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Development of the polyurethane foam passive air sampler for novel applications in ambient air across the globe

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DEVELOPMENT OF THE POLYURETHANE FOAM PASSIVE AIR SAMPLER FOR NOVEL APPLICATIONS IN AMBIENT AIR ACROSS THE GLOBE

by

Nicholas John Herkert

A thesis submitted in partial fulfillment
of the requirements for the Doctor of Philosophy
degree in Civil and Environmental Engineering in the
Graduate College of
The University of Iowa

May 2018

Thesis Supervisor: Professor Keri C. Hornbuckle

Graduate College
The University of Iowa
Iowa City, Iowa

CERTIFICATE OF APPROVAL

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PH.D. THESIS

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This is to certify that the Ph.D. thesis of

Nicholas John Herkert

has been approved by the Examining Committee for
the thesis requirement for the Doctor of Philosophy degree
in Civil and Environmental Engineering at the May 2018 graduation.

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To my parents for their unwavering support

And to Kirsten for making every little day, a whole lot better.

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ABSTRACT

Our understanding about the presence, behavior, and toxicities of atmospheric persistent organic pollutants is limited by our ability to accurately measure them. This dissertation details the development and characterization of a model for the determination of an accurate sampling rate (R_s), and effective sampling volume (V_{eff}), for polyurethane equipped passive air samplers (PUF-PAS), and the subsequent application of PUF-PAS sampling methods towards novel applications studying polychlorinated biphenyls (PCBs).

The user friendly mathematical model resulting from this work, published as a Matlab script, predicts R_s and V_{eff} as a function of local hourly meteorology and the physical-chemical properties of the target analytes. The model was first developed using active sampling methods in urban Chicago, where good agreement was found between the PUF-PAS and high volume active samplers: Active/Passive = 1.1 ± 1.2. The model was then expanded and calibrated globally using the dataset from the Global Atmospheric Passive Sampling (GAPS) network. After this global calibration we found acceptable agreement between modelled and depuration-determined sampling rates for an independent dataset, with several compounds having near zero mean percent bias (±6%). The globally applicable model is the best alternative for locations experiencing low average wind speeds or cold temperatures, and is particularly useful for the interpretation of samples with long deployments, deployments conducted under warming conditions, and compounds with high volatility. An interactive web-based graphical user interface for the sampling rate model was developed. Users input sampler locations, deployment dates, and target chemicals, in the web-interface and are provided with a sample and compound specific R_s and V_{eff}.

The sampling rate model was examined for use in the indoor environment and it was found that both the experimentally calibrated (1.10 ± 0.23 m^3 d^{-1}) and modeled (1.08 ± 0.04 m^3 d^{-1}) R_s agreed with literature reports. Correlating sample specific wind speeds with uptake rates, it was determined that variability of wind speeds throughout the room significantly (*p-value* < 0.001) affected uptake rates. Despite this, the PUF-PAS concentration measurements using modelled R_s values were within 27% of the active sampling determined concentration measurements.

Using PUF-PAS samplers, PCBs 47, 51, and 68 were found to account for up to 50% of measured indoor ΣPCBs concentration (2700 pg m^{-3}). Direct surface measurements were conducted to identify finished cabinetry to be a major source, as a result of the decomposition of 2,4-dichlorobenzoyl peroxide used as an initiator in free-radical polymerization of polyester resins. While this phenomenon has been detected at trace levels in other polymer products, it has never been shown to be a significant environment source of PCBs.

PUF-PAS samplers were similarly used to study the presence of airborne hydroxylated polychlorinated biphenyls (OH-PCBs) and PCBs in the metropolitan Chicago area. While OH-PCBs have been hypothesized to be an important removal mechanism for atmospheric PCBs, they were not directly measured in the air until recently. The two most frequently detect OH-PCB congeners in this study, 2OH-PCB2 and 6OH-PCB2, were detected at levels comparable to a previous report of atmospheric OH-PCBs utilizing active sampling methods, suggesting the viability of PUF-PAS methods to study atmospheric OH-PCBs. One sampling site detected as many as 50 OH-PCBs but uncertainties with sampling and laboratory methods prevent any strong conclusions from being drawn.

PUBLIC ABSTRACT

Our understanding of airborne toxins is limited by our ability to accurately and conveniently measure them. This dissertation details the development of a model to accurately and conveniently predict the sampling rate of a passive air sampling device to measure air toxins. The simple and user-friendly model was developed using passive air sampling devices placed around the world, ensuring the model can be used freely by researchers and citizen-collaborators to assess the air toxins anywhere in the world.

With the growing concern around air toxins present inside buildings, including schools, it was important to also develop this model to apply indoors. A series of experiments were conducted to understand the performance of the model indoors. The model was found to produce concentration estimates of air toxins, such as polychlorinated biphenyls (PCBs), at comparable levels to traditional sampling method inside buildings.

The model and passive air sampling device was used to study the presence of air toxins in the air at residential homes in Iowa. Surprisingly high air concentrations of several PCBs not expected to be in the air were found. The wood sealant used on the kitchen cabinets was, for the first time, identified as the source of these neurotoxic and carcinogenic compounds to the air. The model and passive air sampling device were further used to identify the widespread presence of a breakdown product of PCBs in the air of the City of Chicago.

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CHAPTER I: INTRODUCTION

Polychlorinated Biphenyls (PCBs)

Polychlorinated Biphenyls (PCBs) are persistent organic pollutants (POPs) that are ubiquitous in the environment today due to anthropogenic activity. PCBs are semivolatile and lipophilic. PCBs exist as 209 different congeners consisting of two bonded benzene rings, with a varying number and arrangement of chlorine atoms.[1-3]

PCBs as a group are classified as known human carcinogens by the International Agency for Research on Cancer (IARC).[4, 5] Studies have shown individual congeners to be neurotoxins and endocrine disruptors.[4-7] While specific PCBs congeners may be benign, the metabolic transformations product may be toxic.[8] Despite being banned in the 1970s, significant airborne levels are measured today in metropolitan cities of varying sizes, residential homes, and school buildings due to both Aroclor and modern sources. PCBs are also measured in many rural area across the globe, including the north and south poles.

Legacy atmospheric sources of PCBs in the U.S. were produced by the company Monsanto as Aroclor mixtures.[2] Aroclor mixtures were used in many different industrial applications for their low boiling point, high viscosity, and most importantly, flame retardant properties. Aroclors were produced to have varying weight percent chlorines and therefore have unique mixtures of the 209 individual PCB congeners and unique industrial applications.[9] Based on production history, the most common industrial application was as dielectric fluids in capacitors and transformers. Nevertheless, Aroclor mixtures were added to many other products including lubricants, sealants, adhesives, and a wealth of other products.[2]

Modern atmospheric sources of PCBs have been detected as inadvertent manufacturing byproducts in modern building materials.[10-14] Likely the most prevalent modern source is paint, where PCBs were discovered as a byproduct of pigment manufacturing.[10, 12] One of the most prominent non-Aroclor PCB congeners measured in paint is PCB 11, which is not present at significant levels (<0.15 % mass fraction) in Aroclor mixtures yet has been detected ubiquitously in the environment.[13] Non-Aroclor sources of PCBs are fundamentally changing our understanding of PCB sources in the environment and atmosphere.

Polyurethane Equipped Passive Air Samplers (PUF-PAS)

Polyurethane equipped passive air samplers (PUF-PAS) are a powerful tool for analyzing atmospheric POPs, such as PCBs. PUF-PAS samples are typically deployed for a length of time from a few weeks to a few months, providing a time-integrated concentration of target POPs over their sampling period. Due to the time-integrated nature of the sampler measurements, PUF-PAS are frequently used to study regional spatial and temporal trends. They have been used in regional studies on every continent including Asia,[15-18] Europe,[19-22] North America,[23-29] and Central and South America.[30, 31] Expansive PUF-PAS networks have been used to elucidate fate and transport of POPs on a global scale.[18, 20, 21, 32-36]

PUF-PAS has been used to measure a wide variety of compounds including polychlorinated biphenyls (PCBs),[15, 17, 19, 21, 22, 24, 25, 30, 32, 34, 37-43] polyaromatic hydrocarbons (PAHs), [16, 20, 26, 44, 45] polybrominated diphenyl ethers (PBDEs), [17, 22, 28, 34, 35, 38, 46, 47] pesticides, [17, 18, 23-25, 29, 30, 33, 34, 36, 38, 44, 45, 48-50] and other POPs. They have been used to study potential atmospheric reactions by measuring both parent and product chemicals.[23, 43] PUF-PAS is also useful in quantifying the potential for human exposure.[15, 37, 43, 46, 47] This application of PUF-PAS methods is particularly important in the indoor environment, where people spend much of their time and concentrations are often higher.[28, 37, 46, 47, 51]

Despite the widespread use of PUF-PAS methods, they can be difficult to interpret because contrary to active sampling methods, the flowrate within the PUF-PAS sampler is unknown. The lack of a consistent, accurate, and precise estimate of sampling rate (R_s) for the PUF-PAS sampler is one of the largest sources of uncertainties when using this sampling method. Typically the R_s is determined from the loss of spiked isotope labeled compounds called depuration compounds (DCs), or calibrated from active sampling uptake experiments.[15-17, 20, 24, 34, 35, 38, 41, 49-55] In the absence of one of the methods, an R_s is often assumed ($4\ m^3\ d^{-1}$ for PCBs, for example).[19, 50, 53, 56] While these methods have been proven to work in many scenarios they fail to capture the full spectrum of environmental conditions, nullifying some of the benefits of using passive samplers. In addition, these methods are labor intensive and expensive.

A modelling technique for estimating PUF-PAS sampling rates is an encouraging alternative.[57-60] A sampling rate model could produce an R_s value specific to the time and location being sampled, while also accounting for a range of target chemical compounds. The modelling framework would provide a consistent R_s estimate across sampling campaigns without sampling biases or the expenses of labelled depuration compounds, while requiring very little personnel work.

Despite any uncertainties around an accurate determination R_s, PUF-PAS have been proven to be a powerful tool for understand the behavior of atmospheric POPs. The applications and widespread use of PUF-PAS methods will grow as organizations around the world look to grow their monitoring programs to further elucidate atmospheric fate and transport. [20, 21, 32-36, 61, 62] A reliable R_s determination method will bolster the conclusions and implications derived for PUF-PAS sampling campaigns.

Objectives and Hypothesis

Overall Hypothesis: Model estimated sampling rates for polyurethane equipped passive air samplers can produce reliable airborne concentration estimates in a wide variety of environments, empowering conclusions drawn from sampling campaigns about sources and fate of atmospheric PCBs.

Objective-1: Develop and evaluate a model based approach to interpret results of legacy contamination (i.e. PCBs) with PUF-PAS sampling.

- **Hypothesis 1:** Effective volume can be modelled from hourly meteorological data to create a dynamic effective volume
- **Hypothesis 2:** The modelled dynamic effective volume will produce a more reliable airborne concentration calculation for deployments with changing meteorological conditions.

Objective-2: Evaluate the potential for modelling sampling rate (R_s) in any environment on the globe.

- **Hypothesis 1:** Using a modelling approach we can reliably predict a sampling rate (R_s) anywhere on the globe.
- **Hypothesis 2:** A modelled sampling rate (R_s) will reliably predict R_s in cold climates (artic) and climates with low average wind speeds.

- **Hypothesis 3:** The globally averaged modelled sampling rate will fall between 4 and 5 m^3 d^{-1}.

Objective-3: Develop a model based approach to determine PUF-PAS sampling rates in an indoor environment.

- **Hypothesis 1:** A model originally developed for outdoor PUF-PAS sampling is also appropriate for use in determining the R_s for PUF-PAS samples collected in indoor environments.
- **Hypothesis 2:** Position within the room will affect the interpretation of PUF-PAS results due to airflow changes within the room.

Objective-4: Identify and characterize modern and Aroclor PCB source with PUF-PAS methods utilizing modelled sampling rates in modern residential buildings.

- **Hypothesis:** Recently constructed buildings will have a greater contribution of non-Aroclor sources of PCBs when compared to older buildings.

Objective-5: Demonstrate the ability of PUF-PAS samples to accurately measure occurrence and formation of OH-PCBs compounds in air samples.

- **Hypothesis 1:** We can reliably analyze all OH-PCBs from PUF samples.
- **Hypothesis 2:** The extraction of OH-PCBs from PUF samples is pH dependent.
- **Hypothesis 1:** OH-PCB uptake on PUF samples can be modelled using modelling tools previously developed for PCBs.
- **Hypothesis 2:** OH-PCBs will exist as a breakdown product of PCBs in the atmosphere.

Thesis Overview

The following thesis chapters are structured to address the above objectives and hypotheses. Chapter II address Objective 1 and the corresponding hypothesis. This chapter details the development of a practical mathematical model for the determination of sampling rate and subsequent effective sampling volume for PUF-PAS samples in major metropolitan areas. The developed model accounts for the variability in wind speed, air temperature, and equilibrium partitioning during a sampler deployment by utilizing hourly meteorology data from a nearby airport to calculated hourly sampling rates and subsequent effective sampling volumes. The model effectiveness was examined using three independent datasets of airborne PCBs at sites in Chicago, USA, Lancaster, UK, and Toronto, Canada. The model provided sampling volumes that yielded airborne concentrations comparable to active sampling methods (Active/Passive = 1.1 ± 1.2). Chapter II was published in *Environmental Science and Technology* on March 10, 2016.

Chapter III addresses Objective 2 and the corresponding hypotheses. This chapter revolves around the evaluation of measured and modelled sampling rates across the Global Atmospheric Passive Sampling (GAPS) network. The model applicability range was calibrated with sampling rates from 5 depuration compounds in 82 samples at 24 sites deployed around the world. The dimensionless fitting parameter, gamma, was determined to be a constant 0.267 or 0.315 depending on the weather data input. The model provided acceptable agreement between modelled and measured sampling rates with mean percent bias near zero (±6%) for both weather datasets. Chapter III was published in *Environmental Science: Processes & Impacts* on Nov 2nd, 2017. Chapter IV details the development of a web-based graphical user interface for the globally applicable sampling rate model. The web interface is a Google Maps API based interface in which the user inputs sampler locations, deployment dates, and chemicals sampled, and is provided with a sample and compound specific sampling rate and effective sampling volume. Appendix A contains additional figures for the web-interface display.

Chapter V addresses Objective 3 and the corresponding hypotheses. This chapter characterizes the uptake of PCBs on two different PUF-PAS sampler designs in the indoor environmental and examines the relation of uptake to the room airflow dynamics. Examining airflow characteristics in a room using computational fluid dynamic modeling and 3-D sonic anemometer measurements, the study found uptake rates to be significantly ($p < 0.001$) influenced by spatial airflow variability within the room. The previously developed flowrate model was successful in modelling an R_s (1.08 ± 0.04 m^3 d^{-1}) when compared to the experimentally calibrated R_s (1.10 ± 0.23 m^3 d^{-1}) with precise inputs of wind speed. The airborne PCB measurements conducted with the two passive sampler designs and modelled sampling rates were within 27% and 10% of the active sampling concentration measurements, respectively. Chapter V was submitted for publication in *Environmental Science: Processes & Impacts* on Feb 22nd, 2018. Appendix B contains supplementary information for Chapter V.

Chapter VI addresses Objective 4 and the corresponding hypotheses. This chapter consist of the identification and characterization of a novel non-Aroclor PCB source in modern residential homes using PUF-PAS sampling methods. Analyzing PUF-PAS inside and outside residential homes in Iowa City, the study found a PCBs 47, 51, and 68, to be present in newly constructed residences at higher levels than expected for legacy Aroclor sources. Through direct surface emission measurements, the study identified the finished cabinetry to be a major source of these three congeners. The study concluded these PCB congeners were present in the finish cabinetry as an inadvertent byproducts of polymer sealant manufacturing. Specifically, they were produced from the decomposition of 2,4-dichlorobenzoyl peroxide used as an initiator in free-radical polymerization of polyester resins. Chapter VI was submitted for publication in *Environmental Science and Technology* on Feb 19th, 2018. Appendix C contains supplementary information for Chapter VI.

Chapter VII address Objective 5 and the corresponding hypotheses. This chapter examines the applicability of using PUF-PAS methods to measure the fate and formation of one of the atmospheric reaction products of PCBs, hydroxylated polychlorinated biphenyls (OH-PCBs). The study reports the development and evaluations of laboratory methods for analysis of hydroxylated polychlorinated biphenyls (OH-PCBs) from polyurethane foam sampling media. The study identified multiple locations in Chicago with significant and unique PCB and OH-PCB signals. The most significant sites for OH-PCBs was the Jardine Water plant, where an abundance of OH-PCB congeners were detected showing evidence for both direct volatilization and an atmospheric reaction sources of OH-PCBs to the air. The most prevalent OH-PCB congeners, 2OH-PCB2 & 6OH-PCB2, were measured at levels similar to atmospheric OH-PCBs collected using active sampling methods. Appendix D contains supplementary information for Chapter VII.

This research has also already critically contributed to other peer-reviewed publications. The work done in addressing objectives 1 and 2 contributed to the modeled estimates for sampling rates and depuration compound analysis conducted for the manuscript “Release of Airborne PCBs from New Bedford Harbor Results in Elevated Concentrations in the Surrounding Air” by Andres Martinez et al. published in *Environmental Science and Technology Letters* online on February 21st, 2016.[42] The work done in addressing objectives 1, 2, 3, and 5 contributed to the indoor and outdoor modelled sampling rate estimates for PCBs and the laboratory methods for analyzing OH-PCBs used in the manuscript “Airborne PCBs and OH-PCBs Inside and Outside Urban and Rural U.S. Schools” by Rachel F. Marek et al. published in *Environmental Science and Technology* on July 18th, 2017.[43] The work done in addressing objectives 1 and 2 is also expected to contribute to modelled sampling rates of novel PUF-PAS compounds in the future publication of the manuscript “Passive sampling for outdoor airborne herbicides 2,4-D, acetochlor, atrazine, and glyphosate at Iowa farm households” by Jenna L. Gibbs et al.

CHAPTER II: A MODEL USING LOCAL WEATHER DATA TO DETERMINE THE EFFECTIVE SAMPLING VOLUME FOR PCB CONGENERS COLLECTED ON PASSIVE AIR SAMPLERS [1]

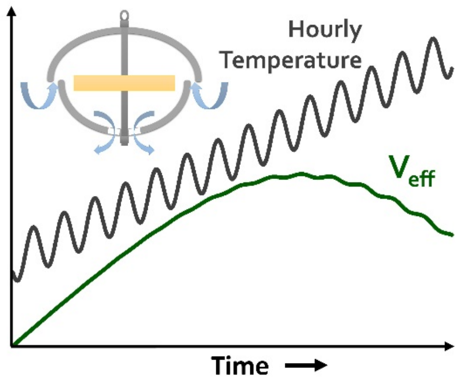

Figure 1: Table of content art for Chapter II.

Abstract

We have developed and evaluated a mathematical model to determine the effective sampling volumes (V_{eff}) of PCBs and similar compounds captured using polyurethane foam passive air samplers (PUF-PAS). We account for the variability in wind speed, air temperature, and equilibrium partitioning over the course of the deployment of the samplers. The model, provided as an annotated Matlab script, predicts the V_{eff} as a function of physical-chemical properties of each compound and meteorology from the closest Integrated Surface Database (ISD) dataset obtained through NOAA's National Centers for Environmental Information (NCEI). The model was developed to be user friendly, only requiring basic Matlab knowledge. To illustrate the effectiveness of the model, we evaluated three independent datasets of airborne PCBs simultaneously collected using passive and active samplers: at sites in Chicago, USA, Lancaster, UK, and Toronto, Canada. The model provides V_{eff} values comparable to those using depuration compounds and calibration against active samplers, yielding an average

[1] Reproduced with permission from Herkert, N. J.; Martinez, A.; Hornbuckle, K. C., *Environ. Sci. Technol.* **2015,** *49*, (2), 1156-1164. Copyright 2016. American Chemical Society. The Supporting Information is available free of charge on the ACS Publications website at DOI: 10.1021/acs.est.6b00319.
Analysis of Chicago samples and model development was conducted by N. Herkert. Data analysis and manuscript preparation was conducted by N. Herkert under the supervision of A. Martinez and K. Hornbuckle.

congener specific concentration method ratio (Active/Passive) of 1.1 ± 1.2. We applied the model to PUF-PAS samples collected in Chicago and show that previous methods can underestimate concentrations of PCBs by up to 40%, especially for long deployments, deployments conducted under warming conditions, and log Koa values less than 8.

Introduction

Our knowledge of the sources, exposures and toxicity of airborne persistent organic pollutants is limited by our ability to accurately and conveniently measure these compounds. Passive air sampling methods are very attractive and have been widely adopted, yet commonly suffer from a major limitation – determination of the effective sampling volume to convert the mass accumulated on the sampler to an environmental concentration. [25, 38, 41, 45, 51-54, 63, 64] This problem has now reached an urgent level as researchers and governments around the world are expanding their monitoring programs to measure and reduce air concentrations of toxic chemicals. [36, 62]

Effective sampling volumes are determined from passive samplers by one of three methods: use of depuration compounds,[25, 38, 41, 51, 52, 65] active sampling calibrations,[24, 52, 65, 66] and modeling approaches.[57, 58] Spiking samples with depuration compounds (DC) prior to deployment is preferred and considered the most accurate way to incorporate site-specific information.[53] Unfortunately, the DC method is expensive, labor intensive, and does not provide essential information about sampler performance over the entire deployment time. For example, the DC method does not indicate if the accumulated compounds have become equilibrated and does not describe the effective sampling volumes for every compound that can be collected on the sampler. Determining effective sampling volumes using active samplers to calibrate the passive samplers is often considered the gold standard: Active sampling methods are promoted as official methods of the U.S. Environmental Protection Agency.[67-71] Passive sampling methods are not yet so recognized. Nevertheless, active sampler calibration are inaccurate when passive samplers are deployed in a different environment than the original calibration. Modeling methods are the most promising but have not yet become widely accepted and adopted.

We provide a mathematical model to cheaply and effectively determine the effective sampling volume of any gas-phase pollutant collected by the most commonly used passive sampler method: the PUF-PAS sampler designed by Harner and colleagues.[24-26, 30, 36, 51, 72] Our model requires no depuration compounds and no calibration with active samplers. It accounts for equilibration of compounds caused by high temperatures and long deployments. It works as well for compounds sampled during linear uptake as well as accumulation in the curvilinear or equilibrium modes. The specific objectives of this study were to: (1) improve the uptake model originally published by Petrich et al.[57] through hourly temperature correction of the K_{PUF} partition coefficient and include the effective sampling volume calculation; (2) assess the reliability of PUF-PAS concentrations determined by our model by comparing with active data; (3) evaluate the performance of the new method in Matlab code (available in the SI), under varying meteorological scenarios. This model is based on an approach we have previously reported for a small set of samples collected in Chicago.[57] Here we show its effectiveness using independent reports from samples collected in Toronto, Canada and Lancaster, UK.[49, 65]

Our model can be used anywhere in the world to determine effective sampling volumes for PUF-PAS deployments. Local hourly meteorological data and the deployment start and stop times are the only required metadata. We examine the method effectiveness with a subset 180 samples collected in Chicago. The samples were analyzed for all 209 PCB congeners and integrated air concentrations are calculated. The impact of our model is most striking for lower molecular weight congeners and long deployments. We show that for these certain compounds and situations, previous methods underestimate ambient concentrations, and therefore underestimate the magnitude of current sources and exposures.

Determining Effective Sampling Volumes

In passive air sampling, air passes through a passive air sampler (PAS) chamber where the chemical contaminants are deposited on a sampling media, such as polyurethane foam (PUF). The uptake of PCBs on a PUF-PAS sampler can be modeled as a function of the air-side mass transfer coefficient (k_v) and the concentration gradient between the surrounding air and PUF sampler (equation 1).

$$\frac{dM_{PUF}}{dt} = k_v A_s \left(C_{air} - \frac{C_{PUF}}{K_{PUF}}\right) \tag{1}$$

where M_{PUF} is the mass (ng) of the PCB congener on the sample (PUF), k_v is the air-side mass transfer coefficient (m d^{-1}), A_s is the surface area of the PUF (m^2), C_{air} is the PCB concentration in the air (ng m^{-3}), C_{PUF} is the PCB concentration on the PUF (ng g^{-1}), and K_{PUF} is the PUF-air equilibrium partitioning coefficient (m^3 g^{-1}).[25, 41, 51, 54, 57, 65] K_{PUF} is the congener specific PUF-air partition coefficient.

This study is based on our previously reported method for estimating deployment and congener specific hourly sampling rate (R_s) from hourly meteorological data using first-principle chemistry, physics, and fluid dynamics, calibrated from depuration compounds.[57] The method used in this study requires a uniform and widely available meteorological data and physical-chemical parameters including: hourly weather data parameters for temperature (K), pressure (Pa), wind speed (m s^{-1}), wind direction (degrees), water vapor mixing ration (Q_v, kg/kg), molecular weight (MW), octanol-air partitioning coefficient (K_{oa}) at 25 °C, and internal energies of octanol–air transfer (dU_{oa}). For hourly weather data, the model uses the Integrated Surface Database (ISD) dataset obtained through NOAA's National Centers for Environmental Information (NCEI) website.[73] We utilize the ISD Lite dataset, which is a derived product from the full ISD dataset, providing data for air temperature, dew point temperature, sea level pressure, wind direction, wind speed, cloud cover, and precipitation. ISD datasets are processed in Matlab to convert them to the necessary input format for the effective sampling volume model and calculate the water vapor mixing ratio (this script is provided in the SI).

With these inputs our Matlab script calculates hourly measurements of internal PAS chamber air flow, molecular diffusivity, dynamic and kinematic viscosities for both air and water, air-side mass transfer coefficient (k_v), sampling rate (R_s), and finally the effective sampling volume (V_{eff}). The only empirical parameter from the Petrich model is the advective mass transfer coefficient (γ), which was determined by calibration with results from depuration experiments. The range of ambient temperature used in the depuration calibration was -6.4 to 23.3 °C, and range of wind speed was 3.3 to 4.8 m s^{-1}.

If the compound accumulated on the PUF-PAS in the linear uptake phase, the effective sampling volume is equivalent to the amount of airflow through the sampler (i.e. sampling rate times time, $R_s t$). If the sample has passed the linear uptake phase, the effective sampling volume is corrected for equilibrium. The time to equilibrium (i.e. maximum effective sampling volume) is directly proportional to K_{PUF}.[25] The congener specific effective sampling volume was determined at each time step (1 h) by rearranging equation 1 in terms of air volume as follows,

$$\frac{dVeff}{dt} = \frac{k_v \cdot A_S}{V_{PUF}}\left(V_{PUF} - \frac{V_{eff}}{K_{PUF} \cdot d_{PUF}}\right) \quad (2)$$

where V_{eff} is the effective sampling volume (m^3), V_{puf} is the volume of the PUF (m^3), and d_{puf} is the density of the PUF ($g\ m^{-3}$). The final congener specific airborne concentrations were determined by applying the final cumulative effective sampling volume to the lab-determined analyte mass on the PUF using equation 3.

$$C_{air} = \frac{M_{PCB}}{V_{eff}} \quad (3)$$

The model was also modified to adjust the PUF-air partitioning for hourly temperature, instead of assuming it to be constant for the deployment time. The congener specific K_{PUF} value was calculated from an empirical relationship with K_{oa} developed by Shoeib and Harner.[51] The K_{PUF} was adjusted for temperature at each time step (1 hr) by adjusting the K_{oa} used to calculate it using the following equation from Li et al (2003),[74]

$$\log K_{oa\,(T)} = \log K_{oa\,(25°C)} - \frac{\Delta U_{oa}}{2.303 * R}\left(\frac{1}{T} - \frac{1}{298.15}\right) \quad (4)$$

where T is temperature (K), ΔU_{oa} is the internal energy of octanol–air transfer ($J\ mol^{-1}$), R is the gas constant ($J\ mol^{-1}\ K^{-1}$) . The reference $\log K_{oa}$ values at 25 °C, were calculated for all congeners based on their relative retention time using the methods described by Harner and Bidleman.[75]

Model Implementation

The model and the script for processing the raw ISD Lite datasets (meteorological data) were developed and run in Matlab version R2015a. Both these files are provided as

Matlab files in the SI. An accompanying file with the necessary physical-chemical properties of all 209 PCB is provided as a CSV (comma separated values) file in the SI. This file is critical to running the model. A step-by-step README file to assist with identifying an appropriate weather station, downloading the correct weather data, processing the data with the provided script, and setting up a run to obtain congener and deployment specific effective sampling volumes, is also provided as a PDF in the SI. The outputs of the model are a deployment specific effective sampling volume (m^3) and sampling rate (m^3/d) for each PCB congener. The user is also alerted of high wind speed measurements (~>5 m s^{-1}), given as a percent of the total number of measurements, for each sample.

Materials and Methods

This study examines a subset of 180 PUF-PAS samples collected in the metropolitan Chicago area to evaluate the model with active sampling comparison and characterize the model's function under varying meteorological scenarios. The "flying saucer" PAS sampler design (with a 24 cm top bowl and 19.5 cm bottom bowl) is based on the "Harner" PUF-PAS Design. [24-26, 30, 36, 51, 72] The PUF disk were purchased from Tisch Environmental (Cleves, OH). Dimensions, 14 cm diameter x 1.3 cm thick; surface area of 365 cm^2; and density of 0.0236 g cm^{-3}. Samples were collected in approximately 6-week intervals (average of 45 days) from January 2012 to January 2014. All samples were collected in pairs with one sample remaining at the University of Iowa for analysis, and the other sample being sent to Indiana University for analysis for a different suite of environmental contaminants.[45] A subset of 10 samples were analyzed for PCBs at both laboratories.

Prior to deployment of the samplers, the sampling media (PUF disk) was cleaned with multiple 24 hour Soxhlet extractions, dried by low-flow nitrogen blow-down, wrapped in aluminum foil, and stored in a freezer until shipment and deployment. [27, 37] After collection, samples were wrapped in combusted aluminum foil and shipped back to the University of Iowa, where they were kept refrigerated at -20° C until extraction. The PUF samples were spiked with 50 ng of surrogate standards (PCB14 (3,5-dichlorobiphenyl), PCB65-d5 (2,3,5,6-tetrachlorabiphenyl-d5, deuterated), and PCB166 (2,3,4,4',5,6-hexachlorobiphenyl)), extracted with a 1:1 Hexane:Acetone mixture in an

Accelerated Solvent Extractor, cleaned with an acidified silica column, and concentrated with a Caliper TurboVap II. [37, 41, 76] The samples were then spiked with 50 ng of internal standard (PCB30-d5 (2,4,6-trichlorobiphenyl-2',3',4',5',6'-d5, deuterated) and PCB204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl)) just prior to analysis by gas chromatography with tandem mass spectrometry (GC-MS/MS, Agilent 6890N Quattro Micro GC, Waters Micromass MS Technologies) using a modified EPA method 1668a.[77] All 209 PCB congeners were quantified as a collection of 156 individual or coeluting chromatographic peaks.

Quality Assurance/Quality Control

Quality assurance and control (QA/QC) was evaluated with the use of surrogate PCB standards, method and field blanks, and a comparison study with the Indiana University lab. The average surrogate percent recoveries for PCB14, PCB 65-d5, and PCB166, were 75% ± 14%, 77% ± 16%, and 88% ± 15% respectively. Method blanks and field blanks were analyzed in tandem with samples. Both method and field blanks experience the same Soxhlet clean-up as samples, but while the field blanks get shipped to deployment site along with samples, method blanks remain in the laboratory freezer. Total PCB masses (Geometric Mean (Geometric Standard Error)) found in method blanks (n=24) and field blanks (n=17) were 4.5 (1.0) and 4.9 (1.1) ng per PUF, respectively. A congener specific limit of quantification (LOQ) was applied to every sample and was calculated as the upper limit of the 95% confidence interval of method blanks. On average the congener specific LOQ was 0.051 ng sample^{-1}, and all LOQs were below 0.5 ng sample^{-1}, with the exception of a coelution of 3 congeners (PCBs 85+116+117) which had an LOQ of 0.53 ng sample^{-1}.

The extracts of 10 samples from Indiana University were analyzed at the University of Iowa with the parameters described previously. These 10 samples were selected for varying times of the year. The ΣPCB mass found from the two different data sets had no statistically significant difference (p = 0.28, two-tailed paired t-test).

Results and Discussion

Evaluation of V_{eff} to Published Reports

Our model was evaluated by comparing PUF-PAS results obtained using the model determined effective sampling volumes and Hi-Vol sampling at the same sampling site. These comparisons were done for Chicago, IL, Lancaster, UK, and Toronto, Canada.[49, 65, 68]

The first evaluation was conducted using five PUF-PAS samples and thirty-one Hi-Vol samples collected at the IADN site at the Illinois Institute of Technology (IIT). [68, 78] The samples were all collected between January 1st, 2012, and February 9th, 2013 and analyzed for 42 PCB congeners or coeluting congeners with varying physical-chemical properties. The second evaluation used data reported from a field study in Lancaster, UK, where PUF-PAS and Hi-Vol samplers were deployed simultaneously for the purposes of calibrating V_{eff} for the PUF-PAS samples.[49] Specifically, one component of the Lancaster study was to derive field based uptake rates. The investigators deployed 23 PUF-PAS samples and collected them at 1, 2, 3, 4, 6, and 8 weeks. They calibrated them using a weekly active sample collected simultaneously. The third evaluation used data from a study conducted by Melymuk et al (2011), where PUF-PAS and low volume air samplers were deployed simultaneously in Toronto, also for calibration purposes.

The dimension of the PUF disk and sampler housing for all three experiments are given in Table S2 of the SI. The PUF disk are specified in the first few lines of the script and can be modified to accommodate a specific study. The sampler housing dimensions are assumed to be the same as the "flying-saucer" design described in Tuduri et al., [72] to calculate the internal air velocity. However, this relationship can be modified to accommodate another sampler if the relationship between internal air velocity and external air velocity is known.

In all three cases, we calculated the concentrations measuring using the PUF-PAS with the chemical mass that accumulated on the PUF media reported from each study, equation 3, and the V_{eff} from our Matlab code. The PUF parameters were changed to accommodate the specific PUF disk parameters specified by the authors (such as length, thickness, density, and surface air). The chemical masses were measured in our laboratory for the Chicago study, and the concentrations for the Chicago IADN Hi-Vol samples were provided by Dr. Ronald A. Hites.[68] The chemical masses on the PUF and concentrations on the Hi-Vols were published by Chaemfa et al for the Lancaster study,[49] and were provided by Dr. Lisa Melymuk for the Toronto study.[65] In the case of Chicago, the weather data was downloaded from Chicago O'Hare Airport (ORD). For the Lancaster study, we used weather data from Barrow/Walney Island Airport (BWF). For the Toronto study, we used weather data from Toronto Pearson International Airport (YYZ). We then compared our calculated concentrations from the PUF-PAS to that of the active samplers in each case (Figure 2).

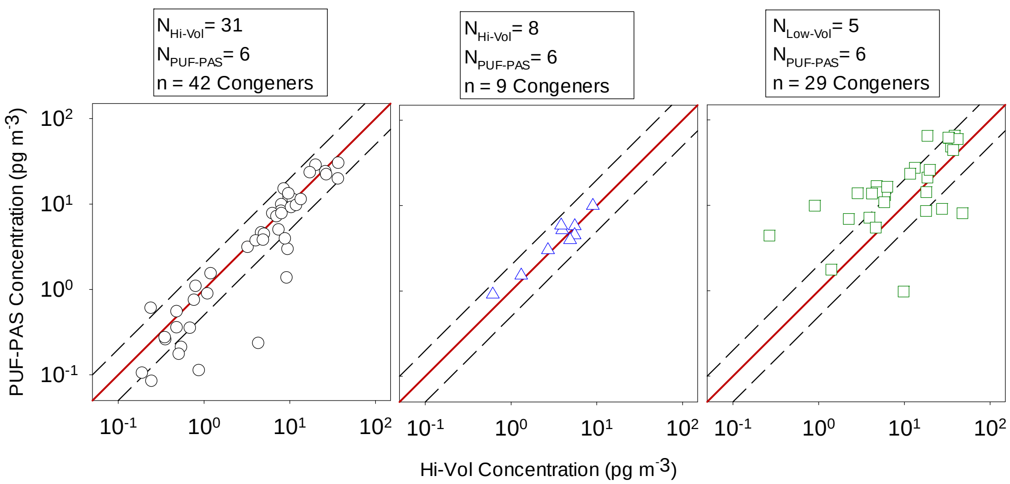

Figure 2: PUF-PAS vs Hi-Vol comparison for select PCB congeners for Chicago, IL (left), Lancaster, UK (middle), and Toronto, Ontario (right). Both Hi-Vol and PUF-PAS values were taken as geometric means. The red line represents the 1:1 line and the dashed lines represent the 2:1 lines (i.e. factor of 2).

A good agreement was found between our approach for estimating concentrations from PUF and Hi-Vol determined concentrations for the three comparison conducted, yielding an average congener specific method ratio (Active/Passive) of 1.1 ± 1.2. The Chicago comparison displayed bias towards PUF-PAS sampling with an average method ratio was 1.59 ± 1.45. While the Lancaster and Toronto comparisons showed bias towards Hi-Vol sampling, with average method ratios of 0.91 ± 0.20 and 0.62 ± 0.58, respectively.

Some variability for these comparison could be due to PAS concentrations representing 4 to 8 weeks, while Hi-Vol measured concentrations were calculated as the average value of 8 to 24 hour measurements. This difference in collection methods might lead to variability in the detection ability of the respective sampling media at low concentration. For congener concentrations above 1 pg m^{-3}, the average method ratio was 0.99 ± 0.92, while congener concentrations below 1 pg m^{-3}, the average method ratio was 1.98 ± 1.86. Other sources of variability could be attributed to meteorological variability during the deployment period and differences in sampler design/installation. Previous studies have shown that sampler installation (fixed or freely-swinging) can affect the internal air velocity, [79, 80] and that slight changes in bowl dimensions can affect uptake performance. [56] The model was designed for a fixed sampler installation with the dimension given (Table S2), therefore differences from the assumed installation can lead to uncertainty in the model performance.

Equilibrium Corrections

PUF-PAS samplers are commonly run in accumulation mode and uptake is linear as a function of time and the sampling rate (R_s). As accumulation approaches equilibrium, this assumption is no longer valid and the use of R_s will underestimate the airborne concentrations, particularly for lower molecular weight compounds. [54] The effective sampling volume approach implemented in our model corrects for equilibrium using hourly adjustments for K_{puf}. We evaluate the severity of this problem and illustrate the impact for a sample collected in Chicago. For this sample (Lemont site, deployed: 7/18/12 – 9/13/12) the impact was especially severe because it was a warm period (average deployment temperature: 23.5°C) and the deployment time (57 days) was longer than average (Figure 3). Using our model, the total concentration of PCBs yielded 504 pg m^{-3}, while assuming linear uptake the airborne concentration would be 305 pg m^{-3}. This is a 40% difference in concentrations when assuming linear uptake. This reduction is even more severe for lower molecular weight congeners. For example, monochlorinated PCB congeners show approximately an 85% difference and dichlorinated PCB congeners show approximately a 65% difference. Therefore, samples with a profile skewed to lower molecular weight congeners (Aroclor 1016/1242), the total airborne PCB concentration could be significantly under predicted using a linear approach.

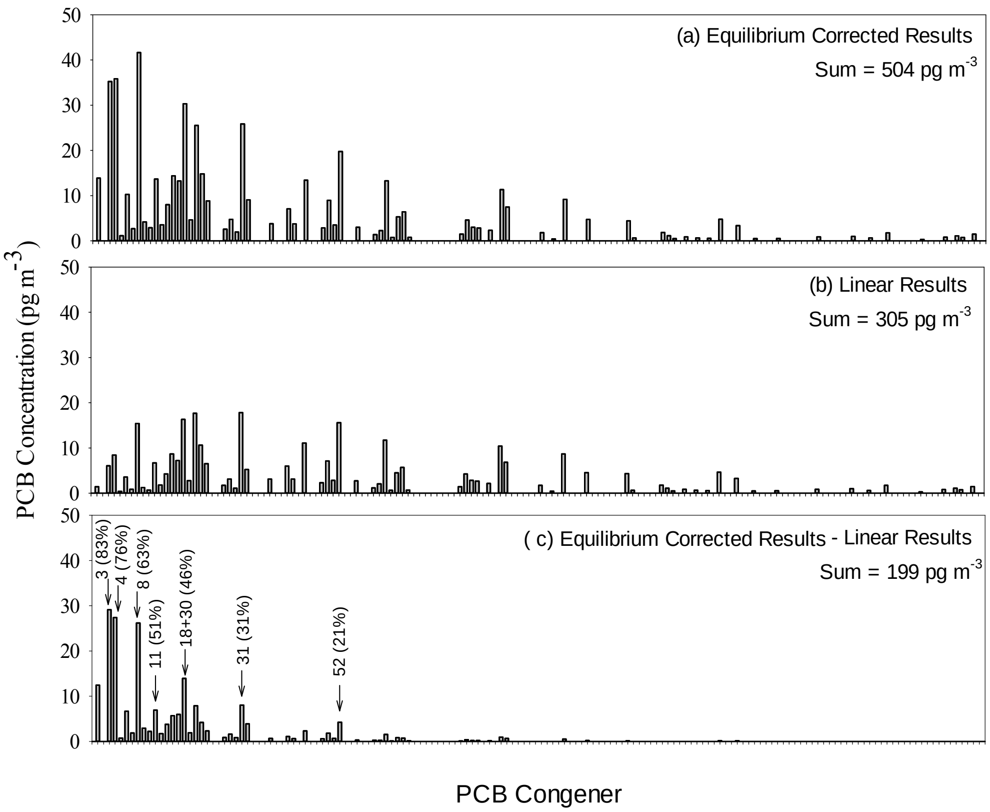

Figure 3: Congener concentrations determined from a PUF-PAS sample (a) using the V_{eff} calculated by this study, (b) using an assumption of linear uptake, (c) and the difference between the two results. The percentages in parenthesis are the percent difference between equilibrium corrected and linear results.

Effects of Temperature Changes

Large changes in temperature during deployment, and temperature increases in particular, can lead to errors in interpreting concentrations. Temperature changes affect gas-particle partitioning of PCBs, sampling medium, and airborne concentration,[53, 66] which can lead to difficulty in interpreting results. We accounted for the effects of temperature changes on the sampling medium with hourly temperature adjustments on K_{PUF} (a function of K_{oa}). We examined the impact of changing K_{PUF} hourly compared to a method involving adjusting K_{PUF} with daily temperature observations and averaging the adjusted K_{PUF} over the entire deployment time.[24]

When the air temperature increases over the deployment period, the capacity of the PUF disk to uptake PCBs decreases. This results in a shorter time to equilibrium and could cause degassing of accumulated chemical. This is a difficult problem that our method addresses. Similarly, temperature changes at the end of a deployment can dramatically impact the interpretation of the integrated air concentrations. Using average values will not adequately account for a consistent trend of temperature change,[24] and would display a bias for temperatures at the beginning of the deployment. Figure 4 shows effective sampling volume curves for a compound with K_{oa} of 10^6 with trends of decreasing and increasing temperature. Increasing temperatures can result in compounds reaching equilibrium during deployment. PCB1 is a clear example: the temperature trends at the end of the deployment has a significant effect on the final effective sampling volume computed with our approach because of the impact on the mass transfer driven by K_{PUF}. However, PCB congeners with K_{oa} greater than or equal to 10^8 are still in the curvilinear or linear phase at the end of the deployment, and the mass uptake is driven by k_v and a temperature jump towards the end of the deployment has little to no effect (Figure S2).

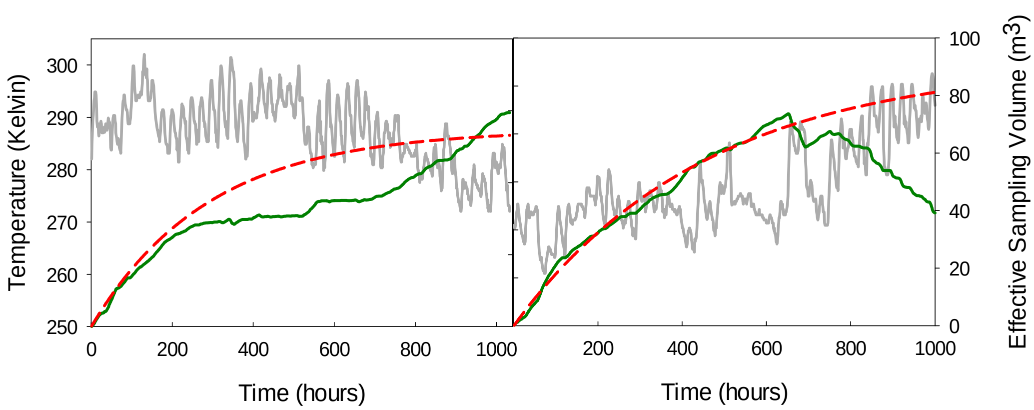

Figure 4: Example effective sampling volume curves for deployments with decreasing temperature (left) and increasing temperature (right) at a K_{oa} of 10^6 (~PCB 1). The solid grey line represents hourly air temperature. The solid green line represents the effective sampling volume calculated using the method of this study, including hourly adjustments on k_v and K_{PUF}. The dashed red line, represent effective sampling volume calculated using average values for k_v and K_{PUF}.

Long Deployment Periods

Although the PUF-PAS is designed to be deployed for 4-8 weeks, longer deployments are convenient when sampling in remote places. Our model for determining V_{eff} is effective for such events. We examine the utility of our method through a set of samples collected at the Jardine Water Plant in Chicago. Although most samples at this site were deployed for 6 weeks, one sample was deployed for 344 days from October 3th, 2011 to November 11th, 2012 (Figure 5). By the end of the deployment, we predict that 80 PCB congeners were no longer in the linear uptake and instead were at equilibrium, degassing, or in the curvilinear portion of the uptake curve. Using our model to predict the final V_{eff} for every compound in the sample, we find the ΣPCB concentration for the long deployment sample was 780 pg m^{-3}. This was not significantly different than the mean of all samples collected at the same site (800 ± 110 pg m^{-3}). This was true for most of the 159 congener sets as well: only 6 congeners or coeluting congeners (PCB3, PCB4, PCB16, PCB35, PCBs40+41+71, PCB159) during the long deployment exhibited concentrations outside the range of what was observed in all other samples (n=11) (Figure S4).

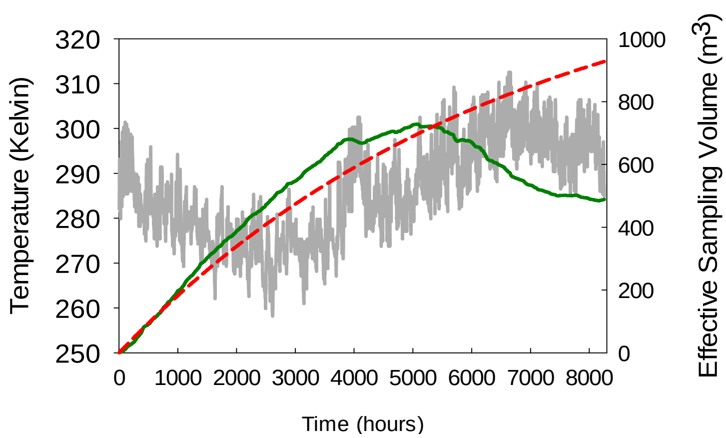

Figure 5: The trend in Veff is plotted for a compound with a Koa of 10^8 that accumulated in a PUF-PAS sampler deployed in Chicago over an unusually long deployment period (344 days). The solid grey line represents the hourly air temperature. The solid green line represents the effective sampling volume calculated using the method of this study, including hourly adjustments on k_v and K_{PUF}. The dashed red line represents the effective sampling volume calculated without hourly adjustment of k_v and K_{PUF}.

Effects of High Wind Speeds

Wind speeds at higher velocities can create sharply increased sampling rates, therefore decreasing the time for the effective sampling volume to reach equilibrium levels. Increased wind speeds decrease the thickness of the air-side boundary layer and therefore increase the sampling rate.[54] Tuduri et al. demonstrated in laboratory experiments that once the internal air velocity becomes greater than 1 m s^{-1} (~5 m s^{-1} external air velocity), the sampling rates increases drastically.[72] These results have also been observed in the field using depuration compound determined sampling rates at windy, coastal, and mountain sites.[30, 35, 36, 53]

Our model does not provide drastically increased sampling rates at values greater than ~5 m s^{-1} because it is calibrated using depuration compound results with average wind speeds over the deployment period ranged from 3.3 to 4.8 m s^{-1}, This at least partly explains why we predict higher concentrations using the PUF-PAS in Toronto than measured with a Hi-Vol. The average wind speed in Toronto during the study period was 5.1 ± 3.0 m s^{-1} and the average during the first 25 days of the study was 6.0 ± 3.4 m s^{-1}. At wind speeds greater than the calibration range, the effective sampling volume will be under-predicted using our model.

Implications

The results of this study elucidate and solve a major challenge in using PUF-PAS samplers for determining concentrations of semivolatile organic compounds (SVOCs) in air. This study provides an accessible method for determining the effective sampling volume for any PUF-PAS sample deployed in an environment similar to our calibration environment in Chicago. The model only requires basic Matlab knowledge, sampling metadata (spatial location, deployment data, collection date), the appropriate ISD meteorological data (processing with the provided script), and laboratory determined analyte mass.

The model results for the Chicago comparison was also compared with results obtained using the commonly used GAPS template.[26] When using the GAPS template it was assumed that the sampling rate was 4 (the default) and particle phase sampling rate as a fraction of gas-phase rate was 1 (i.e. equivalent). From only a subset of congeners compatible between the datasets, the method ratio using the GAPS template calculation was 0.75, while the method rate using the model was 1.09. A graph of this comparison can be found in the SI (Figure S5). For the lower molecular weight congeners (mono- to tetrachlorinated PCBs), the method ratio using the GAPS template calculation was 0.70, while the method rate using the model was 1.02. While the GAPS template provided a very similar result the model is able to calculate a compound specific sampling rate (Rs) instead of assuming the default from the GAPS template.

We also explored the possibility of using a linear free energy relationship (LFER) to predict K_{PUF} for PCBs partitioning to polyurethane foam disks.[81-83] The comparison of the K_{PUF} values for all 209 PCB congeners between the LFER method and the K_{oa} method was an average of 0.8 log units different at 0°C, and an average of 0.1 log units different at 35°C. A graph of this comparison can be found in the SI (Figure S6). The model results for the Chicago comparison were recalculated using the temperature dependent LFER for polyurethane foam given be Sprunger et al.[83] modified from Kamprad and Goss.[82] It was found the average method ratio for the Chicago comparison using the LFER determined K_{PUF} was 1.63, compared to 1.59 for the comparison using the temperature corrected K_{PUF} determined by the empirical relationship proposed by Shoeib and Harner.[51] A graph of this comparison can be found in the SI (Figure S7). For PCBs with lower K_{oa} values ($<10^9$), the LFER was 1.45 compared to 1.47 with the Shoeib and Harner relationship. For PCBs with higher K_{oa} values ($>10^9$), the LFER was 1.84 compared to 1.70 with the Shoeib and Harner relationship. From these results we decided to utilize the empirical relationship proposed by Shoeib and Harner for our study on PCBs.[51] However, the option to use the LFER to determine K_{PUF} remains an option in the model, if the user chooses.

There are several uncertainties in passive sampling methods that could improve the effectiveness of the model in certain scenarios. For example, the effect of particle-phase sampling on the PUF-PAS is still a debated issue.[25, 26, 38, 52-54, 56, 66]At this time the model does not consider the effects of particle-phase sampling rates on the effective sampling volume equation. PCBs are largely in the gas-phase and so this consideration is not important for this study. We have also assumed that the internal PAS housing temperature is equivalent to the ambient air temperature, but increased internal sampler temperature could affect the capacity of the PUF disk. Some studies have also shown that

SVOCs accumulate at greater levels in the outer layers of the passive sampling media, indicating a kinetic resistance to chemical transfer exists in the sampling media. [84, 85] This has also been observed in field studies in studies involving calibration passive air samplers. [49, 79, 84] Due to a lack of complete understanding of this process, the model does not currently account for sampler side resistance. Adjustments in the field operations or the model could potentially improve the accuracy of the V_{eff} prediction due to these issues.

Despite these uncertainties, we assert that the model described here can be utilized in any environment with weather parameters similar to the temperature calibration range (-6 to 23 °C) and wind speed calibration range (3 to 5 m s^{-1}). Higher wind speeds will increase the uncertainty of predicting the effective sampling volume, and therefore the prediction of airborne SVOC concentrations. This approach can be used with other SVOCs.[45] However, the effects of particle-phase sampling rates should be considered for SVOCs with large K_{oa} values. Given that the model was calibrated with a limited number of samples, increasing the number of samples, as well as increasing spatial and temporal variability, this calibration could better describe a wider range of meteorological conditions than what is observed in the city of Chicago.

Contrary to methods using depuration compounds and Hi-Vol calibrations, our approach provides a platform for accounting for deployments with significant temperature changes. The equilibrium status of PCB congeners, particularly the low molecular weight congeners (mono-, di-, and tri- PCB homolog groups) can be significantly affected by temperature changes towards the end of the deployment period causing a shift in the equilibrium level. This model can also allow for interpretation of long deployment samples. Changes in temperature and wind speed can vary greatly over the course of a long deployment, thus using average weather parameters to calculate effective sampling volume can lead to an under prediction of airborne SVOC concentrations.

CHAPTER III: CALIBRATION AND EVALUATION OF PUF-PAS SAMPLING RATES ACROSS THE GLOBAL ATMOSPHERIC PASSIVE SAMPLING (GAPS) NETWORK[2]

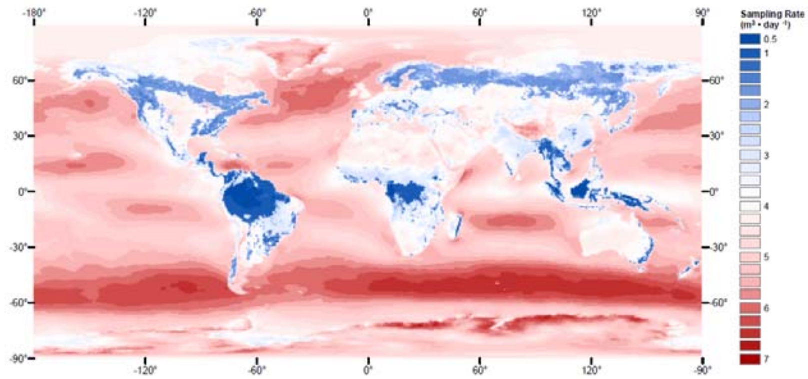

Figure 6: Table of content art for Chapter III.

Abstract

Passive air samplers equipped with polyurethane foam (PUF-PAS) are frequently used to measure persistent organic pollutants (POPs) in ambient air. Here we present and evaluate a method to determine sampling rates (R_S), and the effective sampling volume (V_{eff}), for gas-phase chemical compounds captured by a PUF-PAS sampler deployed anywhere in the world. The method uses a mathematical model that requires only publicly available hourly meteorological data, physical-chemical properties of the target compound, and the deployment dates. The predicted R_S is calibrated from sampling rates determined from 5 depuration compounds (^{13}C PCB-9, ^{13}C PCB-15, ^{13}C PCB-32, PCB-30, and d_6-γ-HCH) injected in 82 samples from 24 sites deployed by the Global Atmospheric Passive Sampling (GAPS) network around the world. The dimensionless fitting parameter, gamma, was found to be constant at 0.267 when implementing the

[2] Reproduced with permission from Herkert, N. J.; Spak, S.; Smith, A.; Schuster, J. K.; Harner, T.; Martinez, A.; Hornbuckle, K. C., *Environmental Science: Processes & Impacts* **2018,** *20*, (1), 210-219. Copyright 2018. The Royal Society of Chemistry. The Electronic supplementary information (ESI) is available free of charge online at DOI: 10.1039/c7em00360a.
Samples were provided by T. Harner and J. Schuster and analysis was conducted by the GAPS network at Environment Canada. Model development and characterization was conducted by N. Herkert in collaboration with S. Spak and A. Smith. New Bedford Harbor samples were supplied by A. Martinez and analyzed for depuration compounds by N. Herkert. Data analysis and manuscript was conducted by N. Herkert under the supervision of A. Martinez and K. Hornbuckle.

Integrated Surface Database (ISD) weather observations and 0.315 using the Modern Era Retrospective-Analysis for Research and Applications (MERRA) weather dataset. The model provided acceptable agreement between modelled and depuration determined sampling rates, with ^{13}C PCB-9, ^{13}C PCB-32, and d6-γ-HCH having mean percent bias near zero (±6%) for both weather datasets (ISD and MERRA). The model provides inexpensive and reliable PUF-PAS gas-phase R_S and V_{eff} when depuration compounds produce unusual or suspect results and for sites where the use of depuration compounds is impractical, such as sites experiencing low average wind speeds, very cold temperatures, or remote locations.

Introduction

Passive air samplers equipped with polyurethane foam (PUF-PAS) are commonly used to measure and assess atmospheric concentrations of persistent organic pollutants (POPs). PUF-PAS samplers have been used to measure regional spatial and temporal trends in urban areas, [15-17, 19, 21, 22, 27, 34, 37, 45, 59, 86] estimate the human exposure potential[15, 37], and assess the global fate and transport of POPs. [21, 32, 35, 36, 50] Despite their widespread use by researchers, PUF-PAS samplers can be subject to significant human error and uncertainty in interpretation. These challenges are often associated with the determination of sampling rates and effective sampling volumes.

The most widely accepted method for determining effective sampling rates for PUF-PAS samplers relies on the loss of depuration compounds.[15, 20, 24, 33, 35, 38, 41, 50, 52-55] Harner and colleagues have used this method to determine the sampling rates for thousands of samples deployed by the Global Atmospheric Passive Sampling network (GAPS) and published a widely used spreadsheet for calculating sample effective volume from depuration recoveries.[15, 22, 24-26, 30, 35, 36, 50] This approach has been shown to be effective as long as the depuration compounds are injected and recovered in a consistent and reproducible way. Unfortunately, consistent and reliable use of these compounds requires skilled personnel and reproducible laboratory methods not always available for sample deployment worldwide. They are also expensive to use, prone to human error, unsuitable for sampling in low temperatures, and are only applicable to a narrow range of chemicals.

In the absence of reliable depuration compounds, a constant value (4 m^3 d^{-1} for polychlorinated biphenyls (PCBs), for example) may be assumed for the sampling rate.[19, 50, 53, 56] For PCBs, this value was approximated from depuration data and also from other reports that used uptake experiments and calibration with other sampling methods, including low volume and high volume active samplers.[16, 17, 34, 38, 41, 49-53] This approach fails to resolve variability in local meteorological conditions and is inappropriate for estimating sampling rates for other compounds.[38-40, 65] In extreme environments, like high mountaintops and remote regions of the world, the inability to consider the effect of local meteorological conditions may negate the benefit of using passive samplers.[30, 36, 53]

We have previously shown that sampling rates of gas-phase PCB congeners for a PUF-PAS sample can be modelled as an air-side diffusive mass transfer process, calibrated using flow rates determined from depuration compounds and meteorological measurements (temperature, pressure, wind speed, humidity) as well as chemical characteristics (octanol-air partitioning coefficient (K_{oa}), molecular weight (MW), and internal energy of transfer).[57, 59] A model was calibrated from and tested on airborne PCBs collected in Chicago and other locations with local meteorology similar to our calibration sample set.[59] However, when we applied the model to a more geographically diverse dataset, our model failed in regions that experienced more extreme weather conditions. At very high and very low wind speeds, the Chicago sampling rate model produced unreasonable results (Figure S1).

The central goal of this study was to develop a useful and practical tool to predict sampling rates for specific PUF-PAS deployments without the use of depuration compound recoveries while still resolving the effect of local meteorological conditions. We hypothesized that a recalibrated model using a larger and more diverse dataset of sampling rates would be able to predict sampling rates for deployment of the PUF-PAS samplers anywhere in the world with accuracy comparable to or better than known analytical uncertainties when using depuration compounds. The specific objectives of this study were to 1) Calibrate a model from flow rates determined from depuration compounds that were deployed in a wide variety of conditions around the world; and 2) Examine the performance and the global spatial distribution of the modelled sampling rates.

Theory

The uptake of semi-volatile organic compounds (SVOCs) on a PUF disk has been represented as a function of a diffusive sampling rate (R_S, $m^3\ d^{-1}$) and the concentration gradient between the air and PUF sample (eqn. 1).[25, 41, 51, 54, 57, 59, 65]

$$\frac{dM_{PUF}}{dt} = R_s\left(C_{air} - \frac{C_{PUF}}{K_{PUF}}\right) \tag{1}$$

where M_{PUF} is the mass of the target compound measured on the PUF sample. The sampling rate can be determined as a function of an air-side resistance dominated mass transfer coefficient (k_V, $m\ s^{-1}$) and the surface area of the sampling PUF (A_S).

$$R_s = k_v A_s \tag{2}$$

Here we describe the mass transfer coefficient using the equation for laminar flow along a flat plate.[87] Although we do not expect the flow to be laminar within the sampler, this equation was selected as reasonably representative of the effect of wind speed and air temperature on the diffusion-limited mass transfer coefficient. The equation is as follows

$$\frac{k_v l}{D} = \gamma\left(\frac{V_i l}{v}\right)^{1/2}\left(\frac{v}{D}\right)^{1/3} \tag{3}$$

where γ is a dimensionless empirically calibrated constant, D is the molecular diffusivity for each compound ($m^2\ s^{-1}$), V_i is the wind speed inside the PAS chamber ($m\ s^{-1}$), v is the kinematic viscosity of the air ($m^2\ s^{-1}$), and l is the length of mass transfer (m). If the system was ideal, γ would equal 0.646 for laminar flow along a flat plate, but due to non-ideal behavior we expect this value to be different. We previously reported a more complex version of the above equation as a method for predicting mass transfer that had γ as a function of wind speed and temperature for the calibration of sampling rates predicted in our Chicago study.[57, 59]

While the focus of this study was the estimation of R_S, the final output of the model is an effective sampling volume (V_{eff}, m^3) specific for the compound as well as the deployment site and dates. The effective sampling volume accounts for non-linear uptake and the model calculates a compound-specific effective sampling volume integrated at 1 hour time intervals over the deployment period with the following equation,

$$\frac{dVeff}{dt} = \frac{R_S}{V_{PUF}}\left(V_{PUF} - \frac{V_{eff}}{K_{PUF} \cdot d_{PUF}}\right) \quad (4)$$

where V_{PUF} is the volume of the PUF disk (m^3), K_{PUF} is the temperature corrected PUF-air equilibrium partitioning coefficient ($m^3\ g^{-1}$), and d_{PUF} is the density of the PUF disk ($g\ m^{-3}$).[59] The V_{eff} used to calculate air concentrations (C_{air}) from the chemical mass on the PUF disk sample is the summation of the hourly effective sampling volume (dV_{eff}) over the deployment period, as given by equation 5.

$$C_{air} = \frac{M_{PUF}}{V_{eff}} \quad (5)$$

Methods

Data Sources

The Global Atmospheric Passive Sampling (GAPS) Network was selected as the global recalibration dataset. The GAPS network was formed in December of 2004 and has included more than 50 sites around the world.[33] The GAPS program is operated by a volunteer network that is coordinated through a central laboratory operated by Environment and Climate Change Canada (ECCC), where samples are analyzed.[31] Our study considered 290 samples deployed in 2006 and 2007 and spiked with seven depuration compounds [^{13}C labelled PCB congeners 9, 15, 32, 107, and 198, PCB-30, and gamma-Hexachlorocyclohexane (d_6-γ-HCH)]. The GAPS network is operated with extensive quality assurance and quality control (QA/QC), generally having method recoveries greater than 85% and has instrumental detection limits (IDL) below 1 pg. Both field and lab blanks are analyzed regularly and typically show levels at or below the IDL.[35, 36]

We examined two potential sources of meteorological data: local measurements collected at a nearby airport or meteorological station; and meteorological data estimated from a global weather reanalysis. Measurements of local hourly and synoptic meteorological conditions at 14,000 active sites are reported through the Integrated Surface Database (ISD) released by the National Oceanic and Atmospheric Administration's (NOAA) National Environmental Information (NCEI).[73, 88] We acquired ISD weather data from the nearest observations for 38 GAPS sites, at a median distance of 13 km from their respective sampler. Before implementation of the ISD dataset, we ran quality tests to detect any missing or erroneous data and removed them from consideration. Only sites for which the weather data meet the following quality constraints were used: (1) a minimum resolution of 3-hour measurements for each variable, (2) no continuous missing data for any single parameter longer than 72 hours, and (3) site is reasonably close/representative (median distance 13 km) of sampler deployment location conditions. For instances where a weather parameter was not present for a given hour, a persistence policy was used by assigning it the last observed value for that interval.

The second weather dataset was the Modern Era Retrospective-Analysis for Research and Applications (MERRA) maintained by the National Aeronautics and Space Administration (NASA) agency. The MERRA dataset is a global weather reanalysis that provides hourly two-dimensional data, including surface, fluxes, and vertical integrals, generated using version 5 of the Goddard Earth Observing System Data Assimilation System (GEOS-5 DAS) at one-half by two-thirds degree resolution.[89] The MERRA dataset offers meteorological data for temperature, specific humidity, and wind speed at 2 m or 10 m above ground level (AGL), while also offering wind speed at 50 m. The MERRA wind speed used for this study was at 2 m AGL, consistent with the GAPS observational protocol.

Initially, supplying local measurements for weather data (with the ISD dataset) for each sample was preferred for all components of the model. However, upon expanding the scope of applicability and wanting to ensure the model could be used anywhere on the globe, it was necessary to use modeled weather data was accurate and available anywhere on the globe (with the MERRA dataset).

Model Calibration

The value of γ was empirically determined using a calibration subset of depuration derived sampling rates reported for 290 samples deployed in 2006 and 2007 by the GAPS program. Sampling rates for all seven depuration compounds (^{13}C labelled PCB congeners 9, 15, 32, 107, and 198, PCB-30, and d_6-γ-HCH) were considered for the calibration subset. Depuration compounds are most effective for sampling rate determination if a portion, but not the total, injected mass volatilizes during sample deployment. Therefore, we selected the calibration subset of sampling rates from only samples with acceptable depuration compound recoveries and complete meteorological data. We chose only those sampling rates calculated from depuration compounds with recoveries below 65% to ensure significant loss, consistent with guidelines in Pozo et al.[35] This excluded all samples below 0°C from use in the calibration. The effectively nonvolatile compounds, ^{13}C PCB-107 and ^{13}C PCB-198, were used as a normalizing factor for calculating the recovery of the others. Each of the samples selected had acceptable results for at least one of the five remaining depuration compounds. We further restricted the calibration subset to deployments with nearby meteorological stations and complete meteorological data as described above. This approach produced a calibration subset of sampling rates for 82 samples deployed at 24 locations (Table S2) from the initial 290 samples. For this calibration subset, γ was calculated for each depuration compound in the 82 samples.

Many different forms of multiple linear regressions (MLRs) and regression trees were explored as potential methods for the recalibration of γ. These regression methods were evaluated using the Matlab R2016a software. The MLRs were primarily done with the Curve Fitting Toolbox add-in. MLRs are global models and rely on a single simple relationship explaining the dataset, while a regression tree is a form of decision tree where binary nodes are used to group data in to small, related subgroups that can be simply expressed with real numbers.[90] The regression tree approach is often much better for handling large datasets with many inputs (predictors) that interact in very complicated, non-linear ways.[91] To avoid over-fitting the data, a leave-one-out cross-validation method was used when creating regression trees.

Results and Discussion

A detailed discussion about the recalibration process is available in the supporting information. Briefly, the most reliable γ value was a constant γ for all deployments and compounds. Unsurprisingly, the two different weather datasets produced different calibration factors because they are fundamentally different. The constant γ was determined to be 0.267 for the ISD weather dataset and 0.315 for the MERRA weather dataset. Recall, for laminar flow along a flat plate γ would equal 0.646, therefore our results seem reasonable. The results of the model calibration are evaluated for PUF-PAS deployments in a wide range of conditions, including those with very low wind speeds, gusty environments, polar and other remote locations, and near urban areas and large sources.

The 2006-2007 GAPS sample set has the potential to provide 1796 unique depuration determined sampling rates. Of those 1796, 346 were stable depuration compounds used to normalize the other compounds, reducing the usable number to 1450. After removing samples with greater than 65% depuration compound recovery, samples with average temperatures below zero ºC, and other outliers, that number is reduced to 857. Thus, only 48% of the initially available unique depuration values were considered useful for determination of a sampling rate. Of the initial 290 GAPS samples, 41 did not yield any reliable depuration results. The model now allows these samples to be accurately interpreted by providing a deployment specific sampling rate estimate.

Global Distribution of Sampling Rates

This model provides compound-specific sampling rates for any location across the globe over any current or historical deployment. To illustrate, we calculated an annual sampling rate (for 2006) at a 2 m height above the ground, across the entire global MERRA weather grid (Figure 7) for a tri-chlorinated PCB congener (MW = 257 g mol^{-1}). The global average sampling rate can be determined for any compound appropriate for PUF-PAS sampling. For example, the average global sampling rate for a tri-chlorinated PCB congener in 2006 was 4.58 ± 1.17 m^3 d^{-1}. The sampling rates calculated for all deployments were not strongly correlated to latitude ($R^2 = 0.157$) or temperature (R^2=0.001), and were primarily a function of wind speed ($R^2 = 0.910$).

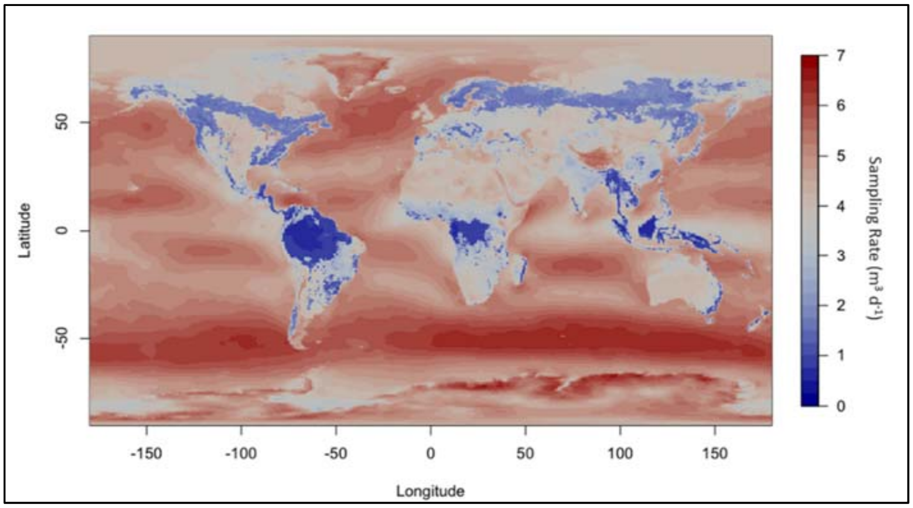

Figure 7: Annual mean PUF-PAS sampling rate (m^3 d^{-1}) of a tri-chlorinated PCB congener in 2006.

At the global scale, there is little seasonal variability for a tri-chlorinated PCB congener, and global average for Rs varies less than 1% between each quarter of 2006. However, individual locations displayed differences in seasonal averages. For example, in Chicago (Latitude: 41.881832; Longitude; -87.623177) the sampling rate varied from 4.2 m^3 d^{-1} in quarter 1 to 3.9 3.5, 4.1 m^3 d^{-1}, for quarters 2, 3, and 4, respectively. These quarterly averages for sampling rates are strongly correlated with quarterly average wind speed (R^2 = 0.987). As expected, the average global sampling rate for tri-chlorinated PCBs is near 4 m^3 d^{-1}. For a tri-chlorinated PCB congener, approximately 50% of the earth's surface would fall in a range of 4 ± 1 m^3 d^{-1}, while 88% of the earth's surface would fall in a range of 4 ± 2 m^3 d^{-1}. Similarly, for the samples collected by the GAPS Network in 2006 and 2007, approximately 31% of depuration results for tri-chlorinated biphenyls fall in a range of 4 ± 1 m^3 d^{-1}, while 62% of depuration results fall in a range of 4 ± 2 m^3 d^{-1}.

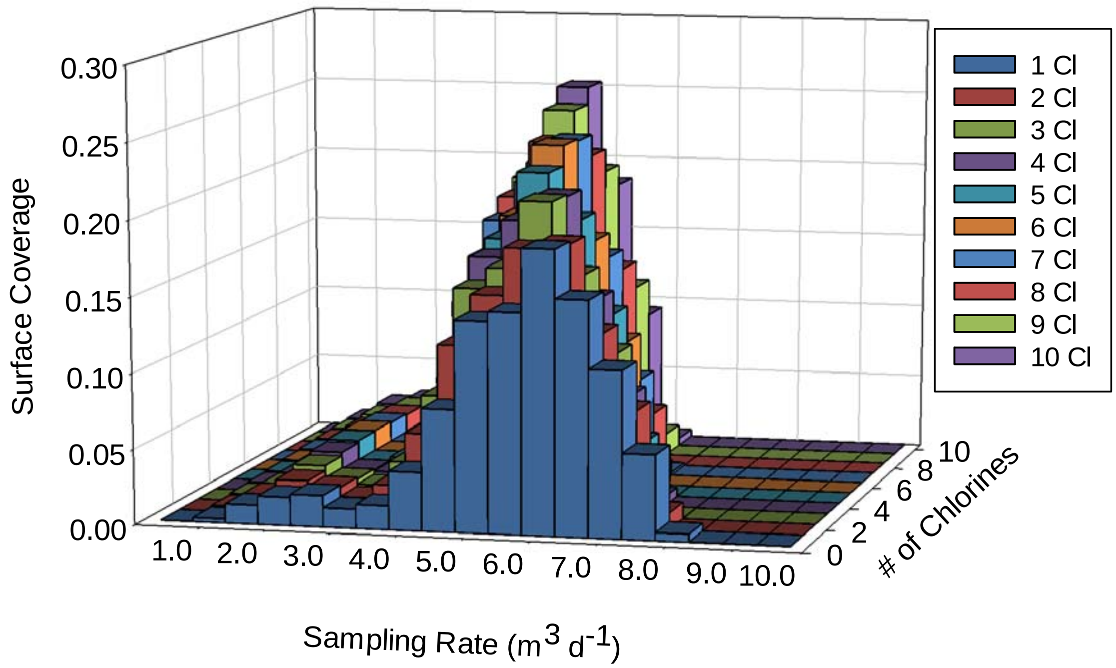

Figure 8: Histogram of the yearly averaged (2006) modelled sampling rates for PCB congeners with percent of global surface coverage as the bin value.

Table 1: Summary of mean sampling rates (m^3 d^{-1}) and percent surface coverage for the different PCB homolog groups.

Homolog	**Rs (m^3 d^{-1})**	**St. Dev**	**% Surface Coverage < 2 m^3 d^{-1}**
Mono-	5.08	1.30	4.6%
Di-	4.80	1.23	5.0%
Tri-	4.58	1.17	5.4%
Tetra-	4.39	1.12	5.6%
Penta-	4.23	1.08	5.9%
Hexa-	4.09	1.05	6.1%
Hepta-	3.97	1.02	6.3%
Octa-	3.86	0.99	6.5%
Nona-	3.76	0.96	6.6%
Deca-	3.67	0.94	6.8%

Model Performance in Low Wind Speeds

The modeled R_S method is a particularly good alternative to depuration compounds for deployments with very low average wind speeds; conditions common at sites with heavy forest cover, such as the boreal forest or Amazon Rainforest. In these conditions, a small percentage (<20%) of the injected depuration compounds are volatilized during deployment, leading to highly uncertain sampling rate determination. Approximately 8.7% of the earth's surface had an annual sampling rate below 3 m^3 d^{-1}, while 5.4% was less than 2 m^3 d^{-1} and 1.3% was less than 1 m^3 d^{-1} for trichlorobiphenyls (Table 1). Low R_S values are expected because the model uses 2 m heights for the meteorological data, consistent with the deployment heights used by GAPS. At this height of 2 m forest cover significantly effects the meteorological conditions. If the sample were deployed in a forest clearing or above the forest canopy, corrections would be required. Fortunately, MERRA provides the capability to directly simulate R_S at 10 m or 50 m AGL. It is expected that the calibration described here would be valid for any height, although this was not specifically tested, and may be biased at wind speeds substantially higher than those represented in the calibration dataset.

Two GAPS sampling sites from 2006 or 2007 with depuration results (excluded from the recalibration) helped to validate model performance at low sampling rates. One of these sites was Tapanti National Park in Costa Rica and the other was Lasqueti Island, British Columbia, Canada. The comparison between depuration and modelled sampling rates for ^{13}C PCB-9 for these sites is shown in Figure 9. The depuration results from Tapanti National Park for 2006 and 2007 averaged 0.6 m^3 d^{-1}, while the model results averaged 1.1 m^3 d^{-1}. At the Lasqueti Island sampling site, the depuration results averaged 2.0 m^3 d^{-1}, while the model results averaged 1.4 m^3 d^{-1}. Both the predicted R_S and the depuration R_S values were significantly lower than the global average, with similar values that support the validity of the method. The depuration method is subject to analytical uncertainty, and we expect that uncertainty is the explanation for the differences between the R_S values from the two methods illustrated in Figure 9. Only 23 of 60 depuration compounds measurements in the 12 samples listed in Figure 9 were considered "reliable," and 10 of those "reliable" results were for ^{13}C PCB 9, the most volatile of the depuration compounds used. No depuration results were reliable for the Tapanti National

Park sample deployed from July 7, 2007 to December 2, 2007. The model presented here is a good substitute should depuration compounds be found questionable in a sample. If a sampling rate of 4 m^3 d^{-1} were assumed for this sample instead of using the modelled value of 1.02 m^3 d^{-1}, the estimated airborne concentration would be underestimated be a factor of 4.

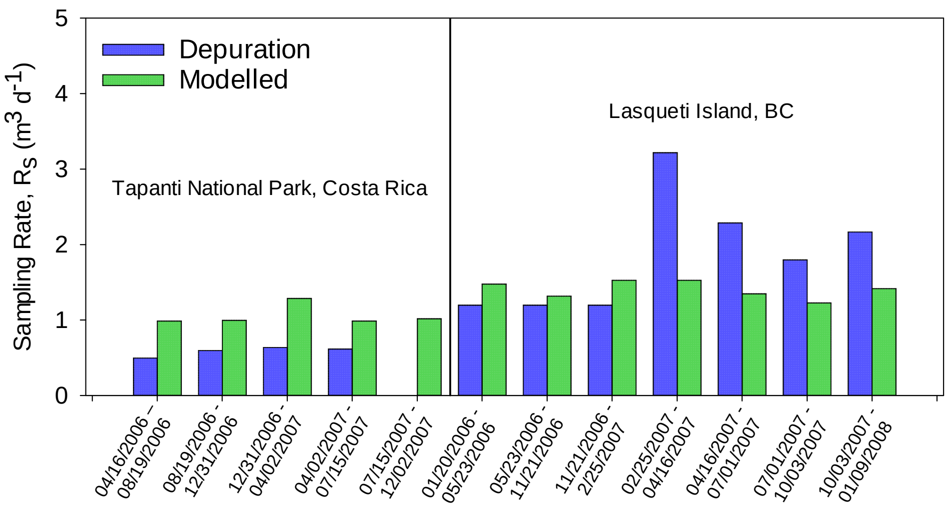

Figure 9: Comparison between depuration and modelled sampling rates for ^{13}C PCB-9 for two GAPS sampling sites. The Tapanti National Park sampling site is in Costa Rica and Lasqueti Island sampling site is in British Columbia, Canada.

Model Performance in Polar Regions

The modeled Rs method is a good alternative to depuration compounds for PUF-PAS deployments in the Polar Regions. Samples collected in extremely cold temperatures typically do not exhibit enough loss of depuration compound to accurately determine a sampling rate. Therefore, there are few measurements in this domain to compare with modelled results. Between 2006 and 2007 there were 22 GAPS samples deployed in the Arctic (above 66.563º latitude). Of the 5 depuration compounds in each sample, only 40% were deemed reliable and only 32% were deemed reliable when the mean temperature was less than 0°C. The depuration results showed a high variability ranging from 0.9 to 24 m^3 d^{-1} for all compounds, and individual samples often showed disagreement between depuration compounds, averaging a 300% difference between the maximum and minimum. The difficulty of assessing depuration compound results from Polar Regions is alleviated with the model. The average modelled sampling rate for a tri-chlorinated PCB congener in the Arctic was 4.15 ± 0.61 m^3 d^{-1}.

Model Performance in High Wind Speeds

The model is less effective for sites with very high average wind speeds. Sampling rates in gusty environments can be difficult to interpret because of the high variability over the deployment period. This effect has been observed in depuration compound results at windy sites.[30, 35, 36] The model calculates a sampling rate from hourly meteorology instead of using average weather parameters, thereby capturing some of the variability but not intense and short term variations. At high wind speeds (>5 m s^{-1}) the PUF-PAS sampler may also behave differently, and experience non-linear aerodynamics.[53, 72] At high wind speeds, the air side controlled mass transfer assumption is less reliable. It is helpful to note, however, that higher wind speeds often result in a rapid approach to chemical equilibrium. The model corrected for this non-linear uptake and approach to equilibrium through the calculation of effective sampling volume. This feature of the model has been discussed in detail previously.[59]

Independent Datasets

We evaluated the performance of the R_S model against independent measurements in three ways. First, as described above, we evaluated the performance for GAPS samples with high quality depuration data that also were not used for calibration (Figure 9). Second, we evaluated samples deployed near a major PCB source with depuration compounds measured in our laboratory. Third, we calculated and compared R_S for deployments reported in the literature.

Our laboratory collaborated with Boston University to deploy and measure airborne PCBs near a major source, New Bedford Harbor (NBH), a Superfund site in Massachusetts contaminated with PCBs. Details of the study are provided elsewhere.[42] During the summer and fall of 2015, PUF-PAS samples were deployed at 17 or 18 different locations for 3 periods lasting ~6 weeks, shorter than the typical deployment of 3 months used by GAPS. Prior to deployment, each of the 53 samples were spiked with 3 depuration compounds - one of which was used as a positive control - providing 106 potential values for R_S. Only 7 showed depuration compound recovery less the criteria of

65%, rendering the depuration results unreliable – a situation that we now understand is common. These seven values rates compare very well to modeled R_S values for the same samples (Figure 10).

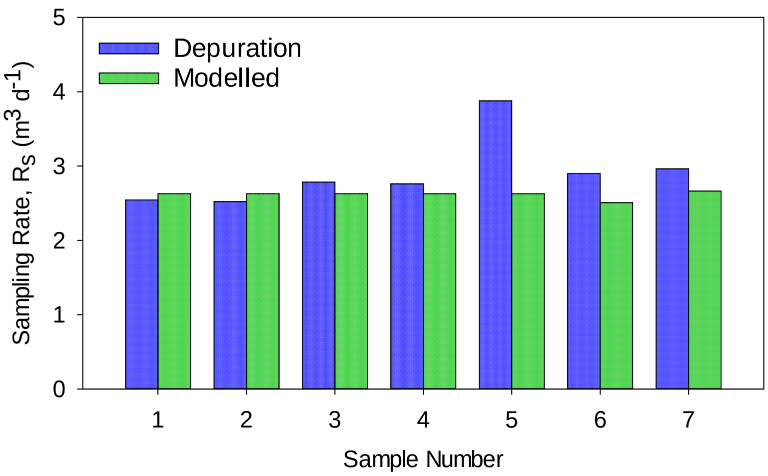

Figure 10: Comparison of depuration-determined and modelled sampling rates in an independent dataset deployed in the summer and fall of 2015 in the New Bedford Harbor (NBH) area. All values presented here are for ^{13}C PCB-28 and had a depuration recovery (C/Co) less than 65%.

The average bias for these 7 samples was 11%, and drops to just 5% if removing one outlier sample deployed at the NBH-15 site from 07/09/2015 – 08/20/2015. This sample was collected at a site immediately adjacent to the bay and may have experienced different meteorological conditions from the other sites. This highlights the sensitivity of the weather data and the notion that some samplers may experience microclimates within a sampling region that are not all perfectly represented by the weather data, while also highlighting that most samples in a region can be described by a central measurement. However, the modeled and depuration results are still in reasonable agreement and we conclude that the modeled R_S method is a particularly good alternative to depuration compounds for PUF-PAS deployments near major sources. Samples collected near major sources require shorter deployment periods to reach analytical detection limits. However, shorter deployment periods reduce the precision and accuracy of the depuration results by not allowing for adequate loss (< 65% recovery.) In addition, high levels of target compounds on the PUF samples may interfere with the detection of depuration compounds, especially when the ambient concentrations are unexpectedly high or unlabeled depuration compounds are implemented.

We also compared our modelled sampling rates to deployments reported in the literature. We identified a set of studies reporting sampling rates for PCB compounds from either depuration compounds or chemical uptake studies (Figure 11). These studies report a range of chemical compounds in a range of environmental conditions with varying analytical protocol. In some instances for the comparison the locations/deployments times had to be approximated. Model modifications were made to appropriately account for the nuances of varying sampler designs and PUF substrate where appropriate and possible. However, not everything could be accounted for such as sampler height or wind speed adjustments (based on building/tree interference), because they were not reported. Of the 19 studies examined for this comparison, 5 studies fell within ±10% bias between modelled and measured sampling rate, 9 studies fell within ±20% bias, and 13 studies fell within ±30% bias. It is difficult to determine the reasons for the nuanced differences between modelled and measured sampling rates for these studies due to the wide scope of protocols, samplers, geography, etc. However, in general it appears that studies that cover a larger spatial scales displayed higher mean biases between measured and modelled value, likely due to the influence of more outlier sites/measurements. It also appears that in general sampling rates determined from active sampler calibrations exhibit greater bias when compared to PUF-PAS concentrations that use our sampling rate predictions. They may be due to the other differences in the two approaches – including the collection of air over different time scales. The difference may also be due to particle phase sampling with PUS-PAS.

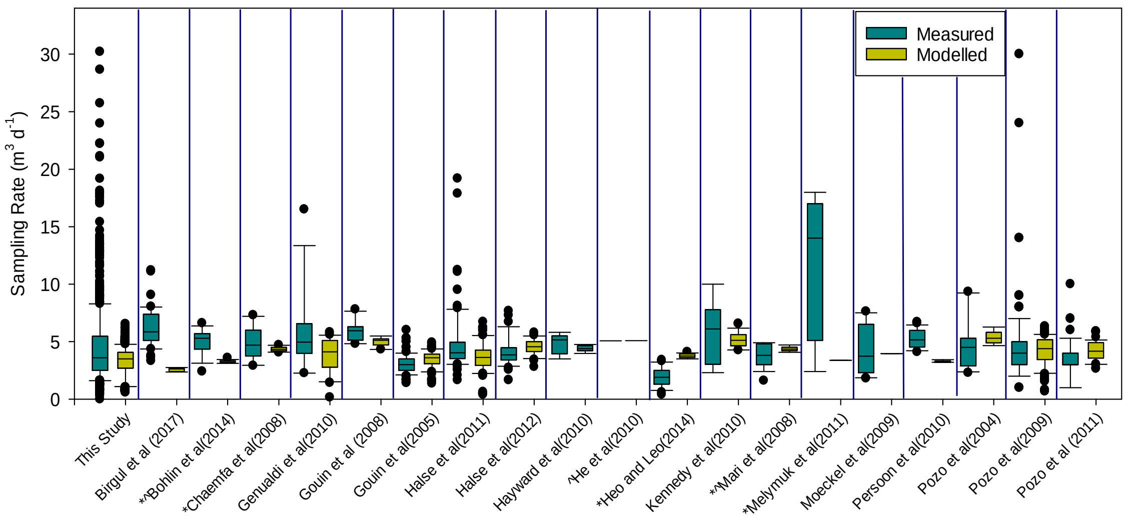

Figure 11: Approximated modelled results for numerous independent studies reporting PUF-PAS sampling rates for a range a different chemicals in a range of different environmental conditions. [15, 20, 21, 24, 27, 30, 35, 36, 38, 40, 49, 52, 65, 92-98] The * denotes studies that conducted active sampler comparison (no * indicates DCs were used). The ^ denotes studies with a different sampler design than the default design (24 cm top bowl, 20 cm bottom bowl).

Conclusion

This model (provided in the Supporting Information) may be used to predict a gas-phase sampling rate for a PUF-PAS sample in any environment on the globe for a "flying saucer" PUF-PAS sampler (24 cm top bowl, 20 cm bottom bowl, 12 cm height, 2 cm gap, 1.5 cm overlay).[24-26, 30, 36, 51, 72]. The model provides a sampling rate in any environment while removing much of the uncertainty involved in the use of depuration compounds. It only requires hourly weather inputs and the molecular weight of the compound of interest to determine a compound specific, deployment specific, and location specific sampling rate based on hourly calculations. With a few addition chemical properties a compound specific, deployment specific, and location specific effective sampling volume can also be determined. The ISD and similar surface observational data can be simply used directly as a weather data source, and the MERRA weather dataset can be used in the absence of local observations. This allows the model to serve as a platform for examining large global datasets with less uncertainty attributed to the sampling rate determination. Although assuming a sampling rate from prior reported field studies has been shown to be reasonable for most locations, it does not account for the effect of local meteorology as the model does. The model also provides a tool to generate information in the pre-deployment stage of the sampling campaign. It can be used to provide insights on length of deployment to stay in linear uptake phase, potential behavior of new chemical contaminants, and location siting.

In addition to the R_S value predicted by this model for any location on the globe, the model also predicts the effective sampling volume (V_{eff}), as a function of the deployment site, deployment period, and target compound. The model calculates the cumulative effective sampling volume for every hour of deployment. The benefit of calculating the effective sampling volume hourly, instead of using weather parameters averaged over the sample deployment period, has been discussed elsewhere.[59]

The validity of this model is dependent on the accuracy of the depuration compound method for determining sampling rates: the model assumes that the dynamics of labeled depuration compounds are representative of any compound that can be sampled with PUF-PAS. Similarly, this model is meant for gas-phase compounds only, as it does not consider the uptake processes of particle-phase compounds. To account for particle phase sampling there would need to be consistent globally applicable datasets for total suspended particles, a measure of the gas/particle partitioning, and an estimate of the flow of particles into the sampler housing and onto the PUF. Given the uncertainty in these processes and the ongoing research on the topic,[38, 50, 56, 66] sampling of particle-associated POPs are not supported in this version of the model. Some studies have also shown that SVOCs experience a kinetic resistance to chemical transfer from chemicals accumulating in the outer layers of the cylindrical PUF plug sampling media. [84, 85] This has also been observed in field studies. [49, 79, 84] . However, calibration studies of the PUF disk sampler have not revealed a bias of lower sampling rates for high Koa chemicals in PUF disks suggesting that this resistance is less important for the thin-disk geometry of the PUF disk, where air flow and chemical exchange occurs from the top and bottom of the disk, which would enhance chemical movement/dispersion within the disk.[50] Due to a lack of complete understanding of this process, the model does not currently account for sample side resistance, however, potential effects of sampler side-resistance, if significant, would be accounted for in the empirical data used to calibrate the model.

Although the model was calibrated and implemented using PCB depuration compounds and lindane ($\log(K_{oa})$ ~7-9), it is applicable to other POPs if the physical-chemical properties are known. However, caution should be exercised towards particle dominated POPs ($\log(K_{oa}) >> 10$), and highly volatile ($\log(K_{oa}) << 6$) POPs as they start to drastically deviate from the calibration dataset. Despite these remaining uncertainties, this study provides an accurate unified method of determining sampling rates for large-scale PUF-PAS studies.

CHAPTER IV: EXAMINING THE UTILITY AND LIMITATIONS OF A PUF-PAS SAMPLING RATE MODEL APPLIED GLOBALLY USING A GRAPHICAL WEB INTERFACE[3]

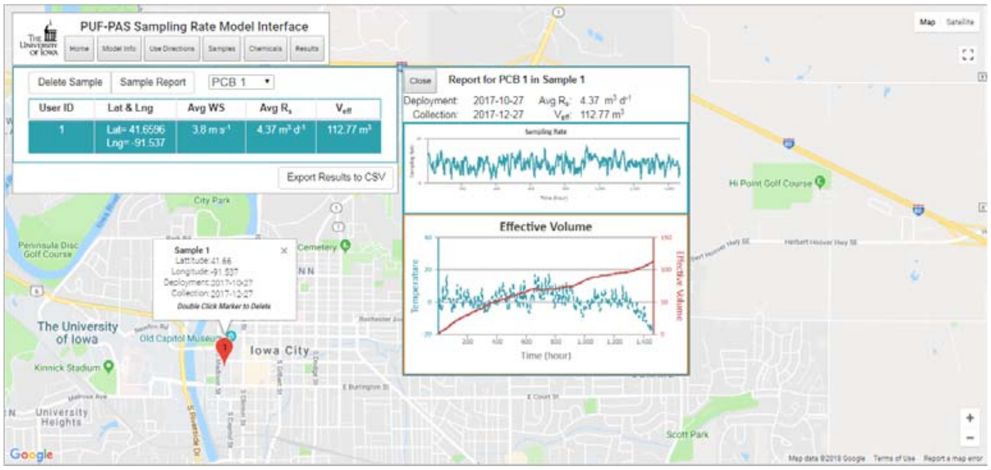

Figure 12: Table of content art for Chapter IV.

Abstract

A web-interface was developed to determine an accurate sampling rate (R_s) for polyurethane equipped passive air samplers (PUF-PAS) in any outdoor environment on the globe. The interface was developed from a previously published mathematical sampling rate model, originally developed as a series of MATLAB scripts. The web interface prompts users to specific the time and location of a PUF-PAS deployment, as well as the target chemicals for analysis. The interface returns a sample specific R_s and effective sampling volume (V_{eff}) for every target analyte. The interactive interface also provides time-series plots of the modeled R_s and V_{eff}. This interface has many important potential applications especially in the early stages of pre-deployment planning. The interface has a few current limitations surrounding its adaptability to a wider range of chemicals and more diverse weather data inputs. Despite these hindrances, this web-interface is a powerful tool for predicting and studying PUF-PAS sampling rates around the world.

[3] This chapter was prepared as if it were to be submitted to the journal *Environmental Modelling & Software* as a short communication and therefore follows a recommended structure by the aforementioned journal. All code development, web-features, database structures, etc. were designed and developed by N. Herkert. The chapter was written by N. Herkert under the supervision of K. Hornbuckle.

Software Availability

Developer: Nicholas J. Herkert, The University of Iowa

Contact Information: 4105 SC, The University of Iowa, Iowa City, IA 52242

Software required: internet browser (later versions recommended)

Program Languages: HTML, JavaScript, PHP, PostgreSQL

Availability: Available free of cost at http://s-iihr41.iihr.uiowa.edu/pufpas_model/

Introduction

Polyurethane equipped passive air samplers (PUF-PAS) are a powerful instrument in elucidating airborne persistent organic pollutants (POPs) around the world.[15-37, 39, 43, 44, 59, 61] The most significant challenge when using this sampler design is the determination of an accurate sampling rate (R_s, m^3 d^{-1}).[33, 36, 38, 41, 50, 52, 53] We have previously developed and characterized a mathematical model for accurate determination of a sample specific sampling rate anywhere on the globe.[57, 59, 60]

Here we present an examination of the utility and limitations of the previously developed global sampling rate model using a graphical web based interface. The web interface is a map based interface that allows the user to identify a sampling site and deployment period for a PUF-PAS sample placed anywhere on the globe and select chemicals of interest. The model returns an output including a sample specific R_s and effective sampling volume (V_{eff}). The model also returns a time-series plot illustrating the predicted R_s and V_{eff} over the deployment period for each compound and sample. The user may export the data to a comma delimited file (csv) for further use.

Related Work

Online visualization tools are an important method of disseminating data to the public or researchers. They have increased access to real time data for a variety of applications, including flood forecasting and air quality monitoring.[99-105] There are many visualization tools for tracking and assess air quality related to the criteria air pollutants, ozone, particulate matter, carbon monoxide, lead, sulfur dioxide, and nitrogen dioxide.[101-105] The U.S. EPA has a suite of web-based visualization tools for criteria air pollutants, that include maps, tile plots, air quality indices (AQI) plots, concentrations plots, etc. (https://www.epa.gov/outdoor-air-quality-data, https://www.airnow.gov/). However, to our knowledge, no such web interface exist to assist in the interpretation semivolatile organic compounds in the ambient air. This is in part due to semivolatile organic compounds requiring complex analytical analysis that cannot reliably be done in real time.

Sampling Rate Model Background

The mathematical sampling rate model, originally developed as a series of MATLAB scripts, determines a sample specific R_s for gas-phase PCB congeners as diffusive mass transfer process and was developed using depuration compound determined R_s for samples deployed around the world as part of the Global Atmospheric Passive Sampling (GAPS) Network.[59, 60] The sampling rate model has two primary sets of inputs, the physical-chemical properties of the target compounds and hourly meteorological data.

The primary physical chemical properties utilized by the model are the octanol-air partitioning coefficient (K_{oa}), molecular weight (MW), and internal energy of transfer to correct partitioning coefficients to local temperature (ΔU_{oa}).[57, 59, 60] Another option explored to predict the partitioning of PCBs to the polyurethane foam disks was linear free energy relationships (LFER).[81-83] We explored utilizing LFERs in place of K_{oa} and ΔU_{oa} to predict uptake of chemicals on the polyurethane foam disk and found a negligible difference between the two methods for predicting PCB properties.[59]

The hourly meteorological measurements utilized by the model to predict a sample specific R_s are temperature, pressure, wind speed, and humidity.[57, 59, 60] Two different datasets were explored as a source of this data: the Integrated Surface Database (ISD) released by the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI)[73, 88] and the Modern Era Retrospective-Analysis for Research and Applications (MERRA) maintained by the National Aeronautics and Space Administration (NASA). The ISD data provides field measurements of hourly meteorological conditions at 14,000 active sites around the world. The MERRA dataset is a global weather reanalysis that provides hourly two-dimensional data generated using version 5 of the Goddard Earth Observing System Data Assimilation System (GEOS-5 DAS) at 1/2 by 1/3° resolution.[89] The MERRA dataset provides the necessary meteorological input at both 2 m and 10 m heights above ground level (AGL).

Web Interface Development and Design

The purpose of the sampling rate model web interface is to provide a platform to allow users to determine a sample specific R_s anywhere on the globe quickly, simply, and efficiently. The web interface currently utilizes K_{oa} and ΔU_{oa} as the physical chemical inputs and has a preselected list of all 209 PCB congeners with the option to manually input other chemicals. For meteorological data, the web interface utilizes the MERRA dataset at a 2-m height to provide complete global coverage.

Client-Side Experience

The web-interface was constructed with a client-side interface centered on a Google Maps API v3 interface to ease mapping of sampling locations around the world. The user interface contains tabs for general information, basic model background, directions for use, sample input, chemical selection/input, results summary, and result report. The results can be exported to a csv file for further research applications. A majority of the tables present on the client-side interface utilize the DataTables jQuery plug-in (v 1.10.13). Figures for the sample report are generated using the CanvasJS charting API (v 1.7.0).

