
Sample Code	RL697	RL692	RL681	RL633	RL717	RL708	RL718	RL719	RL720	RL667	RL656	RL670	RL722
Phase (gas or particle)	gas	gas	gas	gas	gas	gas	gas	gas+particle)	gas	gas	gas	gas	gas
Air volume(1000m3)	0.5014	0.4935	0.4487	0.2924	0.2758	0.5663	0.549	0.554	0.5339	0.5644	0.5467	0.5678	0.5418
Concentration Data in fg/m3													
2,3,7,8-TCDF	4.4	4.2	4.0	0.42	Samples	"See Column	"See Column	2.5	23	6.5	14	9.7	2.7
1,2,3,7,8-PeCDF	2.7	2.5	2.7	0.20	07/06/98 night,	7/6/98 night"	7/6/98 night"	1.2	10	5.1	5.6	3.2	1.4
2,3,4,7,8-PeCDF	1.2	1.7	1.4	0.15	07/07/98 day,			1.0	6.4	2.8	4.9	1.3	1.0
1,2,3,4,7,8-HxCDF	2.2	ND	1.9	0.14	07/07/98 night,			0.6	2.6	3.8	3.1	0.5	1.1
1,2,3,6,7,8-HxCDF	1.6	1.0	1.5	0.13	and 07/08/98 day			0.6	1.5	2.8	2.5	0.6	0.9
1,2,3,7,8,9-HxCDF	ND	ND	ND	ND	are combined for the			ND	ND	ND	0.25	ND	ND
2,3,4,6,7,8-HxCDF	0.97	0.92	1.3	0.26	2,3,7,8 substituted congeners			0.6	0.92	1.2	1.3	0.44	0.6
1,2,3,4,6,7,8-HpCDF	ND	ND	ND	0.22				0.9	ND	ND	2.3	ND	3.6
1,2,3,4,7,8,9-HpCDF	ND	ND	ND	ND	The Data			ND	ND	ND	ND	ND	ND
					is presented								
2,3,7,8-TCDD	ND	ND	ND	0.09	in the			ND	0.41	2	0.18	0.37	ND
1,2,3,7,8-PeCDD	ND	0.66	ND	0.11	column			0.2	ND	8	1.2	0.60	0.6
1,2,3,4,7,8-HxCDD	ND	ND	ND	ND	to the left			0.3	ND	9	0.89	ND	0.2
1,2,3,6,7,8-HxCDD	ND	ND	ND	ND	←			ND	ND	12	1.2	ND	0.6
1,2,3,7,8,9-HxCDD	ND	ND	ND	ND				0.3	0.29	7	ND	ND	0.5
1,2,3,4,6,7,8-HpCDD	0.66	0.57	ND	ND				0.3	ND	24	ND	ND	ND
Mono-Furans	714	2695	486	707	353	658	467	909	1830	1617	697	2068	760
Di-Furans	773	1493	613	448	314	487	465	735	2683	1228	1698	1560	702
Tri-Furans	240	337	207	110	99	110	114	211	1149	361	626	586	224
Tetra-Furans	97	156	88	36	29	20	26	66	461	183	270	205	83
Penta-Furans	46	65	32	14	10	11	9	16	132	78	93	47	33
Hexa-Furans	21	16	17	8	3	4	4	4	27	49	33	8	13
Hepta-Furans	2	3	2	3	1	1	1	1	4	15	3	1	2
1,2,3,4,6,7,8-HpCDF	2	2	2	1	1	1	0.3	0.4	2	5	1	1	2
1,2,3,4,7,8,9-HpCDF	0.04	0.3	0.04	0.04	0.04	0.2	0.04	0.05	0.04	0.3	0.04	0.04	0.04
OCDF	1	2	0.5	2	2	2	0.5	0.6	2	2	0.54	0.47	2
Mono-Dioxins	5	22	5	7	2	3	3	8	5	22	8	14	4
Di-Dioxins	926	3879	1308	987	1349	2721	2023	1413	1623	1389	3410	1926	3137
Tri-Dioxins	19	39	19	16	15	24	20	20	30	40	44	32	33
Tetra-Dioxins	9	15	7	5	4	6	4	11	27	53	25	19	13
Penta-Dioxins	5	4	6	3	2	2	1	3	13	84	15	7	6
Hexa-Dioxins	4	4	4	3	1	2	1	1	3	160	19	3	6
Hepta-Dioxins	3	3	2	4	7	2	1	0.4	6	60	6	1	3
1,2,3,4,6,7,8-HpCDD	1	1	1	2	3	1	1	0.4	2	22	3	1	2
OCDD	6	12	3	17	49	5	3	4	29	32	5	3	11
13C12 Recoveries (%)													
13C-2,8-DiCDF	96	89	102	96	95	101	99	98	68	98	100	99	90
13C-2,3,7,8-TCDF	71	58	60	69	69	67	68	73	48	72	72	83	60
13C-1,2,3,7,8-PeCDF	78	72	77	92	76	81	79	80	57	79	87	92	71
13C-2,3,4,7,8-PeCDF	87	63	100	109	87	95	88	89	67	95	104	106	80
13C-1,2,3,4,7,8-HxCDF	92	87	106	114	91	98	89	93	67	98	101	103	85
13C-1,2,3,6,7,8-HxCDF	96	91	117	116	98	105	104	96	75	104	108	108	92
13C-2,3,4,6,7,8-HxCDF	96	91	117	116	98	105	104	96	75	104	108	108	92
13C-1,2,3,7,8,9-HxCDF	101	95	120	118	99	107	111	99	71	101	110	108	99
13C-1,2,3,4,6,7,8-HpCDF	110	99	128	120	109	122	120	114	75	107	100	107	106
13C-1,2,3,4,7,8,9-HpCDF	104	95	111	95	112	111	110	104	76	110	112	111	102
13C-OCDF	103	98	115	83	110	117	108	108	75	101	103	99	104
13C-2,7-DiCDD	98	89	102	96	95	101	99	98	68	96	100	99	90
13C-2,3,7-TrCDD	83	70	67	67	75	71	82	84	59	75	79	87	70
13C-2,3,7,8-TCDD	79	71	70	95	80	77	77	81	69	75	81	88	72
13C-1,2,3,7,8-PeCDD	77	68	67	60	50	83	87	87	28	78	83	83	61
13C-1,2,3,4,7,8-HxCDD	104	94	106	116	100	114	101	102	77	100	104	103	91
13C-1,2,3,6,7,8-HxCDD	103	96	119	112	107	110	114	106	75	104	109	103	103
13C-1,2,3,7,8,9-HxCDD	103	96	119	112	107	110	114	106	75	104	109	103	103
13C-1,2,3,4,6,7,8-HpCDD	110	99	137	119	123	120	126	114	84	112	113	112	114
13C-OCDD	108	104	112	86	110	116	108	105	78	105	110	105	105
13C-2,3,7,8-TCDF	91	85	80	99					69	80	87	87	
13C-1,2,3,7,8-PeCDF	93	82	91	111					87	94	96	93	
13C-2,3,4,7,8-PeCDF	102	94	96	101					76	92	95	93	
13C-1,2,3,4,7,8-HxCDF	78	32	103	105					82	94	95	91	
13C-1,2,3,6,7,8-HxCDF	85	46	102	110					83	96	96	92	
13C-1,2,3,7,8,9-HxCDF	48	4	117	110					72	94	94	95	
13C-2,3,4,6,7,8-HxCDF	96	67	98	97					76	96	95	94	
13C-1,2,3,4,6,7,8-HpCDF	22	0	153	119					89	98	99	100	
13C-1,2,3,4,7,8,9-HpCDF	3	12		75							85	101	
13C-2,3,7,8-TCDD	74	69	67	82					29	82	85	82	
13C-1,2,3,7,8-PeCDD	95	89	69	111					78	97	101	98	
13C-1,2,3,4,7,8-HxCDD	98	86	93	104					78	99	100	98	
13C-1,2,3,6,7,8-HxCDD	97	89	94	102					78	96	98	95	
13C-1,2,3,7,8,9-HxCDD	96	91	95	96					87	112	122	110	
13C-1,2,3,4,6,7,8-HpCDD	86	59	95	88					80	97	95	92	

