Wenatchee River PCB Source Assessment

Confluence Reach Investigation

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[1] https://www.ecology.wa.gov/Research-Data/Data-resources/Environmental-Information-Management-database

Wenatchee River
PCB Source Assessment

Confluence Reach Source Investigation

by

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Abstract

This 2023 joint study between the Chelan County Natural Resource Department and the Washington State Department of Ecology (Ecology) investigates legacy polychlorinated biphenyl (PCB) contamination in the sediments of the Confluence Reach, where the Wenatchee River meets the Columbia River. Building on earlier work by Ecology, this investigation used sediment sampling and passive low-density polyethylene (LDPE) devices to identify PCB concentrations and evaluate their bioavailability through porewater measurements. Results confirm that measurable PCBs are present across the study area. The highest concentrations were found coinciding with visible legacy debris and suspected groundwater seeps. A strong correlation ($r^2 = 0.92$) between bulk sediment and porewater PCB concentrations suggests that sediments are a likely ongoing source to the aquatic ecosystem.

Congener patterns match Aroclor 1242, a mixture historically used in electrical applications and pesticides which are consistent with previous congener profiles measured in local sediment, water and biofilm—pointing to a persistent source influencing the Wenatchee River food web. This study advances our understanding of sediment-porewater dynamics, highlights the importance of historical land use and hydrologic connectivity, and informs future management decisions. While sediment concentrations did not exceed state ecological screening thresholds, elevated porewater levels suggest potential bioaccumulation risks. These findings reinforce the need for continued monitoring, and further investigation of subsurface sources such as buried infrastructure and groundwater inflows. The work contributes critical data to the region-wide effort to address persistent PCB pollution and supports long-term goals to restore ecological and human health in the Wenatchee River basin.

Introduction

The Wenatchee River watershed, located in central Washington, is critical for fish habitat, recreation, and agriculture, but currently has eight listings for water quality impairment under Section 303(d) of the federal Clean Water Act (Chiasson et al. 2023, Carroll et al. 2006). Contaminates such as polychlorinated biphenyls (PCBs) have contributed to degraded water quality in the basin and have been detected in fish tissues of resident species, mainly mountain white fish (MWF; *Prosopium williamsoni*), for the last ~20 years. Consequently, the Washington State Department of Health (WDOH) has issued consumption advisories on MWF in the lower Wenatchee River (Chiasson et al. 2023).

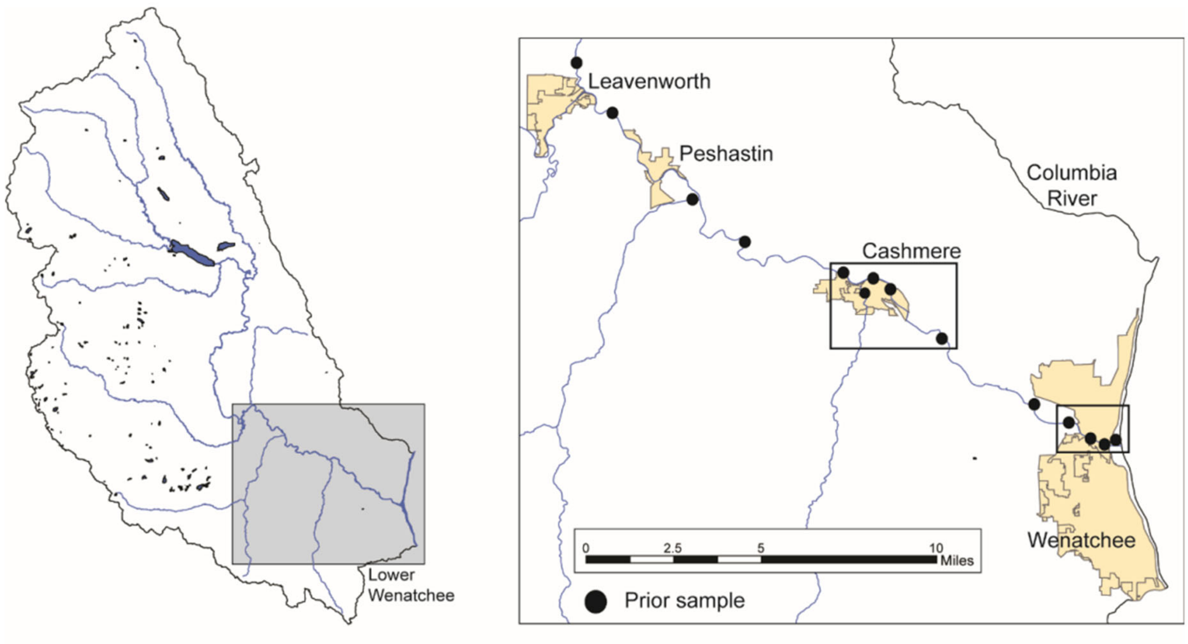

Figure 1. Overview of past sampling locations in the Lower Wenatchee River

This report will focus on PCBs in the lower Wenatchee River. A detailed description of their history, variable chemical compositions, and associated problems can be found in Hobbs (2014). The following summary is cited by Hobbs (2014). PCBs were popular from 1929 until they were banned in 1979 because of their resistance to degradation and wide range of applications, where their primary use was in electrical insulating fluid and lubrication, and hydraulic and heat transfer fluids. PCBs have 209 congener profiles, and of particular interest for this study are the profiles associated with Aroclors, commonly found in commercial and industrial mixtures. PCBs are soluble in fats or lipids, making them persistent environmental contaminants that easily accumulate in fatty tissues of species such as MWF. PCBs are known to be carcinogenic and can negatively impact the immune, endocrine, nervous, and reproductive systems (Hobbs, 2018).

Since 2014, Ecology has conducted two major studies on the Wenatchee River to identify and prioritize PCB source areas (Hobbs and Friese 2016, Hobbs 2018). Through these studies, Hobbs and Friese (2016) identified two chemically distinct areas in the lower Wenatchee River: one near the City of Cashmere (Cashmere Reach), and the second near the confluence of the

Wenatchee and Columbia Rivers (Confluence Reach) (Figure 1). This initial study focused on understanding the rivers' food web and bioaccumulation of PCBs through water and biofilm sampling. Results found a positive correlation between PCB concentrations in water and biofilms and that concentrations vary seasonally with higher levels of PCBs in the summer months when flows are low. Macroinvertebrates, which feed on biofilms, are the primary diet of MWF, and the results from Hobbs and Friese 2016 indicate that MWF are likely ingesting PCBs in the lower Wenatchee River near these two source areas.