Server-Side Data Management

Data is passed to and from the sever-side using PHP (v 5.4.16), where the required data is stored in a local database (PostgreSQL: https://www.postgresql.org/). As of this writing, the local database stores data for temperature, wind speed, and sampling rate for every location on the globe from Jan. 1st 2010 through Dec. 31st, 2017. To ensure efficient use of time, the computations needed to produce the sampling rate data in the database were preprocessed for a model chemical (PCB 1) and results for all subsequent compounds are scaled according to their molecular weight. This increases the speed of returning results to the client-side interface. Effective sampling volumes cannot be preprocessed because each time-step is dependent on a residual between the current time-step and the previous time-step. Therefore, these values are calculated on the server-side before being returned to the client-side interface. Though these values are preprocessed there is no difference in the results obtained from the web-interface than the original MATLAB scripts previously published.[59, 60]

Basic Features

The web-interface provides a simple and intuitive method of retrieving a modeled sampling rate for any sampling location on the globe. The user can add samples to the map interface by clicking the map, dragging existing markers, or manually inputting latitudes and longitudes (Figure 13). The user can enter a customized sample ID for each marker or leave the default number scheme. All 209 PCB congeners can be simply selected in the prefilled chemical selection table or parameters for any other chemical can be manually entered (Figure 14, Figure A4). The results for average wind speed, sample rate, and effective sampling volumes are summarized under the results summary tab for the selected chemical (Figure 15). The chemical shown in the summary table can be changed with a dropdown selection menu at the top of the summary results tab. The data used to determine the values within the results summary table can be visualized by selecting a sample row in the summary results table and clicking the sample report button at the top of the summary results tab (Figure 15). After the results have been inspected, and modified if necessary, the results for all samples and all chemicals can be downloaded as a csv file for further use in sample analysis in other software such as Microsoft Excel.

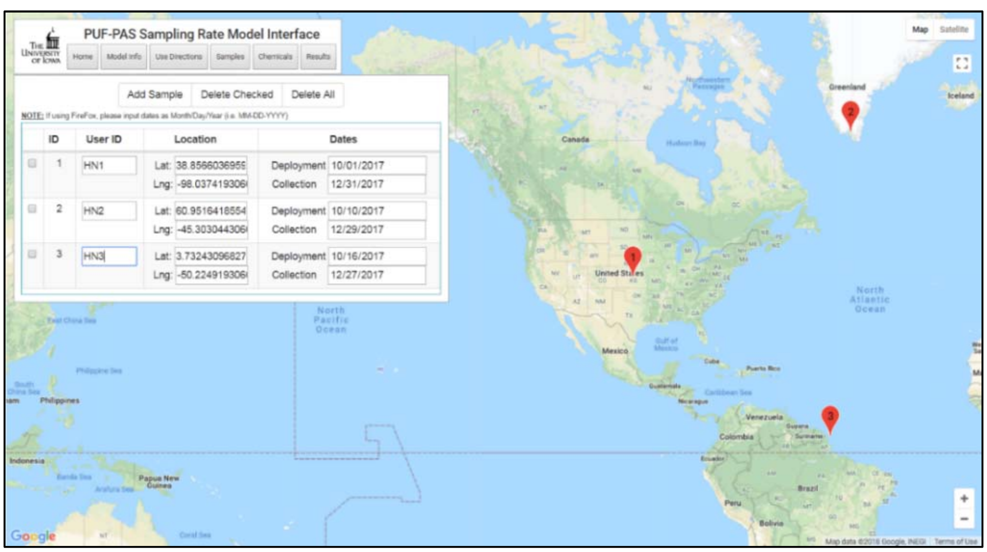

Figure 13: Example of sample input tab.

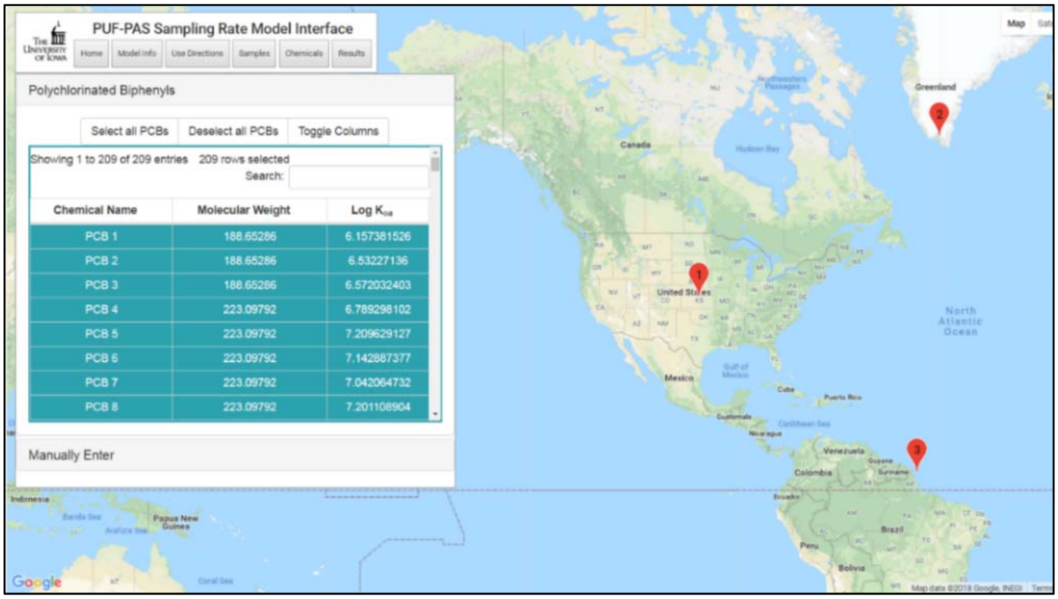

Figure 14: Example of chemical selection menu.

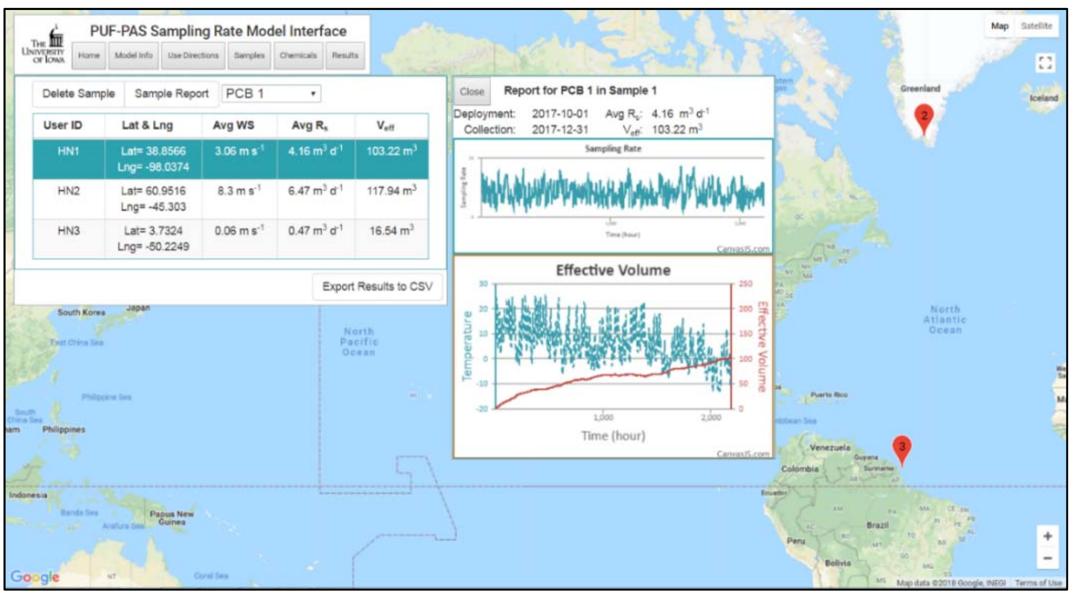

Figure 15: Example of results summary and sample report tabs.

Important Applications

The web-interface has many important potential applications. First and foremost, it offers a precise way to determine a PUF-PAS sampling rate anywhere on globe without the need for expensive depuration compounds. Without the hindrance of cost from depuration compounds, sampling campaigns can be expanded to encompass a wider geologic area or provide more dense sampling measurements to further elucidate global or regional transport studies.

Another important application of the sampling rate model and the web-interface is in the early stages of pre-deployment planning. The model can be used to estimate the sampling rate for desired sampling locations and provide important insights into the environment conditions. For example, consider the spatial distribution of sampling rates across the state of Iowa during December 2017. The sampling rates only range from ~4 to 4.5 (Figure 16a). Compare this range to locations around the shore of Lake Michigan during this same time period. Sampling rates range from ~3 to 4.3 (Figure 16b). While this change is only minor, it can be taken into account when siting locations.

Similarly, the web interface could be used to assess the appropriate length to deploy samples. In the city of Chicago during December, PCB 1 will remain in the linear phase of uptake for more than four weeks, but in July PCB 1 will saturate within 2 weeks (Figure 16c & Figure 16d). While it may be impractical to deploy samples for less than 2 weeks, this simple analysis gives insights into the uptake kinetics and can be used to examine a variety of target analytes to determine which compounds may reach saturation. This same analysis can be used to determine if compounds will be collected above the detect limit. For example, in Chicago July the effective sampling for PCB 1 will be ~20 m^3 for sample deployed for more than 2 weeks (Figure 16d) and a PCB 1 concentration has been reported that the city of Chicago as 6.4 pg m^{-3}.[86] This would imply a sample would collect 128 pg of PCB 1 during the deployment. This number can be compared to a detect limit to assess whether this compound can be reliably sampled. While the predicted mass collected in Chicago is likely above the detect limit of the analytical methods, a more remote location with a lower airborne PCB concentration may not collect PCB 1 at a quantity greater than the detect limit. In this case, samplers would either have to be deployed longer or during a different time of the year.

The web-interface could be similarly used to assess the uptake of new target chemicals. While the sampling rate model was developed around PCBs, we suspect it would adequately predict many other semivolatile organic compounds. For example, if a study wanted to be done to analyze a volatile organic compound, such as meta-dichlorobenzene, with PUF-PAS methods the interface could be used to assess uptake.

With this simple analysis it is easy to see that meta-dichlorobenzene would be poorly sampled by PUF-PAS methods and would saturate quickly (Figure 16e). Conversely, a common pesticide, Acetochlor, would likely be sampled well by PUF-PAS methods (Figure 16f). This provides preliminary information on the appropriateness of the PUF-PAS methods and when other methods would be needed.

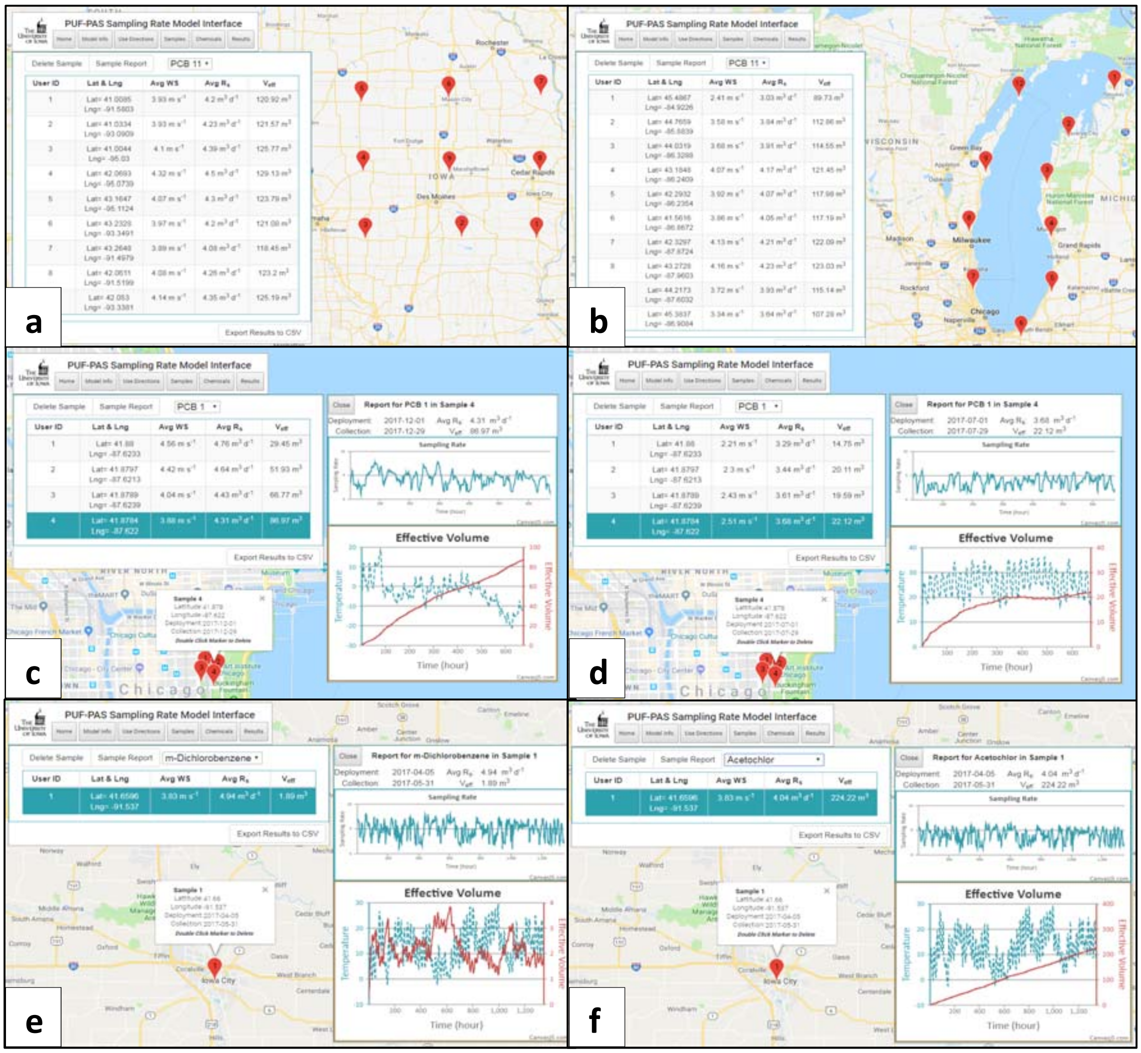

Figure 16: Example applications of the web interface for pre-deployment planning.

Limitations

While the web-interface is simple and provides estimates necessary in most applications of PUF-PAS samples, it is limited in its adaptability. It is designed to provide quick estimates for dataset with few samples but would be impractical for users with many (>20) samples due to tedious sample input methods.

It is also limited in the availability of selectable chemicals. The sampling rate model framework was designed and developed around PCBs, the only selectable chemical class in the web interface. We suspect the model to be applicable to a wide range of POPs, but without explicit laboratory test, caution should be used when expanding the application of the sampling rate model to other POPs. However, the web-interface and server-side database have been designed to be able to handle many more chemicals if the sampling rate model is validated for the use with other chemicals. Particularly, the potential use of linear free energy relationships (LFER) would allow the web-interface to be simply and quickly expanded as databases, such as the UFZ-LSER database (v 3.2.1),[106] already contain linear free energies for a wide range of chemicals.

Perhaps the most significant current limitation is the use of a single meteorological source at a specified height (2 m). We have previously shown the reliability and predictability of the sampling rate model in a large metropolitan area,[59] at sampling location in diverse locations around the globe,[60] and in an indoor setting (*manuscript in review*, Chapter V), when representative meteorological inputs are accessible. Therefore, we conclude that the sampling rate model framework is robust enough to precisely estimate a sampling rate in many applications and much of the uncertainty in these estimate result from the uncertainties surrounding the representativeness of the meteorological data. The MERRA data at a 2 m height may not always accurately represent the true conditions at the sampling site. For example, Martinez et al (2017) reported sampling rates for PUF-PAS samples deployed in the New Bedford Harbor Area (CT, USA) ranging from 2 to 3 m^3 d^{-1} using the sampling rate model and ISD meteorological data for the New Bedford Regional Airport. These modelled values were validated using depuration compound results and proved to be precise estimates.[60] However, when examining the New Bedford Harbor area using the web interface for this time period the sampling rate produced is approximately 0.2 m^3 d^{-1}, an order of magnitude lower than the true value. This low prediction is not a result of an erroneous model run but is a result of the MERRA meteorological data frequently predicting the wind speed at this location as stagnant (wind speed = 0 m s^{-1}). This clearly demonstrates the inaccuracy of the MERRA dataset at some locations. However to provide global estimates it is necessary to have a weather reanalysis dataset, such as MERRA, that offers complete global coverage. Ideally, the user would be able to select from a range of meteorological data inputs, or manually upload measured metrological data, but due to the heavy computational requirements for the sampling rate model it is impractical to do these calculations as needed. In instances where the model-interface is imprecise, the previously published raw scripts should be used for full user customization.

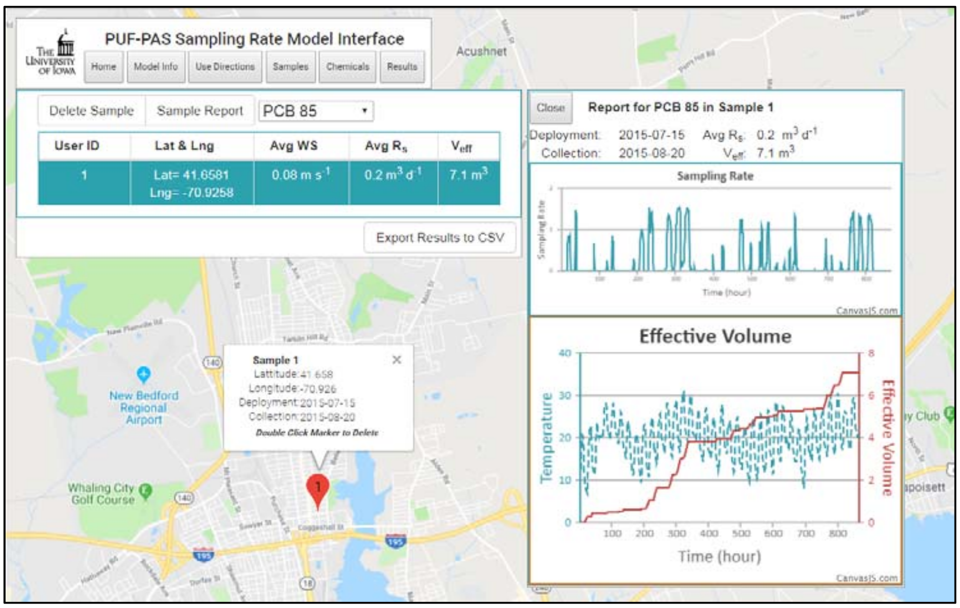

Figure 17: Results from New Bedford Harbor study, demonstrating limitation of MERRA dataset.

Conclusion

The sampling rate web-interfaces is an efficient tool for quickly determining a PUF- PAS sampling rate anywhere on the globe where MERRA is accurate. In most scenarios the interface offers precise sample specific sampling rates and effective sampling volumes. Under certain conditions, such as the New Bedford Harbor example, the MERRA reanalysis data does not adequately represent the true environmental conditions and therefore the sampling rate results produced by web-interface are erroneous. Further development is required to adequately address this issue by expanding the potential meteorological inputs. However, the previously published raw scripts are currently capable of addressing this issue by allowing the user to customize the meteorological data inputs. Further work is also needed to fully assess the potential of modelling sampling rates for chemicals other the PCBs before the web-interface is expanded to include these new chemicals as a preselected option. Despite these minor issues, this web-interface is a powerful tool to study the nuances of PUF-PAS sampling rates around the world.

CHAPTER V: EFFECTS OF ROOM AIRFLOW ON ACCURATE DETERMINATION OF PUF-PAS SAMPLING RATES IN THE INDOOR ENVIRONMENT[4]

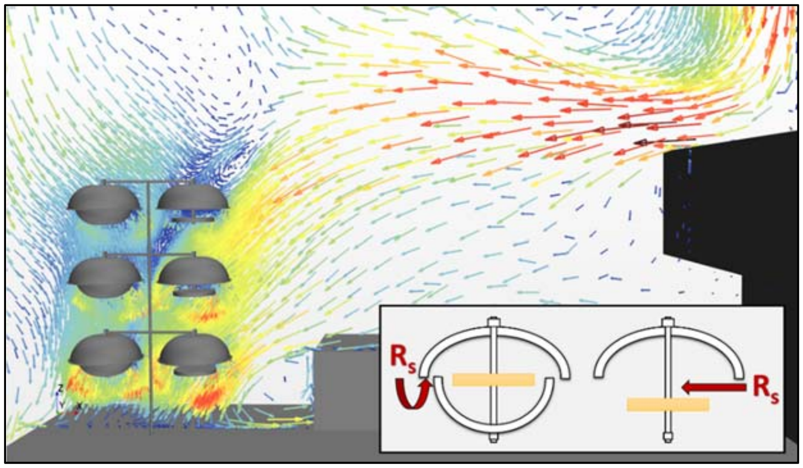

Figure 18: Table of content art for Chapter V.

Abstract

Accurate and precise interpretation of concentrations from polyurethane passive samplers (PUF-PAS) is important as more studies show elevated concentrations of PCBs and other semivolatile air toxics in indoor air of schools and homes. If sufficiently reliable, these samplers may be used to identify local sources and human health risks. Here we report indoor air sampling rates (R_S) for polychlorinated biphenyl congeners (PCBs) predicted for a frequently used double-dome and a half-dome PUF-PAS design. Both our experimentally calibrated (1.10 ± 0.23 m^3 d^{-1}) and modeled (1.08 ± 0.04 m^3 d^{-1}) R_S for the double-dome samplers compare well with literature reports for similar rooms. We determined that variability of wind speeds throughout the room significantly ($p <$ 0.001) effected uptake rates. We examined this effect using computational fluid dynamics modeling and 3-D sonic anemometer measurements and found the airflow dynamics to have a significant but small impact on the precision of calculated airborne concentrations. The PUF-PAS concentration measurements were within 27% and 10% of

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[4] Reproduced with permission from Herkert, N. J.; Hornbuckle, K. C., *Environmental Science: Processes & Impacts* **2018,** 10.1039/C8EM00082D. Copyright 2018. The Royal Society of Chemistry. Appendix B contains the supporting information for this journal submission.
Sampling studies were designed by N. Herkert under the supervision of K. Hornbuckle. Sample processing, data analysis and manuscript preparation were done by N. Herkert under the supervision of K. Hornbuckle.

the active sampling concentration measurements for the double-dome and half-dome designs, respectively. While the half-dome samplers produced more consistent concentration measurements, we find both designs to perform well indoors.

Introduction

Polyurethane equipped passive air samplers (PUF-PAS) are frequently used to examine semivolatile organic compounds (SVOC) in the atmosphere.[15, 17-27, 30-32, 35, 37] They are used to directly measure urban air concentrations[15, 17, 18, 20, 22-27, 30, 31], track atmospheric fate and transport[21, 32-35, 61], characterize atmospheric sources,[15, 19, 21, 22, 25, 27] and assess human exposure[15, 37, 43, 46, 47] in the outdoor environment, but have yet to be widely adopted for use in the indoor environment. With the growing concern of SVOCs in residential homes and schools, validating PUF-PAS methods in the indoor environment is of critical importance.[43, 44, 107-109] PCBs in particular are becoming an increasingly important issue due to their widespread presence in schools.[37, 43, 109-114] Recent research has shown that inhalation exposure to PCBs may be equal to or greater than dietary exposure for children.[37, 43] The growing concern about elevated concentrations of airborne PCBs in schools is a compelling justification for the development of inexpensive, non-intrusive, and accurate sampling methods. PUF-PAS methods are an attractive approach for this because, contrarily to the energy intensive nature of active sampling methods, PUF-PAS methods are inexpensive and require minimal labor. They also allow for simultaneous sampling in separate areas of the building and provided time-average airborne concentrations useful for estimating exposures.

The reason PUF-PAS methods have not been more widely utilized in the indoor environment is the uncertainty in the determination of sampling rates (R_S).[39, 43, 44, 115] The standard method for determining sampling rates for PUF-PAS samplers relies on the loss of depuration compounds.[15, 20, 21, 24, 25, 27, 33, 35, 36] Unfortunately, these compounds are inappropriate for indoor use due to the human exposure potential. In the absence of depuration compounds, a constant value (4 m^3 d^{-1} outdoors or 0.8 m^3 d^{-1} indoors for PCBs, for example) is often assumed for the R_S.[16, 19, 20, 22, 31, 32, 43, 46, 47, 50, 53, 107, 108] While this approach has been shown to provide a reasonable estimate, it fails to account for all environmental variability. We have previously shown that sampling rates of gas-phase

PCB congeners for a PUF-PAS sample in the outdoor environment is a predictable diffusive mass transfer process. Using widely available meteorological measurements and chemical characteristics, we developed a predictive model for R_s and sampling volumes.[57, 59, 60] In outdoor environments, the primary meteorological driver for R_s is wind speed (R^2 = 0.910).[60]

The central goal of this study was to determine an accurate indoor PUF-PAS R_s for gas-phase PCBs and describe how the airflow in a room effects the interpretation of PUF-PAS results. PCBs are an ideal chemical for this type of work because of the extensive characterization that has already been done for these compounds. We hypothesized the same predictive model framework used in outdoors environment would apply to indoor environments, if an accurate estimate of wind speed were available. We further hypothesized that simple parameterization of a room's airflow can lead to more consistent and reliable PUF-PAS use in the indoor environment. The specific objectives of this study were to 1) Determine an accurate PUF-PAS sampling rate in the indoor environment; 2) Evaluate and modify an outdoor sampling rate model for PCBs in the indoor environment; 3) Examine the effects of room airflow dynamics on sampling rates; and 4) Develop recommendations for standard operating procedures for using PUF-PAS samplers indoors.

Methods and Materials

Study Design

Our study was performed with two passive sampler designs and a low-volume active sampler. The double-dome (DB-dome) PUF-PAS sampler design (with a 24 cm top bowl and 19.5 cm bottom bowl) is based on a commonly used PUF-PAS design.[24-26, 30, 36, 51, 72] The half-dome (HF-dome) PUF-PAS design consists of only the top bowl of the DB-dome design with the PUF disk suspended below it.[28, 116] The PUF disk used in the passive air samplers were purchased from Tisch Environmental. The PUF tubes used in the low-volume air sampler were purchased from SKC (Eighty Four, PA).

The uptake of gas-phase PCBs, or more generally semi-volatile organic compounds (SVOCs), on a PUF disk is a function of a diffusive sampling rate and the concentration gradient between the air and PUF sample,

$$\frac{dM_{PUF}}{dt} = R_s \left(C_{air} - \frac{C_{PUF}}{K_{PUF}} \right) \tag{1}$$

where M_{PUF} is the mass of the target compound measured on the PUF sample, C_{air} is the concentration in the air (ng m^{-3}), C_{PUF} is the concentration on the PUF (ng m^{-3}), and K_{PUF} is the PUF-air partition coefficient. [25, 41, 51, 54, 57, 59, 65] The sampling rate is a product of an air-side resistance dominated mass transfer coefficient (k_v, m s^{-1}) and the surface area of the PUF sample (A_s). Previously we calibrated the predictive model for R_s using the mathematical model based on laminar flow along a flat plate to determine the mass transfer coefficient,

$$\frac{k_v l}{D} = \gamma \left(\frac{V_i l}{v} \right)^{1/2} \left(\frac{v}{D} \right)^{1/3} \tag{2}$$

where γ is a dimensionless empirically calibrated constant, D is the molecular diffusivity for each compound (m^2 s^{-1}), V_i is the wind speed inside the PAS chamber (m s^{-1}), *v* is the kinematic viscosity of the air (m^2 s^{-1}), and *l* is the PUF diameter (m).[57, 59, 60] If the kinetics were truly described by laminar flow along a flat plate, γ would equal 0.646.[87] In the outdoor environment we found it to be about 0.3.[60] In the indoor environment we suspect the kinetics to be much closer to laminar flow than the outdoor environment and therefore chose to use 0.646. Our experiments were designed to test this assumption in a typical indoor environment. The sampling rate is calculated from the mass transfer coefficient and the surface area of the PUF disk (365 cm^2).

$$R_s = k_v A_s \tag{3}$$

Previously, we applied an empirical calibration based on lab measurements presented by Tuduri et al (2006) to convert air velocity from outside to inside the DB-dome sampler.[72] To model the HF-dome design, this relation was omitted in the calculation of R_s.[60]

The study was designed to examine primarily gas-phase compounds, i.e. PCBs. Our modeling framework has been designed and developed around gas-phase compounds and thus does not account for particle-phase compounds. Previous work suggests that particle-phase compounds are sampled at similar rates to gas-phase compounds, suggesting the viability of PUF-PAS methods in this type of analysis.[50, 56] However, the current study assumes the effect of particle-associated PCBs to be negligible.

This study was conducted in two phases in an occupied office (1131 SC) at the Seaman's Center for the Engineering Arts and Sciences at the University of Iowa. The purpose of Phase-1 was to measure R_s from chemical uptake on a series of passive samplers. We then compared the empirical R_s with the predictive model and literature. Phase-1 consisted of 18 double-dome PUF-PAS samples deployed at the same time. We collected a set of triplicates after each week over 6 consecutive weeks (Figure B5).

The purpose of the second phase of the study was to analyze the spatial variability of R_s throughout the room. Phase-2 consisted of twelve double-dome PUF-PAS samples and twelve half-dome PUF-PAS samples deployed consecutively in triplicate. We deployed and collected a set of double-dome and a set of half-dome triplicates each week over 4 consecutive weeks. Each deployment was in a different location of the room (Figure B7). Wind speed and temperature, were measured with a 3-D sonic anemometer at each location in the room for week long intervals during the study period. The 3-D sonic anemometer collected the three wind vector components and the temperature at a one hertz frequency.

Throughout both phases of the study, we operated a low-volume active air sampler equipped with polyurethane foam plug (Universal PCXR4 Sample Pump from SKC, Eighty Four, PA) at a flow rate 5 L min^{-1} oriented upward at a 45° angle. Active samples were taken at approximately 50-65 hour intervals to ensure continuous coverage. Active samples were exchanged 3 times a week on Mondays at 8 a.m., Wednesdays at 12 p.m., and Fridays at 5 p.m. A breakthrough test of the active sampling showed efficient retention of PCBs for this sampling length (Figure B1). During Phase-2, we operated the low-volume sampler and the 3-D sonic anemometer in different room locations for weeklong intervals.

Chemical Analysis

The samples were analyzed for all 209 PCB congeners as described elsewhere.[13, 41, 59, 117] Briefly, the PUF sample media was precleaned using a pressurized solution of 1:1

acetone:hexane (Dionex ASE 350) and stored in aluminum foil and sealed plastic bags. Samples were spiked with 50 ng of surrogate standards (PCB14 (3,5-dichlorobiphenyl), PCB65-d5 (2,3,5,6-tetrachlorabiphenyl-d5, deuterated), and PCB166 (2,3,4,4',5,6-hexachlorobiphenyl)), extracted with a 1:1 hexane-acetone in the ASE 350, cleaned on a column of acidified silica, and analyzed by the internal standard method on GC-MS/MS (Agilent 7890A GC system, Agilent 7000 Triple Quad, Agilent 7693 autosampler). The quality of the chemical measurements was assessed using surrogate recoveries, blanks, replicate sampling, and breakthrough studies. Average surrogate recoveries for all samples and blanks were 74 ± 16%, 77 ± 14%, and 98 ± 13% for PCB14, PCB65-d5, and PCB166, respectively. There was no statistical difference in recoveries between samples/blanks, Phase-1/Phase-2 samples, and low-volume/PUF-PAS samples. The average sum PCB level in all blanks was 1.85 ± 1.18 ng. Likewise, there was no statistical difference in blank levels between Phase-1/Phase-2 blanks, and low-volume/PUF-PAS samples. As mentioned above, a breakthrough test of the active sampling showed efficient retention of PCBs. See supporting information for further details.

Room Air Flow

A computational fluid dynamics (CFD) model of the room was constructed with the STAR-CCM+ software and simulations were run as steady state with the k-omega Reynolds averaged Navier Stokes (RANS) turbulence model as the physics model.[118-132] The mesh numbers for our two simulations were 886,763 and 1,990,485, respectively. The CFD model included two inflows to the room; a 6" diameter HVAC inlet at a set point of 140 cfm and the door. The residuals from our model simulations demonstrating convergence can be found in the supporting information (Figure B8). We compared the CFD prediction to the measured wind speed using a CSAT3 3-D sonic anemometer (Campbell Scientific) placed at different positions within the room. We found the CFD model, at an HVAC set point of 140 cfm, and anemometer data to be within 1 standard deviation of each other for all four of our sampling locations within the room (Figure B4).

Results and Discussion

Phase-1: Experimental and Predicted DB-Dome Uptake Curves

An empirical R_s was calculated for each congener by dividing the slope of the uptake curve (ng d^{-1}) by the low-volume determined concentration (ng m^{-3}). The average low-volume concentration (n=4) during Phase 1 was 12 ± 4 ng m^{-3} (Figure B2). The average R_s (n=38 congeners) for this study was 1.10 ± 0.23 m^3 d^{-1} (Figure 20). This is comparable to what is reported by others. For example, Bohlin and colleagues estimated an average indoor PUF-PAS R_s for PCBs of 1.2 m^3 d^{-1} and Hazrati and Harrad estimated an R_s of 0.8 m^3 d^{-1}. The uptake remained linear (R^2=0.973) throughout the experiment for congeners consistently measured at levels above the LOQ and did not approach saturation (Figure 19, Figure 21).

We modeled the R_s from room-averaged wind speeds measured with the 3-D sonic anemometer as inputs. The samplers were deployed from one to six weeks during this period. The wind speed was highest when the building ventilation system was on during weekdays (0.19 ± 0.07 m s^{-1}) and lowest when the ventilation system was off during nights and weekends (0.07 ± 0.02 m s^{-}1). The predicted R_s values for each DB-dome sampler ranged from 1.0 to 1.3 m^3 d^{-1}; a difference from the empirically determined R_s of less than a 25% (excluding PCB105) for the 38 congeners that contributed more than 1% of the sum of all PCBs (Figure 20). The difference was more variable for congeners that were present at low concentrations. The flowrate model also accurately predicted the expected uptake curves for many of the most dominate congeners (Figure 21). With the exception of PCB1, no PCB congeners showed signs of approaching saturation within the 6 week uptake study. We conclude that our assumption for the theoretical γ value of 0.646 is appropriate in this indoor environment. We postulate that with accurate wind speed inputs the sampling rate model can determine an accurate sampling rate (±25%) in any room.

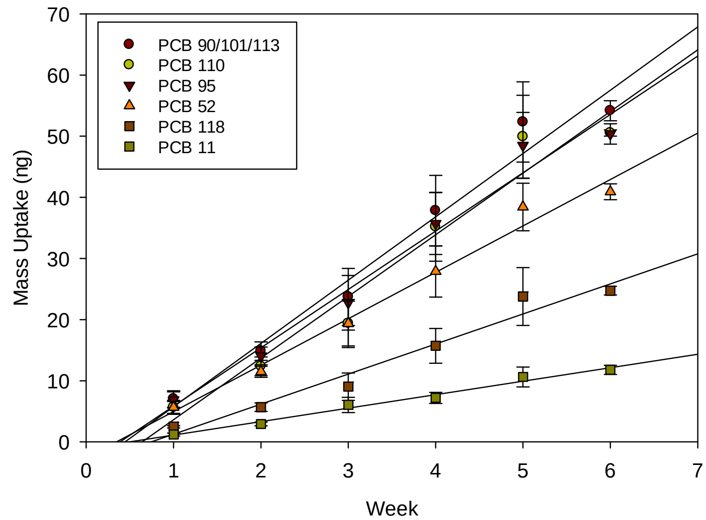

Figure 19: Measured uptake of the 6 most prevalent congeners (or congener coelution).

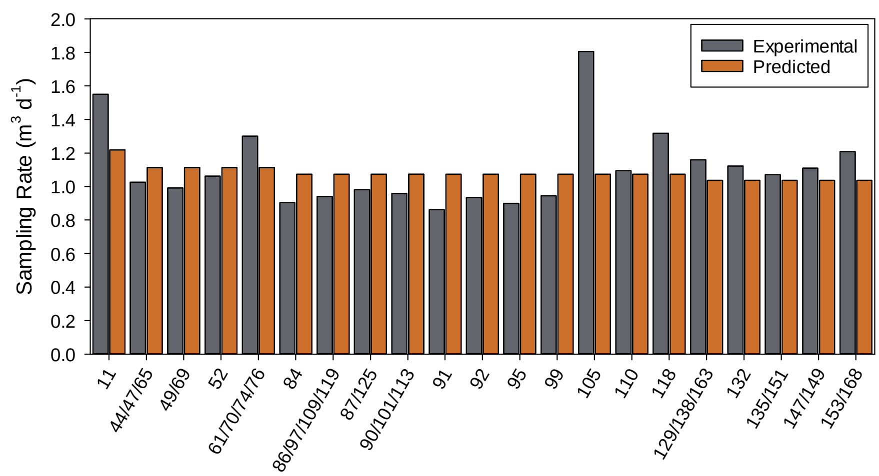

Figure 20: Experimental R_s values and predicted R_s values for 38 congeners that contributed more than 1% of the sum of all PCBs.

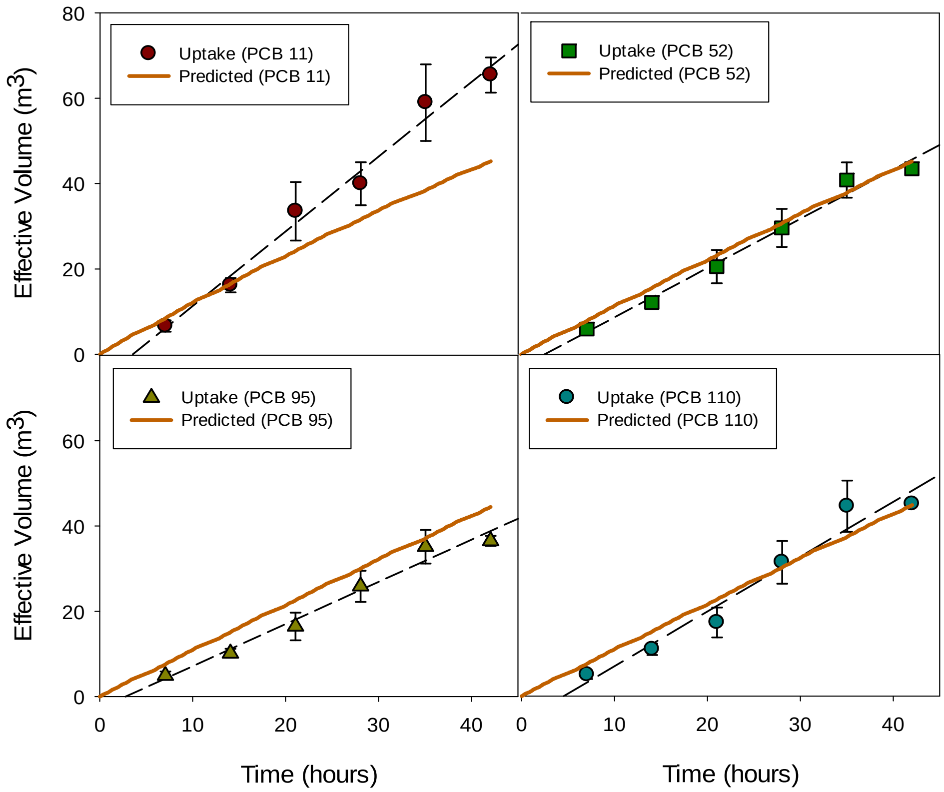

Figure 21: Predicted and experimentally determined uptake curves for PCB 11, 52, 95, and 110. The experimental effective volume was calculated as the mass collected divided by the low-volume determined concentration.

Phase-2: The Effects of Sampler Location and Variable Airflow.

The PUF-PAS sampler is designed for long-term integration of concentrations. This makes it useful for identifying continuous sources, or for calculating human exposure. But this also requires placement that is representative of the intended environmental conditions. In a room, the location of the sampler may be important. We designed Phase-2 of our study to examine this hypothesis. While the dynamics of flow within a room has been examined using computational fluid dynamic (CFD) modeling,[118-132] we know of no studies of room air flow variability and its effect on PUF-PAS sampling.

The location of the PUF-PAS in the room did matter. The PCB accumulation (ng day^{-1}) at each location varied significantly (p <0.001) for both sampler designs. The HF-dome samplers placed at location 3 had the highest PCB accumulation for that sampler design. The DB-dome sampler placed at location 1 had the highest PCB accumulation rate and shortest deployment period for that sampler design. The samplers placed at location 4 had the lowest mass uptake rate of PCBs, for both sampler designs (Table B1). Empirical sampling rates were calculated for every congener at each location for both sampler designs used in Phase-2 as the PCB mass collected divided by the low-volume determined PCB concentration and deployment time.[41, 44, 49, 51, 53, 65] The DB-dome design was particularly affected by the position in the room, and varied by almost a factor of 3 between the maximum and minimum. The HF-dome sampler design was less affected by room position and only varied by a factor of 1.4 between maximum and minimum (Table B1).

There are two possible reasons for variability of PCB accumulation with room location: the concentrations of airborne PCBs vary within the room; or the actual sampling rates vary within the room. Although the concentrations of PCBs vary over time, there are no known point sources of PCBs in the room. There was no window or window caulking; there was carpet throughout the room; the walls were painted the same off-white color. The ΣPCB airborne concentration was 7.7 ± 1.7 ng m^{-3} (Figure B2) and there was no significant difference ($p = 0.311$) between the four different locations sampled by low-volume. Therefore, it is more likely that R_s varies for each sampler, and this variability is caused by the variability in wind speed at each location. This conclusion is supported by position-specific wind speed estimates from the CFD model (Figure 22). Both sampler designs showed small but significant ($p < 0.01$) linear correlations with wind speed, with the exception of the DB-dome triplicate at location one. Wind speed does not sufficiently explain the high accumulation rates exhibited by the DB-dome triplicates deployed at location 1. These samples were deployed for only one week – the shortest period we used. Other studies have reported high accumulation rates for short deployments of this design in the outdoor environment.[49, 85, 133]

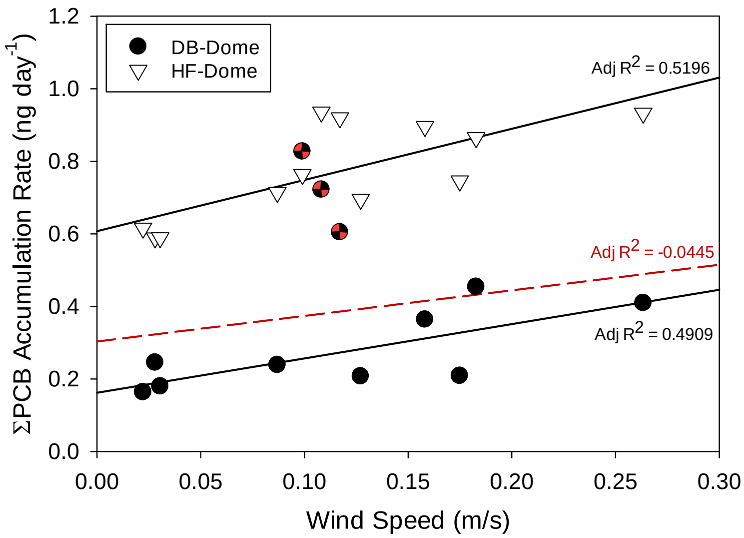

Figure 22: Correlations between ΣPCB accumulation rates and location specific wind speeds from the CFD model. The colored DB-dome markers represent the outlier samplers collected at location 1.

We use our model to predict a room-averaged R_s of 1.08 and 2.69 m^3 d^{-1} for the DB-dome and HF-dome designs, respectively, using the average wind speed parameters from the 3-D sonic anemometer. This estimate is not statistically different ($p > 0.05$) from empirically calibrated R_s for either sampler designs. However, the HF-dome design was better predicted (mean residual = 13%), than the DB-dome design (mean residual = 38%). We also modeled an R_s for each PUF-PAS at its specific placement within the room (Figure 23). Using these estimates and omitting the DB-dome outliers discussed above, the mean R_s residual between predicted and measured was slightly reduced (~2%) for both sampler designs, further demonstrating the influences of room airflow on sampling rate determination (Table B1). Overall we find that windspeed is the most important predictor. Nevertheless, we are unable to account for all the variability, particularly for the DB-dome sampler design. Because our analytical variability is small, other factors such as minor airborne concentration gradients or temporal concentration changes may be contributing factors. This is evidenced by the low-volume concentration estimates which ranged from 5.9 to 12.3 ng m^{-3} and had a relative standard deviation of 24% during Phase-2 of this study.

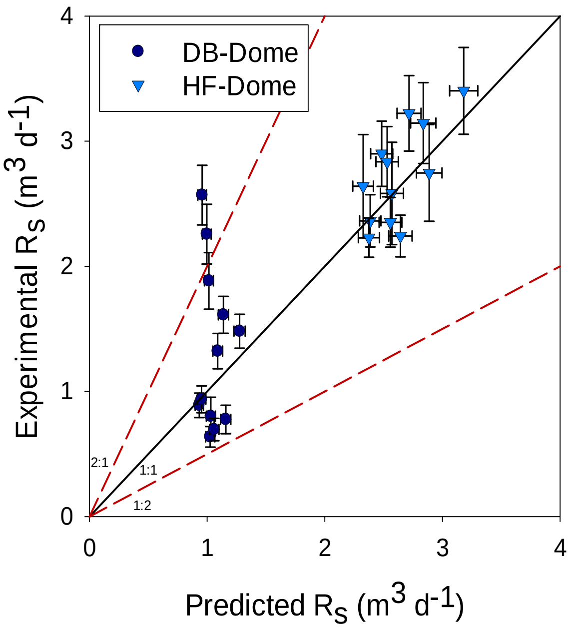

Figure 23: Correlations between experimental determined and predicted R_s values based on position specific wind speed parameters from the CFD model for both sampler designs.

Ultimately the goal of implementing PUF-PAS methods is to determine a time averaged airborne concentration. In this context, the differences between using a room-averaged or location specific R_s has little affect on the PUF-PAS airborne concentration measurements. Using the room-averaged wind speeds to determine the R_s, the PUF-PAS determined concentrations were within 32% and 15% of the low-volume determined concentrations for the DB-dome and HF-dome designs, respectively. When incorporating the effects of room position, the PUF-PAS determined concentrations were within 27% and 10% of the low-volume determined concentrations for the DB-dome and HF-dome designs, respectively (Figure 24). This minor improvement demonstrates that room-averaged R_s predictions are nearly as accurate as position specific R_s predictions when determing airborne concentrations. As stated previously, the low-volume concentration estimates had a relative standard deviation of 24% during Phase-2 of this study. This indicates the low-volume and active sampling methods are producing estimates with similar degress of variability.

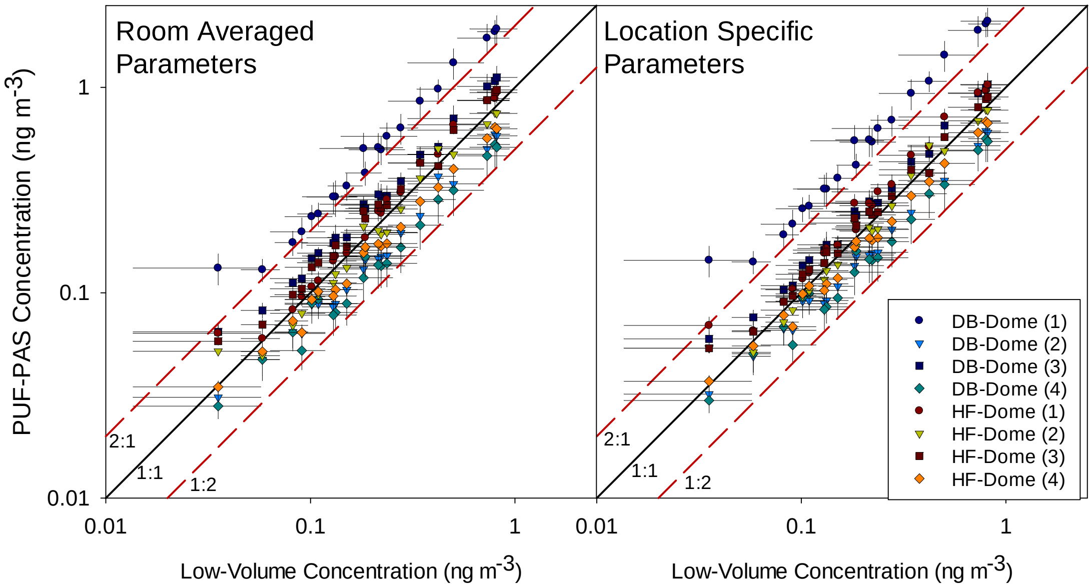

Figure 24: Comparison between concentrations determined by active sampling and passive sampling for 38 congeners that contributed more than 1% of the sum of all PCBs. For the room averaged PUF-PAS estimates, an R_s of 1.08 and 2.69 m^3 d^{-1} for the DB-dome and HF-dome designs, respectively, was used to determine an airborne concentration.

Phase-2: Examining Airflow Variability throughout The Simulated Room

It is important to fully understand what constitutes room-averaged conditions with the assumptions that room-averaged wind speeds provide accurate airborne concentrations. We examined the variability of wind speed in our study room using the CFD model. We found several instances of airflow characteristics not being described well by room-averaged parameters, in both the vertical and horizontal directions.

The lowest wind speeds were found during the nights and weekends when the building ventilation system was shut down. The highest wind speeds were found in the vertical downward direction against a wall and closest to the ventilation diffuser on the ceiling. Due to this airflow pattern and boundary layer mixing, the area closest to the walls experienced elevated air flow. Therefore, any sampler placed near the wall (~30 cm) would experience wind parameters that are not representative of the room-averaged parameters (Figure 25). Similarly, near the ceiling and near surfaces (such as tops of bookcases), there are elevated average wind speeds. Since the air diffuser is the primary driver of ventilation within the room, we expect turbulent zones near the diffuser that dissipate with distance. Along the easternmost and westernmost wall (~1.2 m from diffuser), we found zones of increased turbulence approximately 1 m wide where the air stream from the diffuser perpendicularly intersect the wall.

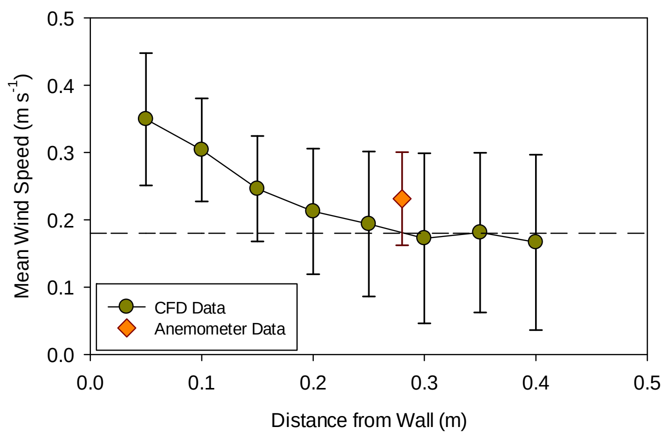

Figure 25: Horizontal profile showing the effects of elevated wind speeds along the wall and the convergence of airflow to room average parameters at increasing distances from the wall generated from the CFD model in our study zone. The anemometer data that corresponds with this location was also included to show the general agreement between the 3-D sonic anemometer data and the CFD model.

We also examined the airflow profiles near the doorway and the effects of having the door open or closed on the air profile. The effects were minimal and most pronounced near the ground. This is likely because the gap under the door was producing a stream of air into the room when the door was closed but this influence is more diffused once the door has been opened. We were also able to observe a noticeable effect within approximately the first meter from the door into the room. Our test room had only one door so there is no chance of experiencing a cross draft through the room that may exist if a room had two doors open or another similar scenario with multiple large openings. Additional findings and images from the CFD modeling of the room can be found in the SI.

Implications for PUF-PAS use Indoors

The use of PUF-PAS in the indoor environment is challenging due to an accurate determination of R_s. However it presents a powerful opportunity to more easily identify and quantify airborne SVOCs, including PCBs, in homes, schools, and workplaces. This study has shown that it is possible to accurately determine an indoor R_s where an accurate understanding of the airflow is available. Although this study is focused on PCBs it is applicable to other SVOCs with similar physical chemical properties (such as PAHs, PBDEs, OCPs, PFCs, etc). From a practical standpoint the average airflow parameters within a room should provide a reasonably accurate estimate of R_s for any position in the room that is not experiencing large eddies. We recommend samplers be placed at least 30 cm from the wall, ceiling, or any surface; at least 50 cm from the direct line of the HVAC air diffuser, and at least 1 m away from the door to avoid the effects of turbulent mixing. Equation 4 may be used to calculate a sampling rate for a given room from a known room averaged wind speed (WS, m s^{-1}), molecular weight, temperature (°C), and an empirical constant, *c*, of 1.326 for DB-dome or 1.723 for HF-dome. In environments like our study room it is important to account for both when the HVAC system is on and off, by taking a time weighted average. In our study the HVAC system was on 36% (f_{on}) of the time, and off 64% of the time (f_{off}).

$$R_s = \left(f_{on}\sqrt{WS_{on}} + f_{off}\sqrt{WS_{off}}\right)\left(\frac{1}{\sqrt[3]{MW}}\right)10^{[0.0012*T+c]} \qquad (4)$$

Equation 5 is adapted from Harner et al. (2004) and may be used to calculate an effective sampling volume from the deployment time (t, days), the volume of the PUF disk (V_{PUF}, m^3), the PUF-air partition coefficient (K_{PUF}), and the R_s (m^3 d^{-1}) calculated from equation 4.[25] The K_{PUF} parameters can be calculated from the empirical relation presented by Shoeib and Harner (2002).[51]

$$V_{eff} = (V_{PUF}K_{PUF})\left[1 - e^{-\left(\frac{R_S}{V_{PUF}K_{PUF}}\right)t}\right] \qquad (5)$$

Although the effective sampling volume equation corrects compounds approaching saturation, these equations can be applied to estimate when saturation might occur prior to deployment to determine an appropriate deployment length. Within our study room, several PCBs will reach half saturation (t_{50}) in a 6 week period. PCB 1 reaches t_{50} in 2 weeks; PCBs 2 and 3 reach t_{50} in 4 weeks; PCBs 4 and 10 reach t_{50} in 6 weeks. For room styles similar to the one in this study we would recommend a PUF-PAS deployment of 4-8 weeks.

In practice it may be difficult to measure or approximate the room averaged air flow parameters due to cost or access. In these instances assuming a sample rate of 1.0 $m^3 d^{-1}$ ($k_v = 27.4 m^3 d^{-1} m^{-2}$) for the double dome sampler or 2.6 $m^3 d^{-1}$ ($k_v = 27.4 m^3 d^{-1} m^{-2}$) for the half dome sampler may be appropriate for most room styles as the ventilation is typically designed to have similar values of wind speed and air turnover regardless of room size. While the ranges of R_s reported for similar studies overlap, we suspect the differences in the reported average indoor PUF-PAS R_s can be attributed to different air ventilation rates for the different room styles or position in the room (Table 2).[28, 39, 41, 44, 51, 116] Much of the differences between the studies conducted in similar room styles for PCBs may be attributed to differences of sampler placement within the room.[39, 44] Our study has shown that adjustments of less than 30 cm of sampler placement may effect interpretation of the sample.

In rooms where significantly different wind speeds are expected, such as a scientific laboratory, assuming a value of 1.0 or 2.6 $m^3 d^{-1}$ for the DB-dome and HF-dome, respectively, would under-predict the airborne concentration. According to ANSI/ASHRAE Standard 62 (Ventilation for Acceptable Indoor Air Quality) the required minimum ventilation rate for science laboratories (0.18 cfm/ft2) is three times higher than the minimum ventilation rate for lecture rooms and office spaces (0.06 cfm/ft2)) and may explain the higher R_s values reported by Persoon and Hornbuckle and Shoeib and Harner from studies conducted in scientific labs.[41, 51, 134]

It is important to note that the conclusions of this study are based upon the commonly used PAS design with a 24 cm top bowl, a 19.5 cm bottom bowl, a 2.5 cm gap between the bowls, a 1.5 cm overlap, and holes in the bottom to aid airflow. We suspect many of the conclusion in this paper to apply to other similar sampler designs. However, caution should be exercised when variations on the common design are used. If a PUF disk other than Tisch Environmental PUF are used, sampling rates can be corrected by adjusting by PUF surface area.

Table 2: Comparison to other studies determining indoor PUF-PAS sampling rates.[28, 39, 41, 44, 51, 116]

Average ($m^3\ d^{-1}$)	Range ($m^3\ d^{-1}$)	Compound	Room Style	Study
Double-Dome				
1.1	*0.8 – 1.3*	*PCBs*	*Occupied Office*	*This Study (Modeled)*
1.1	0.4 – 2.8	PCBs	Occupied Office	This Study (Phase-1)
1.3	0.6 – 2.9	PCBs	Occupied Office	This Study (Phase-2)
1.2	0.9 - 1.7	PCBs	Lecture Hall	Bohlin et al (2014)
0.8	0.6 - 1.6	PCBs	Vacant Office	Hazrati and Harrad (2007)
2.6	2.0 - 3.5	PCBs	Scientific Lab	Persoon and Hornbuckle (2009)
1.5	0.9 - 2.9	PBDEs	Lecture Hall	Bohlin et al (2014)
1.2	<0.1 - 5.5	PAHs	Lecture Hall	Bohlin et al (2014)
2.3	na	PAHs	Factory	Bohlin et al (2010)
Half-Dome or Exposed PUF Sampler				
2.6	*2.1 – 3.2*	*PCBs*	*Occupied Office*	*This Study (Modeled)*
2.7	1.9 - 4.4	PCBs	Occupied Office	This Study (Phase-2)
3.4	1.8 - 8.3	PCBs	Scientific Lab	Shoeib and Harner (2002)
2.5	na	PAHs	Factory	Bohlin et al (2010)
2.5	na	PBDEs	Residential Home	Wilford et al (2004)

CHAPTER VI: EMISSIONS OF TETRACHLOROBIPHENYLS (PCBS 47, 51 AND 68) FROM POLYMER RESIN ON KITCHEN CABINETS AS A NON-AROCLOR SOURCE TO RESIDENTIAL AIR[5]

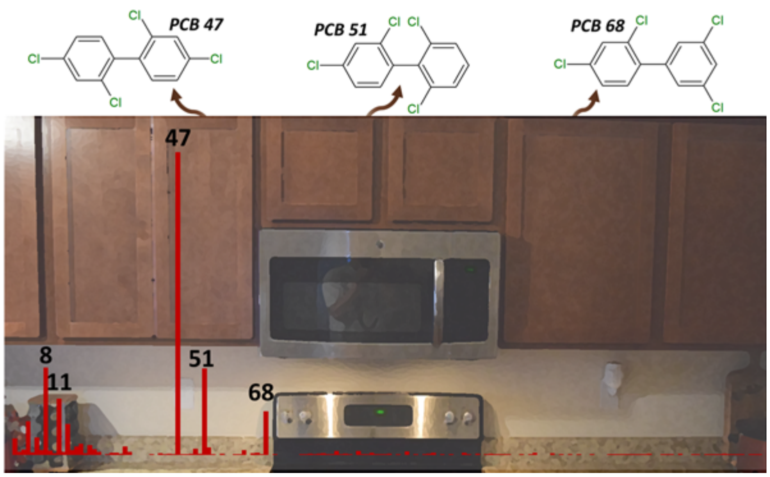

Figure 26: Table of content art for Chapter VI.

Abstract

We found both Aroclor and non-Aroclor sources of airborne polychlorinated biphenyls (PCBs) in residential homes. We deployed passive air samplers at sixteen residences and found PCB-47, PCB-51, and PCB-68 to account for up to 50% of measured indoor ΣPCBs (2700 pg m^{-3}). Although PCB-47 and PCB-51 are neurotoxins present in Aroclor mixtures (<2.5 and <0.3 wt%, respectively), we found them at much higher levels than expected for any Aroclor source. PCB-68 is not present in Aroclor mixtures. Another non-Aroclor congener, PCB-11, a byproduct of pigment manufacturing, was found inside and outside of every household and was frequently the predominate congener. We conducted direct measurements of surface emissions and identify finished cabinetry to be a major source of PCB-47, PCB-51 and PCB-68. We hypothesize that these congeners are inadvertent byproducts of polymer sealant manufacturing and produced from the decomposition of 2,4-dichlorobenzoyl peroxide

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[5] This chapter was accepted with revision for publication in *Environmental Science and Technology* on Mar 23rd, 2018. The current draft reflects the revision submitted for review on Mar 27th, 2018. Appendix C contains the supplementary information for this journal submission.
Sample processing, data analysis and manuscript preparation were done by N. Herkert under the supervision of K. Hornbuckle. Samples were deployed and collected in residences by volunteers. Initial PUF-PES sampler development was conducted by J. Jahnke under the supervision of K. Hornbuckle.

used as an initiator in free-radical polymerization of polyester resins. The presence of these three compounds in polymer products, such as silicone, has been widely noted, but to our knowledge it has never been shown to be a significant environment source of PCBs.

Introduction

The presence of polychlorinated biphenyls (PCBs) in the air of schools, offices, and residential homes is as important an issue today as it was four decades ago when PCBs were banned. The risk posed to adults and children from airborne PCBs is a function of the specific congeners present, as PCBs exert toxicity through a variety of biological pathways. As a group, PCBs are classified as known human carcinogens by the International Agency for Research on Cancer (IARC).[4, 5] Animal and laboratory studies show that many individual congeners are neurotoxins and endocrine disruptors.[4-7] Some congeners are benign, yet their metabolic breakdown products are toxic.[8]

PCBs were originally produced and sold in the United States under the tradename Aroclor by Monsanto, until production ceased in the 1970s.[2] Most commonly Aroclor mixtures were used as dielectric fluids in capacitors (Aroclors 1242 and 1016) and transformers (1254 and 1260). However, Aroclor mixtures were also added to many other products such as paints, lubricants (1232-1260), carbonless copy caper (1242), inks (1254), sealants (primarily 1254), adhesives (1221–1254), and various other plastics.[2]

PCBs have also been detected in modern building material as inadvertent manufacturing byproducts.[10-14] Modern pigments, including those used in household paint, are contaminated with many different PCB congeners, such as PCBs 4, 8, 11, 28, 52, 77, and 209, as byproducts of pigment manufacturing.[10, 12] PCB 11 is an important congener when analyzing PCB signals because it is one of the most prominent congeners from pigment, has been detected ubiquitously in the environment, and is not present in the original Aroclor mixtures.[13] These non-Aroclor sources of PCBs are changing our understanding of PCB sources in the environment.

Due to the widespread historical and modern sources of PCBs, many schools, workplaces and residential homes today have significant airborne concentrations.[43, 109, 111] In some instances airborne PCBs levels in schools have led to litigation and school closure.[109, 135-137] Recently it has been shown that the inhalation exposure of PCBs for some children is equal to or greater than their dietary exposure.[37, 43] More work is needed to fully understand the significance of inhalation exposures, the quantity of Aroclor PCB sources in modern buildings, and the role of modern non-Aroclor PCB sources. Here we report indoor and outdoor airborne concentrations and surface emissions in residences. We characterize the Aroclor and non-Aroclor sources of PCBs in these residences and identify a common building material as a previously unknown non-Aroclor source of PCBs.

Materials and Methods

Air Sampling

Passive air samples were collected inside and outside 16 residences in the greater Iowa City area using polyurethane equipped passive air samplers (PUF-PAS) for a 6-week interval from August 22nd to October 2nd, 2017. The double-dome PUF-PAS sampler design (with a 24 cm top bowl and 19.5 cm bottom bowl) used for this study is based on a commonly used PUF-PAS design.[25, 30, 36, 51] The PUF disk used in the passive air samplers were purchased from Tisch Environmental (Cleves, OH).

Surface Emission Sampling

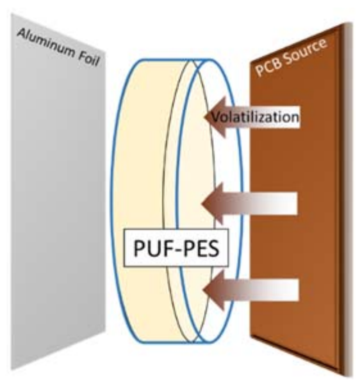

Figure 27: Schematic of polyurethane equipped passive emission sampler (PUF-PES).

We designed a polyurethane foam passive emission sampler (PUF-PES) to measure volatilization of PCBs from walls, floors, and other interior surfaces. The PUF-PES consisted of a solvent-cleaned polyurethane foam disk placed inside a glass Petri dish and sealed over the surface (Figure 27). The glass Petri dish (14 cm diameter, 2 cm rim height) and the air gap assured that the PUF disk captured gas phase PCBs emitted from the surface and not from room air or from direct contact. Duplicate surface emission samplers were placed on five different surfaces at one residence. All surfaces were wiped prior to attaching the samplers to minimize the influence of dust. After fixing the PUF-PES to the respective surfaces the samplers were covered with aluminum foil and sealed. Field blanks consisted of a PUF-PES applied to foil at the same time as the other surfaces to isolate any infiltration effects. These control samples did not exhibit PCB levels above other blanks in the study, indicating no measurable air infiltration occurred. In the analysis of surface emissions, congeners were only reported if there were detected at levels above the limit of quantification (LOQ) in both duplicate samples deployed on each respective surface (Figure C6, Table C7).

Analytical Methods and Quality Control

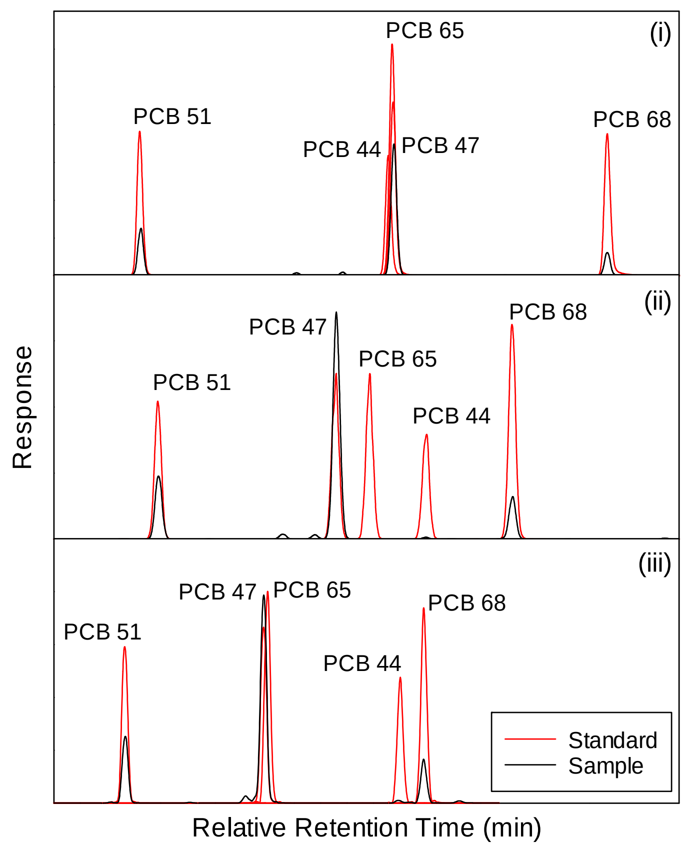

Figure 28: GC/MS/MS chromatograms of PCBs 47, 51, and 68 on (i) Supelco SPB-Octyl capillary column (ii) Agilent Technologies DB-5 capillary column and (iii) Agilent Technologies DB-1701 capillary column.

The PUF disks were analyzed for all 209 PCB congeners with methods described previously.[42, 43, 59, 86, 117] Briefly, PUF disks were extracted using a pressured and heated mixture of 1:1 hexane:acetone (Dionex ASE 350). Sample extracts were cleaned with acidified silica gel and analyzed using a GC-MS/MS (Agilent 7890A GC system, Agilent 7000 Triple Quad, Agilent 7693 autosampler) in multiple-reaction monitoring (MRM) mode. The quality of the chemical measurements was assessed using surrogate recoveries, blanks, and duplicate sampling for emissions samplers. All 209 PCB congeners were initially analyzed as 173 single or co-eluting chromatographic peaks on a Supelco SPB-Octyl capillary column. In this paper, we report the ΣPCBs as the sum of 205 PCB congeners because PCBs 14, 166, and 204 are used as analytical standards and PCB 128 coelutes with PCB 166.

In specific instances of unexpectedly high congener results, specifically PCBs 44/47/65, 51, and 68, peak identification was confirmed by running the individual PCB standards and the sample on both a DB-5 and DB-1701 capillary column (Agilent Technologies). Figure 28 shows the MRM results for five tetrachlorobiphenyls (PCBs 44, 47, 65, 51, and 68) on all three capillary columns. PCB 44 and PCB 65 are included because they co-elute with PCB 47 in the SPB-Octyl column. The confirmation columns show that these two congeners were not present in our samples. In addition to the use of confirmation columns, mass spectra were examined to confirm the identity as a tetrachlorinated PCB congener. An example mass spectra for PCB 47 in a sample is provided in the SI (Figure C1).

Determining Air Concentrations

For PUF-PAS samples collected in the outdoor environment the sampling rate (R_s), and subsequent effective sampling volume (V_{eff}), were calculated using a model previously described.[57, 59, 60] The model calculates a deployment-, compound-, and site-specific V_{eff} based on the hourly meteorological data with wind speed as the primary component. For this study, the average outdoor R_s was 2.45 m^3 d^{-1} and the V_{eff} ranged from 30 to 200 m^3. For the PUF-PAS samples collected indoors, we assumed a sampling rate of 1.0 m^3 d^{-1}. A few studies have estimated the indoor R_s of PCB congeners for the sampler style used in this study. Bohlin and colleagues found an R_s in a lecture room of 1.2 m^3 d^{-1}, Hazrati and Harrad measured an R_s in a vacant office of 0.8 m^3 d^{-1}, and we have estimated an R_s for an occupied office of 1.0 m^3 d^{-1}.[39, 44, 138] We suspect the different R_s values reported for these studies are primarily a result of different air ventilation rates for the different room styles and placement within a room.

Statistics

The limit of quantification (LOQ) was taken as the upper limit of a 95% confidence interval of blank level for each congener: concentrations below the LOQ were treated as zero. Pearson correlations were used to compare sample and source PCB profiles. Aroclor profiles were obtained from Frame et. al. (2001).[9] Leverage values and Cook's distances were used to identify outliers. Large values for leverage and Cook's distance indicate an observation is not well explained in the correlation and may be an outlier.[139] These values were calculated with Minitab 17.

Results and Discussion

Outside Residences

The average outdoor airborne concentration of the sum of detected congeners (ΣPCB) was 142 pg m^{-3} (ranging from 70 to 250 pg m^{-3}), similar to previous reports for rural Iowa.[37] The outdoor concentration of PCBs varied little across our study area, with a RSD of 38% for the ΣPCBs. As expected, the outdoor concentrations were lower than reported for larger metropolitan areas.[27, 68, 140-143] The outdoor air profiles are similar among the samples and their sources appear to be a mixture of Aroclors and modern pigment (PCB 11). The air profile most closely resembles Aroclor 1254 but also shows contributions from 1016, 1242, and 1248 (Table S1). PCB 11 was the predominant congener in the average outdoor air profile and was measured at a level (11 ± 9 pg m^{-3}) comparable to what we have previously measured for a much larger metropolitan area, Chicago (15 ± 13 pg m^{-3}).[13] This suggests that the non-Aroclor sources of PCBs, including pigments, are significant and may be less influenced by the metropolitan size than Aroclor sources, a finding also noticed by Hites.[144]

Indoor Residences

The average indoor airborne ΣPCB concentration was 2830 pg m^{-3} (ranging from 450 to 6970 pg m^{-3}). This is comparable to previous reports from private residences, and lower than many schools.[37, 43, 109] In a recent study reporting PCB levels in schools, ΣPCB levels were measured up to 194 ng m^{-3}, which is over 25 times greater than the maximum measured in this study.[43] The indoor air profiles varied significantly between locations and appeared to be a mixture of Aroclor and non-Aroclor sources. The indoor air had more contributions from lighter Aroclor mixtures such as 1016 and 1242, than the outdoor air (Table C2). As with the outdoor air samples, PCB 11 was frequently the predominant congener measured in indoor air. The average indoor air concentration for PCB 11 in this study was 370 pg m^{-3} (ranging from 100 to 2170 pg m^{-3}). At some locations PCB 11 contributed up to 30% of the ∑PCB levels. It is unsurprising that PCB 11 is a significant congener in residential home air given the known primary source of PCB 11 in the environment is pigments.

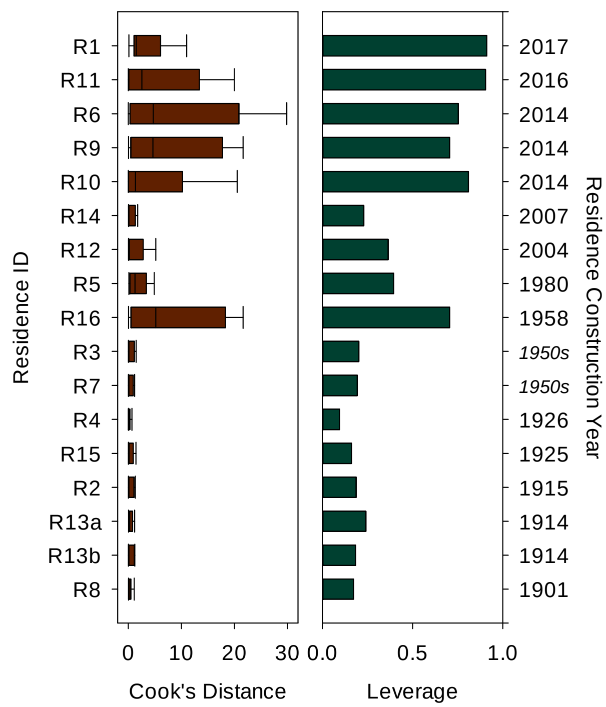

Figure 29: Summary of average Cook's Distance and Leverage for the tetrachlorobiphenyls profile between Aroclors and each residence for PCB 47(Table C3). The larger the value the more important the signal is to the total and the less likely it can be explained by Aroclor sources. Residence R16 had the kitchen remodeled in 2017.

In the most recently constructed buildings, PCBs 47, 51, and 68 appeared at levels that could not be attributed to any known Aroclor or non-Aroclor sources. On average, PCBs 47, 51, and 68 contributed 15%, 4% and 2% mass fraction to the ΣPCBs, respectively, in the five residences built in the last five years (Figure C5). The construction of the newest building in this study was completed in July of 2017, just one month prior to the start of air sampling campaign. In this residence (R1), PCBs 47, 51, and 68 contributed 37%, 11% and 5% mass fraction to the ΣPCBs, and 1900 pg m^{-3}, 530 pg m^{-3}, and 270 pg m^{-3}, respectively. PCB 68 has not been reported in any Aroclor, PCB 51 was present in one or more Aroclor at levels less than 0.25% mass fraction, and PCB 47 was present at levels less than 2.5% mass fraction.[9] Residences with elevated levels of these three PCBs were identified using leverages and Cook's distances for tetra-PCBs in linear correlations between samples and Aroclors (Figure 29, Table C3). Large values for leverage and Cook's distance found for the newest buildings demonstrate that these congener concentrations are outliers and inconsistent with the congener distributions found in Aroclors.[139] All the sampled buildings that were constructed in the last five years exhibited the PCB 47/51/68 signal as did one building recently remodeled in 2017. Residence 16 had the kitchen replaced in 2017.

We investigated potential sources of PCBs by directly measuring the surface emissions in duplicate on five different surface types in the kitchen of the residence with the highest PCB 47/51/68 signal (R1). An additional air sample was collected while the PUF-PES samples were deployed. There was no statistical difference between the profiles of the two different air sampling periods ($p > 0.08$), however the measured ΣPCB concentration was different (2000 pg m^{-3} versus 5000 pg m^{-3} previously). The airborne concentration change was not surprising as the two sampling periods were months apart and occurred in different seasons (summer and winter). The ΣPCB emissions were highest from the finished cabinet (33 ng m^{-2} d^{-1}) and less from the kitchen floor (20 ng m^{-2} d^{-1}), the painted wall (8.3 ng m^{-2} d^{-1}), the stovetop (1.6 ng m^{-2} d^{-1}), and unfinished cabinet (below LOQ). Interestingly, the finished cabinet surface displayed the largest emission while the unfinished cabinet surface had no measured emissions. Under sampling conditions, the emissions value is likely at the lowest magnitude that would be observed within the residence (i.e. diffusive emissions). With increased air movement across each respective surface, the surface/air mass transfer coefficient and total emissions increase.

The finished cabinet surface is a distinct source of the PCB 47/51/68 signal to the air. These three congeners account for almost a third of the total PCB emission from the cabinet surface (Figure 30). The surfaces arranged in order from largest to smallest PCB 47+51+68 emission are finished cabinet (16 ng m^{-2} d^{-1}), painted wall (5.0 ng m^{-2} d^{-1}), kitchen floor (4.1 ng m^{-2} d^{-1}), stovetop (1.2 ng m^{-2} d^{-1}), and unfinished cabinet (below LOQ). Given the close proximity of the painted wall surface tested to the kitchen cabinets, it is possible that the elevated level of these three congeners emitting from the painted wall originate from the finished cabinet. Emissions from newly finished cabinets may explain why these three PCBs were found in more recently constructed (R1, R6, R9, R10, R11) or remodeled (R16) buildings. Omitting the emissions of PCBs 47, 51, and 68, the finished cabinet and floor have very similar ΣPCB emissions, 17 ng m^{-2} d^{-1} and 16 ng m^{-2} d^{-1}, respectively.

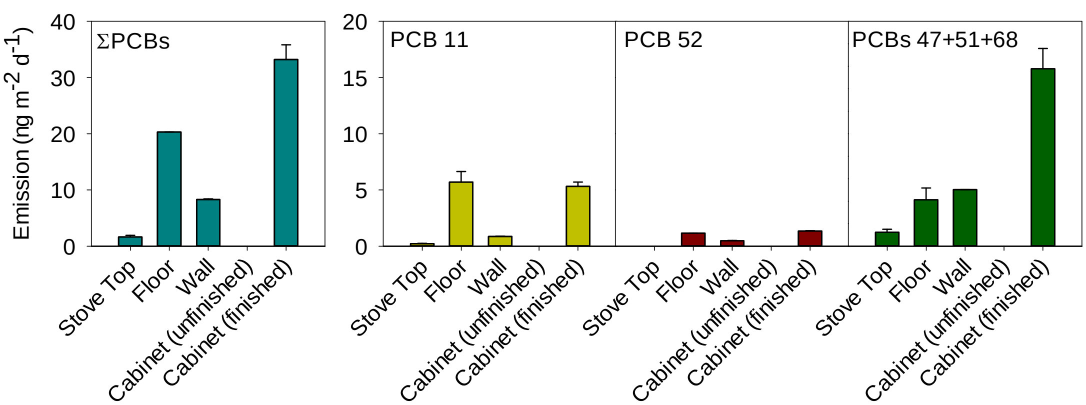

Figure 30: PCB surface emissions measurements of 5 different surfaces for ∑PCBs, PCB11, PCB52, and PCBs 47+51+68. The bars represent the mean of the duplicate samples and error bars represent the largest of the two measurements.

We hypothesize that PCBs 47, 51, and 68 are inadvertent byproducts in the cabinet manufacturing process. Given that the cabinets were supplied by different companies, the PCB source of these PCB congeners to the air may be due to a general production process rather than a single commercial product, similar to a pigment source.

Perdih and Jan (1994) reported PCBs 47, 51, and 68 at trace levels in silicone rubber as a byproduct of the decomposition of 2,4-dichlorobenzoyl peroxide.[145, 146] Diacyl peroxides (such as 2,4-dichlorbenzoyl peroxides) are often used as initiators in the free-radical polymerization of certain commercial products such as silicone and polyester.[147-151] Polyester is a very common and widely used polymer with many important commercial applications, including wood finishing products.

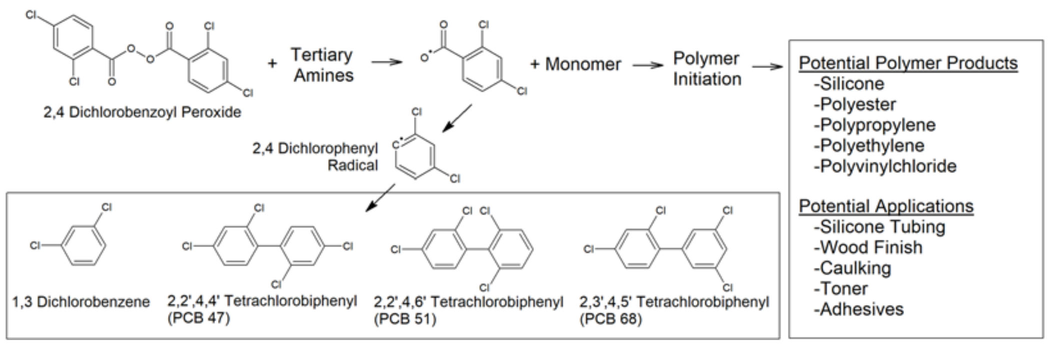

Figure 31: PCB formation pathways in polymer production using 2,4 dichlorobenzoyl peroxide as an initiator in free-radical polymerization. The most probable inadvertent byproducts are 1,3 Dichlorobenzene and PCB 47 (2,2',4,4' Tetrachlorobiphenyl) with PCB 51 (2,2',4,6' Tetrachlorobiphenyl), and PCB 68 (2,3',4,5' Tetrachlorobiphenyl) likely being secondary byproduct reactions.

The decomposition of diacyl peroxides, including 2,4-dichlorobenzoyl peroxide, has been extensively studied for decades because they are crucial to many different polymer production processes.[145-147, 152-154] During the decomposition of 2,4-dichlorobenzoyl peroxide, 2,4-dichlorophenyl radicals are produced which can then form any number of inadvertent byproducts. The predominate products of this decomposition process are 1,3 Dichlorobenzene and PCB 47 (2,2’,4,4’-Tetrachlorobiphenyl). However, the 2,4-dichlorophenyl radical and 1,3 Dichlorobenzene could react to also produce PCB 51 (2,2',4,6'-Tetrachlorobiphenyl), and PCB 68 (2,3',4,5'-Tetrachlorobiphenyl) (Figure 31). This decomposition has also been shown to produce other chlorinated benzene and polychlorinated biphenyl products in the presence of other chlorinated compounds and aromatics, such as 1,2,4-trichlorobenzene, PCB 91, and PCB 99.[145, 146] We did not detected PCB 91 or 99 as significant levels in our PUF-PES samples, suggesting this particular production process does not include other chlorinated compounds or aromatics.

The decomposition of 2,4-dichlorbenzoyl peroxide has even been intentionally used to synthesize PCBs.[155]

While PCBs as a chemical class have been shown to have adverse health effects, each individual congener has unique toxicological properties.[4] In toxicological studies PCB 47 has been shown to cause a massive release of arachidonic acid in rat liver tissue.[156] Both PCBs 47 and 51 have been shown to have weak androgen receptor (AR) antagonistic potential and weak estrogenic activity.[157] PCBs 47, 51, and 68 can all be considered to have neurotoxic potential.[158, 159] Based on their relative potency as reported by Simon et al. (2007), PCB 51 is a more potent neurotoxic congener (REP = 0.692) than both PCB 47 (REP = 0.497) and PCB 68 (REP = 0.209).[159] PCB 47 has been shown to be a potent inducer of Ca2+-dependent apoptosis in rat neurons.[160, 161] Both PCBs 47 and 51 have been shown to be potent partial and full antagonist to human $GABA_A$ receptors. Fernandes et al. (2010) reported PCB 47 as the most potent non-dioxin like PCB congener for activation and potentiation of the $GABA_A$ receptor.[162] It is difficult to address the direct potential effects of these potent neurotoxic congeners in the context of our study as we do not yet fully understand the fate and toxicities of inhaled PCBs.[163-166]

Implications

Discovery of non-Aroclor PCB sources is changing our understanding of PCBs sources in indoor and outdoor environments. Non-Aroclor PCB sources such as pigments and polymer resins may contribute significant levels of PCBs to air both inside and outside residences. Inside the residences we examined, non-Aroclor sources of PCBs often dominated the indoor air signal (Figure 32). Here we identify non-Aroclor sources as sources of PCBs other than Aroclor mixtures (i.e. pigment and polymer resin). In 76% of the indoor air samples collected in this study, PCB 11 or PCB 47 were the predominant congener, which are both present from non-Aroclor sources. On average 23% of the ΣPCB profile can be attributed to non-Aroclor sources of PCBs, with 5 residences having greater than one-third of the ΣPCB attributed to non-Aroclor sources (Figure 32). While some of these residences (R6, R9, R10, R11) had low overall ΣPCB levels compared to other residences with largely Aroclor PCB sources, residence 1 had the fourth highest ΣPCB level. The airborne PCB levels at this residences is from almost entirely non-Aroclor sources (>60% of total).

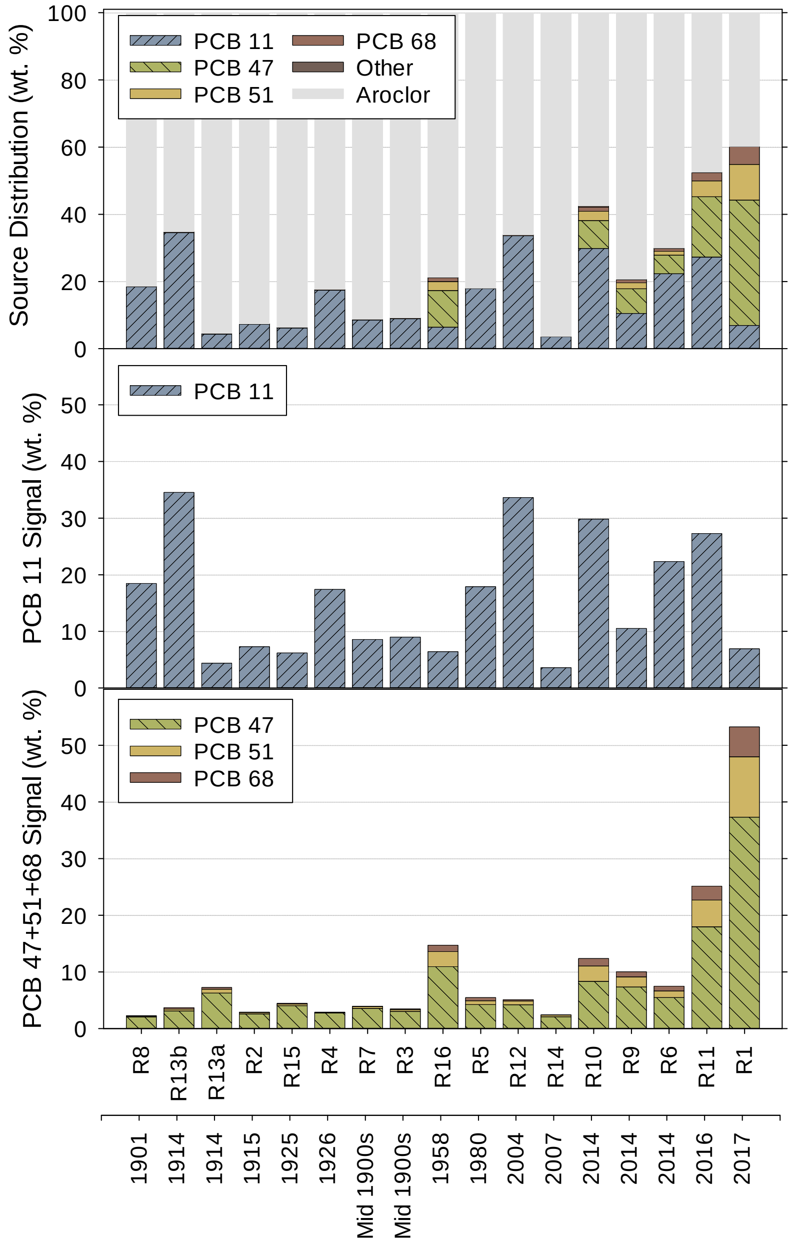

Figure 32: Percent of the indoor air PCB levels attributed to non-Aroclor sources for each residence arranged in order of building construction age. On average 23% (range 4% to 60%) of the ΣPCB profile can be attributed to non-Aroclor sources.

It is likely that other PCB congeners have non-Aroclor source contributions and therefore we are underestimating the total non-Aroclor contributions. For example, we only considered the PCB 47+51+68 signal as a non-Aroclor signal at the 6 residences we identified with the new source, but this source may be contributing low levels of PCBs at other residences. At residence 14, PCB 8 is the predominate congener and has a high Cook's distance (>4), indicating there may be a non-Aroclor source, such as pigment, in addition to Aroclor sources. Similarly, at residence 8, PCB 1 has a high Cook's distance (>2), indicating it could also be present from both pigment and Aroclor sources.

As PCB sources are further characterized more non-Aroclor sources may be discovered. Diacyl peroxides, such as 2,4-dichlorbenzoyl peroxides, are used as initiators in a wide array of commercial and industrial process involving polymers.[150] Muir and Howard have suggested that heavy industrial use of peroxides may be important persistent organic pollutants, in part due to decomposition.[167] It is possible that PCBs 47, 51, 68 and other congeners are present in yet unidentified products given the near ubiquitous presence of polymers, such as silicone and polyester, in commercial use. We found >6,000 patents in the PubChem database that mention the potential use 2,4-dichlorbenzoyl peroxide.

It is widely accepted that PCBs 47, 51, 68 and other congeners exist in polymer products at trace levels, such as silicone, but to our knowledge it has never been identified as a significant environment source of PCBs. This signal has likely not been seen in the environment previously for two primary reasons. Firstly, the signal is dominated by PCB 47 which can be present due to Aroclor mixtures therefore making it difficult to identify in complex mixtures unless the signal is large. Secondly, many studies conducted on PCBs in the environment only measure a few indicator congeners, which often do not include the analysis PCBs 47, 51 and 68. A significant benefit of analyzing all 209 PCB congeners individual is the ability to characterize the contributions of both Aroclor and non-Aroclor sources.

Rodenburg et al. identified PCBs 44+47+65, and PCBs 45+51 as a unique factor in an analysis of groundwater, landfills and wastewater collections systems.[168] They identified this factor primarily in waste water treatment plant effluents and attributed it to a partial dechlorination process, given that PCBs 47 and 51 have both been documented as partial dechlorination products previously.[168-170] PCBs 47 and 51 contributed up to 60% of ΣPCBs in this factor. Although Rodenburg et al identified these compounds as products of Aroclor dechlorination, it is possible that they found PCBs 47 and 51 in wastewater due to polymer manufacturing discharges in the New Jersey area.[168] This non-Aroclor source of PCB congeners may be in industrial waste effluent and an important source to the aquatic environment as it appears to be in indoor air.

CHAPTER VII: PASSIVE SAMPLING OF ATMOSPHERIC HYDROXYLATED POLYCHLORINATED BIPHENYLS IN CHICAGO[6]

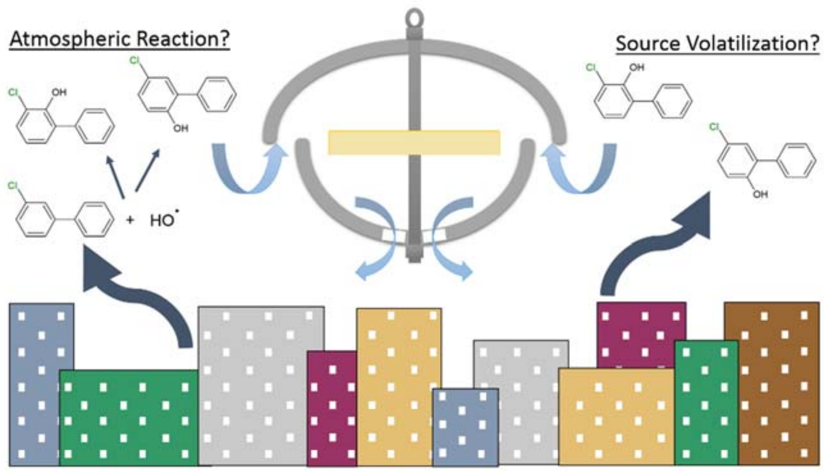

Figure 33: Table of content art for Chapter VII.

Abstract

Here we report revised laboratory method for analysis of hydroxylated polychlorinated biphenyls (OH-PCBs) using a passive air sampling method (PUF-PAS) and their widespread presence in Chicago air. OH-PCBs have long been thought to be an important mechanism in the fate PCBs in environment, but recently, it has been suggested that they are environmental contaminants independent of their parent PCB compounds. We identified multiple locations with significant and unique PCB and OH-PCB signals, specifically the Jardine Water Plant (JN), and the Joliet Township (JT) sampling locations. Both PCBs and OH-PCBs signals at the JN site displayed strong evidence of direct source volatilization from legacy Aroclor sources, while also showing evidence of OH-PCB production from an atmospheric reaction. The two most frequently detect OH-PCB congeners in this study, 2OH-PCB2 & 6OH-PCB2, were detected at levels comparable to a previous report of atmospheric OH-PCBs utilizing active sampling methods. These two OH-PCBs congeners also displayed evidence for both direct volatilization and atmospheric reactions as sources of OH-PCBs to the environment.

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[6] We in the context of this chapter, refers to myself, Nicholas J. Herkert, and my thesis supervisor, Keri C. Hornbuckle. Sample analysis was conducted by N. Herkert with assistance from R. Marek and A. Awad for derivatization of OH-PCB compounds. Method development was conducted by N. Herkert in collaboration with A. Awad and R. Marek. Data analysis and document preparation was conducted by N. Herkert under the supervision of K. Hornbuckle.

Introduction

Polychlorinated Biphenyls (PCBs) have long been important atmospheric contaminants and are still measured ubiquitously due to both Aroclor and modern sources.[12, 13, 37, 64, 68, 71, 86, 117, 171-173] Previously, it has been hypothesized that oxidation of PCB congeners by a hydroxyl radical to form hydroxylated PCBs is an important process for their fate in the environment.[143, 174-182] Hydroxylated PCBs have long been detected in people and are recognized to be metabolites of PCBs in both humans and plants.[8, 183-187] Although few studies have been done to assess the direct toxicities of OH-PCB congener, they have been shown to have neurotoxic and endocrine disrupting potential.[8, 188] They may be more toxic than their parent PCB congeners.[8] Recently, OH-PCBs have been detected in several different environmental matrices and original Aroclor mixtures,[182, 189, 190] suggesting they may be environmental contaminants distinct from their parent PCB compounds.

Hydroxyl (OH) radicals are an important removal pathway for many different atmospheric contaminants.[191] Several studies have presented evidence for reactions between gas-phase PCBs and atmospheric hydroxyl radicals.[143, 174, 177, 178, 180, 181, 188, 191-195] Anderson and Hites (1996) experimentally measured second-order rates constants of OH radical and PCB reactions in a laboratory setting, and reported lower chlorinated congeners to be more reactive.[174] Totten et al (2002) reported diurnal variations of gas-phase PCBs in several major metropolitan cities, and concluded atmospheric PCB levels decreased during the day due to reacting with sunlight generated hydroxyl radicals.[181] Mandalakis et al (2003) similarly concluded diurnal atmospheric PCB variability was a result of OH radical reactions by correlating PCB levels with OH radical levels in the subtropic.[180]

In addition to field and laboratory studies, several modeling studies have been conduct to examine atmospheric PCB and OH radical reactions.[193-196] Dang et al (2015) conducted theoretical examination of the mechanisms and kinetics of the oxidation of gas-phase PCB 126 using quantum chemistry methods. They determined OH-PCB 126 to be a highly reactive short intermediate, but not an end product itself.[193] Sun et al (2015) similarly conducted a quantum chemical investigation of oxidation of gas-phase PCB 47, and found specific OH-PCB products to be more preferential than others based on the orientation of the chlorine atoms (5OH-PCB 47 > 3OH-PCB 47 >> 6OH-PCB 47).[194] Yang et al (2016) further characterized radical oxidation rates for gas-phase PCBs using QSAR quantum chemical methods for several PCB congeners. They similarly found specific OH-PCB products for PCB 47 and other congeners to be more likely based on orientation.[195] For example, gas-phase PCB 116 demonstrated the non-chlorinated phenyl ring would hydroxylate with a para- > meta- > ortho- preference.

Recently, Awad et al (2015) directly measured 2OH-PCB2 (2-hydroxy-3-chlorobiphenyl) and 6OH-PCB2 (6-hydroxy-3-chlorobiphenyl) in the atmosphere for the first time using active sampling methods. In this study, they concluded that these two OH-PCB congeners were present in the atmosphere as a result of direct volatilization from Aroclor sources.[189]

Polyurethane equipped passive air samplers (PUF-PAS) are frequently used to reliably detect PCBs in the atmosphere.[15, 19-22, 27, 35, 38, 41, 49, 50, 60] In this study we measured both PCB and OH-PCB concentrations at 21 different sampling sites across the metropolitan Chicago area using the PUF-PAS sampling method. We hypothesized that OH-PCBs would be primarily present in the atmosphere as a result of source volatilization and there would be little evidence of atmospheric reactions. We further hypothesized that PUF-PAS methods would be appropriate for measuring atmospheric concentrations of OH-PCBs despite the suspected instability of the OH-PCB intermediate.

Air Sampling Methods

This study examines a set of 205 PUF-PAS samples collected across 21 different sampling sites in the metropolitan Chicago area from January 2012 to January 2014. The PUF-PAS sampler design (with a 24 cm top bowl and 19.5 cm bottom bowl) used for this study is based on a commonly used PUF-PAS design.[25, 30, 36, 51] The PUF disk used in the passive air samplers were purchased from Tisch Environmental (Cleves, OH). All 205 PUF-PAS samples were analyzed for all 209 PCB congeners, while a subset of 80 PUF-PAS samples were analyzed for 72 OH-PCB congeners.

Determining Air Concentrations

For all samples, the sampling rate (R_s), and subsequent effective sampling volume (V_{eff}), were calculated using a model previously described.[57, 59, 60] The model calculates a deployment-, compound-, and site-specific V_{eff} based on the hourly meteorological data, with wind speed as the primary component.

As an input to the flowrate model, it is required to have appropriate physical-chemical properties, particularly K_{oa}, to approximate the uptake of chemicals on the PUF disk. To our knowledge, the necessary physical-chemical properties for OH-PCBs do not currently exist in the literature and needed to be determined to model the effective sampling volume of these compounds.

Physical Chemical Properties for OH-PCBs

The K_{oa} and K_{ow} values were approximated for neutral OH-PCB congeners using several different chemical modelling tools. The first of which is the EPI (Estimation Programs Interface) Suite™ program operated by the U.S. Environmental Protection Agency (EPA). The EPI Suite™ software is a Windows-based suite of physical-chemical property and environmental fate estimation programs. The EPI Suite™ software also conveniently offers a database of literature values for > 40,000 chemicals.

The second software used was ACD/Absolv software, which is used to predict the Abraham solvation parameters. The solvation parameters can be used in conjunction with a linear free-energy relationship (LFER) to predict partitioning between two phases. The ABSOLV software was run with a canonical smile input for the OH-PCB congeners through the online UFZ-LSER database.[106] With the ABSOLV software, there is an equation for estimating partitioning between two condensed phases ($ABSOLV_{CC}$), an equation for estimating partitioning between a condensed and gas phase ($ABSOLV_{CG}$), and an equation meant for describing both partitioning processes ($ABSOLV_{XX}$).