ND = not detected in samples

Sandy Hook Dioxin and Furan Data													
Sample Date	7/5/98 day	7/5/98 night	7/6/98 day	7/6/98 night	7/7/98 day	7/7/98 night	7/8/98 day	7/8/98 night	7/9/98 day	7/9/98 night	7/10/98 day	7/10/98 night	7/11/98 day
Sample Code	B0705D	B0705N	B0706D	B0706N	B0707D	B0707N	B0708D	B0708N	B0709D	B0709N	B0710D	B0710N	B0711D
Phase (gas or particle)	part	part	part	part	part	part	part	gas+particle	part	part	part	part	gas+particle
Air volume(1000m3)	0.5014	0.4935	0.4467	0.2924	0.2758	0.5663	0.549	0.554	0.5339	0.5644	0.5467	0.5678	0.5418
Concentration Data in fg/m3													
2,3,7,8-TCDF	ND	ND	ND	0.1	Samples	"See Column	"See Column	2.5	2.2	2.1	2.6	ND	2.7
1,2,3,7,8-PeCDF	0.9	2.1	1.5	0.1	07/06/98 night,	7/6/98 night"	7/6/98 night"	1.2	3.0	3.4	2.4	2.5	1.4
2,3,4,7,8-PeCDF	ND	1.9	ND	0.1	07/07/98 day,			1.0	4.7	3.4	2.4	3.7	1.0
1,2,3,4,7,8-HxCDF	ND	3.7	1.7	0.1	07/07/98 night,			0.6	5.2	8.8	3.5	4.9	1.1
1,2,3,6,7,8-HxCDF	1.2	3.3	2.2	0.1	and 07/08/98 day			0.6	3.6	6.8	2.9	3.6	0.9
1,2,3,7,8,9-HxCDF	ND	ND	ND	ND	are combined for the			ND	ND	1.6	ND	ND	ND
2,3,4,6,7,8-HxCDF	1.3	3.5	3.3	0.2	2,3,7,8 substituted congeners			0.6	6.1	9.4	3.0	4.8	0.8
1,2,3,4,6,7,8-HpCDF	ND	ND	ND	ND				0.9	18.6	66.0	16.5	ND	3.5
1,2,3,4,7,8,9-HpCDF	ND	ND	ND	ND	The Data			ND	ND	ND	ND	1.9	ND
					is presented								
2,3,7,8-TCDD	ND	ND	ND	ND	in the			ND	ND	ND	ND	ND	ND
1,2,3,7,8-PeCDD	ND	0.4	ND	0.1	column			0.2	0.1	3.5	0.8	0.8	0.6
1,2,3,4,7,8-HxCDD	ND	1.4	ND	ND	to the left!			0.3	0.8	11	1.3	1.2	0.2
1,2,3,6,7,8-HxCDD	ND	2.3	ND	0.04	←			ND	0.8	16	2.3	2.2	0.6
1,2,3,7,8,9-HxCDD	ND	2.3	ND	ND				0.3	1.6	22	1.8	1.3	0.5
1,2,3,4,6,7,8-HpCDD	4.3	17.8	ND	0.1				0.3	1.4	699	25.5	19.6	ND
Mono-Furans	12	14	15	8	11	6	6	8	11	13	15	15	10
Di-Furans	10	14	13	14	11	4	5	10	11	14	15	12	9
Tri-Furans	7	13	8	6	4	3	3	10	11	14	13	11	4
Tetra-Furans	7	22	6	7	3	2	1	16	22	24	24	18	6
Penta-Furans	6	26	4	3	1	1	2	16	34	41	17	27	6
Hexa-Furans	10	39	9	4	4	3	2	7	45	80	33	35	9
Hepta-Furans	12	25	10	1	2	1	3	7	29	166	34	25	10
1,2,3,4,6,7,8-HpCDF	6	12	6	1	1	1	1	4	16	61	16	14	6
1,2,3,4,7,8,9-HpCDF	1	2	ND	0.13	ND	ND	0.12	0.49	2	10	2	2	0.36
OCDF	5	9	5	ND	ND	1	1	3	14	154	16	12	5
Mono-Dioxins													
Di-Dioxins	11	13	16	7	12	22	8	11	6	12	15	10	17
Tri-Dioxins	1	1	0	1	0.49	1	1	1	1	1	2	1	3
Tetra-Dioxins	1	1	2	6	1	1	1	2	2	3	3	2	1
Penta-Dioxins	2	3	1	1	2	0.38	0.25	3	9	21	3	6	2
Hexa-Dioxins	6	19	4	2	ND	2	1	6	20	173	20	23	10
Hepta-Dioxins	26	39	23	3	5	1	2	12	24	1338	50	40	25
1,2,3,4,6,7,8-HpCDD	11	17	10	2	3	1	1	6	11	729	22	19	11
OCDD	72	65	47	30	16	7	6	33	56	3615	115	91	66
13C12 Recoveries (%)													
13C-2,8-DiCDF	57	69	62	49	54	62	83	36	78	91	81	74	60
13C-2,3,7,8-TCDF	72	78	72	68	75	75	98	35	96	103	89	85	77
13C-1,2,3,7,8-PeCDF	93	91	86	83	100	87	111	37	113	116	103	101	86
13C-2,3,4,7,8-PeCDF	99	95	87	85	97	93	110	46	111	112	103	98	92
13C-1,2,3,4,7,8-HxCDF	104	104	94	83	117	97	120	37	120	117	110	104	97
13C-1,2,3,6,7,8-HxCDF	104	104	94	83	117	97	120	37	120	117	110	104	97
13C-2,3,4,6,7,8-HxCDF	102	107	90	85	112	102	125	51	115	121	106	106	102
13C-1,2,3,7,8,9-HxCDF	113	112	95	83	120	115	104	56	115	125	109	104	109
13C-1,2,3,4,6,7,8-HpCDF	96	115	97	71	105	108	117	35	125	122	118	111	105
13C-1,2,3,4,7,8,9-HpCDF	98	115	87	62	110	104	117	44	115	117	105	103	103
13C-OCDF	86	107	79	50	88	91	120	33	116	122	97	100	92
13C-2,7-DiCDD	59	75	61	49	58	68	86	54	78	90	81	71	67
13C-2,3,7-TrCDD	64	77	65	68	63	71	92	35	86	97	86	80	71
13C-2,3,7,8-TCDD	64	57	64	48	67	85	92	27	80	93	83	69	87
13C-1,2,3,7,8-PeCDD	99	103	88	89	101	101	115	45	116	116	104	103	101
13C-1,2,3,4,7,8-HxCDD	104	114	94	82	116	108	124	45	117	115	109	104	106
13C-1,2,3,6,7,8-HxCDD	104	114	94	82	116	108	124	45	117	115	109	104	106
13C-1,2,3,7,8,9-HxCDD	118	128	101	94	112	119	125	59	123	125	120	111	117
13C-1,2,3,4,6,7,8-HpCDD	97	116	89	66	104	107	121	42	121	120	110	107	104
13C-OCDD	84	110	81	51	93	96	129	35	117	124	108	104	95