The Hobbs (2018) follow up study aimed to further characterize PCB concentrations in the Cashmere Reach and Confluence Reach. Ecology was able to isolate a 500 ft stretch of river in the Cashmere Reach near Riverside Park and found the park was built on top of a historic landfill that may be leaching PCBs into the river through groundwater seeps. They identified the dominant PCB congener profile at the Cashmere Reach to have a similar chemical composition to Aroclor 1254. The Confluence Reach had more uncertainty regarding the specific PCB source but showed consistent congener profiles over time similar to the Cashmere Reach during both low- and high-flow periods. The dominant PCB congeners at the Confluence Reach were less chlorinated than the Cashmere Reach and most chemically similar to Aroclor 1248. Signs of microbial de-chlorination in samples indicated that the PCB source is likely occurring in anaerobic environments within sediments or groundwater. Hobbs (2018) determined that possible source areas could include sediments from backwater channels with a possible influence from the Columbia River.

In 2021-2023 Ecology completed a follow-up study in the Cashmere Reach and confirmed that groundwater was the main pathway for PCBs entering the Wenatchee River at this upriver location. The former landfill in Cashmere is the likely source. Furthermore, there is a storm catchment basin which collects groundwater and storm water that had measurable PCBs. Some Cashmere follow-up work was funded by the EPA grant for this project, but the final report is written and published by Ecology (Hobbs et al. 2025). All data are available through Ecology's Environmental Information Management system[2].

This current study aims to confirm the source areas for legacy PCB deposits in the Confluence Reach and to evaluate potential contamination influenced by the Columbia River. Historical research by Chiasson et al. (2023) guided sample locations through the investigation of past land use, flood events, and river morphology. This work found that from the early 1800's to mid-1900s, the area around the Confluence Reach was primarily agricultural. The land immediately surrounding the study area was owned by Horan Family Farms from 1898 to 1966 (Figure A-1). This assessment identified several potential sources for PCBs entering the study area. These potential sources include historic dumping sites, old infrastructure such as the repeatedly collapsing Horan Family bridge (construction materials unknown), and the presence of a historically electrified BNSF rail line, along which a train crash occurred in 1947 upstream of the

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[2]https://www.ecology.wa.gov/Research-Data/Data-resources/Environmental-Information-Management-database Search Study ID: WHOB002.

study area with no documented cleanup (Figure A-2). Additionally, when the Confluence State Park and Horan Natural Area were constructed, it was common practice at the time to cap and build on top of any historic debris, leaving the underlying materials and any associated contaminants in place (Figure A-3; Chiasson et al., 2023).

Historic river geomorphology and irrigation pathways may also have facilitated contaminant transport into the Confluence Reach. The construction of the Rocky Reach and Rock Island dams flooded the original Wenatchee River delta (Figure A-1), raising questions about whether old or abandoned electrical equipment remains buried beneath the sediment. Irrigation and stormwater runoff, including drainage from regional canyons and Wenatchee's former Miller Street system, flowed directly into the Horan Natural Area Ponds until 2012. These inflows covered extensive agricultural and urban areas, potentially carrying PCBs and other pollutants to the study site (Figure A-4 and A-5).

Key points of interest and associated coordinates are listed in Table 1 and highlighted in Figure 2, additional descriptions of each location can be found in Appendix B-1.

TABLE 1. SAMPLING LOCATIONS.

Location	Adjacent Water Body	Property/ Ownership	Longitude/ Latitude
Horan Natural Area	Wenatchee and Columbia Rivers	CCPUD	47.453065, -120.324989
Confluence State Park	Wenatchee and Columbia Rivers	CCPUD	47.457298, -120.32774

FIGURE 2. CONFLUENCE REACH OVERVIEW OF STUDY SITE, AREAS OF INTEREST AND POSSIBLE SAMPLING AREAS

Methods

Study location and sample sites

The previous PCB study completed by Hobbs (2018) provided the basis for our initial site analysis and research. Hobbs’ study identified the wetted areas and backwater channels near the Confluence Reach as a potential source of PCBs in the Lower Wenatchee River. The specific sample sites and locations for the Confluence Reach study were identified using historical documentation, anecdotal accounts, aerial data of the confluence area, as well as an initial on the ground survey to determine site access feasibility.

Historical research completed as a part of this study revealed that the backwater channels may contain legacy materials containing PCBs from the Historical Horan Family Homestead that was flooded due to the construction of dams on the Columbia River. An aerial evaluation was completed by reviewing current and historic aerial imagery of the Confluence Reach to determine accessibility of the site, as well as to complement the historical footprint of the Horan Homestead. The aerial survey confirmed the location of the Horan Homestead at the Confluence Reach through the presence of structures and what were likely fruit trees. The aerial survey also indicated that there were backwater channels that would likely be wetted during the proposed sampling timeframe (late August) under typical rainfall and discharge trends.

The initial site survey was conducted on June 15, 2023 when the Wenatchee River was experiencing moderate flows. The survey was conducted to evaluate the feasibility of sampling sites identified in the historic/aerial analysis. The survey acted as a “boots on the ground” effort to indicate if the sites were accessible by watercraft/by foot, had adequate sediment grain size for biofilm accumulation (fine-medium grain sand/silt), contained macroinvertebrates for sampling, and were likely to be wetted during the sampling period. GIS mapping using Survey123 was used to geolocate spots that seemed suitable and allowed survey data collection for a desktop analysis to determine the best sites. The results of this survey are shown in Figure 2.

A petit ponar sampler (described below) was used to evaluate sediment suitability and overall distribution, and presence/absence of macroinvertebrates. Most notably, the survey indicated that there were no benthic macroinvertebrates available to collect for sampling, which led to a deviation from the original sampling plan (Chiasson et al 2023). A method was selected that has been used in investigations to mimic the bioavailable fraction of the sediment porewater through the use of low-density polyethylene (LDPE) strips. The field study was altered to account for the use of ex-situ LDPE strips in lab analysis and for an experimental LDPE in-situ sample.

Collection of sediment and LDPE samples happened over the course of three days, from August 28, 2023 to August 30, 2023. Fifteen samples were collected at targeted sample sites across the study area to analyze for several parameters: total organic carbon, black carbon, grain size and PCB congeners.