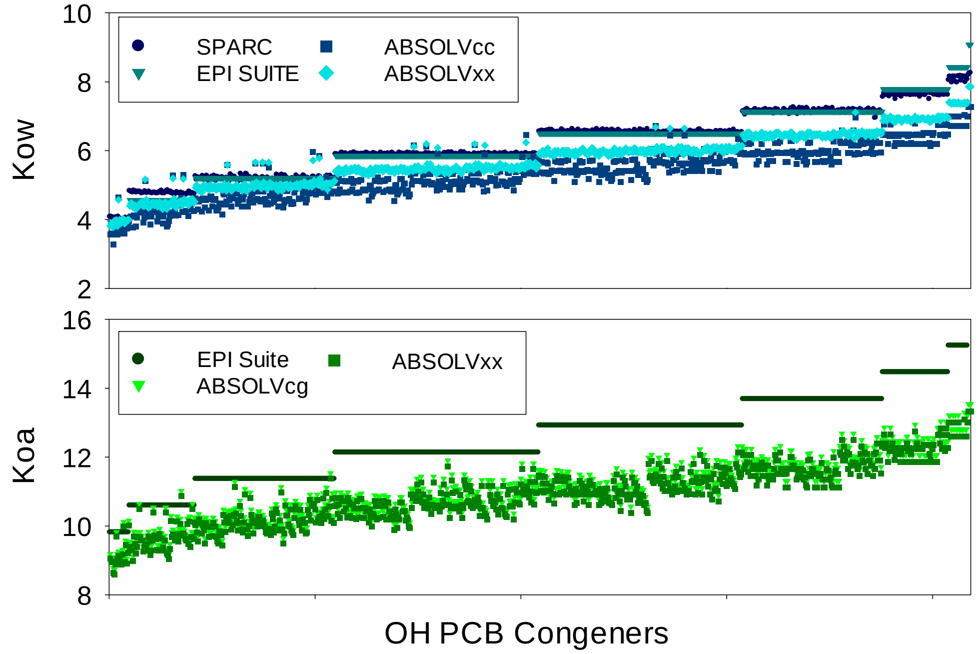

Figure 34: Summary of the results of physical-chemical properties (K_{ow} and K_{oa}) for all 837 OH-PCB congeners using the EPI Suite™ software, SPARC software (results published by Rayne and Forest[197]), and two different methods in the ABSOLV software.

The results of both the EPI Suite™ software and the ABSOLV software for the two physical-chemical properties (K_{ow} and K_{oa}) are summarized for all 837 OH-PCB congeners in Table D1. The results from these two software packages for K_{ow} were also compared to results from the SPARC estimation program as published by Rayne and Forest (2010).[197] The modelled results for K_{ow} were consistent for all software used and both ABSOLV methods. In general the EPI Suite™ and SPARC software estimated higher K_{ow} values than ABSOLV. The modelled results were less consistent for K_{oa} between the EPI Suite™ software package and ABSOLV methods. The EPI Suite™, software produced a K_{oa} estimate between 1 and 3-log units higher than ABSOLV methods. The EPI Suite™ software is not as sensitive to structure related properties and only produces a homolog specific value for both K_{ow} and K_{oa}. For this reason, the ABSOLV is a better alternative for future work. Interestingly, the K_{oa} values for the OH-PCBs are approximately 3-log units larger than their parent PCB compounds. This implies OH-PCBs, particularly higher chlorinated OH-PCBs, may be particle bound in the atmosphere depending on the particulate characteristics at ambient conditions. These compounds will still likely be able to be sampled reliably by the PUF-PAS method because it samples both gas and particle phase compounds.

Laboratory Methods

The methods for extraction and analysis of PCBs and OH-PCBs have been described previously. [189, 190] Initially, PUF samples were spiked with surrogate standards PCB14, PCB 65-d5, PCB166, 13C 4'-MeO-PCB120, and 13C 4'-MeO-PCB187, then extracted with a 1:1 hexane:acetone solvent mixture on an Accelerated Solvent Extractor (ASE). After extraction, the PCB and OH-PCB fractions are separated in a liquid-liquid extraction and the OH-PCB fraction are derivatized in diazomethane to the methoxylated form. Both fractions are then cleaned with acidified silica gel columns and analyzed for all 209 PCB congeners and 72 OH-PCB congeners by gas chromatography with tandem mass spectrometry (GC-MS/MS, Agilent 6890N Quattro Micro GC, Waters Micromass MS Technologies) using a modified EPA method 1668a. The GC-MS/MS is equipped with a Supelco SPB-Octyl capillary column run in multiple-reaction monitoring (MRM) mode.

After analyzing initial results, previous extraction methods for the analysis of OH-PCBs display variable and inconsistent surrogate standard recoveries. The differences were particularly pronounced between samples and blanks for higher chlorinated OH-PCB congeners. The surrogate standard results also varied between sampling media (PUF, XAD, QFF, etc.). Therefore, a mixture of 11 OH-PCBs standards was prepared in methanol to act as a laboratory reference standard to develop new laboratory method for analyzing OH-PCBs from PUF.

Initial analytical results with laboratory reference standards showed a dramatic difference between sample and blank recoveries for higher molecular weight OH-PCB congeners (mw >~ 340 g/mol), with blanks having near zero recoveries for these congeners. We hypothesized that the pronounced difference was due to varying sample and blank pH levels prior to extraction and that the ionized form of the OH-PCB was interacting with the polyurethane sampling media. We tested the pH of a sample extract and found that it had a slightly acidic pH value of 6.21. Conversely, the pH of a randomly selected lab blank extract had a slightly basic pH value of 7.21. This is problematic in the analysis of higher molecular weight OH-PCB congeners (mw >~ 340 g/mol) because the pKa of these congeners are 6 or lower, meaning they are predominantly in the ionized form on the PUF sample. We tested the effects of the adding a small amount of 0.01 HCl to the PUF media prior to extraction, to lower the pH of the sample and ensure the OH-PCBs are in the OH form instead of the ionized form. A comparison of the acidic and the non-acidic extraction can be seen in Figure 35. Acidifying the PUF prior to extraction drastically increased the extraction efficiency by lowering the pH of the samples to ~5. However, due to the low recoveries of 13C 4-MeO PCB187 that PUF was not acidified enough and a higher concentration of HCl would need to be used for extraction. To ensure adequate acidification of PUF samples 2 mLs of 2 M HCl was added to each sample prior to extraction.

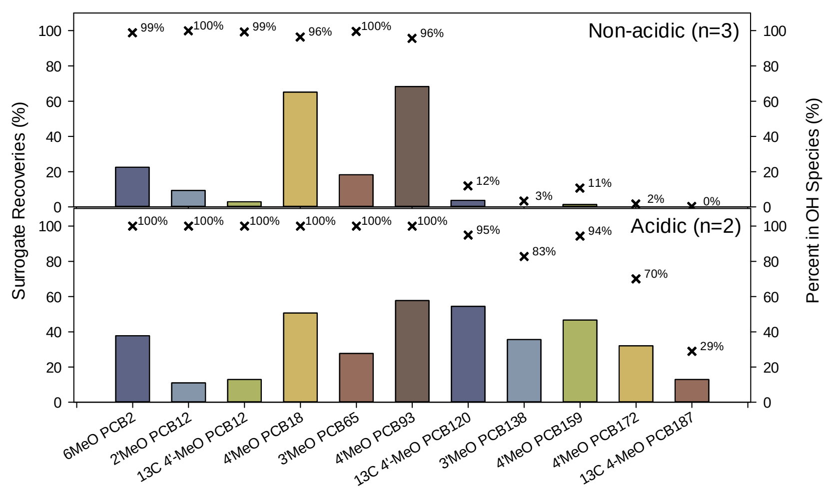

Figure 35: Comparison of OH-PCB recoveries between a non-acidic and slightly acidic extraction. The X markers represent the theoretical percent of the OH-PCB in the OH form (compared to the ionized form).

We further tested method modifications to improve the overall extraction efficiency and recoveries of OH-PCBs from the PUF matrix, particularly the lower molecular weight congeners. In general, the OH-PCB congeners with low K_{ow} and high pKa values were recovered poorest (Figure D1). We hypothesized these congeners we not properly being extracted from the sampling media. We tested this hypothesis by testing more polar extraction solvent mixtures, including pure methanol, 5:4:1

Hexane:Acetone:Methanol and 3:1 dichloromethane:Hexane. We found no statistical difference in recoveries between different solvent mixtures (Figure D2). We then hypothesized these low molecular weight OH-PCB congeners were partitioning incompletely between solvent mixtures during the phase separation and derivatization step. We tested this hypothesis by creating a variety of solvent matrices from previous step in the method and spiked them just prior to derivatization. We found a significant difference between the different solvent matrices undergoing the same derivatization step, indicating impurities in solvent mixtures led to derivatization inefficiencies. We hypothesis this issue could be resolved by evaporating the samples to dryness and reconstituting with a pure solvent prior to derivatization. We tested this hypothesis by directly comparing samples that were not taken to dryness and samples that were taken to dryness, and found an improvement in standard recovery when the sample was evaporated to dryness and reconstituted in a pure solvent mixture (Figure D3).

The ability to consistently and efficiently analyze both OH-PCB samples and blanks is important if they are to be study with the PUF-PAS sampling method. We achieved this by modifying existing laboratory methods for the extraction and analysis of OH-PCBs to include an acidic (2mLs of 2M HCl) extraction of the PUF sampling media and by ensuring a pure solvent mixture prior to derivatization. While the overall recoveries are still lower than desired for some low molecular weight congeners, there compounds can be consistently measured (Figure 36).

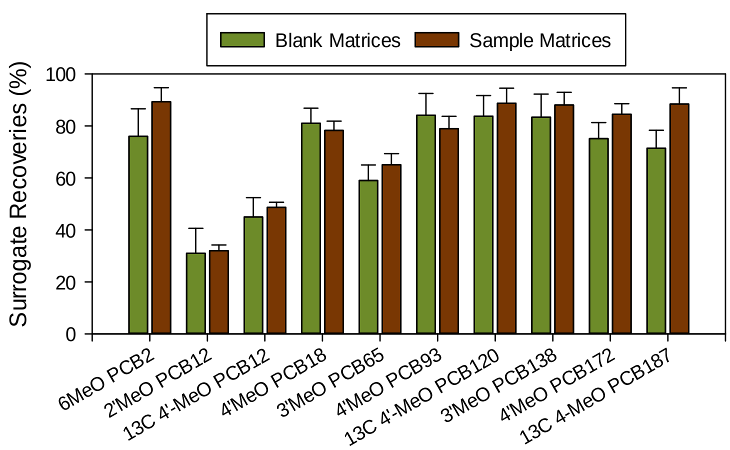

Figure 36: Recoveries of 10 OH-PCBs congeners in both sample and blank matrices with improved sample extraction and analysis methods.

Quality Assurance and Control

Quality assurance and control (QA/QC) in samples was evaluated with the use of surrogate PCB standards, method and field blanks, and the method development discussed above. The average PCB surrogate recoveries were 75% ± 14%, 77% ± 16%, and 88% ± 15%, for PCB14, PCB 65-d5, and PCB166, respectively. The OH-PCBs recoveries were more variable and inconsistent prior to revising the laboratory method as discussed above. After completing the method revision, the average surrogate percent recoveries for 13C 4'-MeO-PCB120 and 13C 4'-MeO-PCB187, were 66% ± 16%, and 59% ± 16%, respectively. Method blanks and field blanks were analyzed in tandem with samples. Total PCB masses found in method blanks and field blanks were 4.5 (1.0) and 4.9 (1.1) ng per PUF, respectively. The total OH-PCB mass found in lab blanks was 0.28 (0.6) and field blanks were quantified similar to samples for OH-PCBs to more clearly identify congeners present from contamination. The limit of quantification (LOQ) was calculated as the upper 95% confidence interval limit from blanks for both PCBs (n=41) and OH-PCBs (n=27). All OH-PCB congener identities were confirmed by reanalyzing the samples using the same GC-MS/MS instrument equipped with a DB-1701 capillary column (Agilent Technologies). Example chromatograms from both capillary columns are available in Appendix D. If a congener peak was detected in one column but not confirmed with the other column it was listed as a non-detect. Due to these QA/QC measures, we are confident that the OH-PCB we report as detections were present in the samples, we cannot be confident that non-detects were truly not present in the air due to uncertainties with analytical and sampling methods.

Air Sampling Results and Discussion

PCB Air Concentrations

The average airborne concentration of the sum of PCB congeners (ΣPCB is the sum of 209 congeners minus three used for analytical standards) was 294 (3.08) pg m^{-3} [geometric mean (geometric standard deviation)]. The only PCB congener detected in all 205 PUF-PAS samples analyzed for PCBs was non-aroclor PCB 11, which had an average airborne concentration of 16 ± 13 pg m^{-3}. This is comparable to what has been measured previously in Chicago with active sampling methods (15 ± 13 pg m^{-3}).[13, 86] The average congener profile reported by this study is similar to what has been previously reported by Hu et al ($r = 0.833$). Our results further support the conclusion made by Hu et al that the average airborne congener profile across Chicago appears to be dominated by a mixture of legacy sources of Aroclors 1242 and 1254 and modern source of paint (PCB 11).[86]

Average airborne PCB concentrations across sampling sites varied from 70 (1.25) pg m^{-3} (Aurora Township) to 2500 (1.18) pg m^{-3} (Joliet Township) (Figure 37). While the average PCB concentration did not vary significantly across the study area, two "hot-spots" with statistically significantly higher concentrations (p <0.001, One Way ANOVA) were identified for further characterization: the Jardine Water Plant (JN), and Joliet, Illinois (JT).

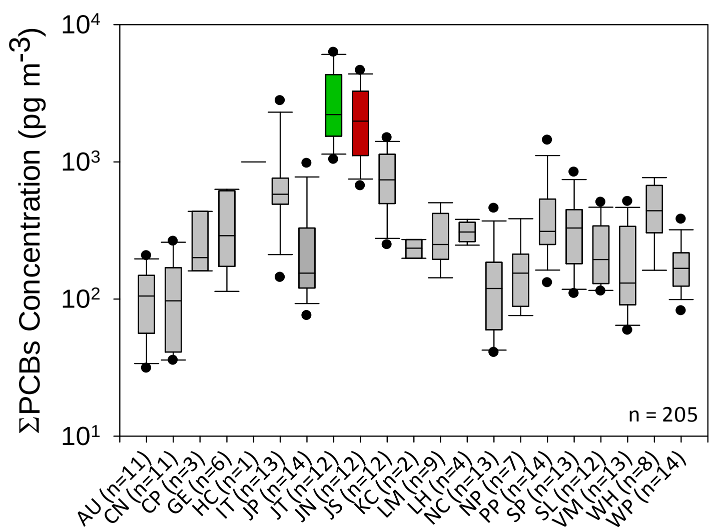

Figure 37: Summary of site specific ΣPCB concentrations (n=205).

In addition to showing higher than average airborne concentration, these two sites (JT & JN) show unique air congener profiles. Both sites demonstrate strong correlations to Aroclor 1254, with the JT site having a better correlation (R^2= 0.93) than the JN site (R^2 = 0.76). These two sites also show strong direct volatilization signals. For example, PCB 110 displays correlations between partial pressure and temperature (R^2= 0.66 for the

JT site and R^2= 0.56 for the JN site), based on a Clausius-Clapeyron equation, indicating volatilization is a likely source.[198]

Hsu et al (2002) hypothesized on the presence of a large atmospheric source of PCBs in the area between Joliet, Il, and Kankakee, Il.[199] Their study used archived PCB data and hybrid receptor models in an attempt to locate and quantify PCBs sources of atmospheric PCBs to Chicago air. The current study is unable to support this conclusion for two reasons. Firstly, another sampling site (CN) was located just south of the city of Joliet and did not display elevated PCB levels. Secondly, the JT sampling location was located in an inner courtyard at Joliet High School (Figure 38). Schools have been repeatedly shown to have elevated levels of PCBs in the air.[43, 109, 111] Therefore, this location is likely elevated as a result of a local source (the school building) and is not likely a major contributor to the elevated concentrations identified by Hsu et al. This sampling site (JT) result illustrates the importance of accounting for local sources when conducting regional studies on atmospheric PCBs. When conducting large spatial examinations, local source, such as this school building may artificially elevate PCBs levels skewing the results of transport estimates.

Figure 38: Location of the Joliet Township (JT) sampling location.

OH-PCB Air Concentrations

The average airborne concentration of the sum of OH-PCB congeners (Σ72) was 1.07(3.72) pg m^{-3}. On average 4 OH-PCB congeners were detected in the 80 PUF-PAS samples after applying the LOQ. The most frequently detected OH-PCB congeners were 2OH-PCB2 and 6OH-PCB2, which were detected in 97% and 87% of samples, respectively. Awad et al (2015) discovered these two OH-PCB congeners in Chicago air samples using active sampling methods.[189] They measured 2OH-PCB2, 6OH-PCB2, and the potential parent PCB 2 at levels of 1.22 (2.2), 0.62 (2.5), and 2.36 (2.5) pg m^{-3}, respectively. Using the PUF-PAS method we found concentrations of 2OH-PCB2, 6OH-PCB2, and the potential parent PCB 2 of 0.39 (2.6), 0.10 (3.9), and 2.19 (1.6) pg m^{-3}, respectively. This compares well with the active sampling method used by Awad et al for both OH-PCB and PCB congeners, indicating PUF-PAS methods may be a viable alternative of assessing airborne levels. Similarly to Awad et al. no clear temporal or spatial trend was observed for these congeners (Figure D4).

Awad et al (2015) concluded these two OH-PCB congeners (2OH-PCB2 & 6OH-PCB2) were present as a results of volatilization from Aroclor sources as opposed to an atmospheric reaction, based on Clausius-Clapeyron relations and other analytical tools.[189] In this study, we examined Clausius-Clapeyron relations and PCB:OH-PCB relations to examine potential atmospheric sources for these congeners. All sites in this study showed no significant correlations with the exception of the Joliet Township and Jefferson Park sampling sites. The Jefferson Park sampling site showed a significant Clausius-Clapeyron relation for both OH-PCB congeners and no correlation between PCB and OH-PCBs levels, indicating source volatilization may be a source of these 2 congeners (Figure 39). Contrarily, the Joliet Township sampling site showed no significant Clausius-Clapeyron relation and a moderate correlation between PCB and OH-PCBs levels, indicating an atmospheric reaction may be a source of these 2 congeners (Figure 40). Further work is needed to fully characterize and study the source of these 2 OH-PCB congeners in the atmosphere.

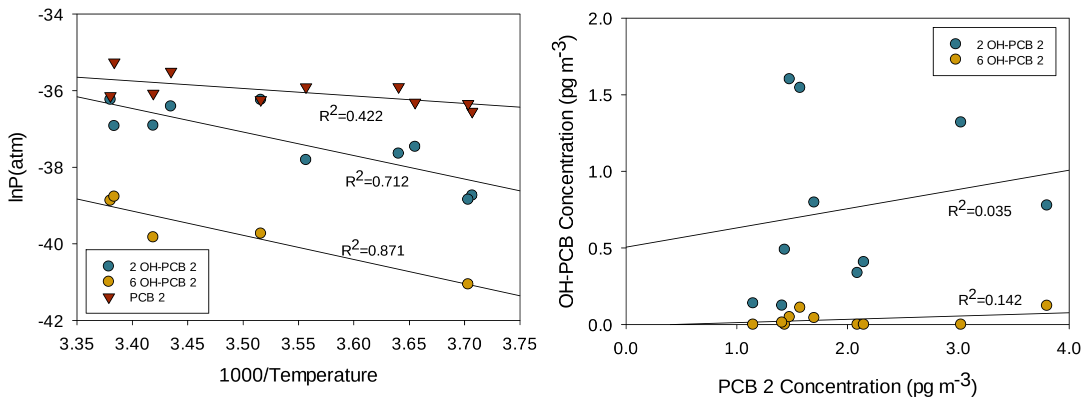

Figure 39: Correlations between both 2OH-PCB2 and 6OH-PCB2 with the potential parent PCB 2 (right), and the Clausius-Clapeyron relation for all three congeners (left) at the Jefferson Park sampling site.

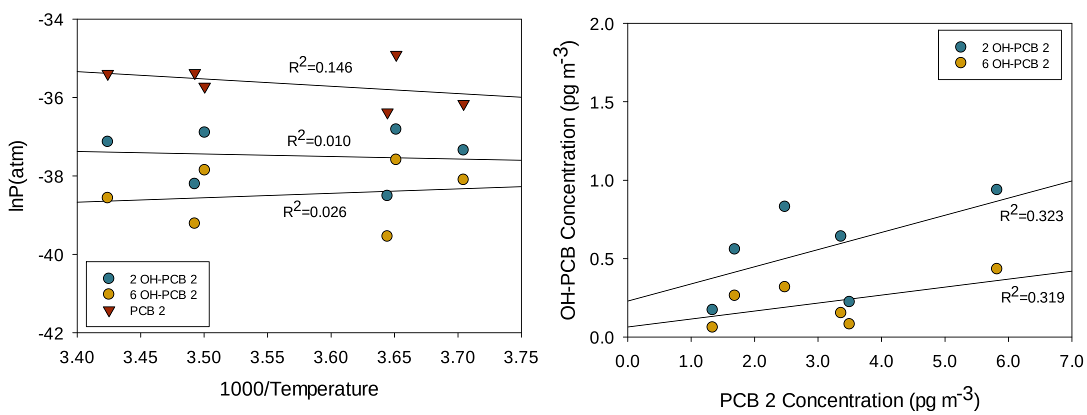

Figure 40: Correlations between both 2OH-PCB2 and 6OH-PCB2 with the potential parent PCB 2 (right), and the Clausius-Clapeyron relation for all three congeners (left) at the Joliet Township sampling site.

Jardine Water Plant

The sampling site that consistently detected the most OH-PCB congeners was the Jardine Water Plant (Figure 41). On average, the two sampling sites located at the Jardine Water Plant (JN & JS) detected 28 individual OH-PCB congeners, well above the average number of detected congeners for the study (Figure D5). Several samples detected as many as 50 individual OH-PCB congeners (Figure 42). This quantity of airborne OH-PCBs has never been reported before.

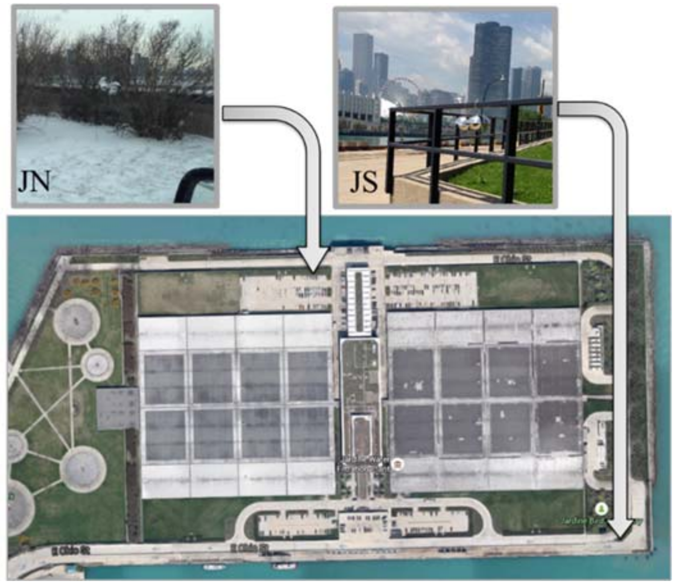

Figure 41: Location of Jardine Water Plant sampling locations (JN & JS).

The presence of so many different OH-PCB congeners at this site could be a result of atmospheric reactions or direct source volatilization. Unfortunately, it is difficult to draw any substantial conclusions from the current data set due to a variety uncertainties. First and foremost, the “Source of Air Toxics to Lake Michigan” study as a whole, was designed to study spatial distributions of PCBs, not to study the atmospheric presence and production of OH-PCBs. Secondly, many of the samples analyzed at this sites were extracted prior to revising the laboratory methods. While we are confident that the OH-PCB we report as detections were present, we cannot be confident that non-detects were truly not present in the air due to uncertainties with analytical and sampling methods. Additionally, we only have analytical standards for 72 OH-PCB congeners while there are 837 possible OH-PCB congeners. Given the high detection frequency of the OH-PCBs we have standards for, it is likely other OH-PCBs are present as well. Unfortunately, we do not have analytical standards for many of the OH-PCB product congeners for the most dominant PCB congeners in air such as PCBs 11, 52, 47, 74, 110 etc. Lastly, the behavior of OH-PCBs with the PUF-PAS sampler is not fully understood. More work is needed to characterize uptake and any interactions the OH-PCBs may have with the polyurethane foam sampling media. Particularly a study needs to be conducted to assess the uptake rates because there is still uncertainties surrounding the true value of the octanol-air partition coefficient and the appropriateness of using this value for estimate uptake of OH-PCBs on PUF. Another study needs to be conducted to quantitatively study the stability of OH-PCBs once they are sorbed on to the PUF media. If OH-PCBs are either breaking down or forming after they have sorbed, air concentration estimate would exhibit significant errors.

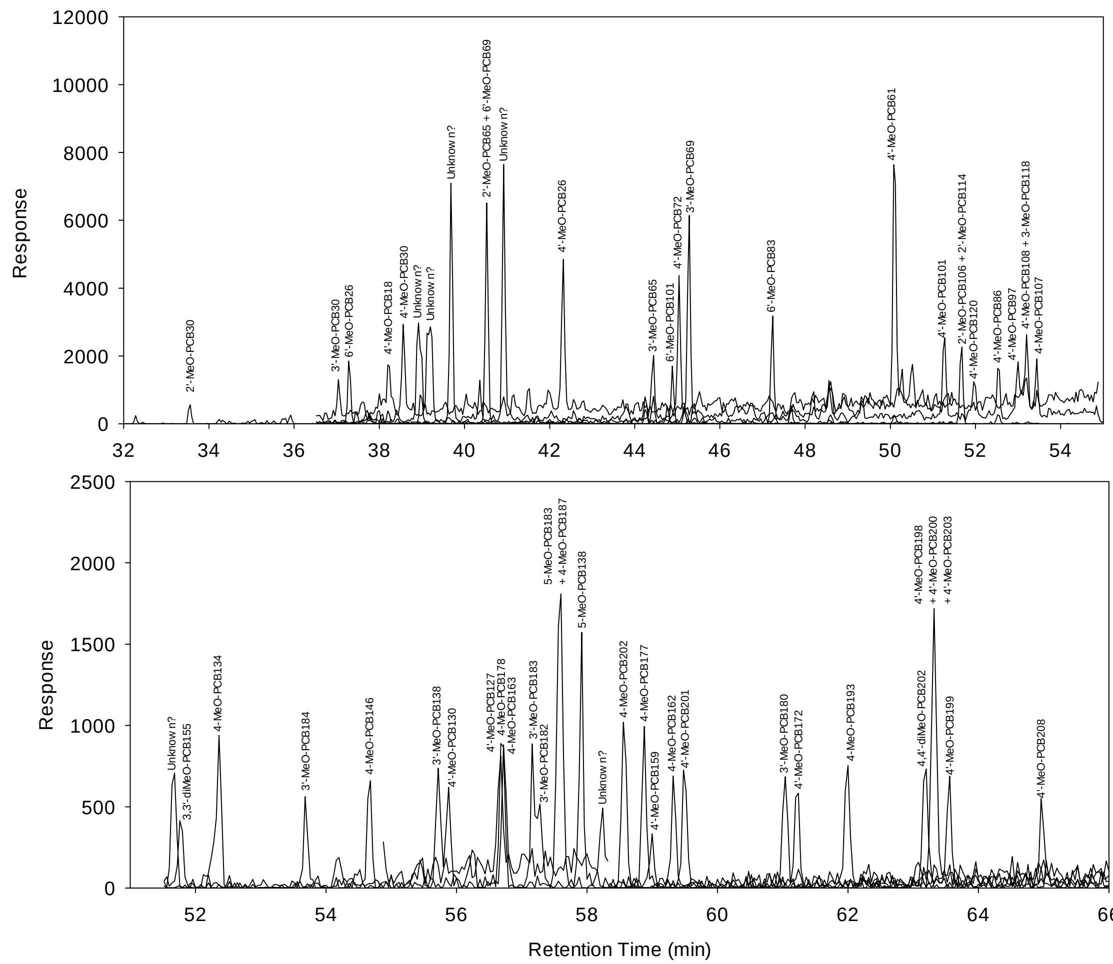

Figure 42: Example Chromatogram at the Jardine water plant demonstrating the high number of OH-PCBs congeners present.

Despite these uncertainties, we can gain insights about the presence of OH-PCBs in the atmosphere by examining individual OH-PCB congeners and their potential parent PCB compounds at the Jardine sampling site. Contrarily to the report published by Awad et al (2015), 2OH-PCB2 & 6OH-PCB2 at the Jardine site appear to be present in the air as a result of an atmospheric reaction.[189] These two OH-PCB congeners were detected ubiquitously at this site, displaying a significant linear correlation with PCB2 levels (r = 0.684) and an insignificant Clausius-Clapeyron relation.

Conversely, several OH-PCBs congeners displayed weak evidence for Aroclors being a source of OH-PCBs to the atmosphere. Two commonly detected OH-PCBs congeners, 4'OH-PCB101 & 6'OH-PCB101, do not display any significant correlation with the potential parent PCB (PCB 101). However, both these congeners are present in Aroclor 1248 and 1254 which are the two dominant Aroclors at this site. Several other higher chlorinated OH-PCB congeners present in Aroclor 1254, and no other Aroclor mixtures, were present at the Jardine Water Plant and found at no other sampling site (Figure D6).

In several samples three hydroxylated PCB-61 isomers, 2'OH-PCB61, 3'OH-PCB61, and 4'OH-PCB61, were present at significant levels. A previous modelling study done by Yang et al (2015) estimated rate constants of hydroxyl radical oxidation of a similar gas-phase PCB congener (PCB 116). They demonstrated that a non-chlorinated phenyl ring would hydroxylate with a para- position preference, followed by meta- and ortho- substitutions.[195] This is significant to PCB-61 because it similarly has a non-chlorinated phenyl ring, and the three OH-PCB61 isomers were detected at abundances demonstrating this same pattern (para- > meta- > ortho). This indicates an atmospheric reaction may be a contributing source, however PCB 61 is a non-Aroclor PCB congener and should not be present in the atmosphere. It is unlikely that PCB 61 is present in the environment from an unidentified source, and therefore is unusual that these three OH-PCB61 isomers are present. It is possible these are other unidentified OH-PCB congeners co-eluting with our analytical standards. Further work is needed to investigate potential sources of these OH-PCBs in the atmosphere.

Conclusions

We detected the widespread presence of OH-PCBs using PUF-PAS methods in the atmosphere of a major metropolitan city, with evidence suggesting OH-PCBs are present due to both direct source volatilization and atmospheric reactions. We are confident that numerous OH-PCB congeners are present in the environment due to repeated detections in air samples and analytical identity confirmations conducted on a DB1701 GC-column. However, we cannot be confident that we are detecting a majority of the OH-PCBs present due to the lack of analytical standards and inconsistent laboratory methods. Unfortunately, due to uncertainties with the PUF-PAS methods and analytic methods, much of the analysis of OH-PCB levels in this study had to remain qualitative. Further work is needed to understand the full magnitude of OH-PCBs levels and to understand the different potential sources of OH-PCBs to the atmosphere.

CHAPTER VIII: SUMMARY AND CONCLUSIONS

Summary

The studies conducted as a part of this dissertation demonstrate the power of polyurethane foam equipped passive air samplers to determine airborne concentrations of semivolatile organic compounds in many diverse applications. The thesis developed a practical and user-friendly model for the determination of a sampling rate in any environment on the globe, including indoors, for anyone with just basic technological experience. In instances where cost or access may limit the ability to conduct best practices for modelling a sampling rate as outlined in this thesis, such as indoors, recommendations and uncertainties are given for simpler methods. This thesis further demonstrates the power of PUF-PAS methods with modelled sampling rates by analyzing novel environmental contaminants and sources. This thesis reports the identification and characterization of a novel and significant non-Aroclor PCB source to residential home air from finished cabinetry as a result of polymer manufacturing, for the first time. This thesis also measures hydroxylated-PCBs at widespread and significant levels throughout the metropolitan Chicago area using PUF-PAS methods.

Major Conclusions

Eight major conclusions resulting from this thesis are summarized below.

1. An effective sampling volume can be modeled from simple physical-chemical properties and hourly meteorological data producing an estimate of airborne concentration that accounts for complex meteorological changes that occur throughout the deployment period and chemicals approaching equilibrium. These modelled estimates provide concentration measurements similar to existing active sampling methods.
2. A sampling rate, and subsequent sampling volume, can be modelled for any sampling location on the globe as long as representative and reliable meteorological input parameters are available. Modelled estimates produce biases near zero when compared with existing methods (i.e. depuration compounds). A modelled sampling rate is the best alternative for cold

climates, remote locations, and sampling locations with low average wind speeds, as other methods for determining R_s are ineffective.

3. PUF-PAS samplers can be reliably utilized in the indoor environment with a modelled sampling rate. A sampling rate can be modelled for the indoor environment when representative airflow characteristics are measured or known, to produce concentration estimates similar to exist active sampling methods.
4. The position of a PUF-PAS sampler in a room has a small but significant effect on the uptake of PCBs due to airflow variability within the room. Due to this effect samplers should be carefully placed within a room to minimize the effects airflow variability.
5. PCBs 47, 51, and 68 are present at significant levels (>50% of total PCBs) in some modern residences as an inadvertent manufacturing byproduct of polymer products. Specifically, these congeners are present due to the decomposition of 2,4-dichlorbenzoyl peroxide used as an initiator in the polymerization of a polyester resin placed on kitchen cabinets. Although not previously identified, this signal is likely not new but has been obscured due to analytical limitations or assumptions about Aroclor source contributions.
6. Modern residential homes are contaminated with non-Aroclor PCB sources due to inadvertent manufacturing process occurring today. Non-Aroclor sources of PCB congeners, such as PCB11 or PCB47, are frequently the predominate PCB congeners in residential homes.
7. PUF-PAS methods can be used to determine atmospheric OH-PCBs concentrations in the metropolitan Chicago area at levels comparable to previously published results utilizing active sampling methods.
8. OH-PCBs are present in the air throughout the metropolitan Chicago area. At one sampling location (the Jardine Water plant), a majority of the target OH-PCB analytes were detected and showed evidence for both direct volatilization and atmospheric reactions as sources of OH-PCBs to the atmosphere.

Future Work

This work has given greater power to the analysis of POPs using PUF-PAS samplers by reducing the uncertainties around determining an applicable sampling rate in diverse applications. With a simple and free method of determining an applicable R_s, PUF-PAS can now be deployed anywhere and everywhere to measure trends in atmospheric pollutants. The web-based interface presented in Chapter IV will need to be continuously developed and maintained as technology changes and the needs of the users evolve. Future development of this interface should focus on expanding the adaptability of the model, specifically expanded the number of available chemicals and building the framework for use of other meteorological data inputs.

Further testing of the indoor parameterization presented in Chapter V of this thesis needs to be conducted to ensure the conclusions are applicable to other room styles. Given that indoor ventilation systems are typically designed to have air flow characteristic for the thermal comfort of its occupants, it is suspected the parameterization should apply to many different room styles. However, this assertion needs to be tested.

The newly discovered environmentally relevant PCB source due to inadvertent byproducts of polymer production needs to be further elucidated. Extensive characterization of specific commercial products, such as polyester wood sealant, should be done to identify products containing inadvertent PCBs from the use of 2,4-dichlorobenzoyl peroxide. Analysis of these products should include the identification and quantification of chlorinated benzene compounds as well, due to these chemicals being produced from the same process and potential precursors to inadvertent PCB production. PCB congener distributions in wastewater should be reexamined to determine if polymer production is a significant source of PCBs to waterways. Emphasis should be given to geographical locations with known polymer production plants. Other polymer products that potentially utilize 2,4-dichlorobenzoyl peroxide as a crosslinking agent, such as caulking, toners, and adhesives, should be analyzed to determine if PCBs are present in final products and if they have the potential to contribute significant levels to the environment.

Given the widespread detection of OH-PCBs in the Chicago air, further work is needed to understand the full magnitude and sources of OH-PCBs in the atmosphere. If the PUF-PAS sampler is further used to study atmospheric OH-PCBs, further development is needed to characterize the behaviors of OH-PCBs on the PUF media. Specifically a study need to be done to assess the relation between sampling rates and modelled K_{oa} values to ensure it appropriately representative the kinetics of uptake onto the PUF media. Further studies are need on understanding the stability of OH-PCBs on the PUF media. It would be inappropriate to use PUF-PAS methods to measure atmospheric OH-PCBs if they have the potential to transform after sorbing to the PUF.

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APPENDIX A: SUPPORTING INFORMATION FOR "EXAMINING THE UTILITY AND LIMITATIONS OF A PUF-PAS SAMPLING RATE MODEL APPLIED GLOBALLY USING A GRAPHICAL WEB INTERFACE"

Screenshots of Tabs Within Web-Interface

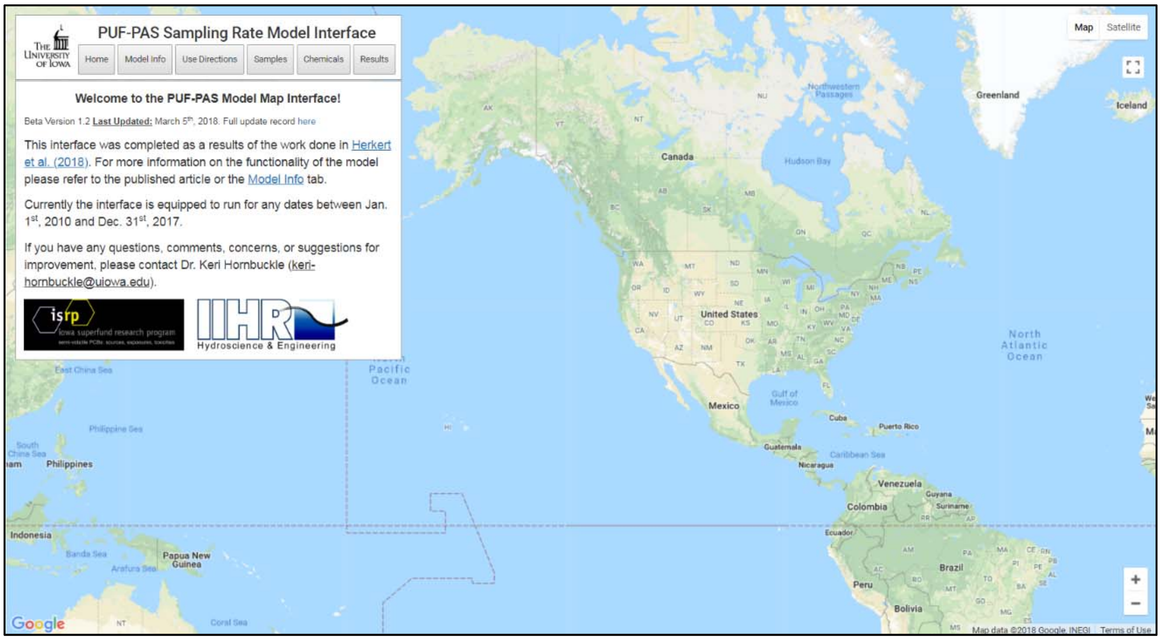


Figure A1: Example of welcome tab.

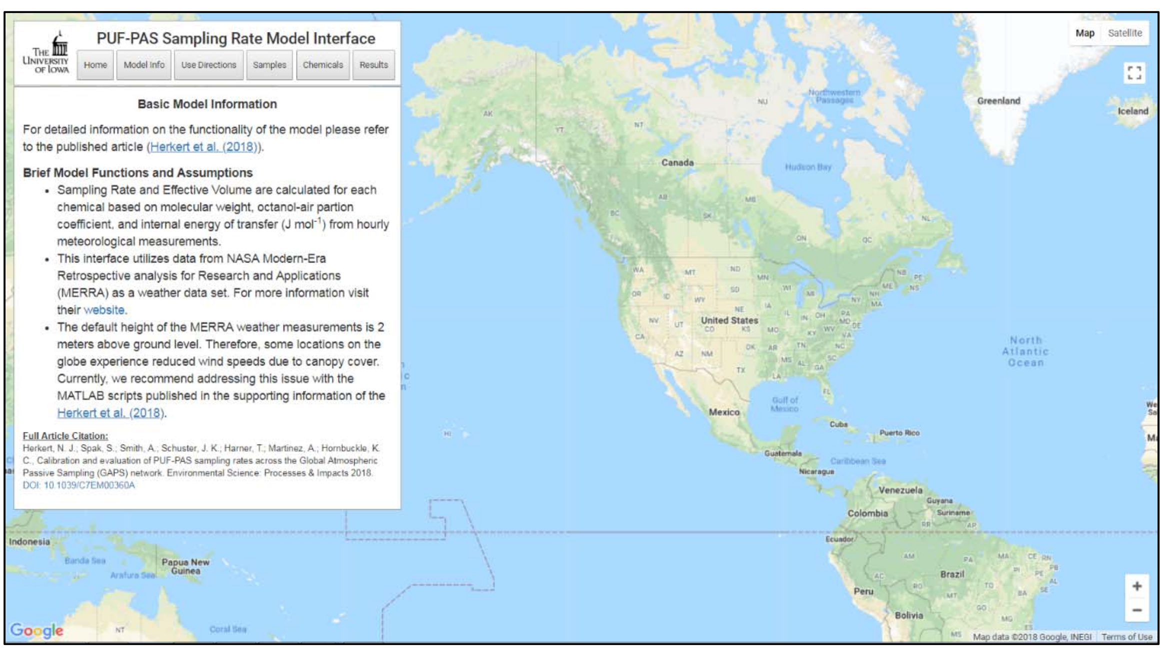


Figure A2: Example of basic model information tab.

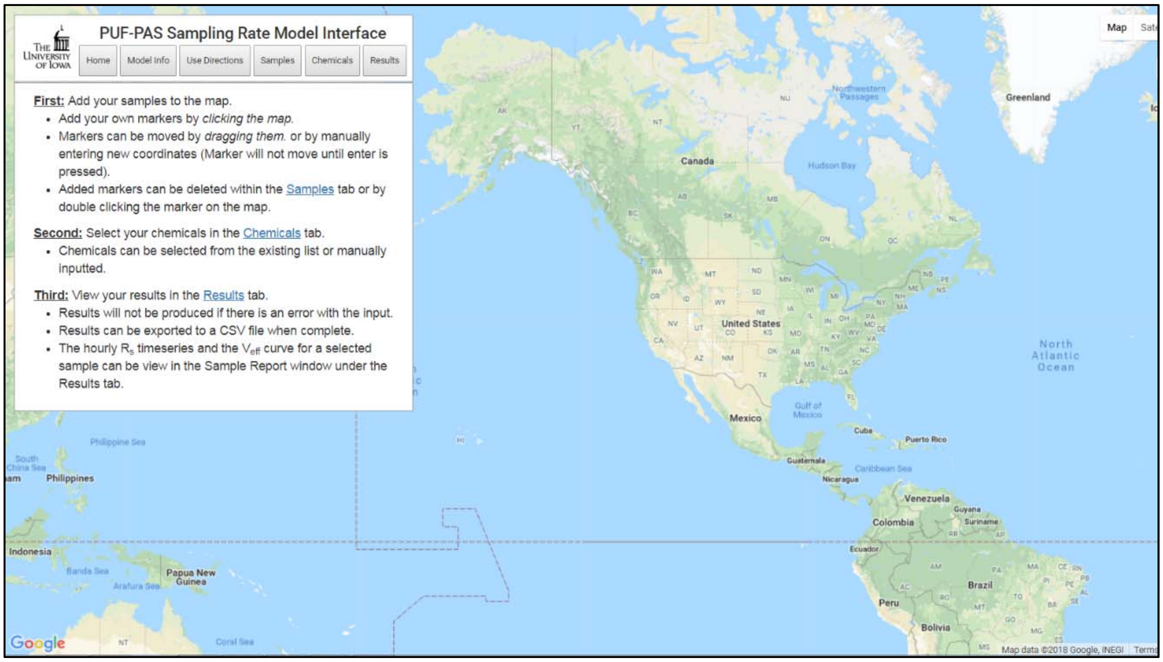


Figure A3: Example of tab with directions for use.

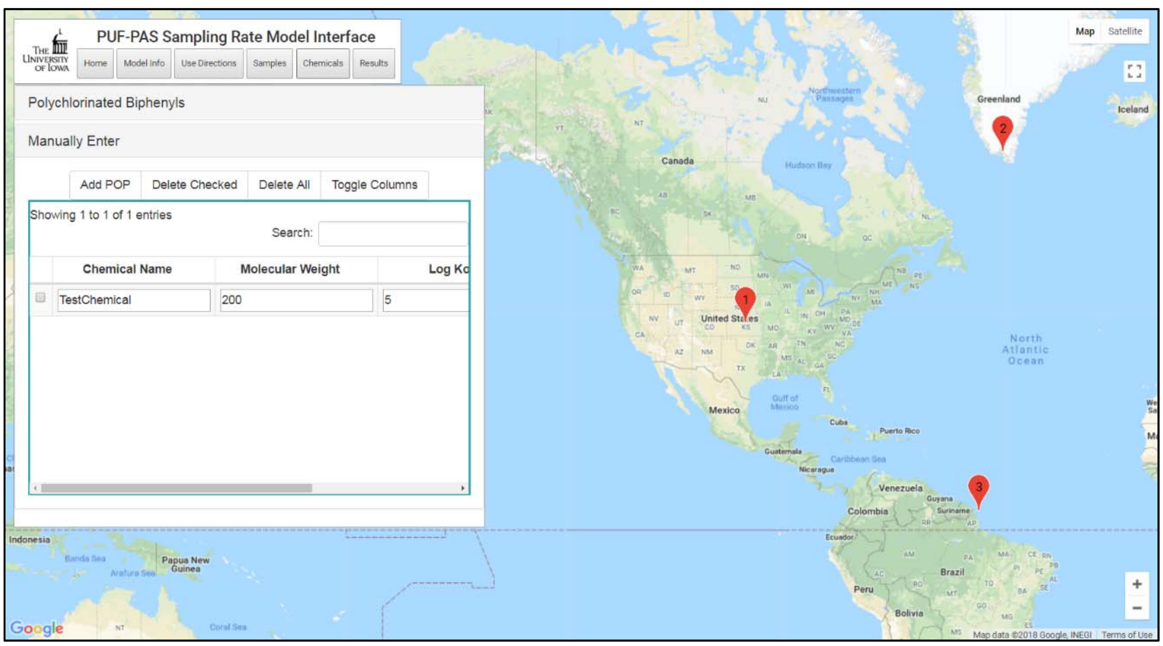


Figure A4: Example of manual input for custom chemical.

APPENDIX B: SUPPORTING INFORMATION FOR "EFFECTS OF ROOM AIRFLOW ON ACCURATE DETERMINATION OF PUF-PAS SAMPLING RATES IN THE INDOOR ENVIRONMENT"

Quality Assurance and Control

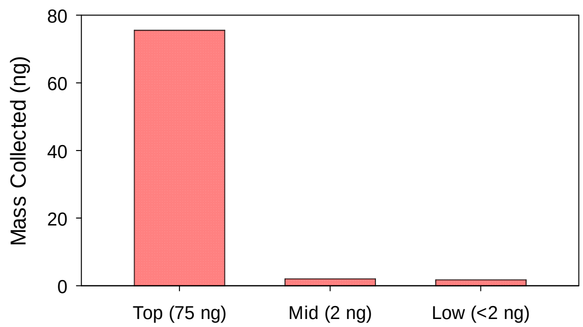


Figure B1: Results from the breakthrough test on an active sampling PUF-plug showing no PCBs above typical lab blank levels (~2 ng) penetrate past the first third of the PUF-plug for our set flowrate and sampling period.

Active Air Sampling Results

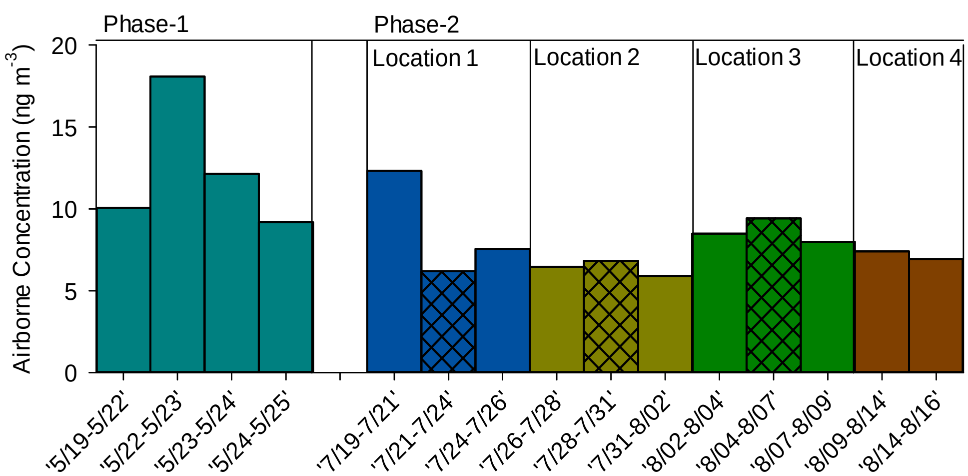


Figure B2: Average airborne concentration determined from the low-volume sampling during the two phases of the study. The checkered bars denote samples collected when the HVAC system was off for >90% of the time and each color represents a different location in the study.

Anemometer Data

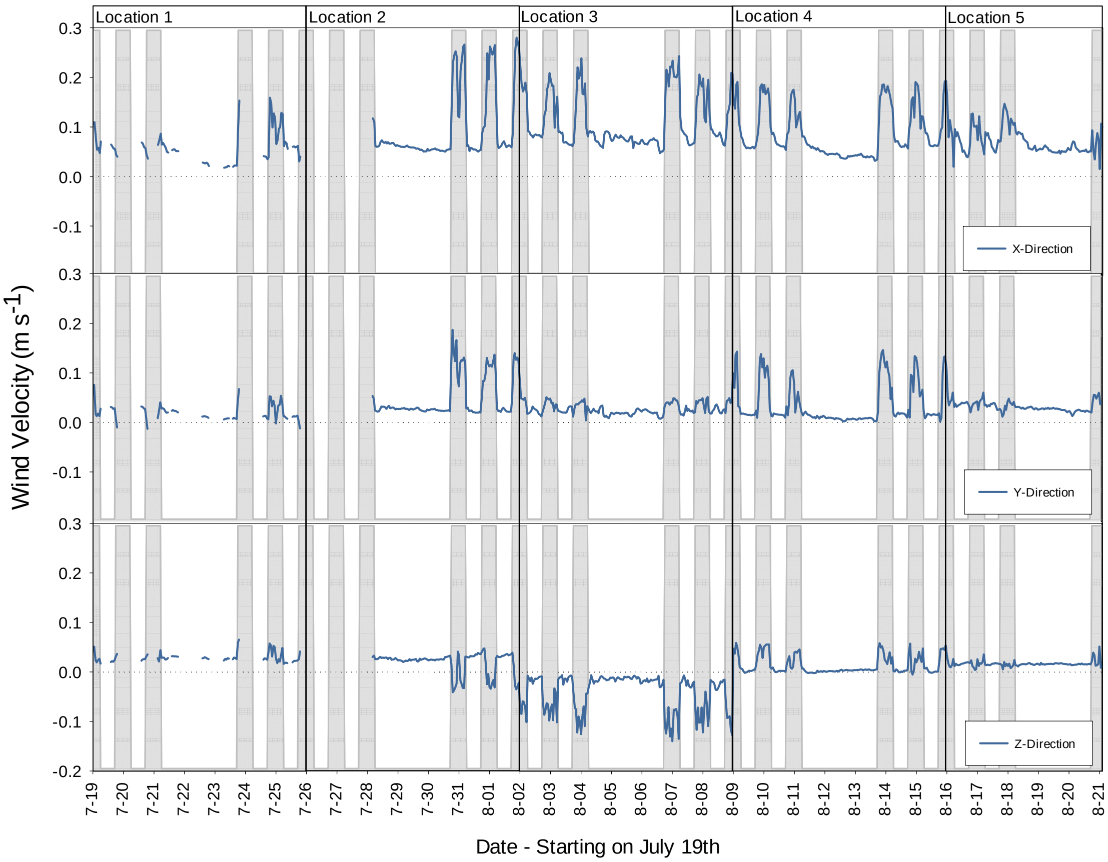


Figure B3: Airflow velocities in all three-vector directions from the 3D sonic anemometer data during phase-2 of our study. The grey shading represents times when the HVAC system was on while the white shading represents times when the HVAC system was off.

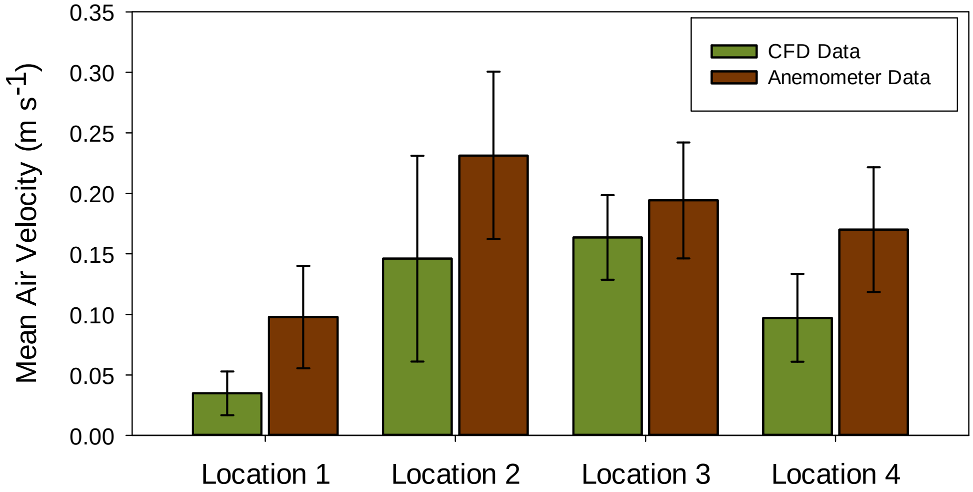


Figure B4: Comparison of the time-series anemometer data to a spatial distribution from the CFD model of the room to verify our model showing approximate agreement.

Uptake Study (Phase-1)

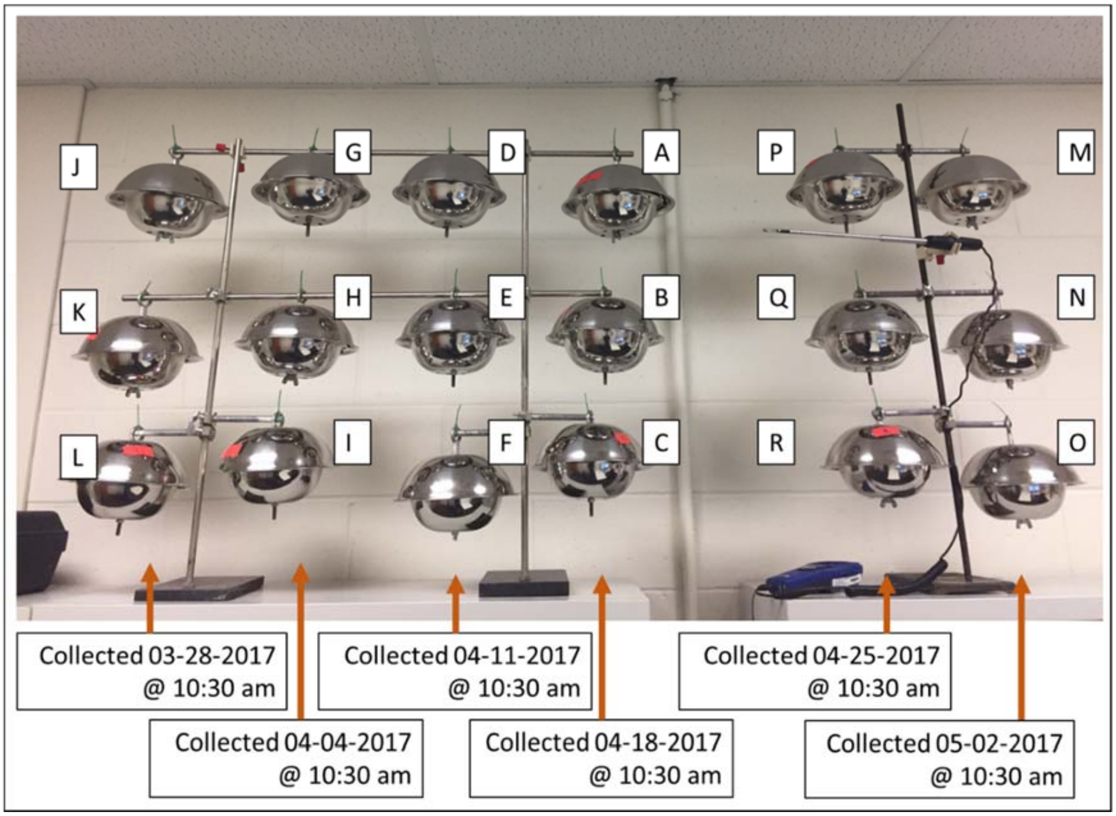


Figure B5: Sampler layout for the 6-week uptake study in the study room. The left side of this schematic represents the northernmost end of the bookcase.

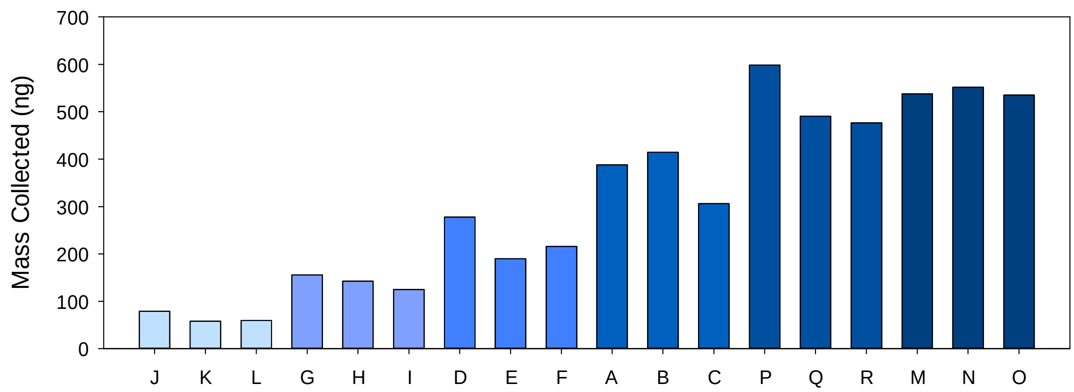


Figure B6: Total mass of PCBs collected on each PUF-PAS sample sampled during phase-1 of this study.

Spatial Study (Phase-2)

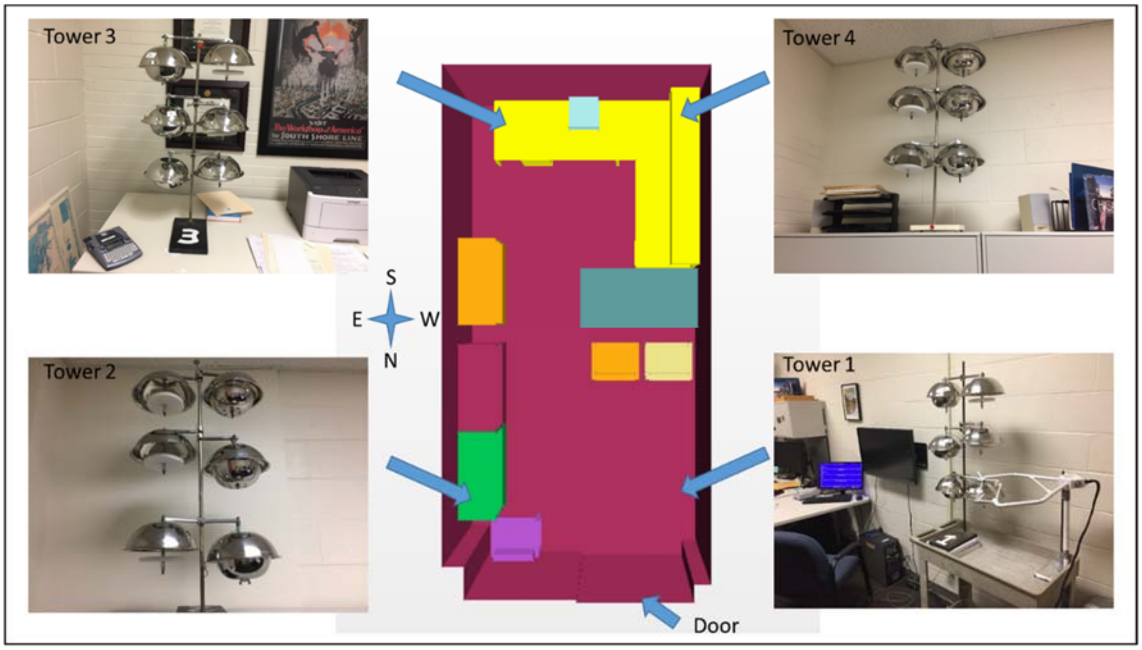


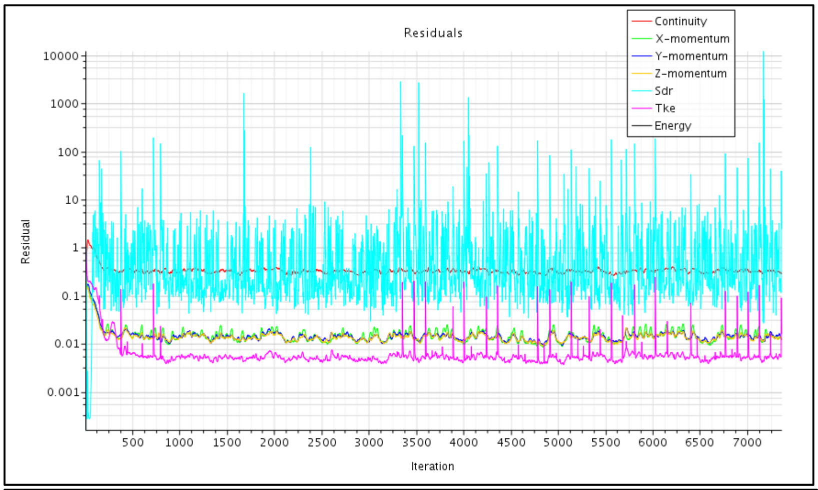
Figure B7: Sampler layout and room floor plan for the 4-week spatial study. The bottom side of this schematic represents the northernmost end of the room. Phase-1 of this study was conducted on the bookcases on the eastern side of this room.

Table B1: Summary of the average experimental and modeled sampling rates (38 congeners) for both sampler designs at the four locations throughout the test room.

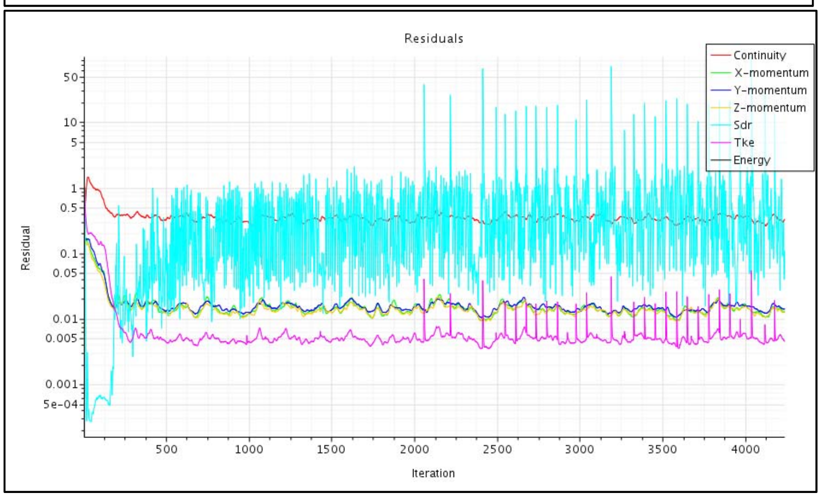
			Accumulation Rate (ng d[-1])		Rs (Experimental)		Location Specific Parameters					
							Rs (Predicted)		Residual		Percent	
			mean	*Std*	mean	*Std*	mean	*Std*	mean	*Std*	mean	*Std*
DB-dome	1	A	0.72	*0.64*	2.26	*0.24*	1.00	*0.04*	1.26	*0.22*	55%	*4%*
		B	0.60	*0.54*	1.88	*0.23*	1.01	*0.04*	0.87	*0.21*	46%	*6%*
		C	0.83	*0.73*	2.57	*0.24*	0.96	*0.04*	1.61	*0.22*	63%	*3%*
	2	A	0.21	*0.18*	0.80	*0.15*	1.03	*0.04*	0.25	*0.13*	35%	*21%*
		B	0.24	*0.21*	0.89	*0.10*	0.93	*0.04*	0.10	*0.04*	12%	*5%*
		C	0.21	*0.18*	0.78	*0.11*	1.16	*0.04*	0.38	*0.10*	51%	*17%*
	3	A	0.36	*0.32*	1.32	*0.14*	1.09	*0.04*	0.23	*0.15*	17%	*9%*
		B	0.45	*0.41*	1.61	*0.15*	1.14	*0.04*	0.47	*0.16*	29%	*6%*
		C	0.41	*0.36*	1.48	*0.14*	1.28	*0.05*	0.21	*0.15*	13%	*8%*
	4	A	0.16	*0.14*	0.64	*0.08*	1.03	*0.04*	0.39	*0.10*	63%	*21%*
		B	0.25	*0.21*	0.94	*0.11*	0.95	*0.04*	0.10	*0.06*	11%	*6%*
		C	0.18	*0.16*	0.70	*0.09*	1.06	*0.04*	0.36	*0.11*	55%	*20%*
Average			0.39	*0.44*	1.32	*0.64*	1.05	*0.10*	0.52	*0.48*	36%	*23%*
Room-Avg			na	*na*	na	*na*	1.08	*0.04*	0.53	*0.39*	38%	*16%*
HF-dome	1	D	0.94	*0.82*	2.90	*0.26*	2.48	*0.09*	0.42	*0.21*	14%	*6%*
		E	0.92	*0.82*	2.84	*0.28*	2.53	*0.10*	0.32	*0.20*	11%	*6%*
		F	0.76	*0.68*	2.36	*0.21*	2.39	*0.09*	0.13	*0.11*	6 %	*5%*
	2	D	0.70	*0.61*	2.58	*0.41*	2.57	*0.10*	0.25	*0.28*	9 %	*8%*
		E	0.71	*0.63*	2.64	*0.41*	2.33	*0.09*	0.33	*0.36*	11%	*10%*
		F	0.75	*0.66*	2.75	*0.39*	2.89	*0.11*	0.31	*0.19*	11%	*6%*
	3	D	0.90	*0.78*	3.22	*0.30*	2.72	*0.10*	0.52	*0.31*	15%	*7%*
		E	0.86	*0.75*	3.15	*0.32*	2.84	*0.11*	0.35	*0.32*	11%	*8%*
		F	0.93	*0.80*	3.40	*0.35*	3.18	*0.12*	0.31	*0.34*	8 %	*8%*
	4	D	0.62	*0.53*	2.35	*0.20*	2.56	*0.10*	0.26	*0.15*	11%	*7%*
		E	0.59	*0.51*	2.23	*0.16*	2.38	*0.09*	0.20	*0.12*	9 %	*6%*
		F	0.59	*0.51*	2.24	*0.17*	2.64	*0.10*	0.41	*0.19*	19%	*9%*
Average			0.77	*0.68*	2.72	*0.48*	*2.62*	*0.26*	*0.32*	*0.26*	*11%*	*8%*
Room-Avg			na	na	na	na	2.69	0.10	0.35	0.28	13%	9%

Table Notes: PCB accumulation was calculated by dividing the collected mass by deployment time. [2] The Empirical R_s was calculated by dividing the accumulation rate by the average Low-Volume airborne concentration. [3] The room averaged input parameters were calculated from anemometer data and set bimodal (on vs. off). [4] The location specific parameters used the CFD results to adjust the room average parameters to more accurately represent the specific location. [5] The residual was calculated as |empirical R_s – Predicted R_s|. [6] The residual percent was calculated as the residual divided by the empirical R_s.

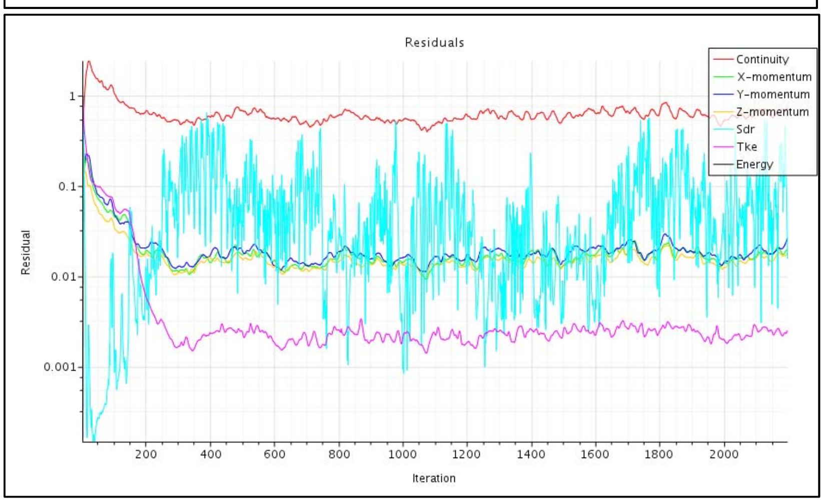
Computational Fluid Dynamic Results



1)



2)



3)

Figure B8: Computational Fluid Dynamic (CFD) residuals demonstrating convergence for our 3 main simulations; 1) room with door closed, 2) room with door open and 3) room with samplers and PUF included.

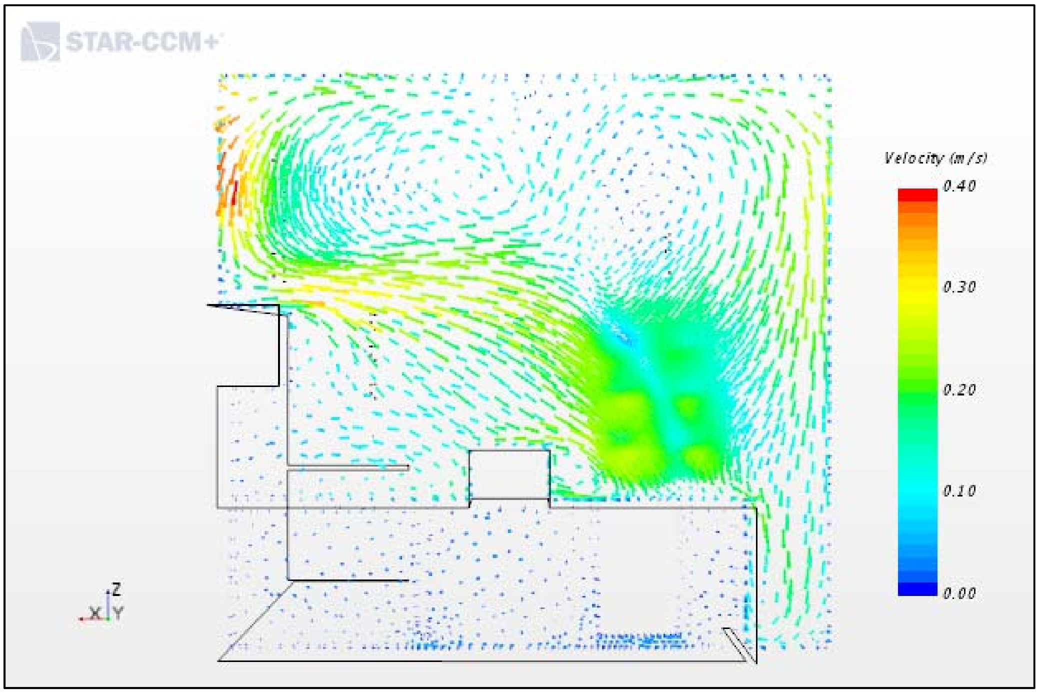


Figure B9: Vector Field demonstrating downdraft at position 3.

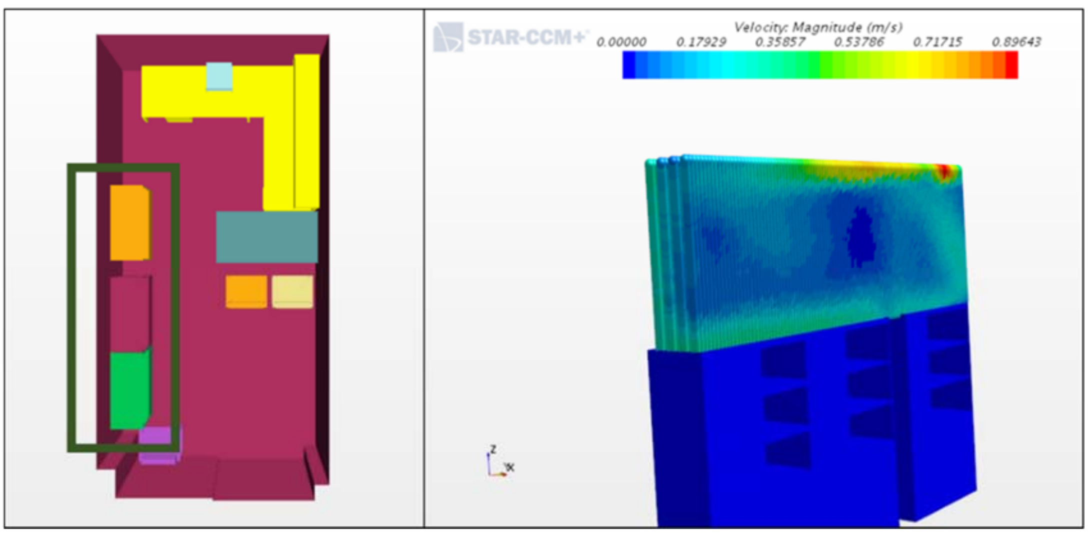


Figure B10: Schematic showing the study area we used to examine the placement of a sampler in the room and the effects of being near a wall/surface.

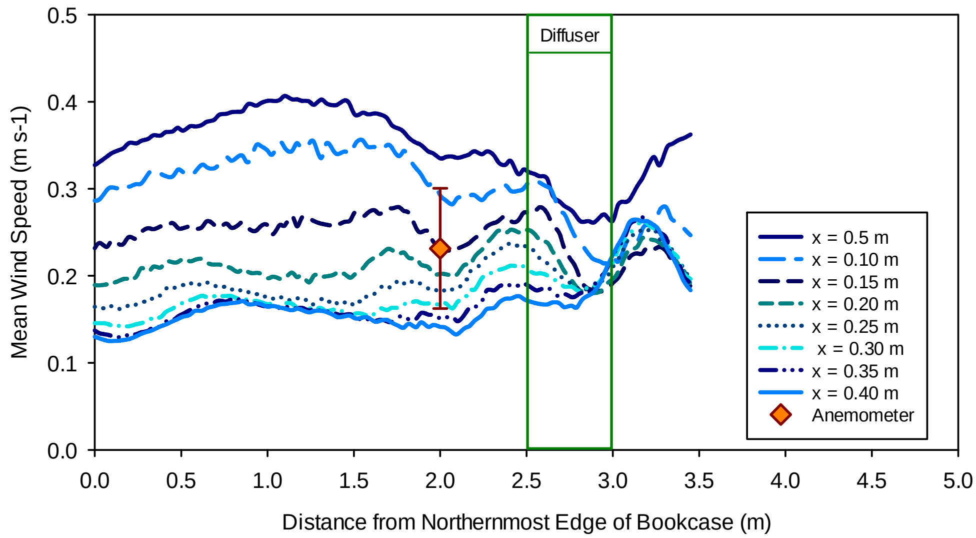


Figure B11: Horizontal profiles showing the influences of mixing from higher velocities at locations nearer to the HVAC air diffuser generated from the CFD model in our study zone. The x direction denotes distances from the wall. The anemometer data that corresponds with this location was also included to show the general agreement between the 3D sonic anemometer data and the CFD.

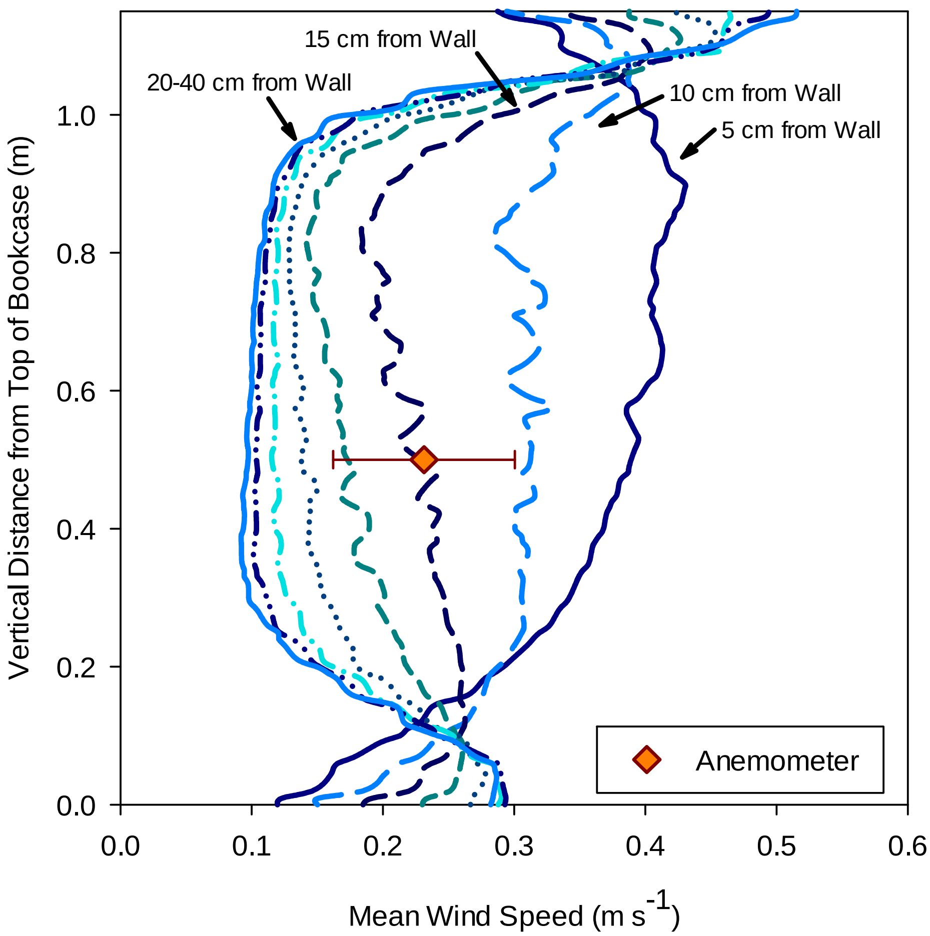


Figure B12: Vertical profiles showing the effects of turbulent mixing along the ceiling and surface of the bookcase and the convergence of airflow to room average parameters at increasing distances from the respective surfaces generated from the CFD model in our study zone. The x direction denotes distances from the wall. The anemometer data that corresponds with this location was also included to show the general agreement between the 3-D sonic anemometer data and the CFD.

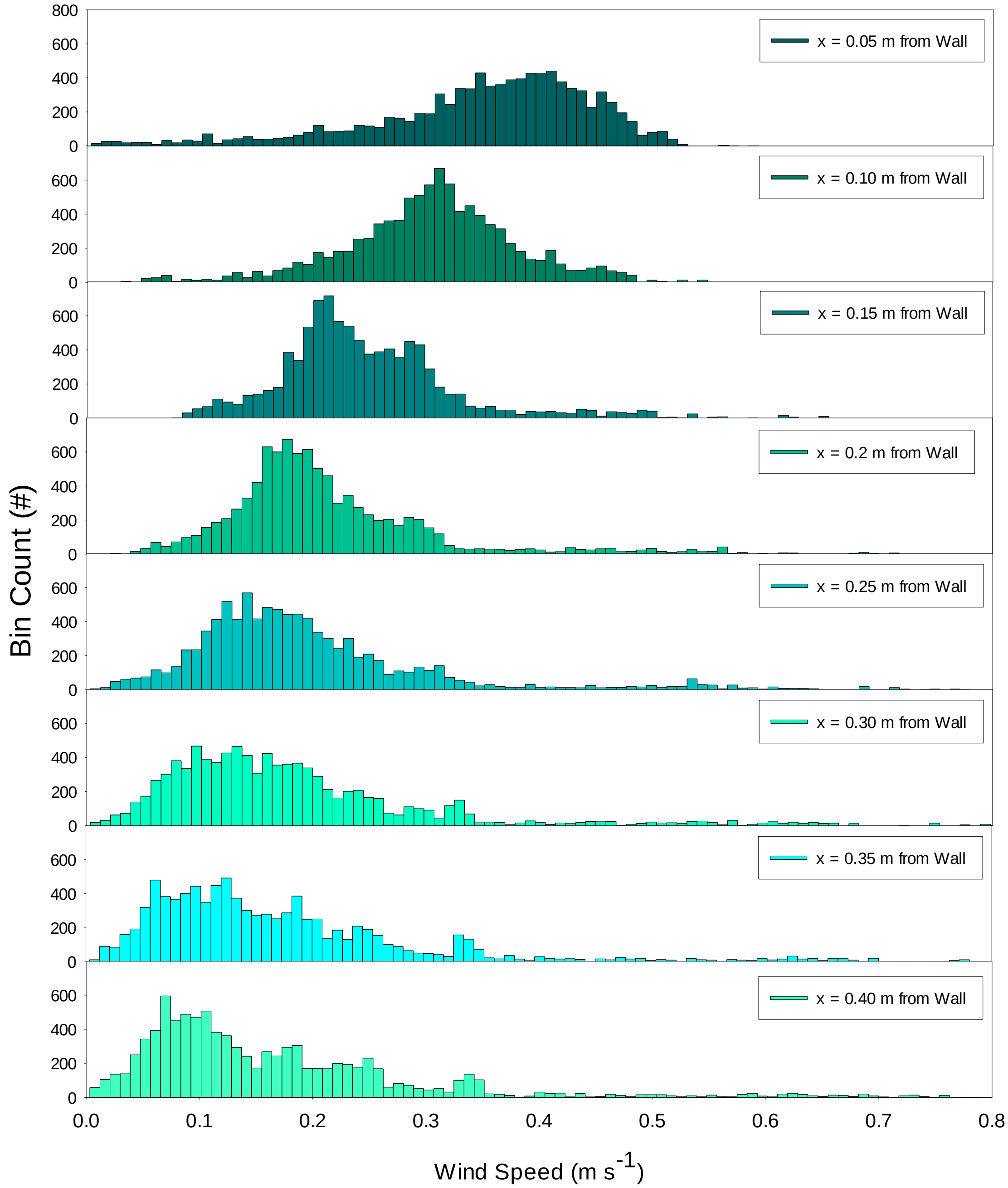


Figure B13: Histograms from the CFD model showing the convergence of airflow to room average parameters at increasing distances from the wall (x direction).

Effects of Door Changes on Airflow

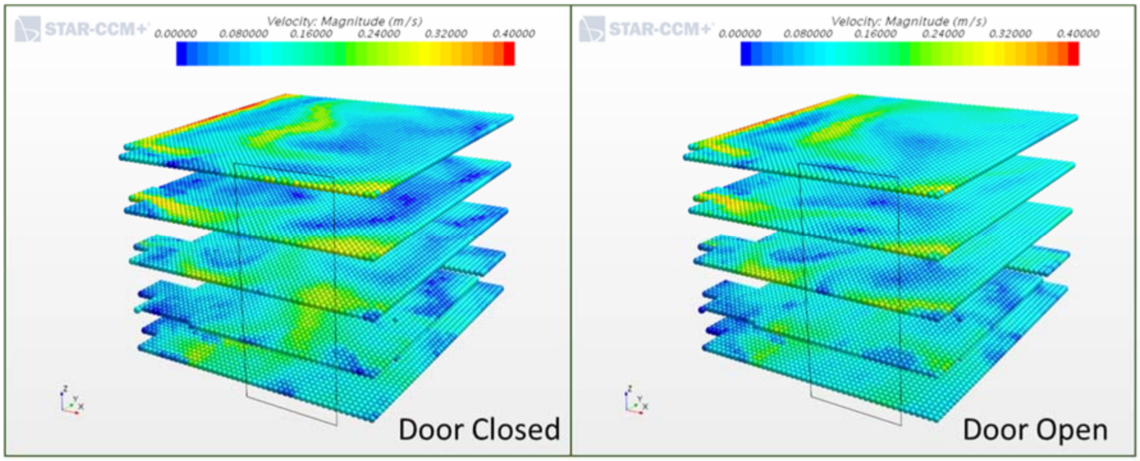


Figure B14: Schematic showing the study area we used to examine the placement of a sampler in the room and the effects of being near a door opening and closing.

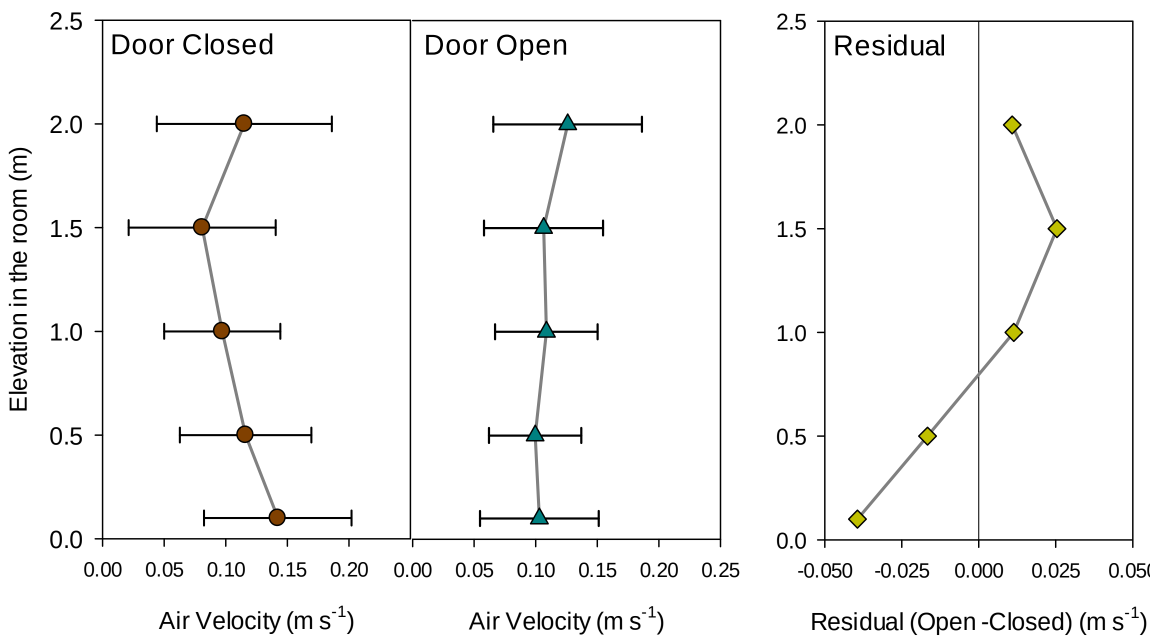


Figure B15: Vertical profiles from a CFD model showing the effects of the door being open or closed on the area immediately surrounding the door.

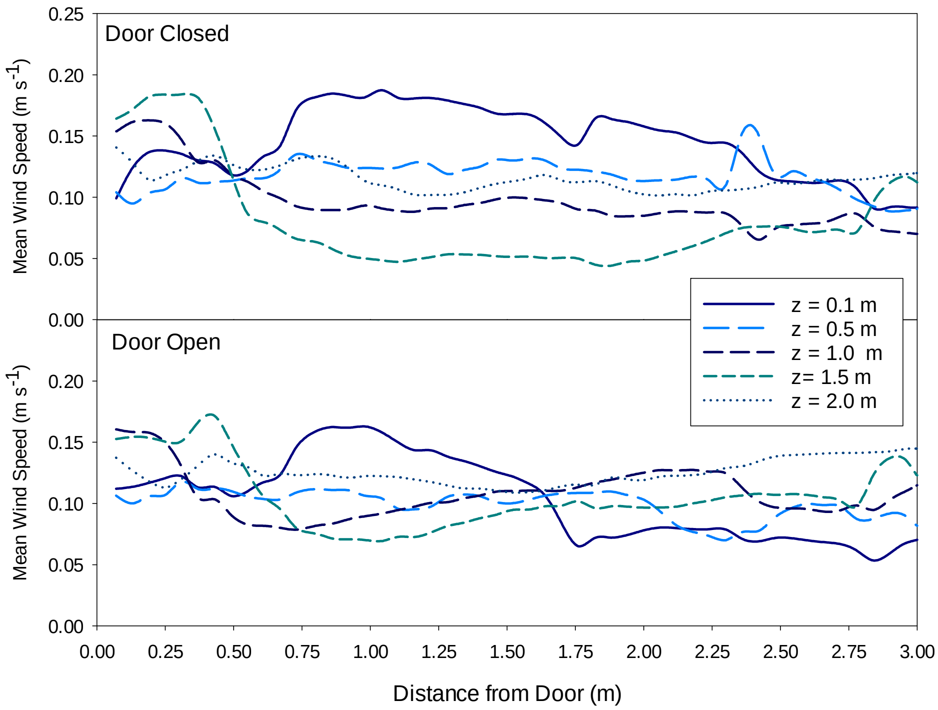


Figure B16: Horizontal profiles from a CFD model showing the effects of the door being open or closed at increasing distances from the door and at difference heights above the ground in the room.

APPENDIX C: SUPPORTING INFORMATION FOR "EMISSIONS OF TETRACHLOROBIPHENYLS (PCBS 47, 51 AND 68) FROM POLYMER RESIN ON KITCHEN CABINETS AS A NON-AROCLOR SOURCE TO RESIDENTIAL AIR"

Laboratory Methods

Prior to deployment, the sampling media (PUF disk) was cleaned using accelerated solvent extraction (ASE 350), wrapped in aluminum foil, and stored in a freezer until deployment. After collection, samples were wrapped in combusted aluminum foil and refrigerated at -20° C until extraction. All samples were spiked with 50 ng of surrogate standards (PCB14 (3,5-dichlorobiphenyl), PCB65-d5 (2,3,5,6-tetrachlorabiphenyl-d5, deuterated), and PCB166 (2,3,4,4',5,6-hexachlorobiphenyl)), extracted with a 1:1 Hexane:Acetone mixture in an ASE 350, cleaned with an acidified silica column, and concentrated with a Caliper TurboVap II. The samples were then spiked with 50 ng of internal standard (PCB30-d5 (2,4,6-trichlorobiphenyl-2',3',4',5',6'-d5, deuterated) and PCB204 (2,2',3,4,4',5,6,6'-octachlorobiphenyl)) just prior to instrument analysis.

Instrumental Parameters

The samples were analyzed by gas chromatography with tandem mass spectrometry (Agilent 7890A GC system, Agilent 7000 Triple Quad, Agilent 7693 autosampler) using a modified EPA method 1668a**.** The GC had a Supelco SPB-Octyl capillary column (5% phenyl methyl siloxane, 30 m × 0.25 mm ID, 0.25 µm film thicknesses) installed and utilized helium as the carrier gas (0.8 mL/min) and nitrogen/ argon as the collision gas. The GC was run in solvent vent injection mode (initial temperature 45 °C, initial time 0.06 min, ramp 600 °C/min to inlet temperature 325 °C at 4.4 psi). The oven temperature program was 45 °C for 2.56 min, 45 to 75 °C at 100 °C/min and hold for 5 min, 75 to 150 °C at 15 °C/min and hold for 1 min, 150 to 280 at 2.5 °C/min and final hold 5 min. The triple quadrupole MS electron ionization source was set to 260 °C.

In select instances in unexpectedly high congener results, identity was confirmed by reanalyzing the samples using the same instrument methods equipped with an Agilent

Technologies DB-5 capillary column (30 m × 0.25 mm ID, and 1.0 µm film thickness) and an Agilent Technologies DB-1701 capillary column (30 m × 0.25 mm ID, and 0.25 µm film thickness). Identities was also confirmed by mass spectra when the responses were measured above the full scan detection limit.

Quality Assurance and Quality Control Data

The quality of the chemical measurements was assessed using surrogate recoveries, blanks, and duplicate sampling. Average surrogate recoveries for all samples and blanks were 82 ± 9%, 86 ± 8%, and 93 ± 7% for PCB 14, PCB 65-d5, and PCB 166, respectively. There was no statistical difference in recoveries between samples and blanks. The average sum PCB level in all blanks was 2.30 ± 0.62 ng. Likewise, there was no statistical difference in blank levels between field and lab blanks.

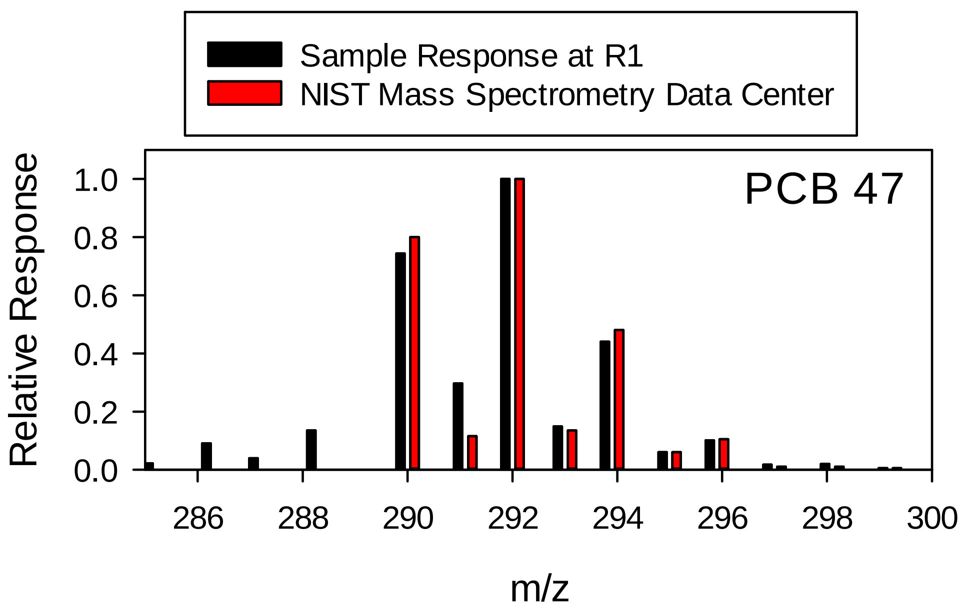


Figure C1: Mass spectra results for PCB 47 in sample R1.

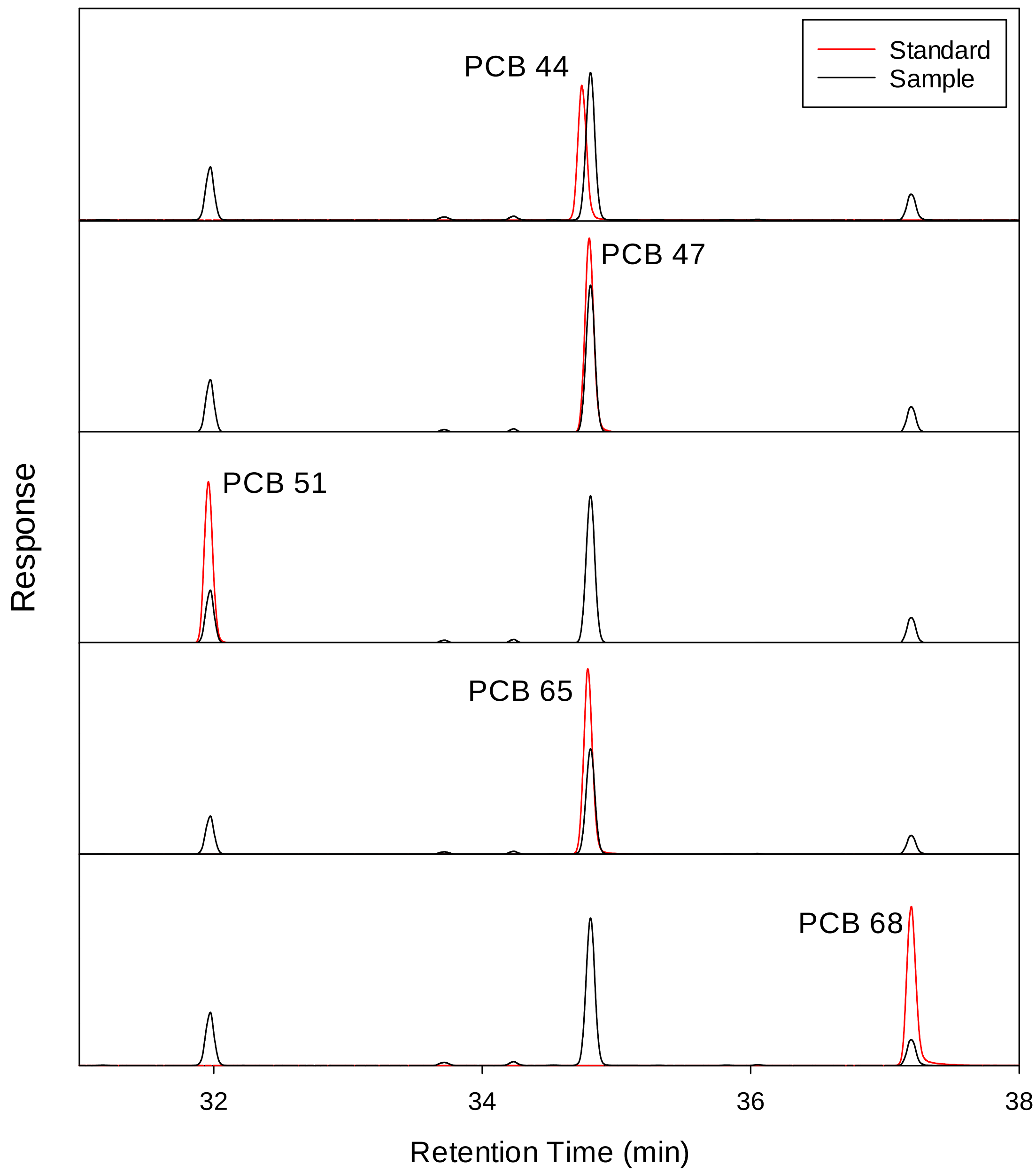


Figure C2: GC-MS/MS Results for PCBs 44, 47, 51, 65, and 68 on a Supelco SPB-Octyl Capillary Column.