ND = not detected in samples

Liberty Science Center Dioxin and Furan Data														
Sample Date	7/5/98 day	7/5/98 night	7/6/98 day	7/6/98 night	7/7/98 day	7/7/98 night	7/8/98 day	7/8/98 night	7/9/98 day	7/9/98 night	7/10/98 day	7/10/98 day	7/10/98 night	7/11/98 day
Sample Code	C0705D	C0705N	C0706D	C0706N	C0707D	C0707N	C0708D	C0708N	C0709D	C0709N	C0710D	C0710D	C0710N	C0711D
Phase (gas or particle)	gas	gas	gas	gas	gas	gas	gas	gas	gas	gas	gas (top of split PUF)	gas (bottom of split PUF)	gas	gas
Air volume(1000m3)	0.5224	0.6497	0.5416	0.6329	0.5344	0.5344	0.5356	0.5601	0.5298	0.5777	0.5325	0.5325	0.5527	0.0579
Concentration Data in fg/m3														
2,3,7,8-TCDF	6.5	Sample	9.5	0.8	Samples	"See Column	"See Column	5.1	13.4	8.6	4.3	ND	2.3	ND
1,2,3,7,8-PeCDF	4.1	not	7.0	0.4	07/06/98 night,	7/6/98 night"	7/6/98 night"	3.1	11.6	6.0	3.7	ND	1.7	ND
2,3,4,7,8-PeCDF	2.5	Quantified	4.4	0.2	07/07/98 day,			1.1	5.8	2.8	1.6	ND	0.3	ND
1,2,3,4,7,8-HxCDF	1.7		2.4	0.2	07/07/98 night,			ND	3.2	1.4	1.8	ND	ND	ND
1,2,3,6,7,8-HxCDF	1.8		2.5	0.2	and 07/08/98 day			0.5	2.9	1.2	1.2	ND	0.3	ND
1,2,3,7,8,9-HxCDF	ND		ND	ND	are combined for the			ND	ND	ND	ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	0.3		1.0	0.2	2,3,7,8 substituted congeners			ND	0.8	0.6	0.6	0.51	0.3	ND
1,2,3,4,6,7,8-HpCDF	ND		ND	ND				ND	ND	ND	ND	ND	0.3	ND
1,2,3,4,7,8,9-HpCDF	ND		ND	ND	The Data			ND	ND	ND	ND	ND	ND	ND
					is presented									
2,3,7,8-TCDD	ND		0.6	ND	in the			1.3	ND	1.3	ND	ND	ND	ND
1,2,3,7,8-PeCDD	0.8		1.6	0.2	column			0.6	2.2	1.3	0.8	ND	0.9	ND
1,2,3,4,7,8-HxCDD	0.3		ND	ND	to the left!			ND	ND	ND	ND	ND	ND	ND
1,2,3,6,7,8-HxCDD	0.7		ND	0.1	←			ND	1.1	ND	ND	ND	ND	ND
1,2,3,7,8,9-HxCDD	ND		ND	0.1				ND	ND	ND	ND	ND	ND	ND
1,2,3,4,6,7,8-HpCDD	ND		ND	ND				ND	ND	ND	ND	ND	ND	2.6
Mono-Furans	2145	2325	2021	1419	1214	1346	2057	2362	2955	3893	314	268.2	1248	5725
Di-Furans	1550	1253	2030	1075	905	922	967	1386	3363	2094	709	236.9	692	1418
Tri-Furans	381	371	550	300	235	241	264	542	970	795	323	11.6	219	221
Tetra-Furans	148	193	231	83	69	68	89	226	438	311	130	0.9	72	57
Penta-Furans	68	89	102	30	33	23	30	46	139	105	65	0.2	25	9
Hexa-Furans	25	18	30	9	12	9	8	6	33	21	19	0.2	5	5
Hepta-Furans	2	1	1	1	2	4	1	1	2	1	1	0.02	0.3	1
1,2,3,4,6,7,8-HpCDF	1	1	1	1	1	2	1	0.5	1	1	1	0.1	0.3	0.2
1,2,3,4,7,8,9-HpCDF	0.04	0.04	0.04	0.04	1	0	0.04	0.09	0.04	0.04	0.2	ND	0.04	1
OCDF	0.5	1	0.6	1	0	2	0.5	0.5	0.6	1	2	0.4	0.3	6
Mono-Dioxins	16	23	21	15	7	18	18	26	25	14	2	0.9	9	37
Di-Dioxins	281	562	1231	2524	1401	2008	1110	1065	257	880	169	17.1	225	215
Tri-Dioxins	21	37	43	43	29	38	35	67	47	40	19	0.5	20	20
Tetra-Dioxins	17	38	42	16	11	13	25	55	61	33	20	0.2	22	11
Penta-Dioxins	7	24	28	6	5	9	17	16	23	3	9	ND	10	9
Hexa-Dioxins	6	4	11	3	3	13	8	2	10	5	5	0.1	1	2
Hepta-Dioxins	3	2	2	1	3	14	2	1	2	1	2	1.0	1	6
1,2,3,4,6,7,8-HpCDD	1	1	1	1	1	6	1	0.4	1	1	1	0.6	0.5	3
OCDD	5	12	6	4	6	45	3	3	26	3	7	ND	3	41
13C12 Recoveries (%)														
13C-2,8-DiCDF	73	60	58	60	60	62	62	68	68	65	53	53	58	62
13C-2,3,7,8-TCDF	80	72	70	77	77	75	73	80	81	73	70	66	79	71
13C-1,2,3,7,8-PeCDF	89	84	81	92	86	82	86	93	100	84	81	81	89	86
13C-2,3,4,7,8-PeCDF	93	88	91	97	93	90	95	98	105	90	87	80	99	89
13C-1,2,3,4,7,8-HxCDF	96	93	108	117	102	90	112	100	121	107	106	89	115	96
13C-1,2,3,6,7,8-HxCDF	96	93	108	117	102	90	112	100	121	107	106	89	115	96
13C-2,3,4,6,7,8-HxCDF	100	97	109	115	114	93	113	105	132	110	106	86	120	98
13C-1,2,3,7,8,9-HxCDF	114	108	112	119	124	98	121	112	129	115	106	84	116	103
13C-1,2,3,4,6,7,8-HpCDF	104	95	100	104	112	94	105	105	112	95	97	96	108	103
13C-1,2,3,4,7,8,9-HpCDF	107	98	110	118	120	96	115	110	117	112	109	90	119	105
13C-OCDF	101	101	121	124	109	96	118	110	101	119	121	92	126	107
13C-2,7-DiCDD	82	71	65	71	72	71	67	77	76	60	59	55	67	66
13C-2,3,7-TrCDD	81	69	67	76	73	74	71	78	75	69	66	62	74	71
13C-2,3,7,8-TCDD	71	74	70	45	81	77	73	79	57	75	38	37	33	71
13C-1,2,3,7,8-PeCDD	103	94	102	112	103	92	114	105	109	103	102	83	111	96
13C-1,2,3,4,7,8-HxCDD	103	99	118	125	114	94	121	106	126	119	119	88	126	98
13C-1,2,3,6,7,8-HxCDD	103	99	118	125	114	94	121	106	126	119	119	88	126	98
13C-1,2,3,7,8,9-HxCDD	110	109	111	121	126	101	118	112	133	113	114	90	123	102
13C-1,2,3,4,6,7,8-HpCDD	109	103	114	116	114	97	110	110	114	109	109	95	117	107
13C-OCDD	108	106	126	134	110	104	126	117	100	125	125	92	130	116
13C-2,3,7,8-TCDF	94		93	84	Sample Recoveries			97	88	91	90	75	92	87
13C-1,2,3,7,8-PeCDF	113		116	91	07/06/98 night,			123	101	125	113	93	113	95
13C-2,3,4,7,8-PeCDF	100		101	88	07/07/98 day,			106	100	101	97	95	98	95
13C-1,2,3,4,7,8-HxCDF	103		104	55	07/07/98 night,			108	102	100	98	102	101	99
13C-1,2,3,6,7,8-HxCDF	105		107	67	and 07/08/98 day			109	106	99	101	106	103	101
13C-1,2,3,7,8,9-HxCDF	103		105	19	are combined for			111	102	104	95	83	94	99
13C-2,3,4,6,7,8-HxCDF	102		105	67	2,3,7,8 substituted congeners			110	108	102	100	85	100	102
13C-1,2,3,4,6,7,8-HpCDF	108		113	5				110	114	104	110	108	108	104
13C-1,2,3,4,7,8,9-HpCDF	103		113	0.05	←			104		99		73	111	91
13C-2,3,7,8-TCDD	78		79	68				83	58	85	39	39	34	74
13C-1,2,3,7,8-PeCDD	101		103	93				108	101	96	99	97	98	98
13C-1,2,3,4,7,8-HxCDD	107		109	88				112	111	101	101	107	99	104
13C-1,2,3,6,7,8-HxCDD	107		105	90				112	113	102	99	107	99	102
13C-1,2,3,7,8,9-HxCDD	123		104	84				130	122	103	100	105	101	122
13C-1,2,3,4,6,7,8-HpCDD	108		110	60				114	117	104	102	85	107	107