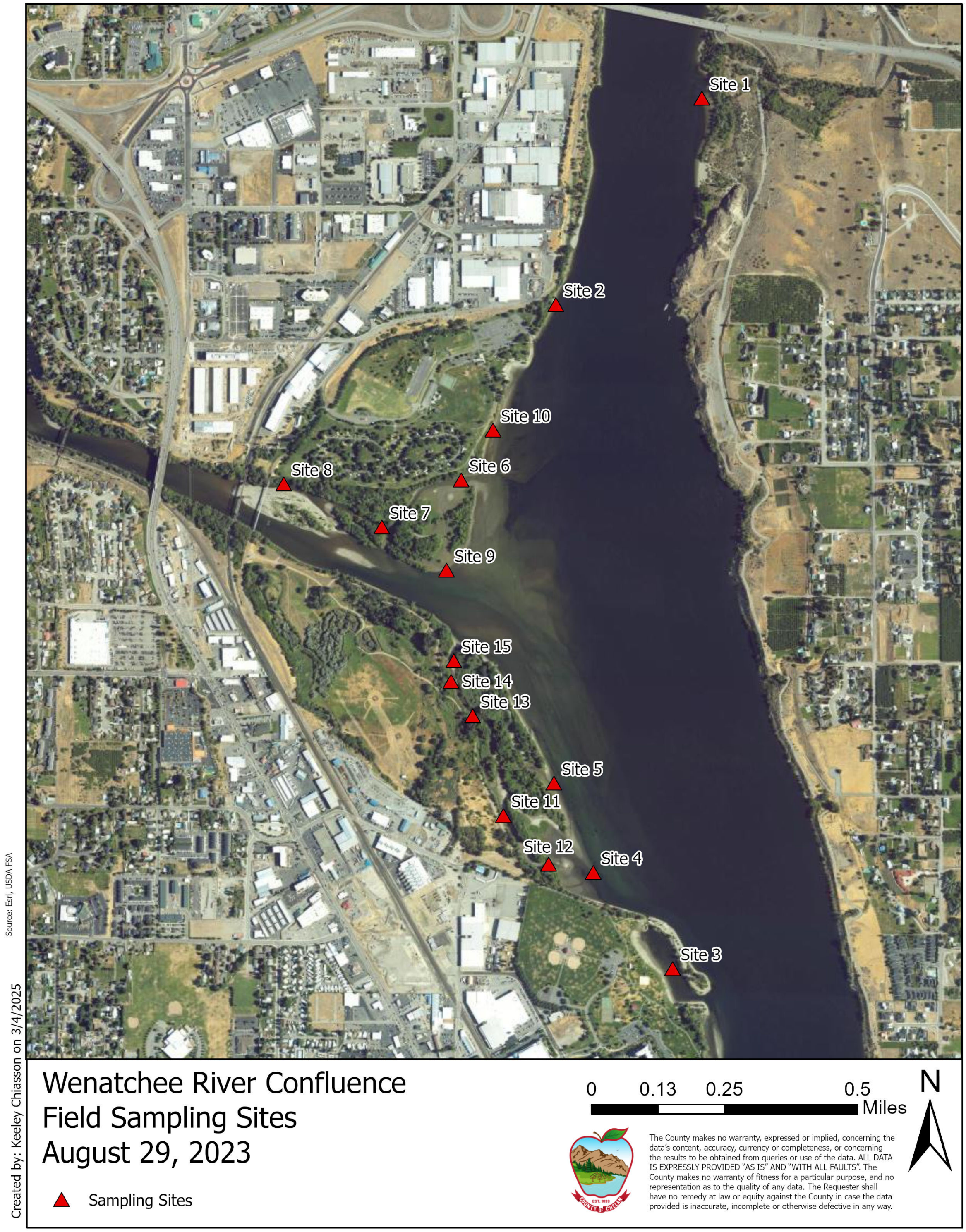

FIGURE 3. FIELD SAMPLE LOCATIONS, COLLECTED AUGUST 29, 2023

Sediment Sampling

Ponar grab sampler

Chelan County Staff utilized two sizes of stainless steel ponar grab samplers that have spring activated scoops to collect sediment samples. The petite ponar is 6” x 6” and was lowered by hand and the standard ponar is 9” x 9” and was lowered using a winch on a pontoon boat. Both samplers have a penetration depth of approximately 10 cm and can collect 1 to 7.25 L of sediment, respectively (Blakely, 2008). For this study, canoes were predominately used to deploy the petite ponar by hand, and in the cases where a larger sample was needed, the ponar sampler was deployed off the deck of a small boat.

Sediment samples were brought to the surface to confirm that an intact sediment-water interface was preserved and the upper ~3-5cm was sampled. Three grabs were taken and composited in a stainless-steel bowl to represent the sample site. Aliquots for each sample parameter were placed in pre-cleaned jars from the lab. Sediments were preserved on ice and shipped to the lab within 48 hrs.

Polyethylene in-situ and ex-situ samplers

The original intent of this study was to use the PCB concentrations of benthic macroinvertebrate tissues to investigate uptake from the bulk sediments,however the initial site survey indicated there was likely a lack of organisms for this method. Instead, this study relied on LDPE strips as passive samplers. LDPE has been used in the past to model the bioavailable fraction of PCBs in aquatic sediments (Burgess 2012; Ghosh et al 2014; Apell et al 2015). The basic principle of using LDPE is that hydrophobic organic compounds, like PCBs, will bind or partition to the LDPE from the porewaters of the sediments emulating the potential equilibrium uptake by invertebrates that may be residing in the sediment (e.g. midge larvae) (Burgess et al 2023). LDPE can be used in-situ or in ex-situ conditions within the lab on bulk sediment sample collections (Apell and Gschwend 2016).

All bulk sediment samples were split, and ex-situ LDPE measurements were made in the lab in addition to PCB measurements directly on the bulk sediments. LDPE strips were prepared by the project contract lab, SGS AXYS, using a range of performance reference compounds (PRCs). PRCs are used to model the uptake of the PCB congeners following analysis because many of the heavier PCB compounds will not be at equilibrium between the porewater and LDPE, and so we model the kinetic partitioning phase using the PRCs. The bulk sediment samples intended for ex-situ LDPE were placed on a shaker table for 30 days with a prepared LDPE strip. The strip is then removed and analyzed for PCB congeners. In-situ LDPE sample devices were also installed at two of the study sites. In-situ devices were the same LDPE in sheets mounted to an aluminum frame and inserted halfway into the sediment at the study sites for approximately 30 days (Figure 4). At recovery, the in-situ LDPE was cut into two samples, representing the conditions above and below the sediment surface (Figure 4).