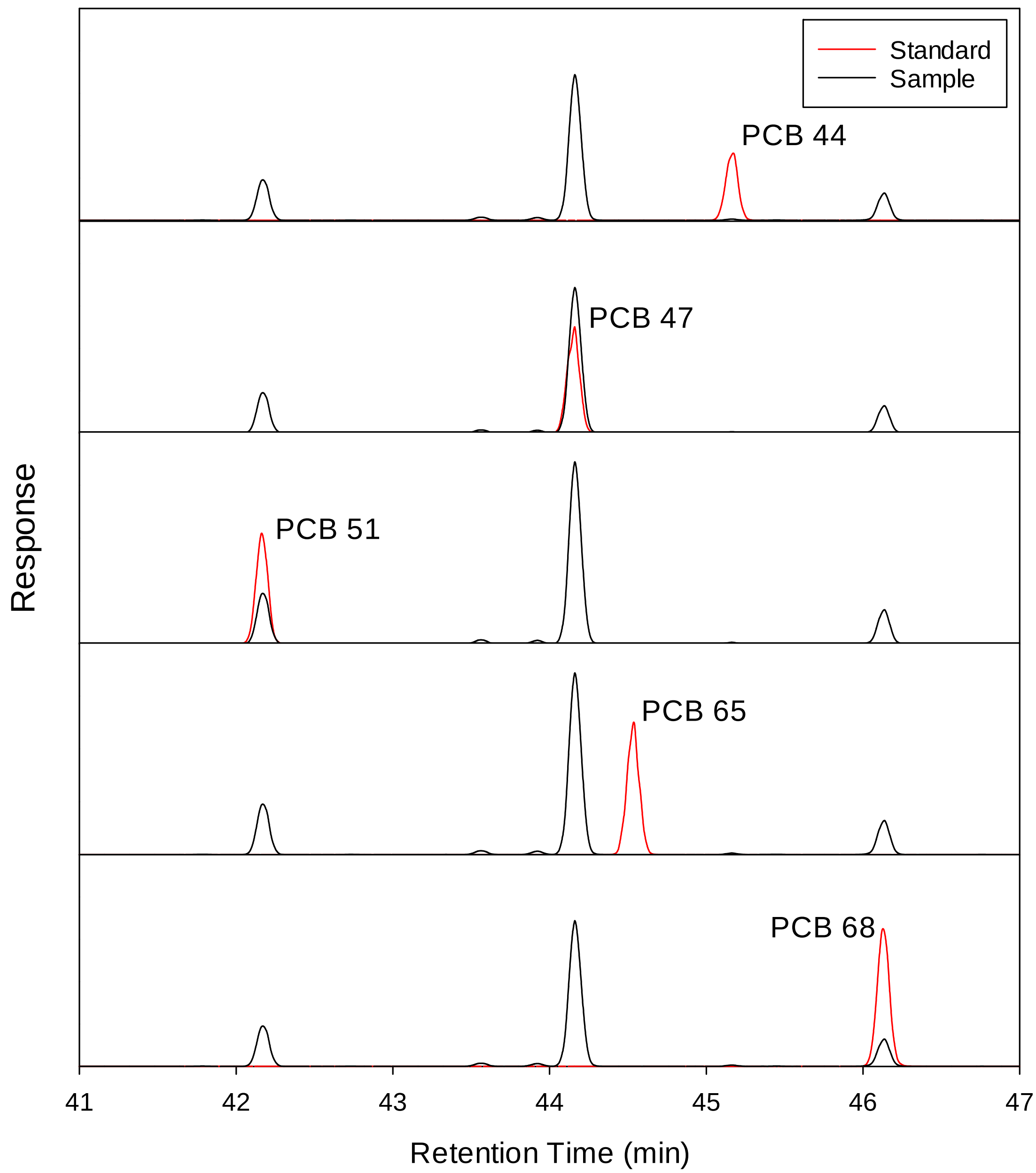


Figure C3: GC-MS/MS Results for PCBs 44, 47, 51, 65, and 68 on an Agilent Technologies DB5 Capillary Column.

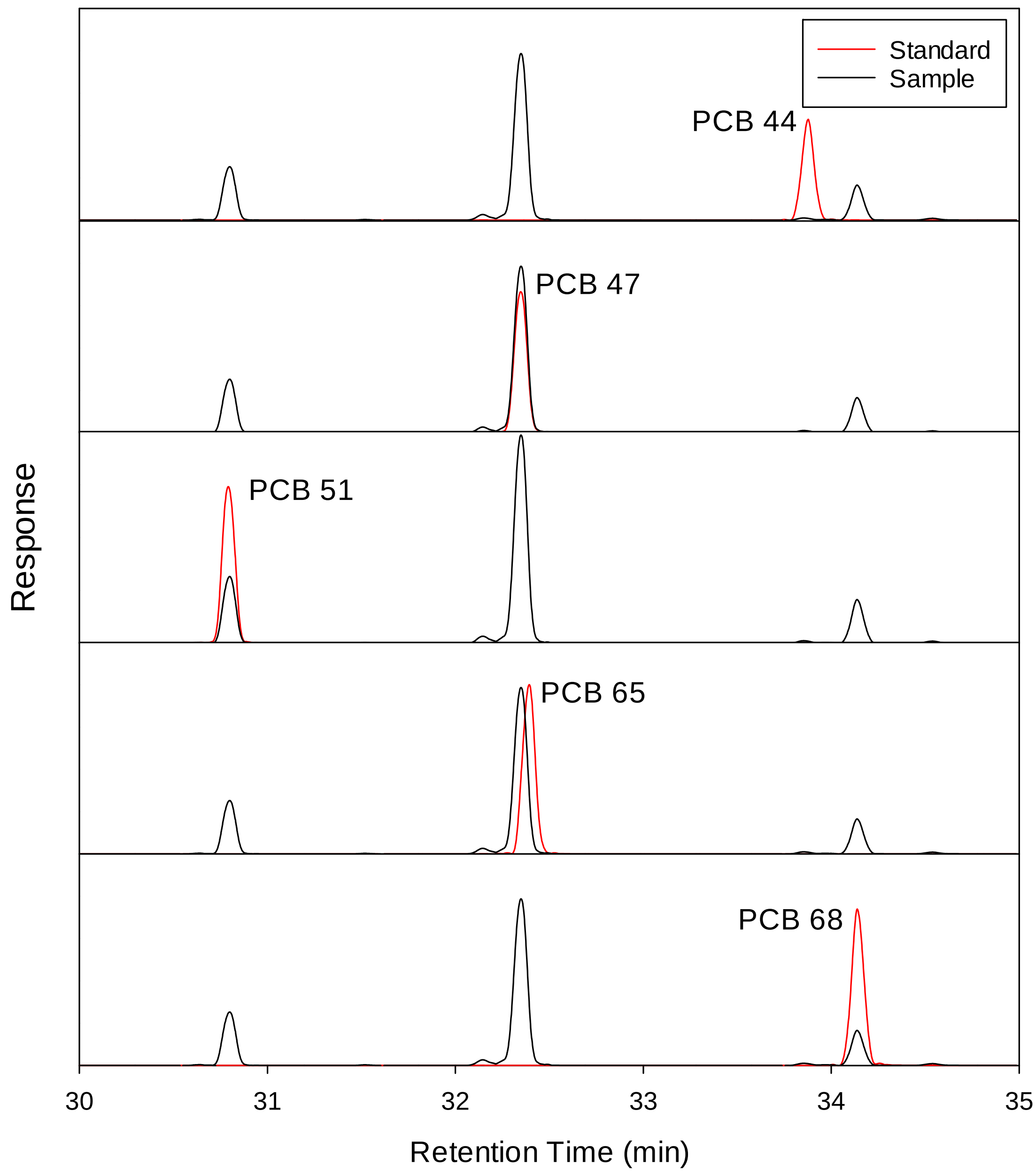


Figure C4: GC-MS/MS Results for PCBs 44, 47, 51, 65, and 68 on an Agilent Technologies DB1701 Capillary Column.

Table C1: Limit of quantification values for both the PUF-PAS and PUF-PES sample sets (ng/sample).

PCB Congener	PUF-PAS	PUF-PES	PCB Congener	PUF-PAS	PUF-PES	PCB Congener	PUF-PAS	PUF-PES
1	0.0103	0.0048	68	0.0507	0.0381	143	0.005	0
2	0.0113	0.014	72	0.0029	0.0004	144	0.0062	0.0024
3	0.0175	0.005	73	0.0101	0.007	145	0.0041	0.0009
4	0.0386	0.0073	77	0.0037	0.0023	146	0.0066	0.0017
5	0.0032	0.0023	78	0.0059	0.0042	147/149	0.0219	0.0167
6	0.0102	0.0075	79	0.0027	0.0008	148	0.0102	0.0015
7	0.0049	0.0037	80	0.0027	0.0013	150	0.005	0.0005
8	0.0312	0.015	81	0.004	0.0032	152	0.0028	0.0005
9	0.0025	0.002	82	0.0016	0.0033	153/168	0.0165	0.015
10	0.0061	0.0012	83	0.0026	0.0018	154	0.0049	0.0013
11	0.0215	0.0695	84	0.0139	0.0199	155	0.0034	0.0008
12/13	0.0176	0.0204	85/116	0.0128	0.0161	156/157	0.005	0.0022
15	0.0133	0.0109	86/97/109 /119	0.0118	0.0232	158	0.0038	0.001
16	0.0041	0.0031	87/125	0.0122	0.0282	159	0.0168	0.0042
17	0.0168	0.006	88	0.0028	0.0011	160	0.0029	0.0007
18/30	0.017	0.0144	89	0.0007	0	161	0.0045	0.0016
19	0.0113	0.0021	90/101/11 3	0.042	0.0693	162	0.0096	0.0024
20/28	0.0244	0.022	91	0.0047	0.0042	164	0.0075	0.0009
21/33	0.0086	0.0147	92	0.0057	0.01	165	0.0057	0.0007
22	0.0048	0.0065	93/100	0.0018	0.0027	167	0.0115	0.0018
23	0.0009	0.0004	94	0.0025	0	169	0.0028	0.0015
24	0.0007	0.0013	95	0.0442	0.086	170	0.0037	0.0015
25	0.0048	0.0025	96	0.0024	0.0009	171/173	0.0056	0.0026
26/29	0.006	0.0029	98	0.0009	0	172	0.0032	0.002
27	0.0052	0.0011	99	0.0129	0.02	174	0.0028	0.0021
31	0.0206	0.0241	102	0.0011	0.0013	175	0.0025	0.0054
32	0.0082	0.005	103	0.001	0.0014	176	0.0031	0.0028
34	0.0008	0.0006	104	0	0.0016	177	0.003	0.0019
35	0.0014	0.0008	105	0.0049	0.0072	178	0.0073	0.0016
36	0.0004	0	106	0.0011	0.0025	179	0.0032	0.0024
37	0.0011	0.0016	107	0.0009	0.0014	180/193	0.0067	0.0035
38	0.0004	0	108/124	0.0015	0.001	181	0.0061	0.0771
39	0.0004	0.0004	110	0.0343	0.0819	182	0.0109	0.1661
40/71	0.0098	0.0172	111	0.0012	0	183	0.0024	0.0017
41	0.0031	0.0033	112	0.0014	0.002	184	0.0143	0.2068
42	0.0056	0.0077	114	0.0087	0.0954	185	0.0034	0.0014
43	0.0025	0.0024	115	0.0252	0.1284	186	0.0039	0.013
44/47/65	0.0476	0.0828	117	0.1712	0.2166	187	0.0065	0.003

Table C1: *Continued*.

45	0.0038	0.0028	*118*	0.01	0.0332	*188*	0.0056	0.1095
46	0.003	0.0012	*120*	0.0017	0.0006	*189*	0.0042	0.0005
48	0.0045	0.0055	*121*	0.0012	0.0009	*190*	0.0036	0.0004
49/69	0.0271	0.0333	*122*	0.0012	0.0009	*191*	0.0025	0.0009
50/53	0.0365	0.0328	*123*	0.0006	0.0014	*192*	0.0025	0.0008
51	0.0021	0.0121	*126*	0.0071	0	*194*	0.0063	0.0021
52	0.0536	0.0808	*127*	0.0021	0.0005	*195*	0.0067	0.0014
54	0.0028	0	*129/138/163*	0.0103	0.0147	*196*	0.0034	0.0018
55	0.0041	0.0027	*130*	0.006	0.001	*197*	0.0106	0.0034
56	0.0051	0.0111	*131*	0.0072	0.001	*198/199*	0.0051	0.0017
57	0.0027	0.0009	*132*	0.0152	0.0049	*200*	0.0061	0.0015
58	0.0009	0.0009	*133*	0.0076	0.0014	*201*	0.0028	0.0019
59/62/75	0.0088	0.0055	*134*	0.0054	0	*202*	0.0161	0.0107
60	0.0053	0.0047	*135/151*	0.0102	0.0057	*203*	0.0023	0.0022
61/70/74/76	0.0349	0.0821	*136*	0.0081	0.0039	*205*	0.0055	0.0016
63	0.0012	0.0037	*137*	0.0045	0.0017	*206*	0.017	0.0045
64	0.0112	0.0148	*139/140*	0.0048	0.0044	*207*	0.0095	0.0048
66	0.0143	0.0313	*141*	0.0102	0.0023	*208*	0.0065	0.0018
67	0.0021	0.003	*142*	0.0106	0.0009	*209*	0.0675	0.0485

Pearson Correlations with Aroclors

Table C2: Summary of Pearson Correlations for all samples and Aroclors.

	Residence	1221	1232	1016	1242	1248	1254	1260	1262
Inside	R1	0.07	0.08	0.36	0.34	0.35	0.08	-0.05	-0.06
	R2	0.42	0.49	0.70	0.70	0.42	0.23	0.06	-0.12
	R3	0.26	0.38	0.78	0.78	0.51	0.20	-0.01	-0.12
	R4	0.00	0.02	0.16	0.24	0.41	0.57	0.14	-0.09
	R5	0.12	0.21	0.48	0.50	0.38	0.21	0.01	-0.10
	R6	0.19	0.24	0.33	0.32	0.17	0.13	0.04	-0.08
	R7	0.06	0.19	0.73	0.78	0.64	0.38	0.05	-0.13
	R8	0.30	0.32	0.38	0.40	0.27	0.19	0.05	-0.09
	R9	0.29	0.37	0.67	0.66	0.47	0.21	0.00	-0.12
	R10	0.17	0.20	0.27	0.26	0.16	0.04	-0.03	-0.07
	R11	0.05	0.06	0.24	0.23	0.29	0.14	0.01	-0.07
	R12	0.04	0.10	0.31	0.30	0.21	0.05	-0.05	-0.07
	R13a	-0.01	0.09	0.63	0.75	0.90	0.48	0.12	-0.12
	R13b	0.02	0.04	0.11	0.13	0.19	0.19	0.05	-0.06
	R14	0.40	0.50	0.78	0.75	0.31	0.06	-0.04	-0.11
	R15	0.03	0.12	0.57	0.63	0.65	0.63	0.13	-0.13
	R16	0.13	0.22	0.74	0.75	0.69	0.31	0.00	-0.12
Outside	R1	0.03	0.05	0.17	0.19	0.22	0.24	0.09	-0.07
	R2	0.03	0.09	0.44	0.51	0.61	0.72	0.29	-0.11
	R3	0.04	0.12	0.51	0.59	0.64	0.68	0.28	-0.11
	R4	-0.03	0.00	0.26	0.37	0.61	0.88	0.28	-0.11
	R5	0.05	0.23	0.93	0.90	0.56	0.25	0.09	-0.12
	R6	0.04	0.11	0.40	0.43	0.42	0.51	0.29	-0.10
	R7	-0.01	0.04	0.36	0.44	0.59	0.81	0.34	-0.11
	R8	0.02	0.07	0.38	0.45	0.51	0.74	0.49	-0.09
	R12	0.03	0.07	0.23	0.28	0.33	0.53	0.26	-0.08
	R14	0.08	0.18	0.60	0.61	0.46	0.38	0.17	-0.11
	R31	0.02	0.07	0.35	0.42	0.54	0.78	0.42	-0.10
	R34	-0.02	-0.01	0.17	0.24	0.39	0.87	0.55	-0.09

Testing for Outliers

Table C3: Summary of Cook's Distance and leverage for PCB 47 for each indoor sample and Aroclor.

			Cook's Distance								
Resid.	*Year*	*Lev.*	*1221*	*1232*	*1016*	*1242*	*1248*	*1254*	*1260*	*1262*	*Avg*
R1	*2017*	0.91	1.57	1.07	10.99	6.44	5.04	1.42	0.10	1.13	*3.47*
R2	*1915*	0.19	0.08	0.07	1.34	0.14	0.05	0.40	1.30	0.03	*0.43*
R3	*1900s*	0.20	0.09	0.08	1.45	0.11	0.03	0.46	1.34	0.03	*0.45*
R4	*1926*	0.10	0.04	0.03	0.69	0.29	0.19	0.25	0.26	0.02	*0.22*
R5	*1980*	0.40	0.30	0.29	0.86	1.67	1.99	4.88	3.88	0.10	*1.75*
R6	*2014*	0.75	0.27	0.40	3.07	6.31	6.68	25.58	29.86	0.00	*9.02*
R7	*1900s*	0.19	0.10	0.08	1.20	0.11	0.01	0.66	1.02	0.04	*0.40*
R8	*1901*	0.17	0.09	0.08	1.09	0.22	0.04	0.25	0.54	0.04	*0.29*
R9	*2014*	0.70	0.45	0.56	1.80	7.52	7.82	21.10	21.64	0.05	*7.62*
R10	*2014*	0.81	0.00	0.02	1.21	1.51	1.75	13.06	20.50	0.16	*4.78*
R11	*2016*	0.90	0.05	0.00	0.68	4.43	5.29	16.08	19.95	0.21	*5.84*
R12	*2004*	0.36	0.19	0.18	0.93	0.06	0.12	3.39	5.19	0.05	*1.26*
R13a	*1914*	0.24	0.15	0.13	1.21	0.05	0.37	0.71	0.82	0.06	*0.44*
R13b	*1914*	0.18	0.08	0.07	1.13	0.14	0.03	1.14	1.22	0.03	*0.48*
R14	*2007*	0.23	0.10	0.09	1.77	0.09	0.03	0.41	1.61	0.03	*0.52*
R15	*1925*	0.16	0.06	0.05	1.14	0.19	0.10	0.25	1.43	0.02	*0.41*
R16	*1958*	0.70	0.47	0.58	1.97	8.40	8.68	21.53	21.64	0.06	*7.92*

Congener Profiles for Newest Residences

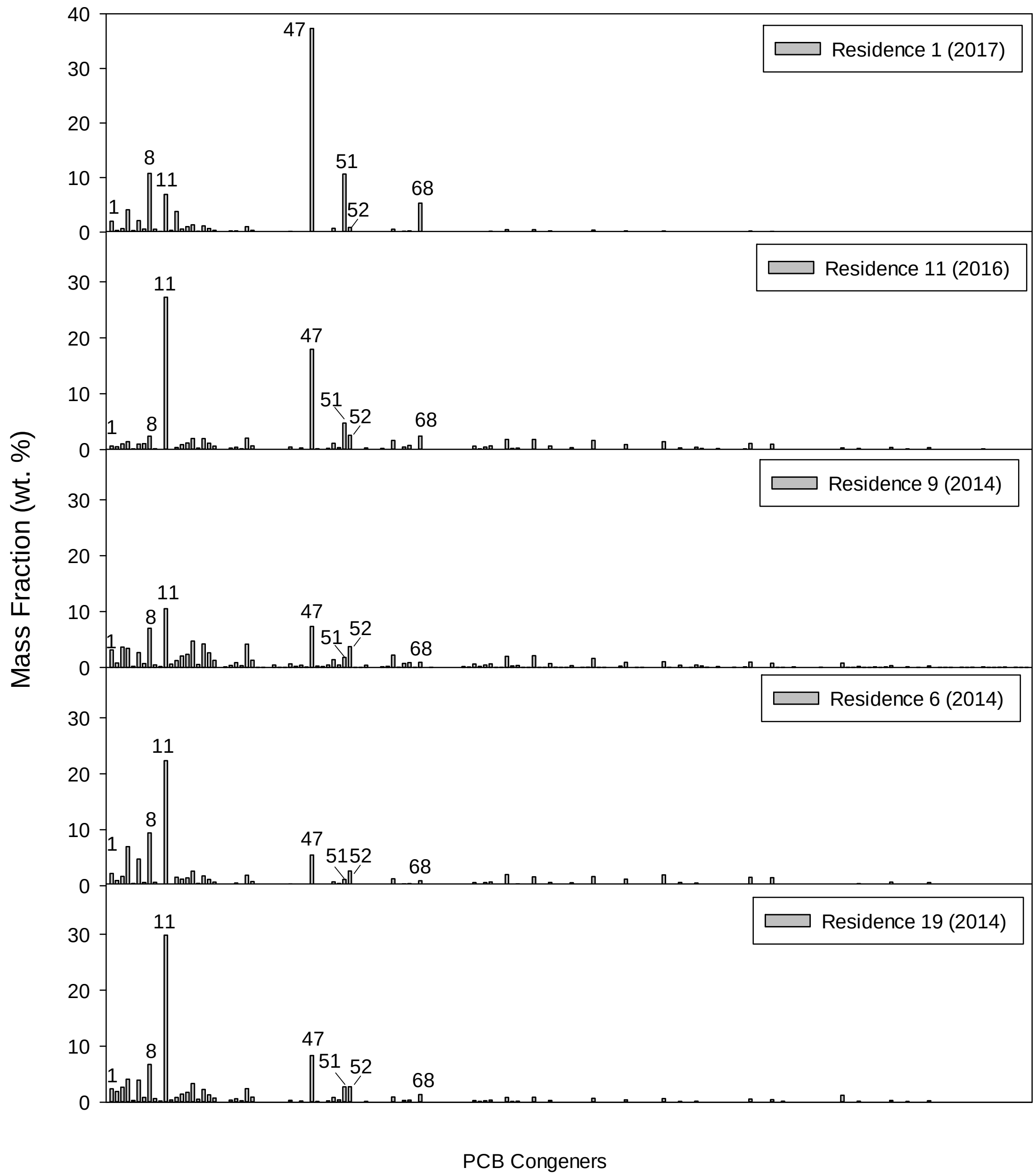


Figure C5: Full congener profiles for the newest building in this study.

Full Surface Emission Congener Profiles

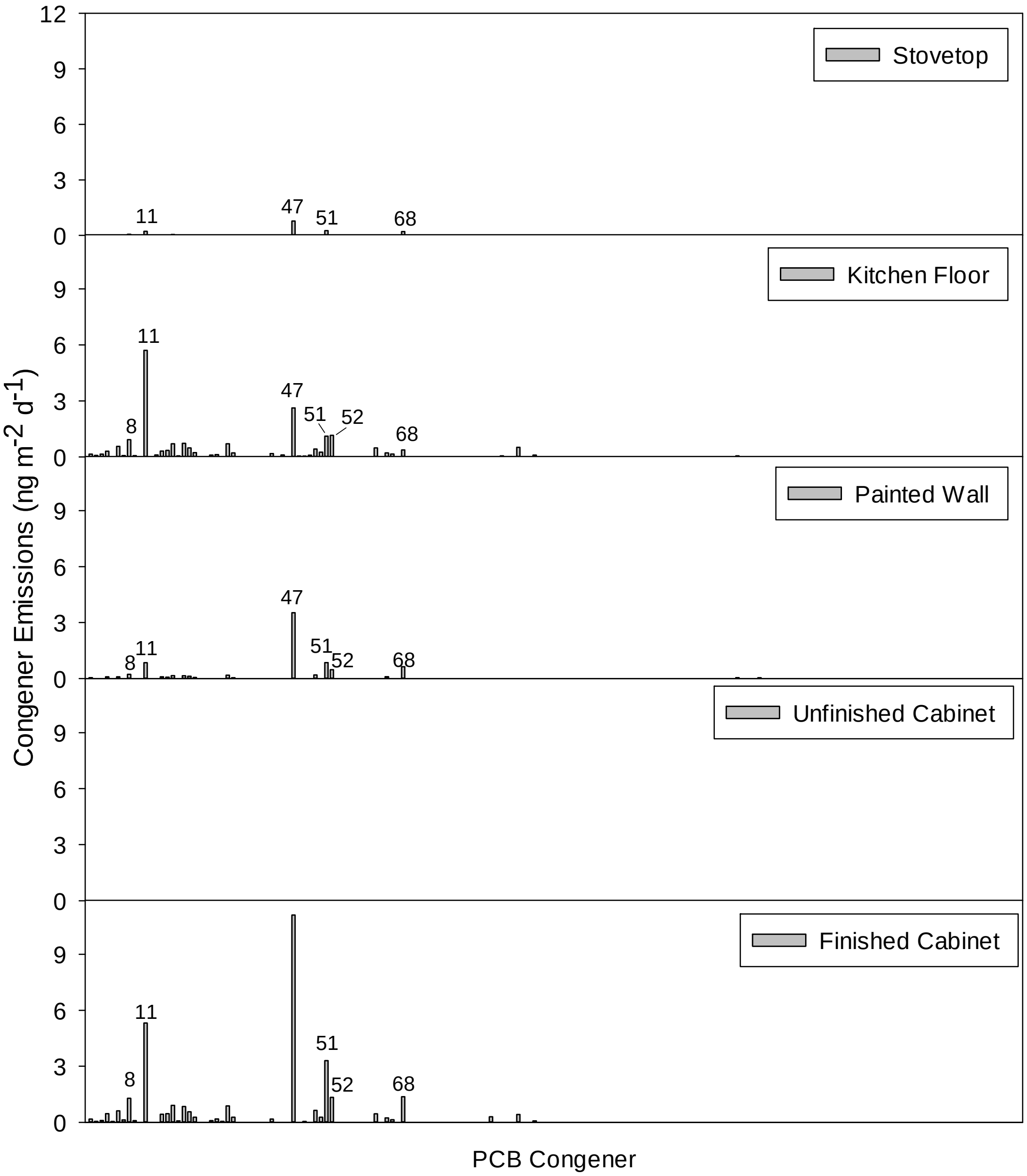


Figure C6: Average (n=2) surface emissions (ng m^{-2} d^{-1}) for all 209 PCB congeners.

Indoor Air Sample Concentrations

Table C4: Indoor Air Concentrations (pg m^{-3}) *part 1 of 2.*

Residence	*R1*	*R2*	*R3*	*R4*	*R5*	*R6*	*R7*	*R8*	*R9*
Year	2017	1915	1950s	1926	1980	2014	1950s	1901	2014
Sum	5028	3158	1915	1823	544	453	3946	2526	1692
1	99.51	154.01	54.02	2.93	6.16	10.03	26.00	120.19	53.04
2	15.49	26.71	13.51	2.08	3.07	4.23	9.43	17.38	13.48
3	31.21	150.42	58.40	9.56	5.57	7.52	32.34	88.86	61.16
4	205.36	147.77	59.93	10.06	16.50	31.66	73.66	70.12	57.56
5	13.89	9.63	4.25	0.82	1.07	1.77	4.52	6.16	3.37
6	105.52	66.34	44.08	6.32	15.08	21.44	43.76	42.08	44.96
7	26.64	19.25	8.07	1.17	1.94	2.61	8.11	10.43	11.85
8	540.56	263.14	131.97	22.98	30.94	42.73	198.85	149.16	118.42
9	25.57	21.91	8.69	1.34	1.96	2.76	10.17	11.69	7.84
10	6.92	7.11	2.40	0.44	0.72	0.95	2.47	4.16	2.60
11	347.07	230.27	171.51	317.46	97.44	101.16	337.60	466.17	177.70
12/13	17.30	13.07	9.62	1.34	2.13	<LOQ	11.74	17.68	10.16
15	190.55	44.59	31.47	7.15	4.96	6.84	51.41	47.29	20.81
16	27.18	62.35	45.11	11.21	10.17	5.35	88.99	36.45	34.63
17	48.83	72.56	46.58	10.78	11.37	6.31	89.24	34.34	39.32
18/30	66.84	155.67	101.21	23.00	22.68	11.69	193.98	73.33	79.42
19	8.87	18.16	11.40	2.44	3.35	1.94	20.58	8.01	9.42
20/28	57.36	130.14	114.85	32.03	24.03	7.89	212.03	94.72	71.10
21/33	33.52	80.57	69.49	19.67	14.51	5.11	133.27	58.33	44.15
22	16.53	40.26	36.82	11.44	8.10	2.89	73.37	32.86	21.42
23	<LOQ	<LOQ	0.08	<LOQ	<LOQ	<LOQ	0.49	<LOQ	<LOQ
24	1.84	2.17	1.79	0.30	0.38	0.33	3.07	1.29	1.58
25	11.66	9.85	8.12	2.16	2.76	0.94	14.85	6.70	6.37
26/29	10.25	22.79	19.88	5.05	5.07	2.22	35.65	15.90	14.43
27	5.25	9.11	6.48	1.64	1.80	0.86	11.41	4.94	5.62
31	48.96	133.95	111.53	32.16	21.41	8.42	211.02	92.75	70.27
32	16.04	39.92	29.09	7.29	6.95	3.40	55.00	22.20	21.76
34	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.57	<LOQ	0.08
35	<LOQ	1.54	1.35	1.94	<LOQ	<LOQ	1.89	3.13	0.03
36	<LOQ	0.12	<LOQ	<LOQ	<LOQ	0.03	<LOQ	1.04	<LOQ
37	<LOQ	13.74	12.49	4.77	3.07	<LOQ	34.64	14.49	7.57
38	0.02	0.03	<LOQ	<LOQ	<LOQ	<LOQ	0.03	<LOQ	0.08
39	<LOQ	<LOQ	0.02	<LOQ	0.02	0.04	0.02	<LOQ	0.09
40/71	7.38	22.87	17.88	10.43	5.23	1.36	45.27	19.73	10.87
41	1.81	6.70	6.15	2.92	1.24	0.35	14.52	6.90	3.58
42	6.00	16.74	12.88	6.58	3.63	1.04	28.86	12.36	6.89
43	0.94	2.72	3.07	1.90	0.26	0.07	4.28	2.13	1.09

Table C4: *Continued*.

44/47/65	1876.24	81.67	57.79	50.02	23.11	24.81	140.41	51.74	123.97
45	0.12	14.01	11.90	4.25	3.11	1.03	25.71	9.13	4.11
46	2.42	5.65	4.56	1.49	0.71	0.20	9.97	3.67	2.55
48	5.68	15.54	13.09	4.87	2.99	0.81	26.17	11.08	7.53
49/69	34.56	49.46	35.67	28.26	8.68	3.06	76.47	30.83	23.81
50/53	6.03	14.37	11.20	5.24	3.14	1.78	23.02	9.31	6.97
51	534.56	7.42	6.06	1.69	3.64	5.16	11.62	3.55	30.48
52	42.69	134.55	88.96	118.06	19.08	11.80	200.98	71.19	62.65
54	0.19	0.26	0.23	0.07	<LOQ	<LOQ	0.28	0.07	0.11
55	<LOQ	1.72	0.98	0.51	<LOQ	<LOQ	0.20	0.81	0.22
56	4.17	13.31	8.65	10.07	3.29	0.69	34.83	14.09	6.84
57	<LOQ	<LOQ	0.22	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
58	<LOQ	<LOQ	0.09	<LOQ	0.10	<LOQ	<LOQ	0.04	<LOQ
59/62/75	1.27	5.10	4.53	1.96	1.08	0.34	9.23	4.24	2.47
60	1.97	8.08	5.68	5.55	1.40	0.34	20.10	8.50	3.56
61/70/74/76	26.24	73.17	48.89	91.65	16.83	5.62	154.20	66.91	37.37
63	<LOQ	1.70	1.24	1.01	0.49	<LOQ	3.21	1.67	0.85
64	8.09	27.05	19.46	16.28	4.46	1.50	46.17	20.53	12.12
66	10.95	32.28	21.67	26.73	8.54	1.73	72.28	31.40	14.28
67	0.05	1.06	0.78	0.45	0.29	<LOQ	2.42	0.88	0.25
68	267.09	2.49	2.55	1.42	2.97	3.92	3.56	1.79	15.39
72	<LOQ	<LOQ	0.13	<LOQ	<LOQ	<LOQ	0.11	<LOQ	<LOQ
73	0.53	1.25	0.56	0.78	<LOQ	<LOQ	0.67	0.54	0.50
77	<LOQ	<LOQ	0.21	0.24	<LOQ	<LOQ	1.75	<LOQ	<LOQ
78	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
79	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
80	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
81	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
82	2.19	4.43	2.46	10.10	1.23	0.30	11.12	5.61	2.76
83	0.97	2.62	2.26	4.33	<LOQ	0.19	4.47	2.20	1.41
84	6.05	18.21	10.08	29.71	3.50	2.48	38.42	18.79	10.27
85/116	3.07	5.52	4.33	14.48	1.14	1.12	13.25	6.75	3.18
86/97/109/119	5.23	12.07	7.58	26.71	4.42	2.46	24.32	11.54	7.28
87/125	7.96	17.11	11.64	37.38	3.26	2.94	44.20	21.04	10.56
88	0.33	0.58	0.28	0.40	<LOQ	<LOQ	0.23	0.16	0.16
89	0.30	0.81	0.18	0.52	0.06	<LOQ	1.35	0.42	0.50
90/101/113	21.13	73.50	34.37	117.50	12.69	9.00	119.06	60.12	33.48
91	3.27	8.24	5.01	12.81	1.87	0.97	17.46	8.02	4.44
92	4.02	11.78	6.05	18.74	1.77	1.40	20.89	10.17	6.15
93/100	0.40	0.83	0.37	0.69	0.11	0.09	1.10	0.20	0.17
94	<LOQ	0.24	<LOQ	0.23	<LOQ	<LOQ	0.45	0.09	0.20

Table C4: *Continued*.

95	22.12	88.67	36.34	102.57	12.08	7.14	128.83	59.49	35.57
96	0.24	0.53	0.36	0.47	0.09	<LOQ	1.29	0.38	0.24
98	0.50	0.10	0.17	0.04	<LOQ	<LOQ	0.16	0.13	0.10
99	10.58	19.83	11.69	43.88	5.05	2.56	37.66	17.72	11.76
102	0.63	1.41	0.86	2.31	0.35	<LOQ	3.57	1.57	0.90
103	0.24	0.41	0.24	0.34	<LOQ	<LOQ	0.85	0.18	0.18
104	0.15	0.11	0.15	0.03	0.03	0.04	0.09	0.02	0.09
105	4.30	5.38	4.94	23.28	2.53	2.36	15.13	8.12	5.52
106	<LOQ	0.07	0.03	<LOQ	0.04	<LOQ	0.12	0.03	<LOQ
107	0.07	1.24	0.66	3.71	0.39	0.07	3.35	1.49	0.52
108/124	<LOQ	1.14	0.69	2.39	0.23	0.15	2.88	1.03	0.75
110	18.26	45.32	29.37	103.21	11.60	7.39	103.51	53.03	27.52
111	<LOQ	<LOQ	0.07	<LOQ	<LOQ	<LOQ	0.13	0.05	0.04
112	0.19	0.53	0.15	0.45	0.11	0.23	0.07	0.39	0.36
114	<LOQ	<LOQ	<LOQ	1.33	0.34	<LOQ	1.21	0.77	<LOQ
115	0.95	1.37	<LOQ	2.80	<LOQ	1.11	2.19	0.74	<LOQ
117	4.26	4.26	<LOQ	4.53	<LOQ	<LOQ	5.20	<LOQ	4.28
118	10.24	19.24	16.36	65.50	7.08	5.27	48.78	25.29	15.30
120	<LOQ	<LOQ	0.08	<LOQ	<LOQ	<LOQ	0.04	<LOQ	<LOQ
121	0.16	0.09	0.22	<LOQ	<LOQ	0.07	0.06	0.04	0.08
122	<LOQ	<LOQ	0.09	0.87	0.09	<LOQ	0.22	<LOQ	0.06
123	0.04	0.36	0.16	1.27	0.04	0.03	0.91	0.43	<LOQ
126	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
127	<LOQ	0.11	0.07	<LOQ	<LOQ	<LOQ	0.06	<LOQ	<LOQ
129/138/163	9.35	35.00	17.66	48.74	6.70	8.70	46.82	43.74	17.18
130	0.34	0.94	0.50	2.54	0.30	0.30	2.54	2.14	0.57
131	<LOQ	0.51	<LOQ	0.78	<LOQ	<LOQ	1.09	0.81	<LOQ
132	3.86	15.33	7.37	18.04	2.17	2.58	20.47	17.17	6.64
133	<LOQ	0.38	<LOQ	0.29	<LOQ	<LOQ	0.32	0.30	<LOQ
134	0.65	2.86	0.45	3.14	<LOQ	<LOQ	4.66	2.93	0.35
135/151	3.94	34.17	10.39	16.02	1.77	2.13	30.25	21.46	7.57
136	1.98	15.56	4.86	8.12	1.23	1.07	14.66	8.84	4.57
137	0.44	0.77	0.55	2.82	<LOQ	0.15	2.46	1.28	0.76
139/140	0.44	0.36	0.35	1.17	<LOQ	0.23	1.36	0.53	<LOQ
141	1.70	11.16	4.11	7.36	0.99	1.20	11.12	9.74	2.88
142	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
143	<LOQ	0.22	<LOQ	0.22	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
144	0.70	4.23	1.33	2.74	0.21	0.28	4.90	3.08	0.78
145	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
146	1.09	6.02	2.10	5.90	0.63	0.81	7.03	5.94	1.59
147/149	9.77	63.02	22.60	42.09	5.45	6.80	62.69	47.06	16.44

Table C4: *Continued*.

148	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
150	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
152	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
153/168	7.68	41.91	15.83	36.96	5.85	6.56	45.03	37.10	12.70
154	<LOQ	<LOQ	<LOQ	0.29	<LOQ	<LOQ	0.53	<LOQ	0.15
155	1.22	0.86	1.25	0.23	<LOQ	0.17	0.58	0.18	0.38
156/157	<LOQ	0.65	0.34	4.04	<LOQ	<LOQ	0.20	1.31	<LOQ
158	0.92	2.87	1.40	5.38	0.33	0.70	4.99	3.86	1.51
159	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
160	0.10	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.29	0.32	<LOQ
161	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
162	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
164	0.20	2.42	0.77	2.76	<LOQ	0.31	1.98	3.23	0.88
165	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
167	<LOQ	<LOQ	<LOQ	1.27	<LOQ	<LOQ	<LOQ	0.65	<LOQ
169	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
170	2.98	5.61	4.07	2.37	1.13	1.17	3.03	3.93	13.40
171/173	0.58	2.71	0.98	1.37	0.33	0.57	1.94	2.02	0.65
172	0.10	1.19	0.37	0.36	<LOQ	0.27	0.63	1.04	0.40
174	2.19	9.92	3.31	4.06	1.15	1.66	8.73	6.85	3.23
175	0.22	0.51	0.16	0.25	<LOQ	<LOQ	0.44	0.31	0.11
176	0.27	2.49	0.90	0.42	0.12	0.08	2.22	1.16	0.33
177	0.91	5.48	1.57	2.21	0.58	0.76	3.80	3.49	1.65
178	0.40	2.57	0.72	0.52	<LOQ	<LOQ	1.60	0.93	0.27
179	1.74	9.07	2.86	3.12	0.49	0.88	9.05	4.52	2.04
180/193	3.84	12.47	4.32	5.74	1.92	2.85	9.91	10.84	5.31
181	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
182	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
183	1.75	6.47	2.65	3.12	0.81	1.17	7.49	5.13	2.24
184	0.50	<LOQ	0.70	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
185	0.41	1.79	0.27	0.22	<LOQ	0.27	1.48	0.88	0.54
186	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
187	4.50	13.51	5.57	6.09	1.86	2.44	16.34	8.84	4.37
188	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
189	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.11	<LOQ	0.54
190	0.17	1.04	0.14	0.57	<LOQ	<LOQ	0.44	0.82	0.57
191	0.14	0.20	0.08	0.08	<LOQ	0.06	0.12	0.16	0.18
192	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
194	1.49	1.05	0.88	0.94	0.56	0.41	0.99	1.37	1.03
195	0.55	0.92	0.38	0.26	<LOQ	<LOQ	0.22	0.81	0.34
196	1.26	1.15	0.84	0.67	0.15	0.44	1.49	1.38	0.82

Table C4: *Continued*.

197	1.03	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.29	<LOQ	<LOQ
198/199	3.49	2.69	1.70	1.64	0.51	0.99	3.52	3.14	2.02
200	0.94	0.62	<LOQ	0.33	0.27	0.27	0.98	0.33	0.20
201	0.75	0.51	0.43	0.43	0.15	0.25	1.50	0.51	0.33
202	1.87	1.28	1.03	1.15	0.64	0.64	3.16	0.99	0.83
203	2.79	1.65	0.93	1.07	0.18	0.60	2.16	1.90	1.27
205	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
206	1.71	0.75	0.85	0.63	<LOQ	0.49	0.78	0.89	0.77
207	0.68	0.37	0.32	<LOQ	<LOQ	0.27	0.34	0.29	0.25
208	0.93	0.35	0.27	0.26	<LOQ	0.22	0.63	0.48	0.27
209	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

Table C5: Indoor Air Concentrations (pg m^{-3}) *part 2 of 2.*

Residence	*R10*	*R11*	*R12*	*R13a*	*R13b*	*R14*	*R15*	*R16*
Year	2014	2016	2004	1914	1914	2007	1925	1958
Sum	913	606	6467	2973	1374	5472	6974	2270
1	21.74	3.97	11.35	8.55	3.28	202.50	33.38	41.02
2	17.16	3.14	9.54	4.42	2.87	55.52	7.80	7.78
3	24.18	6.30	29.92	13.33	4.51	380.27	40.97	38.14
4	37.51	8.62	86.65	20.39	10.33	267.91	148.07	42.14
5	2.86	0.83	7.21	1.39	0.61	33.49	5.78	2.80
6	36.02	6.06	101.24	14.23	5.90	189.25	56.24	23.52
7	7.69	6.56	14.29	3.87	1.55	55.85	17.01	5.10
8	61.43	14.67	305.85	52.22	19.61	698.60	275.72	103.74
9	5.75	1.12	13.36	3.02	1.42	60.89	15.73	6.26
10	1.74	0.40	2.33	0.91	0.49	13.50	5.40	1.87
11	272.32	165.36	2174.85	129.67	474.45	196.59	430.00	145.77
12/13	3.38	0.49	<LOQ	<LOQ	<LOQ	67.38	10.92	4.36
15	7.81	2.35	93.74	11.48	5.44	177.98	53.55	23.07
16	13.00	5.51	154.67	40.85	9.87	153.69	111.84	45.35
17	15.97	7.18	149.23	35.72	9.19	172.97	117.58	46.81
18/30	30.28	12.21	321.96	92.66	19.69	362.94	261.45	115.56
19	4.62	1.80	29.01	7.10	2.22	39.15	29.25	10.40
20/28	20.77	11.90	305.98	122.32	25.61	269.77	251.65	110.66
21/33	11.88	7.06	196.19	85.02	17.66	172.84	154.44	68.29
22	6.86	3.88	99.66	47.94	10.39	82.44	84.04	37.34
23	<LOQ	0.03	0.10	0.04	<LOQ	0.15	0.09	<LOQ
24	0.86	0.42	4.85	0.88	0.35	5.87	3.14	1.22
25	3.21	1.74	21.71	5.78	1.97	23.76	16.03	7.03
26/29	5.44	2.68	60.78	17.03	4.84	60.48	41.86	17.33
27	2.28	1.05	19.86	4.97	1.44	23.32	15.06	6.12
31	21.99	12.48	324.49	157.54	26.94	290.81	268.40	120.19
32	8.07	4.07	93.56	29.47	6.17	94.32	72.02	31.01
34	<LOQ	<LOQ	0.01	0.29	0.09	<LOQ	0.08	<LOQ
35	<LOQ	0.04	0.02	1.37	3.30	<LOQ	2.97	0.16
36	<LOQ	0.17	0.04	<LOQ	<LOQ	<LOQ	0.05	<LOQ
37	<LOQ	0.45	<LOQ	21.29	5.45	20.05	28.96	13.54
38	<LOQ	<LOQ	0.01	0.53	<LOQ	0.07	0.07	<LOQ
39	0.02	<LOQ	0.01	<LOQ	<LOQ	<LOQ	<LOQ	0.05
40/71	3.12	2.90	48.26	61.31	10.35	30.02	58.52	21.44
41	0.75	0.23	16.71	17.60	2.51	11.53	16.15	5.87
42	1.78	1.84	33.03	38.56	6.60	22.88	37.54	13.86
43	0.30	0.14	7.45	6.83	1.08	5.46	5.10	2.62
44/47/65	75.98	108.85	271.00	186.05	42.72	113.66	281.18	247.57
45	1.08	1.08	32.20	22.99	2.98	25.95	28.66	8.01

Table C5: *Continued*.

46	0.67	0.51	13.31	9.24	1.75	9.81	11.87	5.31
48	2.00	1.58	36.44	36.98	4.95	29.06	35.28	16.04
49/69	7.77	7.04	109.58	93.94	20.49	72.54	143.52	48.90
50/53	3.55	2.27	35.64	22.08	4.80	27.14	32.78	14.96
51	24.89	28.76	44.91	19.95	4.59	15.59	19.13	60.33
52	25.10	15.60	300.73	182.16	66.68	168.58	540.80	124.18
54	0.08	0.08	0.52	0.17	<LOQ	0.36	0.41	0.29
55	<LOQ	<LOQ	0.86	<LOQ	0.96	1.03	<LOQ	0.31
56	1.34	1.88	23.90	47.20	9.01	10.17	37.88	12.50
57	0.15	<LOQ	0.48	0.32	<LOQ	<LOQ	0.17	<LOQ
58	<LOQ	0.04	0.11	0.18	0.03	<LOQ	0.03	<LOQ
59/62/75	0.31	1.34	11.57	10.98	2.20	8.56	10.73	4.87
60	0.28	0.42	12.93	28.31	4.67	6.54	21.54	8.22
61/70/74/76	8.26	10.07	135.57	210.96	48.90	68.54	272.99	75.50
63	0.08	0.05	3.18	4.45	0.73	1.70	4.34	1.60
64	2.84	2.84	56.89	67.85	12.61	33.56	77.82	26.04
66	3.21	4.63	56.17	111.59	19.04	29.78	89.41	32.26
67	<LOQ	0.05	2.45	2.72	0.29	1.41	2.07	1.06
68	12.21	14.76	14.08	10.08	3.41	3.81	10.58	26.22
72	<LOQ	<LOQ	0.54	0.67	0.09	<LOQ	<LOQ	<LOQ
73	0.33	<LOQ	0.80	0.47	0.65	0.65	0.73	0.28
77	<LOQ	0.10	<LOQ	<LOQ	0.32	<LOQ	<LOQ	<LOQ
78	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
79	<LOQ	<LOQ	0.11	<LOQ	<LOQ	<LOQ	0.36	0.08
80	<LOQ	<LOQ	0.13	<LOQ	0.07	<LOQ	<LOQ	<LOQ
81	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
82	0.33	0.47	4.76	7.08	3.33	2.80	24.41	4.15
83	0.30	0.14	2.86	3.84	2.07	2.70	13.38	2.61
84	2.44	3.79	30.86	24.52	15.22	15.15	121.49	18.90
85/116	1.22	0.87	6.65	9.26	4.52	4.14	29.40	5.93
86/97/109/119	2.26	2.75	16.42	19.96	10.19	8.32	71.05	10.82
87/125	3.29	4.20	21.27	28.04	17.13	13.41	115.97	18.45
88	<LOQ	<LOQ	0.12	0.24	1.10	0.40	<LOQ	0.24
89	0.25	<LOQ	1.54	1.03	0.28	0.62	2.78	0.28
90/101/113	7.76	11.20	85.99	87.42	51.15	77.61	377.04	55.56
91	1.10	1.42	14.57	11.97	5.42	6.83	49.43	8.70
92	1.52	1.82	16.28	14.96	8.75	11.96	67.96	10.49
93/100	0.33	0.12	2.34	0.95	0.58	0.37	1.76	0.11
94	<LOQ	<LOQ	0.73	0.53	0.13	<LOQ	1.57	0.17
95	8.04	11.15	125.59	79.64	53.71	105.14	464.17	64.23
96	<LOQ	0.09	1.38	0.83	0.33	0.82	3.61	0.50

Table C5: *Continued*.

98	<LOQ	0.07	0.45	0.25	<LOQ	0.48	0.43	0.07
99	2.77	3.99	27.75	33.59	17.88	12.99	117.01	20.25
102	0.20	0.22	3.72	2.88	1.12	1.57	9.63	1.50
103	0.26	<LOQ	2.45	0.56	0.21	0.15	2.45	0.33
104	0.26	0.02	0.76	0.08	0.08	0.10	0.09	0.03
105	0.30	2.30	5.00	11.70	5.93	4.39	38.50	6.26
106	<LOQ	<LOQ	0.04	<LOQ	<LOQ	<LOQ	0.40	<LOQ
107	<LOQ	0.26	<LOQ	2.15	0.79	0.81	7.27	1.28
108/124	<LOQ	0.06	0.03	1.83	0.91	1.12	5.46	<LOQ
110	6.15	10.08	43.88	63.98	36.70	29.88	266.94	39.15
111	0.07	0.05	0.29	0.06	0.04	<LOQ	<LOQ	0.10
112	0.10	0.09	0.34	0.89	0.36	0.39	<LOQ	0.20
114	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	1.99	<LOQ
115	<LOQ	<LOQ	1.10	3.17	1.59	0.99	2.19	0.97
117	<LOQ	<LOQ	3.99	6.73	5.09	4.18	8.41	4.99
118	3.87	5.72	16.50	36.26	18.24	13.95	120.73	19.24
120	0.07	<LOQ	<LOQ	<LOQ	0.05	<LOQ	<LOQ	<LOQ
121	0.14	<LOQ	2.31	0.04	<LOQ	<LOQ	<LOQ	<LOQ
122	<LOQ	<LOQ	<LOQ	0.07	0.13	0.05	0.97	0.04
123	<LOQ	<LOQ	1.17	0.37	0.16	<LOQ	2.40	0.37
126	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
127	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
129/138/163	5.63	8.77	10.70	44.67	19.86	23.44	116.70	18.46
130	<LOQ	0.33	0.56	1.07	0.94	0.73	7.68	0.50
131	<LOQ	<LOQ	0.42	<LOQ	0.48	<LOQ	3.41	0.22
132	1.29	1.96	6.20	15.47	7.71	11.90	55.32	8.88
133	<LOQ	<LOQ	0.26	<LOQ	<LOQ	<LOQ	0.86	<LOQ
134	<LOQ	0.31	1.66	3.15	1.32	2.98	12.78	1.43
135/151	1.51	2.71	13.71	28.23	11.97	37.09	63.76	13.18
136	0.79	1.39	8.34	10.51	5.15	19.03	39.07	6.52
137	0.14	0.40	0.60	1.24	0.63	1.19	7.18	0.90
139/140	<LOQ	<LOQ	0.59	0.71	0.24	0.33	3.42	0.15
141	0.87	1.21	2.65	11.22	3.91	7.91	23.07	4.17
142	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
143	<LOQ	<LOQ	0.12	<LOQ	<LOQ	0.24	1.02	<LOQ
144	0.23	0.21	1.96	4.08	1.51	5.73	10.61	1.66
145	<LOQ	<LOQ	0.16	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
146	0.44	0.92	2.19	6.71	2.70	4.42	16.36	2.36
147/149	4.94	6.73	24.86	58.81	25.80	59.88	150.74	27.61
148	<LOQ	<LOQ	0.22	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
150	<LOQ	<LOQ	0.31	<LOQ	<LOQ	<LOQ	0.26	<LOQ

Table C5: *Continued*.

152	<LOQ	<LOQ	0.09	<LOQ	<LOQ	<LOQ	0.31	<LOQ
153/168	4.09	5.87	13.10	48.99	20.40	31.32	98.47	17.79
154	<LOQ	<LOQ	0.37	<LOQ	<LOQ	0.34	1.62	<LOQ
155	1.45	0.20	7.44	0.15	<LOQ	0.79	0.83	<LOQ
156/157	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	6.01	<LOQ
158	0.42	0.60	1.05	4.59	1.69	2.24	12.26	1.34
159	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
160	0.71	<LOQ	0.05	0.15	0.17	0.08	0.18	0.08
161	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
162	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
164	0.21	0.43	0.61	2.36	1.31	1.39	6.24	0.95
165	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
167	0.68	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	1.96	<LOQ
169	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
170	11.12	2.04	0.12	8.12	2.33	3.87	7.23	2.03
171/173	0.45	0.41	0.54	4.25	1.18	1.75	3.54	0.96
172	<LOQ	<LOQ	0.21	1.83	0.26	0.89	1.55	<LOQ
174	1.50	1.41	2.25	15.77	4.76	6.59	11.36	3.38
175	0.09	0.07	0.24	0.58	0.15	0.46	0.68	0.14
176	<LOQ	0.11	0.69	2.96	1.03	2.28	2.89	0.84
177	0.76	0.73	1.09	7.79	2.09	3.36	5.81	1.72
178	0.34	<LOQ	0.45	3.51	1.01	1.62	2.07	0.38
179	0.40	0.54	3.72	13.64	5.18	9.13	10.30	3.73
180/193	2.71	2.58	2.46	23.05	7.98	9.39	15.64	4.71
181	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.15	<LOQ
182	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
183	1.07	0.99	2.07	11.28	4.07	5.14	8.38	2.63
184	0.53	<LOQ	2.01	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
185	0.27	0.10	0.51	2.28	0.90	1.22	1.10	<LOQ
186	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
187	2.33	2.23	4.79	25.47	9.98	10.41	16.82	6.24
188	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
189	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
190	<LOQ	<LOQ	<LOQ	1.55	0.49	0.77	1.27	<LOQ
191	<LOQ	<LOQ	0.23	0.24	<LOQ	0.07	0.20	<LOQ
192	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
194	0.63	<LOQ	0.30	2.23	1.40	1.32	1.65	0.57
195	0.25	<LOQ	0.19	1.28	0.57	0.90	0.87	<LOQ
196	0.31	0.32	0.33	2.64	1.12	1.51	1.87	0.31
197	<LOQ	<LOQ	<LOQ	0.69	<LOQ	<LOQ	<LOQ	<LOQ
198/199	0.93	0.87	0.86	5.90	2.89	3.35	4.29	1.51

Table C5: *Continued*.

200	<LOQ	<LOQ	0.26	1.56	0.57	<LOQ	0.54	0.16
201	0.15	0.19	0.44	1.77	0.92	0.59	1.13	0.54
202	0.68	0.62	0.91	4.45	2.11	1.44	2.31	1.22
203	0.49	0.55	0.36	3.51	1.94	1.94	2.74	0.94
205	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
206	0.50	<LOQ	0.27	0.70	0.99	0.84	0.95	<LOQ
207	<LOQ	<LOQ	0.14	0.39	0.45	0.26	0.45	0.29
208	0.18	<LOQ	0.14	0.61	0.47	0.34	0.52	0.24
209	<LOQ	<LOQ	<LOQ	<LOQ	1.77	<LOQ	<LOQ	<LOQ

Outdoor Air Sample Concentrations

Table C6: Outdoor Air Concentrations (pg m^{-3}).

Resid.	*R1*	*R2*	*R3*	*R4*	*R5*	*R6*	*R7*	*R8*	*R12*	*R14*	*R15*	*R16*
Year	2017	1915	1950s	1926	1980	2014	1950s	1901	2004	2007	1925	1958
Sum	133	125	102	250	134	82	150	103	72	195	140	221
1	0.59	0.65	0.58	0.52	0.63	0.38	0.46	0.51	0.34	0.63	0.71	0.83
2	0.42	0.43	0.43	0.47	0.38	0.43	0.37	0.49	0.35	0.73	1.14	0.50
3	0.51	0.77	0.61	0.70	0.50	0.48	0.45	0.62	0.48	3.56	1.08	1.08
4	2.27	2.79	2.49	2.44	5.16	2.16	2.66	1.86	1.42	3.54	2.49	2.35
5	0.11	0.14	0.08	0.10	0.25	0.09	<LOQ	0.11	0.08	0.48	0.19	0.14
6	0.71	0.68	0.68	0.70	1.61	0.63	0.72	0.59	0.47	2.34	0.70	0.71
7	0.20	0.19	0.20	0.14	0.33	0.11	0.13	0.15	0.11	0.59	0.19	0.20
8	2.64	3.07	2.93	3.23	8.37	2.49	3.19	2.56	1.78	11.10	3.00	2.95
9	0.18	0.21	0.21	0.21	0.52	0.14	0.19	0.17	0.10	0.58	0.20	0.20
10	0.11	0.14	0.14	0.10	0.26	0.08	0.12	0.10	0.05	0.17	0.09	0.12
11	35.78	7.80	6.44	10.16	4.69	9.84	7.95	6.33	11.13	20.84	7.39	5.80
12/13	<LOQ	<LOQ	<LOQ	0.34	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.23	<LOQ	<LOQ
15	0.53	0.62	0.63	1.08	1.59	<LOQ	0.46	<LOQ	<LOQ	3.81	<LOQ	0.88
16	1.11	1.19	1.47	1.62	4.06	1.13	1.44	1.13	0.74	3.64	1.24	1.50
17	1.37	1.58	1.59	1.72	4.25	1.29	1.56	1.14	0.89	3.41	1.58	1.62
18/30	2.65	2.90	2.99	3.55	8.72	2.47	3.23	2.33	1.64	6.70	3.26	3.53
19	0.46	0.54	0.51	0.42	1.26	0.46	0.52	0.38	0.25	0.80	0.51	0.58
20/28	3.06	3.43	3.65	4.75	8.76	2.51	3.69	2.78	1.51	8.93	3.37	3.52
21/33	1.60	1.73	1.91	2.75	5.95	1.38	2.21	1.46	0.81	5.77	1.98	1.99
22	1.03	1.13	1.15	1.65	3.19	0.74	1.25	0.91	0.46	3.09	1.10	1.37
23	<LOQ	<LOQ	<LOQ	0.01	<LOQ	<LOQ	<LOQ	0.01	0.01	<LOQ	<LOQ	<LOQ
24	0.06	0.04	0.04	0.05	0.08	0.01	0.02	0.04	0.02	0.07	0.06	0.08
25	0.30	0.28	0.24	0.32	0.80	0.21	0.34	0.21	0.13	0.69	0.24	0.33
26/29	0.64	0.70	0.73	0.90	1.92	0.51	0.71	0.58	0.33	1.92	0.73	0.87
27	0.20	0.23	0.23	0.26	0.65	0.22	0.21	0.19	0.16	0.54	0.20	0.36
31	3.13	3.34	3.37	4.88	8.92	2.36	3.60	2.80	1.55	8.75	3.34	3.97
32	0.92	0.99	1.02	1.19	2.66	0.74	1.05	0.76	0.47	2.25	1.00	1.03
34	0.01	0.03	<LOQ	<LOQ	<LOQ	0.01	<LOQ	0.01	0.00	0.01	0.04	0.02
35	0.25	0.08	0.02	0.19	<LOQ	0.09	0.03	0.07	0.01	0.02	0.12	0.03
36	0.01	0.02	<LOQ	<LOQ	<LOQ	0.01	<LOQ	0.01	<LOQ	0.02	0.02	0.01
37	0.35	0.40	0.38	0.81	0.60	0.22	0.34	0.17	0.10	0.48	0.28	0.60
38	<LOQ	0.01	<LOQ	<LOQ	<LOQ	<LOQ	0.01	0.03	0.01	<LOQ	0.07	0.01
39	<LOQ	0.01	0.01	<LOQ	0.01	<LOQ	<LOQ	<LOQ	0.01	0.01	0.01	0.01
40/71	1.02	1.05	1.00	1.96	1.70	0.76	1.15	0.87	0.39	1.58	1.08	1.16
41	0.25	0.36	0.11	0.28	0.85	0.14	0.20	0.33	0.14	0.60	0.22	0.35
42	0.68	0.58	0.64	1.17	1.47	0.44	0.75	0.55	0.24	1.11	0.57	0.75
43	0.13	0.17	<LOQ	0.22	0.16	<LOQ	0.09	0.07	0.02	0.11	0.10	0.08
44/47/65	4.84	3.87	3.49	7.94	4.88	2.40	4.80	2.81	1.72	5.26	4.27	4.35

Table C6: *Continued*.

45	0.39	0.45	0.46	0.84	1.47	0.53	0.58	0.37	0.19	0.96	0.54	0.66
46	0.14	0.23	0.12	0.28	0.44	0.08	0.13	0.12	0.08	0.40	0.12	0.21
48	0.46	0.56	0.51	0.97	1.37	0.45	0.59	0.42	0.24	1.25	0.54	0.73
49/69	1.84	2.17	2.05	4.63	3.23	1.36	2.68	1.63	0.85	3.36	2.16	2.67
50/53	0.73	0.81	0.59	1.04	1.55	0.73	0.88	0.63	0.36	1.37	0.92	0.97
51	0.77	0.16	0.26	0.24	0.22	0.18	0.24	0.19	0.16	0.39	0.19	0.36
52	4.81	6.42	5.90	17.80	5.59	3.02	9.20	3.63	2.77	7.83	7.08	7.44
54	0.03	0.05	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.04	<LOQ
55	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.09	0.05	<LOQ	0.07	<LOQ	<LOQ
56	0.64	0.74	0.61	1.74	0.18	0.46	0.72	0.64	0.25	0.74	0.62	1.06
57	<LOQ	<LOQ	0.03	<LOQ	<LOQ	0.03	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
58	0.02	<LOQ	<LOQ	0.01	<LOQ	<LOQ	0.01	0.01	<LOQ	0.01	0.01	<LOQ
59/62/75	0.30	0.30	0.31	0.34	0.50	0.24	0.12	0.30	0.09	0.35	0.32	0.30
60	0.22	0.35	0.28	0.86	<LOQ	0.13	0.35	0.16	0.05	0.46	0.17	0.51
61/70/74/ 76	3.35	4.56	3.95	12.58	1.89	2.00	5.87	3.17	2.01	4.75	4.85	6.05
63	0.03	0.19	<LOQ	0.16	0.02	0.01	0.03	0.04	0.02	0.08	0.04	0.06
64	1.09	1.33	1.17	2.73	1.85	0.75	1.39	1.05	0.52	1.91	1.21	1.57
66	1.49	1.64	1.56	3.90	0.63	0.89	1.78	1.15	0.59	2.08	1.37	2.22
67	0.04	0.09	<LOQ	0.03	<LOQ	<LOQ	<LOQ	<LOQ	0.01	0.03	<LOQ	0.06
68	0.80	0.57	<LOQ	0.55	<LOQ	0.63	0.58	<LOQ	0.30	0.64	0.60	0.64
72	<LOQ	0.07	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.02	<LOQ	<LOQ	<LOQ
73	0.14	0.22	0.15	0.21	<LOQ	0.15	0.26	0.15	0.09	0.13	0.12	0.13
77	<LOQ	0.16	<LOQ	0.20	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.38
78	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
79	<LOQ	0.04	<LOQ	0.09	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
80	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
81	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
82	0.19	0.37	0.38	1.25	0.11	0.31	0.57	0.09	0.12	0.35	0.55	0.57
83	0.32	0.25	0.04	0.68	0.13	0.08	0.44	0.20	0.13	0.05	0.28	0.19
84	1.21	1.71	1.30	4.96	0.56	0.87	3.00	1.03	0.93	1.73	2.36	1.60
85/116	0.35	0.83	0.52	1.94	0.17	0.34	1.14	0.58	0.42	0.74	0.89	1.75
86/97/ 109/119	0.80	1.50	1.19	4.06	0.64	0.66	2.07	1.06	0.75	0.84	1.48	1.47
87/125	1.84	2.17	1.48	5.85	0.81	1.28	2.98	1.62	1.49	2.13	2.72	4.82
88	<LOQ	0.14	0.04	0.12	<LOQ	<LOQ	<LOQ	0.04	0.02	<LOQ	0.04	0.05
89	0.04	0.07	0.02	0.06	<LOQ	<LOQ	0.08	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
90/101/ 113	4.45	5.81	4.79	17.96	2.30	2.93	8.75	4.33	3.68	6.63	8.01	11.01
91	0.57	0.63	0.53	2.13	0.23	0.31	1.03	0.47	0.37	0.49	0.72	0.84
92	0.92	1.08	0.90	2.99	0.26	0.48	1.66	0.72	0.59	1.19	1.51	2.06
93/100	0.13	<LOQ	0.04	0.09	<LOQ	0.02	0.05	<LOQ	0.04	0.02	0.05	<LOQ
94	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.05	0.03	<LOQ	<LOQ	0.03	<LOQ

Table C6: *Continued*.

95	4.41	6.00	5.21	17.84	2.29	2.77	9.07	4.05	3.15	7.29	8.71	6.01
96	0.03	0.04	<LOQ	0.10	<LOQ	<LOQ	<LOQ	<LOQ	0.02	<LOQ	0.07	<LOQ
98	0.01	0.02	0.02	<LOQ	<LOQ	<LOQ	0.05	0.02	0.01	0.02	<LOQ	<LOQ
99	1.64	2.00	1.64	6.69	0.76	1.09	2.94	1.35	1.25	1.85	2.45	5.46
102	0.05	0.10	0.08	0.32	0.04	0.05	0.20	0.07	0.08	0.12	0.15	0.11
103	0.07	0.03	0.02	0.04	<LOQ	<LOQ	0.02	0.02	<LOQ	0.02	0.02	0.03
104	0.04	0.04	<LOQ	0.01	0.02	<LOQ	<LOQ	<LOQ	0.01	<LOQ	0.02	0.01
105	0.79	1.07	0.59	2.67	0.52	0.46	1.30	1.07	0.57	0.67	0.76	6.62
106	<LOQ	0.03	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.01	<LOQ	<LOQ	<LOQ
107	0.12	0.20	0.02	0.54	0.03	0.07	0.17	0.04	0.14	0.12	0.06	0.48
108/124	0.03	0.08	0.04	0.36	0.02	0.03	0.15	0.04	0.03	<LOQ	0.05	0.06
110	4.28	5.28	4.49	16.57	2.38	3.31	7.98	4.75	3.41	4.58	5.97	10.73
111	<LOQ	0.03	<LOQ	<LOQ	<LOQ	<LOQ	0.01	0.01	0.01	<LOQ	<LOQ	0.01
112	<LOQ	0.03	0.02	0.08	<LOQ	<LOQ	0.06	<LOQ	0.04	<LOQ	<LOQ	0.02
114	0.13	<LOQ	<LOQ	0.14	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.14
115	<LOQ	<LOQ	<LOQ	0.54	<LOQ	<LOQ	0.70	<LOQ	0.18	<LOQ	<LOQ	0.53
117	<LOQ	<LOQ	<LOQ	1.57	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	2.24
118	2.50	2.90	1.97	8.62	1.48	1.83	3.86	2.59	2.02	2.25	3.24	15.85
120	0.03	0.04	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
121	0.06	0.03	<LOQ	<LOQ	<LOQ	0.01	<LOQ	<LOQ	0.01	<LOQ	<LOQ	<LOQ
122	0.02	<LOQ	<LOQ	0.03	<LOQ	0.02	0.02	0.02	0.01	0.02	<LOQ	0.02
123	0.02	0.08	0.02	0.11	0.03	0.01	0.06	<LOQ	<LOQ	0.01	<LOQ	0.04
126	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
127	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.07
129/138/ 163	3.19	3.29	2.72	7.79	2.80	3.00	5.08	5.17	2.48	3.65	4.69	21.23
130	0.12	0.20	<LOQ	0.47	<LOQ	0.16	0.17	0.21	0.08	0.12	0.12	1.34
131	<LOQ	<LOQ	<LOQ	0.11	<LOQ	<LOQ	0.10	<LOQ	0.04	<LOQ	<LOQ	<LOQ
132	1.19	1.38	0.98	3.10	0.53	0.97	1.99	1.40	0.87	1.46	1.84	2.98
133	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.09	<LOQ	<LOQ
134	0.07	0.16	<LOQ	0.33	<LOQ	0.07	0.37	0.09	0.07	0.16	0.31	0.14
135/151	1.18	1.38	1.40	3.56	0.58	1.04	2.24	1.42	1.05	3.28	3.28	2.48
136	0.62	0.61	0.66	2.00	0.35	0.49	1.40	0.88	0.42	1.71	1.37	0.60
137	0.08	0.17	0.08	0.50	<LOQ	0.07	0.07	<LOQ	0.10	0.10	0.17	1.29
139/140	0.14	0.14	0.06	0.22	<LOQ	0.07	<LOQ	<LOQ	0.07	<LOQ	0.12	0.16
141	0.51	0.47	0.56	1.23	0.29	0.31	0.87	0.76	0.51	0.98	0.92	2.25
142	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
143	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.03	<LOQ	<LOQ	<LOQ
144	0.17	0.18	0.12	0.57	<LOQ	0.16	0.14	0.19	0.14	0.37	0.30	0.27
145	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
146	0.44	0.38	0.29	1.08	0.12	0.26	0.59	0.57	0.30	0.34	0.53	2.05
147/149	3.06	3.35	3.34	8.31	2.10	2.51	5.65	3.82	2.29	6.14	6.26	7.94

Table C6: *Continued*.

148	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
150	0.06	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
152	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
153/168	2.49	2.83	2.54	6.36	2.05	2.47	4.07	3.60	2.20	3.69	4.69	13.04
154	0.07	0.05	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.11
155	1.41	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.03	0.06	<LOQ	<LOQ
156/157	<LOQ	0.46	<LOQ	0.42	<LOQ	<LOQ	<LOQ	0.12	0.06	<LOQ	0.25	2.99
158	0.35	0.41	0.16	0.56	0.25	0.24	0.33	0.38	0.26	0.28	0.35	2.40
159	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
160	<LOQ	0.10	<LOQ	0.03	<LOQ	<LOQ	<LOQ	0.05	0.02	<LOQ	<LOQ	<LOQ
161	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
162	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
164	0.14	0.19	0.10	0.43	<LOQ	0.14	0.25	0.26	0.12	0.18	0.24	0.70
165	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
167	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.98
169	<LOQ	0.05	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
170	0.32	0.60	0.20	0.49	0.55	0.30	0.43	0.91	0.16	0.40	0.41	2.45
171/173	0.14	0.43	0.20	0.25	0.24	0.17	0.23	0.25	0.12	0.22	0.25	0.63
172	0.04	0.25	<LOQ	<LOQ	0.16	0.07	0.11	0.10	0.02	0.06	<LOQ	0.46
174	0.66	0.83	0.56	0.93	0.69	0.63	0.94	1.14	0.49	0.97	1.10	1.24
175	<LOQ	0.10	<LOQ	0.04	<LOQ	<LOQ	0.05	<LOQ	0.03	0.05	0.04	0.11
176	0.06	0.09	0.07	0.14	0.05	0.06	0.06	0.04	0.02	0.25	0.12	0.09
177	0.25	0.43	0.29	0.48	0.32	0.24	0.42	0.52	0.26	0.45	0.58	1.11
178	0.10	<LOQ	<LOQ	0.14	<LOQ	<LOQ	<LOQ	0.15	0.06	0.10	0.09	0.11
179	0.42	0.48	0.53	0.66	0.19	0.34	0.47	0.41	0.20	0.92	0.90	0.25
180/193	0.97	1.40	0.92	1.30	1.47	1.10	1.32	2.14	0.75	1.43	1.98	3.66
181	<LOQ	0.15	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
182	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
183	0.38	0.49	0.42	0.63	0.42	0.48	0.69	0.64	0.35	0.81	0.81	1.25
184	1.14	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
185	0.16	0.18	0.13	0.06	<LOQ	0.05	0.04	0.07	0.02	0.12	0.06	0.07
186	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
187	0.89	1.03	1.01	1.37	0.92	1.01	1.43	1.52	0.75	1.55	1.85	1.81
188	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
189	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
190	<LOQ	0.21	<LOQ	0.10	0.07	0.05	0.07	0.21	<LOQ	<LOQ	<LOQ	0.54
191	<LOQ	0.22	<LOQ	<LOQ	<LOQ	0.09	0.05	0.09	<LOQ	<LOQ	<LOQ	0.12
192	<LOQ	0.18	<LOQ	<LOQ	<LOQ	<LOQ	0.03	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
194	0.30	0.44	<LOQ	0.28	0.37	0.27	0.26	0.53	0.70	0.35	<LOQ	0.39
195	<LOQ	0.36	0.10	<LOQ	0.18	<LOQ	0.09	0.21	0.09	0.17	<LOQ	0.14
196	0.14	0.38	0.07	0.16	0.26	0.18	0.12	0.37	0.11	0.16	0.17	0.09

Table C6: *Continued*.

197	<LOQ	0.14	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
198/199	0.44	0.84	0.27	0.39	0.51	0.43	0.43	0.89	0.39	0.42	0.50	0.44
200	<LOQ	0.15	<LOQ	0.15	<LOQ	<LOQ	0.07	0.14	<LOQ	<LOQ	<LOQ	<LOQ
201	0.11	0.23	0.06	0.09	0.08	0.11	0.09	0.08	0.06	0.10	0.15	0.07
202	0.33	0.40	0.32	0.33	0.27	0.31	0.39	0.36	0.24	0.41	0.44	0.30
203	0.27	0.34	0.21	0.33	0.45	0.28	0.26	0.57	0.15	0.33	0.48	0.07
205	<LOQ	0.44	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
206	0.31	0.47	<LOQ	0.27	0.43	0.28	0.30	0.56	0.18	0.22	0.21	<LOQ
207	<LOQ	0.41	<LOQ	0.11	0.18	0.13	0.11	0.12	0.06	0.13	0.16	<LOQ
208	0.10	0.42	<LOQ	0.10	0.14	0.11	0.09	0.17	0.11	0.10	0.10	<LOQ
209	<LOQ	1.09	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.79	<LOQ	0.72	0.75	<LOQ

Full Congeners Emissions Profiles

Table C7: Emissions Profiles (ng m^{-2} d^{-1}) and airborne concentration (pg m^{-3}) at Residence 1.

	Air (pg m^{-3})	Stove	Stove	Floor	Floor	Wall	Wall	Cabinet (Finish)	Cabinet (Finish)	Cabinet Top	Cabinet Top
Sum	2011.6	1.31	1.93	20.33	20.27	8.38	8.21	35.83	30.59	<LOQ	<LOQ
1	24.13	0.02	0.03	0.17	0.13	0.06	0.05	0.19	0.14	<LOQ	<LOQ
2	3.79	<LOQ	<LOQ	0.11	0.05	<LOQ	<LOQ	0.06	0.05	<LOQ	<LOQ
3	7.56	<LOQ	<LOQ	0.18	0.12	0.04	0.02	0.10	0.08	<LOQ	<LOQ
4	44.15	0.02	0.04	0.33	0.28	0.11	0.08	0.47	0.45	<LOQ	<LOQ
5	3.06	<LOQ	<LOQ	0.03	0.03	0.01	0.01	0.04	0.04	<LOQ	<LOQ
6	35.89	<LOQ	<LOQ	0.62	0.53	0.10	0.09	0.59	0.63	<LOQ	<LOQ
7	10.75	<LOQ	<LOQ	0.08	0.08	0.03	0.02	0.13	0.13	<LOQ	<LOQ
8	121.19	0.05	0.07	1.00	0.84	0.24	0.21	1.29	1.28	<LOQ	<LOQ
9	6.97	<LOQ	<LOQ	0.07	0.06	0.01	0.01	0.09	0.09	<LOQ	<LOQ
10	2.80	<LOQ	<LOQ	0.02	0.01	0.01	0.00	0.03	0.03	<LOQ	<LOQ
11	158.83	0.21	0.24	6.65	4.76	0.88	0.83	5.70	4.93	<LOQ	<LOQ
12/13	1.63	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
15	25.03	<LOQ	<LOQ	0.15	0.07	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
16	15.45	<LOQ	<LOQ	0.32	0.31	0.09	0.09	0.42	0.43	<LOQ	<LOQ
17	18.37	<LOQ	<LOQ	0.35	0.35	0.07	0.08	0.47	0.45	<LOQ	<LOQ
18/30	32.32	0.05	0.05	0.71	0.71	0.17	0.15	0.90	0.91	<LOQ	<LOQ
19	4.45	<LOQ	<LOQ	0.06	0.05	0.01	0.01	0.09	0.08	<LOQ	<LOQ
20/28	24.68	<LOQ	<LOQ	0.68	0.78	0.14	0.17	0.87	0.82	<LOQ	<LOQ
21/33	17.13	<LOQ	<LOQ	0.47	0.49	0.13	0.12	0.60	0.53	<LOQ	<LOQ
22	7.49	<LOQ	<LOQ	0.24	0.23	0.07	0.05	0.29	0.25	<LOQ	<LOQ
23	0.07	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
24	0.08	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
25	3.61	<LOQ	<LOQ	0.10	0.09	0.02	0.02	0.10	0.08	<LOQ	<LOQ
26/29	4.69	<LOQ	<LOQ	0.12	0.13	0.02	0.02	0.18	0.18	<LOQ	<LOQ
27	2.36	<LOQ	<LOQ	0.04	0.04	0.01	0.00	0.06	0.05	<LOQ	<LOQ
31	27.90	<LOQ	<LOQ	0.71	0.70	0.17	0.21	0.88	0.87	<LOQ	<LOQ
32	8.77	<LOQ	<LOQ	0.22	0.21	0.05	0.04	0.26	0.29	<LOQ	<LOQ
34	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
35	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
36	0.08	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
37	<LOQ	<LOQ	<LOQ	0.00	0.04	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
38	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
39	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
40/71	5.03	<LOQ	<LOQ	0.18	0.18	<LOQ	<LOQ	0.15	0.19	<LOQ	<LOQ
41	1.90	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
42	4.72	<LOQ	<LOQ	0.09	0.13	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
43	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

Table C7: *Continued.*

44/47/ 65	869.71	0.62	0.93	1.94	3.32	3.57	3.51	12.11	10.10	<LOQ	<LOQ
45	<LOQ	<LOQ	<LOQ	0.04	0.06	0.02	0.02	0.04	0.01	<LOQ	<LOQ
46	1.04	<LOQ	<LOQ	0.05	0.04	0.01	0.01	0.04	0.05	<LOQ	<LOQ
48	3.74	<LOQ	<LOQ	0.09	0.09	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
49/69	19.48	<LOQ	<LOQ	0.39	0.45	0.19	0.20	0.77	0.51	<LOQ	<LOQ
50/53	7.20	<LOQ	<LOQ	0.25	0.27	<LOQ	<LOQ	0.32	0.22	<LOQ	<LOQ
51	201.65	0.17	0.33	0.84	1.39	0.86	0.85	3.87	2.74	<LOQ	<LOQ
52	48.53	<LOQ	<LOQ	1.17	1.13	0.51	0.44	1.36	1.32	<LOQ	<LOQ
54	<LOQ	<LOQ	<LOQ	0.00	0.00	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
55	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
56	1.15	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
57	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
58	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
59/62/ 75	1.83	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
60	0.39	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
61/70/ 74/76	15.55	<LOQ	<LOQ	0.47	0.50	<LOQ	<LOQ	0.49	0.41	<LOQ	<LOQ
63	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
64	8.13	<LOQ	<LOQ	0.21	0.22	0.10	0.10	0.23	0.25	<LOQ	<LOQ
66	5.83	<LOQ	<LOQ	0.16	0.14	<LOQ	<LOQ	0.15	0.12	<LOQ	<LOQ
67	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
68	126.26	0.17	0.23	0.27	0.47	0.60	0.67	1.61	1.13	<LOQ	<LOQ
72	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
73	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
77	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
78	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
79	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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81	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
82	0.57	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
83	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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86/97/ 109/11 9	1.72	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
87/125	3.77	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
88	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
89	0.06	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
90/101 /113	10.40	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	0.33	0.24	<LOQ	<LOQ
91	2.00	<LOQ	<LOQ	0.04	0.04	0.02	0.02	0.02	0.03	<LOQ	<LOQ
92	1.73	<LOQ	<LOQ	0.05	0.05	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

Table C7: *Continued*.

93/100	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
94	0.12	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
95	16.07	<LOQ	<LOQ	0.53	0.51	<LOQ	<LOQ	0.44	0.40	<LOQ	<LOQ
96	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
98	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
99	4.73	<LOQ	<LOQ	0.10	0.10	<LOQ	<LOQ	0.09	0.06	<LOQ	<LOQ
102	0.37	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
103	0.24	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
104	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
105	0.80	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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115	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
117	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
118	3.74	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
120	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
121	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
122	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
123	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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127	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
129/138/163	1.61	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
130	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
131	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
132	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
133	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
134	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
135/151	1.10	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
136	0.88	<LOQ	<LOQ	0.01	0.02	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
137	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
139/140	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
141	0.46	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
142	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
143	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
144	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

Table C7: *Continued.*

145	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
146	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
147/149	2.61	<LOQ	<LOQ	0.05	0.07	0.05	0.05	<LOQ	<LOQ	<LOQ	<LOQ
148	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
150	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
152	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
153/168	1.85	<LOQ	<LOQ	<LOQ	<LOQ	0.04	0.04	<LOQ	<LOQ	<LOQ	<LOQ
154	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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190	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
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Table C7: *Continued*.

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207	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
208	0.25	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ
209	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ

APPENDIX D: SUPPORTING INFORMATION FOR "PASSIVE SAMPLING OF ATMOSPHERIC HYDROXYLATED POLYCHLORINATED BIPHENYLS IN CHICAGO"

Supporting Figures

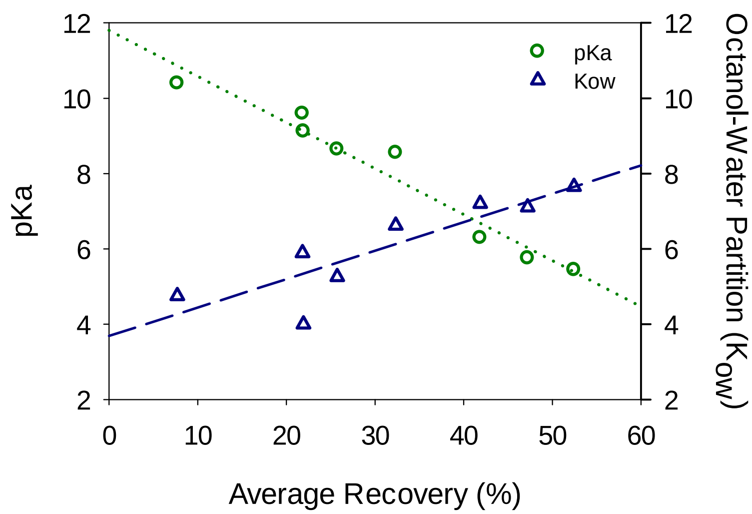

Figure D1: Correlation with of OH-PCB standards with K_{ow} and pK_a.

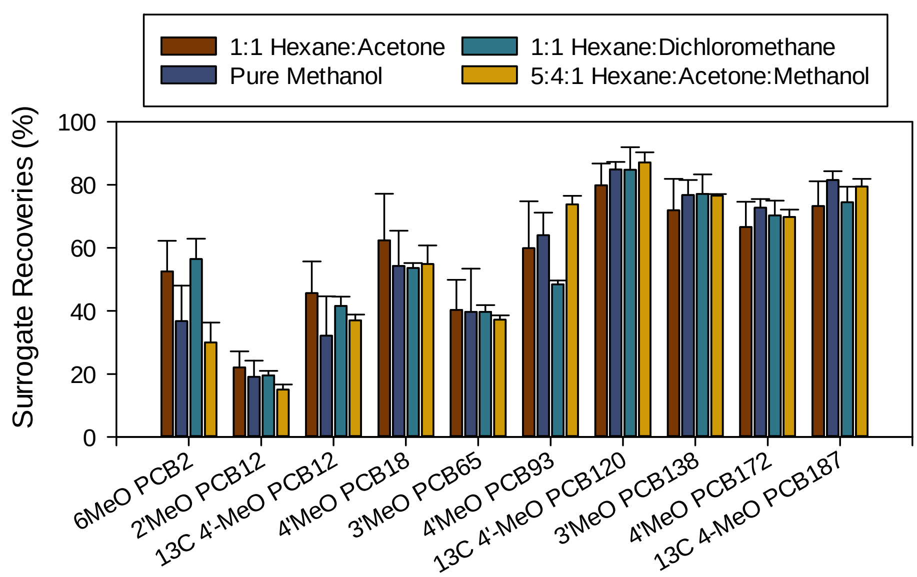

Figure D2: Recoveries of OH-PCB laboratory reference standard with various extraction solvent mixtures.

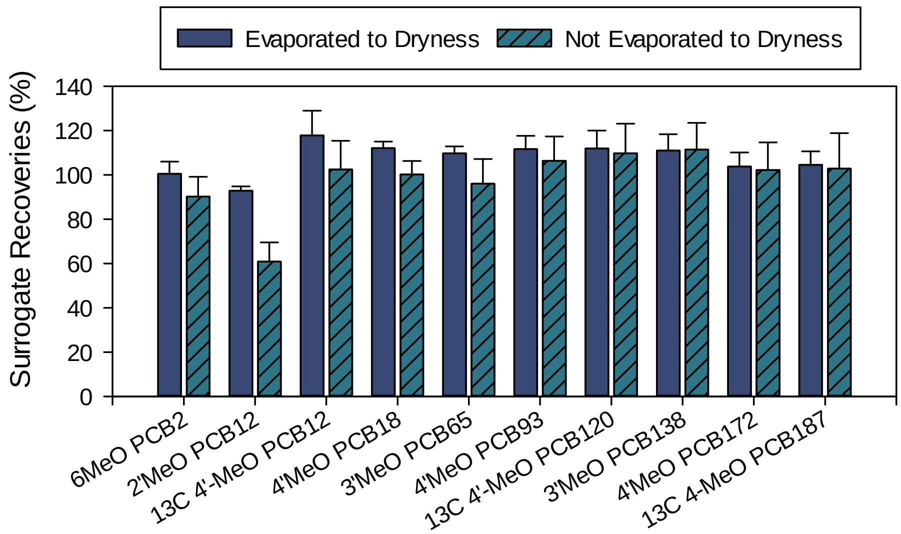

Figure D3: Recoveries of OH-PCB laboratory reference standard when samples were evaporated to dryness.

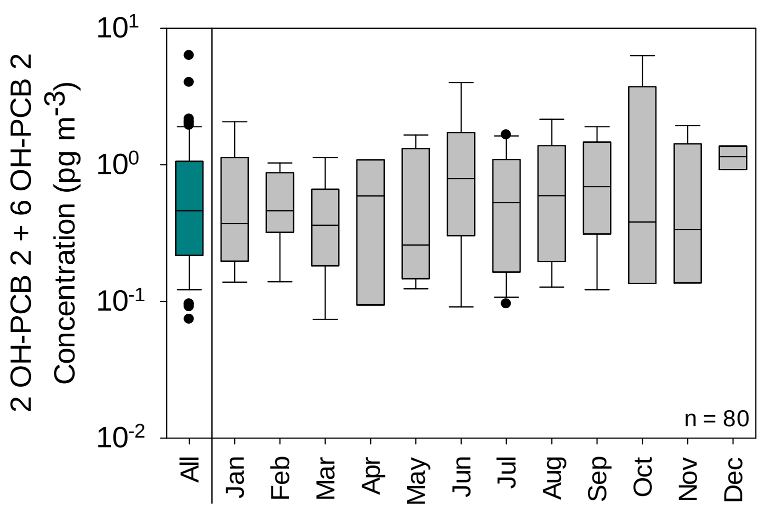

Figure D4: Temporal trend of 2OH-PCB2 + 6OH-PCB2 signal.

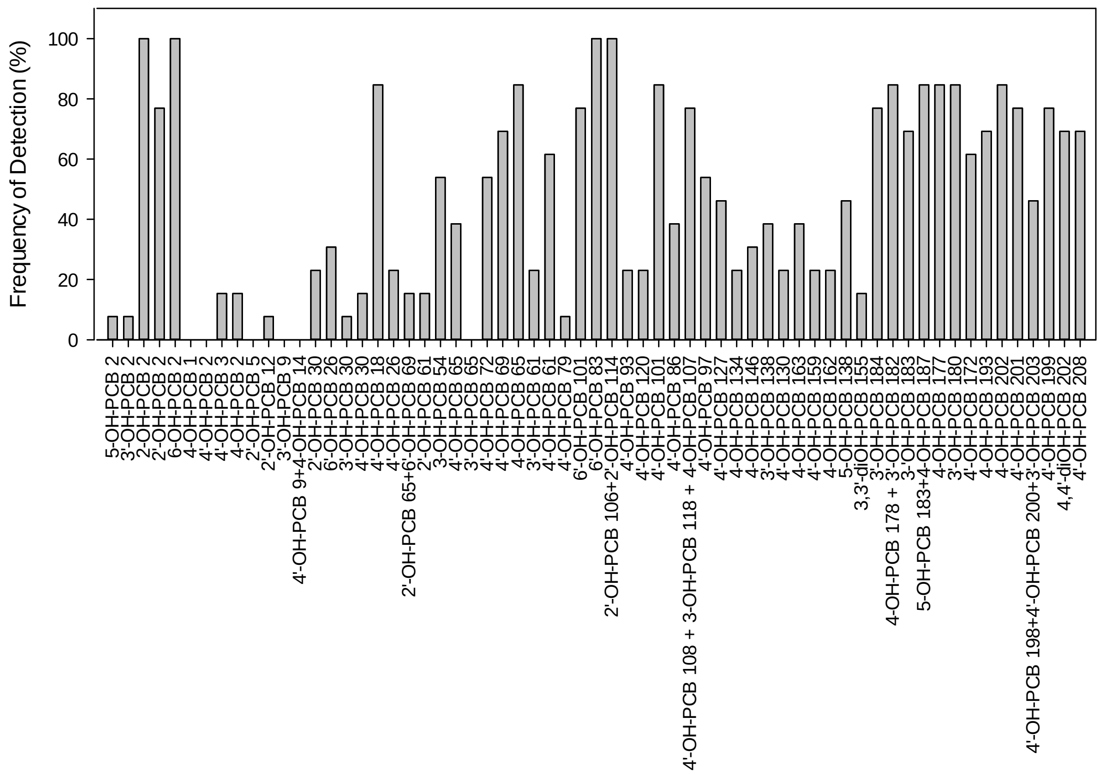

Figure D5: Frequency of detection of OH-PCB congeners collected at the Jardine Water Plant site (n=13).

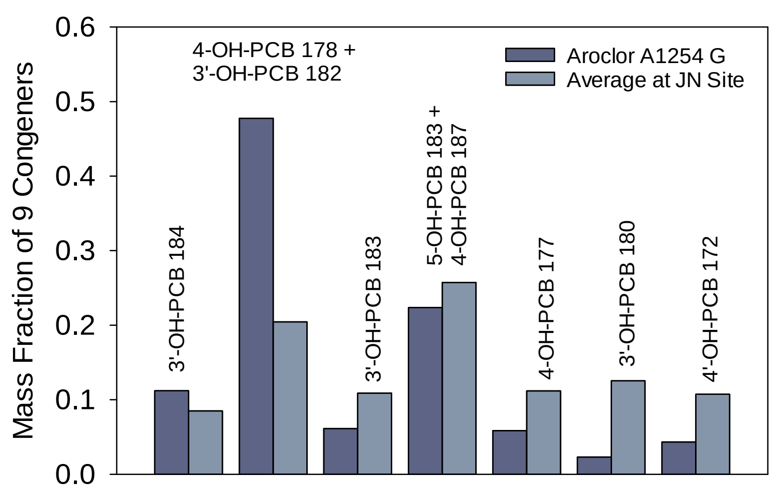

Figure D6: Relative Concentration Profile of 9 OH-PCBs congeners' detected original Aroclor mixture 1254 and at the Jardine Water Plant Sampling location.

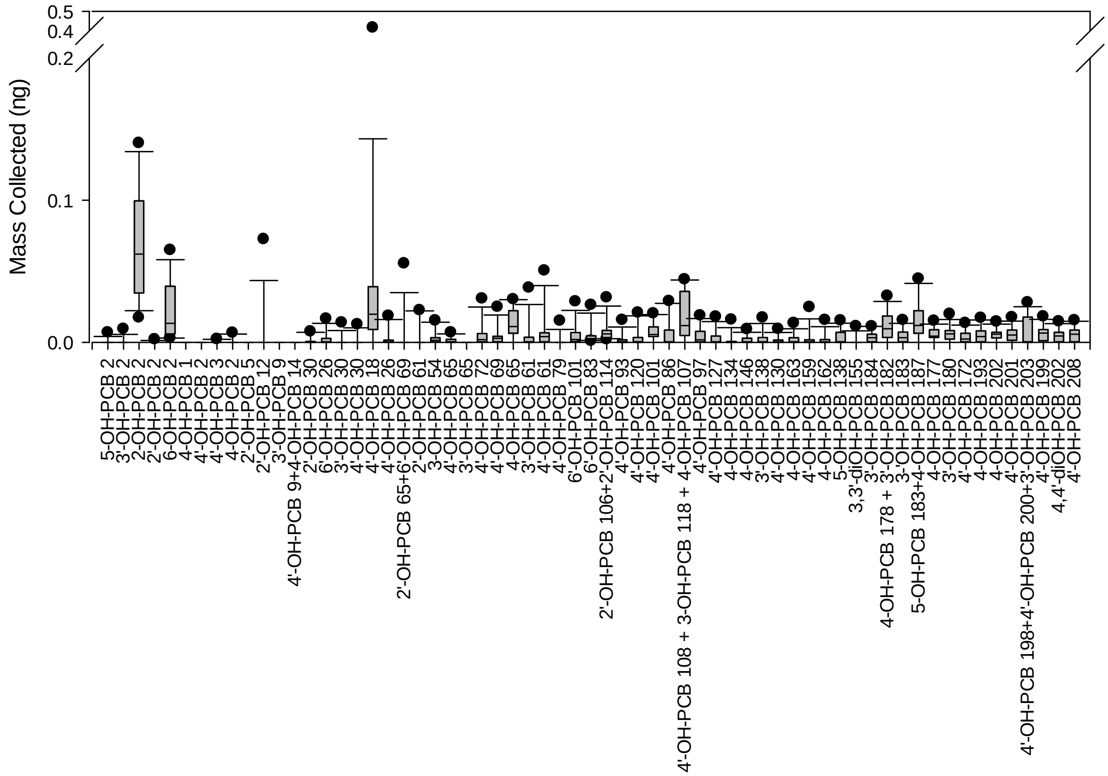

Figure D7: Box plot of mass collected for all samples collected at the Jardine Water Plant site (n=13).

Confirmation Column Chromatograms

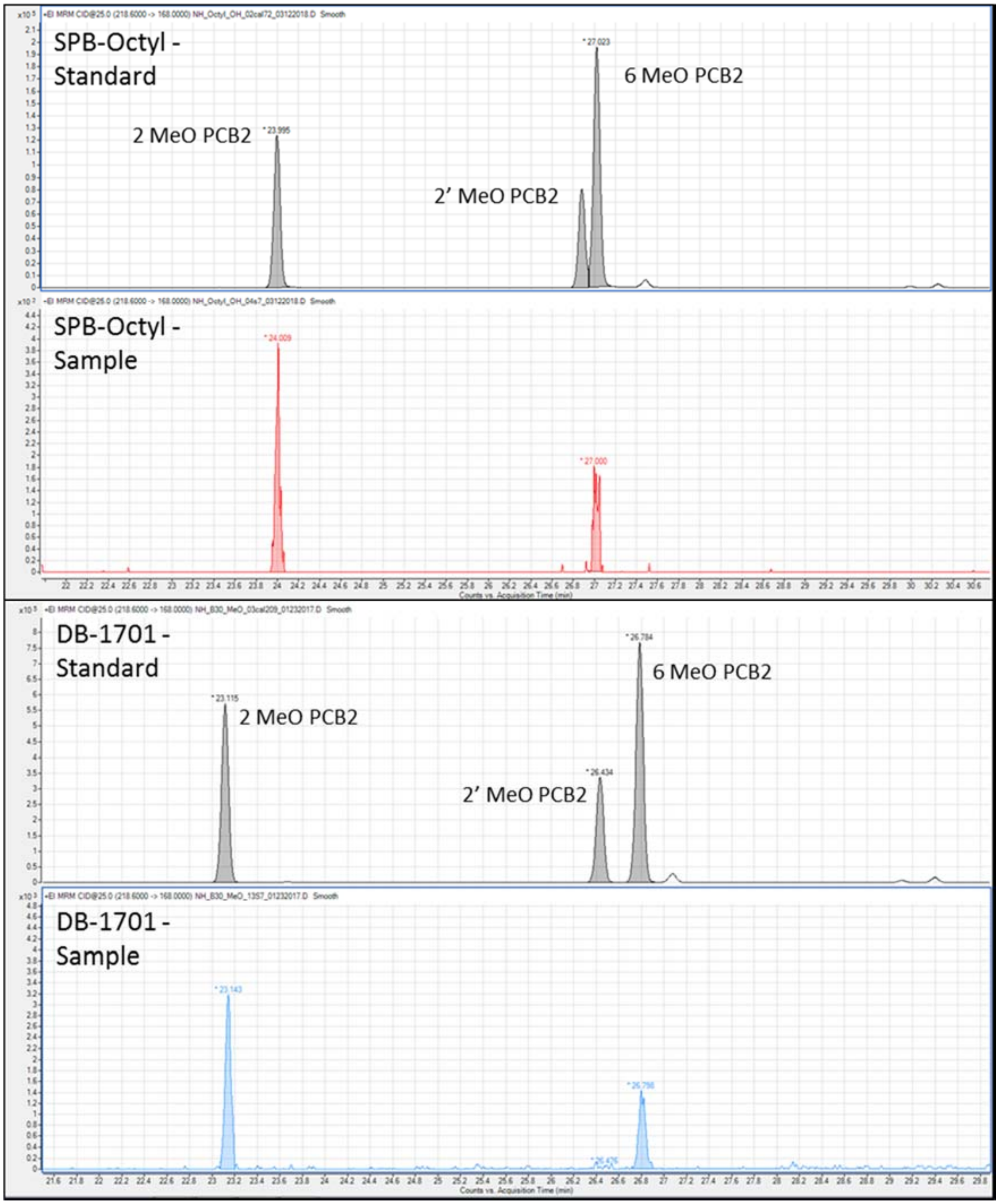

Figure D8: Chromatogram of OH-PCBs in Supelco SPB-Octyl and Agilent DB-1701 capillary columns for select mono-chlorinated hydroxylated congeners, including 2-OH-PCB-2 and 6-OH-PCB-2.

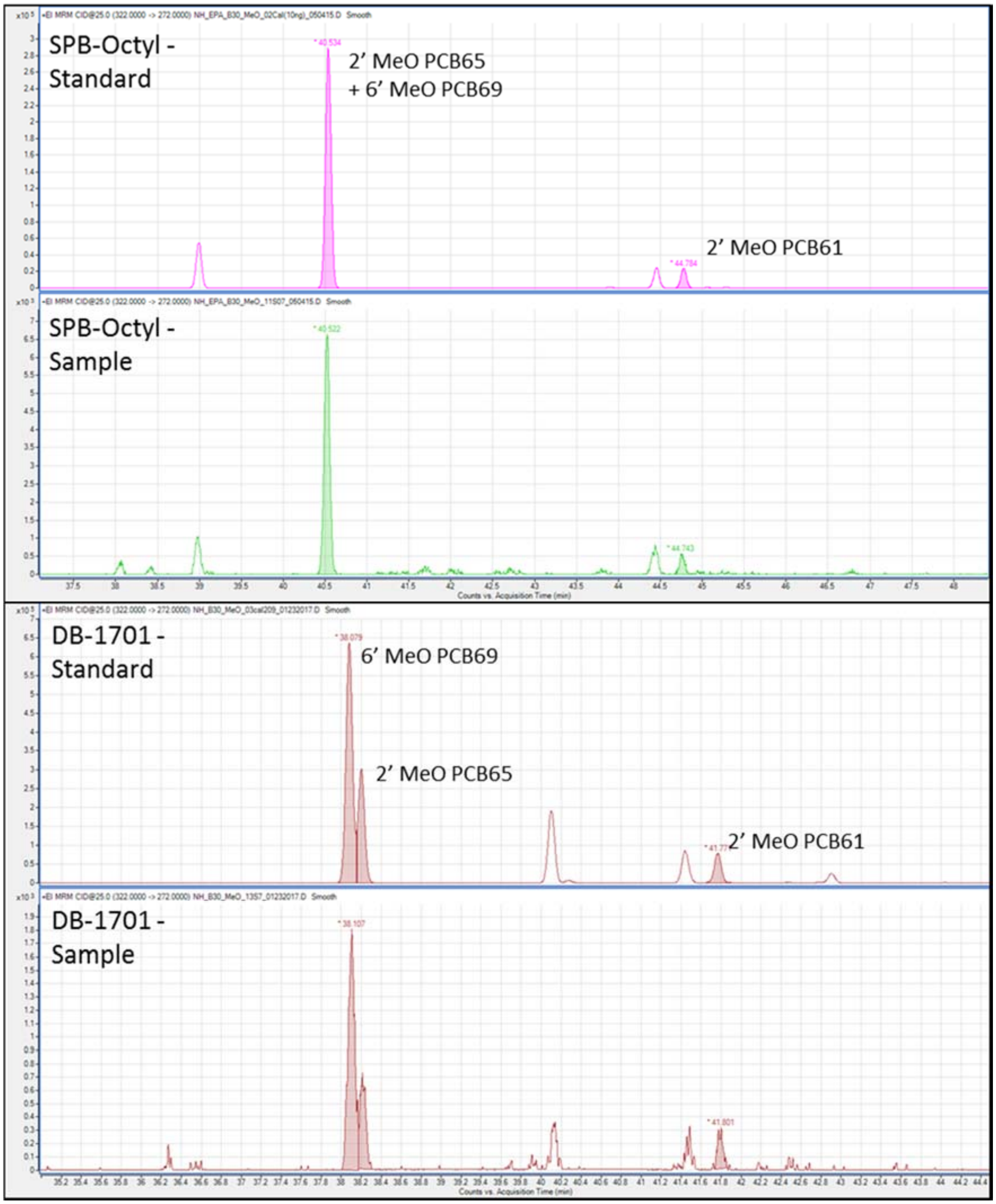

Figure D9: Chromatogram of OH-PCBs in Supelco SPB-Octyl and Agilent DB-1701 capillary columns for select tetra-chlorinated hydroxylated congeners, including 2’-OH-PCB-61.