ND = not detected in samples

Liberty Science Center Dioxin and Furan Data

Sample Date	7/5/98 day	7/5/98 night	7/6/98 day	7/6/98 night	7/7/98 day	7/7/98 night	7/8/98 day	7/8/98 night	7/9/98 day	7/9/98 night	7/10/98 day	7/10/98 night	7/11/98 day
Sample Code	C0705D	C0705N	C0706D	C0706N	C0707D	C0707N	C0708D	C0708N	C0709D	C0709N	C0710D	C0710N	C0711D
Phase (gas or particle)	particle	particle	particle	particle	particle	particle	particle	particle	particle	particle	particle	particle	particle
Air volume(1000m3)	0.5224	0.5497	0.5415	0.5329	0.5344	0.5344	0.5356	0.5601	0.5298	0.5777	0.5325	0.5527	0.0579
Concentration Data in fg/m3													
2,3,7,8-TCDF	0.9	1.6	1.5	0.2	**Samples**	"See Column	"See Column	2.4	2.4	2.4	1.2	1.1	2.8
1,2,3,7,8-PeCDF	0.7	3.2	2.5	0.2	**07/06/98 night,**	7/6/98 night"	7/6/98 night"	3.9	4.4	4.7	2.4	2.6	4.1
2,3,4,7,8-PeCDF	1.2	5.2	2.1	0.2	**07/07/98 day,**			3.5	5.6	5.0	2.1	2.2	2.9
1,2,3,4,7,8-HxCDF	1.6	9.5	4.6	0.4	**07/07/98 night,**			3.5	14.4	9.7	6.6	4.8	8.4
1,2,3,6,7,8-HxCDF	1.3	9.3	4.0	0.4	**and 07/08/98 day**			3.2	9.2	8.1	3.6	3.3	2.9
1,2,3,7,8,9-HxCDF	ND	1.0	ND	ND	**are combined for the**			ND	0.9	1.2	ND	ND	ND
2,3,4,6,7,8-HxCDF	2.1	12.7	5.4	0.4	**2,3,7,8 substituted congeners**			3.3	13.5	7.3	3.3	3.6	4.4
1,2,3,4,6,7,8-HpCDF	10.9	36.8	24.2	1.7				15.8	66.1	43.2	38.3	22.2	ND
1,2,3,4,7,8,9-HpCDF	ND	ND	1.8	0.1	**The Data**			ND	ND	ND	ND	ND	ND
					is presented								
2,3,7,8-TCDD	ND	ND	ND	ND	**in the**			0.5	0.2	0.6	ND	ND	1.9
1,2,3,7,8-PeCDD	0.4	2.3	1.3	0.2	**column**			4.9	1.2	2.5	0.8	1.7	ND
1,2,3,4,7,8-HxCDD	0.9	3.7	2.3	0.3	**to the left!**			8.5	2.2	2.8	1.4	2.3	ND
1,2,3,6,7,8-HxCDD	1.4	6.8	4.3	0.5	←			17.4	5.1	6.0	3.7	7.4	ND
1,2,3,7,8,9-HxCDD	1.0	4.7	4.0	0.5				14.4	4.4	4.8	2.6	6.4	5.8
1,2,3,4,6,7,8-HpCDD	ND	53.9	47.9	5.7				265.7	45.1	ND	ND	99.1	ND
Mono-Furans	14	15	22	11	7	11	13	15	16	21	10	10	60
Di-Furans	28	16	1685	7	9	5	8	50	16	20	11	260	56
Tri-Furans	5	12	13	6	7	5	6	16	19	22	11	11	45
Tetra-Furans	6	23	15	7	7	8	9	36	35	44	21	16	34
Penta-Furans	12	44	27	17	10	12	16	43	56	64	31	27	44
Hexa-Furans	19	92	49	24	18	15	23	41	114	105	53	43	50
Hepta-Furans	18	68	39	13	14	10	18	34	106	81	60	44	46
1,2,3,4,6,7,8-HpCDF	8	37	22	7	7	5	8	15	65	39	35	21	30
1,2,3,4,7,8,9-HpCDF	ND	5	2	0.4	1	1	1	2	7	7	2	3	ND
OCDF	11	31	14	4	7	5	13	21	58	37	47	31	46
Mono-Dioxins	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-Dioxins	5	6	15	13	14	12	9	9	3	9	3	4	57
Tri-Dioxins	1	1	1	1	1	1	1	2	1	2	1	1	4
Tetra-Dioxins	2	5	3	2	3	2	3	12	13	9	4	6	11
Penta-Dioxins	2	14	10	5	3	3	8	33	12	16	7	11	9
Hexa-Dioxins	11	78	57	12	12	11	60	172	54	65	32	79	28
Hepta-Dioxins	38	110	113	16	32	15	141	463	92	122	88	218	102
1,2,3,4,6,7,8-HpCDD	15	51	41	7	12	7	62	260	44	58	41	110	46
OCDD	93	150	220	32	83	28	238	574	220	243	312	379	337
13C12 Recoveries (%)													
13C-2,8-DiCDF	65	52	58	61	59	71	68	63	62	69	50	49	57
13C-2,3,7,8-TCDF	85	68	77	80	72	84	78	77	74	80	75	61	71
13C-1,2,3,7,8-PeCDF	104	82	94	97	85	92	90	91	89	90	92	75	89
13C-2,3,4,7,8-PeCDF	106	87	97	101	96	97	96	101	103	98	103	83	102
13C-1,2,3,4,7,8-HxCDF	118	92	110	105	107	97	97	114	113	99	122	99	113
13C-1,2,3,6,7,8-HxCDF	118	92	110	105	107	97	97	114	113	99	122	99	113
13C-2,3,4,6,7,8-HxCDF	115	95	111	106	107	96	96	114	111	98	125	100	113
13C-1,2,3,7,8,9-HxCDF	126	91	119	117	98	112	116	123	120	113	118	92	102
13C-1,2,3,4,6,7,8-HpCDF	104	93	98	109	99	104	103	106	109	105	117	93	109
13C-1,2,3,4,7,8,9-HpCDF	107	96	103	114	104	106	107	118	121	107	132	100	115
13C-OCDF	98	100	94	113	122	106	105	127	130	110	142	116	129
13C-2,7-DiCDD	70	55	62	70	61	78	74	65	63	78	55	55	62
13C-2,3,7-TrCDD	74	63	70	74	69	80	76	73	71	77	66	59	68
13C-2,3,7,8-TCDD	75	54	67	76	41	81	80	70	37	79	28	24	23
13C-1,2,3,7,8-PeCDD	107	91	99	108	106	104	104	117	120	102	115	94	117
13C-1,2,3,4,7,8-HxCDD	118	97	104	110	118	99	100	125	122	102	138	109	126
13C-1,2,3,6,7,8-HxCDD	118	97	104	110	118	99	100	125	122	102	138	109	126
13C-1,2,3,7,8,9-HxCDD	119	102	111	121	105	112	117	127	126	114	134	102	115
13C-1,2,3,4,6,7,8-HpCDD	103	102	102	116	114	105	105	122	122	111	131	105	118
13C-OCDD	98	102	91	117	128	112	110	140	133	113	149	119	129