The contract laboratory provides results for the LDPE samples as mass of PCBs per mass of the LDPE. Methods to estimate the water concentration are based on modeling the PRCs and an understanding of the partitioning of the individual PCB congeners. The guidance described in

USEPA/SERDP/ESTCP (2017) was followed. Field duplicates of both ex-situ and in-situ LDPE samples were taken along with field blanks, manufacturing blanks (“Day-0”) and laboratory blanks.

FIGURE 4. FIELD SAMPLING PHOTOS OF IN-SITU METHOD

Laboratory Methods

Analytical laboratory methods are detailed in Table 2. All labs used during the project are accredited in Washington State for the specific methods. High-resolution mass spectrometry with an isotope dilution method was used to analyze PCB congeners in both the bulk sediments and LDPE. Following the reporting of the HRMS PCB results, the data package was validated by an external contractor (EcoChem) in accordance with EPA protocols for Level 2B (USEPA 2009, 2020).

TABLE 2. LABORATORY ANALYTICAL METHODS AND DETAILS

Analyte	Sample Matrix	Detection Limit	Reporting Limit	Sample Prep Method	Analytical (Instrumental) Method	Lab
PCB congeners (HRMS) (pg/g)	Sediment	0.016 - 0.29	6.0 - 23.3	EPA 1668C	EPA 1668C	SGS AXYS
Total organic carbon (%)	Sediment	NR	0.10	EPA 440	EPA 440	Ecology's Manchester Environmental Lab
Black Carbon (%)	Sediment	NR	0.10	[1]EPA 440	[1]EPA 440	Ecology's Manchester Environmental Lab
Grain size (%)	Sediment	NR	1.0	NA	[2]PSEP 1986	ALS Kelso
PCB congeners (HRMS) (pg per sample)	LDPE	NR	1.41 - 12.8	EPA 1668C	EPA 1668C	SGS AXYS

NA – not applicable; NR – not reported
[1] EPA 440 modified as per Apell and Gshwend 2014 and Gustafsson et al 1997.
[2]PSEP (Puget Sound Estuary Program). 1986. Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound. Prepared for U.S. Environmental Protection Agency Region 10, Office of Puget Sound, Seattle, WA and Puget Sound Water Quality Authority, Olympia, WA by Tetra Tech, Inc., Bellevue, WA. 25 pp

All project data were entered into Ecology's Environmental Information Management (EIM) database for availability to the public and interested parties, with the exception of the surface water data generated using LDPE. Concentrations of toxics generated using LDPEs are considered estimates by Ecology and are not entered into EIM. Data entered into EIM follow a formal data review process where data is reviewed by the project manager, the person entering the data, and an independent reviewer. EIM can be accessed on Ecology's Internet homepage at www.ecology.wa.gov. The project will be searchable under Study ID WHOB002.

Results

Quality Assurance/Quality Control

Lab bias was evaluated by measuring spiked matrices with isotopically labelled PCB congeners. The recoveries for all of the samples met the method quality objectives; all recovery results are detailed in Appendix D. All the sample results met the project laboratory Measurement Quality Objectives (MQO's) (Chiasson et al 2023). All analytical data packages were reviewed and verified to an EPA Stage 2B level (USEPA 2009) by an independent third party, which included censoring data based on laboratory method blanks at the level of 5 times the blank.

TABLE 3. MEASUREMENT QUALITY OBJECTIVES

Parameter	Verification Standards (LCS,CRM, CCV)	Duplicate Samples	Matrix Spikes	Matrix Spike-Duplicates	Surrogate Standard	Lowest Concentration of Interest
	% Recovery Limits	Relative Percent Difference (RPD)	% Recovery Limits	Relative Percent Difference (RPD)	% Recovery Limits	Units of Concentration
Sediment samples						
PCB congeners	50-150%	± 50%	NA	NA	50-150%	0.5 ng Kg^{-1} per cong
TOC	80-120%	± 20%	NA	NA	NA	1%
Grain size	NA	± 20%	NA	NA	NA	1% dry wt
Invertebrate/LDPE samples						
PCB congeners	50-150%	± 50%	NA	NA	50-150%	0.5 ng Kg^{-1} per cong
C:N stable isotopes	NA	± 20%	NA	NA	NA	0.10%

NA=not analyzed TOC=Total Organic Carbon

Field duplicates were collected to determine the precision and variability in sediment at two sites, Site 9 and Site 13. The relative percent difference (RPD) was calculated for the results to determine if there was consistency between field samples. Table 3 shows the field sample and field duplicate values along with the calculated RPD. This indicates reliable sampling precision, and within the range of allowable RPD per the MQO for this study, outlined in Table 3. Total Organic Carbon (TOC) values showed minor variation, with the lowest calculated RPD at Site 9 (14%) and moderately higher at Site 13 (44%). Black carbon results were below the threshold to calculate RPD, so it was excluded from the calculations.

At Site 13, comparisons between field samples and their duplicates show notable variability, particularly in the bulk sediment (BS) measurements. The BS concentration in the primary sample was **11,301.1 pg/g DW**, while the duplicate measured only **5,337.0 pg/g DW**, resulting in an RPD of 72%—the highest among the three quantified parameters at this site and above the project MQO. LDPE values also showed a moderate difference, with the field sample at **307,104.2 pg/g** and the duplicate at **219,379.5 pg/g** (RPD of 33%). Porewater (PW) concentrations differed by a similar margin, **1,027.2 pg/L** and **720.6 pg/L** (RPD of 35%). Although these RPDs are within generally acceptable QA/QC limits, the BS measurement shows the most substantial absolute and relative variability and is above the ±50% range of allowable difference as noted in Table 3. No changes were made to the data; however, we interpreted the results accordingly. Comprehensive QA/QC data tables for sites 9 and 13 showing RPD for each congener tested can be found in Appendix C.

TABLE 4. FIELD SAMPLING QA/QC RESULTS FROM FIELD SITES 9 AND 13.