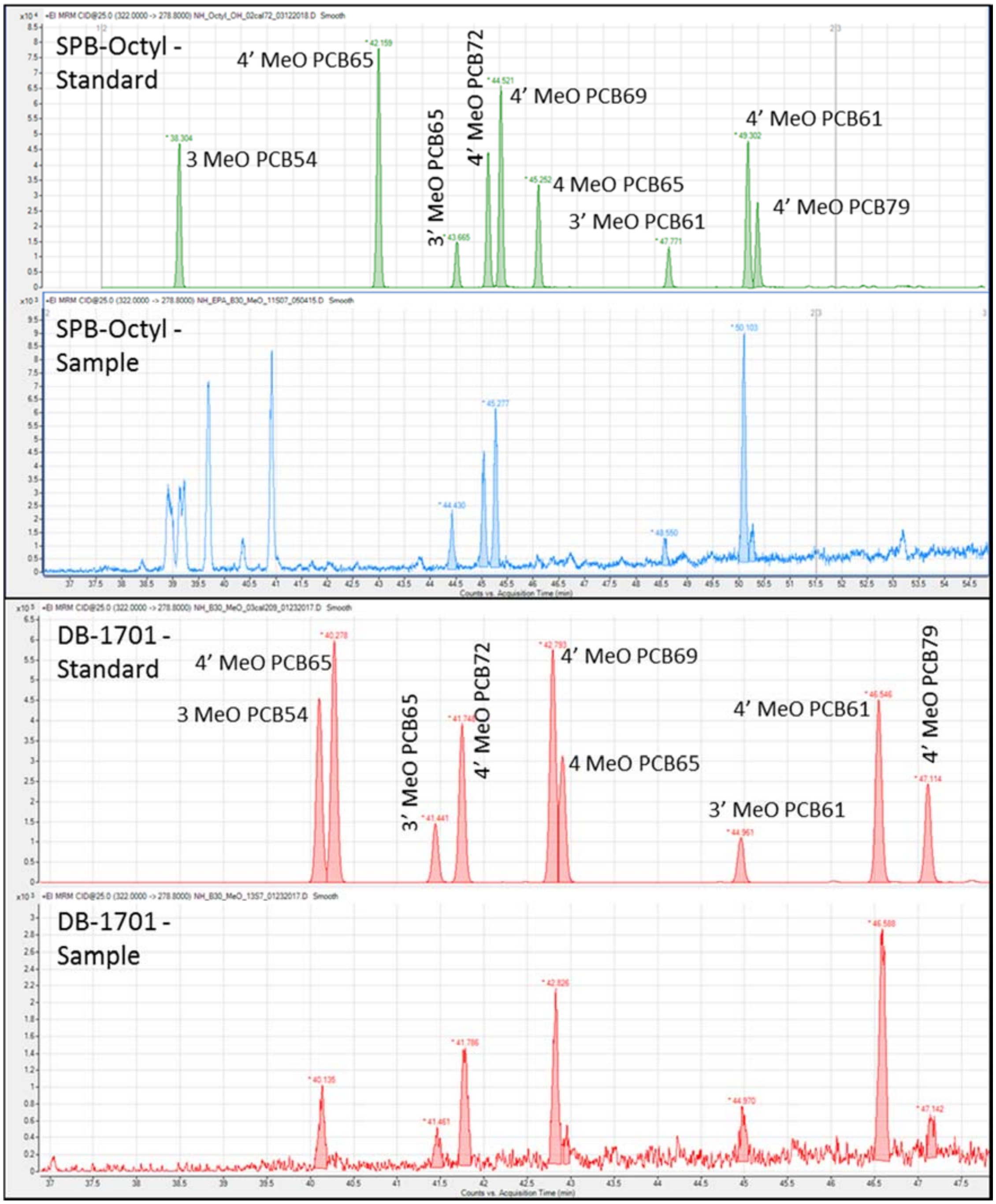

Figure D10: Chromatogram of OH-PCBs in Supelco SPB-Octyl and Agilent DB-1701 capillary columns for select tetra-chlorinated hydroxylated congeners, including 3'-OH-PCB-61 and 4'-OH-PCB-61.

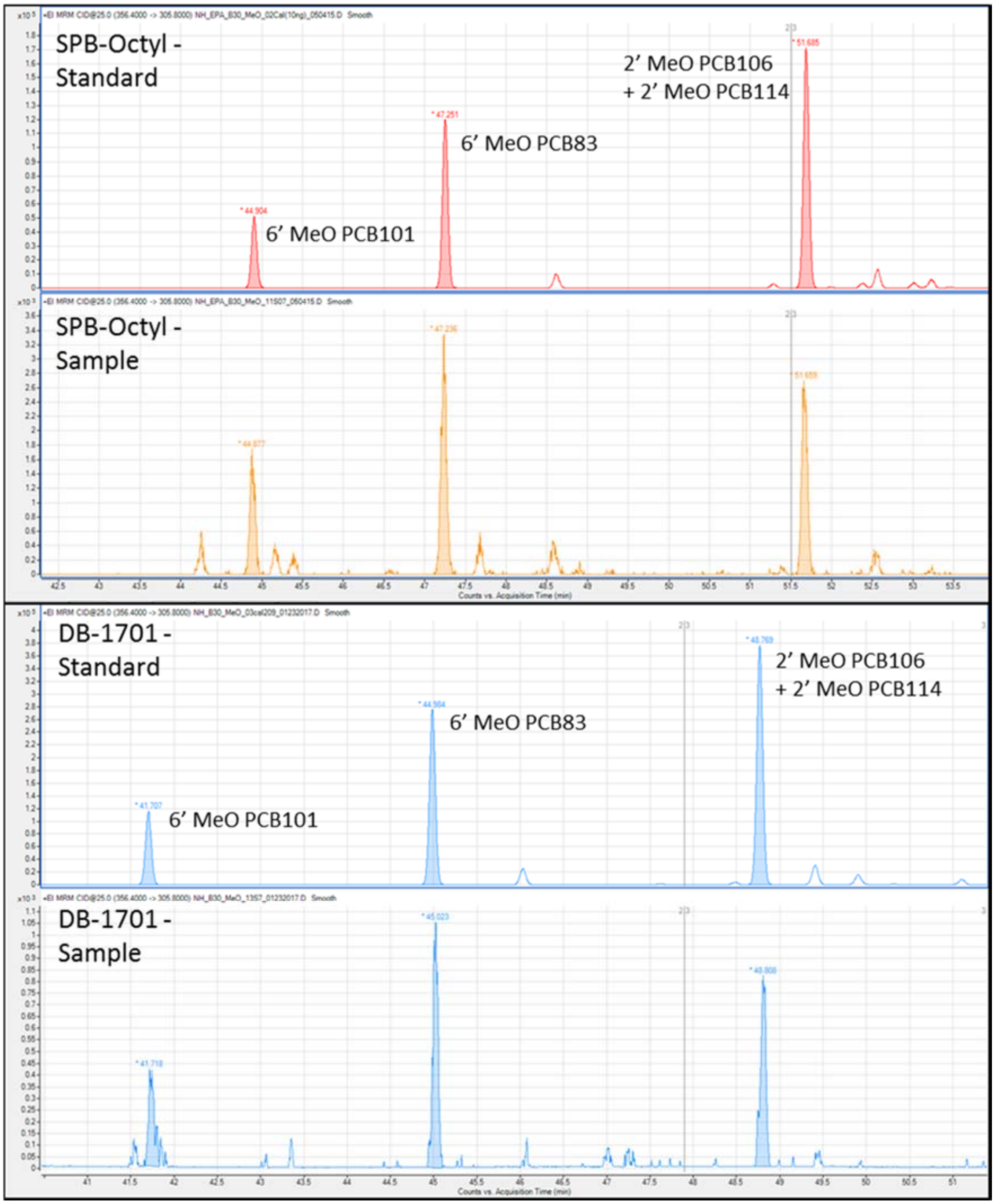

Figure D11: Chromatogram of OH-PCBs in Supelco SPB-Octyl and Agilent DB-1701 capillary columns for select penta-chlorinated hydroxylated congeners, including 6'-OH-PCB-101.

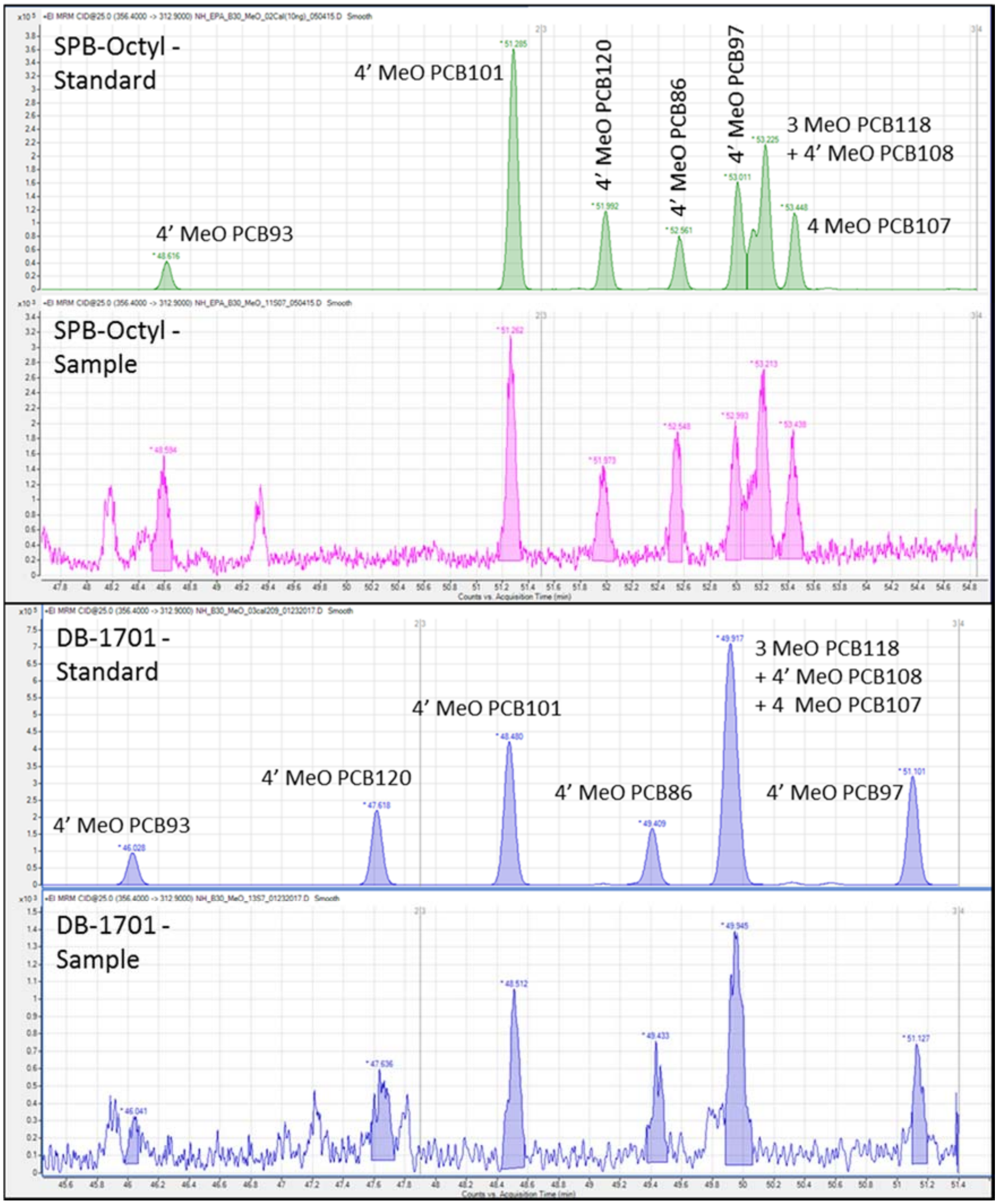

Figure D12: Chromatogram of OH-PCBs in Supelco SPB-Octyl and Agilent DB-1701 capillary columns for select penta-chlorinated hydroxylated congeners, including 4’-OH-PCB-101.

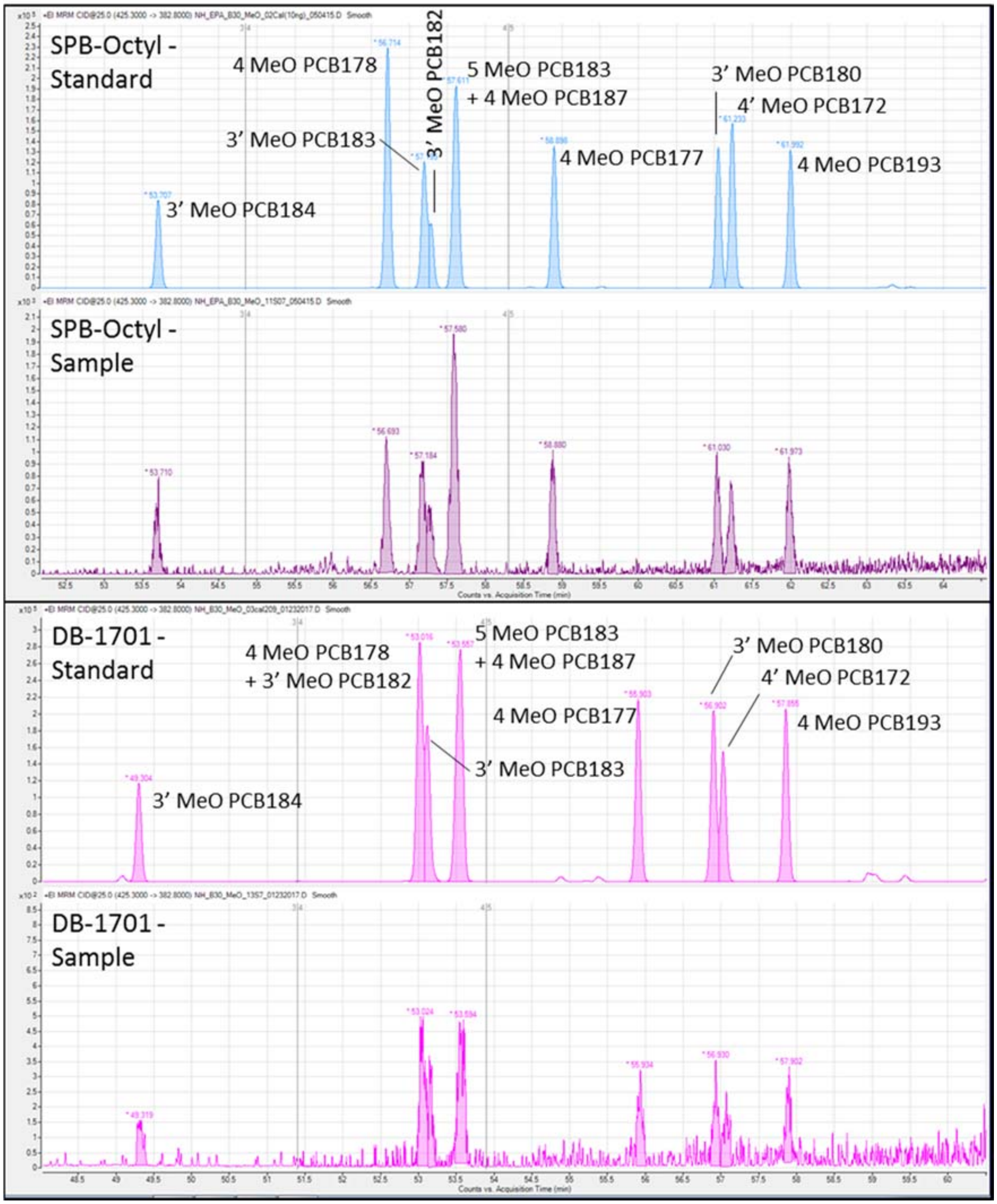

Figure D13: Chromatogram of OH-PCBs in Supelco SPB-Octyl and Agilent DB-1701 capillary columns for select hepta-chlorinated hydroxylated congeners.

Physical-Chemical Properties for all OH-PCB Congeners

Table D1: Summary of modelled physical chemical properties (K_{ow} & Koa) for all 837 mono-hydroxylated PCB congeners.

		Octanol-Water (K_{ow})			*Octanol-Air (K_{oa})*		
ID	Compound	EPI Suite	ABSOLVcc	ABSOLVxx	EPI Suite	ABSOLVcg	ABSOLVxx
1	3-OH-PCB 1	3.92	3.57	3.81	9.81	9.19	9.06
2	4-OH-PCB 1	3.92	3.6	3.88	9.81	9.09	8.95
3	5-OH-PCB 1	3.92	3.6	3.88	9.81	9.09	8.95
4	6-OH-PCB 1	3.92	3.28	3.77	9.81	8.78	8.64
5	2'-OH-PCB 1	3.92	3.57	3.96	9.81	8.73	8.59
6	3'-OH-PCB 1	3.92	3.72	3.98	9.81	9.02	8.88
7	4'-OH-PCB 1	3.92	3.79	3.98	9.81	9.83	9.69
8	2-OH-PCB 2	3.92	3.57	3.81	9.81	9.19	9.06
9	4-OH-PCB 2	3.92	4.64	4.58	9.81	9.26	9.13
10	5-OH-PCB 2	3.92	3.81	3.99	9.81	9.2	9.06
11	6-OH-PCB 2	3.92	3.6	3.88	9.81	9.09	8.95
12	2'-OH-PCB 2	3.92	3.72	3.99	9.81	9.02	8.88
13	3'-OH-PCB 2	3.92	3.87	4.01	9.81	9.31	9.17
14	4'-OH-PCB 2	3.92	3.94	4.01	9.81	10.12	9.98
15	2-OH-PCB 3	3.92	3.6	3.88	9.81	9.09	8.95
16	3-OH-PCB 3	3.92	3.92	3.92	9.81	9.58	9.44
17	2'-OH-PCB 3	3.92	3.74	3.98	9.81	9.06	8.92
18	3'-OH-PCB 3	3.92	3.89	3.99	9.81	9.35	9.21
19	4'-OH-PCB 3	3.92	3.96	3.99	9.81	10.16	10.02
20	3-OH-PCB 4	4.57	4.05	4.4	10.59	9.54	9.39
21	4-OH-PCB 4	4.57	4.08	4.47	10.59	9.44	9.29
22	5-OH-PCB 4	4.57	4.08	4.47	10.59	9.44	9.29
23	6-OH-PCB 4	4.57	3.77	4.36	10.59	9.12	8.98
24	4-OH-PCB 5	4.57	4.12	4.34	10.59	9.84	9.69
25	5-OH-PCB 5	4.57	4.1	4.41	10.59	9.63	9.48
26	6-OH-PCB 5	4.57	3.8	4.3	10.59	9.35	9.21
27	2'-OH-PCB 5	4.57	4.05	4.4	10.59	9.54	9.39
28	3'-OH-PCB 5	4.57	4.2	4.41	10.59	9.83	9.68
29	4'-OH-PCB 5	4.57	4.27	4.42	10.59	10.64	10.49
30	3-OH-PCB 6	4.57	4.2	4.43	10.59	9.83	9.68
31	4-OH-PCB 6	4.57	4.23	4.5	10.59	9.73	9.58
32	5-OH-PCB 6	4.57	4.23	4.5	10.59	9.73	9.58
33	6-OH-PCB 6	4.57	3.92	4.39	10.59	9.41	9.27
34	2'-OH-PCB 6	4.57	4.05	4.4	10.59	9.54	9.39
35	4'-OH-PCB 6	4.57	5.13	5.16	10.59	9.61	9.46
36	5'-OH-PCB 6	4.57	4.3	4.58	10.59	9.54	9.4
37	6'-OH-PCB 6	4.57	4.08	4.47	10.59	9.44	9.29

Table D1: *Continued.*

38	3-OH-PCB 7	4.57	4.12	4.34	10.59	9.84	9.69
39	5-OH-PCB 7	4.57	4.13	4.41	10.59	9.69	9.54
40	6-OH-PCB 7	4.57	3.86	4.38	10.59	9.3	9.16
41	2'-OH-PCB 7	4.57	4.08	4.47	10.59	9.44	9.29
42	3'-OH-PCB 7	4.57	4.23	4.49	10.59	9.73	9.58
43	4'-OH-PCB 7	4.57	4.3	4.49	10.59	10.54	10.39
44	3-OH-PCB 8	4.57	4.22	4.41	10.59	9.87	9.72
45	4-OH-PCB 8	4.57	4.25	4.49	10.59	9.77	9.62
46	5-OH-PCB 8	4.57	4.25	4.49	10.59	9.77	9.62
47	6-OH-PCB 8	4.57	3.94	4.38	10.59	9.45	9.31
48	2'-OH-PCB 8	4.57	4.08	4.47	10.59	9.44	9.29
49	3'-OH-PCB 8	4.57	4.4	4.51	10.59	9.92	9.78
50	3-OH-PCB 9	4.57	4.18	4.41	10.59	9.79	9.64
51	4-OH-PCB 9	4.57	4.18	4.41	10.59	9.79	9.64
52	6-OH-PCB 9	4.57	3.89	4.3	10.59	9.53	9.38
53	2'-OH-PCB 9	4.57	4.08	4.47	10.59	9.44	9.29
54	3'-OH-PCB 9	4.57	4.23	4.49	10.59	9.73	9.58
55	4'-OH-PCB 9	4.57	4.3	4.49	10.59	10.54	10.39
56	3-OH-PCB 10	4.57	3.8	4.3	10.59	9.35	9.21
57	4-OH-PCB 10	4.57	3.86	4.38	10.59	9.3	9.16
58	2'-OH-PCB 10	4.57	3.96	4.46	10.59	9.19	9.04
59	3'-OH-PCB 10	4.57	4.11	4.47	10.59	9.48	9.33
60	4'-OH-PCB 10	4.57	4.18	4.48	10.59	10.29	10.14
61	2-OH-PCB 11	4.57	4.2	4.43	10.59	9.83	9.68
62	4-OH-PCB 11	4.57	5.27	5.19	10.59	9.9	9.75
63	5-OH-PCB 11	4.57	4.45	4.61	10.59	9.83	9.69
64	6-OH-PCB 11	4.57	4.23	4.5	10.59	9.73	9.58
65	2-OH-PCB 12	4.57	4.12	4.34	10.59	9.84	9.69
66	5-OH-PCB 12	4.57	4.5	4.45	10.59	10.28	10.13
67	6-OH-PCB 12	4.57	4.13	4.41	10.59	9.69	9.54
68	2'-OH-PCB 12	4.57	4.4	4.52	10.59	9.92	9.78
69	3'-OH-PCB 12	4.57	4.55	4.53	10.59	10.21	10.07
70	4'-OH-PCB 12	4.57	4.62	4.54	10.59	11.02	10.88
71	2-OH-PCB 13	4.57	4.22	4.41	10.59	9.87	9.72
72	4-OH-PCB 13	4.57	5.29	5.18	10.59	9.94	9.79
73	5-OH-PCB 13	4.57	4.47	4.59	10.59	9.87	9.73
74	6-OH-PCB 13	4.57	4.25	4.49	10.59	9.77	9.62
75	2'-OH-PCB 13	4.57	4.23	4.5	10.59	9.73	9.58
76	3'-OH-PCB 13	4.57	4.55	4.54	10.59	10.21	10.07
77	2-OH-PCB 14	4.57	4.1	4.41	10.59	9.63	9.48
78	4-OH-PCB 14	4.57	4.5	4.45	10.59	10.28	10.13

Table D1: *Continued.*

79	2'-OH-PCB 14	4.57	4.3	4.58	10.59	9.54	9.4
80	3'-OH-PCB 14	4.57	4.45	4.59	10.59	9.83	9.69
81	4'-OH-PCB 14	4.57	4.52	4.6	10.59	10.64	10.5
82	2-OH-PCB 15	4.57	4.25	4.49	10.59	9.77	9.62
83	3-OH-PCB 15	4.57	4.57	4.52	10.59	10.25	10.11
84	4-OH-PCB 16	5.21	4.61	4.93	11.36	10.19	10.03
85	5-OH-PCB 16	5.21	4.59	5	11.36	9.97	9.82
86	6-OH-PCB 16	5.21	4.29	4.89	11.36	9.7	9.54
87	3'-OH-PCB 16	5.21	4.53	4.83	11.36	10.35	10.19
88	4'-OH-PCB 16	5.21	4.56	4.91	11.36	10.25	10.09
89	5'-OH-PCB 16	5.21	4.56	4.91	11.36	10.25	10.09
90	6'-OH-PCB 16	5.21	4.23	4.79	11.36	9.94	9.79
91	3-OH-PCB 17	5.21	4.61	4.93	11.36	10.19	10.03
92	5-OH-PCB 17	5.21	4.62	5	11.36	10.04	9.88
93	6-OH-PCB 17	5.21	4.35	4.96	11.36	9.65	9.49
94	3'-OH-PCB 17	5.21	4.56	4.91	11.36	10.25	10.09
95	4'-OH-PCB 17	5.21	4.6	4.98	11.36	10.15	9.99
96	5'-OH-PCB 17	5.21	4.6	4.98	11.36	10.15	9.99
97	6'-OH-PCB 17	5.21	4.27	4.86	11.36	9.84	9.68
98	3-OH-PCB 18	5.21	4.67	5	11.36	10.14	9.98
99	4-OH-PCB 18	5.21	4.67	5	11.36	10.14	9.98
100	6-OH-PCB 18	5.21	4.37	4.89	11.36	9.87	9.72
101	3'-OH-PCB 18	5.21	4.56	4.91	11.36	10.25	10.09
102	4'-OH-PCB 18	5.21	4.6	4.98	11.36	10.15	9.99
103	5'-OH-PCB 18	5.21	4.6	4.98	11.36	10.15	9.99
104	6'-OH-PCB 18	5.21	4.27	4.86	11.36	9.84	9.68
105	3-OH-PCB 19	5.21	4.29	4.89	11.36	9.7	9.54
106	4-OH-PCB 19	5.21	4.35	4.96	11.36	9.65	9.49
107	3'-OH-PCB 19	5.21	4.44	4.89	11.36	10	9.84
108	4'-OH-PCB 19	5.21	4.47	4.96	11.36	9.9	9.74
109	5'-OH-PCB 19	5.21	4.47	4.96	11.36	9.9	9.74
110	6'-OH-PCB 19	5.21	4.16	4.85	11.36	9.59	9.43
111	4-OH-PCB 20	5.21	4.76	4.96	11.36	10.48	10.32
112	5-OH-PCB 20	5.21	4.73	5.03	11.36	10.26	10.11
113	6-OH-PCB 20	5.21	4.44	4.92	11.36	9.99	9.83
114	2'-OH-PCB 20	5.21	4.53	4.83	11.36	10.35	10.19
115	4'-OH-PCB 20	5.21	5.59	5.59	11.36	10.43	10.27
116	5'-OH-PCB 20	5.21	4.78	5.02	11.36	10.35	10.2
117	6'-OH-PCB 20	5.21	4.56	4.91	11.36	10.25	10.09
118	5-OH-PCB 21	5.21	4.66	4.87	11.36	10.46	10.3
119	6-OH-PCB 21	5.21	4.39	4.83	11.36	10.05	9.89

Table D1: *Continued.*

120	2'-OH-PCB 21	5.21	4.61	4.93	11.36	10.19	10.03
121	3'-OH-PCB 21	5.21	4.76	4.94	11.36	10.48	10.32
122	4'-OH-PCB 21	5.21	4.83	4.95	11.36	11.29	11.13
123	4-OH-PCB 22	5.21	4.77	4.94	11.36	10.52	10.36
124	5-OH-PCB 22	5.21	4.75	5.02	11.36	10.3	10.15
125	6-OH-PCB 22	5.21	4.46	4.91	11.36	10.03	9.87
126	2'-OH-PCB 22	5.21	4.56	4.91	11.36	10.25	10.09
127	3'-OH-PCB 22	5.21	4.88	4.94	11.36	10.73	10.58
128	4-OH-PCB 23	5.21	4.66	4.87	11.36	10.46	10.3
129	6-OH-PCB 23	5.21	4.39	4.83	11.36	10.05	9.89
130	2'-OH-PCB 23	5.21	4.59	5	11.36	9.97	9.82
131	3'-OH-PCB 23	5.21	4.73	5.02	11.36	10.26	10.11
132	4'-OH-PCB 23	5.21	4.8	5.02	11.36	11.07	10.92
133	4-OH-PCB 24	5.21	4.39	4.83	11.36	10.05	9.89
134	5-OH-PCB 24	5.21	4.39	4.83	11.36	10.05	9.89
135	2'-OH-PCB 24	5.21	4.37	4.89	11.36	9.87	9.72
136	3'-OH-PCB 24	5.21	4.52	4.91	11.36	10.16	10.01
137	4'-OH-PCB 24	5.21	4.59	4.91	11.36	10.97	10.82
138	3-OH-PCB 25	5.21	4.76	4.96	11.36	10.48	10.32
139	5-OH-PCB 25	5.21	4.76	5.03	11.36	10.32	10.17
140	6-OH-PCB 25	5.21	4.5	4.99	11.36	9.94	9.78
141	2'-OH-PCB 25	5.21	4.56	4.91	11.36	10.25	10.09
142	4'-OH-PCB 25	5.21	5.62	5.66	11.36	10.32	10.17
143	5'-OH-PCB 25	5.21	4.81	5.08	11.36	10.25	10.1
144	6'-OH-PCB 25	5.21	4.6	4.98	11.36	10.15	9.99
145	3-OH-PCB 26	5.21	4.81	5.03	11.36	10.43	10.27
146	4-OH-PCB 26	5.21	4.81	5.03	11.36	10.43	10.27
147	6-OH-PCB 26	5.21	4.52	4.92	11.36	10.16	10.01
148	2'-OH-PCB 26	5.21	4.56	4.91	11.36	10.25	10.09
149	4'-OH-PCB 26	5.21	5.62	5.66	11.36	10.32	10.17
150	5'-OH-PCB 26	5.21	4.81	5.08	11.36	10.25	10.1
151	6'-OH-PCB 26	5.21	4.6	4.98	11.36	10.15	9.99
152	3-OH-PCB 27	5.21	4.44	4.92	11.36	9.99	9.83
153	4-OH-PCB 27	5.21	4.5	4.99	11.36	9.94	9.78
154	2'-OH-PCB 27	5.21	4.44	4.89	11.36	10	9.84
155	4'-OH-PCB 27	5.21	5.51	5.66	11.36	10.07	9.91
156	5'-OH-PCB 27	5.21	4.69	5.07	11.36	10.01	9.85
157	6'-OH-PCB 27	5.21	4.47	4.96	11.36	9.9	9.74
158	3-OH-PCB 28	5.21	4.77	4.94	11.36	10.52	10.36
159	5-OH-PCB 28	5.21	4.78	5.02	11.36	10.37	10.21
160	6-OH-PCB 28	5.21	4.52	4.98	11.36	9.98	9.82

Table D1*: Continued.*

161	2'-OH-PCB 28	5.21	4.6	4.98	11.36	10.15	9.99
162	3'-OH-PCB 28	5.21	4.91	5.02	11.36	10.63	10.48
163	3-OH-PCB 29	5.21	4.7	4.87	11.36	10.54	10.38
164	6-OH-PCB 29	5.21	4.39	4.83	11.36	10.05	9.89
165	2'-OH-PCB 29	5.21	4.62	5	11.36	10.04	9.88
166	3'-OH-PCB 29	5.21	4.76	5.02	11.36	10.32	10.17
167	4'-OH-PCB 29	5.21	4.84	5.02	11.36	11.14	10.98
168	3-OH-PCB 30	5.21	4.39	4.83	11.36	10.05	9.89
169	2'-OH-PCB 30	5.21	4.35	4.96	11.36	9.65	9.49
170	3'-OH-PCB 30	5.21	4.5	4.98	11.36	9.94	9.78
171	4'-OH-PCB 30	5.21	4.57	4.98	11.36	10.75	10.59
172	3-OH-PCB 31	5.21	4.83	5.02	11.36	10.47	10.31
173	4-OH-PCB 31	5.21	4.83	5.02	11.36	10.47	10.31
174	6-OH-PCB 31	5.21	4.54	4.91	11.36	10.2	10.05
175	2'-OH-PCB 31	5.21	4.6	4.98	11.36	10.15	9.99
176	3'-OH-PCB 31	5.21	4.91	5.02	11.36	10.63	10.48
177	3-OH-PCB 32	5.21	4.46	4.91	11.36	10.03	9.87
178	4-OH-PCB 32	5.21	4.52	4.98	11.36	9.98	9.82
179	2'-OH-PCB 32	5.21	4.47	4.96	11.36	9.9	9.74
180	3'-OH-PCB 32	5.21	4.79	5	11.36	10.39	10.23
181	3-OH-PCB 33	5.21	4.88	4.95	11.36	10.73	10.58
182	4-OH-PCB 33	5.21	4.91	5.03	11.36	10.63	10.48
183	5-OH-PCB 33	5.21	4.91	5.03	11.36	10.63	10.48
184	6-OH-PCB 33	5.21	4.6	4.92	11.36	10.32	10.16
185	2'-OH-PCB 33	5.21	4.61	4.93	11.36	10.19	10.03
186	5'-OH-PCB 33	5.21	4.98	5.04	11.36	10.62	10.47
187	6'-OH-PCB 33	5.21	4.62	5	11.36	10.04	9.88
188	3-OH-PCB 34	5.21	4.78	5.02	11.36	10.35	10.2
189	4-OH-PCB 34	5.21	4.81	5.08	11.36	10.25	10.1
190	5-OH-PCB 34	5.21	4.81	5.08	11.36	10.25	10.1
191	6-OH-PCB 34	5.21	4.5	4.98	11.36	9.94	9.78
192	2'-OH-PCB 34	5.21	4.59	5	11.36	9.97	9.82
193	4'-OH-PCB 34	5.21	4.98	5.04	11.36	10.62	10.47
194	2-OH-PCB 35	5.21	4.76	4.96	11.36	10.48	10.32
195	5-OH-PCB 35	5.21	5.13	5.07	11.36	10.91	10.75
196	6-OH-PCB 35	5.21	4.76	5.03	11.36	10.32	10.17
197	2'-OH-PCB 35	5.21	4.88	4.95	11.36	10.73	10.58
198	4'-OH-PCB 35	5.21	5.96	5.72	11.36	10.8	10.65
199	5'-OH-PCB 35	5.21	5.13	5.13	11.36	10.74	10.58
200	6'-OH-PCB 35	5.21	4.91	5.03	11.36	10.63	10.48
201	2-OH-PCB 36	5.21	4.73	5.03	11.36	10.26	10.11

Table D1*: Continued.*

202	4-OH-PCB 36	5.21	5.13	5.07	11.36	10.91	10.75
203	2'-OH-PCB 36	5.21	4.78	5.02	11.36	10.35	10.2
204	4'-OH-PCB 36	5.21	5.85	5.78	11.36	10.42	10.27
205	5'-OH-PCB 36	5.21	5.03	5.19	11.36	10.36	10.2
206	6'-OH-PCB 36	5.21	4.81	5.08	11.36	10.25	10.1
207	2-OH-PCB 37	5.21	4.77	4.94	11.36	10.52	10.36
208	5-OH-PCB 37	5.21	5.15	5.05	11.36	10.95	10.8
209	6-OH-PCB 37	5.21	4.78	5.02	11.36	10.37	10.21
210	2'-OH-PCB 37	5.21	4.91	5.03	11.36	10.63	10.48
211	3'-OH-PCB 37	5.21	5.23	5.06	11.36	11.12	10.96
212	2-OH-PCB 38	5.21	4.66	4.87	11.36	10.46	10.3
213	2'-OH-PCB 38	5.21	4.89	5.04	11.36	10.44	10.28
214	3'-OH-PCB 38	5.21	5.04	5.05	11.36	10.73	10.57
215	4'-OH-PCB 38	5.21	5.11	5.05	11.36	11.54	11.38
216	2-OH-PCB 39	5.21	4.75	5.02	11.36	10.3	10.15
217	4-OH-PCB 39	5.21	5.15	5.05	11.36	10.95	10.8
218	2'-OH-PCB 39	5.21	4.81	5.08	11.36	10.25	10.1
219	3'-OH-PCB 39	5.21	5.13	5.12	11.36	10.74	10.58
220	4-OH-PCB 40	5.85	5.12	5.4	12.13	10.98	10.81
221	5-OH-PCB 40	5.85	5.07	5.44	12.13	10.79	10.62
222	6-OH-PCB 40	5.85	4.75	5.32	12.13	10.52	10.35
223	5-OH-PCB 41	5.85	5.18	5.49	12.13	10.79	10.62
224	6-OH-PCB 41	5.85	4.87	5.42	12.13	10.4	10.23
225	3'-OH-PCB 41	5.85	5.12	5.4	12.13	10.98	10.81
226	4'-OH-PCB 41	5.85	5.12	5.44	12.13	10.9	10.73
227	5'-OH-PCB 41	5.85	5.12	5.44	12.13	10.9	10.73
228	6'-OH-PCB 41	5.85	4.79	5.32	12.13	10.59	10.42
229	4-OH-PCB 42	5.85	5.12	5.44	12.13	10.9	10.73
230	5-OH-PCB 42	5.85	5.1	5.51	12.13	10.68	10.52
231	6-OH-PCB 42	5.85	4.79	5.39	12.13	10.41	10.25
232	3'-OH-PCB 42	5.85	5.12	5.4	12.13	10.98	10.81
233	5'-OH-PCB 42	5.85	5.1	5.44	12.13	10.85	10.68
234	6'-OH-PCB 42	5.85	4.81	5.39	12.13	10.47	10.3
235	4-OH-PCB 43	5.85	5.18	5.49	12.13	10.79	10.62
236	6-OH-PCB 43	5.85	4.87	5.42	12.13	10.4	10.23
237	3'-OH-PCB 43	5.85	5.07	5.44	12.13	10.79	10.62
238	4'-OH-PCB 43	5.85	5.1	5.51	12.13	10.68	10.52
239	5'-OH-PCB 43	5.85	5.1	5.51	12.13	10.68	10.52
240	6'-OH-PCB 43	5.85	4.77	5.39	12.13	10.38	10.21
241	4-OH-PCB 44	5.85	5.12	5.44	12.13	10.9	10.73
242	5-OH-PCB 44	5.85	5.1	5.51	12.13	10.68	10.52

Table D1: *Continued.*

243	6-OH-PCB 44	5.85	4.79	5.39	12.13	10.41	10.25
244	3'-OH-PCB 44	5.85	5.15	5.44	12.13	10.95	10.78
245	4'-OH-PCB 44	5.85	5.15	5.44	12.13	10.95	10.78
246	6'-OH-PCB 44	5.85	4.84	5.32	12.13	10.69	10.52
247	4-OH-PCB 45	5.85	4.87	5.42	12.13	10.4	10.23
248	5-OH-PCB 45	5.85	4.87	5.42	12.13	10.4	10.23
249	3'-OH-PCB 45	5.85	4.84	5.32	12.13	10.69	10.52
250	4'-OH-PCB 45	5.85	4.87	5.39	12.13	10.59	10.42
251	5'-OH-PCB 45	5.85	4.87	5.39	12.13	10.59	10.42
252	6'-OH-PCB 45	5.85	4.56	5.28	12.13	10.28	10.11
253	4-OH-PCB 46	5.85	4.99	5.42	12.13	10.65	10.48
254	5-OH-PCB 46	5.85	4.97	5.49	12.13	10.44	10.27
255	6-OH-PCB 46	5.85	4.68	5.38	12.13	10.16	9.99
256	3'-OH-PCB 46	5.85	4.75	5.32	12.13	10.52	10.35
257	4'-OH-PCB 46	5.85	4.81	5.39	12.13	10.47	10.3
258	3-OH-PCB 47	5.85	5.12	5.44	12.13	10.9	10.73
259	5-OH-PCB 47	5.85	5.13	5.51	12.13	10.75	10.58
260	6-OH-PCB 47	5.85	4.85	5.46	12.13	10.37	10.2
261	3-OH-PCB 48	5.85	5.22	5.49	12.13	10.87	10.7
262	6-OH-PCB 48	5.85	4.87	5.42	12.13	10.4	10.23
263	3'-OH-PCB 48	5.85	5.1	5.44	12.13	10.85	10.68
264	4'-OH-PCB 48	5.85	5.13	5.51	12.13	10.75	10.58
265	5'-OH-PCB 48	5.85	5.13	5.51	12.13	10.75	10.58
266	6'-OH-PCB 48	5.85	4.8	5.39	12.13	10.44	10.27
267	3-OH-PCB 49	5.85	5.12	5.44	12.13	10.9	10.73
268	5-OH-PCB 49	5.85	5.13	5.51	12.13	10.75	10.58
269	6-OH-PCB 49	5.85	4.85	5.46	12.13	10.37	10.2
270	3'-OH-PCB 49	5.85	5.18	5.51	12.13	10.85	10.68
271	4'-OH-PCB 49	5.85	5.18	5.51	12.13	10.85	10.68
272	6'-OH-PCB 49	5.85	4.87	5.39	12.13	10.59	10.42
273	3-OH-PCB 50	5.85	4.87	5.42	12.13	10.4	10.23
274	3'-OH-PCB 50	5.85	4.81	5.39	12.13	10.47	10.3
275	4'-OH-PCB 50	5.85	4.85	5.46	12.13	10.37	10.2
276	5'-OH-PCB 50	5.85	4.85	5.46	12.13	10.37	10.2
277	6'-OH-PCB 50	5.85	4.53	5.35	12.13	10.05	9.88
278	3-OH-PCB 51	5.85	4.99	5.42	12.13	10.65	10.48
279	5-OH-PCB 51	5.85	5	5.49	12.13	10.5	10.33
280	6-OH-PCB 51	5.85	4.73	5.45	12.13	10.11	9.94
281	3'-OH-PCB 51	5.85	4.79	5.39	12.13	10.41	10.25
282	4'-OH-PCB 51	5.85	4.85	5.46	12.13	10.37	10.2
283	3-OH-PCB 52	5.85	5.18	5.51	12.13	10.85	10.68

Table D1*: Continued.*

284	4-OH-PCB 52	5.85	5.18	5.51	12.13	10.85	10.68
285	6-OH-PCB 52	5.85	4.87	5.39	12.13	10.59	10.42
286	3-OH-PCB 53	5.85	5.05	5.49	12.13	10.6	10.43
287	4-OH-PCB 53	5.85	5.05	5.49	12.13	10.6	10.43
288	6-OH-PCB 53	5.85	4.76	5.38	12.13	10.34	10.17
289	3'-OH-PCB 53	5.85	4.79	5.39	12.13	10.41	10.25
290	4'-OH-PCB 53	5.85	4.85	5.46	12.13	10.37	10.2
291	3-OH-PCB 54	5.85	4.68	5.38	12.13	10.16	9.99
292	4-OH-PCB 54	5.85	4.73	5.45	12.13	10.11	9.94
293	5-OH-PCB 55	5.85	5.3	5.49	12.13	11.09	10.92
294	6-OH-PCB 55	5.85	5.02	5.45	12.13	10.69	10.52
295	2'-OH-PCB 55	5.85	5.12	5.4	12.13	10.98	10.81
296	4'-OH-PCB 55	5.85	6.15	6.12	12.13	11.07	10.9
297	5'-OH-PCB 55	5.85	5.33	5.55	12.13	11	10.83
298	6'-OH-PCB 55	5.85	5.12	5.44	12.13	10.9	10.73
299	4-OH-PCB 56	5.85	5.44	5.48	12.13	11.38	11.21
300	5-OH-PCB 56	5.85	5.42	5.56	12.13	11.17	11
301	6-OH-PCB 56	5.85	5.12	5.45	12.13	10.9	10.73
302	2'-OH-PCB 56	5.85	5.12	5.4	12.13	10.98	10.81
303	5'-OH-PCB 56	5.85	5.46	5.47	12.13	11.43	11.27
304	6'-OH-PCB 56	5.85	5.1	5.44	12.13	10.85	10.68
305	4-OH-PCB 57	5.85	5.3	5.49	12.13	11.09	10.92
306	6-OH-PCB 57	5.85	5.02	5.45	12.13	10.69	10.52
307	2'-OH-PCB 57	5.85	5.07	5.44	12.13	10.79	10.62
308	4'-OH-PCB 57	5.85	6.13	6.19	12.13	10.86	10.69
309	5'-OH-PCB 57	5.85	5.31	5.61	12.13	10.79	10.62
310	6'-OH-PCB 57	5.85	5.1	5.51	12.13	10.68	10.52
311	4-OH-PCB 58	5.85	5.33	5.55	12.13	11	10.83
312	5-OH-PCB 58	5.85	5.31	5.61	12.13	10.79	10.62
313	6-OH-PCB 58	5.85	5.02	5.51	12.13	10.52	10.35
314	2'-OH-PCB 58	5.85	5.07	5.44	12.13	10.79	10.62
315	4'-OH-PCB 58	5.85	5.46	5.47	12.13	11.43	11.27
316	4-OH-PCB 59	5.85	5.02	5.45	12.13	10.69	10.52
317	5-OH-PCB 59	5.85	5.02	5.45	12.13	10.69	10.52
318	2'-OH-PCB 59	5.85	4.84	5.32	12.13	10.69	10.52
319	4'-OH-PCB 59	5.85	5.92	6.08	12.13	10.76	10.59
320	5'-OH-PCB 59	5.85	5.1	5.51	12.13	10.69	10.52
321	6'-OH-PCB 59	5.85	4.87	5.39	12.13	10.59	10.42
322	5-OH-PCB 60	5.85	5.32	5.47	12.13	11.13	10.96
323	6-OH-PCB 60	5.85	5.04	5.44	12.13	10.73	10.56
324	2'-OH-PCB 60	5.85	5.12	5.44	12.13	10.9	10.73

Table D1*: Continued.*

325	3'-OH-PCB 60	5.85	5.44	5.47	12.13	11.38	11.21
326	6-OH-PCB 61	5.85	4.94	5.33	12.13	10.79	10.62
327	2'-OH-PCB 61	5.85	5.18	5.49	12.13	10.79	10.62
328	3'-OH-PCB 61	5.85	5.3	5.47	12.13	11.09	10.92
329	4'-OH-PCB 61	5.85	5.37	5.48	12.13	11.9	11.73
330	5-OH-PCB 62	5.85	4.94	5.33	12.13	10.79	10.62
331	2'-OH-PCB 62	5.85	4.87	5.42	12.13	10.4	10.23
332	3'-OH-PCB 62	5.85	5.02	5.44	12.13	10.69	10.52
333	4'-OH-PCB 62	5.85	5.09	5.44	12.13	11.5	11.33
334	4-OH-PCB 63	5.85	5.32	5.47	12.13	11.13	10.96
335	6-OH-PCB 63	5.85	5.04	5.44	12.13	10.73	10.56
336	2'-OH-PCB 63	5.85	5.1	5.51	12.13	10.68	10.52
337	3'-OH-PCB 63	5.85	5.42	5.55	12.13	11.17	11
338	4-OH-PCB 64	5.85	5.04	5.44	12.13	10.73	10.56
339	5-OH-PCB 64	5.85	5.04	5.44	12.13	10.73	10.56
340	2'-OH-PCB 64	5.85	4.87	5.39	12.13	10.59	10.42
341	3'-OH-PCB 64	5.85	5.21	5.44	12.13	11.07	10.9
342	4-OH-PCB 65	5.85	4.94	5.33	12.13	10.79	10.62
343	2'-OH-PCB 65	5.85	4.87	5.42	12.13	10.4	10.23
344	3'-OH-PCB 65	5.85	5.02	5.44	12.13	10.69	10.52
345	4'-OH-PCB 65	5.85	5.09	5.44	12.13	11.5	11.33
346	3-OH-PCB 66	5.85	5.44	5.48	12.13	11.38	11.21
347	5-OH-PCB 66	5.85	5.45	5.56	12.13	11.23	11.06
348	6-OH-PCB 66	5.85	5.18	5.52	12.13	10.85	10.68
349	2'-OH-PCB 66	5.85	5.12	5.44	12.13	10.9	10.73
350	5'-OH-PCB 66	5.85	5.5	5.55	12.13	11.33	11.16
351	6'-OH-PCB 66	5.85	5.13	5.51	12.13	10.75	10.58
352	3-OH-PCB 67	5.85	5.34	5.49	12.13	11.17	11.01
353	6-OH-PCB 67	5.85	5.02	5.45	12.13	10.69	10.52
354	2'-OH-PCB 67	5.85	5.1	5.44	12.13	10.85	10.68
355	4'-OH-PCB 67	5.85	6.16	6.19	12.13	10.92	10.75
356	5'-OH-PCB 67	5.89	5.85	5.34	5.61	12.13	10.85
357	6'-OH-PCB 67	5.89	5.85	5.13	5.51	12.13	10.75
358	3-OH-PCB 68	5.88	5.85	5.33	5.55	12.13	11
359	5-OH-PCB 68	5.9	5.85	5.34	5.61	12.13	10.85
360	6-OH-PCB 68	5.85	5.08	5.58	12.13	10.47	10.3
361	2'-OH-PCB 68	5.85	5.1	5.51	12.13	10.68	10.52
362	4'-OH-PCB 68	5.85	5.5	5.55	12.13	11.33	11.16
363	3-OH-PCB 69	5.85	5.02	5.45	12.13	10.69	10.52
364	2'-OH-PCB 69	5.85	4.81	5.39	12.13	10.47	10.3
365	4'-OH-PCB 69	5.85	5.89	6.15	12.13	10.54	10.37

Table D1*: Continued.*

366	5'-OH-PCB 69	5.85	5.08	5.58	12.13	10.47	10.3
367	6'-OH-PCB 69	5.85	4.85	5.46	12.13	10.37	10.2
368	3-OH-PCB 70	5.85	5.5	5.56	12.13	11.33	11.16
369	4-OH-PCB 70	5.85	5.5	5.56	12.13	11.33	11.16
370	6-OH-PCB 70	5.85	5.21	5.45	12.13	11.07	10.9
371	2'-OH-PCB 70	5.85	5.12	5.44	12.13	10.9	10.73
372	5'-OH-PCB 70	5.85	5.5	5.55	12.13	11.33	11.16
373	6'-OH-PCB 70	5.85	5.13	5.51	12.13	10.75	10.58
374	3-OH-PCB 71	5.85	5.12	5.45	12.13	10.9	10.73
375	4-OH-PCB 71	5.85	5.18	5.52	12.13	10.85	10.68
376	2'-OH-PCB 71	5.85	4.99	5.42	12.13	10.65	10.48
377	5'-OH-PCB 71	5.85	5.37	5.53	12.13	11.09	10.92
378	6'-OH-PCB 71	5.85	5	5.49	12.13	10.5	10.33
379	3-OH-PCB 72	5.85	5.39	5.61	12.13	10.95	10.78
380	4-OH-PCB 72	5.85	5.39	5.61	12.13	10.95	10.78
381	6-OH-PCB 72	5.85	5.1	5.51	12.13	10.69	10.52
382	2'-OH-PCB 72	5.85	5.1	5.51	12.13	10.68	10.52
383	4'-OH-PCB 72	5.85	5.5	5.55	12.13	11.33	11.16
384	3-OH-PCB 73	5.85	5.02	5.51	12.13	10.52	10.35
385	4-OH-PCB 73	5.85	5.08	5.58	12.13	10.47	10.3
386	2'-OH-PCB 73	5.85	4.97	5.49	12.13	10.44	10.27
387	4'-OH-PCB 73	5.85	5.37	5.53	12.13	11.09	10.92
388	3-OH-PCB 74	5.85	5.36	5.47	12.13	11.21	11.05
389	6-OH-PCB 74	5.85	5.04	5.44	12.13	10.73	10.56
390	2'-OH-PCB 74	5.85	5.13	5.51	12.13	10.75	10.58
391	3'-OH-PCB 74	5.85	5.45	5.55	12.13	11.23	11.06
392	3-OH-PCB 75	5.85	5.04	5.44	12.13	10.73	10.56
393	2'-OH-PCB 75	5.85	4.85	5.46	12.13	10.37	10.2
394	3'-OH-PCB 75	5.85	5.18	5.51	12.13	10.85	10.68
395	3-OH-PCB 76	5.85	5.37	5.47	12.13	11.25	11.08
396	4-OH-PCB 76	5.85	5.41	5.55	12.13	11.15	10.98
397	5-OH-PCB 76	5.85	5.41	5.55	12.13	11.15	10.98
398	6-OH-PCB 76	5.85	5.09	5.44	12.13	10.84	10.67
399	2'-OH-PCB 76	5.85	5.18	5.49	12.13	10.79	10.62
400	2-OH-PCB 77	5.85	5.44	5.48	12.13	11.38	11.21
401	5-OH-PCB 77	5.85	5.81	5.59	12.13	11.82	11.65
402	6-OH-PCB 77	5.85	5.45	5.56	12.13	11.23	11.06
403	2-OH-PCB 78	5.85	5.3	5.49	12.13	11.09	10.92
404	2'-OH-PCB 78	5.85	5.37	5.47	12.13	11.25	11.08
405	4'-OH-PCB 78	5.85	6.45	6.24	12.13	11.32	11.15
406	5'-OH-PCB 78	5.85	5.62	5.65	12.13	11.26	11.09

Table D1*: Continued.*

407	6'-OH-PCB 78	5.85	5.41	5.55	12.13	11.15	10.98
408	2-OH-PCB 79	5.85	5.33	5.55	12.13	11	10.83
409	5-OH-PCB 79	5.85	5.71	5.65	12.13	11.44	11.27
410	6-OH-PCB 79	5.85	5.34	5.61	12.13	10.85	10.68
411	2'-OH-PCB 79	5.85	5.42	5.56	12.13	11.17	11
412	4'-OH-PCB 79	5.85	5.81	5.59	12.13	11.82	11.65
413	2-OH-PCB 80	5.85	5.31	5.61	12.13	10.79	10.62
414	4-OH-PCB 80	5.85	5.71	5.65	12.13	11.44	11.27
415	2-OH-PCB 81	5.85	5.32	5.47	12.13	11.13	10.96
416	2'-OH-PCB 81	5.85	5.41	5.55	12.13	11.15	10.98
417	3'-OH-PCB 81	5.85	5.72	5.58	12.13	11.64	11.47
418	5-OH-PCB 82	6.5	5.66	5.93	12.91	11.6	11.42
419	6-OH-PCB 82	6.5	5.37	5.88	12.91	11.2	11.02
420	4'-OH-PCB 82	6.5	5.68	5.93	12.91	11.63	11.45
421	5'-OH-PCB 82	6.5	5.66	6	12.91	11.42	11.24
422	6'-OH-PCB 82	6.5	5.34	5.88	12.91	11.15	10.97
423	4-OH-PCB 83	6.5	5.66	5.93	12.91	11.6	11.42
424	6-OH-PCB 83	6.5	5.37	5.88	12.91	11.2	11.02
425	4'-OH-PCB 83	6.5	5.66	6	12.91	11.42	11.24
426	5'-OH-PCB 83	6.5	5.64	6.07	12.91	11.21	11.03
427	6'-OH-PCB 83	6.5	5.32	5.95	12.91	10.94	10.76
428	4-OH-PCB 84	6.5	5.37	5.88	12.91	11.2	11.02
429	5-OH-PCB 84	6.5	5.37	5.88	12.91	11.2	11.02
430	4'-OH-PCB 84	6.5	5.43	5.88	12.91	11.32	11.14
431	5'-OH-PCB 84	6.5	5.41	5.95	12.91	11.11	10.93
432	6'-OH-PCB 84	6.5	5.11	5.84	12.91	10.84	10.66
433	5-OH-PCB 85	6.5	5.69	6	12.91	11.5	11.32
434	6-OH-PCB 85	6.5	5.4	5.95	12.91	11.1	10.92
435	3'-OH-PCB 85	6.5	5.68	5.93	12.91	11.63	11.45
436	5'-OH-PCB 85	6.5	5.69	6	12.91	11.48	11.3
437	6'-OH-PCB 85	6.5	5.4	5.95	12.91	11.1	10.92
438	6-OH-PCB 86	6.5	5.43	5.91	12.91	11.13	10.95
439	3'-OH-PCB 86	6.5	5.66	5.93	12.91	11.6	11.42
440	4'-OH-PCB 86	6.5	5.69	6	12.91	11.5	11.32
441	5'-OH-PCB 86	6.5	5.69	6	12.91	11.5	11.32
442	6'-OH-PCB 86	6.5	5.37	5.88	12.91	11.19	11.01
443	5-OH-PCB 87	6.5	5.69	6	12.91	11.5	11.32
444	6-OH-PCB 87	6.5	5.4	5.95	12.91	11.1	10.92
445	3'-OH-PCB 87	6.5	5.74	6	12.91	11.58	11.4
446	4'-OH-PCB 87	6.5	5.74	6	12.91	11.58	11.4
447	6'-OH-PCB 87	6.5	5.43	5.88	12.91	11.32	11.14

Table D1*: Continued.*

448	5-OH-PCB 88	6.5	5.43	5.91	12.91	11.13	10.95
449	3'-OH-PCB 88	6.5	5.37	5.88	12.91	11.2	11.02
450	4'-OH-PCB 88	6.5	5.4	5.95	12.91	11.1	10.92
451	5'-OH-PCB 88	6.5	5.4	5.95	12.91	11.1	10.92
452	6'-OH-PCB 88	6.5	5.09	5.84	12.91	10.79	10.61
453	5-OH-PCB 89	6.5	5.57	5.99	12.91	11.25	11.07
454	6-OH-PCB 89	6.5	5.29	5.95	12.91	10.85	10.67
455	3'-OH-PCB 89	6.5	5.34	5.88	12.91	11.15	10.97
456	4'-OH-PCB 89	6.5	5.4	5.95	12.91	11.1	10.92
457	4-OH-PCB 90	6.5	5.69	6	12.91	11.5	11.32
458	6-OH-PCB 90	6.5	5.4	5.95	12.91	11.1	10.92
459	3'-OH-PCB 90	6.5	5.66	6	12.91	11.42	11.24
460	5'-OH-PCB 90	6.5	5.67	6.07	12.91	11.27	11.09
461	6'-OH-PCB 90	6.5	5.38	6.02	12.91	10.89	10.71
462	4-OH-PCB 91	6.5	5.4	5.95	12.91	11.1	10.92
463	5-OH-PCB 91	6.5	5.4	5.95	12.91	11.1	10.92
464	3'-OH-PCB 91	6.5	5.43	5.88	12.91	11.32	11.14
465	5'-OH-PCB 91	6.5	5.44	5.95	12.91	11.17	11
466	6'-OH-PCB 91	6.5	5.17	5.91	12.91	10.79	10.61
467	4-OH-PCB 92	6.5	5.69	6	12.91	11.5	11.32
468	6-OH-PCB 92	6.5	5.4	5.95	12.91	11.1	10.92
469	3'-OH-PCB 92	6.5	5.71	6.07	12.91	11.37	11.19
470	4'-OH-PCB 92	6.5	5.71	6.07	12.91	11.37	11.19
471	6'-OH-PCB 92	6.5	5.41	5.95	12.91	11.11	10.93
472	4-OH-PCB 93	6.5	5.43	5.91	12.91	11.13	10.95
473	3'-OH-PCB 93	6.5	5.37	5.88	12.91	11.2	11.02
474	4'-OH-PCB 93	6.5	5.4	5.95	12.91	11.1	10.92
475	5'-OH-PCB 93	6.5	5.4	5.95	12.91	11.1	10.92
476	6'-OH-PCB 93	6.5	5.09	5.84	12.91	10.79	10.61
477	4-OH-PCB 94	6.5	5.57	5.99	12.91	11.25	11.07
478	6-OH-PCB 94	6.5	5.29	5.95	12.91	10.85	10.67
479	3'-OH-PCB 94	6.5	5.32	5.95	12.91	10.94	10.76
480	4'-OH-PCB 94	6.5	5.38	6.02	12.91	10.89	10.71
481	4-OH-PCB 95	6.5	5.4	5.95	12.91	11.1	10.92
482	5-OH-PCB 95	6.5	5.4	5.95	12.91	11.1	10.92
483	3'-OH-PCB 95	6.5	5.49	5.95	12.91	11.28	11.1
484	4'-OH-PCB 95	6.5	5.49	5.95	12.91	11.28	11.1
485	6'-OH-PCB 95	6.5	5.2	5.84	12.91	11.01	10.83
486	4-OH-PCB 96	6.5	5.29	5.95	12.91	10.85	10.67
487	5-OH-PCB 96	6.5	5.29	5.95	12.91	10.85	10.67
488	3'-OH-PCB 96	6.5	5.11	5.84	12.91	10.84	10.66

Table D1*: Continued.*

489	4'-OH-PCB 96	6.5	5.17	5.91	12.91	10.79	10.61
490	4-OH-PCB 97	6.5	5.69	6	12.91	11.48	11.3
491	5-OH-PCB 97	6.5	5.67	6.07	12.91	11.27	11.09
492	6-OH-PCB 97	6.5	5.35	5.95	12.91	11	10.82
493	3'-OH-PCB 97	6.5	5.7	5.93	12.91	11.68	11.5
494	6'-OH-PCB 97	6.5	5.37	5.88	12.91	11.2	11.02
495	4-OH-PCB 98	6.5	5.4	5.95	12.91	11.1	10.92
496	5-OH-PCB 98	6.5	5.38	6.02	12.91	10.89	10.71
497	6-OH-PCB 98	6.5	5.09	5.91	12.91	10.61	10.43
498	3'-OH-PCB 98	6.5	5.37	5.88	12.91	11.2	11.02
499	3-OH-PCB 99	6.5	5.74	6	12.91	11.58	11.4
500	6-OH-PCB 99	6.5	5.4	5.95	12.91	11.1	10.92
501	3'-OH-PCB 99	6.5	5.69	6	12.91	11.48	11.3
502	5'-OH-PCB 99	6.5	5.7	6.07	12.91	11.33	11.15
503	6'-OH-PCB 99	6.5	5.41	6.02	12.91	10.95	10.77
504	3-OH-PCB 100	6.5	5.4	5.95	12.91	11.1	10.92
505	3'-OH-PCB 100	6.5	5.4	5.95	12.91	11.1	10.92
506	5'-OH-PCB 100	6.5	5.41	6.02	12.91	10.95	10.77
507	6'-OH-PCB 100	6.5	5.14	5.98	12.91	10.56	10.39
508	3-OH-PCB 101	6.5	5.74	6	12.91	11.58	11.4
509	6-OH-PCB 101	6.5	5.4	5.95	12.91	11.1	10.92
510	3'-OH-PCB 101	6.5	5.74	6.07	12.91	11.43	11.25
511	4'-OH-PCB 101	6.5	5.74	6.07	12.91	11.43	11.25
512	6'-OH-PCB 101	6.5	5.44	5.95	12.91	11.17	11
513	3-OH-PCB 102	6.5	5.61	5.99	12.91	11.33	11.15
514	6-OH-PCB 102	6.5	5.29	5.95	12.91	10.85	10.67
515	3'-OH-PCB 102	6.5	5.35	5.95	12.91	11	10.82
516	4'-OH-PCB 102	6.5	5.41	6.02	12.91	10.95	10.77
517	3-OH-PCB 103	6.5	5.4	5.95	12.91	11.1	10.92
518	3'-OH-PCB 103	6.5	5.46	6.02	12.91	11.05	10.87
519	4'-OH-PCB 103	6.5	5.46	6.02	12.91	11.05	10.87
520	6'-OH-PCB 103	6.5	5.17	5.91	12.91	10.79	10.61
521	3-OH-PCB 104	6.5	5.29	5.95	12.91	10.85	10.67
522	3'-OH-PCB 104	6.5	5.09	5.91	12.91	10.61	10.43
523	4'-OH-PCB 104	6.5	5.14	5.98	12.91	10.56	10.39
524	5-OH-PCB 105	6.5	6.01	6.05	12.91	11.98	11.8
525	6-OH-PCB 105	6.5	5.74	6.01	12.91	11.58	11.4
526	2'-OH-PCB 105	6.5	5.68	5.93	12.91	11.63	11.45
527	5'-OH-PCB 105	6.5	6.05	6.04	12.91	12.07	11.89
528	6'-OH-PCB 105	6.5	5.69	6	12.91	11.48	11.3
529	6-OH-PCB 106	6.5	5.58	5.94	12.91	11.42	11.24

Table D1: *Continued.*

530	2'-OH-PCB 106	6.5	5.66	5.93	12.91	11.6	11.42
531	4'-OH-PCB 106	6.5	6.72	6.68	12.91	11.68	11.5
532	5'-OH-PCB 106	6.5	5.91	6.11	12.91	11.6	11.43
533	6'-OH-PCB 106	6.5	5.69	6	12.91	11.5	11.32
534	4-OH-PCB 107	6.5	6.01	6.05	12.91	11.98	11.8
535	6-OH-PCB 107	6.5	5.74	6.01	12.91	11.58	11.4
536	2'-OH-PCB 107	6.5	5.66	6	12.91	11.42	11.24
537	5'-OH-PCB 107	6.5	6.03	6.11	12.91	11.86	11.68
538	6'-OH-PCB 107	6.5	5.67	6.07	12.91	11.27	11.09
539	5-OH-PCB 108	6.5	5.91	6.11	12.91	11.6	11.43
540	6-OH-PCB 108	6.5	5.63	6.07	12.91	11.2	11.02
541	2'-OH-PCB 108	6.5	5.66	6	12.91	11.42	11.24
542	4'-OH-PCB 108	6.5	6.05	6.04	12.91	12.07	11.89
543	5-OH-PCB 109	6.5	5.58	5.94	12.91	11.42	11.24
544	2'-OH-PCB 109	6.5	5.37	5.88	12.91	11.2	11.02
545	4'-OH-PCB 109	6.5	6.45	6.65	12.91	11.27	11.09
546	5'-OH-PCB 109	6.5	5.63	6.07	12.91	11.2	11.02
547	6'-OH-PCB 109	6.5	5.4	5.95	12.91	11.1	10.92
548	4-OH-PCB 110	6.5	5.74	6.01	12.91	11.58	11.4
549	5-OH-PCB 110	6.5	5.74	6.01	12.91	11.58	11.4
550	2'-OH-PCB 110	6.5	5.43	5.88	12.91	11.32	11.14
551	5'-OH-PCB 110	6.5	5.82	6	12.91	11.76	11.58
552	6'-OH-PCB 110	6.5	5.44	5.95	12.91	11.17	11
553	4-OH-PCB 111	6.5	5.91	6.11	12.91	11.6	11.43
554	6-OH-PCB 111	6.5	5.63	6.07	12.91	11.2	11.02
555	2'-OH-PCB 111	6.5	5.64	6.07	12.91	11.21	11.03
556	4'-OH-PCB 111	6.5	6.03	6.11	12.91	11.86	11.68
557	4-OH-PCB 112	6.5	5.58	5.94	12.91	11.42	11.24
558	2'-OH-PCB 112	6.5	5.37	5.88	12.91	11.2	11.02
559	4'-OH-PCB 112	6.5	6.45	6.65	12.91	11.27	11.09
560	5'-OH-PCB 112	6.5	5.63	6.07	12.91	11.2	11.02
561	6'-OH-PCB 112	6.5	5.4	5.95	12.91	11.1	10.92
562	4-OH-PCB 113	6.5	5.63	6.07	12.91	11.2	11.02
563	5-OH-PCB 113	6.5	5.63	6.07	12.91	11.2	11.02
564	2'-OH-PCB 113	6.5	5.41	5.95	12.91	11.11	10.93
565	4'-OH-PCB 113	6.5	5.82	6	12.91	11.76	11.58
566	6-OH-PCB 114	6.5	5.59	5.93	12.91	11.46	11.28
567	2'-OH-PCB 114	6.5	5.69	6	12.91	11.5	11.32
568	3'-OH-PCB 114	6.5	6.01	6.04	12.91	11.98	11.8
569	5-OH-PCB 115	6.5	5.59	5.93	12.91	11.46	11.28
570	2'-OH-PCB 115	6.5	5.4	5.95	12.91	11.1	10.92

Table D1*: Continued.*

571	3'-OH-PCB 115	6.5	5.74	6	12.91	11.58	11.4
572	2'-OH-PCB 116	6.5	5.43	5.91	12.91	11.13	10.95
573	3'-OH-PCB 116	6.5	5.58	5.93	12.91	11.42	11.24
574	4'-OH-PCB 116	6.5	5.65	5.93	12.91	12.23	12.05
575	4-OH-PCB 117	6.5	5.59	5.93	12.91	11.46	11.28
576	2'-OH-PCB 117	6.5	5.4	5.95	12.91	11.1	10.92
577	3'-OH-PCB 117	6.5	5.74	6	12.91	11.58	11.4
578	3-OH-PCB 118	6.5	6.05	6.05	12.91	12.07	11.89
579	6-OH-PCB 118	6.5	5.74	6.01	12.91	11.58	11.4
580	2'-OH-PCB 118	6.5	5.69	6	12.91	11.48	11.3
581	5'-OH-PCB 118	6.5	6.06	6.11	12.91	11.92	11.74
582	6'-OH-PCB 118	6.5	5.7	6.07	12.91	11.33	11.15
583	3-OH-PCB 119	6.5	5.74	6.01	12.91	11.58	11.4
584	2'-OH-PCB 119	6.5	5.4	5.95	12.91	11.1	10.92
585	5'-OH-PCB 119	6.5	5.79	6.07	12.91	11.53	11.35
586	6'-OH-PCB 119	6.5	5.41	6.02	12.91	10.95	10.77
587	3-OH-PCB 120	6.5	5.95	6.11	12.91	11.69	11.51
588	6-OH-PCB 120	6.5	5.63	6.07	12.91	11.2	11.02
589	2'-OH-PCB 120	6.5	5.67	6.07	12.91	11.27	11.09
590	4'-OH-PCB 120	6.5	6.06	6.11	12.91	11.92	11.74
591	3-OH-PCB 121	6.5	5.63	6.07	12.91	11.2	11.02
592	2'-OH-PCB 121	6.5	5.38	6.02	12.91	10.89	10.71
593	4'-OH-PCB 121	6.5	5.79	6.07	12.91	11.53	11.35
594	4-OH-PCB 122	6.5	5.96	6.04	12.91	11.88	11.7
595	5-OH-PCB 122	6.5	5.94	6.11	12.91	11.67	11.49
596	6-OH-PCB 122	6.5	5.65	6	12.91	11.4	11.22
597	2'-OH-PCB 122	6.5	5.66	5.93	12.91	11.6	11.42
598	3-OH-PCB 123	6.5	5.96	6.04	12.91	11.88	11.7
599	5-OH-PCB 123	6.5	5.97	6.11	12.91	11.73	11.55
600	6-OH-PCB 123	6.5	5.7	6.07	12.91	11.35	11.17
601	2'-OH-PCB 123	6.5	5.69	6	12.91	11.5	11.32
602	3-OH-PCB 124	6.5	6.02	6.11	12.91	11.83	11.65
603	4-OH-PCB 124	6.5	6.02	6.11	12.91	11.83	11.65
604	6-OH-PCB 124	6.5	5.73	6	12.91	11.57	11.39
605	2'-OH-PCB 124	6.5	5.69	6	12.91	11.5	11.32
606	3-OH-PCB 125	6.5	5.65	6	12.91	11.4	11.22
607	4-OH-PCB 125	6.5	5.7	6.07	12.91	11.35	11.17
608	2'-OH-PCB 125	6.5	5.57	5.99	12.91	11.25	11.07
609	2-OH-PCB 126	6.5	6.01	6.05	12.91	11.98	11.8
610	2'-OH-PCB 126	6.5	5.96	6.04	12.91	11.88	11.7
611	5'-OH-PCB 126	6.5	6.34	6.14	12.91	12.32	12.14

Table D1: *Continued.*

612	6'-OH-PCB 126	6.5	5.97	6.11	12.91	11.73	11.55
613	2-OH-PCB 127	6.5	5.91	6.11	12.91	11.6	11.43
614	2'-OH-PCB 127	6.5	5.94	6.11	12.91	11.67	11.49
615	4'-OH-PCB 127	6.5	6.34	6.14	12.91	12.32	12.14
616	5-OH-PCB 128	7.14	6.22	6.46	13.68	12.25	12.06
617	6-OH-PCB 128	7.14	5.93	6.41	13.68	11.85	11.66
618	6-OH-PCB 129	7.14	5.89	6.34	13.68	11.95	11.76
619	4'-OH-PCB 129	7.14	6.22	6.46	13.68	12.25	12.06
620	5'-OH-PCB 129	7.14	6.2	6.53	13.68	12.03	11.84
621	6'-OH-PCB 129	7.14	5.89	6.41	13.68	11.77	11.58
622	5-OH-PCB 130	7.14	6.2	6.53	13.68	12.03	11.84
623	6-OH-PCB 130	7.14	5.91	6.48	13.68	11.64	11.45
624	4'-OH-PCB 130	7.14	6.22	6.46	13.68	12.25	12.06
625	6'-OH-PCB 130	7.14	5.93	6.41	13.68	11.85	11.66
626	5-OH-PCB 131	7.14	5.89	6.34	13.68	11.95	11.76
627	4'-OH-PCB 131	7.14	5.93	6.41	13.68	11.85	11.66
628	5'-OH-PCB 131	7.14	5.91	6.48	13.68	11.64	11.45
629	6'-OH-PCB 131	7.14	5.61	6.37	13.68	11.36	11.17
630	5-OH-PCB 132	7.14	5.97	6.41	13.68	11.94	11.75
631	6-OH-PCB 132	7.14	5.69	6.37	13.68	11.54	11.35
632	4'-OH-PCB 132	7.14	5.93	6.41	13.68	11.85	11.66
633	5'-OH-PCB 132	7.14	5.93	6.41	13.68	11.85	11.66
634	4-OH-PCB 133	7.14	6.2	6.53	13.68	12.03	11.84
635	6-OH-PCB 133	7.14	5.91	6.48	13.68	11.64	11.45
636	4-OH-PCB 134	7.14	5.89	6.34	13.68	11.95	11.76
637	4'-OH-PCB 134	7.14	5.93	6.41	13.68	11.85	11.66
638	5'-OH-PCB 134	7.14	5.91	6.48	13.68	11.64	11.45
639	6'-OH-PCB 134	7.14	5.61	6.37	13.68	11.36	11.17
640	4-OH-PCB 135	7.14	5.97	6.41	13.68	11.94	11.75
641	6-OH-PCB 135	7.14	5.69	6.37	13.68	11.54	11.35
642	4'-OH-PCB 135	7.14	5.91	6.48	13.68	11.64	11.45
643	5'-OH-PCB 135	7.14	5.91	6.48	13.68	11.64	11.45
644	4-OH-PCB 136	7.14	5.69	6.37	13.68	11.54	11.35
645	5-OH-PCB 136	7.14	5.69	6.37	13.68	11.54	11.35
646	6-OH-PCB 137	7.14	5.93	6.41	13.68	11.85	11.66
647	3'-OH-PCB 137	7.14	6.22	6.46	13.68	12.25	12.06
648	5'-OH-PCB 137	7.14	6.23	6.53	13.68	12.1	11.91
649	6'-OH-PCB 137	7.14	5.94	6.48	13.68	11.72	11.53
650	5-OH-PCB 138	7.14	6.23	6.53	13.68	12.1	11.91
651	6-OH-PCB 138	7.14	5.94	6.48	13.68	11.7	11.51
652	3'-OH-PCB 138	7.14	6.26	6.46	13.68	12.33	12.14

Table D1*: Continued.*

653	6'-OH-PCB 138	7.14	5.93	6.41	13.68	11.85	11.66
654	5-OH-PCB 139	7.14	5.93	6.41	13.68	11.85	11.66
655	3'-OH-PCB 139	7.14	5.93	6.41	13.68	11.85	11.66
656	5'-OH-PCB 139	7.14	5.94	6.48	13.68	11.7	11.51
657	6'-OH-PCB 139	7.14	5.67	6.44	13.68	11.31	11.12
658	5-OH-PCB 140	7.14	5.94	6.48	13.68	11.72	11.53
659	6-OH-PCB 140	7.14	5.67	6.44	13.68	11.31	11.12
660	3'-OH-PCB 140	7.14	5.93	6.41	13.68	11.85	11.66
661	6-OH-PCB 141	7.14	5.93	6.41	13.68	11.85	11.66
662	3'-OH-PCB 141	7.14	6.28	6.53	13.68	12.2	12.01
663	4'-OH-PCB 141	7.14	6.28	6.53	13.68	12.2	12.01
664	6'-OH-PCB 141	7.14	5.97	6.41	13.68	11.94	11.75
665	3'-OH-PCB 142	7.14	5.89	6.34	13.68	11.95	11.76
666	4'-OH-PCB 142	7.14	5.93	6.41	13.68	11.85	11.66
667	5'-OH-PCB 142	7.14	5.93	6.41	13.68	11.85	11.66
668	6'-OH-PCB 142	7.14	5.61	6.31	13.68	11.54	11.35
669	6-OH-PCB 143	7.14	5.81	6.41	13.68	11.6	11.41
670	3'-OH-PCB 143	7.14	5.89	6.41	13.68	11.77	11.58
671	4'-OH-PCB 143	7.14	5.94	6.48	13.68	11.72	11.53
672	5-OH-PCB 144	7.14	5.93	6.41	13.68	11.85	11.66
673	3'-OH-PCB 144	7.14	5.98	6.48	13.68	11.8	11.61
674	4'-OH-PCB 144	7.14	5.98	6.48	13.68	11.8	11.61
675	6'-OH-PCB 144	7.14	5.69	6.37	13.68	11.54	11.35
676	5-OH-PCB 145	7.14	5.81	6.41	13.68	11.6	11.41
677	3'-OH-PCB 145	7.14	5.61	6.37	13.68	11.36	11.17
678	4'-OH-PCB 145	7.14	5.67	6.44	13.68	11.31	11.12
679	4-OH-PCB 146	7.14	6.23	6.53	13.68	12.1	11.91
680	6-OH-PCB 146	7.14	5.94	6.48	13.68	11.7	11.51
681	3'-OH-PCB 146	7.14	6.24	6.53	13.68	12.12	11.93
682	6'-OH-PCB 146	7.14	5.91	6.48	13.68	11.64	11.45
683	4-OH-PCB 147	7.14	5.93	6.41	13.68	11.85	11.66
684	3'-OH-PCB 147	7.14	5.93	6.41	13.68	11.85	11.66
685	5'-OH-PCB 147	7.14	5.94	6.48	13.68	11.7	11.51
686	6'-OH-PCB 147	7.14	5.67	6.44	13.68	11.31	11.12
687	4-OH-PCB 148	7.14	5.94	6.48	13.68	11.72	11.53
688	6-OH-PCB 148	7.14	5.67	6.44	13.68	11.31	11.12
689	3'-OH-PCB 148	7.14	5.91	6.48	13.68	11.64	11.45
690	4-OH-PCB 149	7.14	5.94	6.48	13.68	11.7	11.51
691	5-OH-PCB 149	7.14	5.94	6.48	13.68	11.7	11.51
692	3'-OH-PCB 149	7.14	6.01	6.41	13.68	12.02	11.83
693	6'-OH-PCB 149	7.14	5.69	6.37	13.68	11.54	11.35

Table D1*: Continued.*

694	4-OH-PCB 150	7.14	5.67	6.44	13.68	11.31	11.12
695	5-OH-PCB 150	7.14	5.67	6.44	13.68	11.31	11.12
696	3'-OH-PCB 150	7.14	5.69	6.37	13.68	11.54	11.35
697	4-OH-PCB 151	7.14	5.93	6.41	13.68	11.85	11.66
698	3'-OH-PCB 151	7.14	5.98	6.48	13.68	11.8	11.61
699	4'-OH-PCB 151	7.14	5.98	6.48	13.68	11.8	11.61
700	6'-OH-PCB 151	7.14	5.69	6.37	13.68	11.54	11.35
701	4-OH-PCB 152	7.14	5.81	6.41	13.68	11.6	11.41
702	3'-OH-PCB 152	7.14	5.61	6.37	13.68	11.36	11.17
703	4'-OH-PCB 152	7.14	5.67	6.44	13.68	11.31	11.12
704	3-OH-PCB 153	7.14	6.27	6.53	13.68	12.18	11.99
705	6-OH-PCB 153	7.14	5.94	6.48	13.68	11.7	11.51
706	3-OH-PCB 154	7.14	5.98	6.48	13.68	11.8	11.61
707	6-OH-PCB 154	7.14	5.67	6.44	13.68	11.31	11.12
708	3'-OH-PCB 154	7.14	5.94	6.48	13.68	11.7	11.51
709	3-OH-PCB 155	7.14	5.67	6.44	13.68	11.31	11.12
710	6-OH-PCB 156	7.14	6.26	6.47	13.68	12.33	12.14
711	2'-OH-PCB 156	7.14	6.22	6.46	13.68	12.25	12.06
712	5'-OH-PCB 156	7.14	6.59	6.57	13.68	12.68	12.49
713	6'-OH-PCB 156	7.14	6.23	6.53	13.68	12.1	11.91
714	5-OH-PCB 157	7.14	6.5	6.57	13.68	12.5	12.31
715	6-OH-PCB 157	7.14	6.23	6.53	13.68	12.1	11.91
716	2'-OH-PCB 157	7.14	6.22	6.46	13.68	12.25	12.06
717	5-OH-PCB 158	7.14	6.26	6.47	13.68	12.33	12.14
718	2'-OH-PCB 158	7.14	5.93	6.41	13.68	11.85	11.66
719	5'-OH-PCB 158	7.14	6.32	6.53	13.68	12.28	12.09
720	6'-OH-PCB 158	7.14	5.94	6.48	13.68	11.7	11.51
721	6-OH-PCB 159	7.14	6.15	6.53	13.68	11.95	11.76
722	2'-OH-PCB 159	7.14	6.2	6.53	13.68	12.03	11.84
723	4'-OH-PCB 159	7.14	6.59	6.57	13.68	12.68	12.49
724	2'-OH-PCB 160	7.14	5.89	6.34	13.68	11.95	11.76
725	4'-OH-PCB 160	7.14	6.97	7.11	13.68	12.02	11.83
726	5'-OH-PCB 160	7.14	6.15	6.53	13.68	11.95	11.76
727	6'-OH-PCB 160	7.14	5.93	6.41	13.68	11.85	11.66
728	5-OH-PCB 161	7.14	6.15	6.53	13.68	11.95	11.76
729	2'-OH-PCB 161	7.14	5.91	6.48	13.68	11.64	11.45
730	4'-OH-PCB 161	7.14	6.32	6.53	13.68	12.28	12.09
731	4-OH-PCB 162	7.14	6.5	6.57	13.68	12.5	12.31
732	6-OH-PCB 162	7.14	6.23	6.53	13.68	12.1	11.91
733	2'-OH-PCB 162	7.14	6.2	6.53	13.68	12.03	11.84
734	4-OH-PCB 163	7.14	6.26	6.47	13.68	12.33	12.14

Table D1*: Continued.*

735	2'-OH-PCB 163	7.14	5.93	6.41	13.68	11.85	11.66
736	5'-OH-PCB 163	7.14	6.32	6.53	13.68	12.28	12.09
737	6'-OH-PCB 163	7.14	5.94	6.48	13.68	11.7	11.51
738	4-OH-PCB 164	7.14	6.23	6.53	13.68	12.1	11.91
739	5-OH-PCB 164	7.14	6.23	6.53	13.68	12.1	11.91
740	2'-OH-PCB 164	7.14	5.97	6.41	13.68	11.94	11.75
741	4-OH-PCB 165	7.14	6.15	6.53	13.68	11.95	11.76
742	2'-OH-PCB 165	7.14	5.91	6.48	13.68	11.64	11.45
743	4'-OH-PCB 165	7.14	6.32	6.53	13.68	12.28	12.09
744	2'-OH-PCB 166	7.14	5.93	6.41	13.68	11.85	11.66
745	3'-OH-PCB 166	7.14	6.26	6.46	13.68	12.33	12.14
746	3-OH-PCB 167	7.14	6.54	6.57	13.68	12.58	12.39
747	6-OH-PCB 167	7.14	6.23	6.53	13.68	12.1	11.91
748	2'-OH-PCB 167	7.14	6.23	6.53	13.68	12.1	11.91
749	3-OH-PCB 168	7.14	6.23	6.53	13.68	12.1	11.91
750	2'-OH-PCB 168	7.14	5.94	6.48	13.68	11.72	11.53
751	2-OH-PCB 169	7.14	6.5	6.57	13.68	12.5	12.31
752	6-OH-PCB 170	7.79	6.45	6.87	14.46	12.6	12.4
753	5'-OH-PCB 170	7.79	6.76	6.99	14.46	12.86	12.66
754	6'-OH-PCB 170	7.79	6.47	6.94	14.46	12.47	12.26
755	5-OH-PCB 171	7.79	6.45	6.87	14.46	12.6	12.4
756	5'-OH-PCB 171	7.79	6.47	6.94	14.46	12.47	12.26
757	6'-OH-PCB 171	7.79	6.19	6.9	14.46	12.06	11.86
758	6-OH-PCB 172	7.79	6.43	6.94	14.46	12.39	12.19
759	4'-OH-PCB 172	7.79	6.76	6.99	14.46	12.86	12.66
760	6'-OH-PCB 172	7.79	6.47	6.94	14.46	12.47	12.26
761	4'-OH-PCB 173	7.79	6.45	6.87	14.46	12.6	12.4
762	5'-OH-PCB 173	7.79	6.43	6.94	14.46	12.39	12.19
763	6'-OH-PCB 173	7.79	6.13	6.84	14.46	12.11	11.91
764	6-OH-PCB 174	7.79	6.22	6.84	14.46	12.29	12.09
765	4'-OH-PCB 174	7.79	6.47	6.94	14.46	12.47	12.26
766	5'-OH-PCB 174	7.79	6.47	6.94	14.46	12.47	12.26
767	5-OH-PCB 175	7.79	6.43	6.94	14.46	12.39	12.19
768	4'-OH-PCB 175	7.79	6.47	6.94	14.46	12.47	12.26
769	6'-OH-PCB 175	7.79	6.19	6.9	14.46	12.06	11.86
770	5-OH-PCB 176	7.79	6.22	6.84	14.46	12.29	12.09
771	4'-OH-PCB 176	7.79	6.19	6.9	14.46	12.06	11.86
772	5'-OH-PCB 176	7.79	6.19	6.9	14.46	12.06	11.86
773	5-OH-PCB 177	7.79	6.47	6.94	14.46	12.47	12.26
774	6-OH-PCB 177	7.79	6.19	6.9	14.46	12.06	11.86
775	4'-OH-PCB 177	7.79	6.45	6.87	14.46	12.6	12.4

Table D1: *Continued.*

776	4-OH-PCB 178	7.79	6.43	6.94	14.46	12.39	12.19
777	4'-OH-PCB 178	7.79	6.47	6.94	14.46	12.47	12.26
778	6'-OH-PCB 178	7.79	6.19	6.9	14.46	12.06	11.86
779	4-OH-PCB 179	7.79	6.22	6.84	14.46	12.29	12.09
780	4'-OH-PCB 179	7.79	6.19	6.9	14.46	12.06	11.86
781	5'-OH-PCB 179	7.79	6.19	6.9	14.46	12.06	11.86
782	6-OH-PCB 180	7.79	6.46	6.94	14.46	12.45	12.25
783	3'-OH-PCB 180	7.79	6.8	6.99	14.46	12.95	12.74
784	6'-OH-PCB 180	7.79	6.47	6.94	14.46	12.47	12.26
785	3'-OH-PCB 181	7.79	6.45	6.87	14.46	12.6	12.4
786	5'-OH-PCB 181	7.79	6.46	6.94	14.46	12.45	12.25
787	6'-OH-PCB 181	7.79	6.19	6.9	14.46	12.06	11.86
788	6-OH-PCB 182	7.79	6.19	6.9	14.46	12.06	11.86
789	3'-OH-PCB 182	7.79	6.47	6.94	14.46	12.47	12.26
790	5-OH-PCB 183	7.79	6.46	6.94	14.46	12.45	12.25
791	3'-OH-PCB 183	7.79	6.51	6.94	14.46	12.55	12.35
792	6'-OH-PCB 183	7.79	6.19	6.9	14.46	12.06	11.86
793	5-OH-PCB 184	7.79	6.19	6.9	14.46	12.06	11.86
794	3'-OH-PCB 184	7.79	6.19	6.9	14.46	12.06	11.86
795	3'-OH-PCB 185	7.79	6.51	6.94	14.46	12.55	12.35
796	4'-OH-PCB 185	7.79	6.51	6.94	14.46	12.55	12.35
797	6'-OH-PCB 185	7.79	6.22	6.84	14.46	12.29	12.09
798	3'-OH-PCB 186	7.79	6.13	6.84	14.46	12.11	11.91
799	4'-OH-PCB 186	7.79	6.19	6.9	14.46	12.06	11.86
800	4-OH-PCB 187	7.79	6.46	6.94	14.46	12.45	12.25
801	3'-OH-PCB 187	7.79	6.51	6.94	14.46	12.55	12.35
802	6'-OH-PCB 187	7.79	6.19	6.9	14.46	12.06	11.86
803	4-OH-PCB 188	7.79	6.19	6.9	14.46	12.06	11.86
804	3'-OH-PCB 188	7.79	6.19	6.9	14.46	12.06	11.86
805	6-OH-PCB 189	7.79	6.75	6.99	14.46	12.85	12.64
806	2'-OH-PCB 189	7.79	6.76	6.99	14.46	12.86	12.66
807	2'-OH-PCB 190	7.79	6.45	6.87	14.46	12.6	12.4
808	5'-OH-PCB 190	7.79	6.84	6.99	14.46	13.03	12.83
809	6'-OH-PCB 190	7.79	6.46	6.94	14.46	12.45	12.25
810	5-OH-PCB 191	7.79	6.75	6.99	14.46	12.85	12.64
811	2'-OH-PCB 191	7.79	6.47	6.94	14.46	12.47	12.26
812	2'-OH-PCB 192	7.79	6.43	6.94	14.46	12.39	12.19
813	4'-OH-PCB 192	7.79	6.84	6.99	14.46	13.03	12.83
814	4-OH-PCB 193	7.79	6.75	6.99	14.46	12.85	12.64
815	2'-OH-PCB 193	7.79	6.47	6.94	14.46	12.47	12.26
816	6-OH-PCB 194	8.43	6.99	7.4	15.23	13.22	13

Table D1*: Continued.*

817	5'-OH-PCB 195	8.43	6.99	7.4	15.23	13.22	13
818	6'-OH-PCB 195	8.43	6.71	7.37	15.23	12.81	12.6
819	6-OH-PCB 196	8.43	6.71	7.37	15.23	12.81	12.6
820	5'-OH-PCB 196	8.43	6.99	7.4	15.23	13.22	13
821	5-OH-PCB 197	8.43	6.71	7.37	15.23	12.81	12.6
822	4'-OH-PCB 198	8.43	6.99	7.4	15.23	13.22	13
823	6'-OH-PCB 198	8.43	6.71	7.37	15.23	12.81	12.6
824	6-OH-PCB 199	8.43	6.71	7.37	15.23	12.81	12.6
825	4'-OH-PCB 199	8.43	6.99	7.4	15.23	13.22	13
826	4'-OH-PCB 200	8.43	6.71	7.37	15.23	12.81	12.6
827	5'-OH-PCB 200	8.43	6.71	7.37	15.23	12.81	12.6
828	5-OH-PCB 201	8.43	6.71	7.37	15.23	12.81	12.6
829	4'-OH-PCB 201	8.43	6.71	7.37	15.23	12.81	12.6
830	4-OH-PCB 202	8.43	6.71	7.37	15.23	12.81	12.6
831	3'-OH-PCB 203	8.43	7.03	7.4	15.23	13.3	13.09
832	6'-OH-PCB 203	8.43	6.71	7.37	15.23	12.81	12.6
833	3'-OH-PCB 204	8.43	6.71	7.37	15.23	12.81	12.6
834	2'-OH-PCB 205	8.43	6.99	7.4	15.23	13.22	13
835	6'-OH-PCB 206	9.08	7.27	7.86	16.01	13.55	13.32
836	5'-OH-PCB 207	9.08	7.27	7.86	16.01	13.55	13.32
837	4'-OH-PCB 208	9.08	7.27	7.86	16.01	13.55	13.32

Sampling Site Metadata

Table D2: Summary of sampling sites across the metropolitan Chicago area.

Sampling Site	*Location ID*	*Longitude*	*Latitude*
Aurora	AU	-88.329374	41.784717
Channahon Park	CN	-88.187542	41.468465
Chase Park	CP	-87.669303	41.967150
Graves Elementary School	GE	-87.805740	41.782596
Harrison Crib	HC	-87.572256	41.916117
IIT	IT	-87.624700	41.834400
Jefferson Park	JP	-87.762946	41.968148
Joliet Township	JT	-88.124903	41.529934
JWPP Over Intake	JN	-87.606188	41.8959050
JWPP SE Corner	JS	-87.602717	41.89355
Kane County Health Department	KC	-88.329528	41.784623
Lemont	LM	-87.990570	41.668120
Lemont High School	LH	-87.992357	41.674019
Naperville City Hall	NC	-88.153036	41.770978
Norwood Park	NP	-87.794134	41.986593
Portage Park	PP	-87.762161	41.955091
Sauganash Park	SP	-87.737399	41.988401
Schiller Park	SL	-87.865005	41.954700
Village of McCook	VM	-87.832527	41.800371
Waukegan Harbor	WH	-87.822736	42.363092
Winnemac Park	WP	-87.684438	41.974165

OH PCB in Samples

Table D3: Summary of concentrations (pg m^{-3}) of 2-OH-PCB-2 and 6-OH-PCB-2 in all samples.

Site ID	*Date Deployed*	*Date Collected*	*2-OH-PCB-2*	*6-OH-PCB-2*
AU	6/30/2013	8/4/2013	0.814	0.091
AU	8/4/2013	9/14/2013	0.186	0.189
AU	5/21/2013	6/30/2013	0.198	0.179
CN	7/12/2013	8/23/2013	0.109	0.018
CN	2/19/2013	4/2/2013	0.067	0.009
CN	5/14/2013	7/12/2013	0.115	0.062
IT	7/22/2013	9/3/2013	1.975	0.161
IT	n/a	10/31/2012	4.209	2.224
IT	10/22/2013	11/25/2013	1.211	0.781
IT	5/1/2013	6/25/2013	1.613	0.414
IT	2/1/2013	3/19/2013	0.874	0.304
IT	11/25/2013	1/14/2014	0.619	0.249
IT	6/25/2013	7/22/2013	0.594	0.494
IT	3/19/2013	5/1/2013	0.702	0.413
JN	6/27/2013	8/13/2013	0.387	0.038
JN	4/11/2013	5/23/2013	0.107	0.018
JN	5/23/2013	6/27/2013	0.744	0.047
JN	9/23/2013	11/5/2013	0.368	0.021
JN	11/5/2013	12/12/2013	0.72	0.238
JN	1/10/2013	2/21/2013	0.315	0.165
JN	2/21/2013	4/11/2013	0.159	0.068
JP	8/30/2012	10/5/2012	1.328	0
JP	10/5/2012	11/25/2012	0.347	0
JP	11/25/2012	1/11/2013	0.423	0
JP	1/11/2013	2/22/2013	0.145	0
JP	2/22/2013	4/5/2013	0.505	0
JP	4/5/2013	5/17/2013	1.622	0.05
JP	5/17/2013	6/28/2013	0.794	0.044
JP	6/28/2013	8/9/2013	1.531	0.112
JP	10/31/2013	1/29/2014	0.138	0.015
JP	8/9/2013	9/20/2013	0.77	0.125
JS	1/10/2013	2/21/2013	0.583	0.274
JS	2/21/2013	4/11/2013	0.178	0.063
JS	4/11/2013	5/23/2013	0.225	0.083
JS	5/23/2013	6/27/2013	0.639	0.155
JS	9/23/2013	11/5/2013	0.845	0.326

Table D3: *Continued*

JS	11/5/2013	12/12/2013	0.97	0.448
JT	7/12/2013	9/4/2013	0.244	0.04
JT	11/26/2012	1/11/2013	0.312	0.038
JT	1/11/2013	2/22/2013	0.373	0.026
JT	2/22/2013	4/5/2013	0.501	0.021
JT	4/5/2013	5/29/2013	0.19	0.026
JT	5/29/2013	7/12/2013	0.263	0.031
JT	10/16/2013	11/25/2013	0.865	0.071
LH	7/12/2013	8/23/2013	0.133	0.031
LH	5/21/2013	7/12/2013	0.109	0.044
LM	8/23/2013	9/23/2013	0.043	0.079
NC	6/30/2013	8/4/2013	0.142	0.021
NC	8/4/2013	9/14/2013	0.299	0.185
NC	5/21/2013	6/30/2013	0.206	0.073
PP	6/11/2013	7/27/2013	1.066	0.443
PP	7/27/2013	8/30/2013	0.492	0.425
SL	6/12/2013	7/27/2013	0.468	0.185
SL	1/12/2013	2/28/2013	0.271	0.211
SP	8/1/2013	8/30/2013	0.767	0.765
VM	6/30/2013	8/4/2013	0.084	0.012
VM	8/4/2013	9/14/2013	1.073	0.826
VM	5/14/2013	6/30/2013	1.673	2.369
WH	1/24/2013	3/7/2013	0.787	0.286
WH	12/13/2012	1/24/2013	1.621	0.531
WP	9/15/2012	10/13/2012	0	0
WP	10/13/2012	11/16/2012	0	0
WP	11/16/2012	1/17/2013	0.227	0
WP	1/17/2013	4/30/2013	0.101	0
WP	4/30/2013	6/11/2013	0.086	0.006
WP	6/11/2013	8/1/2013	0.48	0.043
WP	8/30/2013	10/23/2013	0.243	0.03
WP	10/23/2013	11/25/2013	0.244	0.036
WP	8/1/2013	8/30/2013	0.66	0.094

Table D4: Raw mass of OH-PCBs (pg) collected at the north side of the Jardine Water Plant (JN).