ND = not detected in samples

R/V Walford (air samples) Dioxin and Furan Data				
Sample Date	7/5/98 day	7/6/98 day	7/7/98 day	7/10/98 day
Sample Code	WAL0705	WAL0706	WAL0707	WAL0710
Phase (gas or particle)	gas	gas	gas	gas
Air volume(1000m3)	0.3838	0.3423	0.3518	0.3695
Concentration Data in fg/m3				
2,3,7,8-TCDF	4.7	25.0	2.8	8.5
1,2,3,7,8-PeCDF	2.1	23.3	0.6	3.7
2,3,4,7,8-PeCDF	0.9	12.7	0.6	1.8
1,2,3,4,7,8-HxCDF	1.2	4.2	0.7	2.2
1,2,3,6,7,8-HxCDF	0.8	4.0	0.3	1.6
1,2,3,7,8,9-HxCDF	ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	ND	1.0	ND	0.8
1,2,3,4,6,7,8-HpCDF	1.2	0.9	ND	1.5
1,2,3,4,7,8,9-HpCDF	ND	ND	ND	ND
2,3,7,8-TCDD	0.40	1.0	0.34	ND
1,2,3,7,8-PeCDD	0.41	3.5	ND	0.9
1,2,3,4,7,8-HxCDD	ND	0.3	ND	ND
1,2,3,6,7,8-HxCDD	ND	0.8	ND	0.2
1,2,3,7,8,9-HxCDD	ND	0.4	ND	0.4
1,2,3,4,6,7,8-HpCDD	ND	ND	ND	ND
Mono-Furans	1150	1987	757	905
Di-Furans	2000	2878	654	1401
Tri-Furans	539	2128	192	823
Tetra-Furans	119	1380	57	170
Penta-Furans	42	365	26	66
Hexa-Furans	13	50	8.4	25
Hepta-Furans	1	2	1.4	3
1,2,3,4,6,7,8-HpCDF	1	1	0.9	2
1,2,3,4,7,8,9-HpCDF	0.2	0.3	0.5	1
OCDF	1	1	1.7	4
Mono-Dioxins	26	43	9	22
Di-Dioxins	7345	6508	4216	7533
Tri-Dioxins	90	230	34	160
Tetra-Dioxins	27	296	13	46
Penta-Dioxins	6	141	3	5
Hexa-Dioxins	3	24	2	9
Hepta-Dioxins	3	3	2	3
1,2,3,4,6,7,8-HpCDD	2	1	1	2
OCDD	6	6	5	9
13C12 Recoveries (%)				
13C-2,8-DICDF	56	85	74	69
13C-2,3,7,8-TCDF	95	103	94	91
13C-1,2,3,7,8-PeCDF	110	108	103	97
13C-2,3,4,7,8-PeCDF	117	115	51	102
13C-1,2,3,4,7,8-HxCDF	138	119	113	100
13C-1,2,3,6,7,8-HxCDF	138	119	113	100
13C-2,3,4,6,7,8-HxCDF	139	125	115	102
13C-1,2,3,7,8,9-HxCDF	140	114	98	96
13C-1,2,3,4,6,7,8-HpCDF	157	132	118	103
13C-1,2,3,4,7,8,9-HpCDF	159	126	106	93
13C-OCDF	178	121	99	88
13C-2,7-DICDD	66	89	81	72
13C-2,3,7-TrCDD	77	93	85	80
13C-2,3,7,8-TCDD	82	91	63	57
13C-1,2,3,7,8-PeCDD	121	113	112	103
13C-1,2,3,4,7,8-HxCDD	143	119	112	99
13C-1,2,3,6,7,8-HxCDD	143	119	112	99
13C-1,2,3,7,8,9-HxCDD	141	124	117	108
13C-1,2,3,4,6,7,8-HpCDD	162	128	114	99
13C-OCDD	177	129	106	86
13C-2,3,7,8-TCDF	95	113	99	105
13C-1,2,3,7,8-PeCDF	113	127	119	124
13C-2,3,4,7,8-PeCDF	86	124	112	115
13C-1,2,3,4,7,8-HxCDF	89	128	118	121
13C-1,2,3,6,7,8-HxCDF	92	128	124	121
13C-1,2,3,7,8,9-HxCDF	90	109	94	84
13C-2,3,4,6,7,8-HxCDF	94	105	85	96
13C-1,2,3,4,6,7,8-HpCDF	91	123	103	97
13C-1,2,3,4,7,8,9-HpCDF	95	83	88	104
13C-2,3,7,8-TCDD	83	100	63	60
13C-1,2,3,7,8-PeCDD	102	122	113	118
13C-1,2,3,4,7,8-HxCDD	84	129	121	115
13C-1,2,3,6,7,8-HxCDD	85	126	116	110
13C-1,2,3,7,8,9-HxCDD	83	124	113	102
13C-1,2,3,4,6,7,8-HpCDD	89	77	83	98