Site #	LDPE (pg/g)	porewater (pg/L)	Bulk sediment (pg/g DW)	Total organic carbon (%)	Black Carbon (%)
9	197030.3	607.8	2878.0	0.96	0.1
9 (FD)	141490.6	434.1	2460.5	1.1	0.1
Relative % Difference	**33%**	**33%**	**16%**	**14%**	**nc**
13	307104.2	1027.2	11301.1	1.85	0.1
13(FD)	219379.5	720.6	5336.9	1.18	0.1
Relative % Difference	**33%**	**35%**	**72%**	**44%**	**nc**

NC=not calculated FD=field duplicate

Field duplicates of grain size distribution were evaluated for sediment samples collected from Site 9 and Site 13, to assess variability in composition. Results are presented as proportional distributions across eight particle size classes: gravel, very coarse sand, coarse sand, medium sand, fine sand, very fine sand, silt, and clay. Figure 5 displays comparative distributions for each site and its field duplicate.

At Site 9, the primary sediment sample was composed largely of fine sand (32%), medium sand (24.1%), and very fine sand (23.2%), with silt accounting for 18.8%. The Site 9 field duplicate showed a shift in composition, with silt increasing to 49.1% and reduced in very fine sand (3.9%) and medium sand (8.5%). Gravel, very coarse & coarse sand, and clay remained low across both samples (<3%).

At Site 13, the primary sample had a relatively balanced distribution of silt (40.8%) and very fine sand (33.6%), with lesser proportions of fine sand (11.2%). In the Site 13 field duplicate, very fine sand increased to 46.4% while silt decreased to 30.4%. Fine sand content more than doubled relative to the original sample (23% vs. 11.2%). Again, gravel, very coarse & coarse sand, and clay remained low across both samples (<3%).

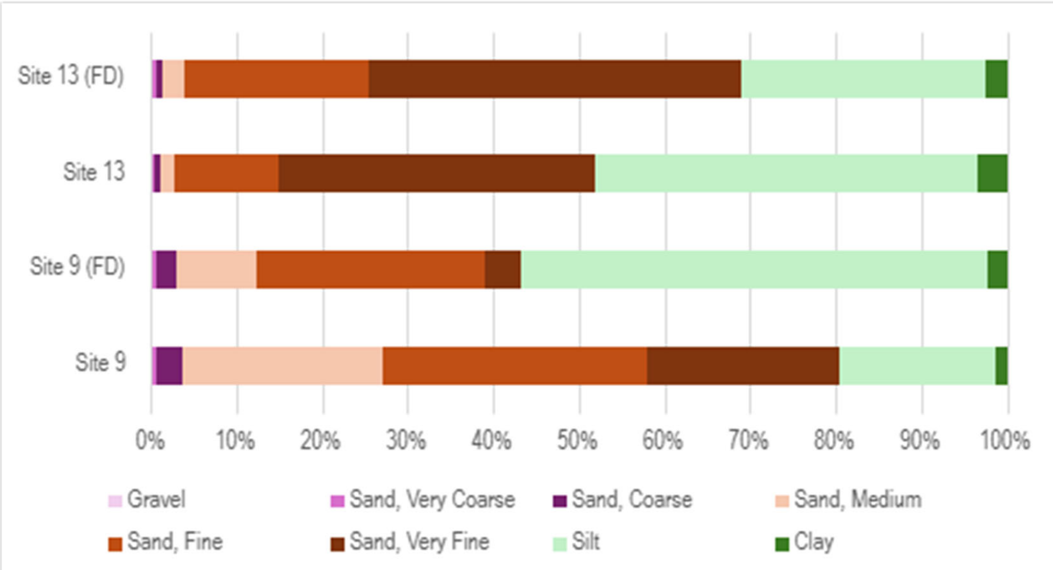

FIGURE 5. QA/QC GRAIN SIZE ANALYSIS FOR FIELD DUPLICATES TO SHOW CONSISTENCY IN MATERIAL BETWEEN SAMPLES.

RPDs were calculated to assess differences between primary sediment samples and their field duplicates at Site 9 and Site 13, as shown in Table 5. At Site 9, the most pronounced differences were observed in silt (29.4%), very fine sand (18.7%), and medium sand (15.1%). Gravel, very coarse & coarse sand, and clay showed relatively low RPDs (<1.1%). At Site 13, RPDs were generally lower across all grain sizes. The largest differences occurred in fine sand (11.4%), very fine sand (12.4%), and silt (10%). Gravel, very coarse & coarse sand, and clay showed relatively low RPDs (<.7%).

These findings underscore the importance of accounting for within-site heterogeneity in particle size distributions, particularly in finer fractions, which are more likely to influence contaminant binding and sediment transport dynamics.

TABLE 5. QA/QC GRAIN SIZE ANALYSIS FOR FIELD DUPLICATES WITH CALCULATIONS FOR THE RELATIVE PERCENT DIFFERENCE IN GRAIN SIZES FOR FIELD SAMPLES.

Site #	Gravel	Sand, Very Coarse	Sand, Coarse	Sand, Medium	Sand, Fine	Sand, Very Fine	Silt	Clay
Site 9	0.19	0.43	3.21	24.06	31.98	23.21	18.76	1.37
Site 9 (FD)	0	0.61	2.15	8.48	24.03	3.88	49.12	2.13
Relative % Difference	**.2%**	**.2%**	**1%**	**15%**	**8%**	**19%**	**29%**	**.7%**

Site #	Gravel	Sand, Very Coarse	Sand, Coarse	Sand, Medium	Sand, Fine	Sand, Very Fine	Silt	Clay
Site 13	0	0.36	0.54	1.57	11.21	33.59	40.76	3.2
Site 13 (FD)	0.17	0.41	0.86	2.65	22.96	46.4	30.44	2.53
Relative % Difference	**.2%**	**.05%**	**.3%**	**1%**	**11%**	**12%**	**10%**	**.65%**

A field duplicate was collected for the in-situ LDPE sample at site 13. Results for this sample consisted of both in-situ water and in-situ sediment data to account for the portions of the LDPE that was submerged into the streambed, and the portion that was just submerged in the water. The RPDs calculated for in-situ field duplicates are shown in Figure 6. The in-situ sediment results show a higher RPD (**18%** and **22%**) when compared to the in-situ water (**10%** and **4%**) results.