Location ID	JN	JN	JN	JN	JN	JN	JN
Date Deployed	6/27/2013	4/11/2013	5/23/2013	9/23/2013	11/5/2013	1/10/2013	2/21/2013
Date Collected	8/13/2013	5/23/2013	6/27/2013	11/5/2013	12/12/2013	2/21/2013	4/11/2013
5-OH-PCB 2	0	0	0	0	6.89	0	0
3'-OH-PCB 2	0	0	0	0	9.38	0	0
2-OH-PCB 2	61.99	17.35	93.03	54.51	104.03	51.31	29.47
2'-OH-PCB 2	0	0	0	2.06	0.07	0.02	0.03
6-OH-PCB 2	6.1	2.92	5.92	3.09	34.32	26.92	12.58
4-OH-PCB 1	0	0	0	0	0	0	0
4'-OH-PCB 2	0	0	0	0	0	0	0
4'-OH-PCB 3	0	1.98	2.22	0	0	0	0
4-OH-PCB 2	0	6.67	4.74	0	0	0	0
2'-OH-PCB 5	0	0	0	0	0	0	0
2'-OH-PCB 12	0	0	0	0	0	0	72.51
3'-OH-PCB 9	0	0	0	0	0	0	0
4'-OH-PCB 9+ 4-OH-PCB 14	0	0	0	0	0	0	0
2'-OH-PCB 30	0	0	0	0	6.1	0	1.53
6'-OH-PCB 26	0	0	0	0	8.43	0	2.18
3'-OH-PCB 30	0	0	0	0	0	0	0
4'-OH-PCB 30	0	0	0	0	6.44	0	0
4'-OH-PCB 18	0	19.78	43.34	10.37	65.85	32.8	417.07
4'-OH-PCB 26	0	0	0	0	12.24	3.06	0
2'-OH-PCB 65+ 6'-OH-PCB 69	0	0	0	0	4.58	0	0
2'-OH-PCB 61	0	0	21.66	0	0	0	0
3-OH-PCB 54	0	1.46	0	0	12.56	3.56	3.1
4'-OH-PCB 65	0	2.16	0	0	6.93	4.63	2.06
3'-OH-PCB 65	0	0	0	0	0	0	0
4'-OH-PCB 72	0	4.45	0	0	16.13	7.78	3.81
4'-OH-PCB 69	0	2.85	0	0	10.88	4.42	2.8
4-OH-PCB 65	0	8.35	27.1	13.43	17.44	10.64	29.68
3'-OH-PCB 61	0	0	0	0	0	0	0
4'-OH-PCB 61	0	0	0	0	24.46	7.46	5.99
4'-OH-PCB 79	0	0	0	0	0	0	0
6'-OH-PCB 101	7.53	0	0	0	13.21	3.08	1.93
6'-OH-PCB 83	4.31	3.15	4.89	2.22	12.28	2.75	3.68
2'-OH-PCB 106+ 2'-OH-PCB 114	3.2	6.35	5.96	4.93	16.63	4.93	7.61
4'-OH-PCB 93	0	0	0	0	3.49	3.49	0
4'-OH-PCB 120	0	0	0	0	15.3	7.04	0
4'-OH-PCB 101	4.27	12.01	4.78	3.98	20.33	7.98	9.89
4'-OH-PCB 86	0	0	0	0	29	5.53	9.55

Table D4: *Continued.*

4'-OH-PCB 108 + 3-OH-PCB 118 + 4-OH-PCB 107	0	30.71	40.96	0	43.37	24.57	22.33
4'-OH-PCB 97	0	0	0	0	18.84	10.05	1.77
4'-OH-PCB 127	0	0	0	0	9.53	0	3.65
4-OH-PCB 134	0	0	0	0	2.13	0	1.28
4-OH-PCB 146	0	0	0	0	3.87	0	3.04
3'-OH-PCB 138	0	0	17.31	0	3.46	0	2.89
4'-OH-PCB 130	0	0	0	0	3.28	0	3.36
4-OH-PCB 163	0	0	0	0	3.62	0	3.34
4'-OH-PCB 159	0	0	0	0	3.47	0	4.49
4-OH-PCB 162	0	0	0	0	4.16	0	3.96
5-OH-PCB 138	0	0	2.42	0	7.2	0	10.88
3,3'-diOH-PCB 155	0	0	0	0	3.11	0	0
3'-OH-PCB 184	0	0	3.33	0	11.2	5.8	5.56
4-OH-PCB 178 + 3'-OH-PCB 182	11.52	0	19.93	0	32.63	12.53	17.15
3-'OH-PCB 183	0	0	0	0	15.61	5.59	7.26
5-OH-PCB 183+ 4-OH-PCB 187	15.16	0	44.75	0	36.55	15.16	20.72
4-OH-PCB 177	6.45	0	8.64	0	15	5.82	9.21
3'-OH-PCB 180	2.64	0	5.99	0	19.9	6.7	10
4'-OH-PCB 172	0	0	0	0	13.52	0	6.71
4-OH-PCB 193	0	0	0	0	17.17	7.3	13.49
4-OH-PCB 202	0	2.99	5.67	0	14.56	5.85	10.25
4'-OH-PCB 201	0	0	4.47	0	17.63	6.5	10.86
4'-OH-PCB 198+ 4'-OH-PCB 200+ 3'-OH-PCB 203	0	0	0	0	15.6	0	28.01
4'-OH-PCB 199	0	0	6.56	0	18.11	6.54	13.22
4,4'-diOH-PCB 202	0	0	0	0	14.62	4.88	10.88
4'-OH-PCB 208	0	0	0	0	15.45	5.67	14.06

Table D5: Raw mass of OH-PCBs (pg) collected at the south side of the Jardine Water Plant (JS).

Location ID	JS	JS	JS	JS	JS	JS
Date Deployed	1/10/2013	2/21/2013	4/11/2013	5/23/2013	9/23/2013	11/5/2013
Date Collected	2/21/2013	4/11/2013	5/23/2013	6/27/2013	11/5/2013	12/12/2013
5-OH-PCB 2	0	0	0	0	0	0
3'-OH-PCB 2	0	0	0	0	0	0
2-OH-PCB 2	95.1	33.01	36.46	79.9	125.24	140.12
2'-OH-PCB 2	0.01	0.06	0.03	0.02	0.01	0.15
6-OH-PCB 2	44.75	11.77	13.44	19.37	48.26	64.76
4-OH-PCB 1	0	0	0	0	0	0
4'-OH-PCB 2	0	0	0	0	0	0
4'-OH-PCB 3	0	0	0	0	0	0
4-OH-PCB 2	0	0	0	0	0	0
2'-OH-PCB 5	0	0	0	0	0	0
2'-OH-PCB 12	0	0	0	0	0	0
3'-OH-PCB 9	0	0	0	0	0	0
4'-OH-PCB 9+ 4-OH-PCB 14	0	0	0	0	0	0
2'-OH-PCB 30	0	0	7.63	0	0	0
6'-OH-PCB 26	0	0	16.54	3.53	0	0
3'-OH-PCB 30	0	0	13.93	0	0	0
4'-OH-PCB 30	0	0	12.59	0	0	0
4'-OH-PCB 18	15.94	7.94	21.26	34.88	19.5	0
4'-OH-PCB 26	0	0	18.6	0	0	0
2'-OH-PCB 65+ 6'-OH-PCB 69	0	0	55.3	0	0	0
2'-OH-PCB 61	0	0	22.47	0	0	0
3-OH-PCB 54	0	0	15.23	2.34	1.84	0
4'-OH-PCB 65	0	0	0	1.36	0	0
3'-OH-PCB 65	0	0	0	0	0	0
4'-OH-PCB 72	0	0	30.69	1.9	2.48	0
4'-OH-PCB 69	0	2.16	24.86	2.62	3.81	4.1
4-OH-PCB 65	0	6.1	6.61	30.2	15.6	11.14
3'-OH-PCB 61	0	7.16	38.39	0	9.15	0
4'-OH-PCB 61	4.24	2.68	50.38	0	4.05	6.06
4'-OH-PCB 79	0	0	15.18	0	0	0
6'-OH-PCB 101	1.1	1.11	28.73	5.3	6.4	1.87
6'-OH-PCB 83	2.69	1.96	26.17	2.76	2.45	1.03
2'-OH-PCB 106+ 2'-OH-PCB 114	3.42	2.05	31.45	5.97	9.22	3.27
4'-OH-PCB 93	0	0	15.76	0	0	0
4'-OH-PCB 120	0	0	20.91	0	0	0
4'-OH-PCB 101	0	0	18.34	5.14	8.04	5.53

Table D5: *Continued.*

4'-OH-PCB 86	0	0	25.07	0	7.81	0
4'-OH-PCB 108 + 3-OH-PCB 118 + 4-OH-PCB 107	0	9.61	44.26	11.41	11.82	11.05
4'-OH-PCB 97	0	0	13.57	4.05	5.24	5.44
4'-OH-PCB 127	0	1.05	17.95	1.2	5.24	0
4-OH-PCB 134	0	0	15.91	0	0	0
4-OH-PCB 146	0	0	9.2	0	2.77	0
3'-OH-PCB 138	0	0	7.06	0	3.27	0
4'-OH-PCB 130	0	0	9.38	0	0	0
4-OH-PCB 163	0	0	13.39	0	3.03	3.19
4'-OH-PCB 159	0	0	24.68	0	0	0
4-OH-PCB 162	0	0	15.67	0	0	0
5-OH-PCB 138	0	0	15.35	0	6.03	7.07
3,3'-diOH-PCB 155	0	0	11.32	0	0	0
3'-OH-PCB 184	0.27	3.81	11.17	1.41	3.59	1.95
4-OH-PCB 178 + 3'-OH-PCB 182	6.36	2.21	23.05	4.8	7.53	9.5
3-'OH-PCB 183	0.87	3.33	9.86	4.6	7.11	2.65
5-OH-PCB 183+ 4-OH-PCB 187	10.23	5.57	23.71	7.04	11.93	8.77
4-OH-PCB 177	4.26	4.1	9.64	4.31	4	2.92
3'-OH-PCB 180	1.89	2.68	10.29	5.16	6	6.74
4'-OH-PCB 172	1.96	2.5	10.19	2.39	4.94	6.1
4-OH-PCB 193	2.5	1.29	8.76	4.85	4.03	7.43
4-OH-PCB 202	4.72	3.23	5.82	4.69	6.15	7.87
4'-OH-PCB 201	2.98	4.34	9.51	5.18	6.53	7.69
4'-OH-PCB 198+ 4'-OH-PCB 200+ 3'-OH-PCB 203	0	0	20.09	7.65	10.72	20.71
4'-OH-PCB 199	6.77	2.13	9.3	5.99	8.79	8.46
4,4'-diOH-PCB 202	2.95	3.27	7.2	4.53	4.75	7.01
4'-OH-PCB 208	3.4	2.4	7.35	5.69	6.01	9.94

PCBs in Samples

Table D6: PCB concentration (pg m^{-3}) data for the Aurora (AU, n=11) and Kane County Health Department (KC, n=2) sampling sites.

Location ID	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	AU	KC	KC
Deployment	11/19/12	09/14/13	06/20/12	10/14/12	06/30/13	10/27/13	04/07/13	02/24/13	12/29/12	08/04/13	05/21/13	08/03/12	09/18/12
Collection	12/29/12	10/27/13	08/03/12	11/19/12	08/04/13	12/01/13	05/21/13	04/07/13	02/24/13	09/14/13	06/30/13	09/18/12	10/14/12
1	0	0	0	2.74	0	1.96	3.32	1.38	24	2.08	2.32	5.95	4.99
2	0	0	0	1.33	0.42	0.97	1.28	0.74	0.13	0.75	0.58	0	1.36
3	5.06	0	1.08	3.85	2.65	1.68	8.34	1.09	0.18	3.18	4.41	27.2	50.4
4	5.32	3.56	6.58	5.06	2.48	2.97	7.85	2.54	0.28	6.28	6.71	16.2	20.2
5	0	0	0.24	0.2	0	0.14	0.31	0.16	0	0.27	0.11	0	0.32
6	1.52	0	2.28	1.13	0.61	0.85	1.86	0.87	0.15	1.42	1.11	5.04	2.01
7	1.98	0	0.34	0.34	0.17	0.21	0.56	0.24	0.08	0	0.13	0	0.94
8	7.35	0	10.7	4.83	2.88	3.84	7.22	3.64	0.39	6.62	6.36	21.0	7.99
9	0	0	0.83	0.45	0.21	0.32	0.73	0.34	0.07	0	0	1.77	0.69
10	0.82	0	0.31	0.25	0.09	0.15	0.54	0.19	0.06	0	0	0	0.81
11	6.58	5.82	16.6	10.9	5.43	3.54	13.8	5.93	9.61	10.5	10.5	11.9	8.13
12/13	0	0	0.76	0.51	0.18	0.25	0.51	0.27	0	0	0	3.37	3.97
15	0	0	4.54	1.02	0.69	0.67	1.32	0.66	0	0.97	0.66	5.51	1.68
16	4.14	0	7.03	2.02	1.21	1.39	2.62	1.61	0.21	3.65	3.33	6.96	2.69
17	5.01	0	8.13	2.1	1.29	1.62	2.77	1.52	0.2	3.64	3.34	7.33	3.13
18/30	10.02	0	0	4.44	2.71	3.39	5.56	3.13	0.49	7.41	6.82	15.8	6.67
19	0	0	1.29	0.82	0.39	0.54	1.07	0.54	0.07	1.53	1.75	0	1.73
20/28	10.44	0	17.9	3.58	2.35	2.34	4.66	2.68	0.48	5.95	5.28	12.8	3.91
21/33	5.71	0	8.71	2.13	1.3	1.35	2.71	1.78	0.32	3.52	3.36	7.72	2.01
22	3.28	0	7.1	1.17	0.8	0.8	1.55	0.93	0.19	2.1	1.92	3.69	1.19
23	0	0	0.36	0.03	0	0	0.04	0.04	0.02	0	0	0	0.08
24	0	0	0.26	0.09	0.05	0.08	0.14	0.07	0.03	0.17	0.13	0	0.14
25	0	0	1.76	0.36	0.23	0.22	0.49	0.28	0.08	0.59	0.5	1.42	0.41
26/29	0	0	3.33	0.7	0.45	0.51	1.06	0.65	0.58	1.22	1.19	2.49	0.91
27	0	0	0.84	0.31	0.17	0.23	0.49	0.26	0.05	0.56	0.66	1.54	0.49
31	11.72	0	17.6	3.32	2.19	2.31	4.4	2.56	0.45	5.88	5.24	13.8	3.37
32	2.87	0	7.01	1.23	0.76	0.88	1.76	0.93	0.16	2.15	2	4.59	1.5
34	0	0	0.09	0.03	0	0.02	0.05	0.03	0.02	0.11	0	0	0
35	0	0	0.29	0.17	0.09	0.07	0.3	0.16	0.03	0	0	0	0.21
36	0	0	0.03	0.05	0	0	0.11	0.04	0	0	0	0	0.09
37	0	0	2.67	0.59	0.37	0.28	0.6	0.38	0.14	0.69	0.55	2.82	0.54
38	0	0	0.04	0.06	0	0	0.07	0	0.02	0	0	0	0.1
39	0	0	0.05	0.02	0	0	0.03	0	0	0	0	0	0.03
40/41/71	4.23	0	2.55	1.27	0.72	0.67	1.53	0.85	0.24	2.37	2.28	4.16	1.5
42	1.91	0	1.69	0.67	0.42	0.32	0.77	0.41	0.11	1.21	1.23	1.7	0.76
43	0	0	0.28	0.09	0.08	0.06	0.19	0.12	0	0.18	0	0	0

Table D6: *Continued.*

44/47/65	7.86	0	0	3.07	1.89	1.59	3.38	1.85	0.88	5.47	5.08	7.62	3.34
45/51	0	0	1.24	0.73	0.41	0.51	1.15	0.63	0.14	1.49	1.47	0	0.9
46	0	0	0.42	0.22	0.12	0.15	0.32	0.18	0.04	0.49	0.46	0	0.25
48	2.16	0	1.41	0.55	0.35	0.31	0.74	0.42	0.11	1.06	0.91	1.78	0.67
49/69	5.14	0	4.2	2.03	1.18	1.04	2.41	1.27	0	3.24	3	4.75	2.38
50/53	0	0	0.88	0.96	0.68	0	1.11	0.73	0	1.51	1.44	0	1.2
52	9.92	0	11.65	5.59	2.8	2.62	5.97	2.98	0	8.72	7.4	12.13	7.33
54	0	0	0	0.04	0	0.03	0.08	0.04	0.02	0	0	0	0.09
55	0	0	0.15	0	0	0.04	0.13	0.07	0.02	0	0	0	0
56	0	0	1.54	0.5	0.32	0	0.6	0.34	0	0.98	0.8	1.81	0.71
57	0	0	0	0	0	0	0.06	0	0.02	0	0	0	0.08
58	0	0	0	0	0	0	0.02	0	0	0	0	0	0
59/62/75	0	0	0.54	0.3	0.15	0.17	0.41	0.26	0.09	0.51	0.5	0	0.44
60	1.33	0	0.87	0.33	0.17	0.13	0.39	0.24	0.11	0.52	0.44	0	0.45
61/70/74/76	7.84	0	5.66	3.3	1.68	1.33	3.55	1.97	0	5.12	4.4	8.57	4.21
63	0	0	0	0.09	0.04	0.04	0.14	0.08	0	0	0	0.41	0
64	2.65	0	2.8	1.24	0.71	0.52	1.35	0.71	0	2.05	1.69	2.96	1.3
66	3.2	0	2.8	1.02	0.63	0.51	1.31	0.75	0	1.97	1.82	4	1.19
67	0	0	0	0.07	0.03	0.05	0.08	0.07	0	0	0	0.72	0.1
68	0	0	0	0.34	0	0	0.42	0.38	0.28	0.5	0.49	0	0.43
72	0	0	0	0.05	0	0	0.05	0.03	0	0	0	0	0
73	0	0	0	0.1	0	0	0.11	0.11	0.09	0	0	0	0.16
77	0	0	0.2	0	0.07	0	0.15	0.07	0	0	0	0	0
78	0	0	0.05	0	0	0	0	0.04	0.05	0	0	0	0
79	0	0	0	0	0	0	0	0.03	0.02	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0.05	0	0	0	0	0	0	0	0	0	0
82	0	0	0.28	0.26	0.15	0.16	0.34	0.15	0	0	0.29	0	0.39
83/99	4.85	0	1.83	1.45	0.7	0.64	1.4	0.67	0	2.02	1.81	3.29	1.79
84	0	0	1.39	1.1	0.53	0.51	1.1	0.56	0	1.73	1.48	0	1.45
85/116/117	0	5.03	0	0	0	0	2.4	2.52	2.01	0	0	3.93	2.94
86/87/97/ 109/119/125	0	0	2.38	1.91	1.09	1.09	2.22	1.11	0	3.4	2.52	0	2.74
88/91	0	0	0.49	0.5	0.22	0.22	0.63	0.3	0	0.71	0.66	0	0.7
89	0	0	0.03	0.05	0	0	0.06	0.03	0	0.11	0.06	0	0.06
90/101/113	0	9.03	4.81	3.66	1.77	1.75	3.71	1.83	0	5.7	4.49	6.56	4.79
92	0	0	1.05	0.65	0.31	0.32	0.69	0.35	0	0.91	0.87	8.45	0.86
93/95/98/ 100/102	0	0	5.24	3.89	1.77	1.97	3.98	2.03	0	5.76	4.97	0	5.17
94	1.13	0	0.02	0.03	0	0	0.04	0.02	0	0	0.08	0	0.07
96	0	0	0.02	0.05	0	0	0.09	0.04	0.01	0.1	0	0	0.1
103	0	0	0	0.04	0	0	0.05	0.04	0	0.23	0	0	0.09

Table D6: *Continued.*

104	0	0	0	0	0	0	0.04	0.03	0	0	0	0	0.04
105	0	0	0.68	0.3	0.23	0.27	0.44	0.23	0	0.75	0.66	1.2	0.41
106	0	0	0	0	0	0	0	0	0	0	0	0	0
107	0.72	0	0.12	0.07	0.06	0	0.1	0.05	0	0	0.15	0.67	0.12
108/124	0	0.68	0	0.06	0	0	0.16	0.07	0	0.09	0.18	0	0.14
110/115	0	0	4.79	2.89	1.56	1.57	2.85	1.48	0	3.96	3.59	5.4	3.76
111	0	0	0	0	0	0	0.02	0	0	0	0	0	0
112	0	0	0.02	0	0	0	0.05	0	0	0	0.07	0	0.05
114	0	0	0	0	0	0	0	0	0	0	0	0	0
118	2.81	0	2.41	1.16	0.73	0.79	1.26	0.63	0	2.16	1.91	3.7	1.45
120	0	0	0	0	0	0	0	0	0	0	0	0	0.05
121	0	0	0	0	0	0	0	0	0.29	0.02	0.03	0	0
122	0	0	0.02	0	0	0	0	0	0	0	0	0	0
123	0	0	0.03	0	0	0	0	0	0	0	0	0	0
126	0	3.88	0	0	0	0	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0	0	0	0	0	0	0
129/138/ 160/163	0	0	1.92	1.13	0.71	0.83	0.99	0.48	0	2.57	2.07	0	1.34
130	0.43	0	0	0.07	0.04	0.04	0.1	0.03	0.02	0.12	0.12	0.42	0.1
131	0	0	0	0.02	0.01	0	0.05	0.02	0	0.08	0	0	0.03
132	10.27	0	0.82	0.51	0.29	0.35	0.45	0.23	0	1.25	0.94	0	0.7
133	0	0	0	0.02	0	0	0.04	0	0	0	0	0	0.03
134/143	0	0	0.17	0.14	0.07	0.07	0.14	0.07	0	0.12	0.27	0	0.19
135/151/154	0	0	1.17	0.84	0.42	0.47	0.7	0.35	0	1.41	1.13	1.5	1.05
136	0	1.64	0.4	0.42	0.21	0.26	0.34	0.18	0.44	0.79	0.69	0	0.55
137	0	0	0.05	0.07	0.03	0.04	0.07	0	0	0.1	0.15	0	0.04
139/140	0	0	0.03	0.05	0	0	0.08	0.04	0.02	0.12	0	0	0.08
141	0	0	0.38	0.27	0.16	0.16	0.22	0.11	0	0.59	0.32	0	0.3
142	0	0	0	0	0	0	0.01	0	0	0.01	0	0	0.02
144	0	0	0.17	0.12	0.06	0.07	0.11	0.04	0	0.26	0	0	0.15
145	0	0	0	0.01	0	0	0.02	0.01	0	0	0	0	0.05
146	0	0	0.3	0.19	0.11	0.11	0.19	0.09	0	0.35	0.31	0	0.25
148	0	0	0	0	0	0	0.01	0.01	0	0	0.06	0	0.04
147/149	0	0	2.55	1.52	0.89	1.03	1.32	0.64	0	3.05	2.39	2.97	1.87
150	0	0	0	0	0	0	0.02	0.01	0	0	0	0	0.05
152	0	0	0	0	0	0	0.02	0	0	0	0	0	0.04
153/168	0	0	1.82	1.03	0.63	0.68	0.93	0.48	0	2.26	1.88	1.81	1.29
155	0	0.55	0	0	0	0	0.02	0.01	0	0	0	0	0.04
156/157	0	0	0.09	0.07	0.04	0.04	0.08	0	0	0	0	0	0
158	0	0	0.09	0.11	0.07	0.07	0.13	0.06	0	0.24	0.25	0	0.09
159	0	0	0	0	0	0	0	0	0	0	0	0	0
161	0	0	0	0	0	0	0.03	0.01	0	0.06	0	0	0.02

Table D6: *Continued.*

162	0	0	0	0	0	0	0	0	0	0	0	0	0
164	0	0	0.03	0.06	0.04	0.05	0.1	0	0.02	0.14	0.14	0	0.08
165	0	0	0	0.01	0	0	0.02	0.01	0	0	0	0	0.01
167	0	0	0.03	0	0	0	0.03	0	0	0	0	0	0.03
169	0	0	0	0	0	0	0	0.01	0	0	0	0	0
170	0	0	0.26	0.1	0	0.1	0.09	0.05	0.04	0	0	0	0
171/173	0	0	0.11	0.06	0	0.06	0.09	0.06	0	0	0	0	0
172	0	0	0.05	0	0	0	0.04	0	0	0	0	0	0
174	0	0	0.36	0.15	0.12	0.11	0.15	0.1	0.06	0.45	0.48	0	0.22
175	0	0	0	0	0	0	0.03	0	0	0	0.05	0	0.02
176	0.68	0	0.04	0.05	0.02	0.02	0.06	0.04	0.01	0.04	0.05	0	0.07
177	0	0	0.19	0.09	0.05	0.08	0.12	0.06	0	0.3	0.23	0	0.12
178	0	0	0	0.04	0.03	0.03	0.07	0.03	0.02	0.05	0.07	0	0.05
179	0	0	0.3	0.17	0.1	0.13	0.17	0.09	0.03	0.28	0.24	0	0.23
180/193	0	0	0.65	0.29	0.14	0.21	0.23	0.13	0.08	0.45	0.61	0	0.38
181	0	0	0	0	0	0	0	0	0	0	0	0	0
182	0	0	0	0	0	0	0	0	0	0	0	0	0
183/185	0	0	0.37	0.11	0.09	0	0.13	0.07	0.12	0.29	0.32	0	0.15
184	0	0	0	0	0	0	0	0	0	0	0	0	0
186	0	0	0	0	0	0	0	0	0	0	0	0	0.05
187	0	0	0.51	0.3	0.21	0.19	0.24	0.14	0	0.68	0.72	0	0.38
188	0	0	0	0	0	0	0	0	0	0	0	0	0
189	0	0	0.06	0	0	0	0.03	0	0	0	0	0	0
190	0	0	0.06	0	0	0	0.04	0	0	0	0	0	0
191	0	0	0.03	0	0	0	0.04	0.03	0.02	0	0	0	0
192	0	0	0	0	0	0	0.02	0	0	0	0	0	0
194	0	0	0.11	0	0	0	0.1	0	0.14	0	0	0	0
195	0	0	0.04	0	0	0	0.08	0	0	0	0	0	0
196	0	0	0.06	0.06	0	0	0.09	0	0	0	0	0	0
197/200	0	0	0.05	0	0	0	0	0	0	0.08	0	0	0
198/199	0	0	0.14	0.13	0	0	0.12	0.1	0	0	0.42	0	0
201	0	0	0.04	0.03	0.02	0	0.05	0.03	0.01	0.16	0	0	0.04
202	0	0	0.11	0.14	0	0	0.14	0.12	0.07	0.31	0.28	0	0.19
203	0	0	0.09	0	0	0	0.1	0	0	0	0.35	0	0
205	0	0	0	0	0	0	0.07	0	0	0	0	0	0
206	0	1.12	0	0	0	0	0.12	0	0	0	0	1.98	0
207	0	0	0	0	0	0	0.06	0	0	0	0	0	0
208	0	0	0	0	0	0	0.06	0	0	0	0	0	0
209	0	0	0	0.48	0	0	0	0	0	0	0	0	0.63

Table D7: PCB concentration (pg m^{-3}) data for the Channahon Park (CN, n=11) sampling site.

Location ID	*CN*	*CN*	*CN*	*CN*	*CN*	*CN*	*CN*	*CN*	*CN*	*CN*	*CN*
Deployment	06/06/12	11/19/12	08/23/13	07/18/12	09/13/12	10/11/12	07/12/13	04/02/13	01/12/13	02/19/13	05/14/13
Collection	07/18/12	01/12/13	09/19/13	09/13/12	10/11/12	11/19/12	08/23/13	05/14/13	02/19/13	04/02/13	07/12/13
1	0	4.06	0	11.55	3.92	1.99	2.43	8.23	1.51	1.05	2.72
2	0	1.95	0	1.95	0.9	1	0.82	0.6	0.88	0.37	0.72
3	0	3.54	0	35.34	38.35	3.06	2.74	13.89	1.82	0.91	3.45
4	4.03	5.42	0	19.18	15.54	3.32	5.53	7.65	2.58	2.16	6.65
5	0	0	0	0.43	0.23	0.16	0	0.12	0.12	0.08	0.16
6	1.32	1.88	0	2.19	1.57	0.6	0.97	0.96	0.57	0.42	1.12
7	0	3.1	0	0.92	0.74	0.22	0.29	0.3	0.21	0.12	0.24
8	6.4	8.7	0	8.96	6.48	2.17	4.19	4.24	2.19	1.73	4.72
9	0	0	0	0.97	0.54	0.24	0.35	0.35	0.25	0	0
10	0.19	0	0	0.85	0.57	0.22	0.2	0.29	0.17	0	0
11	14.46	8.35	8.93	10.49	5.12	2.95	8.55	7.75	2.78	4.89	8.74
12/13	0.8	0	0	1.4	3.41	0.46	0.27	0.62	0.12	0.06	0.07
15	2.49	3.05	0	1.86	1.44	0.58	0.87	0.69	0.34	0.19	0.53
16	5.07	3.47	0	3.2	2.16	1.05	1.98	1.57	0.9	0.72	2.46
17	5.94	6.42	0	3.71	2.72	1.18	2.36	2.08	0.99	1.03	2.94
18/30	0	13.28	0	7.44	5.74	2.3	4.58	4.18	1.95	2.03	5.73
19	1.43	1.64	0	1.91	1.57	0.83	1	0.9	0.49	0	1.95
20/28	15.4	13.28	0	5.85	3.38	1.94	3.56	2.64	1.47	1.25	4.35
21/33	8.26	8.81	0	3.07	1.73	0.98	1.68	1.31	0.84	0.72	1.92
22	6.49	5.28	0	2.17	1.04	0.69	1.15	0.82	0.48	0.41	1.39
23	0.33	0	0	0.24	0.04	0.05	0	0.04	0	0	0
24	0.13	0	0	0.14	0	0.07	0.08	0.08	0.04	0	0.1
25	1.24	1.01	0	0.55	0.37	0.29	0.43	0.3	0.17	0.16	0.54
26/29	2.5	3.61	0	1.28	0.72	0.52	0.78	0.73	0.37	0.26	0.91
27	0.63	0.92	0	0.62	0.38	0.25	0.36	0.29	0.19	0.14	0.51
31	14.76	15.39	0	5.9	2.81	1.7	3.29	2.73	1.34	1.27	4.13
32	5.56	6.81	0	2.57	1.35	0.98	1.62	1.33	0.66	0.56	2.19
34	0.15	0.78	0	0.13	0.05	0.06	0.03	0.03	0.03	0	0.06
35	0.18	0	0	0.24	0.14	0.09	0.16	0.12	0.08	0	0
36	0.04	0	0	0.15	0.05	0.06	0	0.03	0.04	0	0
37	1.69	2.78	0	0.91	0.44	0.29	0.44	0.22	0.32	0	0.19
38	0	0	0	0.11	0.08	0.07	0.03	0.02	0.03	0	0
39	0.07	0	0	0.14	0.05	0.04	0.04	0	0	0	0
40/41/71	3.29	7.97	0	3.56	1.28	1.25	1.43	0.89	0.52	0.55	2.52
42	1.63	3.29	0	1.89	0.69	0.71	0.86	0.53	0.29	0.27	1.28
43	0.22	0	0	0.4	0.15	0.12	0.16	0.11	0.06	0	0.3
44/47/65	0	12.6	6.67	6.92	3.3	2.6	3.73	2.16	1.29	1.41	5.78
45/51	1.38	4.62	0	1.54	0.81	0.8	0.92	0.7	0.47	0.53	1.65

Table D7: *Continued.*

46	0.34	0	0	0.63	0.27	0.29	0.29	0.22	0.13	0.11	0.49
48	1.49	3.4	0	1.31	0.59	0.43	0.55	0.38	0.24	0.27	0.92
49/69	4.44	9.01	0	4.74	2.25	1.75	2.34	1.52	0.96	0.85	3.85
50/53	0.97	2.03	0	1.61	1.07	1.06	1.05	0.83	0.63	0	1.67
52	10.56	15.75	0	10.19	6.81	3.52	5.27	3.74	1.99	2.03	8.17
54	0.04	1.14	0	0.13	0.07	0.05	0.03	0.03	0.03	0	0.09
55	0.1	0	0	0.18	0	0.03	0	0	0	0	0
56	1.33	2.09	0	2.36	0.64	0.54	0.56	0.31	0	0.16	1.05
57	0	0	0	0.16	0.08	0.05	0	0.02	0	0	0
58	0.04	0	0	0	0.03	0	0	0	0	0	0
59/62/75	0.66	1.86	0	0.81	0.36	0.37	0.27	0.19	0.19	0	0.5
60	0.95	0	0	1.32	0.36	0.37	0.3	0.19	0.15	0.09	0.61
61/70/74/76	5.78	12.68	6.53	8.83	3.78	1.98	2.61	1.45	0	1.09	3.88
63	0	1.26	1.17	0.35	0.15	0.1	0.08	0.05	0	0.06	0.16
64	3.29	5.39	2.49	3.23	1.29	1.11	1.48	0.78	0.45	0.46	2.21
66	3.02	6.8	0	3.97	1.13	0.91	1.07	0.72	0.46	0.41	2.16
67	0	1	0	0.26	0.12	0	0.05	0	0	0.05	0.09
68	0	0	0	0.34	0.45	0.32	0	0	0.4	0	0.39
72	0	0	0	0.14	0.1	0.07	0	0.03	0	0	0.05
73	0.13	1.38	0	0.19	0.18	0.13	0	0	0.1	0	0
77	0	1.06	0	0.42	0.14	0	0.1	0	0	0	0
78	0	0.67	0	0	0.1	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0.04	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0
82	0.23	0	0	0.75	0.37	0.15	0.25	0.16	0	0	0.37
83/99	1.83	3.27	0	2.52	1.78	0.82	1.15	0.63	0	0.4	1.58
84	1.32	3.29	0	1.74	1.27	0.57	0.97	0.49	0	0.31	1.39
85/116/117	0	0	5.57	2.17	2.83	2.23	0	0	3.02	0	0.47
86/87/97/ 109/119/125	2.42	0	0	3.83	2.71	1.1	1.64	0.87	0	0.66	2.35
88/91	0.49	0	0	0.97	0.61	0.32	0.44	0.24	0.22	0.13	0.65
89	0	0	0	0.16	0.05	0.04	0.04	0	0	0	0.11
90/101/113	4.54	7.53	0	4.95	4.75	1.89	2.81	1.58	0	1.05	3.74
92	0.77	0	0	0.91	0.87	0.36	0.53	0.33	0	0.17	0.75
93/95/98/ 100/102	5	5.36	0	5.39	4.73	1.97	3.16	1.86	0	1.28	4.5
94	0.06	0	0	0.13	0.06	0	0	0	0	0	0.05
96	0.03	0	0	0.13	0.07	0.06	0.05	0.02	0	0	0.07
103	0.05	0	0	0.13	0.06	0.07	0.03	0	0	0	0.15
104	0.04	0	0	0.07	0.03	0.02	0	0	0	0	0
105	0.49	1.76	0	1.49	0.44	0.17	0.29	0.15	0	0.12	0.48

Table D7: *Continued.*

106	0	0	0	0	0	0	0	0	0	0	0.06
107	0.09	0	0	0.27	0.13	0.05	0.08	0.04	0	0	0.09
108/124	0	0.43	1.16	0.24	0.11	0.06	0.07	0	0	0	0.1
110/115	4.38	5.6	0	5.12	3.86	1.73	2.48	1.24	0	0.75	2.99
111	0	1.09	0	0.01	0	0.04	0	0	0	0	0
112	0.05	0.3	0	0.08	0.04	0	0	0	0	0	0.03
114	0	0	0	0.21	0	0.31	0	0	0	0	0
118	1.76	0	0	3.06	1.42	0.59	0.95	0.46	0	0.36	1.37
120	0	0	0	0.02	0	0	0.01	0	0	0	0
121	0	0	0	0.09	0	0	0.11	0.09	0	0	0.01
122	0	0	0	0.1	0.04	0	0.03	0	0	0	0
123	0	0	0	0.11	0	0	0.03	0	0	0	0
126	0	2.97	5.03	0.06	0	0	0	0	0	0	0.02
127	0.02	0	0	0	0	0	0	0	0	0	0.01
129/138/ 160/163	1.13	2.31	0	1.97	1.38	0.65	0.91	0.43	0.35	0.24	1.34
130	0	0	0	0.13	0.07	0.03	0.05	0.02	0.03	0	0.14
131	0	0	0	0.07	0.04	0.03	0.02	0	0	0	0.02
132	0.34	0	0	0.74	0.73	0.22	0.45	0.2	0	0.08	0.64
133	0	0	0	0.04	0	0.02	0.02	0	0	0	0.03
134/143	0.08	0	0	0.25	0.22	0.08	0.12	0.04	0	0	0.08
135/151/154	0.51	1.1	0	1.06	1.04	0.43	0.64	0.28	0	0.13	0.87
136	0.2	0	0	0.48	0.59	0.2	0.42	0.27	0	0.07	0.53
137	0	0	0	0.15	0.04	0.04	0.08	0.02	0	0	0.07
139/140	0	0	0	0.14	0.08	0.05	0.04	0	0.03	0	0
141	0.17	0.76	0	0.37	0.32	0.13	0.23	0.09	0.08	0	0.29
142	0	0	0	0.05	0.02	0.01	0	0	0	0	0
144	0.05	0.89	0	0.19	0.18	0.05	0.07	0.04	0	0	0.11
145	0	0	1.08	0.05	0.02	0	0	0	0	0	0
146	0.07	0.83	0	0.28	0.21	0.11	0.17	0.06	0.06	0.03	0.16
148	0	0	0	0.05	0.02	0.02	0	0	0	0	0
147/149	1.25	2.65	0	1.95	2.07	0.82	1.36	0.62	0	0.36	1.94
150	0	0	0	0.06	0.02	0.01	0.01	0	0	0	0
152	0	0	0	0.05	0.02	0.02	0	0	0	0	0
153/168	0.85	1.77	0	1.5	1.31	0.57	0.87	0.42	0.34	0.27	1.4
155	0	0	1.14	0.05	0.02	0.02	0	0	0	0	0
156/157	0	0.48	0	0.23	0	0	0.05	0	0	0	0
158	0.05	0	0	0.22	0.1	0.06	0.08	0.04	0.04	0.03	0.1
159	0	0	0	0.04	0	0	0	0	0	0	0
161	0	0.62	0	0.03	0	0.01	0	0	0	0	0
162	0	0	0	0	0	0	0	0	0	0	0
164	0.04	0	0	0.14	0.09	0.05	0.04	0.02	0.02	0.02	0.12

Table D7: *Continued.*

165	0	0	0	0.05	0	0.01	0	0	0	0	0
167	0	0	0	0.07	0	0	0.03	0	0	0	0
169	0	0	0	0	0	0	0	0	0	0	0
170	0.1	0	0	0.31	0	0	0.1	0	0	0	0
171/173	0	0	0	0.15	0	0	0.08	0	0	0	0.22
172	0.04	0	0	0	0	0	0.03	0	0	0	0
174	0.23	0	0	0.46	0.21	0.14	0.19	0.07	0	0	0.28
175	0	0	0	0.02	0	0	0	0	0	0	0.11
176	0	0	0	0.08	0.07	0.02	0.04	0	0	0	0.05
177	0.1	0	0	0.23	0.07	0	0.1	0	0	0.07	0.21
178	0	0	0	0.11	0.05	0.04	0.06	0	0	0	0.04
179	0.13	0	0	0.28	0.21	0.07	0.18	0.07	0.05	0	0.18
180/193	0.36	0	0	1.26	0.28	0.21	0.22	0.1	0	0.16	0.39
181	0	0	0	0.07	0	0.14	0	0	0	0	0.09
182	0	0	0	0	0	0.37	0	0	0	0	0
183/185	0.22	0	0	0.26	0.17	0	0.2	0.07	0	0	0.22
184	0	0.87	0	0	0	0.51	0	0	0	0	0
186	0	0	0	0.04	0	0.06	0	0	0	0	0
187	0.29	0	0	0.74	0.35	0.2	0.29	0.12	0.09	0.08	0.45
188	0	0	0	0	0	0.33	0	0	0	0	0
189	0.07	0	0	0	0	0	0	0	0	0	0
190	0.05	0.39	0	0.26	0	0	0	0	0	0	0
191	0	0	0	0	0	0	0.04	0	0	0	0
192	0	0.28	0	0	0	0	0	0	0	0	0
194	0	0	0	0.79	0	0	0	0	0	0	0
195	0	1.14	0	0.22	0	0	0.05	0	0	0	0
196	0.06	0	0	0.35	0	0	0	0	0	0	0
197/200	0	0	0	0.22	0	0	0	0	0	0	0
198/199	0.16	0	0	0.95	0.15	0	0.11	0	0	0	0.27
201	0.02	0	0	0.13	0	0.04	0.04	0	0.02	0	0.09
202	0	0	0	0.26	0.17	0.13	0.14	0	0.11	0	0.25
203	0.08	0	0	0.64	0	0	0.08	0	0	0	0
205	0	0	0	0.06	0	0	0	0	0	0.09	0
206	0	0	1.33	0.82	0	0	0.12	0	0	0	0.33
207	0	0	0	0.13	0	0	0.04	0	0	0	0.2
208	0	0	0	0.18	0	0	0.04	0	0	0	0
209	0	0	0	0.46	0.57	0.52	0.4	0	0	0	0

Table D8: PCB concentration (pg m^{-3}) data for the Chase Park (CP, n=3), Grave Elementary School (GE, n=6), and Harrison Crib (HC, n=1) sampling sites.

Location ID	*CP*	*CP*	*CP*	*GE*	*GE*	*GE*	*GE*	*GE*	*GE*	*HC*
Deployment	03/14/12	06/05/12	01/28/12	11/20/12	06/19/12	08/02/12	09/13/12	10/11/12	01/14/13	01/11/12
Collection	06/05/12	07/10/12	03/14/12	01/14/13	08/02/12	09/13/12	10/11/12	11/20/12	02/12/13	03/16/12
1	0	0	2.58	3.79	14.83	38.56	21.19	13.73	5.89	1.36
2	0.65	0	0.84	0	2.79	5.17	2.52	2.11	1.24	0.71
3	1.47	1.48	1.97	3.61	16.11	57.23	15.68	9.66	3.46	12.65
4	7.78	12.17	8.07	6.09	19.02	39.58	15.53	9.84	5.42	7.24
5	0.43	0.54	0.38	0	1.24	1.51	0.74	0.54	0.3	0.42
6	3.38	5.82	3.53	2.3	9.02	10.05	4.65	3.12	1.83	3.87
7	0.66	1.09	0.72	2.05	2.44	3	1.36	0.93	0.5	0.71
8	15.87	28.15	16.03	10.23	38.09	40.64	19.01	12.87	8.2	21.37
9	1.23	2.41	1.27	0.86	3.59	3.85	1.73	1.21	0.75	1.15
10	0.32	0.4	0.37	0	1.23	1.71	0.79	0.49	0.31	0.33
11	12.67	15.55	9	10.35	65.89	50.1	25.15	14.87	7.99	23.3
12/13	0.77	1.69	0.89	1.09	3.42	3.89	1.7	1.01	0.52	2.05
15	4.84	8.88	4.37	2.7	14.17	10.64	5.01	3.23	1.92	11.24
16	6.13	13.3	6.08	4.93	15.26	12.1	6.43	3.79	2.85	17.46
17	7.33	17.51	7.13	6.01	18.18	12.84	7.14	4.12	3.44	16.56
18/30	0	0	0	13.76	0	25.58	14.02	8.05	6.82	0
19	1.38	3.09	1.68	0	3.79	3.9	2.45	1.43	1.11	2.57
20/28	13.51	32.37	12.32	12.48	39.71	23.3	13.41	7.19	6.12	61.75
21/33	6.99	16	5.94	7.24	18.59	13.3	7.84	4.22	3.26	32.63
22	5.15	14.2	4.71	4.47	15.47	7.77	4.61	2.38	2.06	25.28
23	0.15	0.31	0.26	0	0.25	0.15	0.09	0.03	0	0.19
24	0.18	0.4	0.3	0	0.58	0.45	0.29	0.12	0.12	0.32
25	1.13	2.65	1.13	1.06	3.51	2.19	1.26	0.67	0.53	3.22
26/29	2.48	6.28	2.36	2.67	7.06	4.5	2.52	1.34	1.2	8.44
27	0.75	1.78	0.74	0.84	1.95	1.61	0.95	0.56	0.47	1.64
31	14.15	34.29	12.8	13.64	40.19	21.39	12.48	6.58	6.03	74.46
32	4.67	15.55	4.12	4.48	14.6	7.25	4.24	2.36	2.2	12.88
34	0.06	0.15	0.08	0	0.09	0.2	0.12	0.06	0	0.19
35	0.34	0.54	0.22	0	0.52	0.59	0.37	0.15	0	2.03
36	0.12	0.07	0.07	0	0.11	0.14	0.11	0.03	0	0.13
37	2.31	4.88	1.65	2.47	6.07	3.67	2.31	0.99	0.83	10.12
38	0.02	0.04	0.03	0	0.07	0.15	0.06	0	0	0.21
39	0.05	0.07	0.06	0	0.08	0.13	0.05	0	0	0.19
40/41/71	2.85	6.64	1.98	4.03	6.63	6.36	4.62	1.94	1.48	28.57
42	1.79	4.4	1.42	2.31	4.25	3.52	2.49	1.04	0.76	16.38
43	0.37	0.66	0.2	0	0.72	0.67	0.47	0.15	0.14	2.56
44/47/65	0	0	0	9.31	0	14.51	10.05	4.53	2.96	0

Table D8: *Continued.*

45/51	1.41	3.85	1.46	0	3.51	3.24	2.21	1.15	0.91	11.33
46	0.5	0.89	0.44	0	1.22	1.09	0.73	0.38	0.3	3.83
48	1.45	3.75	1.15	2.27	3.62	2.94	2.12	0.87	0.73	13.54
49/69	4.14	9.26	2.87	5.98	9.96	9.61	6.46	2.96	2	38.02
50/53	0.97	2.13	0.88	1.83	2.31	2.81	2.19	1.22	1.17	7.38
52	11.43	27.04	8.54	13.24	29.58	24.14	16.61	7.56	4.76	115.09
54	0.02	0.07	0	0	0.07	0.14	0.09	0.06	0	0.09
55	0.08	0.4	0.06	0	0.44	0.17	0	0.04	0	0.8
56	1.38	3.61	0.85	2.72	4.14	2.9	2.9	0.84	0.53	13.52
57	0.03	0.06	0	0	0.07	0.11	0	0.03	0	0.16
58	0.02	0.05	0	0	0.03	0	0	0.02	0	0.16
59/62/75	0.48	1.12	0.4	0.85	1	1.25	0.87	0.43	0.34	3.38
60	0.72	2.1	0.48	1.97	2.16	1.62	1.65	0.45	0.35	6.93
61/70/74/76	5.96	13.64	3.04	9.85	14.98	16.85	13.98	5.28	2.68	53.2
63	0	0	0	0.35	0	0.37	0.3	0.12	0	1.15
64	2.83	7	2.07	3.31	7.01	6.2	4.34	1.82	1.16	30
66	2.61	6.58	1.49	4.64	7.28	6.3	5.43	1.82	1.18	24.89
67	0	0	0	0	0	0.35	0.28	0.09	0	0.63
68	0	0	0	0	0	0.4	0.46	0.31	0	0
72	0.03	0.11	0.03	0	0.07	0.15	0.06	0.05	0	0.16
73	0.07	0.38	0	0	0.16	0	0.17	0	0	0
77	0.24	0.31	0.08	0	0.49	0.49	0.57	0	0	0.54
78	0	0.13	0	0	0	0	0	0	0	0.08
79	0.02	0	0	0	0.03	0.15	0	0	0	0.12
80	0	0	0	0	0.04	0	0	0	0	0.06
81	0.03	0.08	0	0	0.04	0	0	0	0	0.2
82	0.48	0.91	0.18	0	1.19	1.12	1.01	0.36	0.18	1.41
83/99	2.05	5.29	0.83	3.05	5.61	5.86	4.56	2.03	0.96	7.05
84	1.69	4.18	0.8	1.82	4.35	4.35	3.45	1.7	0.81	11.38
85/116/117	0	0	0	0	0	3.25	3.77	2.45	0	1.91
86/87/97/ 109/119/125	2.87	6.72	1.12	0	7.16	8.83	6.73	2.89	1.47	10.06
88/91	0.59	1.46	0.29	0	1.34	2.12	1.49	0.75	0.32	4
89	0.07	0.09	0	0	0.12	0.18	0.15	0.06	0	0.59
90/101/113	5.1	12.15	2.17	6	14.04	15.22	11.17	5.51	2.52	27.3
92	0.99	3.14	0.51	0	3.16	2.63	1.93	0.93	0.42	4.89
93/95/98/ 100/102	5.13	14.21	2.77	0	15.61	15.81	11.53	5.6	2.7	62.68
94	0.02	0.06	0	0	0.05	0.15	0.07	0.05	0	0.23
96	0.05	0.07	0.02	0	0.1	0.18	0.13	0.06	0	0.43
103	0.03	0	0.03	0	0.04	0.15	0.1	0.06	0	0.2
104	0	0	0	0	0	0.04	0.03	0.02	0	0

Table D8: *Continued.*

105	0.91	2.27	0.39	2.12	1.88	1.85	2.16	0.49	0.31	1.14
106	0.02	0	0	0	0.02	0	0	0.03	0	0.03
107	0.18	0.35	0.05	0	0.38	0.39	0.38	0.15	0.07	0.29
108/124	0.12	0.23	0	0	0.3	0.32	0.28	0.1	0.08	0.22
110/115	5.07	12.5	2.09	4.79	13.66	12.36	9.5	4.28	1.92	15.11
111	0.01	0.02	0	0	0.02	0	0	0	0	0
112	0.04	0.07	0	0	0.1	0.03	0.03	0	0	0
114	0	0	0	0	0	0.23	0.34	0.2	0	0
118	2.88	7.35	1.23	3.7	6.9	5.7	5.17	1.75	0.92	3.77
120	0.01	0	0	0	0.02	0.02	0	0	0	0
121	0	0	0	0	0	0.05	0	0	0	0
122	0.04	0.08	0	0	0.12	0.04	0.12	0.03	0	0.1
123	0.05	0.14	0.03	0	0.08	0.05	0.18	0	0	0.14
126	0.07	0.21	0.08	0	0	0	0	0	0	0.12
127	0.01	0	0	0	0	0	0	0	0	0
129/138/ 160/163	2.49	4.31	1.43	1.66	7.06	4.77	3.83	1.54	0.73	7.97
130	0.15	0.15	0.06	0	0.44	0.31	0.2	0.08	0	0.4
131	0.03	0.02	0	0	0.08	0.15	0.09	0.06	0	0.2
132	1.14	2.06	0.62	1.89	3.27	2.11	1.48	0.68	0.29	5.86
133	0.02	0	0	0	0.05	0.07	0	0.03	0	0.12
134/143	0.26	0.3	0.12	0	1.21	0.62	0.4	0.17	0	1.62
135/151/154	1.19	2.52	0.79	1.11	4.7	2.98	2.11	1.05	0.46	18.66
136	0.51	0.93	0.28	0	1.82	1.58	1.07	0.56	0.21	18.86
137	0.16	0.15	0	0	0.24	0.29	0.25	0.11	0	0.38
139/140	0.06	0.05	0	0	0.2	0.22	0.11	0.08	0	0.25
141	0.53	0.86	0.29	0	1.75	1.06	0.84	0.36	0.11	2.27
142	0	0.02	0	0	0	0.02	0	0.01	0	0.02
144	0.17	0.47	0.08	0	0.68	0.47	0.31	0.15	0.06	2.43
145	0	0	0	0	0.01	0.03	0.02	0.01	0	0.02
146	0.33	0.48	0.13	0.54	1.1	0.72	0.54	0.23	0.1	1.32
148	0	0	0	0	0.01	0.04	0	0.02	0	0.01
147/149	2.75	6.17	1.78	2.1	10.39	6.35	4.58	2.24	0.94	28.89
150	0	0.01	0	0	0.02	0.05	0.02	0.02	0	0.04
152	0	0.02	0	0	0.01	0.05	0.01	0.01	0	0.04
153/168	2.11	3.99	1.23	1.64	7.03	4.42	3.23	1.45	0.66	8.17
155	0.02	0.02	0.03	0	0	0.04	0.02	0.01	0	0.03
156/157	0.14	0.2	0.06	0	0.34	0.27	0.32	0.08	0	0.5
158	0.24	0.48	0.12	0	0.75	0.48	0.41	0.16	0.07	0.74
159	0	0	0	0	0	0	0	0	0	0
161	0	0	0	0	0	0.01	0	0.01	0	0
162	0	0	0	0	0	0	0.04	0	0	0.04

Table D8: *Continued.*

164	0.12	0.29	0.07	0	0.38	0.27	0.2	0.1	0	0.45
165	0	0	0	0	0	0	0.01	0.01	0	0.03
167	0.05	0.04	0	0	0.16	0.13	0.1	0.04	0	0.18
169	0.01	0	0	0	0.05	0	0	0	0	0.05
170	0.18	0.27	0.18	0	0.59	0.39	0.46	0.13	0	0.75
171/173	0.1	0.09	0.06	0	0.36	0.24	0	0.09	0	0.38
172	0.05	0.05	0	0	0.11	0.1	0	0	0	0.2
174	0.34	0.52	0.24	0	1.45	0.67	0.71	0.22	0.09	1.26
175	0	0.03	0	0	0.04	0.02	0	0	0.02	0.04
176	0.06	0.04	0.03	0	0.28	0.21	0.14	0.06	0.02	0.61
177	0.16	0.31	0.11	0	0.74	0.36	0.38	0.13	0	0.76
178	0.05	0.02	0	0	0.36	0.25	0.17	0.08	0.02	0.33
179	0.23	0.45	0.19	0	1.29	0.62	0.52	0.24	0.09	2.7
180/193	0.5	0.71	0.37	0	2.14	1.13	1.25	0.34	0.25	2.23
181	0	0	0	0	0	0	0	0	0	0
182	0	0	0	0	0	0	0	0	0	0
183/185	0.28	0.46	0.21	0	1.52	0.66	0.5	0.16	0	1.13
184	0	0	0	0	0	0	0	0	0	0
186	0	0	0	0	0	0.03	0	0.03	0	0
187	0.47	0.57	0.19	0	2.5	1.25	1.16	0.39	0.19	2.14
188	0	0	0	0	0	0	0	0	0	0
189	0.03	0	0.05	0	0.13	0.04	0	0	0	0.09
190	0.05	0.07	0.04	0	0.15	0.08	0	0	0	0.21
191	0.02	0.03	0	0	0.07	0.05	0	0.03	0	0.11
192	0	0	0	0	0	0	0	0	0	0.05
194	0.11	0	0	0	0.29	0.29	0.44	0.08	0	0.36
195	0.04	0	0	0	0.17	0.17	0.16	0	0	0.16
196	0.07	0.58	0	0	0.31	0.2	0.27	0.05	0	0.24
197/200	0.05	0	0	0	0.18	0.22	0	0	0	0.12
198/199	0.17	0.2	0.11	0	0.84	0.55	0.72	0.17	0	0.61
201	0.04	0.05	0.02	0	0.24	0.14	0.13	0.04	0	0.11
202	0.11	0.18	0	0	0.55	0.35	0.36	0.17	0	0.28
203	0.12	0.38	0	0	0.6	0.38	0.52	0.1	0	0.35
205	0.02	0.04	0	0	0.03	0.04	0	0	0	0.06
206	0.09	0	0	0	0.28	0.34	0.42	0	0	0.29
207	0.02	0	0	0	0.05	0.08	0.11	0.04	0	0.04
208	0.05	0.07	0	0	0.19	0.15	0.16	0.06	0	0.13
209	0	0	0	0	0	0.52	0.74	0.45	0	0

Table D9: PCB concentration (pg m^{-3}) data for the Illinois Institute of Technology (IT, n=14) sampling site.

Location ID	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT	IT
Deployment	02/08/12	04/09/12	05/08/12	7/22/13	10/31/12	12/18/12	09/03/13	10/22/13	05/01/13	02/01/13	11/25/13	06/25/13	09/03/13	03/19/13
Collection	04/09/12	05/08/12	06/12/12	09/03/13	12/18/12	02/01/13	10/31/12	11/25/13	06/25/13	03/19/13	01/14/14	07/22/13	10/22/13	05/01/13
1	4.71	4.39	0	6.67	5.16	9.15	6.1	5.3	11.5	3.31	2.94	6.32	8.87	3.52
2	4.59	1.05	0	1.15	1.56	3.09	1.05	1.88	1.38	0.9	0.88	1.04	1.44	1.11
3	4.46	2.45	1.18	4.46	2.7	4.96	4.6	3.44	5.5	2.5	1.6	7.92	5.81	4.33
4	15.2	22.3	15.7	17.3	17.5	29.7	29.8	17.5	35.5	10.3	5.97	16.6	25.2	23.3
5	0	0.85	0.53	0.57	0.61	0.94	0.83	0.92	1.58	0.42	0.37	0.55	0.87	0.76
6	6.01	6.93	5.22	5.25	5.56	8.96	8.53	4.25	15.1	3.08	1.8	4.38	6.75	8.01
7	1.96	1.49	0.85	1.08	1.02	1.66	1.45	0.89	3.19	0.62	0.45	1.01	1.2	1.34
8	26.4	32.5	24.8	25.3	26.0	40.4	38.9	17.8	81.8	14.8	8.27	20.3	33.2	35.6
9	3.29	2.94	1.79	1.71	1.9	3.25	3.04	1.72	5.42	1.1	0.68	0	2.26	2.41
10	0	1.22	0.56	0.61	0.75	1.25	1.71	0.97	1.59	0.45	0.29	0	1.21	0.99
11	15.2	11.7	14.4	18.0	9.37	12.2	18.6	9.99	53.4	8.87	5.42	11.5	15.6	22.2
12/13	1.98	1.91	1.43	1.16	1.25	1.92	2.48	0.88	0	0.92	0.48	0	1.44	1.68
15	8.04	8.25	6.08	6.57	5.6	7.89	11.4	2.49	19.3	2.63	1.17	3.13	6.12	6.84
16	10.0	16.1	12.3	12.8	10.5	15.4	31.7	9.54	28.7	6.59	2.96	10.2	15.7	18.0
17	17.2	17.3	15.6	12.5	12.0	17.9	28.9	10.0	33.0	7.18	3.12	9.81	15.7	19.0
18/30	28.4	0	0	27.7	25.2	37.2	68.1	23.0	70.0	15.7	6.66	22.0	37.2	41.2
19	2.95	4.65	3.19	3.17	3.17	4.85	8.6	3.64	9.11	5.74	1.44	4.02	5.73	6
20/28	32.5	31.4	26.3	24.5	20.8	28.3	78.3	19.0	67.3	12.2	4.83	15.9	27.8	35.0
21/33	24.8	17.5	13.6	14.3	12.3	17.5	49.2	11.4	40.3	7.97	3.14	10.2	17.0	21.4
22	11.7	13.0	12.3	8.88	7.45	10.0	31.3	6.99	22.4	4.87	1.77	5.79	9.94	12.3
23	0	0.22	0.25	0.03	0.06	0.11	0	0	0	0	0	0	0	0
24	0.87	0.44	0.59	0.27	0.31	0.56	1.02	0.39	1.11	0	0	0.41	0.56	0.53
25	3.16	2.68	2.15	1.88	1.47	2.27	4.51	1.25	5.09	0.92	0.45	1.44	2.06	2.79
26/29	7.2	5.62	4.54	4.27	3.77	5.7	12.5	3.52	11.9	2.68	1.05	3.18	5.14	6.89
27	2.37	1.98	1.38	1.54	1.39	2.08	4.4	1.68	4.49	1.11	0.47	1.5	2.28	2.82
31	49.8	33.9	26.7	25.5	22.5	31.2	77.3	17.8	70.7	14	4.98	15.6	29.2	36.7
32	9.19	11.0	10.7	7.77	6.98	9.4	20.5	6.12	19.7	4.54	1.67	6.2	9.68	11.0
34	0	0.13	0.06	0.11	0.12	0.15	0.25	0.19	0.32	0	0	0.12	0	0.24
35	0	0.52	0.36	0.57	0.3	0.56	1.48	0.62	1.22	0.05	0	0	0	0
36	0	0.15	0.12	0.06	0.04	0.09	0	0	0.02	0.03	0	0	0	0
37	8.38	3.63	3.27	4.19	2.82	3.76	13.9	2.48	9.53	1.76	0.69	2.2	4.14	4.41
38	0	0	0.04	0.06	0	0.1	0	0	0	0	0	0	0	0
39	0	0.1	0.05	0.06	0.03	0.03	0	0	0	0	0.02	0	0	0
40/41/71	7.38	9.27	7.29	11.9	5.8	7.39	56.4	8.63	25.7	5.11	1.85	7.68	14.0	14.9
42	4.4	5.87	4.44	6.52	2.88	3.55	25.4	3.74	12.4	2.64	0.78	3.73	6.8	7.87
43	0	1.06	0.67	0.99	0.54	0.71	4.11	0.85	1.83	0.36	0.17	0.93	1.3	1.54
44/47/65	17.5	0	0	27.4	12.7	15.1	120.	18.2	62.8	11.0	4.35	18.9	30.9	34.5

Table D9: *Continued.*

45/51	0	5.02	2.92	5	3.15	4.33	26.4	5.06	12.6	2.81	1.16	4.77	7.57	8.83
46	2.14	1.61	0.62	1.7	1.02	1.3	7.64	1.46	3.53	0.92	0.3	1.61	2.39	2.58
48	4.93	4.77	3.31	4.84	2.66	3.56	21.0	3.28	11.3	2.44	0.91	3.58	6.06	6.87
49/69	12.4	12.9	10.0	16.3	8.57	10.3	67.8	10.8	37.6	6.84	2.48	10.5	17.7	20.5
50/53	4.04	3.51	2.38	4.14	2.6	3.44	18.3	3.76	9.71	2.35	1.13	3.73	5.65	6.35
52	26.1	37.2	32.8	41.6	24.1	28.6	191	30.5	107	18.3	7.09	30.9	51.7	52.1
54	0	0.07	0	0.09	0.07	0.08	0.31	0.07	0.22	0.07	0	0.13	0.13	0.16
55	0	0.55	0.65	0.17	0.14	0.19	0.12	0.3	0.17	0.13	0.07	0.36	0.17	0.42
56	4.88	5.55	4.9	6.71	2.9	2.96	29.3	3.37	12.5	2.37	0.84	4.26	6.72	5.62
57	0	0.08	0.06	0.07	0	0.07	0.15	0	0.08	0	0	0	0	0
58	0	0.04	0	0.03	0	0	0	0	0	0	0	0	0	0
59/62/75	1.46	1.62	1	1.66	0.93	1.18	8.45	1.66	3.98	1	0.35	1.64	2.47	2.77
60	2.71	3.29	2.34	3.58	1.51	1.58	15.2	2.22	6.61	1.24	0.46	2.25	4.06	3.41
61/70/74/76	23.6	21.6	18.3	34.9	19.5	17.9	159.	19.3	74.4	13.0	4.75	24.1	38.0	32.4
63	0.91	0	0	0.6	0.32	0.35	2.53	0.31	1.43	0.3	0.08	0.51	0.68	0.61
64	7.32	9.87	7.9	11.8	5.16	6.11	48.1	6.72	22.7	4.01	1.42	6.84	12.6	12.8
66	10.2	9.62	8.89	13.0	6.76	6.81	65.6	7.86	29.1	5.38	1.77	9.44	15.1	13.4
67	0.94	0	0	0.4	0.22	0.29	1.6	0.24	0.97	0.19	0.09	0.38	0.56	0.57
68	0	0	0	0.34	0	0.3	0.42	0	0	0	0	0.74	0	0.6
72	0	0.1	0.07	0.08	0.05	0.07	0	0	0.19	0.06	0	0	0	0
73	0	0.21	0.96	0.09	0	0	0	0.27	0.11	0	0	0.47	0.17	0
77	0.81	1.21	0.31	1.41	1.54	0.72	4.24	0.21	1.63	0	0.13	1.53	1.01	0.51
78	0	0	0.08	0	0	0	0	0	0	0	0	0	0	0
79	0	0.06	0	0.05	0	0.03	0.26	0	0	0	0.07	0	0	0
80	0	0	0.04	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0.07	0	0	0	0	0.03	0	0	0	0	0
82	1.64	2.26	1.6	3.13	2.12	1.59	17.6	0.96	5.84	1.19	0.61	3.46	5.44	2.66
83/99	8.25	9.69	8.21	13.3	11.3	7.73	62.6	8.02	25.5	4.78	2.53	14.2	16.9	12.3
84	5.09	7.17	7.08	9.56	5.6	4.73	49.7	6.97	21.6	3.42	1.65	9.85	13.0	9.53
85/116/117	4.23	3.06	2.77	6.09	4.73	3.64	23.2	5.64	7.3	1.45	0.6	4.28	4.65	3.21
86/87/97/ 109/119/125	0	13.5	12.7	22.1	17	11.0	105	12.9	40.7	7.17	3.92	23.6	25.5	16.7
88/91	2.22	2.53	1.66	4.13	2.43	1.99	19.2	2.7	9.37	1.78	0.66	3.68	4.97	4.39
89	0	0.24	0	0.37	0.16	0.16	1.86	0.21	0.81	0.13	0.06	0.36	0.68	0.48
90/101/113	19.9	22.3	21.2	33.3	28.8	19.8	167	22.5	67.6	11.8	6.08	36.5	42.4	30.6
92	5.12	4.6	4.94	5.42	4.61	3.27	25.7 9	3.54	11.1 2	2.03	1.01	5.98	7.38	5.37
93/95/98/ 100/102	15.6	20.6	21.5	29.1	19.8	17.3	156	22.5	76.8	11.8	5.78	29.7	38.2	33.7
94	0	0.07	0.02	0.13	0.08	0.09	0.72	0.1	0.34	0.08	0	0	0.1	0.23
96	0	0.18	0.08	0.28	0.14	0.17	1.44	0.21	0.66	0.11	0.04	0.25	0.43	0.38
103	0	0.1	0.07	0.16	0.11	0.1	0.92	0.34	0.53	0	0	0	0.38	0.35
104	0	0	0.03	0	0	0.02	0	0	0	0	0	0	0	0

Table D9: *Continued.*

105	4.6	4.22	3.36	5.67	4.75	3.03	34.5	3.53	9.39	1.52	1.26	6.85	7.7	4.36
106	0	0.07	0	0	0	0	0	0	0	0	0.04	0	0	0.07
107	0.38	0.71	0.57	1.12	0.9	0.62	4.98	0.85	1.64	0.27	0.21	1.12	1.21	0.89
108/124	0.81	0.43	0.27	0.73	0.61	0.41	3.35	0.57	1.36	0.23	0.19	1	1.46	0.83
110/115	15.2	24.1	24.5	34.0	26.3	17.1	187	21.4	58.8	9.42	5.72	33.4	38.0	24.2
111	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112	0	0.24	0.27	0.02	0	0	0.54	0.08	0.08	0.04	0.03	0.19	0.12	0.13
114	0	0.38	0	0.45	0.28	0.25	2.22	0	0.78	0	0.06	0.56	0.08	0.4
118	11.1	12.8	12.6	17.2	15.1	9.56	94.4	10.2	27.9	5.14	3.34	19.5	21.6	13.0
120	0	0.02	0.03	0.02	0	0.01	0	0	0	0	0	0	0	0
121	0	0	0	0.08	0	0	0	0.02	0.04	0.02	0.02	0.02	0	0.03
122	0	0.16	0.11	0.24	0.15	0.09	1.95	0	0.41	0	0	0.16	0	0.12
123	0	0.1	0.18	0.33	0.23	0.15	1.78	0	0.49	0	0.05	0.3	0.34	0.23
126	0	0.1	0	0.14	0	0	0	0	0	0.01	0	0	0	0.01
127	0	0.05	0.05	0	0	0	0.01	0	0	0	0.11	0.09	0	0
129/138/ 160/163	8.92	10.7	8.48	13.9	8.9	6.31	64.5	8.31	20.0	3.81	2.72	18.9	17.6	12.8
130	0.9	0.41	0.26	0.8	0.54	0.4	3.83	0.51	1.12	0.2	0.1	1.5	1.1	0.95
131	0	0.23	0	0.37	0.22	0.12	1.17	0.2	0.45	0.07	0	0.47	0.54	0.26
132	3.75	5.51	3.67	6.04	3.86	2.71	26.0	3.39	9.26	1.76	1.23	10.2	8.24	5.39
133	0	0.02	0.05	0.18	0.11	0.08	0.85	0.11	0.24	0.06	0	0.17	0.23	0.26
134/143	0	1	0.62	1.46	0.83	0.58	5.81	0.82	2.14	0.27	0.1	1.72	1.92	1.34
135/151/154	3.52	5.58	3.78	6.47	3.64	2.94	26.5	3.82	11.4	2.22	0.98	8.51	8.43	6.79
136	1.65	2.49	1.59	3.25	1.83	1.52	12.8	1.91	6.12	1.14	0.56	5.34	4.88	4.18
137	0.77	0.52	0.25	0.74	0.49	0.29	3.42	0.4	1.01	0.2	0.12	1.19	0.98	0.71
139/140	0	0.24	0.07	0.4	0.27	0.18	1.53	0.19	0.58	0.16	0	0.65	0.48	0.55
141	2.08	2.68	1.59	2.55	1.64	1.2	12.4	1.89	4.04	0.78	0.56	3.74	3.56	2.68
142	0	0	0	0	0	0	0.03	0	0.01	0.02	0	0	0	0
144	0.57	0.77	0.4	0.92	0.63	0.47	4.09	0.54	1.77	0.3	0.15	1.55	1.28	1.06
145	0	0	0	0.02	0	0	0	0	0	0	0	0	0	0
146	1.9	1.15	0.72	1.82	1.04	0.82	7.85	1.09	2.63	0.62	0.33	2.39	2.52	1.68
148	0	0	0	0.01	0	0	0.06	0	0.04	0	0	0	0	0
147/149	7.58	13.0	11.1	15.4	9.74	7.2	65.3	8.84	25.5	4.83	2.68	20.4	19.5	15.1
150	0	0.03	0	0.03	0.02	0.01	0.06	0	0.06	0	0	0	0	0
152	0	0	0.03	0.02	0.01	0	0.06	0	0	0	0	0	0	0
153/168	6.34	8.9	7.27	11.1	6.99	5.18	50.0	6.6	17.1	3.5	1.92	15.3	15.2	11.6
155	0	0.04	0	0.01	0.01	0.02	0	0	0	0	0	0.1	0	0
156/157	1.04	0.38	0.34	0.66	0.44	0.39	3.79	0.21	1.09	0	0	1.19	0.92	0.96
158	0.77	1.06	0.61	1.31	0.88	0.6	5.63	0.79	1.93	0.34	0.32	1.92	1.89	1.38
159	0	0	0	0	0	0	0	0	0	0	0	0	0	0
161	0	0	0	0	0	0	0	0	0	0	0	0	0	0
162	0	0.04	0	0	0	0	0	0	0	0	0	0	0	0

Table D9: *Continued.*

164	0.75	0.49	0.19	0.78	0.5	0.37	3.18	0.64	1.21	0.26	0.21	1.3	1.2	0.89
165	0	0	0	0	0	0.01	0.02	0	0	0	0	0	0	0
167	0.34	0.15	0	0.25	0.17	0.14	1.41	0	0.43	0	0	0.53	0.5	0.26
169	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170	0.64	0.54	0.37	0.59	0.32	0.36	3.38	0.87	1.22	0.43	0.26	1.71	0.99	1.11
171/173	0	0.31	0.16	0.43	0.22	0.2	2.1	0.48	0.8	0.32	0.15	1.21	0.71	0.7
172	0	0.18	0.05	0.19	0.08	0.08	0.96	0.26	0.28	0.19	0	0	0	0.33
174	1.39	1.37	0.91	1.53	0.66	0.62	7.85	1.24	2.74	0.67	0.35	2.16	2.23	1.92
175	0	0	0	0.09	0.02	0.03	0.45	0.09	0.15	0.07	0	0.19	0.1	0.1
176	0.51	0.26	0.14	0.39	0.17	0.13	1.72	0.21	0.77	0.16	0.04	0.47	0.42	0.46
177	0.57	0.65	0.35	0.72	0.35	0.36	4.02	0.76	1.38	0.42	0.18	1.46	1.23	1.06
178	0	0.15	0	0.42	0.16	0.14	2.13	0.23	0.78	0.14	0.06	0.57	0.63	0.43
179	1.09	1.25	0.77	1.37	0.6	0.57	6.8	0.95	2.77	0.51	0.22	1.8	2.24	1.8
180/193	1.86	1.95	1.46	2.12	0.86	0.9	11.1	1.88	3.65	1.01	0.61	3.34	2.98	2.82
181	0	0	0	0	0	0	0	0.14	0	0	0	0	0.12	0
182	0	0	0	0	0	0	0.21	0	0	0	0	0	0	0
183/185	1.19	1.26	0.83	1.26	0.49	0.53	6.58	1.15	2.18	0.63	0.24	1.77	1.92	1.6
184	0	0	0	0	0	0	0	0	0	0	0	0	0	0
186	0	0	0	0	0	0	0	0	0	0.03	0	0	0	0
187	2.03	2.28	0.83	2.94	1.03	1.02	15.2	2.06	4.73	0.9	0.55	3.94	4.21	2.93
188	0	0	0	0	0	0	0.04	0	0	0	0	0	0	0
189	0	0.1	0.1	0.04	0	0	0	0	0	0.28	0	0	0	0
190	0	0.17	0.05	0.16	0.08	0.08	0.76	0.2	0.5	0.27	0.3	0.26	0.31	0.21
191	0	0.05	0	0.04	0	0	0.12	0	0.12	0.14	0	0	0	0.12
192	0	0.08	0	0	0	0	0	0	0	0	0	0	0	0
194	0.48	0.51	0.18	0.27	0.15	0.19	1.56	0.37	0.59	0.69	0.17	0.76	0	0.43
195	0	0.27	0.09	0.13	0.04	0	0.62	0.34	0.21	0.38	0	0	0.16	0.19
196	0.64	0.33	0.17	0.26	0.1	0.12	1.66	0.28	0.47	0.43	0.16	0.62	0.57	0.31
197/200	0	0.31	0.07	0.12	0	0.05	1.66	0	0.34	0.19	0.06	0.49	0.44	0.12
198/199	0.85	0.83	0.37	1.09	0.32	0.37	6.48	0.79	2.17	0.89	0.33	2.66	2.05	1.2
201	0	0.27	0.16	0.26	0.09	0.07	1.45	0.19	0.47	0.28	0	0.62	0.64	0.39
202	0	0.76	0.38	0.84	0.25	0.22	4.17	0.56	1.24	0.4	0	1.62	1.63	0.77
203	0	0.67	0.34	0.68	0.2	0.2	3.93	0.54	1.22	0.54	0.21	1.66	1.08	0.63
205	0	0.17	0.05	0	0	0	0.12	0.12	0	0.57	0	0	0	0
206	1.33	0.44	0.22	0.34	0.15	0.18	1.99	0.5	0.68	0.82	0	1.18	0.61	0.58
207	0	0.12	0.05	0.1	0	0	0.55	0	0.19	0.45	0.15	0.47	0.29	0.29
208	0	0.21	0.11	0.28	0.08	0.08	1.52	0	0.48	0.37	0	0.84	0.52	0.32
209	0	0	0	0.38	0.36	0.4	0	0	0	0	0	0	0	0

Table D10: PCB concentration (pg m^{-3}) data for the northside Jardine Water Plant (JN, n=12) sampling site.

Location ID	*JN*	*JN*	*JN*	*JN*	*JN*	*JN*	*JN*	*JN*	*JN*	*JN*	*JN*	*JN*
Deployment	08/13/13	09/11/12	10/09/12	06/27/13	04/11/13	05/23/13	09/23/13	11/05/13	01/10/13	02/21/13	11/15/12	11/15/12
Collection	09/23/13	10/09/12	11/15/12	08/13/13	05/23/13	06/27/13	11/05/13	12/12/13	02/21/13	04/11/13	01/10/13	01/10/13
1	6.55	13.08	9.4	10.25	10.13	14.77	7.46	7.53	6.06	5.81	8.94	7.61
2	0	2.04	2.33	1.67	1.61	1.99	1.32	1.73	1.08	0.82	1.89	1.48
3	5.45	15.96	6.73	8.88	14.36	10.57	3.84	4.01	3.08	2.57	4.51	3.93
4	8.91	25.66	18.74	20.25	24.73	26.68	14.81	14.74	10.5	8.83	16.43	12.85
5	0	0.88	0.74	0.74	0.54	0.82	0.56	0.57	0.42	0.32	0.57	0.47
6	3.33	7.88	5.67	6.29	5.63	7.26	4.44	4.78	3.24	2.51	5.22	4.41
7	0	1.59	1.22	1.29	1.11	1.48	0.96	1.01	0.72	0.56	0.99	0.81
8	13.38	29.88	24.28	26.12	20.15	29.49	19.73	21.22	14.69	11.46	22.2	18.21
9	0	2.51	1.9	1.91	1.49	2.25	1.48	1.54	1.12	0.84	1.81	1.44
10	0	1.23	1.04	0.88	0.81	1.1	0.71	0.68	0.47	0.41	0.82	0.68
11	14.32	29.89	14.99	43.8	50.68	58.62	13.49	12.29	7.32	16.22	11.54	10.31
12/13	0	5.23	2.1	2.02	1.78	2.16	1.37	1.4	0.9	0.69	1.75	1.65
15	5.14	10.5	8.32	10.06	7.12	11.25	6.84	6.64	3.93	3.09	5.44	4.99
16	9.06	15.95	13.43	14.53	11.19	16.52	11.5	10.64	6.13	5.17	9.75	8.21
17	7.51	15.39	13.41	15.29	14.7	18.27	11.21	11.51	6.72	5.64	10.87	9.33
18/30	18.54	34.65	29.74	32.6	27.26	36.38	24.72	23.72	14.13	11.88	23.99	20.22
19	0	4.63	4.25	3.81	4.54	4.9	3.09	3.06	1.85	1.68	3.13	2.59
20/28	21.22	35.43	30.02	34.11	26.98	38.21	25.12	22.36	12.23	10.53	20.07	18.13
21/33	8.43	20.62	16.98	18.68	13.16	20.38	14.62	12.44	7.11	6.01	11.32	10.33
22	7.59	13.19	10.49	12.03	9.05	14.03	9.3	8	4.24	3.78	6.97	6.42
23	0	0.06	0.09	0.04	0.04	0.11	0.05	0.06	0.04	0	0.04	0.04
24	0	0.45	0.45	0.3	0.27	0.4	0.31	0.28	0.22	0.16	0.26	0.25
25	0	3.53	2.16	2.85	3.16	3.46	1.86	1.69	0.96	0.82	1.5	1.43
26/29	4.14	15.65	4.89	6.11	5.53	6.9	4.08	3.87	2.22	1.95	5.14	4.83
27	1.7	2.12	1.81	1.98	1.87	2.41	1.41	1.29	0.75	0.68	1.32	1.21
31	24.79	38.23	31.54	36.57	29.83	41.23	27.06	24.63	13.74	12.1	23.31	21.02
32	4.72	9.62	8.73	10.01	9.29	11.41	7.49	6.68	3.79	3.26	6.75	5.82
34	0	0.17	0.15	0.12	0.15	0.17	0.09	0.09	0.06	0.03	0.09	0.11
35	0	5.85	0.66	1.54	1.3	1.83	0.49	0.33	0.26	0.45	0.99	1.12
36	0	0.58	0.19	0.59	0.91	1.02	0.12	0.09	0.05	0.16	0.13	0.08
37	6.66	9.86	4.94	6.79	4.91	7.35	4.6	3.34	1.78	1.76	2.91	2.98
38	0	0.28	0.15	0.08	0.08	0.09	0.05	0.06	0	0	0.07	0.08
39	0	0.35	0.09	0.07	0	0.11	0.03	0.05	0	0	0.05	0.04
40/41/71	9.33	25.16	16.32	24.14	37.15	53.43	30.8	10.15	5	5.45	9.05	8.25
42	9.09	13.95	8.52	13.11	20.69	29.29	16.49	5.7	2.87	3	4.47	4.09
43	0	2	1.48	1.76	3.17	3.85	2.71	0.9	0.46	0.49	0.75	0.72
44/47/65	97.28	75.79	43.66	63.27	111.8	133.0	78.2	27.15	17.13	20.74	25.86	23.43

Table D10: *Continued.*

45/51	5.12	8.98	7.29	8.31	15.52	21.18	11.9	4.71	2.32	2.21	4.35	3.63
46	0	3.63	2.47	2.96	5.35	7.39	4.13	1.61	0.77	0.76	1.47	1.21
48	3.24	9.21	6.81	8.85	14.22	20.3	11.85	4.4	2.16	2.21	3.87	3.29
49/69	41.48	46.39	26.38	36.25	65.38	79.1	45.51	17.17	10.9	11.89	15.78	13.86
50/53	5.19	10.37	6.59	7.46	15	18.51	10.52	4.34	2.38	2.27	4.15	3.64
52	255.9	164.4	89.94	117.8	225.0	238.4	146.4	58.78	45.6	53.63	64.8	57.16
54	0	0.27	0.18	0.16	0.5	0.47	0.26	0.11	0.06	0.06	0.08	0.07
55	0	0.78	0.07	0.31	0.57	0.77	0.44	0.16	0	0.14	0.24	0.28
56	13.8	22.02	10.03	16.61	26.75	35.31	19.41	5.91	3.08	4.1	6.14	6.29
57	0	0.34	0.14	0.12	0.24	0.32	0.22	0.06	0	0.04	0.07	0.09
58	0	0	0	0.04	0.09	0.14	0.04	0	0	0	0.06	0.05
59/62/75	2.17	3.98	2.32	2.92	4.82	6.73	4.18	1.36	0.69	0.75	1.37	1.29
60	9.47	9.82	5.17	8.56	12.81	18.46	10.16	2.96	1.47	1.87	2.75	2.63
61/70/74/76	220.3	139.8	63.69	95.43	187.2	186.5	111.0	35.05	24.68	37.43	44.33	44.74
63	1.73	1.73	0.96	1.43	2.35	2.98	1.76	0.51	0.3	0.38	0.53	0.52
64	30.91	30.14	17.99	26.13	43.78	56.61	33.17	11.41	6.56	7.64	9.5	8.59
66	53.14	41.47	20.27	32.69	54.23	69.21	38.9	12.39	7.01	9.22	13.15	12.9
67	0	2.74	0.62	0.78	1.36	1.73	0.98	0.34	0.21	0.28	0.62	0.72
68	0	0.67	0.59	0.33	0.87	0.99	0.8	0	0	0	0	0
72	0	1.44	0.18	0.17	0.34	0.4	0.22	0.09	0.07	0.07	0.19	0.23
73	0	0	0.38	0	0.19	0.21	0.24	0.14	0.08	0	0.14	0
77	2.27	8.15	1.21	2.1	4.42	4.21	2.34	0.56	0.37	0.67	1.58	2.53
78	0	0.09	0	0	0.06	0	0	0	0	0	0	0.03
79	0	2.49	0	0.18	0.92	0.28	0.09	0	0	0	0.21	0.25
80	0	0	0	0	0.04	0	0	0	0	0	0	0
81	0	0	0	0	0.18	0.17	0.08	0	0	0	0	0
82	8.58	15.87	5.82	9.05	24.76	15.94	9.23	2.54	2.32	4.86	8.48	9.59
83/99	89.99	88.02	28.47	43.68	115.1	72.64	44.61	13.52	12.74	25.09	34.92	35.2
84	87.17	58.07	23.44	36.59	88.32	63.56	38.24	12.29	10.33	20.61	22.8	22.38
85/116/117	30.42	29.29	11.54	15.17	39.39	27.44	17.29	5.99	5.11	8.65	12.26	12.51
86/87/97/ 109/119/125	147.0	149.6	48.05	78.43	204.9	125.3	75.23	22.77	21.54	45.2	65.69	66.58
88/91	33.82	26.35	8.73	14.03	29.92	22.86	14	4.69	3.8	6.87	8.03	7.72
89	1.25	1.61	0.69	0.97	1.98	1.95	1.11	0.35	0.23	0.37	0.56	0.56
90/101/113	322.5	301.6	137.3	164.9	388.3	303.6	175.2	61.22	45.9	85.94	118.7	110.5
92	54.54	48.48	17.65	25.11	63.21	44.57	25.67	8.49	6.9	13.77	18.93	17.83
93/95/98/ 100/102	301.1	266.9	150.3	166.2	351.8	325.1	195.1	75.08	48.59	81.47	105.9	94.36
94	0	0.97	0.32	0.44	0.93	0.89	0.52	0.19	0.12	0.18	0.24	0.2
96	0	2.25	0.58	0.74	1.38	1.56	0.93	0.3	0.21	0.28	0.57	0.53
103	1.19	1.55	0.38	0.47	1.06	0.91	0.61	0.22	0.15	0.24	0.38	0.34
104	0	0.07	0.05	0.02	0.06	0.06	0.04	0.02	0	0.02	0.02	0

Table D10: *Continued.*

105	26.2	46.65	10.29	14.56	52.63	25	14.94	4	4.47	9.4	28.35	31.41
106	0	0	0.03	0	0	0.03	0.02	0	0	0	0.02	0
107	7.45	9.49	2.07	3.19	10.84	5.34	3.23	0.79	0.96	2.02	4.48	4.82
108/124	4.35	5.71	1.4	2.07	7.1	3.52	2.1	0.54	0.65	1.37	2.96	3.1
110/115	249.3	230.9	79.59	115.8	310.8	191.5	114.9	35.91	33.99	70.59	107.0	106.7
111	0	0	0	0	0	0.02	0.02	0	0	0	0.03	0
112	0	0.03	0	0	0.08	0.02	0.05	0.05	0.04	0.07	0.07	0.03
114	1.91	2.55	0.96	0.94	3.16	1.72	1.18	0.31	0.24	0.58	1.16	1.36
118	79.46	145.4	36.63	51.74	181.9	88.43	53.3	14.91	17.22	35.83	80.74	82.83
120	0	0.7	0.03	0	0.22	0.13	0.08	0	0	0	0.08	0.14
121	0	0	0	0.09	0.13	0.1	0.11	0.07	0	0.07	0	0
122	1.11	1.23	0.32	0.43	1.45	0.76	0.51	0.14	0.12	0.26	0.72	0.89
123	1.4	1.65	0.56	0.78	2.43	1.3	1	0.23	0.2	0.47	0.91	0.98
126	3.25	0.47	0	0	0.44	0.13	0.17	0	0	0	0.26	0.62
127	0	0.1	0	0	0	0	0.02	0	0	0	0	0
129/138/ 160/163	55.74	290.6	97.2	81.22	102.8	73.37	33.19	25.92	24.94	43.81	105.7	95.77
130	4.37	11.69	3.05	3.2	5.03	2.76	1.5	0.95	0.99	1.95	5.41	5.15
131	1.65	3.14	1.29	1.33	1.8	1.22	0.6	0.44	0.38	0.85	1.21	1.17
132	35.75	90.74	37.3	38.19	42.44	33.78	15.36	11.79	9.44	18.33	32.46	29.58
133	1.63	3.21	1.13	1.07	1.22	1	0.45	0.32	0.26	0.47	1.01	0.85
134/143	8.1	17.35	7.75	8.52	8.91	7.02	3.5	2.63	1.94	3.91	5.64	5.1
135/151/154	58.6	155.2	89.59	82.81	65.23	77.79	34.16	31.11	16.88	27.66	42.23	31.35
136	47.75	66.2	42.99	40.2	31.59	37.48	17.86	15.63	7.99	13.57	19.3	15.34
137	3.67	6.52	1.21	1.99	4.14	1.91	0.92	0.53	0.81	1.71	3.33	4.2
139/140	1.75	3.49	0.98	1.15	1.65	0.93	0.56	0.34	0.4	0.82	1.36	1.29
141	14.55	68.13	28.15	24.56	23.18	22.45	9.36	7.4	5.69	9.23	19.71	15.75
142	0	0.03	0.01	0.01	0	0.01	0	0	0.01	0	0.01	0.01
144	8.05	18.77	10.91	10.4	8.6	9.78	4.39	3.7	2.13	3.59	5.56	4.25
145	0	0.13	0.05	0.04	0.05	0.03	0.01	0.01	0.01	0.03	0.01	0.03
146	11.36	39.75	13.78	13.68	14.57	12.27	5.29	4.11	3.17	5.71	11.71	9.77
148	0	0.28	0.05	0.05	0.05	0.04	0.01	0	0.02	0.02	0.04	0.04
147/149	110.0	316	165.4	151.3	133.3	142.3	64.86	55.87	34.57	59.28	91.2	72.86
150	0	0.85	0.1	0.13	0.13	0.11	0.05	0.04	0.03	0.06	0.13	0.11
152	0	0.33	0.09	0.09	0.1	0.08	0.05	0.04	0.03	0.05	0.07	0.07
153/168	66.04	267.3	109.6	94.37	93.41	87.58	37.89	31.71	23.85	39.58	81.56	65.06
155	0.61	0.04	0.02	0.01	0.01	0	0	0.02	0	0.01	0.01	0
156/157	2.69	17.11	3.32	2.38	5.44	2.27	1.18	0.73	1.24	2.02	8.73	10.48
158	5.67	23.04	7.25	6.49	9.16	5.65	2.64	1.9	2.06	3.68	9.65	9.25
159	0	1.21	0.65	0.13	0.11	0.11	0.04	0	0	0	0.06	0.06
161	0	0.02	0.02	0	0	0	0	0	0	0	0.01	0
162	0	0.52	0.07	0.08	0.19	0.07	0.05	0	0	0	0.18	0.23

Table D10: *Continued.*

164	3.79	16.47	5.81	4.75	5.89	4.13	1.96	1.35	1.28	2.02	6.37	5.4
165	0	0.05	0.42	0	0	0.02	0	0	0	0	0.01	0
167	1.12	5.9	1.31	1.08	2.01	1	0.49	0.33	0.43	0.75	2.74	3.14
169	0	0.83	0.16	0.01	0.02	0	0	0	0	0	0.02	0.02
170	4.18	58.08	13.67	6.27	5.97	5.79	2.14	2.06	3.07	3.09	13.91	9.89
171/173	2.21	22.00	7.2	4.86	4.16	4.54	1.77	1.55	1.41	1.72	4.97	3.36
172	1.34	11.19	2.84	1.87	1.53	1.71	0.64	0.61	0.65	0.7	2.4	1.47
174	10.96	82.95	31.16	22.43	16.48	21.23	7.8	7.52	5.95	7.01	17.15	10.17
175	0.69	3.29	1.33	1.08	0.8	0.95	0.38	0.35	0.25	0.31	0.69	0.42
176	3.34	12.72	6.91	5.82	4.03	5.55	2.25	1.92	1.09	1.52	2.6	1.7
177	5.7	45.44	15.67	10.74	7.93	10.07	3.68	3.59	3.02	3.53	9.74	5.72
178	3.06	16.95	7.07	5.67	3.94	5.38	2.1	1.77	1.22	1.54	3.46	1.89
179	13.46	50.09	27.8	23.54	15.72	22.56	8.97	7.99	4.2	5.92	10.38	6.45
180/193	12.22	161.4	46.03	24.36	19.39	22.94	8.24	8.41	9.9	9.7	29.39	16.82
181	0	0.52	0	0.08	0.16	0	0	0	0	0	0.15	0.16
182	0	0.5	0.35	0	0	0	0	0	0	0	0	0
183/185	8.29	55.22	22.26	15.81	11.8	15.05	5.92	5.43	4.07	4.88	10.84	6.76
184	0	0	0	0	0	0	0	0	0	0	0	0
186	0	0	0	0	0	0	0	0	0	0	0	0
187	11.69	104.5	42.84	32.15	21.93	29.3	10.99	10.29	7.18	8.59	18.62	10.38
188	0	0.41	0	0	0	0	0	0	0	0	0	0
189	0	1.98	0.44	0.13	0.15	0.1	0.05	0	0.09	0.09	0.42	0.34
190	0.81	12.27	2.88	1.28	1.12	1.14	0.41	0.43	0.59	0.58	2.66	1.63
191	0	2.3	0.59	0.33	0.31	0.32	0.18	0.12	0.13	0.14	0.5	0.31
192	0	0	0	0	0	0	0	0	0	0	0	0
194	1.5	28.15	5.25	1.22	1.19	1.05	0.47	0.68	1.24	0.91	4.27	1.5
195	1.23	11.28	2.59	0.83	0.65	0.76	0.29	0.38	0.59	0.44	1.8	0.66
196	1.09	15.53	3.84	1.62	1.18	1.48	0.54	0.68	0.87	0.71	2.27	0.95
197/200	0	5.55	2.16	1.43	1.05	1.48	0.64	0.29	0.6	0.55	1.05	0.6
198/199	2.5	33.56	8.61	3.82	2.7	3.62	1.34	1.57	1.87	1.49	5.2	1.98
201	0.51	4.55	1.71	1.19	0.78	1.13	0.46	0.44	0.35	0.34	0.75	0.38
202	1.1	7.32	3.04	2.17	1.45	2.13	0.9	0.91	0.61	0.64	1.15	0.63
203	2.11	19.83	4.21	2.05	1.44	1.88	0.74	0.9	1.03	0.83	2.91	1.13
205	0	1.39	0.3	0.07	0.25	0.06	0	0.05	0.07	0.03	0.19	0.09
206	1.22	6.67	1.28	0.32	0.38	0.32	0.17	0.28	0.34	0.29	0.93	0.45
207	0	0.91	0.24	0.09	0.09	0.1	0.04	0.06	0.08	0.06	0.13	0.07
208	0	1.25	0.38	0.17	0.14	0.18	0.12	0.12	0.11	0.1	0.2	0.12
209	0	0.92	0.79	0.3	0	0.4	0.39	0	0	0	0	0.31

Table D11: PCB concentration (pg m^{-3}) data for the southside Jardine Water Plant (JS, n=12) sampling site.