ND = not detected in samples

R/V Walford (air samples) Dioxin and Furan Data				
Sample Date	7/5/98 day	7/6/98 day	7/7/98 day	7/10/98 day
Sample Code	WAL0705	WAL0706	WAL0707	WAL0710
Phase (gas or particle)	part	part	part	part
Air volume(1000m3)	0.3838	0.3423	0.3518	0.3695
Concentration Data in fg/m3				
2,3,7,8-TCDF	1.4	2.8	0.8	1.2
1,2,3,7,8-PeCDF	1.1	4.2	0.8	1.9
2,3,4,7,8-PeCDF	1.4	5.0	0.6	1.4
1,2,3,4,7,8-HxCDF	1.6	6.6	0.7	7.3
1,2,3,6,7,8-HxCDF	1.5	5.2	0.5	3.4
1,2,3,7,8,9-HxCDF	0.3	ND	ND	0.8
2,3,4,6,7,8-HxCDF	2.0	9.0	ND	3.6
1,2,3,4,6,7,8-HpCDF	8.8	16	2.7	35
1,2,3,4,7,8,9-HpCDF	ND	ND	ND	ND
2,3,7,8-TCDD	0.3	ND	0.4	ND
1,2,3,7,8-PeCDD	0.5	2.0	ND	0.6
1,2,3,4,7,8-HxCDD	0.5	1.8	ND	ND
1,2,3,6,7,8-HxCDD	1.2	4.3	ND	1.3
1,2,3,7,8,9-HxCDD	0.8	2.6	ND	1.2
1,2,3,4,6,7,8-HpCDD	17	ND	ND	ND
Mono-Furans	21	18	16	19
Di-Furans	38	26	20	23
Tri-Furans	20	29	9	19
Tetra-Furans	21	53	7	19
Penta-Furans	18	57	8	24
Hexa-Furans	18	58	10	39
Hepta-Furans	13	21	6	40
1,2,3,4,6,7,8-HpCDF	8	16	3	30
1,2,3,4,7,8,9-HpCDF	0.3	0.6	0.2	2
OCDF	7	5	2	40
Mono-Dioxins	ND	ND	ND	ND
Di-Dioxins	114	80	74	34
Tri-Dioxins	9	4	6	4
Tetra-Dioxins	10	14	3	6
Penta-Dioxins	5	23	2	4
Hexa-Dioxins	17	62	5	14
Hepta-Dioxins	34	36	9	41
1,2,3,4,6,7,8-HpCDD	13	18	3	20
OCDD	99	72	19	134
13C12 Recoveries (%)				
13C-2,8-DICDF	58	73	55	64
13C-2,3,7,8-TCDF	78	81	74	90
13C-1,2,3,7,8-PeCDF	101	86	86	102
13C-2,3,4,7,8-PeCDF	99	80	89	105
13C-1,2,3,4,7,8-HxCDF	116	71	93	111
13C-1,2,3,6,7,8-HxCDF	115	71	93	111
13C-2,3,4,6,7,8-HxCDF	108	68	97	115
13C-1,2,3,7,8,9-HxCDF	144	64	90	115
13C-1,2,3,4,6,7,8-HpCDF	128	58	101	122
13C-1,2,3,4,7,8,9-HpCDF	137	51	97	118
13C-OCDF	123	39	98	116
13C-2,7-DICDD	60	72	56	67
13C-2,3,7-TrCDD	74	78	62	74
13C-2,3,7,8-TCDD	81	65	53	77
13C-1,2,3,7,8-PeCDD	112	83	94	108
13C-1,2,3,4,7,8-HxCDD	131	68	96	114
13C-1,2,3,6,7,8-HxCDD	131	68	96	114
13C-1,2,3,7,8,9-HxCDD	118	78	105	124
13C-1,2,3,4,6,7,8-HpCDD	140	54	101	120
13C-OCDD	126	41	101	126
13C-2,3,7,8-TCDF				
13C-1,2,3,7,8-PeCDF				
13C-2,3,4,7,8-PeCDF				
13C-1,2,3,4,7,8-HxCDF				
13C-1,2,3,6,7,8-HxCDF				
13C-1,2,3,7,8,9-HxCDF				
13C-2,3,4,6,7,8-HxCDF				
13C-1,2,3,4,6,7,8-HpCDF				
13C-1,2,3,4,7,8,9-HpCDF				
13C-2,3,7,8-TCDD				
13C-1,2,3,7,8-PeCDD				
13C-1,2,3,4,7,8-HxCDD				
13C-1,2,3,6,7,8-HxCDD				
13C-1,2,3,7,8,9-HxCDD				
13C-1,2,3,4,6,7,8-HpCDD				

ND = not detected in samples

R/V Walford (water samples) Dioxin and Furan Data				
Sample Date	7/5/98 day	7/6/98 day	7/7/98 day	7/10/98 day
Sample Code	WAL0705diss	WAL0706diss	WAL0707diss	WAL0710diss