TABLE 6. RELATIVE PERCENT DIFFERENCE CALCULATED FOR IN-SITU FIELD DUPLICATES

Site #	LDPE (pg/g)	PW (pg/L)
Site 13 In-situ water	16805.6	101.4
Site 13 In-situ water (FD)	15154.0	105.5
Relative % Difference	**10%**	**4%**
Site 13 In-situ sediment	31695.9	337.3
Site 13 In-situ sediment (FD)	37966.3	422.2
Relative % Difference	**18%**	**22%**

Overall, we see minimal to modest variability between site samples and corresponding field duplicates. The variability between sediment grab samples simply reflects the heterogenous nature of sediment and we will acknowledge this in the interpretation of our chemical results.

1Bulk Sediment Analysis – Conventional Parameters

Results of the bulk sediment analysis for grain size distribution are shown in Figure 6. Site samples are presented as proportional distributions across eight particle size classes (Table 7). Grain size composition varied across sites, with most samples dominated by fine materials ranging from fine sand to silt and smaller amounts of coarser particles. Figure 6 shows that fine grain sand comprised the highest proportions at most sites (32.6%–66.0%), except at Sites 6 and 13 where silt was the dominant component (55.0% and 40.8%, respectively). Site 1 was notable for its much higher medium grain sand content (~40%), likely due to its location in the Columbia River upstream of the confluence. Sites 2 and 10, also upstream in the mainstem, had distributions more consistent with the other sites. A detailed table of sediment distribution for each site can be found in the Appendix table B-2.

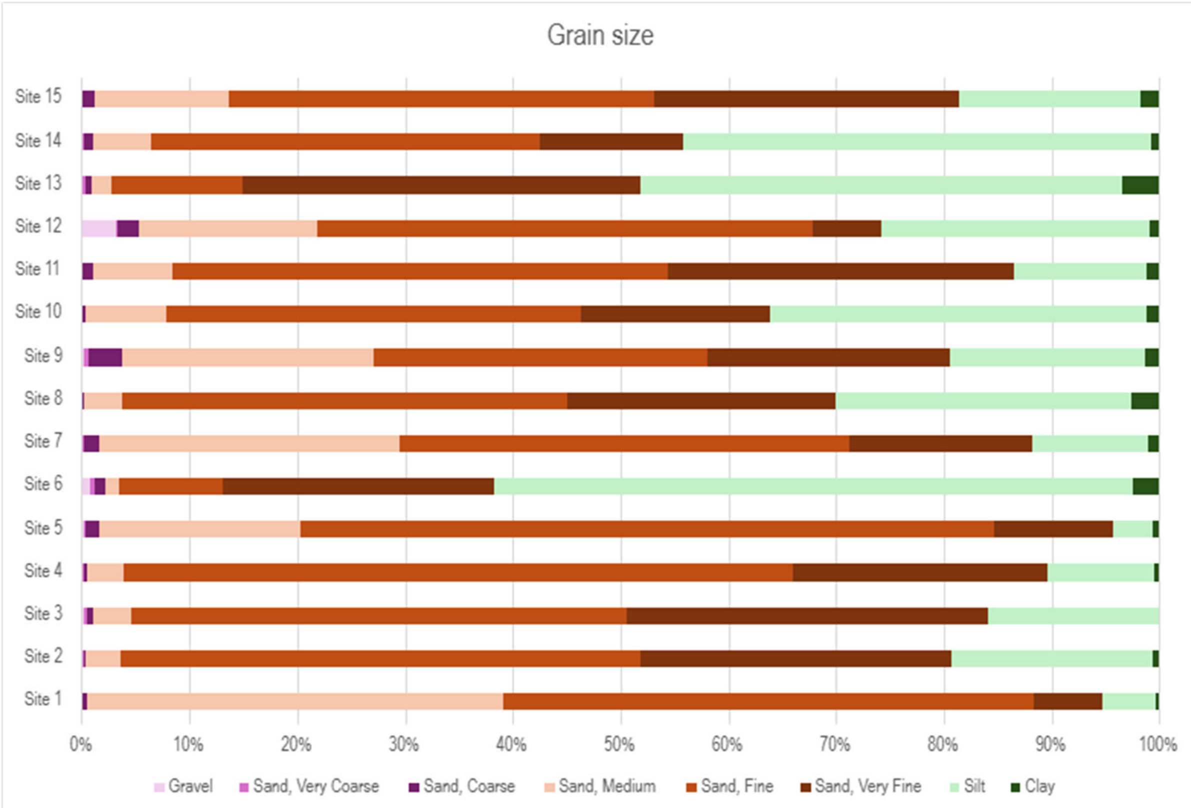

FIGURE 6. GRAIN SIZE COMPOSITION FOR BULK SEDIMENT SAMPLES

TABLE 7. GRAIN SIZE KEY

Grainsize Key
Gravel (>2.00 mm)
Sand, Very Coarse (1.00 mm to 2.00 mm)
Sand, Coarse (0.500 mm to 1.00 mm)
Sand, Medium (0.250 mm to 0.500 mm)
Sand, Fine (0.125 mm to 0.250 mm)
Sand, Very Fine (0.0625 mm to 0.125 mm)
Silt (0.0039 mm to 0.0625 mm)
Clay (< 0.0039 mm)

Table 8 describes the amount of black carbon, total organic carbon (TOC), and the percentage of moisture measured in each sample. Black carbon concentrations were below analytical detection in all samples, except for Site 5 and 7, but levels were generally so low that they are insignificant in this investigation. Total organic carbon ranged from 0.19% to 1.85%, with the highest concentration measured at Site 13. Percent moisture measured ranged from 28.4% to 42.2%.