Location ID	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS	JS
Deployment	11/15/12	08/13/13	10/03/11	09/11/12	10/09/12	06/27/13	01/10/13	02/21/13	04/11/13	05/23/13	09/23/13	11/05/13
Collection	01/10/13	09/23/13	09/11/12	10/09/12	11/15/12	08/13/13	02/21/13	04/11/13	05/23/13	06/27/13	11/05/13	12/12/13
1	4.51	8.99	13.56	12.19	39	4.35	3.96	3.77	4.49	6.13	4.75	10.51
2	1.84	0	2.07	2.14	4.29	1.02	1.35	0.79	1.03	1.03	1.25	5.15
3	3.34	6.28	35.95	17.5	12.62	2.88	2.86	1.64	11.38	5.26	2.78	9.65
4	10.9	4.91	31.58	26.37	26.34	12.51	10.16	6.78	20.91	16.09	11	30.91
5	0.8	0	0.67	0.89	0.91	0.35	0.38	0.22	0.27	0.35	0.5	1.19
6	3.66	2.11	5.93	6.78	6.4	3.33	3.05	1.82	4.09	3.6	3.04	10.04
7	5.44	2.25	1.4	1.64	1.66	0.66	0.62	0.39	0.58	0.67	0.63	2.12
8	20.75	9.36	25.94	30.23	26.58	14.11	13.81	8.3	12.78	14.6	13.52	41.95
9	1.36	0	2	2.39	2.46	0.98	1.03	0.63	0.82	1.03	0.99	3.23
10	1.6	0	1.16	1.11	1.27	0.4	0.38	0.26	0.46	0.55	0.4	1.09
11	16.53	14.32	37.54	31.59	30.42	49.95	14.26	24.66	60.13	53.92	20.36	49.12
12/13	2.66	0	1.94	2.54	1.98	0.94	0.88	0.57	1.17	0.93	0.88	3.48
15	5.7	2.52	7.26	7.89	6.05	3.98	3.12	1.95	3.44	3.83	3.67	11.16
16	14.21	6.56	23.11	14.13	12.24	9.37	6.29	3.66	7.84	8.18	7.07	19.67
17	14.01	5.15	11.15	13.91	12.4	10.52	6.82	4.19	13.21	11.4	7.9	22.04
18/30	30.8	10.47	18.35	29.43	25.35	20.27	13.65	8.21	20.14	19.41	15.63	42.12
19	2.3	2.91	3.03	4.72	4.38	2.83	1.85	1.24	4.39	3.17	2.15	6.08
20/28	30.37	11.14	38.05	26.95	22.69	21.95	11.5	7.04	21.08	20.74	15.64	38.99
21/33	17.85	6.46	16.04	15.85	12.63	10.53	6.82	3.81	7.4	8.72	8.21	20.73
22	14.35	4.39	7.37	9.84	8.09	7.83	4.25	2.59	6.78	7.34	5.89	14.86
23	0.84	0	0.03	0.12	0.16	0.02	0.04	0.03	0.03	0.04	0.02	0.11
24	0	0	0.13	0.44	0.5	0.21	0.19	0.13	0.21	0.23	0.24	0.62
25	2.9	0	1.71	2.37	2.06	2.33	1.05	0.65	3.26	2.44	1.4	3.58
26/29	4.75	2.89	5.48	5.1	4.44	4.55	2.26	1.49	5.03	4.39	2.89	8.66
27	1.66	0	0.97	1.94	1.82	1.44	0.81	0.49	1.58	1.44	0.97	2.57
31	32.34	12.44	21.56	26.53	21.6	21.61	11.95	7.3	21.64	21.21	16.03	40.05
32	10.69	3.91	7.24	8.31	7.15	6.88	3.48	2.18	8.05	6.62	4.69	11.54
34	0	0	0.07	0.16	0.22	0.1	0.07	0.05	0.15	0.13	0.05	0.18
35	1.37	0	2.12	1.3	1.17	1.98	0.42	0.61	1.73	1.69	0.65	1.98
36	1.16	0	0.73	0.23	0.32	0.64	0.19	0.29	1.06	0.73	0.15	0.45
37	5.54	2.16	6.98	5.17	4.35	4.86	1.85	1.42	3.21	3.75	2.99	8.33
38	0	0	0.12	0.19	0.22	0.05	0.05	0.02	0	0.04	0.03	0.12
39	0	0	0.08	0.17	0.16	0.06	0	0	0	0	0.02	0.13
40/41/71	9.43	4.13	22.18	13.34	11.4	15.22	4.07	2.77	10.27	10.92	7.94	19
42	7.63	2.53	5.07	7.03	6.03	8.05	2.18	1.5	6.02	6.05	4.36	10.38
43	0	0	0.8	1.32	1.21	1.1	0.43	0.09	0.99	0.76	0.62	1.45
44/47/65	26.21	12.96	20.26	35.11	28.63	35.03	10.15	6.89	24.26	25.46	19.09	46.06

Table D11: *Continued.*

45/51	0	0	3.19	5.43	5.14	5.11	1.88	1.31	5	4.51	3.27	7.97
46	2.67	0	1.3	1.85	1.81	1.87	0.64	0.45	1.76	1.65	1.24	2.67
48	4.41	1.46	2.74	5.28	4.56	4.97	1.76	1.1	3.69	3.86	2.92	7.56
49/69	12.93	8.15	10.27	20.65	16.48	20.1	6.27	4.33	15.92	15.85	11.32	27.64
50/53	4.67	2.84	2.21	5.07	4.7	4.62	1.79	1.31	4.94	4.22	2.93	6.84
52	31.81	25.91	38.39	68.83	50.65	56.16	19.86	13.55	39.05	42.77	33.87	84.43
54	1.61	0	0.05	0.15	0.22	0.14	0.05	0.04	0.23	0.15	0.09	0.15
55	0	0	0.27	0.3	0	0.29	0.12	0.06	0.22	0.19	0.18	0.47
56	6.15	5.07	8.89	9.39	8.12	11.45	2.51	2	5.99	7.14	5.52	15.54
57	0	0	0.08	0.17	0	0.1	0.03	0.03	0.08	0.08	0.08	0.17
58	0	0	0.04	0	0	0.06	0	0	0	0.04	0.02	0.1
59/62/75	3.13	0	1.46	2.07	2.11	1.98	0.63	0.42	1.42	1.44	1.08	2.63
60	5.39	2.47	6.25	4.71	5.05	5.63	1.28	1	2.9	3.42	2.65	7.41
61/70/74/76	31.39	24.22	42.24	55.34	47.93	53.33	13.21	9.89	28.8	33.88	26.75	69.63
63	1.68	0	0.73	0.83	0.9	0.89	0.23	0.16	0.54	0.64	0.44	1.08
64	9.71	6.34	10.8	14.19	12.21	15.45	4.26	2.97	10.12	11.24	8.36	20.28
66	12.81	9.64	22.32	17.75	17	20.12	4.77	3.71	11.59	13.61	10.3	27.67
67	1.96	0	0.3	0.73	0.67	0.59	0.18	0.14	0.38	0.39	0.3	0.9
68	0	0	0.09	0.58	0.6	0.31	0	0	0.33	0.33	0.49	0.56
72	0	0	0.08	0.25	0.25	0.15	0	0.04	0.12	0.14	0.08	0.23
73	0.72	0	0	0.18	0	0.1	0.08	0	0.12	0.12	0.16	0.17
77	0.95	0	1.9	1.77	1.78	1.9	0.36	0.39	0.89	0.98	0.87	3.51
78	0.85	0	0.01	0	0	0	0	0	0	0	0	0
79	0.98	0	0.09	0.29	0	0.24	0	0	0	0	0.06	0.19
80	0	0	0.03	0.05	0	0	0	0	0	0	0	0
81	0	0	0.07	0	0	0.09	0	0	0	0	0	0.14
82	3.47	1.89	3.99	5.56	4.58	5.72	1.22	0.91	2.29	3	2.6	7.17
83/99	12.13	8.33	18.08	25.87	21.14	23.56	5.3	3.83	10.26	13.1	10.64	28.28
84	7.94	5.72	10.01	19.78	15.69	18.42	4.46	3.09	8.59	11.06	9.12	22.5
85/116/117	9.3	5.66	5.46	10.97	9.92	9.33	3.16	2.49	4.83	5.73	6.19	12.45
86/87/97/ 109/119/125	17.25	12.87	28.69	42.51	35.57	42.39	8.67	6.32	17.05	22.7	18.3	47.63
88/91	4.26	2.91	6.44	7.87	6.3	7.26	1.75	1.29	3.44	4.21	3.42	8.9
89	0	0	0.33	0.53	0.61	0.58	0.15	0.1	0.3	0.39	0.29	0.74
90/101/113	25.59	28.78	49.98	74.46	63.46	73.03	15.56	11.32	32.11	43.03	33.58	75.9
92	6.24	0	7.56	11.58	9.6	11.37	2.47	1.78	5	6.67	5.24	12.47
93/95/98/ 100/102	19.21	26.11	61.27	73.21	56.41	68.57	16.35	11.96	33.03	43.8	35.39	75.8
94	1.8	0	0.12	0.26	0.26	0.29	0.07	0.06	0.19	0.19	0.15	0.33
96	0	0	0.28	0.5	0.47	0.42	0.12	0.08	0.29	0.28	0.22	0.54
103	0	0	0.12	0.38	0.31	0.27	0.08	0.06	0.18	0.21	0.15	0.38
104	0	0	0.01	0.05	0.11	0.01	0	0.01	0.03	0.03	0.02	0.03

Table D11: *Continued.*

105	4.43	4.58	6.35	10.38	9.44	10.04	2.36	1.69	3.93	4.87	4.27	16.8
106	0.68	0	0	0	0	0.02	0	0	0	0	0	0
107	1.31	0.9	1.27	2.01	1.88	1.99	0.48	0.34	0.85	1.09	0.87	2.88
108/124	0	0	0.66	1.36	1.33	1.31	0.29	0.22	0.52	0.67	0.54	1.68
110/115	18.58	20.63	28.93	65.15	56.32	64.49	14.12	10.07	27.29	35.74	28.88	73.68
111	0	0	0	0	0	0.01	0	0	0	0	0	0
112	0.54	0	0.01	0	0.11	0.03	0	0	0.03	0.03	0.04	0.06
114	0.83	0	0.36	1.03	0.77	0.63	0	0	0.3	0.35	0.31	1.03
118	11	13.34	17.64	33.74	30.09	31.84	7.41	5.21	13.09	16.95	13.86	44.89
120	0	0	0	0	0	0.07	0	0	0	0.03	0	0.04
121	0	0	0.01	0	0.12	0.12	0	0	0	0	0	0.08
122	0	0	0.17	0.34	0.25	0.31	0.07	0.06	0.14	0.17	0.15	0.55
123	0	0	0.27	0.58	0.58	0.51	0.15	0.08	0.19	0.28	0.2	0.79
126	3.72	4.06	0.07	0	0	0.11	0	0	0.05	0	0	0.18
127	0	0	0	0	0	0	0	0	0	0	0	0
129/138/ 160/163	6.36	13.18	25.99	33.6	35.88	37.92	7.9	4.98	15.11	20.2	15.6	42.11
130	0	0.47	1.13	1.81	1.92	1.78	0.39	0.24	0.7	0.9	0.73	1.97
131	0	0	0.43	0.84	0.8	0.73	0.17	0.09	0.3	0.37	0.33	0.74
132	0	5.26	12	14.47	13.89	16.59	3	1.96	6.13	8.77	6.77	14.58
133	0	0	0.3	0.52	0.49	0.49	0.09	0.05	0.18	0.25	0.21	0.45
134/143	1.2	1.17	2.15	3.3	3.54	3.69	0.7	0.47	1.39	1.86	1.48	3
135/151/154	4.19	9.25	19.64	22.03	25.33	28.55	3.76	2.98	10.26	15.37	11.07	18.05
136	2.02	5.46	8.8	11.05	11.67	13.81	1.83	1.51	4.89	7.4	5.55	8.42
137	1.27	1.3	0.88	1.53	1.58	1.5	0.33	0.2	0.59	0.75	0.54	1.86
139/140	0	0	0.38	0.88	0.86	0.7	0.18	0.12	0.29	0.36	0.34	0.78
141	1.59	2.87	7.12	7.3	8.18	9.17	1.58	1	3.26	4.56	3.48	7.65
142	0	0	0	0	0	0.01	0	0	0	0	0.01	0
144	1.05	1.5	1.87	2.8	2.88	3.49	0.54	0.41	1.31	1.91	1.44	2.33
145	0	1.36	0.02	0.07	0.07	0.02	0.01	0	0.01	0.01	0.01	0.04
146	2.19	2.18	3.05	4.68	4.87	5.48	0.94	0.65	2.12	2.87	2.17	4.8
148	0	0	0.02	0.05	0.11	0.03	0.01	0	0.01	0.02	0.02	0.04
147/149	8.28	16.63	36.12	46.04	51.61	57.24	8.54	6.49	21.63	31.87	23.5	41.9
150	0	0	0.03	0.09	0.11	0.06	0.01	0.01	0.04	0.03	0.03	0.08
152	0	0	0.02	0.1	0.11	0.06	0.02	0.01	0.03	0.03	0.03	0.06
153/168	5.69	14.24	24.51	31.43	34.95	37.49	6.31	4.35	14.28	19.76	14.83	32.63
155	0.45	0	0.01	0.03	0.09	0.01	0	0.01	0.01	0	0.01	0.03
156/157	1.07	1.26	0.95	1.73	1.77	1.45	0.54	0.3	0.62	0.7	0.73	3.01
158	0.66	1.17	2.04	3.06	3.16	3.24	0.66	0.46	1.18	1.54	1.32	3.68
159	0	0	0.08	0	0	0.04	0	0	0	0	0	0
161	0	0	0	0.02	0	0	0	0	0	0	0	0
162	0	0	0.02	0	0	0.06	0	0	0	0	0	0

Table D11: *Continued.*

164	0	0	1.41	1.74	1.98	1.99	0.43	0.29	0.74	1.02	0.8	1.96
165	0	0	0	0.01	0.01	0.01	0	0	0.01	0.01	0	0
167	0.89	0.63	0.49	0.71	0.76	0.62	0.18	0.13	0.23	0.29	0.28	0.98
169	0	0	0.01	0	0	0	0	0	0	0	0.02	0
170	0.87	0.91	1.63	1.9	2.04	2.36	0.92	0.43	1.01	1.06	1.02	4.71
171/173	0	0.88	1.05	1.21	1.19	1.68	0.39	0.23	0.64	0.79	0.62	1.81
172	0	1.37	0.43	0.46	0.5	0.64	0.21	0.12	0.25	0.28	0.27	0.96
174	1.48	2.85	4.01	5.08	4.94	7.65	1.57	0.96	2.69	3.56	2.71	8.59
175	0.66	0	0.19	0.28	0.38	0.35	0.05	0.04	0.12	0.15	0.13	0.31
176	0	0.9	0.94	1.34	1.57	1.8	0.27	0.19	0.63	0.94	0.66	1.22
177	1.03	1.61	2.01	2.43	2.45	3.62	0.75	0.47	1.32	1.68	1.29	3.99
178	0.72	0.84	1.04	1.43	1.55	1.84	0.3	0.24	0.73	0.91	0.65	1.76
179	1.67	3.51	4.24	5.24	6.32	7.54	0.98	0.8	2.57	3.71	2.53	4.94
180/193	1.58	3.15	5.15	6.33	6.09	8.84	2.85	1.56	3.66	4.02	3.3	15.95
181	0.66	0	0.03	0.35	0	0	0	0	0	0	0	0
182	1	0	0.03	0.49	0	0	0	0	0	0	0	0
183/185	1.62	1.55	3.2	3.59	3.66	5.35	1.05	0.66	1.9	2.46	1.85	5.43
184	0	0	0	0.6	0	0	0	0	0	0	0	0
186	0.91	0	0	0.09	0.06	0	0	0	0	0	0	0
187	1.95	3.75	6.24	8	7.79	11.08	2.06	1.34	3.79	5.01	3.61	11.04
188	0	0	0	0.37	0	0	0	0	0	0	0	0
189	0	0	0.04	0	0	0.06	0	0	0	0	0	0.15
190	0.52	0	0.34	0.41	0.51	0.48	0.2	0.09	0.2	0.2	0.19	0.93
191	0.48	0	0.07	0	0.15	0.14	0.05	0.04	0.05	0.06	0.06	0.2
192	0.66	0	0	0	0	0	0	0	0	0	0	0
194	0.85	0.54	0.44	0.62	0.63	0.71	0.54	0.31	0.35	0.25	0.33	3.3
195	1.08	0	0.24	0.44	0.35	0.39	0.25	0.13	0.19	0.15	0.17	1.21
196	0	0	0.4	0.62	0.51	0.68	0.35	0.2	0.32	0.3	0.27	1.9
197/200	0	0	0.27	0.69	0.19	0.35	0.14	0.05	0.13	0.14	0.14	0.84
198/199	0	1.76	1.05	1.64	1.25	1.68	0.89	0.5	0.76	0.75	0.7	5.01
201	0	0.62	0.25	0.45	0.36	0.46	0.14	0.09	0.18	0.22	0.18	0.69
202	1.1	0.73	0.56	0.96	0.86	0.89	0.33	0.22	0.41	0.5	0.43	1.44
203	0	1.35	0.62	0.95	0.74	0.93	0.52	0.29	0.45	0.44	0.41	2.82
205	0	0	0.03	0	0.11	0.06	0.05	0	0	0	0	0.17
206	0	0	0.21	0.63	0.33	0.39	0.37	0.16	0.28	0.23	0.17	1.41
207	0	0	0.04	0.19	0.19	0.09	0.06	0	0.04	0.05	0	0.19
208	0	0	0.1	0.23	0.2	0.15	0.12	0.06	0.1	0.09	0.09	0.38
209	1.41	1.79	0.13	0.96	0.83	0.39	0	0	0	0	0	0.7

Table D12: PCB concentration (pg m^{-3}) data for the Jefferson Park (JP, n=14) sampling site.

Location ID	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP	JP
Deployment	03/10/12	07/23/12	04/17/12	06/01/12	08/30/12	10/05/12	11/25/12	01/11/13	02/22/13	04/05/13	05/17/13	06/28/13	10/31/13	08/09/13
Collection	04/17/12	08/30/12	06/01/12	07/23/12	10/05/12	11/25/12	01/11/13	02/22/13	04/05/13	05/17/13	06/28/13	08/09/13	01/29/14	09/20/13
1	0	19.8	0	13.2	5.2	7	6.46	1.97	2.75	2.09	2.28	2.39	2.16	6.38
2	2.75	0	0.71	3.42	1.29	1.13	1.49	0.88	0.95	0.5	0.51	0.53	1.03	1.39
3	0	10.3	2.06	15.1	12.6	4.15	5.81	1.98	2.37	4.93	4.1	3.31	1.65	5.78
4	6.59	24.4	4.67	14.9	10.9	7.11	7.75	4.2	4.38	5.04	4.97	4.31	3.49	12.3
5	0	1.2	0.28	0.91	0.38	0.22	0.28	0.26	0.21	0.15	0	0	0.13	0.55
6	1.63	8.31	2.29	8.71	2.22	1.42	1.67	1.51	1.34	1.23	1.09	1	0.96	3.49
7	0	0	0.67	2.49	0.7	0.37	0.47	0.43	0.38	0.3	0.27	0.27	0.23	0.8
8	0	38.8	10.4	41.9	9.76	6.25	7.33	6.53	6.05	5.59	5.02	4.66	4.2	16.0
9	0	2.48	0.89	3.12	0.85	0.54	0.62	0.6	0.5	0.42	0.37	0.35	0.33	1.2
10	0	0	0.34	0.68	0.53	0.31	0.33	0.23	0.22	0.17	0.17	0.16	0.14	0.46
11	15.9	22.4	22.9	78.6	11.9	5.41	5.53	5.34	9.45	11.4	7.41	9.1	4.04	21.7
12/13	0	2.6	1.56	3.07	1.07	0.42	0.7	0.5	0.46	0.34	0.25	0.22	0.33	0.8
15	2	9.22	3.83	13.2	2.03	1.19	1.47	1.27	1.17	1.3	1.11	0.95	0.85	3.77
16	3.42	14.2	5.87	17.3	3.83	2.41	3.09	2.82	2.47	2.52	2	1.8	1.88	6.72
17	5.34	15.0	6.69	19.0	4.02	2.67	3.2	2.84	2.59	2.65	2.13	1.88	1.94	6.9
18/30	8.33	29.8	0	0	8.22	5.46	6.82	5.95	5.44	5.5	4.35	4.03	4.19	14.2
19	0	3.49	1.18	2.59	1.34	0.96	1.11	0.87	0.8	0.75	0.63	0.52	0.6	1.74
20/28	9.14	26.6	15.6	44.2	7.24	4.26	5.42	4.86	4.48	4.77	3.68	3.39	3.05	12.8
21/33	7.16	15.9	7.36	21.5	4.62	2.72	3.47	3.27	3	2.91	2.12	2.01	1.89	7.72
22	2.93	8.14	6.46	16.3	2.49	1.49	1.93	1.74	1.57	1.71	1.26	1.18	1	4.46
23	0	0	0.38	0.35	0.1	0.05	0.07	0.07	0.02	0	0	0	0.01	0.04
24	0	0	0.17	0.5	0.18	0.13	0.12	0.12	0.09	0.08	0.05	0.06	0.06	0.22
25	1.53	1.88	1.44	3.64	0.71	0.46	0.57	0.52	0.47	0.43	0.34	0.3	0.3	1.05
26/29	1.94	5.78	2.77	7.57	1.46	0.87	1.12	1.02	0.94	0.9	0.7	0.64	0.67	2.29
27	0	1.96	0.71	1.89	0.6	0.37	0.46	0.41	0.37	0.33	0.26	0.24	0.25	0.85
31	14.8	26.2	16.0	47.8	6.89	4.11	5.2	4.72	4.48	4.78	3.54	3.3	2.99	12.3
32	3.15	8.68	4.58	11.7	2.29	1.49	1.81	1.57	1.42	1.52	1.2	1.05	1.03	3.96
34	0	0	0.12	0.26	0.11	0.05	0.08	0.07	0.06	0.02	0.02	0	0.02	0.06
35	0	0	0.4	0.75	0.3	0.12	0.14	0.14	0.12	0.14	0.11	0.11	0.07	0.27
36	0	0	0.21	0.13	0.12	0.04	0.06	0.06	0.03	0.03	0.02	0.02	0	0.06
37	2.57	5.66	2.21	5.83	1.16	0.62	0.63	0.55	0.49	0.72	0.57	0.5	0.37	1.85
38	0	0	0.15	0.14	0.11	0.07	0.09	0.04	0.04	0	0	0	0.02	0.03
39	0	0	0.19	0	0.08	0.05	0.09	0.06	0	0	0	0	0	0.04
40/41/71	3.64	8.17	3.3	7.15	2.59	1.34	1.69	1.46	1.57	1.56	1.16	1.14	0.9	4.35
42	1.8	4.45	2.35	4.46	1.38	0.74	0.85	0.81	0.77	0.87	0.65	0.65	0.5	2.49
43	0	0	0.37	0.87	0.42	0.16	0.21	0.22	0.17	0.14	0.1	0.09	0.08	0.4
44/47/65	7.59	15.94	0	0	6.73	3.47	4.05	3.74	4.36	4.55	3.14	3.26	2.4	13.12
45/51	0	0	1.46	3.08	1.36	0.82	1	0.84	0.88	0.79	0.58	0.55	0.55	1.99

Table D12: *Continued.*

46	0	0	0.6	1.17	0.47	0.28	0.32	0.31	0.29	0.26	0.19	0.17	0.17	0.62
48	0	2.99	1.61	3.88	1.22	0.66	0.81	0.72	0.74	0.7	0.53	0.47	0.42	1.84
49/69	4.15	10.0	5.49	13.7	4.18	2.11	2.57	2.37	2.6	2.74	1.96	1.93	1.45	7.47
50/53	0	3.68	1.33	2.41	1.43	0.88	1	1.07	1.01	0.93	0.75	0.75	0.57	1.9
52	11.6	27.6	22.2	67.9	12.9	6.02	7.03	6.81	8.33	8.62	5.53	6.01	3.86	25.2
54	0	0	0.04	0.04	0.09	0.05	0.05	0.06	0.03	0.02	0	0	0.01	0.03
55	0	0	0.22	0.58	0.21	0.09	0.06	0.16	0	0.03	0.02	0	0.02	0.09
56	0	4.03	2.17	5.42	1.27	0.55	0.66	0.58	0.71	0.82	0.59	0.57	0.35	2.31
57	0	0	0.06	0.06	0.11	0.04	0.04	0.1	0	0	0	0	0	0.03
58	0	0	0.08	0.03	0.08	0.03	0.03	0.04	0	0	0	0	0	0.02
59/62/75	0	0	0.63	1.04	0.64	0.35	0.38	0.38	0.39	0.26	0.2	0.2	0.17	0.67
60	0	2.55	1.03	2.91	0.71	0.32	0.37	0.4	0.39	0.41	0.3	0.29	0.19	1.16
61/70/74/76	9.5	21.3	9.39	28.4	8.65	3.58	4.09	4.12	4.99	5.69	3.56	3.8	2.12	16.7
63	0	0.82	0	0.48	0.23	0.09	0.11	0.13	0	0.09	0.06	0.06	0.05	0.22
64	3.42	7.15	4.07	9.38	2.62	1.25	1.56	1.37	1.53	1.73	1.21	1.21	0.85	4.85
66	3.49	9.13	3.96	10.7	2.65	1.14	1.32	1.38	1.39	1.73	1.19	1.2	0.72	5.09
67	0	0	0	0.27	0.21	0.08	0.11	0.12	0	0.06	0.05	0.04	0.04	0.16
68	0	0	0	0	0.39	0.24	0.31	0.35	0	0	0	0	0	0.3
72	0	0	0.06	0.07	0.13	0.05	0.05	0.06	0.03	0	0	0	0	0.04
73	0	0	0.13	0.19	0.17	0	0.14	0.14	0.13	0	0	0	0	0
77	0	0	0.26	0.47	0.17	0	0.06	0	0	0.1	0.1	0.08	0.05	0.32
78	0	0	0.07	0	0.08	0.03	0	0	0	0	0	0	0	0
79	0	0	0	0.1	0.17	0.04	0.06	0	0	0	0	0	0	0.04
80	0	0	0.05	0	0.11	0.06	0.03	0	0	0	0	0	0	0
81	0	0	0.07	0.07	0.05	0.03	0	0	0	0	0	0	0	0.11
82	0	1.5	0.72	2.74	0.76	0.26	0.37	0.36	0.4	0.55	0.34	0.38	0.18	1.61
83/99	0	7.37	4.95	14.7	3.97	1.44	1.73	1.86	2.29	3.04	1.78	1.96	0.9	8.53
84	0	6.63	4.32	10.3	2.93	1.19	1.4	1.41	1.79	2.23	1.27	1.46	0.7	6.57
85/116/117	0	4.74	0	4.06	2.87	1.76	2.01	2.16	2.45	0	0	0	1.02	4.03
86/87/97/ 109/119/125	0	0	6.44	18.2	5.85	2.22	2.55	2.58	3.48	4.66	2.74	3.19	1.42	14.2
88/91	0	2.83	1.39	4.95	1.27	0.55	0.63	0.69	0.79	0.88	0.52	0.56	0.33	2.73
89	0	0	0.07	0.28	0.15	0.05	0.05	0.06	0.06	0.06	0.03	0.04	0.02	0.17
90/101/113	10.7	20.3	12.2	38.4	10.5	4	4.57	4.89	6.5	7.98	4.52	5.27	2.38	24.4
92	0	12.4	2.82	7.66	1.72	0.7	0.86	0.83	1.07	1.28	0.76	0.88	0.41	3.81
93/95/98/ 100/102	9.56	18.2	13.6	37.5	10.4	4.23	4.93	5.08	6.47	7.35	4.23	4.96	2.52	22.7
94	0	0	0.02	0.11	0.1	0.04	0.04	0.03	0.04	0.03	0.02	0.02	0.01	0.09
96	0	0	0.06	0.16	0.13	0.06	0.07	0.06	0.07	0.05	0.03	0.03	0.02	0.16
103	0	0	0.03	0.14	0.11	0.05	0.04	0.05	0.05	0.04	0.03	0.03	0.02	0.12
104	0	0	0	0	0.07	0.02	0.02	0.03	0.02	0	0	0	0	0
105	1.52	3.25	1.52	5.17	1.23	0.42	0.56	0.45	0.59	1.02	0.63	0.68	0.25	2.84

Table D12: *Continued.*

106	0	0	0.05	0	0.06	0	0.02	0	0	0	0	0	0	0.01
107	0	0.9	0.19	1.04	0.31	0.11	0.1	0.13	0.16	0.23	0.15	0.15	0.07	0.63
108/124	0	0	0.18	0.69	0.27	0.09	0.1	0.09	0.1	0.15	0.09	0.11	0.04	0.43
110/115	6.86	15.4	11.6	37.9	8.94	3.44	3.78	3.59	5.43	7.02	4.22	4.75	1.92	21.4
111	0	0	0.03	0	0.06	0.01	0.02	0.01	0	0	0	0	0	0.02
112	0	0	0.38	0.17	0.06	0	0.02	0.04	0	0	0	0	0.01	0
114	0	0	0	0.39	0.21	0.19	0.2	0	0.29	0	0	0	0	0.25
118	4.14	8.71	5.63	19.5	4.37	1.47	1.72	1.59	2.27	3.59	2.13	2.38	0.93	10.2
120	0	0	0.01	0	0.05	0.01	0.02	0	0.02	0	0	0	0	0.01
121	0	0	0	0	0.07	0	0	0	0	0	0	0	0.1	0.11
122	0	0	0.08	0.23	0.1	0.02	0.04	0	0	0.03	0.03	0.03	0	0.11
123	0	0	0.06	0.33	0.1	0.03	0.04	0	0	0.06	0.04	0.04	0.02	0.19
126	0	0	0.12	0.13	0	0	0.05	0	0	0	0	0	0	0
127	0	0	0	0	0	0	0.02	0	0	0	0	0	0	0.03
129/138/ 160/163	3.82	7.6	4.54	29.2	4.78	1.4	1.89	1.73	2.7	4.33	2.32	2.65	0.89	13.2
130	0	0.77	0.11	1.61	0.29	0.1	0.1	0.04	0.13	0.2	0.13	0.14	0.05	0.57
131	0	0	0.07	0.65	0.13	0.04	0.04	0.04	0.06	0.08	0.04	0.05	0.02	0.26
132	2.26	3.35	2.11	12.4	1.86	0.63	0.79	0.7	1.06	1.58	0.88	1.04	0.38	4.81
133	0	0	0.03	0.26	0.09	0.03	0.03	0.01	0.05	0.04	0.02	0.03	0.02	0.14
134/143	0	1.18	0.39	4.37	0.57	0.18	0.23	0.17	0.25	0.33	0.19	0.24	0.11	1.09
135/151/154	1.76	4.57	3.23	17.6	2.71	0.89	1.06	1	1.63	1.99	1.02	1.29	0.53	6.65
136	0	1.88	1.26	6.56	1.27	0.44	0.58	0.5	0.75	0.9	0.49	0.61	0.36	3.15
137	0	0	0.19	1.24	0.22	0.08	0.11	0.09	0.13	0.18	0.07	0.13	0.06	0.47
139/140	0	0	0.13	0.66	0.2	0.06	0.07	0.07	0.09	0.09	0.05	0.06	0.03	0.28
141	0.76	1.99	1.07	7.48	1.07	0.3	0.37	0.37	0.63	0.88	0.42	0.54	0.18	2.76
142	0	0	0.05	0.01	0.03	0	0	0	0.01	0	0	0	0	0.01
144	0	0.68	0.64	3.04	0.43	0.12	0.15	0.16	0.24	0.32	0.16	0.19	0.08	1.04
145	0	0	0	0.01	0.04	0.01	0.01	0.01	0.01	0	0	0	0	0.01
146	0	1.39	0.62	3.96	0.69	0.2	0.26	0.26	0.37	0.53	0.27	0.34	0.14	1.67
148	0	0	0.01	0.01	0.04	0.01	0.01	0	0.01	0	0	0	0	0.01
147/149	4.04	9.22	7.9	44.1	5.81	1.8	2.25	2.23	3.55	4.92	2.48	3.09	1.11	16.1 6
150	0	0	0	0.04	0.06	0.02	0.02	0.02	0.01	0	0	0	0	0.02
152	0	0	0.01	0.03	0.05	0.01	0.01	0.01	0	0	0	0	0	0.02
153/168	3.36	6.45	6.01	34.5	4.57	1.23	1.66	1.72	2.95	4.44	2.08	2.49	0.79	14.3
155	0	0	0.01	0.05	0.04	0.02	0.02	0.02	0.02	0.01	0	0	0.01	0.02
156/157	0.63	0	0.12	1.29	0.25	0.07	0.12	0.08	0.14	0.21	0.11	0.13	0.05	0.57
158	0.53	0.95	0.44	2.85	0.49	0.14	0.19	0.17	0.29	0.39	0.22	0.25	0.08	1.14
159	0	0	0	0	0	0	0	0	0.03	0	0	0	0	0
161	0	0	0	0	0.04	0.01	0.01	0	0.02	0	0	0	0	0
162	0	0	0	0.04	0	0	0	0	0	0	0	0	0	0.02

Table D12: *Continued.*

164	0	0	0.22	1.76	0.3	0.09	0.12	0.08	0.15	0.22	0.15	0.14	0.05	0.71
165	0	0	0.01	0.02	0.03	0.01	0.01	0.01	0	0	0	0	0	0.01
167	0	0	0.04	0.47	0.09	0	0.06	0	0.02	0.08	0.05	0.05	0	0.21
169	0	0	0	0.04	0	0	0	0	0	0	0	0	0	0.01
170	0	0	0.27	1.45	0.43	0.18	0.2	0.22	0.35	0.33	0.16	0.21	0.1	0.98
171/173	0	0.75	0.18	0.92	0.27	0.12	0.21	0.16	0.2	0.22	0.11	0.13	0.05	0.69
172	0	0	0.04	0.23	0.16	0	0.03	0	0	0.07	0.03	0.07	0.02	0.21
174	0	1.35	0.66	3.31	0.74	0.24	0.39	0.33	0.52	0.68	0.34	0.42	0.15	2.27
175	0	0	0.02	0.11	0.09	0.02	0.03	0.05	0.04	0.04	0.02	0.02	0.01	0.11
176	0	0	0.09	0.86	0.19	0.05	0.07	0.05	0.12	0.14	0.07	0.09	0.03	0.49
177	0	0	0.28	1.7	0.39	0.15	0.22	0.2	0.27	0.34	0.17	0.21	0.08	1.08
178	0	1.03	0.03	0.74	0.19	0.05	0.08	0.04	0.09	0.15	0.08	0.09	0.04	0.43
179	0	1.04	0.62	3.11	0.6	0.19	0.26	0.23	0.34	0.48	0.24	0.31	0.13	1.57
180/193	0	1.54	1.12	4.73	1.25	0.36	0.56	0.46	0.84	1.21	0.55	0.68	0.24	3.88
181	0	0	0	0	0	0.1	0.12	0	0.18	0	0	0	0	0
182	0	0	0	0	0	0.2	0.16	0	0.38	0	0	0	0	0
183/185	0.71	1.37	0.75	3.89	0.69	0.19	0.32	0.29	0.43	0.67	0.31	0.38	0.16	2.09
184	0	0	0	0	0	0.2	0	0	0.44	0	0	0	0	0
186	0	0	0	0	0	0.02	0.03	0	0.06	0	0	0	0	0
187	1.19	1.93	0.68	4.83	1.14	0.36	0.52	0.46	0.77	1.05	0.49	0.63	0.24	3.44
188	0	0	0	0	0	0.14	0	0	0.3	0	0	0	0	0
189	0	0	0	0.08	0	0	0	0	0	0	0	0	0	0.05
190	0	0	0.08	0.32	0.08	0.03	0.06	0	0.05	0.08	0.04	0.04	0.03	0.26
191	0	0	0.03	0.11	0.05	0	0.03	0	0	0.02	0	0	0.01	0.1
192	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0.04
194	0	0	0.11	0.2	0.16	0.09	0.14	0.08	0.12	0.08	0	0	0.09	0.25
195	0	0	0.05	0.12	0.11	0.04	0.09	0.08	0.07	0.05	0	0.04	0.05	0.15
196	0	0	0.44	0.24	0.16	0.06	0.1	0.06	0.13	0.09	0.06	0.08	0.05	0.31
197/200	0	0	0.08	0.18	0.24	0.04	0	0	0	0	0	0.05	0	0.13
198/199	0	0	0.13	0.52	0.3	0.15	0.23	0.16	0.22	0.19	0.12	0.15	0.1	0.59
201	0	0	0.04	0.2	0.09	0.03	0.03	0.04	0.04	0.05	0.03	0.03	0.03	0.15
202	0	0	0.11	0.36	0.23	0.12	0.15	0.13	0.17	0.12	0.08	0.11	0.08	0.34
203	0	0	0.35	0.43	0.21	0.09	0.15	0.11	0.15	0.15	0.09	0.11	0.08	0.41
205	0	0	0	0	0.03	0	0	0	0	0	0	0	0	0.07
206	1.33	2.43	0	0.09	0.16	0	0	0	0	0	0	0	0.08	0.17
207	0	0	0	0	0.08	0.03	0	0	0.05	0	0	0	0	0.06
208	0	0	0.05	0.08	0.09	0.03	0.05	0	0	0	0	0	0.03	0.09
209	0	0	0	0	0.45	0.32	0.37	0.6	0.42	0	0	0	0.19	0.41

Table D13: PCB concentration (pg m^{-3}) data for the Joliet Township sampling site (JT, n=12).

Location ID	*JT*	*JT*	*JT*	*JT*	*JT*	*JT*	*JT*	*JT*	*JT*	*JT*	*JT*	*JT*
Deployment	07/18/12	10/09/12	09/04/13	06/04/12	09/13/12	07/12/13	11/26/12	01/11/13	02/22/13	04/05/13	05/29/13	10/16/13
Collection	09/13/12	11/26/12	10/16/13	07/18/12	10/09/12	09/04/13	01/11/13	02/22/13	04/05/13	05/29/13	07/12/13	11/25/13
1	10.86	2.3	0	0	6.28	3.04	7.78	2.85	3.41	3.63	7.37	2.26
2	0	0	0	0.7	1.06	1.04	1.34	1.01	1.03	0.89	1.18	1.09
3	18.2	2.5	0	1.62	11.87	2.64	5.18	2.96	4.9	12.88	11.03	2.43
4	23.16	5.37	5.8	8.11	10.8	9.03	8.04	5.83	7.51	11.62	11.8	5.95
5	0.86	0	0	0	0.27	0.22	0.26	0.22	0.23	0.23	0.24	0.21
6	7.5	1.83	0	2.54	1.92	1.88	1.84	1.66	1.83	2.12	2.11	1.54
7	0	2.11	0	0.57	0.59	0.46	0.47	0.4	0.43	0.5	0.51	0.36
8	26.12	9.23	0	12.96	8.51	8.71	8.71	7.68	8.38	9.58	9.68	7.23
9	3.12	1.03	0	1.09	0.74	0.7	0.66	0.58	0.64	0.75	0.77	0.54
10	1.57	0	0	0.45	0.46	0.35	0.32	0.23	0.28	0.38	0.43	0.21
11	17.16	9.11	8.18	18.82	9.33	10.1	8.7	9.71	13.84	14.23	13.27	9.22
12/13	2.13	0	0	0.92	1.02	0.47	0.62	0.5	0.68	0.57	0.58	0.48
15	6.72	2.45	0	4.48	1.95	2.15	1.99	1.82	1.9	2.27	2.47	1.76
16	8.9	4.86	4.4	7.17	3.62	4.13	4.67	3.99	4.05	4.41	4.53	4.13
17	10.41	4.63	4.22	8.7	3.77	4.56	4.91	4.08	4.29	4.81	5.06	4.25
18/30	24.22	14.95	7.94	0	8.51	9.96	10.69	9.15	9.26	10.31	10.48	9.33
19	2.38	0	0	1.94	1.52	1.37	1.49	1.17	1.25	1.45	1.48	1.36
20/28	19.45	13.73	8.96	20.66	7.62	8.47	9.4	8.18	7.96	8.99	9.19	8.58
21/33	11.89	7.03	5.9	9.64	4.58	4.87	5.69	4.98	4.7	5.13	5.25	5.01
22	6.38	4.99	0	7.75	2.62	2.93	3.4	2.93	2.89	3.11	3.28	3.06
23	0	0	0	0.21	0	0	0.04	0.04	0.04	0.03	0	0.03
24	0	0	0	0.24	0.07	0.11	0.14	0.09	0.14	0.12	0.12	0.11
25	1.62	0.85	0	1.63	0.67	0.71	0.72	0.66	0.73	0.76	0.8	0.69
26/29	3.61	3.21	2.22	3.61	1.41	1.64	1.68	1.52	1.74	1.69	1.78	1.52
27	2.19	1.28	0.97	0.96	0.55	0.56	0.6	0.51	0.53	0.57	0.63	0.53
31	22.17	14.41	9.83	23.66	8.31	9.31	10.75	9.28	8.82	9.87	10.33	9.47
32	7.5	4.38	2.77	7.32	2.34	2.92	3.03	2.47	2.51	2.99	3.01	2.72
34	0	0	0	0.03	0	0.04	0.05	0.05	0.06	0.03	0.04	0.03
35	1.14	0	0	0.81	0.35	0.53	0.38	0.32	0.53	0.6	0.58	0.32
36	0	0	0	0.05	0	0.04	0.03	0.06	0.09	0.07	0.06	0.03
37	5.55	2.67	2.67	6.02	2.04	3.62	1.68	1.43	2.03	2.91	3.95	1.75
38	0	0	0	0.06	0	0.06	0.07	0.06	0.05	0.05	0.06	0.06
39	0	0	0	0.1	0	0.04	0.03	0.03	0.03	0.04	0.03	0
40/41/71	12.89	7.19	5.74	10.42	5.39	8.12	12.22	10	10.53	15.06	18.16	10.9
42	5.33	3.57	2.93	6.38	2.74	4.04	6.42	5.55	5.59	7.41	8.71	5.95
43	2.16	0	0	1.6	0	0.44	1.08	0.96	0.74	0.77	1.02	1.05
44/47/65	47.12	22.12	27.96	0	22.58	42.97	47.3	41.49	45.89	70.79	92.08	46.6
45/51	4.03	0	0	2.99	1.84	1.88	5.11	4.58	3.75	4.21	4.48	4.33

Table D13: *Continued.*

46	0	0	0	0.98	0.66	0.69	1.71	1.46	1.37	1.6	1.64	1.5
48	3.9	2.52	2.01	3.7	1.86	2.17	4.72	4.19	3.63	4.54	4.82	4.16
49/69	22.4	14.09	12.93	25.08	11.48	18.81	25.63	21.31	22.91	33.02	41.47	24
50/53	4.26	2.77	2.42	2.76	2.31	2.33	5.4	4.56	4.46	4.91	5.32	4.8
52	123.9	43.24	66.34	201.7	57.66	104.6	115.9	92.43	110.8	172.3	229.3	114
54	0	0	0	0.05	0.06	0.03	0.09	0.07	0.07	0.09	0.1	0.11
55	0	0	0	1.73	0	0.21	0.3	0.22	0.24	0.34	0.5	0.23
56	15.5	5.1	7.87	23.97	6.25	12.93	10.21	8.32	12.19	22.34	29.6	10.8
57	0	0	0	0.12	0	0.04	0.07	0.03	0.09	0.11	0.06	0.08
58	0	0	0	0	0	0.04	0.06	0.04	0.03	0.01	0	0
59/62/75	1.59	1.48	0	1.46	0.73	0.81	1.62	1.37	1.38	1.63	1.79	1.44
60	6.61	2.16	3.23	9.2	2.57	4.65	4.3	3.65	4.66	8.14	10.9	4.24
61/70/74/76	140.6	43.56	70.5	162.3	58.37	127.6	92.44	71.11	114.1	206.6	284.7	98.4
63	1.21	0.8	0	1.39	0.46	0.84	0.89	0.69	0.9	1.48	1.75	0.87
64	15.03	8.42	7.19	19.69	7.92	14.01	16.29	13.4	15.39	23.87	30.67	15.8
66	33.12	12.49	16.23	39.81	11.98	24.47	20.89	16.92	23.72	41.7	56.31	21.4
67	0	0	0	0.68	0.28	0.41	0.44	0.39	0.7	0.85	0.93	0.47
68	0	0	0	0	0	0.26	0.66	0.87	0.75	0.55	0.64	0.67
72	0	0	0	0.29	0	0.12	0.09	0.1	0.23	0.24	0.2	0.13
73	0	0	0	0.85	0	0.09	0.28	0.15	0.17	0	0.08	0.11
77	11.05	2.43	4.98	12.85	2.88	8.15	3.81	2.77	6.65	13.1	18.92	4.35
78	0	0	0	0.12	0	0.06	0	0	0	0	0.04	0
79	0	1.37	1.77	1.1	0.64	1.3	0.26	0.22	0.54	0.96	1.19	0.38
80	0	0	0	0	0	0	0.03	0	0	0	0	0
81	0	0	0	0.31	0	0.24	0.17	0.11	0.15	0.34	0.49	0.16
82	35.8	8.64	16.52	51.26	12.13	34.36	18.09	12.62	25.65	56.37	79.15	21
83/99	107.5	34.8	55.79	178.5	48.54	127.4	70.29	50.96	95.83	194.1	271.8	80.3
84	84.96	24.42	40.87	127.2	34.05	90.16	53.75	38.16	72.55	139.5	191.3	60.5
85/116/117	43.78	15.97	24.07	58.98	18.38	46.29	26.85	20.37	36.83	73.07	101.1	31
86/87/97/ 109/119/125	81.1	61.52	112.0	324.6	98.28	269.1	137.9	96.49	194.2	402.3	561.4	157
88/91	27.66	6.59	13.1	26.6	11.41	28	16.43	12.05	20.96	39.79	54.96	18.2
89	2.11	0.95	0	2.35	0.67	1.4	0.99	0.74	1.29	2.3	3.06	1.06
90/101/113	357.1	94.55	193.7	508.1	138.6	357.5	204.6	145.8	276.0	545.5	764.5	229
92	64.21	15.28	27.64	103.3	21.92	61.41	33.14	24.27	45.69	92.32	130.4	38
93/95/98/ 100/102	249.5	68.62	115.7	370.0	99.52	234.6	163.4	117.0	200.4	364.8	501.1	176
94	1.09	0.88	0	0.57	0.28	0.52	0.46	0.37	0.53	0.82	1.19	0.45
96	0.78	0	0	0.68	0.35	0.63	0.63	0.5	0.73	1.04	1.3	0.7
103	1.3	0	0	0.75	0.36	0.64	0.51	0.43	0.66	1.05	1.33	0.57
104	0	0	0	0	0.04	0	0.02	0.02	0.02	0.02	0.02	0.02
105	0	21.35	39.6	152.3	28.31	74.5	37.65	26.15	55.01	124.3	172.2	44.4

Table D13: *Continued.*

106	0	0	0	0.29	0	0	0.01	0	0.03	0.06	0.01	0.02
107	17.05	3.79	6.47	22.64	5.12	14.85	7.27	5.09	10.94	25.31	34.56	8.86
108/124	12.3	3.19	7.26	14.91	3.64	10.32	4.9	3.52	7.37	16.62	23.12	5.83
110/115	406.1	95.83	201.3	706.8	155.1	429.1	216.3	151.2	308.7	646.4	891.8	249
111	0	0	0	0	0	0.04	0.03	0	0.03	0.09	0	0
112	0	0	0	1	0	0.03	0.06	0.03	0.15	0	0.32	0.04
114	5.1	1.77	2.65	6.86	1.83	3.97	2.14	1.55	3.1	7.06	9.44	2.67
118	260.0	61.62	115.4	488.3	94.06	247.7	127.8	90.14	186.3	409.1	568.6	150
120	0	0	0	0	0.08	0.17	0.04	0.03	0.12	0.11	0.21	0.04
121	0	0	0	0	0	0.06	0.13	0.09	0.15	0.05	0.13	0.08
122	0	1.59	1.32	5.35	0.72	2.02	0.94	0.66	1.52	3.63	4.53	1.26
123	3.18	0.68	1.35	5.9	1.28	3.26	1.54	1.14	2.57	5.83	7.44	2.07
126	0	2.38	3.5	1.39	0	0.6	0.19	0.17	0.49	1.14	1.32	0.38
127	0	0	0	0	0	0.15	0.04	0.03	0	0.03	0.08	0.02
129/138/ 160/163	173.2	43.86	98.15	368.3	83.53	197.4	50.74	35.8	72.93	151.2	201.2	60.1
130	12.27	2.9	6.19	23.21	4.68	11.96	2.79	2	4.14	9.01	12.04	3.53
131	4.02	1.19	0	7.13	1.95	4.65	1.16	0.87	1.72	3.55	4.69	1.42
132	82.45	26.13	43.69	154.5	35.73	89.96	21.88	15.51	32.38	67.49	89.62	27.1
133	2.61	0.83	2.41	3.59	0.94	2.4	0.62	0.4	0.86	1.72	2.33	0.69
134/143	18.26	4.42	7.89	40.81	7.83	19.97	4.82	3.43	6.89	14.17	18.51	5.7
135/151/154	57.11	14.72	33.62	109.6	27.75	67.29	18.65	13.36	24.41	47.97	63.31	21.4
136	28.3	7.99	21.15	39.82	14.05	32.97	9.32	6.78	12.21	22.73	30.54	10.8
137	10.24	2.87	5.69	18.19	4.04	11.43	2.46	1.86	4.04	8.48	11.37	3.55
139/140	5.02	1.37	0	7.03	1.96	4.79	1.22	0.87	1.78	3.54	4.76	1.47
141	32.02	7.63	15.58	72.96	13.63	34.09	8.75	5.96	12.05	25.75	34.18	10.2
142	0	0	0	0.07	0.01	0.05	0.01	0.01	0.02	0.04	0.05	0.02
144	10.3	2.71	4.92	19.3	4.21	10.03	2.74	1.95	3.61	7.33	9.82	3.21
145	0	0	0	0.16	0.07	0.1	0.02	0.02	0.05	0.07	0.1	0.03
146	24.97	5.7	13.38	39.22	9.43	24.2	5.87	4.26	8.58	18.11	24.21	7.06
148	0	0	0	0.07	0.06	0.1	0.02	0.01	0.05	0.08	0.09	0.03
147/149	153.4	40.17	84.28	328.5	77.4	180.9	49.3	35.01	67.6	132.8	176.1	57.7
150	0	0	0	0.23	0.1	0.19	0.06	0.04	0.09	0.14	0.17	0.06
152	0	0	0.71	0.15	0.1	0.19	0.04	0.03	0.07	0.14	0.2	0.06
153/168	127.8	32.13	71.68	254.8	58.71	136.9	36.87	26.08	50.97	103.4	138.0	42.5
155	0	0	0	0	0.02	0.01	0.01	0.01	0.01	0	0	0
156/157	11.29	2.6	5.03	23.1	4.12	9.2	2.79	1.89	3.61	8.13	10.58	3.05
158	18.61	4.87	10.06	38.71	7.74	19.32	4.66	3.28	6.88	14.96	19.59	5.75
159	0.38	0	0	0.07	0.11	0.05	0	0	0	0.04	0.06	0
161	0	0	0	0.12	0.02	0	0	0	0	0	0	0
162	0.42	0.28	0	0.81	0.12	0.31	0.09	0.04	0.15	0.22	0.33	0.12
164	11.45	2.57	4.65	19.76	4.5	11.18	2.87	1.95	3.81	8.56	11	2.94

Table D13: *Continued.*

165	0	0	0	0.1	0	0.02	0.01	0	0	0	0.01	0
167	4.45	1.18	0	8.69	1.61	3.72	1.04	0.77	1.49	3.06	4.05	1.15
169	0	0	0	0.1	0	0.01	0	0	0	0	0	0
170	5.58	1.95	3.5	10.2	2.02	4.52	1.76	1.26	1.97	3.59	4.57	1.56
171/173	4.47	0.81	2.68	7.05	1.49	3.69	1.13	0.77	1.37	2.74	3.6	1.17
172	1.46	0.72	0	1.65	0.47	1.02	0.43	0.26	0.43	0.74	1	0.38
174	10.27	2.63	5.59	18.92	3.98	10.06	3.42	2.37	3.77	7.43	9.63	3.36
175	0.68	0	0	1.06	0.22	0.54	0.17	0.14	0.17	0.4	0.5	0.19
176	2.33	1.11	1.54	4.06	0.96	2.25	0.84	0.58	0.91	1.69	2.22	0.85
177	6.15	1.41	3.46	10.95	2.16	5.44	1.78	1.21	1.98	3.98	5.14	1.78
178	2.34	0.98	1.35	3.47	0.97	2	0.81	0.6	0.82	1.54	1.99	0.82
179	7.22	2.2	6.59	12.13	3.08	6.77	2.78	2.02	2.77	4.98	6.4	2.68
180/193	11.35	3.3	6.6	21	4.61	10.78	4.54	3.06	4.55	8.62	10.69	3.98
181	0	0	0	0.54	0.27	0.29	0	0	0.1	0.21	0.27	0.1
182	0	0	0	0	0.47	0.14	0	0	0	0	0	0
183/185	7.26	2.79	4.87	15.02	2.85	7.05	2.56	1.89	2.74	5.26	6.74	2.52
184	0	0	0	0	0.63	0	0	0	0	0	0	0
186	0	0	0	0	0.09	0	0	0	0	0	0	0
187	11.2	3.92	6.24	17.65	4.89	11.22	4.07	3.02	3.77	6.8	8.25	3.43
188	0	0	0	0	0.42	0	0	0	0	0	0	0
189	0	0	0	0.21	0	0.11	0.09	0.07	0.04	0.09	0.1	0.05
190	1.04	0	0.55	1.58	0.38	0.75	0.3	0.24	0.37	0.57	0.72	0.28
191	0.39	0	0	0.51	0.11	0.23	0.1	0.09	0.12	0.17	0.19	0.1
192	0	0	0	0.03	0	0	0	0	0	0	0	0
194	0.68	0.62	0	0.47	0.22	0.23	0.33	0.22	0.21	0.26	0.25	0.2
195	0.61	0	0.9	0.4	0.14	0.19	0.18	0.11	0.14	0.18	0.2	0.11
196	0.73	0	0	0.77	0.26	0.37	0.34	0.22	0.24	0.31	0.35	0.22
197/200	0	0	0	0.51	0.11	0.27	0.41	0.41	0.23	0.24	0.3	0.42
198/199	1.01	0	0	1.45	0.58	0.84	0.75	0.55	0.52	0.74	0.78	0.52
201	0.49	0	0	0.58	0.21	0.29	0.21	0.15	0.16	0.23	0.26	0.16
202	0.68	0	0	1.01	0.48	0.56	0.47	0.39	0.38	0.47	0.52	0.39
203	0	0	0	1.01	0.45	0.48	0.43	0.35	0.34	0.43	0.46	0.32
205	0	0	0	0.05	0	0.02	0.03	0	0	0.03	0	0
206	0	0	0	0.14	0.19	0.09	0.16	0.16	0.12	0.11	0.08	0.1
207	0	0	0.81	0.05	0.07	0.03	0.06	0	0.04	0.03	0.04	0
208	0	0	0	0.14	0.06	0.07	0.07	0.07	0.07	0.06	0.06	0.06
209	0	0	0	0	0.64	0	0	0.4	0.39	0	0	0

Table D14: PCB concentration (pg m^{-3}) data for the Lemont (LM, n=9) and Lemont High School (LH, n=4) sampling sites.

Location ID	*LH*	*LH*	*LH*	*LH*	*LM*	*LM*	*LM*	*LM*	*LM*	*LM*	*LM*	*LM*	*LM*
Deployment	09/13/12	07/12/13	11/04/13	05/21/13	07/18/12	11/19/12	06/06/12	10/11/12	09/23/13	04/23/13	03/11/13	01/14/13	08/23/13
Collection	10/11/12	08/23/13	12/16/13	07/12/13	09/13/12	01/14/13	07/18/12	11/19/12	11/04/13	05/21/13	04/23/13	03/11/13	09/23/13
1	7.52	6.25	12.87	4.32	13.88	3.83	7.15	5.7	5.4	5.31	4.38	3.11	5.55
2	1.21	1.05	2.31	0.64	0	0	0.63	1.22	0.72	1.85	1.26	1.03	0.91
3	25.37	5.18	4.1	4.68	35.23	2.65	2.35	4.37	1.89	14.06	14.72	1.86	8.77
4	29.99	20.64	41.32	13.41	35.86	10.02	33.98	15.17	22.87	16.56	15.83	10.53	21.44
5	0.63	0.52	1.22	0.34	1.16	0.78	1.01	0.48	0.62	0.49	0.49	0.37	0.82
6	5.05	4.71	11.24	2.89	10.27	3.62	8.66	3.07	5.64	4.08	3.7	3.03	5.65
7	1.26	0.96	2.36	0.56	2.72	2.1	1.82	0.8	1.01	0.93	0.92	0.64	1.18
8	22.91	21.93	44.4	13.62	41.64	14.32	40.11	13.2	25.91	15.79	15.21	12.66	25.35
9	1.82	1.67	4.27	0	4.17	1.52	3.76	1.27	2.08	1.47	1.33	1.12	2.23
10	1.18	0.72	2.01	0.59	2.91	0	1.58	0.72	1.02	0.82	0.78	0.55	1.15
11	7.2	12.71	6.07	10.81	13.67	6.38	9.33	4.93	6.6	19.84	13.11	4.37	10.23
12/13	2.31	0.81	1.54	0	3.56	1.11	1.41	0.97	0.72	1.18	1.15	0.63	0.93
15	3.84	4.35	6.08	1.87	8.02	2.64	8.64	2.15	3.85	3.06	2.6	2.07	4.1
16	7.88	9.05	14.95	5.31	14.37	8.42	14.87	4.56	9.1	6.25	5.88	4.89	11
17	8.98	9.71	15.28	6.14	13.26	8.22	18.56	4.96	10.49	6.65	6.16	4.76	11.24
18/30	19.04	19.75	31.76	12.99	30.3	19.46	0	10.22	22.77	12.79	12.42	9.59	24.24
19	3.86	3.03	5.91	2.58	4.65	3.04	4.35	1.99	3.52	2.58	2.45	1.81	4.99
20/28	11.87	14.04	19.36	9.36	25.56	16.13	29.25	6.66	13.36	11.29	9.18	7.1	17.42
21/33	7.09	7.91	12.95	5.65	14.8	9.84	13.62	4.06	8.19	6.34	5.7	4.69	10.75
22	4.1	4.79	6.58	3.3	8.84	5.65	11.08	2.12	4.44	3.75	3.1	2.43	6.38
23	0	0.09	0	0	0	0	0.28	0.09	0.04	0.03	0.03	0.03	0
24	0.25	0.28	0.53	0.24	0	0	0.55	0.24	0.3	0.21	0.22	0.17	0.34
25	1.14	1.38	1.92	0.89	2.61	1.57	2.6	0.74	1.09	1.17	0.9	0.72	1.66
26/29	2.36	2.8	4.61	2.19	4.76	2.94	5.51	1.42	2.6	3.09	2.2	1.65	3.52
27	1.29	1.22	2.3	0.97	1.95	1.19	1.92	0.72	1.3	1.11	1	0.77	1.77
31	11.27	13.5	19.38	9.22	25.86	16.38	30.98	6.19	13.45	10.87	8.97	6.88	18.64
32	4.85	5.33	8.14	3.49	9.09	5.07	13.69	2.58	5.63	4.16	3.68	2.8	6.64
34	0.11	0.11	0.02	0	0	0	0.08	0.08	0.08	0.04	0.06	0.06	0
35	0	0.31	0.21	0.19	0	0	0.48	0.13	0.17	0.55	0.29	0.15	0
36	0	0.05	0	0.02	0	0	0.09	0.1	0	0.12	0.03	0.03	0
37	1.22	1.87	2.22	1.19	3.81	2.08	4.02	0.64	1.29	1.54	1.17	0.92	2.16
38	0	0.03	0	0	0	0	0.03	0.1	0	0	0.04	0.02	0
39	0	0.03	0	0	0	0	0.06	0.1	0	0	0	0.02	0
40/41/71	3.21	4.17	4.67	3.78	7.11	5.92	4.92	2.01	3.04	3.96	3.07	2.08	6.39
42	2.13	2.36	2.35	2.23	3.8	1.99	3.29	1.06	1.55	1.93	1.49	0.94	3.14
43	0.42	0.43	0.5	0.39	0	0	0.65	0.33	0.32	0.41	0.3	0.26	0.71
44/47/65	7.55	9.76	8.46	8.75	13.45	11.57	0	4.22	6.06	8.09	5.73	3.78	13.92

Table D14: *Continued.*

45/51	2.2	2.39	3.97	2.27	0	0	2.95	1.26	2.28	2.65	2.12	1.55	4.25
46	0.77	0.79	1.11	0.82	0	0	1.04	0.45	0.66	0.79	0.64	0.44	1.3
48	1.75	1.83	2.63	1.67	2.9	1.9	2.69	1	1.51	1.71	1.47	1.05	3.01
49/69	5.08	6.17	6.33	5.12	8.99	6.18	7.3	2.82	4.13	6.02	4.23	2.74	8.95
50/53	2.32	2.19	3.12	2.21	3.5	1.75	1.88	1.39	1.73	2.49	1.78	1.25	3.19
52	11.38	14.24	12.1	13.03	19.78	13.63	20.85	6.4	9.55	14.27	8.93	5.44	21.27
54	0.13	0.07	0.11	0	0	0	0.07	0.12	0.06	0.1	0.07	0.07	0.13
55	0.08	0.08	0.05	0	0	0	0.21	0	0.04	0	0.03	0.03	0
56	1.17	1.5	1.14	1.35	3.02	1.46	2.53	0.67	0.87	1.5	0.91	0.69	2.15
57	0	0.03	0	0	0	0	0.05	0.13	0.04	0	0.02	0.04	0
58	0	0	0	0	0	0	0	0.12	0	0	0	0.03	0
59/62/75	0.81	0.73	0.98	0.85	1.4	0.82	0.84	0.7	0.6	0.81	0.68	0.45	1.48
60	0.72	0.8	0.66	0.73	2.28	1.1	1.37	0.4	0.51	0.79	0.59	0.41	1.17
61/70/74/76	6.75	8.29	6.41	7.92	13.27	8.23	9	3.98	4.64	8.94	5.26	3.49	10.94
63	0.19	0.18	0.18	0.14	0.75	0.54	0	0.19	0.13	0.21	0.18	0.11	0.28
64	3.18	3.88	3.38	3.27	5.33	4.18	5.05	1.68	2.3	3.41	2.39	1.51	5.43
66	2.41	3.11	2.62	3.13	6.43	4.41	4.54	1.32	2.06	3.37	2.2	1.42	4.5
67	0.21	0.17	0.2	0.14	0.79	0	0	0.17	0.13	0.23	0.16	0.13	0.24
68	0	0.33	0.38	0	0	0	0	0.39	0	0.63	0.41	0.3	0.7
72	0.09	0.04	0	0	0	0	0.06	0.13	0.03	0.12	0.04	0	0
73	0	0.09	0	0.13	0	0	0.1	0.2	0.11	0.13	0	0.08	0
77	0	0.28	0.11	0.09	0	0	0.46	0	0.1	0.45	0.12	0	0.29
78	0.09	0	0	0	0	0	0	0	0	0	0	0	0
79	0	0.02	0	0.09	0	0	0	0	0	0	0.02	0.02	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0.03	0	0	0	0	0	0	0	0	0
82	0.52	0.66	0.39	0.76	1.53	0	0.78	0.27	0.34	0.79	0.45	0.26	1.18
83/99	2.75	3.19	1.68	3.32	4.61	2.87	3.32	1.58	1.43	3.67	1.9	1	4.64
84	2.14	2.45	1.39	2.8	3.02	2.26	2.72	1.16	1.14	2.78	1.4	0.83	3.89
85/116/117	3.26	2.52	3.1	0.87	2.84	2.9	0	2.53	0	4.51	2.92	2.08	1.67
86/87/97/ 109/119/125	4.32	5.02	2.54	5.11	0	0	4.67	2.27	2.2	5.76	2.95	1.62	7.86
88/91	0.89	1.13	0.73	1.3	2.34	0	0.85	0.68	0.56	1.34	0.74	0.45	1.71
89	0.08	0.12	0.06	0.12	0	0	0.11	0.09	0.05	0.13	0.04	0.05	0.22
90/101/113	6.85	8	4.23	8.48	11.34	5.74	8.13	3.91	3.66	9.36	4.68	2.56	12.45
92	1.19	1.45	0.77	1.66	7.49	0	1.84	0.74	0.66	1.79	0.86	0.46	2.33
93/95/98/ 100/102	6.84	8.32	4.86	9.27	0	5.53	9.03	4.25	4.19	9.97	5.13	2.89	13.01
94	0.05	0.06	0.04	0.06	0	0	0.03	0.09	0.04	0.08	0.04	0.02	0
96	0.09	0.1	0.11	0.1	0	0	0.06	0.1	0.07	0.15	0.08	0.05	0.13
103	0.09	0.06	0.06	0	0	0	0.03	0.11	0.03	0.12	0.06	0.03	0
104	0.03	0	0.02	0	0	0	0	0.07	0	0	0.02	0.02	0

Table D14: *Continued.*

105	0.74	1.02	0.56	1.21	1.81	1.48	1.71	0.4	0.49	1.18	0.6	0.42	1.78
106	0	0.02	0	0	0	0	0	0	0.02	0	0	0.01	0.09
107	0.22	0.27	0	0.25	0.46	0.49	0.31	0.1	0.12	0.29	0.14	0.09	0.57
108/124	0.16	0.17	0	0.17	0	0	0.17	0.13	0.09	0.27	0.15	0.09	0.37
110/115	6.23	7.35	3.43	7.49	9.18	4.23	9.12	3.42	3.14	7.8	4.03	2.15	9.84
111	0.02	0	0	0	0	0	0	0.05	0	0	0.02	0.02	0
112	0.06	0	0	0	0	0	0.09	0.1	0.02	0	0.02	0.02	0
114	0.29	0	0	0	0	0	0	0.37	0	0.25	0	0	0.2
118	2.44	3.29	1.57	3.43	4.75	0	5.06	1.22	1.4	3.54	1.69	1.07	5.63
120	0	0.02	0	0	0	0	0.02	0.04	0	0	0	0.02	0
121	0	0.14	0	0	0	0	0	0.08	0	0	0	0	0.03
122	0.03	0	0	0.05	0	0	0.08	0	0	0	0.03	0.03	0.1
123	0.07	0.08	0	0	0	0	0.08	0	0.04	0	0	0.03	0.08
126	0	0	0	0	0	2.34	0	0	0	0	0	0	0.02
127	0	0	0	0.02	0	0	0	0	0.02	0	0	0	0
129/138/ 160/163	2.34	2.9	0.98	3.14	4.44	2.23	4.79	1.19	1.03	2.53	1.37	0.89	5.43
130	0.1	0.19	0.07	0.17	0.65	0	0.26	0.07	0.05	0.19	0.11	0.06	0.22
131	0.05	0.08	0.03	0.03	0	0	0.07	0.04	0.02	0.08	0.04	0.02	0.13
132	1.1	1.32	0.45	1.47	0	0	2.03	0.52	0.44	1.14	0.57	0.31	2.46
133	0.03	0.05	0.02	0	0	0	0.05	0.01	0	0.08	0.03	0.02	0.08
134/143	0.28	0.35	0.11	0.15	0	0	0.46	0.19	0.1	0.27	0.14	0.06	0.52
135/151/154	1.49	1.73	0.62	1.78	1.85	1.42	2.28	0.86	0.61	1.64	0.83	0.45	2.93
136	0.82	0.99	0.37	0.86	1.15	0	0.83	0.46	0.32	0.85	0.44	0.22	1.6
137	0.16	0.18	0.07	0.11	0.52	0	0.23	0.1	0.09	0.18	0.09	0.06	0.36
139/140	0.08	0.11	0.06	0.1	0	0	0.09	0.11	0.03	0.12	0.07	0.04	0.21
141	0.51	0.62	0.22	0.58	0.91	0.57	1.26	0.26	0.23	0.58	0.3	0.18	1.08
142	0	0.01	0.01	0	0	0	0	0.02	0	0	0.01	0	0.03
144	0.22	0.25	0.1	0.2	0.66	0	0.33	0.17	0.09	0.24	0.13	0.06	0.39
145	0.01	0.01	0.01	0	0	0	0	0.04	0	0.01	0.01	0.01	0
146	0.38	0.44	0.16	0.46	0.6	0.39	0.66	0.21	0.18	0.46	0.22	0.12	0.95
148	0.01	0.01	0	0	0	0	0	0.05	0	0.01	0.01	0	0
147/149	3.18	3.81	1.26	3.97	4.8	1.95	5.53	1.58	1.29	3.23	1.67	0.91	6.33
150	0.03	0.01	0.01	0	0	0	0	0.06	0	0.03	0.02	0.01	0
152	0.03	0.01	0.01	0	0	0	0	0.05	0	0.02	0.01	0	0
153/168	1.98	2.56	0.9	2.69	3.39	1.14	3.93	1.08	0.89	2.32	1.25	0.71	5.01
155	0.02	0.01	0.01	0	0	0	0	0.06	0	0.02	0.02	0.01	0
156/157	0.1	0.15	0	0	0	0	0.27	0.03	0.06	0.2	0.1	0.1	0
158	0.22	0.29	0.11	0.2	0.52	0	0.48	0.13	0.1	0.27	0.14	0.08	0.56
159	0	0	0	0	0	0	0	0	0	0	0	0.03	0
161	0	0	0	0	0	0	0	0.01	0	0.02	0.01	0.01	0
162	0	0.02	0	0	0	0	0	0	0	0	0.02	0	0

Table D14: *Continued.*

164	0.13	0.18	0.07	0.19	0.56	0	0.3	0.08	0.06	0.18	0.09	0.07	0.29
165	0.01	0.01	0	0	0	0.3	0	0.03	0	0.01	0.02	0.01	0.04
167	0	0.06	0	0	0	0	0.11	0	0.02	0.03	0.02	0.03	0
169	0	0.01	0	0	0	0	0.05	0	0	0	0	0	0
170	0.13	0.24	0.09	0.15	0	0	0.37	0.11	0.08	0	0.05	0.08	0.54
171/173	0.15	0.17	0.07	0.12	0	0	0.2	0.07	0.06	0.09	0	0.06	0
172	0.05	0.1	0	0	0	0	0.08	0	0	0.08	0.03	0	0
174	0.29	0.41	0.15	0.47	0.9	0	0.69	0.15	0.16	0	0	0.14	0.78
175	0.04	0.05	0	0	0	0	0	0.03	0	0.05	0.02	0.01	0.05
176	0.09	0.1	0.05	0.12	0	0	0.13	0.08	0.03	0.11	0.07	0.03	0.1
177	0.13	0.31	0.09	0.28	0	0	0.37	0.12	0.1	0.39	0.19	0.08	0.48
178	0.11	0.14	0.05	0.08	0	0	0.22	0.08	0.04	0.16	0.08	0.05	0.17
179	0.33	0.46	0.16	0.55	0	0	0.61	0.22	0.17	0.45	0.23	0.11	0.81
180/193	0.48	0.63	0.24	0.66	1.01	0	1.15	0.39	0.24	0	0	0.21	1.37
181	0.13	0	0	0	0	0	0	0.19	0	0.21	0.13	0	0
182	0.3	0	0	0	0	0	0	0.33	0	0	0	0	0
183/185	0.29	0.47	0.15	0.53	0.64	0	0.76	0.15	0	0.61	0.26	0.09	0.86
184	0.36	0	0	0	0	0	0	0.45	0	0	0	0	0
186	0	0	0	0	0	0	0	0.08	0	0	0	0	0.03
187	0.72	1.1	0.34	1.49	1.78	0.87	1.76	0.48	0.39	0.88	0.39	0.22	2.18
188	0.22	0	0	0	0	0	0	0.28	0	0	0	0	0
189	0	0	0	0	0	0	0.06	0	0	0.06	0.04	0.04	0
190	0	0.07	0.03	0	0	0	0.1	0	0	0.16	0.13	0.05	0.24
191	0	0.04	0	0	0	0	0.04	0	0	0.27	0.16	0.03	0
192	0	0.03	0	0	0	0	0	0	0	0.06	0	0	0
194	0	0.13	0.08	0.13	0.33	0	0.19	0.11	0	0.12	0.08	0.12	0.29
195	0	0	0	0	0	0	0.07	0	0	0	0.07	0.05	0
196	0.1	0.11	0.07	0.23	0	0	0.22	0.09	0.06	0.14	0.09	0.08	0.54
197/200	0	0.12	0	0.18	0	0	0.15	0	0	0	0.12	0	0.29
198/199	0.33	0.52	0.27	1.02	0.81	0	0.89	0.29	0.24	0.55	0.27	0.19	1.71
201	0.11	0.13	0.06	0.27	0	0	0.28	0.09	0.06	0.16	0.07	0.04	0.5
202	0.48	0.67	0.27	1.12	1.13	0.61	1.28	0.37	0.3	0.71	0.28	0.17	1.72
203	0.29	0.36	0.17	0.77	0.75	0	0.92	0.22	0.19	0.4	0.18	0.14	1.28
205	0	0	0	0	0	0	0	0	0	0	0.03	0.08	0
206	0	0.21	0.15	0.48	1.5	0	0.25	0.2	0.12	0.21	0.11	0.17	0.97
207	0	0.06	0	0.16	0	0	0.06	0.05	0	0.07	0	0.05	0.45
208	0.14	0.18	0.08	0.36	0	0	0.32	0.11	0.08	0.19	0.06	0.08	0.48
209	0.68	0.37	0	0	0	0	0	0.46	0	0	0	0	0

Table D15: PCB concentration (pg m^{-3}) data for the Naperville City Hall (NC, n=13) sampling site.

Location ID	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Deployment	11/19/12	09/14/13	06/28/12	08/03/12	09/18/12	10/14/12	06/30/13	10/27/13	02/24/13	04/07/13	12/29/12	08/04/13	05/21/13
Collection	12/29/12	10/27/13	08/03/12	09/18/12	10/14/12	11/19/12	08/04/13	12/01/13	04/07/13	05/21/13	02/24/13	09/14/13	06/30/13
1	5.69	0	0	9.17	3.83	2.88	0	1.72	2.12	3.38	2.54	2.87	3.88
2	2.86	0	0	1.6	1.02	1.03	0.42	0.66	0.6	1.15	1.3	0.94	0.74
3	5.12	0	0.92	9.87	19.48	3.54	1.64	0.96	1.2	13.32	2.13	3.15	3.93
4	7.76	3.1	6.89	11.03	11.64	4.87	4.08	3.13	3.06	6.26	3.84	8.24	6.9
5	0	0	0.37	0.44	0.26	0.19	0	0.14	0.13	0.31	0.2	0	0.18
6	2.46	0	2.46	2.59	1.49	1.04	0.97	0.9	0.87	1.35	1.33	1.82	1.53
7	3.78	0	0.52	0.72	0.57	0.32	0.26	0.23	0.21	0.53	0.35	0.42	0.44
8	13.31	0	12.21	10.63	5.82	4.25	4.32	3.95	3.86	4.91	5.09	6.92	6.8
9	2.05	0	0.91	1.02	0.55	0.42	0.37	0.34	0.32	0.61	0.51	0	0
10	0.88	0	0.41	0.51	0.48	0.24	0.18	0.16	0.16	0.56	0.23	0	0
11	18.11	9.28	24.91	17.01	8.42	7.08	7.69	5.02	8.3	7.46	5.8	13.29	16.8
12/13	1.52	0	1.22	0.88	1.27	0.5	0.19	0.26	0.28	0.71	0.44	0.17	0
15	3.85	0	4.87	2.32	1.11	0.9	0.77	0.64	0.69	0.86	0.91	0.77	1.08
16	7.82	0	7.89	3.94	1.95	1.65	1.54	1.36	1.4	1.93	2	3.27	2.78
17	10.51	0	8.78	4.1	2.32	1.78	1.64	1.6	1.62	2.02	2	3.62	3.19
18/30	25.56	5.62	0	8.55	4.59	3.62	3.43	3.46	3.52	4.16	4.07	8.04	6.52
19	3.27	0	1.51	1.37	1.08	0.73	0.53	0.51	0.5	0.81	0.71	2.53	1.54
20/28	24.78	0	21.34	7.01	3.37	2.59	2.43	2.03	2.42	3.49	3.14	5.92	4.39
21/33	14.77	0	10.17	4	1.97	1.52	1.39	1.25	1.53	2.05	2.12	3.2	2.61
22	9.49	0	8.96	2.4	1.15	0.88	0.83	0.73	0.88	1.15	1.11	2.1	1.55
23	0	0	0.38	0	0	0	0	0.03	0	0.07	0.03	0	0
24	0	0	0.23	0.21	0.09	0.04	0.05	0.08	0.08	0.13	0.08	0.15	0.1
25	1.41	0	1.6	0.72	0.38	0.32	0.25	0.21	0.23	0.39	0.34	0.49	0.44
26/29	4.83	0	3.92	1.44	0.81	0.52	0.48	0.45	0.55	0.83	0.78	1.04	1.03
27	1.82	0	0.91	0.58	0.36	0.29	0.21	0.23	0.24	0.4	0.34	0.68	0.54
31	28.08	0	23.21	6.89	3.11	2.49	2.33	2.17	2.45	3.14	3.18	5.37	4.32
32	8.47	0	6.76	2.41	1.22	1.01	0.87	0.85	0.89	1.25	1.13	2.27	1.65
34	0	0	0.1	0	0	0.05	0	0.04	0	0.09	0.04	0	0
35	0	0	0.33	0.29	0.1	0.13	0.12	0	0.13	0.2	0.11	0	0.14
36	0	0	0.15	0.07	0	0.03	0	0	0	0.12	0.04	0	0.08
37	4.46	0	3.35	1.02	0.47	0.36	0.34	0.53	0.34	0.46	1	0	0.4
38	0	0	0.08	0.07	0	0	0	0	0	0.05	0	0	0
39	0	0	0.06	0	0	0	0.03	0	0	0.05	0	0	0
40/41/71	10.6	0	2.85	2.52	1.3	0.9	0.72	0.56	0.71	1.38	1.01	2.11	1.75
42	5.18	0	1.83	1.28	0.7	0.52	0.41	0.27	0.34	0.63	0.46	0.93	0.91
43	0	0	0.36	0	0	0.1	0.07	0.07	0.1	0.17	0.09	0.26	0.18
44/47/65	22.26	0	0	5.96	3.34	2.22	1.92	1.33	1.59	2.84	1.99	5.9	3.85

Table D15: *Continued.*

45/51	5.74	0	1.76	1.28	0.72	0.58	0.43	0.46	0.48	0.84	0.73	1.57	1.2
46	3.4	0	0.44	0.41	0.26	0.2	0.12	0.12	0.16	0.29	0.21	0.54	0.39
48	4.21	0	1.86	1.08	0.61	0.45	0.33	0.29	0.35	0.52	0.51	1.02	0.8
49/69	12.8	0	4.6	3.73	2.07	1.47	1.2	0.8	1.02	2.09	1.43	3.32	2.51
50/53	5.98	0	1.08	1.29	1.05	0.79	0.7	0	0.53	1.44	0.69	1.61	1.22
52	28.72	7.15	15.28	10.97	6.31	3.64	2.93	1.97	2.6	4.96	2.97	9.83	6.32
54	0	0	0	0.07	0.07	0.04	0	0.02	0	0.09	0.03	0	0
55	0	0	0.15	0	0.09	0	0	0	0.03	0.15	0	0	0.08
56	7.92	0	1.83	1.25	0.59	0.39	0.29	0	0.24	0.52	0.24	0.74	0.57
57	0	0	0	0	0	0	0	0	0.02	0.08	0	0	0
58	0	0	0.05	0	0	0.03	0	0	0	0.1	0	0	0
59/62/75	2.45	0	0.66	0.58	0.46	0.22	0.14	0.14	0.18	0.48	0.24	0.43	0.36
60	5.13	0	1.07	0.7	0.39	0.21	0.15	0	0.16	0.36	0.11	0.4	0.35
61/70/74/76	21.24	0	6.91	7.33	3.94	2.28	1.66	0	1.35	3.17	1.66	5.02	3.6
63	0.53	0	0	0.21	0	0.08	0	0	0.06	0.13	0.05	0	0.12
64	7.02	0	3.31	2.35	1.23	0.82	0.66	0.45	0.56	1.08	0.74	1.93	1.4
66	9.74	0	3.47	2.35	1.16	0.72	0.58	0.45	0.57	1.16	0.61	2.02	1.39
67	0	0	0	0.14	0.05	0.05	0	0	0.04	0.16	0.03	0	0
68	0	0	0	0.35	0.47	0.37	0	0	0	0.38	0.29	0	0
72	0	0	0.08	0	0.07	0.06	0	0	0	0.08	0	0	0
73	0	0	0	0	0	0.08	0	0	0	0.14	0.07	0.23	0
77	1.41	0	0.24	0.18	0	0	0	0	0.06	0	0	0	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0.09	0	0	0
80	1.68	0	0	0	0	0.04	0	0	0	0.07	0	0	0
81	0	0	0.07	0	0	0	0	0	0	0	0	0	0
82	1.88	0	0.33	0.52	0.38	0.18	0.14	0	0.1	0.24	0.12	0.57	0.22
83/99	6.85	0	2.2	2.7	1.74	0.98	0.69	0	0.51	1.24	0.57	2.23	1.52
84	4.95	0	1.64	2.03	1.34	0.7	0.51	0	0.41	1.09	0.43	1.9	1.26
85/116/117	0	3.75	0	2.31	3.06	2.38	0	0	0	2.42	2.03	3.11	0
86/87/97/ 109/119/125	0	0	2.74	4.31	2.81	1.34	1.01	0	0.87	2.24	0.77	3.34	2.09
88/91	2.16	0	0.52	0.95	0.66	0.36	0.22	0	0.19	0.61	0.25	0.87	0.57
89	0	0	0	0.09	0.08	0	0	0	0.02	0.07	0.02	0.1	0.08
90/101/113	12.68	6.79	5.46	6.99	4.63	2.4	1.69	0	1.32	3.66	1.41	5.45	3.74
92	0	0	1.47	1.22	0.86	0.45	0.32	0	0.27	0.71	0.26	1.08	0.61
93/95/98/ 100/102	16.44	0	6.52	7.42	4.76	2.62	1.69	0	1.51	3.96	1.62	6.6	4.45
94	0	0	0	0.06	0.05	0.02	0	0	0.01	0.07	0	0	0
96	0	0	0.03	0.1	0.08	0.04	0	0	0.02	0.09	0.03	0	0.06
103	0	0	0	0.08	0.08	0.04	0	0	0	0.09	0	0	0
104	0	0	0	0.04	0.03	0.02	0	0	0	0.04	0	0	0

Table D15: *Continued.*

105	2.37	0	0.68	1	0.42	0.23	0.19	0.31	0.19	0.38	0.16	0.16	0.41
106	0	0	0	0	0	0	0	0	0	0.02	0	0	0
107	0	0	0.09	0.22	0.14	0.06	0.06	0	0.05	0.04	0	0	0.07
108/124	0.8	0	0.09	0.18	0.09	0.07	0.05	0	0	0.17	0.04	0	0
110/115	10.05	0	5.03	5.83	4.09	2.23	1.46	0	0	2.73	1.15	5.06	2.82
111	0	0	0	0	0	0.02	0	0	0	0.04	0	0	0
112	0	0	0.05	0.05	0	0	0	0	0	0.06	0	0	0
114	0	0	0	0.18	0.26	0.3	0	0	0	0	0	0	0
118	4.55	0	2.43	2.78	1.39	0.78	0.64	0.78	0.52	1.13	0.45	1.82	1.03
120	0	0	0	0.02	0	0	0	0	0	0.02	0	0	0
121	0	0	0	0	0	0	0	0	0	0.05	0	0.01	0.02
122	0.96	0	0.04	0.03	0	0	0	0	0	0	0	0	0
123	0	0	0.05	0.09	0.07	0	0	0	0	0	0	0	0.04
126	4.97	3.88	0.16	0	0	0	0	0	0	0	0	0	0.01
127	0	0	0	0.02	0	0	0	0	0.02	0.02	0	0	0
129/138/ 160/163	0	0	1.42	2.31	1.28	0.75	0.55	0.74	0.35	1.05	0.32	1.49	1.11
130	0	0	0.07	0.14	0.06	0.02	0.04	0.03	0	0.08	0	0	0.02
131	0	0	0	0.08	0.04	0.03	0.02	0	0	0.05	0	0	0
132	0	0	0.61	1.07	0.63	0.33	0.26	0.21	0.14	0.45	0.15	0.65	0.44
133	0	0	0	0.04	0.03	0.02	0	0	0	0.06	0	0.06	0
134/143	0	0	0.07	0.33	0.2	0.08	0.07	0	0	0.15	0.03	0	0
135/151/154	3.94	0	0.92	1.57	0.95	0.52	0.36	0.23	0.22	0.66	0.23	0.87	0.56
136	0	1.24	0.36	0.78	0.63	0.28	0.18	0	0	0.37	0.14	0.45	0.38
137	0	0	0	0.18	0.12	0.04	0.04	0.04	0	0.11	0	0	0
139/140	0	0	0.04	0.14	0.09	0.04	0	0	0	0.12	0.02	0	0
141	1.14	0	0.37	0.53	0.31	0.15	0.11	0.12	0.06	0.25	0.06	0.35	0.18
142	1.3	0	0	0.02	0	0.01	0	0	0.01	0.02	0	0.01	0
144	1.21	0	0.09	0.23	0.13	0.09	0.04	0	0	0.11	0.03	0.08	0.1
145	0	0	0	0.03	0.01	0	0	0	0	0.02	0	0	0
146	0.82	0	0.15	0.37	0.21	0.12	0.07	0.08	0.07	0.18	0.06	0.2	0.14
148	0	0	0	0.03	0.03	0.01	0	0	0	0.02	0	0	0
147/149	4.55	0	2.29	3.18	1.86	1.06	0.75	0.58	0.5	1.31	0.44	1.9	1.53
150	0	0	0	0.04	0.03	0.02	0	0	0	0.03	0	0	0
152	0	0	0	0.03	0.03	0	0	0	0	0.02	0	0	0
153/168	2.48	0	1.28	2.1	1.23	0.72	0.48	0.52	0.34	0.98	0.32	1.4	1.03
155	0	0	0	0.03	0.02	0.02	0	0	0	0.03	0.01	0	0
156/157	0	0	0	0.14	0.06	0	0	0.09	0	0.13	0	0	0
158	0	0	0.04	0.25	0.12	0.07	0.05	0.09	0	0.13	0.03	0.08	0.08
159	0	0	0	0	0	0	0	0	0	0.02	0	0	0
161	0	0	0	0.02	0.01	0.01	0	0	0	0.06	0	0	0
162	0.5	0	0	0	0	0	0	0	0	0	0	0	0

Table D15: *Continued.*

164	0	0	0	0.15	0.07	0.06	0.03	0.04	0.02	0.1	0.02	0.11	0.03
165	0	0	0.01	0.02	0.02	0.01	0	0	0	0.03	0	0	0
167	0	0	0	0.06	0	0	0	0.04	0	0.02	0	0	0
169	0	0	0	0	0	0	0	0	0	0.03	0	0	0
170	0	0	0.15	0.16	0	0	0	0.07	0	0.12	0	0.16	0
171/173	0	0	0	0.19	0	0	0	0	0	0.15	0	0.16	0
172	0	0	0.04	0	0	0	0	0	0	0.06	0	0	0
174	0	0	0.3	0.38	0.13	0.12	0.08	0.08	0	0.2	0.06	0.24	0.19
175	0	0	0	0.03	0	0	0	0	0	0.02	0	0	0
176	0	0	0.03	0.1	0.06	0.04	0.02	0	0.01	0.06	0.02	0	0
177	0	0	0.15	0.2	0	0	0	0	0	0.12	0.04	0.18	0.1
178	0	0	0	0.1	0.08	0.02	0.02	0	0	0.05	0.02	0.08	0
179	0.96	0	0.13	0.33	0.19	0.11	0.08	0.05	0.04	0.17	0.05	0.12	0.18
180/193	1.12	0	0.53	0.5	0.27	0.16	0.12	0.15	0	0.26	0.09	0.36	0.22
181	0	0	0	0	0	0.13	0	0	0	0	0	0	0
182	0	0	0	0	0.25	0.3	0	0	0	0	0	0	0
183/185	0	0	0.25	0.33	0.1	0.1	0	0	0	0.18	0	0.21	0.1
184	0.85	0	0	0	0.32	0.37	0	0	0	0	0	0	0
186	0	0	0	0.03	0.05	0.05	0	0	0	0.03	0	0	0
187	0	0	0.41	0.55	0.37	0.2	0.15	0.11	0.09	0.26	0.08	0.39	0.37
188	0	0	0	0	0	0.24	0	0	0	0	0	0	0
189	0	0	0.08	0	0	0	0	0	0	0.09	0	0	0
190	0	0	0.08	0.08	0	0	0	0	0	0.06	0	0.15	0
191	0	0	0	0.03	0	0	0	0	0	0.08	0	0	0
192	0.84	0	0	0	0	0	0	0	0	0.04	0	0	0
194	0	0	0	0.15	0.19	0	0	0	0	0.15	0	0	0
195	0	0	0	0.07	0	0	0	0	0	0.1	0	0	0
196	0	0	0	0.11	0.1	0	0	0	0	0.11	0	0	0
197/200	0	0	0	0.07	0	0	0	0	0	0	0	0	0
198/199	0	0	0	0.25	0.18	0	0	0	0	0.24	0	0	0
201	0	0	0.03	0.08	0.04	0.02	0.02	0	0	0.08	0	0	0
202	0	0	0	0.19	0.19	0.13	0	0	0	0.16	0.08	0	0
203	0	0	0	0.19	0.18	0	0	0	0	0.14	0	0	0.2
205	0.74	0	0	0	0	0	0	0	0	0.14	0	0	0
206	0	0	0	0.14	0.16	0	0	0	0	0.12	0	0	0
207	0	0	0	0.06	0	0	0	0	0	0.07	0	0	0
208	0	0	0	0.06	0.06	0.05	0	0	0	0.09	0	0	0
209	0	0	0	0.41	0.61	0.45	0	0	0	0.71	0	0	0

Table D16: PCB concentration (pg m^{-3}) data for the Norwood Park (NP, n=7) sampling site.

Location ID	*NP*	*NP*	*NP*	*NP*	*NP*	*NP*	*NP*
Deployment	03/10/12	04/21/12	06/02/12	09/15/12	10/13/12	11/16/12	01/28/13
Collection	04/21/12	06/02/12	07/16/12	10/13/12	11/16/12	01/28/13	02/28/13
1	3.75	0	0	5.06	1.92	2.31	4.22
2	2.55	0.51	0.63	0.94	0.6	0.8	1.44
3	4.4	1.78	2.93	5.81	1.37	1.88	3.55
4	6.29	5.37	14.34	5.29	1.79	3.4	6.52
5	0	0.2	0.49	0.34	0.15	0.2	0.42
6	1.77	2.09	5.08	1.46	0.58	1.1	2.7
7	0	0.36	1.05	0.6	0.24	0.33	0.74
8	8.34	8.49	22.93	5.92	2.18	4.35	10.74
9	0	0.55	1.93	0.67	0.31	0.46	1.02
10	0	0.24	0.59	0.42	0.19	0.26	0.4
11	17.07	10.17	17.81	8.87	3.41	2.78	9.15
12/13	0	0.68	1.35	1.22	0.54	0.3	0.87
15	2.19	2.21	6.51	1.88	0.7	0.7	2.21
16	3.85	3.49	8.85	2.54	1	1.53	3.67
17	5.06	5.17	11.46	2.72	0.97	1.57	3.72
18/30	8	0	0	5.54	2.03	3.15	7.33
19	2.24	1.1	2.31	0.85	0.37	0.55	1.2
20/28	8.69	8.76	22.81	4.79	2.06	2.52	6.19
21/33	6.32	4.19	10.94	2.87	1.4	1.65	4.19
22	3.76	3.6	9.09	1.68	0.76	0.84	2.13
23	0	0.24	0.24	0.12	0.07	0.03	0
24	0	0.17	0.51	0.16	0.07	0.08	0.14
25	1.12	0.84	1.84	0.56	0.24	0.26	0.57
26/29	2.47	1.79	3.78	1.09	0.49	0.59	1.38
27	1.14	0.52	1.15	0.47	0.19	0.25	0.59
31	14.36	9.61	22.58	4.36	1.87	2.38	6.28
32	3.05	3.21	10.21	1.46	0.59	1.02	2.05
34	0	0	0.11	0.12	0.08	0.03	0.05
35	0	0.21	0.26	0.29	0.12	0.07	0.16
36	0	0.07	0.05	0.17	0.08	0.01	0.04
37	2.29	0.88	3.4	0.93	0.42	0.35	2.27
38	0	0	0.04	0.11	0.08	0	0
39	0	0.03	0.16	0.12	0.07	0	0
40/41/71	3.14	1.65	3.52	1.67	0.95	0.77	1.86
42	1.84	1.23	2.38	1.07	0.54	0.41	0.85
43	0	0.11	0.49	0.33	0.09	0.12	0.18
44/47/65	7.65	0	0	5.23	2.73	1.9	4.45
45/51	0	0.83	2.59	1.01	0.46	0.55	1.25

Table D16: *Continued.*

46	0	0.28	0.62	0.24	0.17	0.17	0.35
48	1.27	1.01	2.09	0.87	0.43	0.35	0.92
49/69	4.28	2.86	6.57	3.17	1.63	1.2	2.69
50/53	2.32	0.76	1.36	2.23	0.91	0.61	1.23
52	11.89	11.04	22.94	7.99	4.37	2.88	6.56
54	0	0	0	0.11	0.08	0.04	0.04
55	0	0.17	0.21	0	0.08	0.04	0.11
56	1.9	1.06	2.81	1.16	0.48	0.33	0.89
57	0	0	0.09	0.04	0.1	0	0
58	0	0.04	0.04	0	0.06	0	0
59/62/75	1.19	0.47	0.83	0.75	0.42	0.22	0.45
60	0	0.44	1.62	0.77	0.32	0.18	0.56
61/70/74/76	7.96	4.76	11.28	6.63	3.38	2.04	4.95
63	0	0	0	0	0.11	0.07	0.14
64	2.62	1.94	4.5	1.68	0.91	0.63	1.46
66	2.3	2.03	4.93	1.94	0.94	0.73	1.92
67	0	0	0	0	0.07	0.06	0.13
68	0	0	0	0.61	0.45	0.26	0.59
72	0	0.05	0	0.04	0.11	0.02	0
73	0	0	0.14	0.25	0.19	0.07	0.12
77	0	0.2	0.52	0	0	0	0.22
78	0	0	0	0.06	0	0	0
79	0	0	0.03	0	0	0	0
80	0	0	0.06	0	0.08	0	0
81	0	0	0.12	0	0	0	0
82	0	0.36	1.23	0.46	0.39	0.3	0.37
83/99	3.07	2.3	5.54	2.75	1.72	1.03	1.72
84	2.63	1.88	5.41	1.94	1.26	0.88	1.32
85/116/117	0	0	2.18	3.07	2.79	1.67	4.09
86/87/97/ 109/119/125	0	3.17	8.7	4.46	2.67	1.77	2.79
88/91	2.93	0.52	1.31	1.01	0.6	0.41	0.61
89	0	0	0.15	0.13	0.08	0.03	0.09
90/101/113	9.05	5.74	13.81	7.03	4.22	2.7	4.55
92	0	1.33	3.4	1.29	0.76	0.48	0.76
93/95/98/ 100/102	9.02	6.85	15.89	6.99	4.31	2.68	4.31
94	0	0.03	0.03	0.07	0.07	0.02	0.03
96	0	0.02	0.07	0.09	0.08	0.04	0.06
103	0	0.08	0.04	0.11	0.08	0.03	0.06
104	0	0	0	0.09	0.05	0.02	0.02
105	1.09	0.87	2.96	0.86	0.61	0.64	0.7

Table D16: *Continued.*

106	0	0	0	0.02	0.02	0	0
107	0	0.13	0.37	0.29	0.14	0.13	0.16
108/124	0	0.07	0.39	0.21	0.14	0.1	0.15
110/115	5.58	5.65	15.94	6.12	4.19	2.57	3.95
111	0	0	0	0.03	0.04	0.02	0
112	0	0.05	0.06	0.04	0.03	0.01	0
114	0	0	0	0.29	0.56	0	0
118	4.11	2.78	9.05	2.72	1.69	1.53	2.03
120	0	0.03	0	0.06	0	0.02	0
121	0	0	0	0	0	0	0
122	0	0.04	0.06	0.03	0	0.02	0
123	0	0.03	0.19	0.05	0	0.04	0
126	0	0.13	0.24	0	0	0	0
127	0	0	0	0.03	0.03	0.01	0
129/138/ 160/163	2.7	1.96	8.04	2.61	1.75	1.62	1.36
130	0	0.05	0.41	0.09	0.1	0.11	0.08
131	0	0.03	0.16	0.08	0.04	0.03	0.03
132	0	0.89	3.36	1.11	0.76	0.61	0.55
133	0	0	0.02	0.05	0.02	0.02	0.02
134/143	0	0.31	0.79	0.07	0.21	0.13	0.15
135/151/154	1.93	0.78	2.85	1.45	0.89	0.53	0.73
136	0	0.35	1.11	0.79	0.46	0.29	0.39
137	0	0.06	0.24	0.11	0.1	0.1	0.09
139/140	0	0	0.2	0.16	0.08	0.05	0.06
141	0.69	0.29	1.59	0.45	0.36	0.29	0.27
142	0	0	0	0	0.02	0	0
144	0	0.19	0.38	0.23	0.13	0.08	0.11
145	0	0	0	0.04	0.03	0	0
146	0.56	0.18	0.83	0.33	0.24	0.18	0.21
148	0	0	0	0	0.01	0	0
147/149	3.42	2.59	7.68	3.01	1.77	1.24	1.48
150	0	0	0	0.01	0.05	0	0
152	0	0	0	0.05	0.03	0.01	0
153/168	3.09	1.53	5.36	2.24	1.34	1.02	1.21
155	0	0	0.02	0.03	0.03	0.01	0
156/157	0.58	0.07	0.7	0.19	0.15	0.19	0
158	0.45	0.05	0.81	0.25	0.2	0.18	0.16
159	0	0	0	0	0	0	0
161	0	0	0	0.02	0.01	0.01	0
162	0	0	0	0	0	0	0
164	0	0.07	0.55	0.14	0.08	0.14	0.1

Table D16: *Continued.*

165	0	0.01	0	0.02	0.02	0.01	0.01
167	0	0.03	0.2	0	0	0	0
169	0	0	0.01	0	0	0	0
170	0.48	0.15	0.88	0.16	0.16	0.16	0.13
171/173	0	0.06	0.24	0.11	0	0.09	0.1
172	0.6	0	0.07	0	0	0.04	0
174	0	0.18	0.86	0.38	0.12	0.16	0.19
175	0	0	0	0.04	0	0.01	0
176	0	0	0.13	0.05	0.06	0.03	0.05
177	0	0.07	0.45	0.13	0.08	0.09	0.1
178	0	0	0.12	0.11	0.09	0.03	0.06
179	0	0.18	0.29	0.22	0.16	0.1	0.16
180/193	0.77	0.36	1.50	0.65	0.38	0.27	0.28
181	0	0	0	0	0.35	0	0
182	0	0	0	0.32	0.86	0	0
183/185	1.24	0.21	0.65	0.27	0.12	0.11	0.14
184	0	0	0	0.37	1.19	0	0
186	0	0	0	0.09	0.15	0	0
187	0	0.13	0.85	0.55	0.29	0.17	0.27
188	0	0	0	0.21	0.8	0	0
189	0	0	0.11	0	0	0.05	0
190	0	0	0.17	0	0	0.05	0.05
191	0	0	0.04	0	0	0.03	0.04
192	0	0	0	0	0	0.02	0
194	0	0	0.17	0.1	0.08	0.09	0
195	0	0	0.09	0.07	0	0.05	0
196	0	0	0.1	0.08	0.06	0.06	0.07
197/200	0	0	0.06	0	0	0	0
198/199	0	0	0.3	0.35	0.1	0.13	0.13
201	0.76	0.02	0.05	0.08	0.04	0.02	0.04
202	0	0	0.15	0.24	0.17	0.08	0.17
203	0	0	0.17	0.21	0	0.08	0
205	0	0	0.04	0	0	0.07	0
206	1.17	0	0.11	0.29	0	0.11	0
207	0	0	0	0.12	0.04	0.05	0
208	0	0	0.11	0.06	0.07	0.04	0
209	0	0	0	2.11	0.66	0.25	0

Table D17: PCB concentration (pg m^{-3}) data for the Portage Park (PP, n=14) sampling site.