Phase (dissolved or particle)	dissolved	dissolved	dissolved	dissolved
Water volume(L)	39	31	51	60
Concentration Data in pg/L				
2,3,7,8-TCDF	0.041	0.064	0.05	0.07
1,2,3,7,8-PeCDF	0.007	0.009	0.008	0.008
2,3,4,7,8-PeCDF	0.015	0.009	0.010	0.008
1,2,3,4,7,8-HxCDF	0.007	0.012	0.008	0.004
1,2,3,6,7,8-HxCDF	0.004	0.014	0.005	0.004
1,2,3,7,8,9-HxCDF	ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	ND	0.011	0.008	ND
1,2,3,4,6,7,8-HpCDF	0.028	0.038	0.037	0.019
1,2,3,4,7,8,9-HpCDF	ND	ND	ND	ND
2,3,7,8-TCDD	ND	0.011	ND	ND
1,2,3,7,8-PeCDD	ND	ND	ND	0.003
1,2,3,4,7,8-HxCDD	0.004	ND	ND	ND
1,2,3,6,7,8-HxCDD	0.01	0.034	0.042	0.008
1,2,3,7,8,9-HxCDD	0.01	0.021	ND	ND
1,2,3,4,6,7,8-HpCDD	0.14	0.27	0.18	0.21
Mono-Furans	3.0	2.7	2.1	1.2
Di-Furans	3.8	2.9	3.0	5.9
Tri-Furans	1.1	1.0	0.80	2.9
Tetra-Furans	0.25	0.23	0.22	0.56
Penta-Furans	0.095	0.084	0.13	0.10
Hexa-Furans	0.069	0.087	0.11	0.038
Hepta-Furans	0.060	0.033	0.020	0.028
1,2,3,4,6,7,8-HpCDF	0.037	0.17	0.17	0.17
1,2,3,4,7,8,9-HpCDF	0.005	0.039	0.039	0.001
OCDF	0.039	0.046	0.029	0.016
Mono-Dioxins	0.032	0.039	0.019	0.063
Di-Dioxins	21	39	22	44
Tri-Dioxins	0.28	0.49	0.42	1.4
Tetra-Dioxins	0.092	0.083	0.062	0.36
Penta-Dioxins	0.034	0.048	0.043	0.086
Hexa-Dioxins	0.16	0.25	0.34	0.35
Hepta-Dioxins	0.41	0.70	0.52	0.83
1,2,3,4,6,7,8-HpCDD	0.14	0.20	0.16	0.18
OCDD	1.1	2.2	1.3	1.4
13C12 Recoveries (%)				
13C-2,8-DiCDF	44	51	45	44
13C-2,3,7,8-TCDF	55	49	58	68
13C-1,2,3,7,8-PeCDF	67	50	66	76
13C-2,3,4,7,8-PeCDF	69	52	69	77
13C-1,2,3,4,7,8-HxCDF	72	51	69	76
13C-1,2,3,6,7,8-HxCDF	72	51	69	78
13C-2,3,4,6,7,8-HxCDF	69	51	66	76
13C-1,2,3,7,8,9-HxCDF	62	43	64	70
13C-1,2,3,4,6,7,8-HpCDF	77	51	74	78
13C-1,2,3,4,7,8,9-HpCDF	64	41	64	69
13C-OCDF	64	40	65	68
13C-2,7-DiCDD	43	46	45	44
13C-2,3,7-TrCDD	45	46	51	55
13C-2,3,7,8-TCDD	30	25	40	48
13C-1,2,3,7,8-PeCDD	70	54	69	78
13C-1,2,3,4,7,8-HxCDD	75	52	69	79
13C-1,2,3,6,7,8-HxCDD	75	52	69	79
13C-1,2,3,7,8,9-HxCDD	79	54	72	82
13C-1,2,3,4,6,7,8-HpCDD	78	52	72	82
13C-OCDD	75	51	73	84
13C-2,3,7,8-TCDF	65	50	65	67
13C-1,2,3,7,8-PeCDF	77	54	74	77
13C-2,3,4,7,8-PeCDF	71	47	59	63
13C-1,2,3,4,7,8-HxCDF	77	48	66	65
13C-1,2,3,6,7,8-HxCDF	81	47	63	64
13C-1,2,3,7,8,9-HxCDF	56	38	51	53
13C-2,3,4,6,7,8-HxCDF	65	43	57	59
13C-1,2,3,4,6,7,8-HpCDF	71	45	62	62
13C-1,2,3,4,7,8,9-HpCDF	54	37	56	52
13C-2,3,7,8-TCDD	29	27	42	46
13C-1,2,3,7,8-PeCDD	81	54	70	75
13C-1,2,3,4,7,8-HxCDD	81	48	63	64
13C-1,2,3,6,7,8-HxCDD	78	48	62	65
13C-1,2,3,7,8,9-HxCDD	78	48	62	67
13C-1,2,3,4,6,7,8-HpCDD	65	43	58	61