TABLE 8. RESULTS FOR CARBON CONTENT AND PERCENT MOISTURE CONTENT FOR EACH SAMPLE SITE

The data qualifier "U" signifies a non-detect value or below the detection limit

Sample ID	Black Carbon (%)	TOC (%)	% Moisture
Site 1	0.1 U	0.19	28.4
Site 2	0.1 U	0.24	30.5
Site 3	0.1 U	0.79	41.3
Site 4	0.1 U	0.33	33.6
Site 5	0.12	0.26	32
Site 6	0.1 U	1.47	39.1
Site 7	0.13	0.49	33.2
Site 8	0.1 U	0.64	32.8
Site 9	0.1 U	0.96	31.4
Site 10	0.1 U	0.32	29.5
Site 11	0.1 U	0.36	30.3
Site 12	0.1 U	1.06	39.4
Site 13	0.1 U	1.85	42.1
Site 14	0.1 U	0.96	42.2
Site 15	0.1 U	0.72	40.1
Site 9 (FD)	0.1 U	1.1	37.7
Site 13 (FD)	0.1 U	1.18	35.1

PCB Congeners

Bulk Sediment

Bulk sediment samples collected for all sites were analyzed for PCB congeners and total PCB concentrations were calculated based on positive analytical detections. Results of this analysis are presented in Figure 7 and 8. Total PCB concentrations across all sites ranged from **74.7 pg/g** at Site 1 to **11,301.1 pg/g** at Site 13. The concentration at Sites 13 is almost four times higher than the next highest site, Site 9 where concentrations were **2,878.0 pg/g**. However, as shown previously, the field duplicate at Site 13 was 5,336.9 pg/g, but this is still roughly twice the Site 9 concentration.

Ecology's Sediment Management Standards for freshwater sediments based on the protection of the benthic community are: 2500 ng/g (screening level) and 100 ng/g (cleanup level) (Ecology 2013). These sediment standards describe the no adverse effects concentrations (cleanup) and acute and chronic effects concentrations (screening) for invertebrates in the sediments. The concentrations we measured in this study were well below the screening levels.

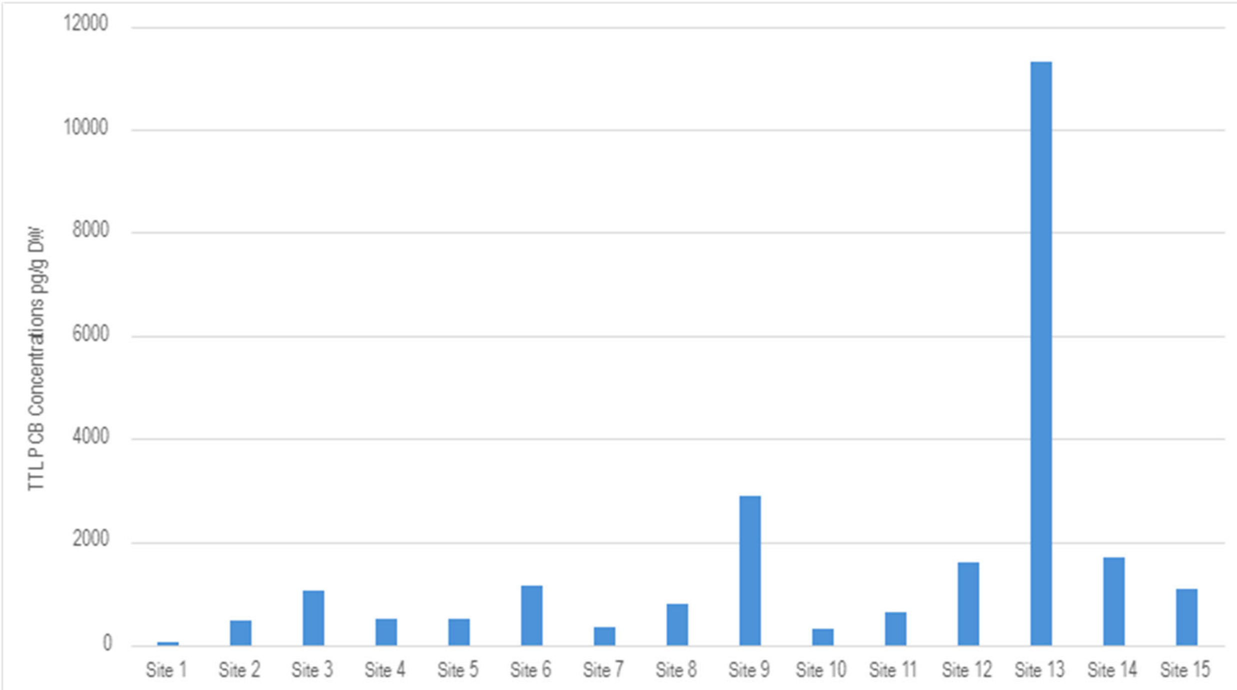

Figure 7. Total PCB concentrations for bulk sediment samples

The PCB congener distribution for the bulk sediments collected at Site 13 and 9 are very similar (Figure A-6 and A-7). The majority of the congeners are lighter (lower chlorination) and in the di-, tri- and – tetra-chlorobiphenyl range.