Location ID	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*	*PP*
Deployment	03/10/12	07/16/12	11/16/12	08/30/13	04/17/12	06/02/12	09/15/12	10/13/12	04/30/13	02/28/13	10/07/13	01/12/13	06/11/13	07/27/13
Collection	04/17/12	09/15/12	01/12/13	10/07/13	06/02/12	07/16/12	10/13/12	11/16/12	06/11/13	04/30/13	12/04/13	02/28/13	07/27/13	08/30/13
1	3.89	13.9	3.07	17.6	0	0	5.84	3.44	8.62	3.22	15.0	91.6	5.15	5.46
2	2.68	0	1.36	16.1	0.73	0.69	1.22	0.84	1.85	1.13	1.76	1.59	0.79	1.1
3	0	18.8	3.69	16.8	1.51	1.61	8.6	4.67	29.6	4.45	2.83	2.79	5.32	4
4	7.94	21.3	6.1	39.5	6.49	11.1	12.7	8.48	22.4	6.23	10.1	7.92	11.9	14.6
5	0	0	0	7.11	0.28	0.38	0.41	0.26	0.61	0.25	0.55	0.41	0.42	0.6
6	3.28	6.77	2.42	10.8	2.18	3.81	2.6	1.98	5.06	1.76	3.31	3.03	3.02	4.34
7	0	0	1.89	8.4	0.46	0.77	0.71	0.44	1.32	0.45	0.75	0.69	0.66	0.92
8	9.33	26.9	8.96	20.7	9.91	17.7	11.4	9.03	21.7	7.19	13.5	11.5	14.7	20.1
9	0	3.13	1.17	7.76	0.89	1.32	0.99	0.72	1.96	0.68	1.23	1.1	0	0
10	0	0	0	7.25	0.32	0.49	0.58	0.39	1.14	0.35	0.55	0.43	0.6	1.09
11	15.4	15.5	6.74	34.5	13.9	18.0	8.83	6.53	24	8.74	8.3	39.6	29.7	36.7
12/13	0	1.59	0	5.67	0.77	1.23	1.12	0.43	1.44	0.55	0.78	0.86	0	1.21
15	3.04	6.41	2.77	6.57	3.58	4.45	2.76	1.67	4.01	1.31	2.52	2.07	2.97	3.78
16	5.55	9.28	6.45	13.8	4.66	7.93	4.99	3.8	8.34	2.92	5.69	4.76	6.95	10.7
17	7.25	8.88	5.63	34.5	5.49	10.1	5.26	4.6	8.36	2.98	5.54	4.6	7.71	10.0
18/30	10.9	20.6	14.6	50.3	0	0	11.0	9.42	17.0	5.93	11.4	9.6	16.8	21.8
19	2.23	2.51	1.65	9.84	1.19	1.83	1.8	1.4	2.91	1.02	1.85	1.55	2.48	3.98
20/28	13.0	18.3	13.2	40.4	11.0	19.2	8.72	7.36	13.9	5.17	9.96	7.84	13.7	17.0
21/33	9.55	10.5	8.55	26.0	5.65	9.32	5.37	4.2	8.67	3.22	6.49	5.27	8.9	11.46
22	4.74	6.09	4.39	16.2	4.27	7.86	3.09	2.45	4.83	1.81	3.48	2.69	4.87	6.47
23	0	0	0	5.4	0.22	0.17	0.07	0	0	0.04	0	0	0	0
24	0	0	0	5.05	0.21	0.35	0	0.18	0.33	0.13	0.17	0.19	0.32	0.47
25	1.09	1.44	0.89	14.0	0.95	1.51	0.84	0.56	1.31	0.49	0.95	0.78	1.22	1.42
26/29	2.71	3.96	2.58	15.1	1.94	3.3	1.84	1.39	3.18	1.14	2.22	3.56	2.75	3.55
27	0	1.35	0.72	5.46	0.6	1.08	0.77	0.61	1.37	0.51	0.89	0.72	1.17	1.69
31	19.7	19.2	15.4	36.8	11.5	19.8	8.7	7.82	13.9	5.02	10	7.86	14.3	18.6
32	3.98	6.58	4.34	18.9	3.37	8.1	2.99	2.71	5.05	1.89	3.62	2.72	4.33	5.83
34	0	0	0	11.59	0.05	0.07	0.04	0.04	0.05	0.04	0.02	0.02	0.09	0
35	0	0	0	7.52	0.32	0.33	0	0.12	0.42	0.2	0.22	0.17	0.47	0
36	0	0	0	4.93	0.05	0.08	0	0	0.12	0.03	0	0	0.02	0
37	3.7	3.22	2.44	8.5	1.88	2.77	1.36	0.85	1.98	0.7	1.36	2.43	2.13	2.29
38	0	0	0	4.14	0.04	0.04	0	0	0.02	0	0	0	0	0
39	0	0	0	7.58	0.03	0.05	0	0	0.04	0.02	0	0	0	0
40/41/71	3.1	6.13	6.87	21.9	2.43	3.49	2.99	1.97	5.05	1.71	3.32	2.41	6.17	7.41
42	1.87	2.31	2.21	2.3	1.46	2.74	1.69	1.01	2.43	0.82	1.57	1.12	2.78	3.72
43	0	0	0	13	0.28	0.48	0.5	0.25	0.5	0.19	0.4	0.23	0.57	0.99
44/47/65	9.67	10.4	10.0	19.3	0	0	10.9	6.06	13.6	3.47	8.38	6.67	21.1	27.6
45/51	0	3.94	0	14.2	1.21	1.73	1.52	1.21	2.84	1.14	2.01	1.68	3.22	4.31

Table D17: *Continued.*

46	0	0	0	15.3	0.42	0.62	0.55	0.39	0.96	0.31	0.62	0.47	1	1.22
48	2.27	2.16	2.28	11.1	1.27	1.79	1.4	0.89	2.3	0.78	1.59	1.21	2.48	3.58
49/69	6.49	6.27	6.58	22.4	4.1	5.79	6.83	3.92	8.87	2.54	5.7	3.96	11.2	14.4
50/53	2.18	1.81	2.45	15.1	0.89	1.37	1.89	1.35	2.61	0.97	1.81	1.52	3.13	4.16
52	20.2	19.6	22.0	62.1	16.6	21.5	34.0	20.1	34.8	6.21	21.8	13.5	61.6	87.0
54	0	0	0	6.85	0	0	0.09	0.05	0.09	0.04	0.07	0.06	0	0.14
55	0	0	0	8.07	0.11	0.37	0.05	0	0.03	0.03	0.06	0.1	0	0
56	2.22	2.5	2.32	7.51	1.34	2.59	1.37	0.79	2.17	0.65	1.16	0.83	2.87	3.62
57	0	0	0	4.78	0	0.03	0	0	0.09	0.02	0	0	0	0
58	0	0	0.78	3.64	0	0	0	0	0.06	0	0	0	0	0
59/62/75	0	0.9	1.86	3.19	0.47	0.64	0.65	0.4	1.01	0.37	0.64	0.49	0.91	1.48
60	0	1.63	1.36	10.5	0.69	1.21	0.76	0.44	1.19	0.4	0.68	0.51	1.69	2.11
61/70/74/76	12.9	13.0	11.4	36.4	6.53	9.28	11.2	5.73	16.8	3.78	8.89	5.89	24.9	29.5
63	0	0.63	0.6	3.91	0	0	0.25	0.06	0.34	0.11	0.19	0.15	0.44	0.46
64	3.01	4.25	4.22	13.5	2.68	4.06	3.26	1.92	4.71	1.37	2.95	2.03	6.41	7.92
66	3.88	5.45	4.31	9.44	2.58	4.3	2.96	1.79	5.03	1.36	2.77	1.98	7.22	7.68
67	0	0.68	0	6.61	0	0	0.18	0	0.29	0.09	0.17	0.14	0.24	0.26
68	0	0	0	6.35	0	0	0.42	0	0.48	0.3	0.3	0.39	0	0.68
72	0	0	0	5.9	0	0.04	0.11	0	0.05	0.03	0	0.04	0	0
73	0	0	0	1.46	0.1	0.14	0.26	0	0.16	0.07	0.12	0.13	0.42	0.46
77	1.27	0	0	8.61	0.19	0.1	0.22	0	0.36	0.11	0.13	0.1	0.26	0
78	0	0	0	3.36	0	0	0	0	0	0	0	0	0	0
79	0	0	0	5.12	0	0.03	0	0	0	0	0	0.02	0	0
80	0	0	0	3.79	0	0	0	0	0	0	0	0	0	0
81	0	0	0	3.18	0	0	0	0	0	0	0	0	0.03	0
82	0	0.9	0	6.52	0.52	0.73	0.81	0.39	1.78	0.33	0.59	0.45	2.38	2.71
83/99	4.07	4.61	4.76	16.2	2.74	4.36	5.34	2.82	8.89	1.64	3.91	2.4	14.8	16.0
84	3.95	4.06	4.81	19.9	2.48	3.9	5.05	2.7	7.6	1.2	3.75	2.26	15.0	17.0
85/116/117	0	0	0	11.3	0	0	3.47	0	4.78	2.13	2.83	2.94	3.62	3.66
86/87/97/ 109/119/125	0	0	0	22.3	3.64	6.08	7.63	4.08	14.7	2.47	5.97	3.68	24.2	24.9
88/91	2.56	1.59	2.04	17.7	0.86	1.04	2.21	1.1	3.21	0.57	1.67	1.02	5.44	6.43
89	0	0	1.29	5.14	0.06	0.03	0.11	0.05	0.19	0.05	0.1	0.06	0.26	0.38
90/101/113	12.5	12.1	11.4	43.9	7.72	11.1	16.6	9.24	25.7	4.25	12.3	7.6	45.1	55.9
92	0	8.4	0	16.42	1.56	2.46	2.87	1.67	4.81	0.75	2.22	1.38	7.62	10.4
93/95/98/ 100/102	12.8	12.2	11.9	64.0	8.7	14.1	22.5	13.1	29.0	4.39	15.4	9.37	59.2	71.9
94	0	0	0	3.18	0	0.04	0.1	0.03	0.12	0.04	0.06	0.05	0.14	0.24
96	0	0	0	3.52	0.04	0.04	0.16	0.09	0.25	0.06	0.14	0.12	0.31	0.47
103	0	0	0	3.46	0.05	0.04	0.13	0.07	0.18	0.05	0.11	0.07	0.29	0.49
104	0	0	0	1.72	0	0	0.04	0	0.02	0.01	0.02	0.02	0	0
105	2.62	2.17	1.4	4.95	0.88	1.72	0.98	0.5	2.47	0.54	0.87	0.61	4.24	3.8

Table D17: *Continued.*

106	0	0	0	1.43	0	0	0	0	0.02	0	0	0	0	0.11
107	0.52	0.53	0	4.42	0.17	0.33	0.24	0.06	0.73	0.11	0.24	0.16	0.85	0.77
108/124	0	0.47	0	5.18	0.12	0.15	0.24	0.07	0.56	0.06	0.21	0.15	0.68	0.64
110/115	6.71	0	7.1	28.4	5.95	11.1	10.6	5.14	19.1	3.46	7.61	4.77	35.2	31.1
111	0	0	0	1.46	0	0	0.03	0	0	0.01	0	0	0	0
112	0	0	0	2.08	0.03	0.07	0.09	0	0	0	0.01	0	0.09	0.14
114	0	0	0	4.14	0	0	0	0	0.31	0	0.14	0	0.29	0.51
118	5.83	5.66	3.48	15.4	2.98	5.49	3.94	1.99	8.27	1.56	3.06	1.94	13.9	13.1
120	0	0	0	3.28	0	0.04	0.05	0	0	0	0	0	0	0
121	0	0	0	4.94	0	0	0	0	0	0	0.05	0.82	0.01	0
122	0	0	0	3.49	0.03	0.09	0	0	0.17	0	0	0	0.24	0.14
123	0	0	0	3.57	0.06	0.04	0.08	0	0.18	0	0.02	0	0.28	0.13
126	0	0	2.15	2.95	0	0.06	0	0	0	0	0	0	0.01	0
127	0	0	0	5.03	0	0	0	0	0.07	0.01	0	0	0	0.06
129/138/ 160/163	3.72	3.71	2.05	11.1	2.37	4.47	3.77	1.84	5.8	1.42	2.2	1.7	12.6	12.8
130	0.52	0.44	0.29	3.59	0.11	0.19	0.24	0.08	0.42	0.09	0.15	0.1	0.79	0.91
131	0	0	0	2.76	0.02	0.06	0.15	0.03	0.21	0.04	0.07	0.05	0.3	0.29
132	0	1.74	0	7.13	1.1	2	1.79	0.87	2.82	0.57	1.04	0.71	5.86	6.42
133	0	0	0	7.85	0.02	0	0.05	0.01	0.16	0.02	0.05	0.03	0.12	0.23
134/143	0	0	0	1.73	0.28	0.69	0.55	0.13	0.78	0.14	0.28	0.2	1.43	1.55
135/151/154	2.46	3.03	1.91	8.43	1.81	2.25	3.33	1.73	3.89	0.98	1.84	1.53	7.79	10.6
136	0	1.67	1.14	3.77	0.75	0.95	2.01	0.97	2.35	0.48	1.17	1.71	4.94	7.71
137	0	0	0	3.14	0.09	0.07	0.27	0.07	0.39	0.1	0.12	0.09	0.6	0.73
139/140	0	0	0	2.15	0.05	0.08	0.2	0	0.31	0.06	0.11	0.07	0.41	0.41
141	0.79	1.17	0.95	3.09	0.71	0.95	0.87	0.48	1.35	0.35	0.54	0.46	2.68	3.28
142	0	0	0	2.38	0	0	0.01	0	0.03	0.01	0	0	0	0
144	0	0	0.45	1.94	0.28	0.29	0.47	0.23	0.61	0.15	0.27	0.24	1.24	1.66
145	0	0	0	3.73	0	0	0.02	0	0.02	0.01	0.01	0.01	0	0
146	0.79	0.86	0.81	1.87	0.4	0.5	0.66	0.33	0.97	0.22	0.39	0.31	1.99	2
148	0	0	0	1.95	0	0	0	0	0.02	0.01	0.01	0.01	0	0
147/149	4.57	5.35	3.82	10.3	3.69	5.13	6.36	3.29	7.95	1.88	3.47	2.79	17.0	20.1
150	0	0	0	4.48	0	0	0.05	0.01	0.04	0.01	0.02	0.01	0.05	0
152	0	0	0	3.47	0	0	0.03	0.01	0.04	0.01	0.02	0.01	0	0
153/168	4.02	4.32	2.86	8.33	2.56	3.48	3.85	2.13	5.46	1.47	2.33	2.1	11.0	12.7
155	0	0	0	4.22	0	0	0.03	0	0.03	0.01	0.01	0.02	0	0
156/157	0.51	0	0	1.2	0.1	0.08	0.2	0	0.34	0.11	0.11	0	0.62	0.73
158	0.45	0.47	0.45	2.21	0.18	0.36	0.36	0.16	0.6	0.15	0.24	0.18	1.25	1.13
159	0	0	0	2.55	0	0	0	0	0	0	0	0	0	0
161	0	0	0	1.2	0	0	0.01	0	0.04	0.01	0	0	0	0
162	0	0	0	0.75	0	0.03	0	0	0.02	0	0	0	0	0
164	0.68	0.46	0	2.76	0.1	0.12	0.21	0.1	0.4	0.09	0.15	0.11	0.84	0.87

Table D17: *Continued.*

165	0	0	0	0.79	0	0	0.02	0	0.03	0.01	0.01	0	0	0
167	0	0	0	0.96	0.03	0.06	0.07	0	0.11	0.02	0.02	0	0.33	0.29
169	0	0	0	0.53	0	0.02	0	0	0	0	0	0	0	0
170	0	0.39	0	2.69	0.21	0.34	0.3	0.16	0.06	0.03	0.17	0.21	0.74	1.18
171/173	0	0	0.62	1.57	0.11	0.09	0.19	0.13	0.09	0	0.14	0.13	0.52	0.81
172	0	0	0	3.25	0.05	0.06	0.05	0	0.14	0.06	0.05	0.03	0.18	0.39
174	0.88	0.7	0.72	2.07	0.48	0.62	0.62	0.41	0.12	0	0.39	0.41	1.58	2.39
175	0	0	0	2.01	0	0	0.06	0	0.05	0.02	0.03	0.02	0.1	0
176	0	0	0.47	2.82	0.09	0.07	0.17	0.08	0.21	0.08	0.12	0.12	0.41	0.43
177	0	0	0	1.35	0.26	0.27	0.32	0.22	0.76	0.25	0.21	0.24	0.95	1.27
178	0	0	0	2.1	0.07	0.03	0.19	0.09	0.24	0.09	0.13	0.14	0.44	0.54
179	1.01	0	0.71	5.2	0.44	0.47	0.61	0.43	0.72	0.26	0.41	0.43	1.42	2.08
180/193	1.07	1.04	0.9	5.54	0.69	0.83	0.98	0.49	0	0	0.56	0.66	2.1	3.04
181	0	0	0	0.95	0	0	0	0	0.41	0.17	0	0	0	0
182	0	0	0	3.39	0	0	0	0	0	0	0	0	0	0
183/185	0	0.56	0	4.62	0.45	0.55	0.51	0.31	1.01	0.41	0.32	0.52	1.37	2.1
184	0	0	0	3.54	0	0	0	0	0	0	0	0	0	0
186	0	0	0	1.17	0	0	0	0	0	0	0	0	0.02	0
187	1.49	1.07	1	4.47	0.72	0.87	1.03	0.68	0.98	0.42	0.49	0.64	2.41	3.61
188	0	0	0	1.91	0	0	0	0	0	0	0	0	0	0
189	0	0	0	1.49	0.06	0	0	0	0.1	0.05	0	0	0	0
190	0	0	0.53	0.6	0.05	0.08	0.04	0	0.34	0.16	0.05	0.06	0.25	0.47
191	0	0	0	2.73	0	0	0	0	0.47	0.22	0.03	0	0	0
192	0	0	0	1.18	0	0	0	0	0.1	0.04	0	0	0	0
194	0	0	0	2.49	0.09	0.09	0.17	0	0.17	0.12	0.13	0.27	0.36	0.75
195	0	0	0	1.23	0.04	0.05	0	0	0.11	0.05	0.05	0	0	0.43
196	0	0	0	1.96	0.07	0.07	0.12	0	0.15	0.08	0.09	0.11	0.34	0.63
197/200	0	0	0	7.3	0.08	0.07	0	0	0.19	0	0	0	0.13	0.13
198/199	0	0	0	8.84	0.18	0.16	0.31	0.13	0.35	0.17	0.22	0.22	1.34	1.4
201	0	0	0	1.95	0.04	0.06	0.07	0.03	0.11	0.04	0.07	0.06	0.2	0.37
202	0	0	0	5.68	0.11	0.11	0.24	0.14	0.24	0.12	0.15	0.16	0.48	0.78
203	0	0	0	8.38	0.11	0.19	0.21	0.1	0.22	0.1	0.13	0.14	0.69	0.76
205	0	0	0	2.9	0	0	0	0	0.08	0.03	0	0	0	0
206	2.73	2.31	0	2.47	0	0	0	0	0.13	0.07	0.1	0.15	2.08	0.71
207	0	0	0	6.05	0	0	0	0	0.05	0.03	0.03	0	0.32	0.37
208	0	0	0	5.06	0.04	0.04	0	0	0.06	0.03	0.05	0.04	0.84	0.36
209	0	0	0	7.18	0	0	0.62	0	0	0	0	0.35	0	0

Table D18: PCB concentration (pg m^{-3}) data for the Schiller Park (SL, n=12) sampling site.

Location ID	*SL*	*SL*	*SL*	*SL*	*SL*	*SL*	*SL*	*SL*	*SL*	*SL*	*SL*	*SL*
Deployment	07/24/12	08/30/13	09/15/12	10/13/12	07/27/13	11/16/12	10/07/13	04/30/13	02/28/13	10/14/13	06/12/13	01/12/13
Collection	09/15/12	10/07/13	10/13/12	11/16/12	08/30/13	01/12/13	11/25/13	06/12/13	04/30/13	12/18/13	07/27/13	02/28/13
1	14.35	5.22	5.12	4.47	5.54	4.75	6.26	9.51	3.19	46.93	3.13	2.17
2	0	0	1.18	1.44	1.24	1.25	1.09	2.16	1.31	1.24	0.74	0.96
3	16.55	5.58	15.17	5.31	4.61	2.05	2.25	54.22	7.26	1.53	4.04	2.47
4	26.4	9.87	12.95	9.67	10.14	5.47	7.79	22.4	7.28	3.34	7.12	5.26
5	0.97	0	0.33	0.35	0.36	0.22	0.64	0.58	0.27	0.18	0.24	0.18
6	8.72	2.19	2.3	2.21	2.39	1.53	2.23	4.22	1.88	1.06	2.12	1.36
7	2.75	0	0.69	0.61	0.69	0.36	0.54	1.41	0.49	0.31	0.52	0.27
8	33.47	9.59	9.86	9.49	11.01	7.14	10.4	17.2	7.71	3.97	9.53	5.84
9	3.48	0	0.84	0.84	0.83	0.59	0.92	1.53	0.68	0.4	0	0
10	1.69	0	0.52	0.47	0.45	0.25	0.45	1.15	0.4	0.2	0	0
11	28.67	23.17	15.82	10.83	36	7.92	10.44	31	15.62	15.42	42.74	6.77
12/13	2.28	0	1.13	0.84	0.52	0.51	0.87	2.24	0.54	0.39	0	0.43
15	8.61	0	1.97	1.96	2.13	1.35	2.24	3.26	1.48	0.62	2.33	0.72
16	12.93	5.61	4.54	4	4.68	2.79	4.57	6.03	3.17	1.31	4.49	2.72
17	12.84	5.49	5.03	4.21	4.99	3.35	4.64	6.57	3.23	1.46	5.35	2.93
18/30	26.77	11.97	10.28	8.82	10.19	7.03	10.04	13.5	6.5	2.95	11.11	6.25
19	3.75	0	1.77	1.54	1.45	1.03	1.57	2.61	1.17	0.53	1.88	1.3
20/28	23.95	9.48	8.75	6.98	8.02	5.28	7.83	11.27	6.04	2.32	9.26	4.06
21/33	12.84	5.03	4.83	3.94	4.51	2.96	4.71	6.27	3.46	1.41	5.63	2.38
22	6.71	3.36	2.97	2.44	2.74	1.79	2.96	3.83	2.13	0.86	3.43	1.52
23	0	0	0.09	0.12	0	0.04	0.06	0.08	0.06	0	0	0
24	0	0	0.21	0.16	0.14	0.08	0.3	0.2	0.14	0.06	0.19	0.13
25	1.29	0	0.89	0.73	0.78	0.41	0.63	1.02	0.57	0.23	0.93	0.38
26/29	4.11	0	1.83	1.42	1.56	1	1.61	2.44	1.22	1.31	1.79	0.9
27	2.28	0	0.77	0.66	0.66	0.42	0.69	1.18	0.56	0.24	0.8	0.48
31	22.26	8.15	8.4	6.52	7.74	5.63	7.52	10.63	5.7	2.16	9.33	4.23
32	7.54	3.45	2.92	2.49	2.93	1.92	3.19	4.29	2.24	0.88	3.35	1.7
34	0	0	0.11	0.09	0.04	0.03	0.08	0.12	0.05	0	0	0.07
35	0	0	0.32	0.24	0.41	0.12	0.2	0.56	0.34	0.06	0.61	0
36	0	0	0.07	0.13	0.12	0.02	0.07	0.18	0.17	0	0.18	0
37	3.76	0	1.37	0.93	1.08	0.53	1.14	1.56	0.85	0.39	1.45	0.33
38	0	0	0.1	0.14	0.03	0.03	0.08	0	0.04	0	0	0
39	0	0	0.04	0.09	0.04	0.01	0.06	0.07	0.02	0	0	0
40/41/71	8.01	0	4.48	2.68	2.84	1.5	2.5	4.8	2.47	0.8	4.62	1.66
42	4.16	1.81	2.47	1.48	1.66	0.81	1.27	2.37	1.25	0.38	2.55	0.8
43	0	0	0.41	0.3	0.29	0.15	0.25	0.48	0.27	0.1	0.51	0.12
44/47/65	14.63	7.08	10.55	6.2	7.08	3.4	4.71	9.53	4.89	2.4	10.57	3.78
45/51	5.45	0	2.11	1.66	1.54	1.04	1.65	2.79	1.54	0.56	2.54	1.27

Table D18: *Continued.*

46	0	0	0.74	0.56	0.48	0.33	0.5	0.88	0.46	0.16	0.88	0.33
48	3.32	0	1.76	1.17	1.23	0.71	1.01	1.94	0.99	0.37	1.73	0.78
49/69	10.29	4.02	6.48	4.03	4.37	2.27	3.26	6.61	3.42	1.15	5.79	2.23
50/53	3.34	0	2.2	1.6	1.51	0.96	2.07	2.34	1.3	0.58	2.24	1.23
52	25.08	11.29	17.4	9.74	11.26	6.06	7.28	15	7.49	2.62	15.91	5.87
54	0	0	0.07	0.08	0.03	0.03	0.09	0.12	0.05	0.02	0	0.07
55	0	0	0.23	0	0.04	0.03	0.1	0.03	0.12	0	0	0.07
56	3.81	0	2.37	1.27	1.21	0.62	0.88	2	1	0.33	2.05	0.63
57	0	0	0.08	0.07	0	0	0.07	0.13	0	0	0	0
58	0	0	0.03	0	0	0.02	0.03	0.03	0	0	0	0
59/62/75	1.2	0	0.82	0.63	0.46	0.3	0.67	1.02	0.51	0.2	0.83	0.32
60	2.45	0	1.19	0.75	0.65	0.36	0.59	1.2	0.61	0.19	1.26	0.32
61/70/74/76	16.41	6.86	12.57	6.45	6.52	2.92	4.07	9.98	4.98	1.66	10.47	3.09
63	0.65	0	0.26	0.19	0.14	0.08	0.11	0.34	0.17	0.03	0.32	0
64	5.85	2.43	4.28	2.51	2.77	1.3	1.79	4.03	2.04	0.64	3.89	1.34
66	8.03	3.54	4.59	2.4	2.44	1.31	1.96	4.38	2.24	0.71	4.57	1.24
67	0	0	0.21	0.15	0.11	0.07	0.14	0.3	0.12	0.04	0.21	0
68	0	0	0.44	0.43	0.38	0	0	0.49	0.35	0.27	0	0.4
72	0	0	0.11	0.05	0	0.03	0.05	0.1	0.05	0	0	0
73	0	0	0	0	0	0	0.12	0.11	0.09	0.07	0	0
77	0	0	0.43	0.1	0.19	0	0.15	0.38	0.2	0.06	0.32	0
78	0	0	0	0	0	0	0.14	0	0.02	0	0	0
79	0	0	0	0	0	0.04	0.06	0	0.03	0	0	0.14
80	0	0	0	0	0	0	0.1	0	0.02	0	0	0
81	0	0	0	0	0	0	0.11	0	0	0	0	0
82	1.73	0	1.21	0.48	0.49	0.22	0.31	0.86	0.44	0.14	0.77	0.23
83/99	5.46	0	5.36	2.47	2.64	1.1	1.35	3.79	1.84	0.6	3.83	1.28
84	3.95	0	4.58	1.97	2.16	0.87	1.1	2.9	1.32	0.45	3.59	0.96
85/116/117	3.92	4.78	3.84	2.74	2.74	0	1.82	3.51	2.22	1.83	0.91	0
86/87/97/ 109/119/125	0	0	9.08	3.99	4.12	1.53	2.3	6.11	2.77	0.88	6.37	1.79
88/91	2.39	0	1.92	0.98	0.97	0.38	0.54	1.41	0.68	0.24	1.59	0.43
89	0	0	0.14	0.02	0.08	0.02	0.06	0.19	0.07	0	0.15	0
90/101/113	12.86	9.43	16.15	6.59	7.03	2.84	3.57	9.46	4.63	1.53	9.9	3.34
92	5.57	0	2.52	1.13	1.23	0.56	0.59	1.77	0.84	0.28	1.81	0.65
93/95/98/ 100/102	13.99	7.13	17.01	6.68	7.44	3.28	4.02	9.8	4.72	1.57	11.73	3.74
94	0	0	0.09	0.08	0.04	0.02	0.03	0.08	0.04	0	0	0
96	0	0	0.14	0.11	0.08	0.04	0.07	0.16	0.07	0.03	0.11	0.05
103	0	0	0.11	0.1	0.05	0.03	0.05	0.11	0.06	0.02	0	0
104	0	0	0.03	0.02	0	0.01	0.03	0.03	0	0.01	0	0
105	2.46	0	1.8	0.8	0.81	0.36	0.65	1.39	0.68	0.2	1.37	0.53

Table D18: *Continued.*

106	0	0	0	0	0.03	0	0.02	0.07	0	0	0.04	0.07
107	0.49	0	0.4	0.21	0.22	0.07	0.08	0.42	0.1	0	0.22	0.08
108/124	0.44	0.7	0.3	0.15	0.17	0.05	0.11	0.35	0.13	0	0.21	0.06
110/115	11.82	5.41	14.07	5.56	6.03	2.28	2.99	8.28	3.88	1.24	8.62	2.12
111	0	0	0	0.02	0	0	0.02	0.04	0	0	0	0
112	0	0	0	0	0	0	0.04	0.06	0	0	0.05	0
114	0	0	0	0	0	0	0	0.22	0	0	0	0.1
118	5.8	2.49	5.84	2.53	2.53	1.09	1.38	3.81	1.84	0.53	4.15	1.13
120	0	0	0	0.02	0	0	0.05	0.06	0.01	0	0	0.03
121	0	0	0	0.05	0.15	0	0.05	0.06	0	0.64	0	0
122	0	0	0.03	0	0.03	0	0.06	0.11	0	0	0	0
123	0	0	0.14	0.04	0.06	0	0.06	0.14	0	0	0.05	0.03
126	0	4.15	0	0	0	0	0.09	0	0	0	0	0
127	0	0	0	0	0	0	0.06	0.05	0	0	0	0
129/138/ 160/163	5.74	2.67	8.93	2.66	2.75	0.97	1.03	3.03	1.62	0.39	3.96	1.96
130	0.38	0.36	0.45	0.14	0.17	0.05	0.04	0.23	0.1	0.03	0.24	0.09
131	0	0	0.2	0.1	0.06	0.01	0.02	0.11	0.03	0	0.08	0.05
132	0	0	3.97	1.11	1.25	0.43	0.4	1.25	0.65	0.17	1.91	0.75
133	0	0	0.11	0.04	0.07	0.01	0.01	0.09	0.04	0	0	0
134/143	0	0	0.96	0.33	0.34	0.08	0.04	0.35	0.16	0.04	0.35	0.16
135/151/154	3.63	1.66	6.66	1.62	1.81	0.64	0.59	1.87	1.02	0.27	2.4	1.62
136	1.54	0	3.27	0.81	1.03	0.33	0.35	0.94	0.49	1.02	1.32	0.69
137	0	0	0.56	0.14	0.12	0.04	0.06	0.22	0.12	0.03	0.19	0.11
139/140	0	0	0.21	0.13	0.1	0.04	0.05	0.16	0.06	0.02	0.19	0
141	1.72	0	2.21	0.6	0.65	0.25	0.21	0.67	0.36	0.09	0.83	0.54
142	0	0	0	0.01	0	0	0.01	0.02	0.01	0	0	0.02
144	0.46	0	0.84	0.24	0.26	0.1	0.05	0.28	0.15	0.04	0.33	0.14
145	0	0	0.02	0.03	0	0	0.02	0.02	0.01	0	0	0
146	0.95	0.57	1.31	0.4	0.42	0.15	0.14	0.52	0.26	0.06	0.56	0.35
148	0	0	0.01	0.02	0.01	0	0.02	0.03	0.01	0	0	0
147/149	5.78	3.41	13.7	3.35	3.83	1.32	1.37	3.64	1.93	0.52	5.28	2.78
150	0	0	0.04	0.03	0.01	0	0.01	0.02	0.01	0	0	0
152	0	0	0.02	0.03	0	0	0	0.03	0.01	0	0	0
153/168	4.5	2.52	8.68	2.31	2.55	0.89	0.94	2.74	1.49	0.37	3.77	2.1
155	0	0	0.02	0.03	0	0	0.02	0.02	0.01	0	0	0.05
156/157	0.44	0	0.39	0.18	0.12	0	0.05	0.23	0.13	0	0.21	0
158	0.66	0	0.76	0.24	0.28	0.09	0.08	0.33	0.17	0.04	0.35	0.2
159	0	0	0	0	0	0	0	0.04	0	0	0	0
161	0	0	0	0.01	0.01	0	0	0.05	0.01	0	0	0
162	0	0	0	0	0	0	0.03	0.05	0	0	0	0
164	0.87	0	0.43	0.19	0.19	0.05	0.03	0.21	0.1	0.03	0.27	0.15

Table D18: *Continued.*

165	0	0	0	0.04	0.01	0	0.01	0.04	0.01	0	0	0
167	0	0	0.15	0.06	0.02	0	0.04	0.1	0.05	0	0	0
169	0	0	0	0	0	0	0.02	0	0	0	0	0
170	0.48	0	0.94	0.2	0.25	0.11	0.22	0.07	0.04	0.06	0.4	0.77
171/173	0	0	0.53	0.16	0.12	0	0.16	0.1	0.04	0	0.26	0.44
172	0	0	0.21	0	0.09	0	0.08	0.11	0.06	0	0	0
174	1.35	0	2.11	0.38	0.55	0.16	0.24	0.05	0	0.08	0.69	0.95
175	0	0	0.11	0.11	0.04	0	0	0.06	0.02	0	0.07	0
176	0	0	0.49	0.1	0.11	0.04	0.01	0.15	0.09	0.02	0.16	0.08
177	0.9	0	0.98	0.23	0.27	0.1	0.17	0.52	0.28	0.04	0.49	0.46
178	0	0	0.52	0.1	0.1	0.02	0.05	0.18	0.09	0.03	0.11	0.21
179	0.97	0	2.02	0.39	0.47	0.15	0.15	0.46	0.26	0.07	0.62	0.42
180/193	1.09	0.99	2.86	0.67	0.74	0.3	0.39	0	0	0.13	1.03	1.69
181	0	0	0	0	0	0	0	0.28	0.18	0	0	0
182	0	0	0	0	0	0	0	0	0	0	0	0
183/185	0.77	0	1.47	0.28	0.45	0.11	0.17	0.58	0.37	0.29	0.53	0.62
184	0	0	0	0	0	0	0	0	0	0	0	0
186	0	0	0	0	0	0	0	0	0	0	0	0
187	1.43	1.16	3.16	0.68	0.81	0.25	0.22	0.66	0.43	0.11	1.18	1.03
188	0	0	0	0	0	0	0	0	0	0	0	0
189	0	0	0	0	0	0	0.18	0.08	0.05	0	0	0
190	0	0	0.2	0.06	0.06	0.03	0.11	0.27	0.23	0	0.41	0
191	0	0	0.08	0	0.06	0	0.05	0.34	0.26	0	0	0
192	0	0	0	0	0	0	0.03	0.11	0.06	0	0	0
194	0	0	0.6	0.21	0.15	0.07	0.11	0.17	0.17	0.18	0.23	0.47
195	0	0	0.29	0	0.12	0	0.06	0.11	0.06	0	0	0
196	0	0	0.37	0.11	0.11	0.04	0.08	0.12	0.09	0	0	0.37
197/200	0	0	0.08	0	0.06	0	0.19	0.2	0	0	0	0.21
198/199	0	0	0.9	0.25	0.27	0.08	0.13	0.33	0.21	0	0.47	0.74
201	0	0	0.2	0.06	0.07	0.02	0.03	0.1	0.05	0.01	0.16	0.11
202	0	0	0.47	0.19	0.24	0.08	0.11	0.22	0.13	0.07	0.31	0.28
203	0	0	0.59	0.17	0.17	0.06	0.09	0.15	0.13	0	0.16	0.46
205	0	0	0	0	0	0	0.08	0.07	0.02	0	0	0
206	1.04	1	0.48	0.15	0	0.07	0.13	0.11	0.12	0.11	0	0
207	0	0	0.1	0.06	0	0	0.04	0.05	0.03	0	0	0
208	0	0	0.17	0	0.04	0	0.06	0.06	0.04	0	0	0
209	0	0	0.87	0.46	0.49	0	0.82	0	0	0	0	0

Table D19: PCB concentration (pg m^{-3}) data for the Sauganash Park (SP, n=13) sampling site.

Location ID	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP
Deployment	03/10/12	07/16/12	08/30/13	06/02/12	04/21/12	09/15/12	10/13/12	04/30/13	02/28/13	11/16/12	10/14/13	01/28/13	08/01/13	03/10/12
Collection	04/21/12	09/15/12	10/14/13	07/16/12	06/02/12	10/13/12	11/16/12	06/11/13	04/30/13	01/28/13	12/04/13	02/28/13	08/30/13	04/21/12
1	5.65	16.7	10.7	5.75	2.9	5.68	4.58	6.95	3.48	3.29	7.61	2.32	4.25	5.65
2	2.75	0	4.57	1.48	0.84	1.19	1.33	1.73	0.92	1.33	1.72	1	0.77	2.75
3	4.66	21.4	5.06	3.79	2.08	14.1	6.09	10.0	7.33	2.33	3.08	2.2	4.81	4.66
4	12.6	38.5	15.1	23.3	13.8	20.2	13.4	19.0	5.61	6.81	12.5	6.24	17.3	12.6
5	0	1.27	0	0.97	0.64	0.53	0.43	0.71	0.23	0.34	0.6	0.32	0	0
6	4.13	15.4	5.81	9.99	6.11	4.83	3.24	5.92	1.47	2.55	4.08	2.22	4.69	4.13
7	0	3.21	0	2	1.22	1.14	0.77	1.28	0.42	0.56	0.87	0.55	0.95	0
8	19.6	62.5	29.1	49.1	26.8	22.6	14.3	25.3	5.92	10.5	17.2	9.01	20.9	19.6
9	2.07	6.23	0	3.48	2.34	1.62	1.15	2.11	0.58	0.91	1.48	0.78	0	2.07
10	0	1.59	0	0.98	0.7	0.76	0.59	1.03	0.32	0.38	0.64	0.35	1.36	0
11	30.3	53.4	29.1	64.1	30.3	13.3	8.82	24.2	5.97	6.59	9.48	6.88	19.1	30.3
12/13	2.02	3.67	0	2.01	2.2	1.56	1.06	1.2	0.41	0.66	0.89	0.46	0	2.02
15	4.42	16.2	7.1	12.3	8.06	4.19	2.86	4.51	0.98	2.06	2.95	1.44	1.69	4.42
16	7.64	19.9	15.1	14.9	11.1	7.36	5.73	7.8	2.02	4.42	6	3.34	10.7	7.64
17	9.46	22.9	10.9	17.6	12.1	8.12	6.13	8.26	2.14	4.22	6.07	3.59	11.3	9.46
18/30	17.5	51.3	26.8	0	0	17.2	12.4	16.3	4.31	8.47	12.2	6.83	24.5	17.5
19	2.55	4.9	4.83	3.43	2.77	2.92	2.19	2.7	0.78	1.37	2.09	1.3	6.54	2.55
20/28	17.3	38.4	17.7	29.7	23.0	12.0	9.39	13.0	3.6	7.37	9.82	5.6	17.6	17.3
21/33	12.9	22.8	12.3	13.5	11.2	7.03	5.93	7.9	2.15	4.82	6.26	3.62	12.0	12.9
22	5.25	13.1	6.29	10.7	8.89	3.96	3.25	4.33	1.2	2.56	3.31	1.9	7.11	5.25
23	0	0	0	0.33	0.2	0.05	0.06	0.1	0.04	0.02	0.02	0	0	0
24	0	0	0	0.48	0.28	0.22	0.17	0.36	0.1	0.18	0.23	0.14	0.36	0
25	1.97	3.23	1.89	2.51	2.03	1.03	0.87	1.25	0.36	0.69	0.93	0.56	1.7	1.97
26/29	3.36	6.3	5	5.25	4.34	2.31	1.92	2.75	0.79	1.62	2.11	1.26	3.2	3.36
27	1.35	3.23	1.17	1.76	1.48	1	0.84	1.32	0.34	0.67	0.96	0.58	1.81	1.35
31	24.8	40.4	21.5	31.4	23.5	11.3	8.95	12.4	3.46	7.21	9.39	5.37	15.7	24.8
32	5.57	13.6	7.79	10.3	7.85	4.34	3.33	4.9	1.33	2.59	3.52	2.05	6.65	5.57
34	0	0	0	0.17	0.13	0.1	0.07	0.11	0.05	0.02	0.03	0	0	0
35	0	1.15	0	0.78	0.23	0.18	0.21	0.45	0.11	0.2	0.18	0.15	0	0
36	0	0	0	0.14	0.14	0	0.04	0.13	0.02	0	0	0	0	0
37	4.28	5.91	3.07	3.29	2.69	1.37	1.26	1.55	0.43	0.97	1.15	5.28	0	4.28
38	0	0	0	0.05	0.07	0	0.06	0.09	0.02	0	0.03	0	0	0
39	0	0	0	0.08	0.07	0	0.07	0.13	0	0	0	0	0	0
40/41/71	3.7	10.3	4.77	4.31	3.08	2.95	2.74	3.38	1.11	2.12	2.65	1.53	6.21	3.7
42	2.32	5.19	1.84	2.93	2.17	1.78	1.53	1.74	0.51	0.99	1.28	0.8	3.26	2.32
43	0	0	0	0.64	0.45	0.31	0.32	0.38	0.08	0.22	0.31	0.2	0.45	0
44/47/65	9.17	23.9	13.7	0	0	8.17	6.53	7.47	2.31	4.26	5.53	3.47	14.3	9.17
45/51	0	5.09	5.03	2.41	1.87	1.81	1.7	2.25	0.77	1.45	1.83	1.07	4.18	0

Table D19: *Continued.*

46	0	0	0	0.77	0.65	0.58	0.6	0.67	0.23	0.42	0.56	0.35	1.11	0
48	1.62	4.8	1.41	2.37	1.83	1.49	1.35	1.67	0.51	1.04	1.3	0.77	3.12	1.62
49/69	6.26	14.5	8.22	8.04	5.8	5.17	4.27	5.38	1.68	3.07	3.88	2.42	8.62	6.26
50/53	2.67	4.66	3.39	1.79	1.38	1.89	1.64	1.98	0.76	1.18	1.6	1.21	3.63	2.67
52	16.8	46.9	21.5	40.6	22.4	15.7	10.3	13.6	3.89	7.32	9.2	5.95	24.5	16.5
54	0	0	0	0.04	0.07	0.07	0.06	0.09	0.03	0.04	0.07	0.07	0	0
55	0	0	0	0.24	0.09	0.1	0.03	0.04	0.02	0	0.04	0	0	0
56	2.29	4.77	3.48	2.71	2.03	1.29	1.06	1.31	0.44	0.72	0.92	0.54	1.72	2.29
57	0	0	0	0.05	0	0	0	0.09	0.02	0	0	0	0	0
58	0	0	0	0.03	0.05	0	0	0	0.01	0	0	0	0	0
59/62/75	1.06	1.54	0	0.72	0.56	0.62	0.58	0.77	0.26	0.43	0.59	0.43	1.41	1.06
60	1.14	2.8	1.65	1.31	1.06	0.73	0.58	0.76	0.27	0.42	0.54	0.32	1.13	1.14
61/70/74/76	12.8	27.8	15.1	14.2	7.98	9.47	6.5	8.58	2.54	4.56	5.57	3.62	11.6	12.8
63	0	0.41	0	0	0	0.17	0.16	0.23	0.08	0.1	0.14	0.07	0	0
64	3.61	8.03	4.26	5.26	3.75	3.1	2.64	2.91	0.9	1.67	2.15	1.25	4.74	3.61
66	4.5	10.2	5.97	5.32	3.41	2.73	2.22	2.97	0.96	1.68	2.12	1.27	4.39	4.5
67	0	0	0	0	0	0.18	0.16	0.22	0.07	0.07	0.11	0	0	0
68	0	0	0	0	0	0.42	0.38	0.46	0.3	0.25	0.36	0.53	0	0
72	0	0	0	0.05	0.03	0	0	0.11	0.04	0	0.05	0	0	0
73	0	0	0	0.12	0.2	0	0.09	0.14	0	0.06	0.11	0.18	1.01	0
77	0	0.99	0	0.57	0.17	0.31	0.17	0.32	0.09	0.1	0.13	0	0	0
78	0	0	0	0.05	0	0	0	0	0.04	0	0	0	0	0
79	0	0	0	0.05	0.06	0	0	0	0.01	0	0	0	0	0
80	0	0	0	0.04	0.04	0	0	0	0	0	0	0	0	0
81	0	0	0	0.07	0	0	0	0	0	0	0	0	0	0
82	1.2	2.57	0	1.35	0.66	0.76	0.5	0.83	0.29	0.41	0.47	0.28	1.33	1.2
83/99	4.77	11.3	4.34	7.87	3.42	4.53	2.56	3.82	1.07	1.74	2.1	1.42	7.03	4.77
84	2.59	9.74	4.58	6.19	3.23	3.44	2	2.84	0.78	1.42	1.67	1.14	6.08	2.59
85/116/117	0	4.64	5.56	2.09	0	3.47	2.74	3.44	1.98	1.91	2.66	3.82	6.3	0
86/87/97/ 109/119/125	0	0	0	10.2	4.77	7.17	3.72	6.12	1.73	2.74	3.2	2.22	8.67	0
88/91	1.75	4.54	0	1.92	0.93	1.5	0.95	1.32	0.38	0.71	0.82	0.54	2.2	1.75
89	0	0	0	0.2	0.04	0.11	0.07	0.15	0.03	0.06	0.08	0.04	0	0
90/101/113	13.3	0	28.9	19.9	8.6	12.3	6.59	9.79	2.8	4.68	5.39	3.8	17.5	13.3
92	7.09	6.97	0	4.34	1.99	2.08	1.17	1.77	0.5	0.85	0.96	0.66	3.43	7.09
93/95/98/ 100/102	11.2	35.3	20.8	22.2	11.2	12.0	6.79	9.79	2.75	4.81	5.72	4.05	19.8	11.2
94	0	0	0	0.07	0.02	0.06	0.03	0.08	0.03	0.04	0.04	0.04	0	0
96	0	0	0	0.11	0.06	0.1	0.08	0.13	0.05	0.07	0.09	0.06	0.18	0
103	0	0	0	0.08	0.04	0.09	0.06	0.11	0.03	0.05	0.06	0.04	0	0
104	0	0	0	0	0	0	0.02	0.04	0.02	0.01	0.02	0	0	0
105	2.54	4.27	2.03	2.48	1.08	1.61	0.79	1.17	0.42	0.61	0.66	0.35	1.19	2.54

Table D19: *Continued.*

106	0	0	0	0.03	0	0	0	0	0	0	0	0	0	0
107	0.47	1.39	0	0.52	0.16	0.31	0.16	0.33	0.09	0.17	0.17	0.06	0	0.47
108/124	0.47	0.62	3.3	0.4	0.11	0.27	0.13	0.32	0.1	0.13	0.13	0.07	0.17	0.47
110/115	9.97	25.7	12.1	19.8	8.27	11.5	5.52	8.04	2.41	3.71	4.2	3.11	16.3	9.97
111	0	0	0	0.02	0.03	0	0	0.02	0.02	0	0.02	0	0	0
112	0	0	0	0.1	0.03	0.03	0.07	0.03	0.02	0.02	0.02	0	0.39	0
114	0	0	2.23	0	0	0.26	0	0.19	0	0	0	0	0	0
118	5.79	13.0	5.52	9.21	3.69	5.27	2.49	3.73	1.07	1.79	1.93	1.19	5.05	5.79
120	0	0	0	0.02	0	0	0	0	0.04	0	0.01	0	0	0
121	0	0	0	0	0	0	0	0	0.03	0	0	0	0	0
122	0	0	0	0.19	0.05	0.11	0.03	0	0	0.01	0.03	0	0	0
123	0	0	0	0.24	0.06	0.07	0.03	0	0.03	0.06	0	0	0	0
126	0	0	4.19	0.08	0	0	0	0	0	0	0	0	0.02	0
127	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0
129/138/ 160/163	4.51	9.7	3.81	10.3	3.07	5.19	2.59	2.54	2	1.35	1.3	0.83	5.96	4.51
130	0	0.88	1.21	0.63	0.05	0.35	0.16	0.2	0.09	0.08	0.1	0.04	0.4	0
131	0	0	0	0.23	0	0.11	0.05	0.1	0.03	0.03	0.04	0.03	0.04	0
132	2.15	6.03	0	5.68	1.46	2.11	1.07	1.17	0.56	0.58	0.59	0.38	2.21	2.15
133	0	0	2.23	0.1	0	0.05	0.04	0.08	0.03	0.02	0.03	0.02	0	0
134/143	0	1.06	0	1.44	0.28	0.53	0.28	0.28	0.1	0.13	0.15	0.11	0.29	0
135/151/154	2.34	5.46	1.81	6.16	1.77	2.19	1.4	1.5	0.75	0.76	0.82	0.6	2.7	2.34
136	1.12	3.15	3.09	2.99	0.97	1.2	0.7	0.81	0.34	0.41	0.46	0.34	1.71	1.12
137	0	1.06	0	0.63	0.03	0.48	0.18	0.2	0.06	0.08	0.09	0.05	0.2	0
139/140	0	0	0	0.3	0.09	0.17	0.09	0.14	0.05	0.05	0.08	0.05	0.16	0
141	0	2.16	1.12	2.34	0.62	0.95	0.49	0.55	0.51	0.3	0.29	0.19	1.28	0
142	0	0	0	0	0	0.01	0.01	0.01	0.01	0	0.01	0	0	0
144	0.53	1.18	0.56	1.01	0.15	0.33	0.2	0.23	0.12	0.11	0.14	0.1	0.29	0.53
145	0	0	0	0.01	0	0.01	0.01	0.03	0	0	0.01	0	0	0
146	0.56	1.92	0.67	1.54	0.42	0.65	0.4	0.43	0.26	0.2	0.22	0.12	0.64	0.56
148	0	0	0	0	0	0.01	0.01	0.03	0.01	0	0.01	0	0	0
147/149	3.25	12.1	4.35	14.8	5.16	5.35	2.92	3.11	1.64	1.55	1.67	1.19	6.54	3.25
150	0	0	0	0	0	0.01	0.01	0.03	0.01	0.01	0.02	0	0	0
152	0	0	0.9	0.02	0	0.02	0.02	0.02	0	0	0.02	0	0	0
153/168	3.18	7.78	3.5	9.13	2.9	3.81	2.22	2.29	1.8	1.17	1.2	0.78	4.65	3.18
155	0	0	0.78	0	0	0.02	0.02	0.03	0.01	0.01	0.02	0.01	0	0
156/157	0	0.53	0.87	0.56	0.1	0.38	0.15	0.18	0.15	0.1	0.07	0	0	0
158	0.45	1.23	0.44	1.11	0.3	0.52	0.27	0.31	0.19	0.14	0.15	0.08	0.45	0.45
159	0	0	0	0	0	0	0	0	0.01	0	0	0	0	0
161	0	0	0	0.02	0.02	0	0.01	0.01	0.01	0	0.01	0	0	0
162	0	0	0	0	0.03	0	0	0	0	0	0	0	0	0
164	0	0.43	0.67	0.6	0.09	0.21	0.13	0.19	0.14	0.09	0.09	0.06	0.4	0

Table D19: *Continued.*

165	0	0	0	0	0	0	0	0.03	0.01	0	0.01	0	0	0
167	0	0	0	0.21	0.05	0.1	0.08	0	0.06	0.02	0	0	0	0
169	0	0	0	0	0	0	0	0.01	0.01	0	0	0	0	0
170	0	0.51	0	0.4	0.14	0.35	0.19	0.06	0.06	0.1	0.09	0	1.7	0
171/173	0	0	0	0.22	0.07	0.14	0.09	0.09	0	0.06	0.08	0	0.58	0
172	0	0	0	0.09	0.03	0	0	0.08	0.15	0.02	0	0	0.31	0
174	0	1.09	0	0.82	0.32	0.46	0.36	0	0.08	0.19	0.2	0.13	1.54	0
175	0	0	0	0	0	0	0.03	0.05	0.05	0.01	0.02	0	0.12	0
176	0	0.4	0	0.16	0.07	0.1	0.1	0.11	0.11	0.04	0.06	0.04	0.13	0
177	0	0	0	0.46	0.14	0.28	0.18	0.35	1.05	0.11	0.11	0.08	0.74	0
178	0	0	0	0.1	0	0.11	0.11	0.13	0.19	0.06	0.06	0.04	0	0
179	0	0.83	2.38	0.98	0.28	0.4	0.29	0.32	0.32	0.17	0.19	0.14	0.74	0
180/193	0	1.16	0.9	1.07	0.34	0.81	0.6	0	0	0.26	0.26	0.19	3.19	0
181	0	0	0	0	0	0	0	0.2	0.6	0	0	0	0	0
182	0	0	0	0	0	0	0	0	0	0	0	0	0	0
183/185	0	0.98	0.69	0.79	0.22	0.26	0.26	0.39	0.82	0.13	0.15	0.09	1.07	0
184	0	0	0	0	0	0	0	0	0	0	0	0	0	0
186	0	0	0	0	0	0	0	0	0	0	0	0	0	0
187	0	1.49	1.22	1.05	0.29	0.66	0.57	0.46	0.96	0.26	0.28	0.19	1.77	0
188	0	0	0	0	0	0	0	0	0	0	0	0	0	0
189	0	0	0	0.06	0	0	0	0.07	0.19	0	0	0	0	0
190	0	0	0	0.1	0.04	0	0	0.23	0.86	0.03	0.03	0	0.51	0
191	0	0	0	0.04	0.04	0	0	0.27	1.07	0.02	0.03	0	0	0
192	0	0	0	0	0	0	0	0.07	0.18	0	0	0	0	0
194	0	0	0.7	0.11	0	0.2	0.19	0.17	0.46	0.04	0.06	0	1.37	0
195	0	0	0	0.05	0	0.08	0.08	0.09	0.22	0	0.04	0	0	0
196	0	0	0	0.09	0	0.1	0.11	0.14	0.29	0.04	0.05	0	0.56	0
197/200	0	0	0	0.07	0.07	0	0	0	0.07	0	0	0	0	0
198/199	0	0	0	0.2	0	0.31	0.34	0.86	0.61	0.09	0.15	0	1.44	0
201	0	0	0	0.06	0.04	0.05	0.06	0.07	0.08	0.03	0.04	0.03	0.23	0
202	0	0	0	0.2	0	0.23	0.21	0.19	0.16	0.1	0.13	0.15	0.52	0
203	0	0	0	0.18	0.08	0.21	0.21	0.23	0.34	0.06	0.08	0	0.33	0
205	0	0	0	0	0	0	0	0.07	0.03	0	0.04	0	0.26	0
206	1.27	0	3.05	0	0	0.18	0.17	0.3	0.13	0	0	0	1.03	1.27
207	0	0	0	0	0	0	0.06	0.09	0.04	0	0.04	0	0	0
208	0	0	2.7	0.06	0.04	0.06	0.06	0.13	0.04	0.02	0.04	0	0	0
209	0	0	2.41	0	0	0.65	0.47	0	0	0	0	0	0	0

Table D20: PCB concentration (pg m^{-3}) data for the Village of McCook (VM, n=13) sampling site.

Location ID	VM	VM	VM	VM	VM	VM	VM	VM	VM	VM	VM	VM	VM
Deployment	08/02/12	09/14/13	06/28/12	09/13/12	06/30/13	11/20/12	10/11/12	10/27/13	04/02/13	02/12/13	01/14/13	08/04/13	05/14/13
Collection	09/13/12	10/27/13	08/02/12	10/11/12	08/04/13	01/14/13	11/20/12	12/01/13	05/14/13	04/02/13	02/12/13	09/14/13	06/30/13
1	10.74	0	0	3.51	0	2.79	8.32	2.07	3.91	1.02	2.46	3.84	5.05
2	0	0	0	0.91	0.39	0.7	0.75	1.09	1.04	0.54	0.87	0.94	0.94
3	7.09	0	1.24	7.93	2.74	1.84	2.87	1.54	13.12	1.13	2.3	4.97	8.85
4	21.74	4.71	11.07	8.76	4.26	3	5.46	3.8	8.59	2.73	4.03	13.59	13.81
5	0	0	0.36	0.24	0	0.12	0.15	0.35	0.25	0.17	0.27	0.58	0.28
6	7.11	0	3.78	1.46	0.89	0.73	1.09	1.11	1.95	0.9	1.52	2.94	2.78
7	3.05	0	0.52	0.45	0.23	0.24	0.3	0.37	0.57	0.25	0.4	0.54	0.6
8	29.38	0	16.5	6.04	4.12	3.25	4.8	4.37	7.94	3.62	6.03	15.67	12.46
9	2.94	0	1.26	0.55	0.31	0.29	0.38	0.47	0.73	0.33	0.53	0	0
10	1.6	0	0.56	0.4	0.14	0.13	0.21	0.29	0.47	0.19	0.27	1.04	0.82
11	18.65	11.37	24.32	7.58	7.53	5.47	8.79	5.01	13.13	5.79	6.61	16.05	23.02
12/13	0	0	1.42	0.76	0.22	0.32	0.39	0.42	1.06	0.24	0.6	0.51	0
15	7.23	0	6.61	1.29	1.01	0.65	0.94	0.86	1.7	0.65	1.29	2.25	1.96
16	12.09	4.36	11.02	2.54	1.84	1.31	2.01	2.11	3.35	1.72	3.22	11.89	6.31
17	12.22	3.52	12.77	2.84	2.16	1.57	2.48	2.4	3.72	1.71	3.06	13.39	7.06
18/30	23.5	7.9	0	5.65	4.17	3.15	4.82	4.53	7.13	3.48	5.9	39.57	14.53
19	2.79	0	2.78	1.25	0.69	0.55	0.88	0.99	1.4	0.64	1.09	5.27	3.19
20/28	22.15	7.23	27.72	4.41	3.77	2.5	3.66	3.96	6.51	2.99	5.71	22.59	11.92
21/33	12.56	4	12.91	2.55	1.92	1.3	1.96	2.21	3.66	1.93	3.76	12.61	6.57
22	7.01	0	11.34	1.5	1.24	0.82	1.28	1.33	2.23	1.07	2.06	7.32	4.08
23	0	0	0.3	0.05	0	0	0.03	0.06	0.05	0	0.04	0	0
24	0	0	0.41	0.11	0.07	0.05	0.11	0.11	0.11	0.08	0.15	0.27	0.19
25	1.89	0	2.41	0.53	0.4	0.23	0.37	0.45	0.59	0.31	0.64	1.33	1.15
26/29	4.54	0	4.8	0.97	0.67	0.49	0.81	0.85	1.4	0.67	1.36	3.84	2.37
27	1.33	0.91	1.48	0.45	0.29	0.23	0.36	0.44	0.65	0.3	0.56	1.76	1.13
31	22.2	7.51	28.64	4.17	3.5	2.56	3.51	3.76	6.2	2.96	5.57	29.17	11.91
32	8.68	2.99	9.82	1.62	1.27	0.96	1.41	1.59	2.39	1.09	1.96	9.75	4.28
34	0	0	0.1	0.07	0.03	0	0.06	0.06	0.07	0.03	0.06	0.16	0.05
35	0	0	0.51	0.17	0.13	0	0.09	0.15	0.3	0.15	0.18	0	0
36	0	0	0.1	0.05	0.03	0	0.03	0	0.1	0.04	0	0	0
37	4.17	0	3.44	0.58	0.58	0.33	1.29	0.55	1	0.47	0.91	2.13	1.86
38	0	0	0.09	0.07	0	0	0.02	0	0.05	0	0	0	0
39	0	0	0.09	0.07	0	0	0	0.02	0.04	0	0	0	0.02
40/41/71	7.48	2.5	5	1.74	1.31	0.67	1.14	1.64	2.85	0.97	1.47	11.02	5.35
42	2.65	2.02	3.38	0.98	0.75	0.33	0.56	0.79	1.36	0.47	0.74	6.24	2.67
43	0	0	0.41	0.23	0.13	0.06	0.11	0.23	0.3	0.13	0.17	1.32	0.54
44/47/65	12.88	6.59	0	4.17	3.23	1.47	2.42	3.07	5.56	2.05	3.31	26.31	11.77

Table D20: *Continued.*

45/51	0	0	2.89	1.02	0.73	0.5	0.74	1.16	1.67	0.63	1.04	9.79	3.54
46	0	0	0.9	0.33	0.23	0.14	0.23	0.37	0.51	0.21	0.31	2.94	0.94
48	2.98	0	2.54	0.82	0.55	0.29	0.5	0.73	1.25	0.47	0.74	6.24	2.27
49/69	7.34	3.66	7.46	2.77	2.04	1.01	1.53	2.28	3.96	1.43	2.25	17.93	6.96
50/53	2.86	0	1.97	1.25	0.96	0.62	0.71	1.22	1.55	0.69	1.11	8	2.79
52	19.74	9.84	22.56	7.16	4.77	2.71	3.9	4.63	9.15	3.24	5.11	40.75	17.85
54	0	0	0.05	0.06	0	0.02	0.03	0.08	0.06	0.03	0.05	0.24	0.12
55	0	0	0.25	0.12	0	0	0.04	0.14	0.1	0.05	0	0.08	0.18
56	3.18	0	2.98	0.8	0.6	0.27	0.42	0.6	1.27	0.4	0.64	4.11	2.27
57	0	0	0	0	0	0	0	0	0.04	0	0	0	0
58	0	0	0	0	0	0	0	0.03	0.04	0	0	0	0
59/62/75	1.04	0	0.86	0.43	0.24	0.18	0.23	0.43	0.55	0.22	0.38	2.06	1.08
60	1.63	0	1.58	0.47	0.29	0.18	0.25	0.39	0.75	0.23	0.37	2.37	1.21
61/70/74/76	14.61	6.87	10.04	4.52	3.03	1.45	2.15	2.97	6.28	2.19	3.73	20.39	11.26
63	0	0	0	0.14	0.06	0	0.07	0.06	0.18	0	0.11	0.49	0.28
64	4.54	1.88	5.49	1.64	1.31	0.52	0.87	1.24	2.23	0.76	1.23	10.7	4.55
66	5.84	3.47	5.46	1.5	1.18	0.59	0.88	1.26	2.68	0.88	1.35	9.52	4.69
67	0	0	0	0.15	0.05	0.04	0.06	0.04	0.17	0	0.12	0.28	0.17
68	0	0	0	0.45	0	0	0	0.55	0.39	0.34	0.57	0.63	0
72	0	0	0.06	0.05	0	0	0	0.08	0.07	0	0.04	0	0.07
73	0	0	0.12	0.16	0	0	0.08	0.14	0.13	0.09	0.15	0.2	0
77	0	0	0.19	0.11	0.11	0	0.07	0.09	0.2	0.08	0	0	0.24
78	0	0	0	0.05	0	0	0	0	0	0	0	0	0
79	0	0	0.05	0	0	0	0	0.03	0	0	0	0	0
80	0	0	0.09	0.05	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0
82	0	0	0.75	0.34	0.23	0.14	0.18	0.29	0.64	0.22	0.37	1.29	1.03
83/99	4.56	3.26	3.59	1.94	1.19	0.65	0.79	1.11	2.47	0.81	1.43	5.27	4.25
84	3.44	0	3.03	1.53	0.88	0.44	0.6	0.82	1.83	0.67	1.11	4.7	3.8
85/116/117	3.44	4.33	0	2.81	0	0	0	3.23	3.03	2.39	4.04	1.57	1.28
86/87/97/ 109/119/125	0	0	4.51	2.99	1.73	0.96	1.21	1.84	3.76	1.35	2.17	7.89	6.49
88/91	0	0	0.97	0.75	0.4	0.24	0.31	0.46	0.91	0.35	0.6	2.3	1.68
89	0	0	0.09	0.07	0.03	0.02	0.03	0.09	0.1	0.04	0.06	0.29	0.23
90/101/113	0	7.56	8.37	5.12	2.84	1.65	2.02	2.65	6.02	2.19	3.71	12.66	11.02
92	9.37	0	2.13	0.94	0.51	0.31	0.37	0.52	1.09	0.4	0.65	2.37	2.06
93/95/98/ 100/102	11.43	6.77	10.38	5.42	2.96	1.76	2.2	2.96	6.29	2.36	3.83	15.18	12.57
94	0	0	0.02	0.05	0.02	0.02	0	0.05	0.06	0.02	0.03	0.1	0.11
96	0	0	0.04	0.06	0.03	0.03	0.03	0.07	0.1	0.04	0.07	0.36	0.14
103	0	0	0	0.06	0.03	0.02	0.02	0.07	0.08	0.03	0.05	0.2	0
104	0	0	0	0.02	0	0.01	0	0.03	0.02	0	0	0	0

Table D20: *Continued.*

105	1.07	1.05	1.23	0.57	0.41	0.24	0.32	0.45	0.97	0.39	0.47	1.63	1.6
106	0	0	0	0	0	0	0	0	0	0	0	0.08	0
107	0	0	0.27	0.12	0.09	0	0.07	0	0.22	0.1	0.1	0.4	0.35
108/124	0	0.89	0.13	0.09	0.07	0.03	0.05	0	0.16	0.08	0.09	0.25	0.27
110/115	7.89	0	8.25	4.56	2.59	1.34	1.73	2.46	5.34	1.91	3.15	9.66	8.56
111	0	0	0	0	0	0	0.01	0	0	0	0	0	0
112	0	0	0.09	0	0	0	0	0.03	0.04	0.01	0	0.15	0
114	0	1	0	0	0	0	0	0	0	0	0	0.09	0.04
118	0	2.5	3.95	1.69	1.24	0.66	0.82	1.13	2.5	0.94	1.32	4.98	4.55
120	0	0	0.03	0.02	0	0	0	0	0.01	0	0	0.05	0
121	0	0	0	0	0	0	0.05	0	0	0	0	0.05	0.01
122	0	0	0.06	0	0	0.02	0.02	0	0.06	0.03	0	0.12	0
123	0	0	0.07	0	0.03	0	0	0	0.03	0.02	0	0.09	0
126	0	3.62	0.23	0	0	0	0	0	0	0	0	0.04	0.01
127	0	0	0.05	0	0	0	0	0	0	0	0	0.03	0.02
129/138/ 160/163	3.18	0	3.67	1.85	1.13	0.55	0.65	1.04	2.43	0.82	1.29	4.77	5.36
130	0.34	0	0.1	0.11	0.07	0.01	0.02	0.1	0.18	0.03	0.09	0.32	0.29
131	0	0	0.03	0.04	0.02	0	0.01	0.03	0.06	0.02	0.02	0.09	0.1
132	0	0	1.64	0.78	0.49	0.2	0.26	0.41	0.94	0.31	0.47	2.09	2.26
133	0	0	0.02	0.02	0.02	0	0	0.01	0.05	0	0.03	0	0.06
134/143	0	0	0.32	0.22	0.11	0.05	0.05	0.05	0.23	0.06	0.11	0.45	0.63
135/151/154	2.3	1.32	2.29	1.21	0.67	0.34	0.43	0.55	1.47	0.39	0.74	2.82	3.17
136	0	1.38	0.91	0.63	0.31	0.17	0.26	0.3	0.68	0.2	0.37	1.72	1.77
137	0	0	0.13	0.14	0.06	0.02	0.03	0.1	0.16	0.06	0.06	0.21	0.25
139/140	0	0	0.04	0.09	0	0	0	0.08	0.11	0.04	0.05	0.26	0.2
141	1.12	0	0.88	0.42	0.25	0.1	0.12	0.23	0.55	0.16	0.31	0.92	1.19
142	0	0	0	0	0	0	0	0.01	0	0	0.01	0.01	0.1
144	0	0	0.35	0.16	0.11	0.03	0.04	0.11	0.22	0.06	0.11	0.5	0.59
145	0	0	0	0	0	0	0	0	0.01	0	0	0	0
146	0.75	0	0.47	0.26	0.19	0.07	0.1	0.18	0.44	0.13	0.18	0.75	0.83
148	0	0	0	0.01	0	0.01	0	0	0	0	0	0	0
147/149	5.35	2.43	5.47	2.43	1.47	0.67	0.83	1.09	2.94	0.82	1.46	6.15	6.69
150	0	0	0	0.03	0	0	0	0.01	0.02	0	0.01	0	0
152	0	0	0	0.01	0	0	0	0.01	0.01	0	0.01	0	0
153/168	2.92	1.81	3.33	1.64	0.99	0.5	0.6	0.84	2.43	0.67	1.18	4.1	4.93
155	0	0	0	0.01	0	0	0.01	0	0.01	0.01	0	0	0
156/157	0	0	0.12	0	0.05	0.02	0.05	0	0.18	0	0	0.23	0.44
158	0	0	0.41	0.19	0.11	0.05	0.07	0.13	0.28	0.09	0.13	0.43	0.52
159	0	0	0	0	0	0	0	0	0.03	0	0	0	0
161	0	0	0	0.01	0	0	0	0.02	0.02	0	0	0	0.05
162	0	0	0	0.02	0	0	0	0	0	0	0	0	0

Table D20: *Continued.*

164	0.72	0	0.16	0.1	0.07	0.03	0.04	0.1	0.16	0.06	0.1	0.35	0.32
165	0	0	0	0.01	0	0.01	0	0.03	0.01	0	0.01	0	0
167	0	0	0	0	0.03	0	0.02	0	0.09	0.03	0	0.23	0.18
169	0	0	0.01	0	0	0	0	0	0.01	0	0	0	0
170	0	0	0.38	0.25	0.1	0.05	0.09	0.06	0.05	0.12	0.29	0.49	0.6
171/173	0	0	0.19	0	0.06	0	0	0	0	0.05	0.11	0.39	0.47
172	0	0	0.04	0	0	0	0	0.06	0.12	0	0.07	0	0
174	0	0	0.62	0.36	0.2	0.1	0.12	0	0	0.12	0.42	0.88	1.07
175	0	0	0	0	0	0	0	0.03	0.04	0	0	0	0.05
176	0	0	0.11	0.09	0.04	0	0.02	0.06	0.13	0.03	0.07	0.19	0.21
177	0	0	0.35	0.19	0.1	0.05	0.07	0.14	0.6	0.08	0.21	0.53	0.63
178	0	0	0.1	0.11	0.06	0.02	0.02	0.05	0.21	0.03	0.11	0.26	0.19
179	0	0.98	0.55	0.29	0.17	0.06	0.1	0.13	0.48	0.11	0.22	0.71	0.84
180/193	0.94	0	0.92	0.75	0.26	0.17	0.21	0	0	0.21	0.76	1.19	1.63
181	0	0	0	0	0	0	0	0.12	0.38	0	0	0	0
182	0	0	0	0	0	0	0	0	0	0	0	0	0
183/185	0	0	0.56	0.19	0.16	0.06	0.12	0.28	0.76	0.09	0.24	0.87	0.94
184	0	0	0	0	0	0	0	0	0	0	0	0	0
186	0	0	0	0	0	0	0	0	0	0	0	0	0.03
187	1.1	0.89	0.91	0.62	0.33	0.15	0.16	0.23	0.93	0.16	0.46	1.31	1.7
188	0	0	0	0	0	0	0	0	0	0	0	0	0
189	0	0	0.09	0	0	0	0	0.05	0.11	0	0	0	0
190	0	0	0.1	0.05	0	0	0	0.11	0.38	0	0.09	0.16	0.3
191	0	0	0.04	0	0	0	0	0.14	0.56	0	0.04	0	0
192	0	0	0	0	0	0	0	0.03	0.1	0	0	0	0
194	0	0	0.17	0.25	0	0	0.07	0.1	0.26	0.07	0.22	0.39	0.35
195	0	0	0	0	0	0	0	0.06	0.11	0	0.09	0	0
196	0	0	0.08	0.18	0	0	0	0.06	0.21	0	0.14	0.23	0.38
197/200	0	0	0.07	0	0	0	0	0	0.05	0	0	0.16	0.28
198/199	0	0	0.21	0.48	0.11	0.07	0	0.17	0.45	0.08	0.27	0.64	0.77
201	0	0	0.07	0.07	0.02	0.01	0	0.03	0.08	0.02	0.04	0.18	0.18
202	0	0	0.15	0.23	0	0	0	0.14	0.2	0.1	0.18	0.39	0.48
203	0	0	0.15	0.33	0.08	0	0	0.08	0.19	0.06	0.16	0.31	0.43
205	0	0	0	0	0	0	0	0.05	0.04	0.03	0	0.22	0
206	2.01	0	0	0.25	0	0.07	0.13	0	0.18	0	0	0.4	0.44
207	0	0	0	0.06	0	0	0	0	0.05	0	0	0.24	0.23
208	0	0	0.06	0.08	0	0.03	0	0.04	0.05	0	0	0	0
209	0	0	0	0.62	0	0.32	0	0	0	0	0	0	0

Table D21: PCB concentration (pg m^{-3}) data for the Waukegan Harbor (WH, n=8) sampling site.

Location ID	*WH*	*WH*	*WH*	*WH*	*WH*	*WH*	*WH*	*WH*
Deployment	08/08/12	03/20/12	02/07/12	11/17/11	01/24/13	12/13/12	01/24/13	12/13/12
Collection	09/19/12	05/01/12	03/26/12	12/28/11	03/07/13	01/24/13	03/07/13	01/24/13
1	0	5.72	13.32	11.16	5.37	0.88	4.44	3.8
2	0	0.51	1.72	1.15	1.75	0.45	0.94	1.26
3	12.74	1.22	6.58	6.56	6.5	5.47	14.3	21.52
4	21.51	59.05	80.84	48.03	33.37	31.26	28.47	172.83
5	0	0.23	0.43	0.23	0.36	0.14	0.27	0.31
6	3.71	4.67	6.97	3.8	3.26	1.7	2.65	7.15
7	4.35	0.74	1.13	0.77	0.75	0.34	0.65	1.01
8	14.56	11.89	21.21	11.9	10.54	4.42	9.52	18.77
9	0	0.47	1.07	0.6	0.7	0.24	0	0.72
10	0	1.84	3.08	1.47	1.11	0.92	0.76	3.38
11	16.52	6.5	12.32	5.92	7.99	2.06	10.74	9.98
12/13	1.91	2.07	2.68	1.51	1.23	0.9	1.61	3.32
15	4.41	8.42	9.3	4.5	2.68	1.14	2.08	4.12
16	9.65	7.25	10.14	4.63	4.52	1.67	4.19	6.11
17	16.06	29.98	28.25	22.49	12.91	11.8	12.45	63.81
18/30	26.36	0	27.42	16.53	11.24	5.94	12.21	30.82
19	7.4	18.43	20.44	14.08	10.73	11.32	16.77	56.69
20/28	27.62	31.33	35.54	16.72	10.23	3.62	10.61	14.58
21/33	9.43	4.67	7.13	3.79	4.18	1.26	4.35	4.32
22	8.59	9.06	10.9	3.89	3.14	0.99	4.43	4.01
23	0	0.16	0.08	0.03	0.05	0.02	0	0
24	0	0	0.61	0.13	0.21	0.09	0	0.26
25	2.84	6.68	5.03	3.64	1.94	1.32	1.73	5.4
26/29	5.99	8.69	7.57	6.02	3.54	2.52	3.66	10.81
27	3.52	6.81	7.64	5.91	3.61	3.19	4.29	15.13
31	25.82	26.69	26.33	15.96	9.34	4.26	9.82	18.39
32	13.39	24.51	24.49	14.42	8.64	7.59	8.93	34.71
34	0	0.3	0.29	0.17	0.16	0.1	0.33	0.39
35	0	0.26	0.38	0.17	0.34	0	0	0
36	0	0.04	0.09	0.03	0.03	0	0	0
37	3.58	2.95	3.64	1.34	1.27	0.36	1.15	1.2
38	0	0.06	0.11	0.07	0.03	0	0	0
39	0	0.09	0.17	0.06	0.02	0	0	0
40/41/71	15.49	12.38	17.48	7.28	4.85	1.97	5.09	8.97
42	7.52	8.37	10.44	4.02	2.57	1.04	2.82	5.24
43	1.89	1.91	1.33	0.79	0.5	0.29	0.35	0.62
44/47/65	28.76	0	38.44	17.77	10.47	4.59	11.8	24.8
45/51	7.77	8.98	11.84	6.27	4.37	2.47	4.55	13.14

Table D21: *Continued.*

46	0	3.32	3.83	1.99	1.29	0.78	1.31	4.04
48	6.54	4.02	6.04	2.36	1.83	0.5	1.89	2.14
49/69	18.53	21.29	26.77	13.23	8.4	4.19	8.35	20.79
50/53	7.45	8.38	10.89	6.9	4.62	3.12	4.36	15.93
52	38.4	40.78	45.22	24.67	14.98	6.89	17.1	38.26
54	0	0.45	0.41	0.33	0.33	0.31	0.27	1.45
55	0	0.34	0.4	0.06	0	0	0.09	0
56	6.54	5.78	6.94	2.6	1.82	0.55	1.85	1.97
57	0	0.11	0.14	0.11	0.04	0	0	0
58	0	0.04	0	0.04	0	0	0	0
59/62/75	2.87	1.92	3.24	1.25	0.93	0.41	0.92	1.56
60	4.66	3.26	3.84	1.57	1.04	0.33	1.03	1.19
61/70/74/76	25.05	15.31	24.32	10.68	8.16	2.63	7.85	9.34
63	0.8	0.67	0.89	0.38	0.32	0	0.13	0.5
64	13.17	12.67	16.58	6.11	3.95	1.36	4.03	6.13
66	12.24	10.36	14.14	6.01	4.07	1.13	4.24	4.72
67	0.66	0.34	0.55	0.2	0.22	0	0.1	0.19
68	0	0	0.42	0.29	0.38	0.33	0.4	0
72	0.59	0.18	0.27	0.12	0.07	0.03	0	0.11
73	0	0.32	0.15	0.21	0.07	0.14	0	0
77	0	0.47	0.87	0.31	0.31	0	0	0
78	0	0	0	0	0	0	0	0
79	0	0.04	0	0	0	0	0	0
80	0	0.07	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0
82	1.98	0.89	1.33	0.64	0.76	0.26	0.62	0.88
83/99	7.42	3.74	5.19	2.41	2.53	1	2.76	3.71
84	7.37	3.28	4.41	2.13	2.08	0.92	2.34	3.37
85/116/117	5.77	0	3.19	2.2	3.26	2.69	0.87	1.03
86/87/97/ 109/119/125	0	3.86	7.5	3.29	3.87	1.54	4	5.07
88/91	2.87	1.67	2.52	1.38	1.32	0.62	1.32	2.29
89	0	0.25	0.33	0.12	0.15	0.03	0.17	0.17
90/101/113	15.82	5.82	10.97	4.76	5.92	2.36	5.8	7.83
92	0	1.62	2.06	1.09	1.14	0.54	1.23	2.02
93/95/98/ 100/102	13.94	8.78	13.56	6.24	6.5	2.72	7.42	10.82
94	0	0.16	0.23	0.15	0.13	0.08	0.08	0.35
96	0	0.26	0.36	0.2	0.19	0.11	0.16	0.43
103	0	0.15	0.17	0.11	0.12	0.04	0.19	0.3
104	0	0	0.05	0.02	0.03	0.03	0	0
105	2.6	1.03	1.67	0.91	1.07	0.35	1.13	1.41

Table D21: *Continued.*

106	0.51	0	0.01	0.02	0	0	0	0
107	0.55	0.18	0.36	0.16	0.1	0.08	0.03	0.22
108/124	0	0.1	0.25	0.09	0.08	0.08	0.16	0.14
110/115	13.63	6	10.44	4.37	5.07	2.06	5.08	7.23
111	0	0	0	0.01	0.03	0.02	0	0
112	0	0.03	0.04	0.04	0.03	0.03	0	0.15
114	0	0	0.24	0	0	0	0	0.04
118	8.29	2.59	4.32	2.02	2.72	0.87	2.75	3.53
120	0	0	0	0	0.04	0	0	0
121	0	0	0	0	0.05	0	0.02	0.03
122	0	0.05	0.08	0.03	0	0.02	0	0.04
123	0	0.07	0.15	0.04	0.03	0.03	0	0.07
126	0	0.09	0	0.05	0	0	0	0
127	0	0	0	0	0	0	0	0.03
129/138/160/163	5.23	1.8	3.1	1.12	2.46	0.67	2.58	3.43
130	0.6	0.05	0.19	0.06	0.16	0.04	0.11	0.18
131	0	0.02	0.08	0.02	0.05	0	0.03	0.03
132	0	0.85	1.34	0.44	0.9	0.25	0.89	1.4
133	0	0.02	0.04	0	0.07	0.01	0	0
134/143	0	0.24	0.4	0.09	0.2	0.07	0.11	0.17
135/151/154	2.57	1.14	1.87	0.71	1.4	0.46	1.1	2.03
136	1.35	0.59	0.95	0.34	0.59	0.21	0.53	1
137	0	0.08	0.2	0.06	0.13	0.06	0.1	0.16
139/140	0	0	0.13	0.03	0.08	0.04	0	0
141	0.98	0.38	0.66	0.23	0.59	0.16	0.46	0.75
142	0	0	0.01	0	0	0	0	0
144	0.57	0.11	0.28	0.08	0.21	0.06	0.13	0.21
145	0	0	0.03	0	0.01	0.01	0	0
146	0.74	0.28	0.48	0.16	0.39	0.09	0.31	0.45
148	0	0	0.03	0	0.01	0.01	0	0
147/149	4.84	2.58	3.79	1.35	2.73	0.83	2.57	4.23
150	0	0	0.04	0	0.02	0.01	0	0
152	0	0	0.04	0	0.01	0.01	0	0
153/168	4.18	1.62	3.31	0.94	2.57	0.62	2.4	3.69
155	0	0	0.04	0	0.02	0.01	0	0
156/157	0	0.07	0.21	0.07	0.22	0.06	0	0
158	0.59	0.17	0.3	0.1	0.26	0.07	0.2	0.32
159	0	0	0	0	0	0.03	0	0
161	0	0	0.02	0	0	0	0	0
162	0	0	0	0	0	0.03	0	0
164	0.79	0.11	0.17	0.05	0.18	0.05	0.15	0.18

Table D21: *Continued.*

165	0	0	0.01	0	0.02	0.01	0	0
167	0	0	0.08	0	0.06	0.03	0	0
169	0	0	0	0	0	0	0	0
170	0	0.15	0.29	0.13	0.41	0.1	0.54	0.77
171/173	0	0.09	0.19	0.07	0.26	0.05	0.29	0.42
172	0	0.04	0.09	0.03	0.1	0.03	0	0
174	0.84	0.33	0.52	0.17	1.13	0.21	1.08	1.75
175	0	0	0.03	0	0.07	0	0.04	0.06
176	0	0.05	0.12	0.03	0.2	0.03	0.17	0.21
177	0	0.16	0.28	0.11	0.52	0.11	0.47	0.79
178	0	0.04	0.17	0.03	0.34	0.05	0.2	0.45
179	0	0.24	0.42	0.13	0.75	0.18	0.48	1.32
180/193	0.62	0.47	0.9	0.3	1.88	0.34	2.18	3.04
181	0	0	0	0	0	0	0	0
182	0	0	0	0	0	0	0	0
183/185	0.69	0.28	0.34	0	0.89	0.17	0.98	1.6
184	0	0	0	0	0	0	0	0
186	0	0	0	0	0	0	0	0
187	0.93	0.41	0.82	0.31	1.7	0.3	1.74	3.07
188	0	0	0	0	0	0	0	0
189	0	0	0	0	0	0	0	0
190	0	0.04	0.07	0	0.14	0.04	0.38	0.52
191	0	0	0.03	0	0.06	0.05	0	0
192	0	0	0	0	0	0	0	0
194	0	0	0.25	0.11	0.63	0.18	0.99	1.25
195	0	0	0.09	0	0.27	0.06	0.37	0.42
196	0	0	0.15	0	0.48	0.1	0.63	0.87
197/200	0	0	0	0	0.27	0	0.2	0.41
198/199	0	0	0.37	0.22	1.12	0.23	1.62	2.17
201	0	0	0.07	0.02	0.24	0.05	0.24	0.42
202	0	0	0.2	0.12	0.47	0.15	0.47	0.72
203	0	0	0.23	0.13	0.74	0.16	0.95	1.22
205	0	0	0	0	0.06	0.03	0	0.11
206	0	0	0.17	0.38	0.44	0.1	0.62	0.71
207	0	0	0.04	0	0.11	0	0	0.23
208	0	0	0.07	0.12	0.15	0.04	0	0.25
209	0	0	0.35	0	0	0	0	0

Table D22: PCB concentration (pg m^{-3}) data for the Winnemac Park (WP, n=14) sampling site.

Location ID	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP	WP
Deployment	03/06/12	07/16/12	04/21/12	06/02/12	09/15/12	10/13/12	11/16/12	01/17/13	04/30/13	06/11/13	08/30/13	10/23/13	11/25/13	08/01/13
Collection	04/21/12	09/15/12	06/02/12	07/16/12	10/13/12	11/16/12	01/17/13	04/30/13	06/11/13	08/01/13	10/23/13	11/25/13	12/18/13	08/30/13
1	3.66	11.0	0	0	3.42	4.22	7.86	4.06	2	2.36	3.69	3.26	3.16	4.84
2	2.4	0	0.76	0.82	1.02	1.26	1.71	1.15	0.49	0.53	0.9	0.91	1.1	1.01
3	0	19.1	1.06	2.23	8.62	4.9	3.99	5.86	4.98	5.71	4.43	1.89	1.71	4.31
4	6.94	20.7	6.51	8.87	7.53	8.87	11.6	8.2	5.04	6.5	9.08	7.27	7.1	8.99
5	0	0	0.23	0.29	0.33	0.34	0.39	0.23	0	0.18	0.25	0.34	0.24	0.53
6	2.25	6.8	2.15	3.25	1.52	1.94	2.94	1.74	0.95	1.48	2.25	1.87	1.88	2.3
7	0	0	0.38	0.6	0.54	0.56	0.7	0.44	0.23	0.35	0.51	0.45	0.47	0.62
8	8.88	26.4	10.4	15.8	6.33	8.61	12.9	7.48	4.26	6.8	10.1	8.32	8.34	10.4
9	0	3.14	0.77	0.95	0.62	0.76	1.11	0.65	0.34	0.51	0.79	0.68	0.69	0.81
10	0	0	0.42	0.49	0.36	0.41	0.49	0.35	0.17	0.22	0.33	0.28	0.29	0.36
11	17.2	17.1	20.9	21.6	6.57	6.72	6.02	6.95	6.23	7.41	10.2	5.81	6.71	12.7
12/13	0	2.26	0.98	1.3	0.78	0.71	0.77	0.48	0.23	0.36	0.51	0.47	0.49	0.61
15	2.29	6.37	3.13	4.24	1.43	1.66	2.47	1.33	0.93	1.6	2.27	1.68	1.46	2.18
16	4.19	8.34	4.74	7.03	2.56	3.24	5.42	2.75	1.72	2.75	4.24	3.46	3.45	4.57
17	6.45	9.41	5.72	8.7	2.72	3.59	5.54	3.03	1.96	2.95	4.44	3.74	3.67	4.93
18/30	9.68	22.0	0	0	5.61	7.26	11.6	6.2	3.88	5.99	9.21	7.71	7.74	9.98
19	1.92	2.56	1.33	2.05	1.04	1.4	1.9	0.99	0.6	0.84	1.3	1.21	1.2	1.39
20/28	11.0	16.9	11.4	16.0	4.81	5.94	8.56	4.73	3.23	5.03	7.37	5.67	5.35	7.97
21/33	7.93	10.0	6.05	7.85	2.94	3.57	5.49	2.81	1.73	2.8	4.25	3.39	3.44	4.56
22	3.83	5.58	4.97	6.54	1.72	1.96	2.95	1.55	1.08	1.75	2.5	1.92	1.81	2.81
23	0	0	0.2	0.15	0.09	0.07	0.05	0.02	0	0.04	0.03	0.03	0	0
24	0	0	0.16	0.29	0.16	0.16	0.18	0.1	0.06	0.11	0.16	0.1	0.13	0.15
25	1.04	1.52	0.94	1.35	0.6	0.58	0.79	0.48	0.34	0.54	0.72	0.58	0.59	0.79
26/29	1.81	3.65	2.22	2.95	1.06	1.25	1.73	0.97	0.65	1.01	1.48	1.27	1.33	1.65
27	0	2.03	0.59	0.86	0.47	0.54	0.73	0.4	0.27	0.4	0.61	0.45	0.45	0.67
31	15.8	18.8	12.1	16.8	4.48	5.3	8.25	4.49	3.04	4.79	7.02	5.42	5.26	7.69
32	2.76	5.82	3.76	6.64	1.6	1.99	2.96	1.64	1.09	1.66	2.49	1.94	1.87	2.77
34	0	0	0.07	0	0.13	0.08	0.08	0.03	0.02	0.02	0.05	0.05	0	0
35	0	0	0.14	0.25	0.2	0.18	0.15	0.11	0.09	0.12	0.18	0.11	0.12	0.2
36	0	0	0.05	0.03	0.13	0.1	0.05	0.01	0	0	0.05	0.03	0	0
37	1.84	3.11	1.42	1.89	0.71	0.8	1.01	0.5	0.45	0.75	1.08	0.77	0.71	1.14
38	0	0	0.03	0.05	0.13	0.09	0.05	0.03	0	0	0.04	0.04	0	0
39	0	0	0.08	0.08	0.12	0.11	0.05	0.03	0	0.02	0.04	0	0	0
40/41/71	4.21	5.65	2.51	3.15	1.72	1.87	2.34	1.31	1.02	1.71	2.37	1.63	1.55	2.81
42	0	2.69	1.65	2.11	0.94	0.98	1.31	0.72	0.59	0.94	1.33	0.9	0.91	1.6
43	0	0	0.34	0.12	0.37	0.34	0.3	0.17	0.09	0.15	0.25	0.17	0.16	0.31
44/47/65	10.1	10.9	0	0	4.25	4.6	5.3	3.24	2.55	4.06	5.86	3.94	4.23	6.87
45/51	0	3.94	1.37	1.69	1.06	1.14	1.47	0.84	0.56	0.82	1.31	0.99	0.92	1.45

Table D22: *Continued.*

46	0	0	0.46	0.34	0.39	0.41	0.5	0.27	0.19	0.28	0.42	0.33	0.28	0.5
48	1.29	2.41	1.44	1.52	0.85	0.96	1.2	0.63	0.45	0.71	1.06	0.8	0.82	1.2
49/69	5.7	6.73	3.84	5.34	2.76	2.92	3.47	2.12	1.68	2.58	3.64	2.44	2.47	4.17
50/53	0	2.08	0.96	1.07	1.46	1.34	1.35	0.78	0.75	0.9	1.24	1.1	1.34	1.66
52	19.3	17.8	12.7	16.0	7.27	7.26	8.29	5.28	4.1	6.51	9.26	5.76	6.13	10.8
54	0	0	0	0.03	0.11	0.09	0.05	0.03	0	0	0.03	0	0	0.03
55	0	0	0.2	0.19	0.19	0.15	0.12	0.05	0	0.05	0.07	0	0	0
56	2.73	2.28	1.69	2.29	0.73	0.72	0.78	0.49	0.45	0.77	0.99	0.56	0.59	1.26
57	0	0	0	0.03	0.16	0.1	0.05	0.02	0	0.02	0.02	0	0	0
58	0	0	0.05	0	0.11	0.1	0.03	0	0	0	0.02	0	0	0
59/62/75	2.27	1.15	0.47	0.57	0.63	0.55	0.47	0.27	0.19	0.27	0.41	0.32	0.35	0.52
60	1.66	1.72	0.79	1.02	0.47	0.46	0.47	0.29	0.23	0.41	0.54	0.34	0.34	0.63
61/70/74/76	13.7	12.4	5.53	7.31	4.61	4.51	4.74	3.03	2.48	4.23	5.72	3.28	3.6	6.63
63	0	0.66	0	0	0.15	0.17	0.11	0.08	0.06	0.09	0.13	0.08	0.1	0.17
64	4.77	4	2.42	3.33	1.63	1.7	2.02	1.25	0.99	1.66	2.32	1.45	1.47	2.78
66	4.92	6.1	2.67	3.66	1.42	1.51	1.68	1.03	0.93	1.6	2.07	1.18	1.2	2.39
67	0	0	0	0	0.24	0.16	0.11	0.08	0.04	0.07	0.11	0.07	0.08	0.12
68	0	0	0	0	0.5	0.4	0.22	0.14	0	0	0.25	0	0	0
72	0	0	0.04	0.06	0.15	0.1	0.05	0.03	0	0	0.03	0	0	0
73	0	0	0.23	0.11	0.22	0.19	0.11	0.04	0	0	0	0	0	0
77	0	0	0.09	0.22	0	0	0.06	0	0.08	0.13	0.18	0.1	0.17	0.19
78	0	0	0	0.1	0.16	0.05	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0.04	0	0	0.02	0.02	0	0	0	0
80	1.16	0	0.05	0.03	0.13	0.08	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82	1.49	1.3	0.44	0.65	0.38	0.37	0.25	0.21	0.19	0.33	0.4	0.26	0.32	0.64
83/99	5.58	4.17	2.29	3.09	1.91	1.86	1.62	1.12	1	1.64	2.13	1.29	1.62	2.77
84	2.53	3.15	1.81	2.38	1.44	1.44	1.32	0.81	0.76	1.18	1.72	1.01	1.2	2.07
85/116/117	0	3.29	0	0	3.14	2.55	1.58	1	0	0	1.83	0	0	3.09
86/87/97/ 109/119/125	0	0	3.01	4.18	2.71	2.74	2.26	1.51	1.45	2.43	3.38	2	2.31	4.15
88/91	2.8	2.45	0.52	0.76	0.71	0.72	0.56	0.4	0.33	0.51	0.75	0.5	0.59	0.99
89	0	0	0	0.04	0.11	0.09	0.06	0.02	0.03	0.04	0.06	0.03	0	0.08
90/101/113	13.8	11.6	5.59	7.03	4.68	4.73	4.22	2.84	2.43	3.97	5.58	3.38	4	6.92
92	0	0	1.39	1.42	0.86	0.88	0.76	0.51	0.43	0.69	0.99	0.61	0.75	1.24
93/95/98/ 100/102	12.8	9.39	6.48	8.61	5.16	5.08	4.74	3.04	2.44	3.97	5.86	3.55	4.38	7.24
94	0	0	0	0	0.08	0.06	0.04	0.02	0.02	0.02	0.03	0.03	0	0.04
96	0	0	0	0.05	0.11	0.1	0.07	0.04	0.02	0.04	0.06	0.04	0.04	0.07
103	0	0	0	0.07	0.09	0.07	0.05	0.03	0	0.03	0.04	0	0.05	0.05
104	0	0	0	0	0.07	0.04	0.02	0.01	0	0	0	0	0	0
105	2.98	1.65	0.84	1.2	0.4	0.52	0.44	0.34	0.32	0.55	0.72	0.41	0.43	0.79

Table D22: *Continued.*

106	0	0	0	0	0.04	0	0	0	0	0	0	0.02	0	0.02
107	0.63	0.39	0.08	0.12	0.14	0.15	0.11	0.08	0.08	0.13	0.17	0.09	0.12	0.21
108/124	0.53	0.35	0.08	0.11	0.15	0.1	0.08	0.06	0.05	0.09	0.12	0.09	0	0.16
110/115	9.75	8.96	5.77	7.5	4.24	4.22	3.42	2.42	2.18	3.67	5	2.7	3.26	6.15
111	0	0	0	0	0.04	0.03	0	0	0	0	0	0	0.03	0
112	0	0	0.05	0.07	0.07	0.07	0.01	0.01	0	0	0.03	0	0	0
114	0	0	0	0	0.44	0.35	0	0.11	0	0	0	0	0	0
118	5.54	4.86	2.87	3.5	1.53	1.63	1.49	1.07	1.02	1.78	2.32	1.16	1.34	2.64
120	0	0	0	0	0.04	0	0	0	0	0	0.02	0.02	0	0
121	0	0	0	0	0.07	0	0	0	0	0	0.11	0.22	0.3	0.17
122	0	0	0	0.05	0.04	0	0.03	0	0	0.02	0	0.04	0	0.04
123	0	0	0	0.03	0.03	0	0	0.03	0.02	0.04	0.06	0.05	0.05	0.08
126	0	0	0	0.14	0.11	0	0	0	0	0	0	0	0	0
127	0	0	0.02	0	0	0	0	0	0	0	0	0.02	0	0.03
129/138/ 160/163	2.51	4.08	1.95	2.57	1.43	1.83	1.53	1.07	0.89	1.5	2.09	1.07	1.23	2.71
130	0	0.44	0.16	0.04	0.09	0.11	0.08	0.06	0.05	0.09	0.12	0.07	0.07	0.19
131	0	0	0.03	0.03	0.04	0.04	0.03	0.03	0.02	0.04	0.06	0.04	0.03	0.08
132	1.75	3.33	0.79	0.98	0.65	0.75	0.68	0.44	0.41	0.65	0.85	0.5	0.53	1.19
133	0	0	0	0	0.02	0.02	0.03	0.01	0.01	0.02	0.04	0.02	0.03	0.06
134/143	0	0	0.22	0.21	0.22	0.23	0.18	0.13	0.08	0.16	0.23	0.11	0.15	0.25
135/151/154	1.53	2.34	1	1.46	0.99	1.15	0.99	0.62	0.51	0.81	1.13	0.69	0.76	1.58
136	0	1.23	0.52	0.59	0.51	0.58	0.5	0.31	0.25	0.4	0.67	0.52	0.72	0.96
137	0	0	0.07	0.06	0.1	0.11	0.08	0.06	0.05	0.08	0.15	0.09	0.07	0.21
139/140	0	0	0	0.04	0.11	0.12	0.05	0.03	0.02	0.04	0.07	0.04	0.06	0.09
141	0	0.82	0.35	0.42	0.32	0.45	0.37	0.21	0.19	0.3	0.43	0.23	0.25	0.59
142	0	0	0	0	0.03	0.02	0	0	0	0	0	0.01	0.01	0.01
144	0	0	0.15	0.1	0.15	0.18	0.14	0.08	0.07	0.12	0.17	0.11	0.13	0.22
145	0	0	0	0	0.04	0.03	0.01	0	0	0	0	0	0	0
146	0	0.51	0.32	0.29	0.25	0.27	0.23	0.17	0.14	0.23	0.3	0.16	0.21	0.41
148	0	0	0	0	0.04	0.02	0.01	0.01	0	0	0.01	0	0	0
147/149	2.71	4.82	2.82	3.44	1.91	2.28	2.04	1.36	1.11	1.89	2.54	1.42	1.58	3.29
150	0	0	0	0	0.04	0.04	0.01	0.01	0	0	0.01	0.01	0.02	0
152	0	0	0.01	0	0.04	0.03	0.01	0	0	0	0.01	0	0	0
153/168	2.58	3.12	1.61	2.26	1.32	1.61	1.42	0.93	0.79	1.31	1.8	0.89	1.11	2.28
155	0	0	0	0	0.05	0.03	0.02	0.01	0	0	0.01	0.02	0.02	0
156/157	0.56	0.34	0	0.1	0.07	0.06	0.05	0.06	0.04	0.07	0.12	0.08	0.09	0.15
158	0	0.4	0.14	0.3	0.16	0.17	0.15	0.1	0.09	0.14	0.2	0.11	0.14	0.27
159	0	0	0	0	0	0	0	0	0	0	0	0.03	0	0
161	0	0	0	0	0.05	0.03	0	0	0	0	0	0	0	0
162	0	0	0	0.03	0	0	0	0	0	0	0.02	0	0	0
164	0	0	0.06	0.08	0.09	0.1	0.09	0.06	0.05	0.08	0.12	0.06	0.11	0.15

Table D22: *Continued.*

165	0	0	0	0	0.03	0.01	0	0	0	0	0.01	0	0	0.01
167	0	0.26	0	0.03	0	0	0.02	0	0.02	0.03	0.04	0.02	0	0.05
169	0	0	0	0	0	0	0	0	0	0	0	0.01	0	0
170	0	0.37	0.14	0.17	0.15	0.29	0.25	0.1	0.07	0.09	0.15	0.1	0.1	0.24
171/173	0	0	0	0.1	0.09	0.13	0.11	0.1	0	0.07	0.1	0	0	0.12
172	0	0	0.03	0.07	0	0	0	0.02	0	0.02	0.03	0	0	0.08
174	0.63	0.57	0.37	0.43	0.27	0.32	0.37	0.19	0.13	0.22	0.27	0.16	0.19	0.46
175	0	0	0	0	0.1	0.07	0.02	0.01	0	0.01	0.02	0	0	0.03
176	0	0	0	0.02	0.05	0.07	0.07	0.03	0.02	0.05	0.06	0.05	0.04	0.1
177	0	0	0.14	0.19	0.12	0.25	0.2	0.11	0.08	0.11	0.15	0.07	0.12	0.21
178	0	0	0.02	0	0.06	0.1	0.09	0.04	0.03	0.06	0.09	0.03	0.05	0.11
179	0	0.75	0.17	0.42	0.18	0.29	0.25	0.14	0.12	0.18	0.27	0.15	0.17	0.33
180/193	0.94	0.52	0.57	0.6	0.37	0.75	0.59	0.28	0.19	0.29	0.42	0.28	0.28	0.58
181	0	0	0	0	0.34	0.19	0	0.07	0	0	0	0	0	0
182	0	0	0	0	0.7	0.47	0	0.11	0	0	0	0	0	0
183/185	0.62	0	0.23	0.32	0.28	0.26	0.28	0.17	0.1	0.18	0.27	0.21	0.31	0.44
184	0	0	0	0	0.88	0.55	0	0.12	0	0	0	0	0	0
186	0	0	0	0	0.15	0.07	0	0.02	0	0	0	0	0	0
187	0	1.09	0.36	0.49	0.44	0.68	0.52	0.3	0.23	0.37	0.49	0.27	0.31	0.71
188	0	0	0	0	0.56	0.35	0	0.07	0	0	0	0	0	0
189	0	0	0	0	0	0	0	0	0	0	0	0	0	0
190	0	0	0	0.05	0	0	0.04	0	0	0	0.04	0	0	0.08
191	0.36	0	0	0	0	0	0	0	0	0	0.02	0	0	0.06
192	0	0	0	0	0	0	0	0	0	0	0	0	0	0
194	0	0	0	0.14	0.14	0.27	0.14	0.06	0	0	0.09	0.15	0.18	0.16
195	0	0	0	0	0.07	0.12	0.08	0.04	0	0	0	0.06	0	0.07
196	0	0	0	0	0	0.14	0.1	0.06	0	0.04	0.06	0.09	0	0.12
197/200	0	0	0	0.08	0	0.08	0.07	0.02	0	0	0	0	0	0.07
198/199	0	0.86	0.12	0.19	0.2	0.31	0.24	0.13	0.08	0.11	0.17	0.15	0	0.26
201	0	0	0.03	0.05	0.06	0.06	0.04	0.03	0	0.02	0.04	0.04	0.05	0.08
202	0	0	0	0.09	0.18	0.2	0.14	0.08	0	0.1	0.15	0.15	0.22	0.24
203	0	0	0.11	0.11	0.14	0.24	0.16	0.08	0	0.07	0.1	0	0	0.19
205	0	0	0	0	0.07	0.06	0.04	0	0	0	0.02	0.05	0	0.05
206	1.48	0.93	0	0	0.14	0.13	0.15	0.07	0	0	0.09	0.13	0	0.14
207	0	0	0	0	0	0	0	0.02	0	0	0	0	0	0.06
208	0	0	0.05	0	0	0.08	0.04	0.03	0	0.03	0.05	0.06	0	0.08
209	0	0	0	0	0.82	0.48	0.31	0.18	0	0	0.32	0.55	0.87	0.63