ND = not detected in samples

R/V Walford (water samples) Dioxin and Furan Data				
Sample Date	7/5/98 day	7/6/98 day	7/7/98 day	7/10/98 day
Sample Code	WAL0705part	WAL0706part	WAL0707part	WAL0710part
Phase (dissolved or particle)	particle	particle	particle	particle
Water volume(L)	39	31	51	60
Concentration Data in pg/L				
2,3,7,8-TCDF	0.12	0.12	0.08	0.21
1,2,3,7,8-PeCDF	0.05	0.05	0.04	0.10
2,3,4,7,8-PeCDF	0.05	0.05	0.03	0.09
1,2,3,4,7,8-HxCDF	0.06	0.07	0.05	0.12
1,2,3,6,7,8-HxCDF	0.03	0.03	0.02	0.07
1,2,3,7,8,9-HxCDF	ND	ND	ND	0.01
2,3,4,6,7,8-HxCDF	0.04	0.04	0.02	0.07
1,2,3,4,6,7,8-HpCDF	0.35	0.38	0.29	0.88
1,2,3,4,7,8,9-HpCDF	0.05	ND	ND	ND
2,3,7,8-TCDD	0.03	0.06	0.02	0.06
1,2,3,7,8-PeCDD	0.02	0.02	0.01	0.03
1,2,3,4,7,8-HxCDD	0.02	0.03	0.02	0.05
1,2,3,6,7,8-HxCDD	0.08	0.08	0.04	0.16
1,2,3,7,8,9-HxCDD	0.05	0.05	0.04	0.11
1,2,3,4,6,7,8-HpCDD	1.06	0.94	0.74	2.75
Mono-Furans	0.67	0.54	0.39	0.65
Di-Furans	3.15	2.65	1.36	5.54
Tri-Furans	1.89	1.59	0.92	4.41
Tetra-Furans	0.84	0.72	0.47	2.29
Penta-Furans	0.50	0.44	0.34	1.20
Hexa-Furans	0.47	0.41	0.31	1.12
Hepta-Furans	0.64	0.62	0.46	1.79
1,2,3,4,6,7,8-HpCDF	0.33	0.30	0.27	0.82
1,2,3,4,7,8,9-HpCDF	0.02	0.02	0.01	0.04
OCDF	0.41	0.42	0.42	1.29
Mono-Dioxins	0.05	0.03		0.03
Di-Dioxins	19.20	23.76	15.64	14.15
Tri-Dioxins	0.54	0.51	0.34	1.08
Tetra-Dioxins	0.36	0.42	0.22	0.98
Penta-Dioxins	0.14	0.10	0.07	0.35
Hexa-Dioxins	0.92	0.83	0.60	2.10
Hepta-Dioxins	2.44	2.29	1.66	6.35
1,2,3,4,6,7,8-HpCDD	0.97	0.89	0.70	2.60
OCDD	9.59	11.39	8.93	25.33
13C12 Recoveries (%)				
13C-2,8-DiCDF	42	38	36	34
13C-2,3,7,8-TCDF	62	58	55	63
13C-1,2,3,7,8-PeCDF	78	75	76	68
13C-2,3,4,7,8-PeCDF	83	84	73	76
13C-1,2,3,4,7,8-HxCDF	90	87	95	80
13C-1,2,3,6,7,8-HxCDF	90	87	95	80
13C-2,3,4,6,7,8-HxCDF	83	90	90	84
13C-1,2,3,7,8,9-HxCDF	95	96	121	89
13C-1,2,3,4,6,7,8-HpCDF	100	94	109	90
13C-1,2,3,4,7,8,9-HpCDF	99	93	117	89
13C-OCDF	106	97	109	99
13C-2,7-DiCDD	46	42	41	37
13C-2,3,7-TrCDD	55	50	52	45
13C-2,3,7,8-TCDD	74	52	71	53
13C-1,2,3,7,8-PeCDD	87	85	89	77
13C-1,2,3,4,7,8-HxCDD	96	94	116	87
13C-1,2,3,6,7,8-HxCDD	96	94	116	87
13C-1,2,3,7,8,9-HxCDD	89	89	103	83
13C-1,2,3,4,6,7,8-HpCDD	102	97	130	93
13C-OCDD	107	96	123	102
13C-2,3,7,8-TCDF	78	63	68	64
13C-1,2,3,7,8-PeCDF	91	76	96	83
13C-2,3,4,7,8-PeCDF	87	71	97	75
13C-1,2,3,4,7,8-HxCDF	97	76	108	87
13C-1,2,3,6,7,8-HxCDF	98	77	109	86
13C-1,2,3,7,8,9-HxCDF	89	67	100	70
13C-2,3,4,6,7,8-HxCDF	84	69	106	73
13C-1,2,3,4,6,7,8-HpCDF	97	77	113	79
13C-1,2,3,4,7,8,9-HpCDF	65	75	108	66
13C-2,3,7,8-TCDD	74	50	70	53
13C-1,2,3,7,8-PeCDD	91	79	105	86
13C-1,2,3,4,7,8-HxCDD	99	77	109	87
13C-1,2,3,6,7,8-HxCDD	101	78	109	83
13C-1,2,3,7,8,9-HxCDD	100	78	111	81
13C-1,2,3,4,6,7,8-HpCDD	89	76	111	77

ND = not detected in samples