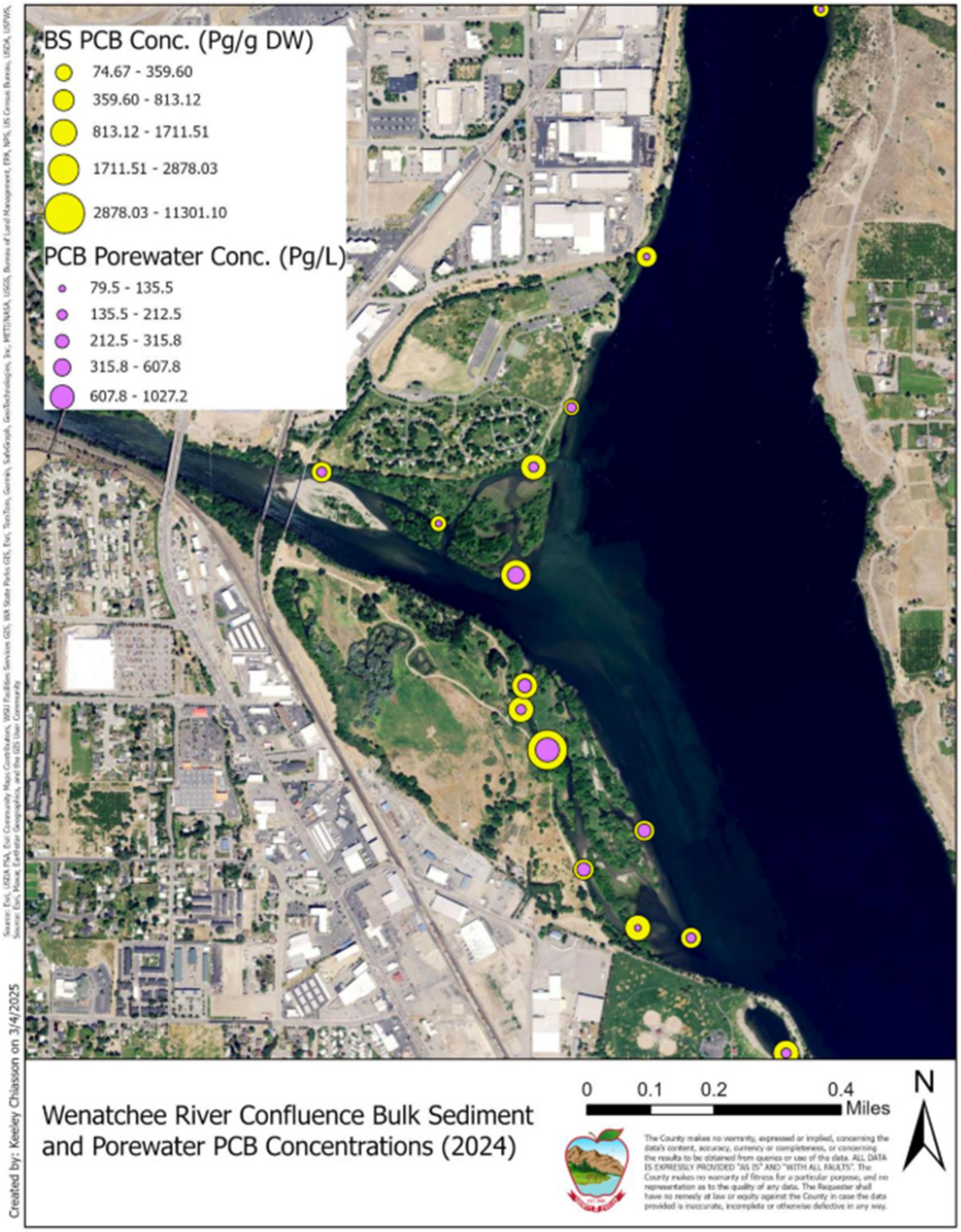

Figure 8. PCB concentrations of ex-situ porewater and bulk sediment

Low Density Polyethylene passive samplers

Ex-situ PCB congeners

The results of total PCB concentrations measured on Low Density Polyethylene (LDPE) passive samplers are shown in Figure 9. Total concentrations range from **58,701.0 pg/g** at Site 12 to **313,828.2 pg/g** at Site 13. Similar to bulk sediment, Site 13 has the highest PCB concentrations and Site 9 has the second highest with a concentration of **208,242.3 pg/g**. These concentrations represent the measured mass of PCBs in the sampler and not water concentrations. Methods to estimate the water concentration are based on modeling the performance reference compounds in the LDPE and an understanding of the partitioning of the individual PCB congeners. We followed the guidance described in USEPA/SERDP/ESTCP (2017) to estimate porewater (freely dissolved, CFree) concentrations in each sediment sample. For more detailed graphics of PCB congeners profiles at Sites 9 & 13, reference Figure A-8 and 9 in the appendix. A comprehensive table of PCB congener concentrations measured for each site can be found in Appendix tables B 3-6.

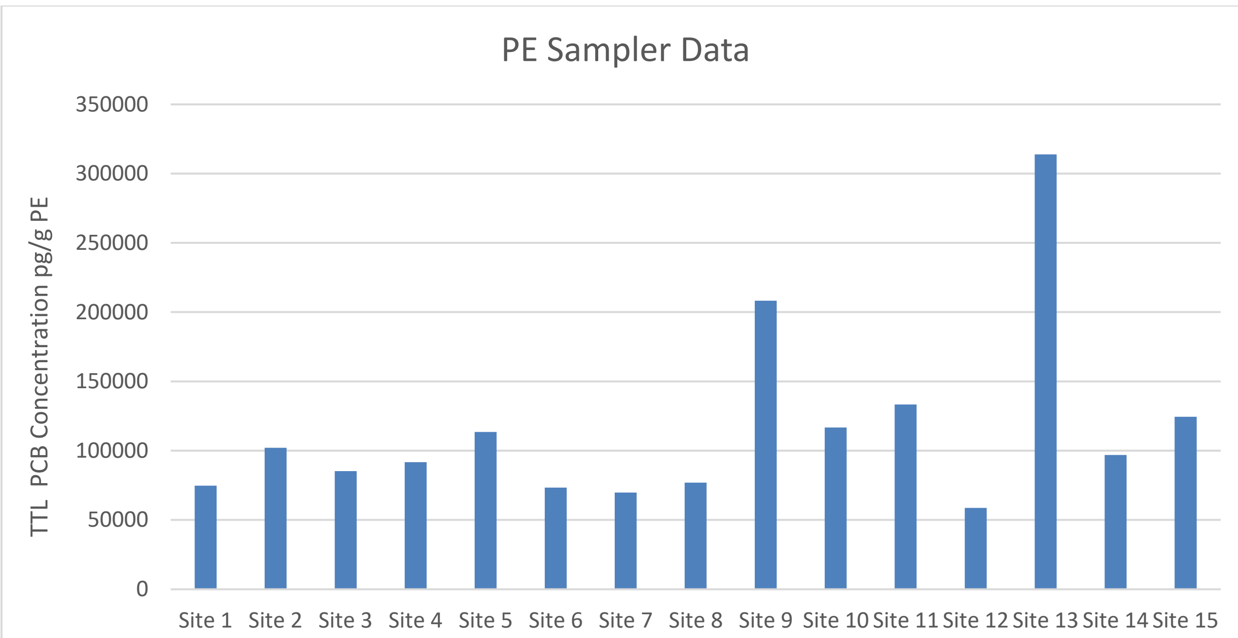

FIGURE 9. RESULTS FOR TOTAL PCB CONCENTRATION FROM EX-SITU PASSIVE SAMPLERS

A comparison of bulk sediment and porewater (freely dissolved, CFree) PCB concentrations is shown in Figure 10. In general, the trend across the sites is comparable for the PCB concentrations in sediment and porewater (ex-situ Cfree), where Site 13 and 9 have the highest concentration. These samples are consistent with results for LDPE and bulk sediment PCB concentrations and show the highest recovery for Site 9 (**607.83 pg/L**) and Site 13 (**1,027.20 pg/L**).

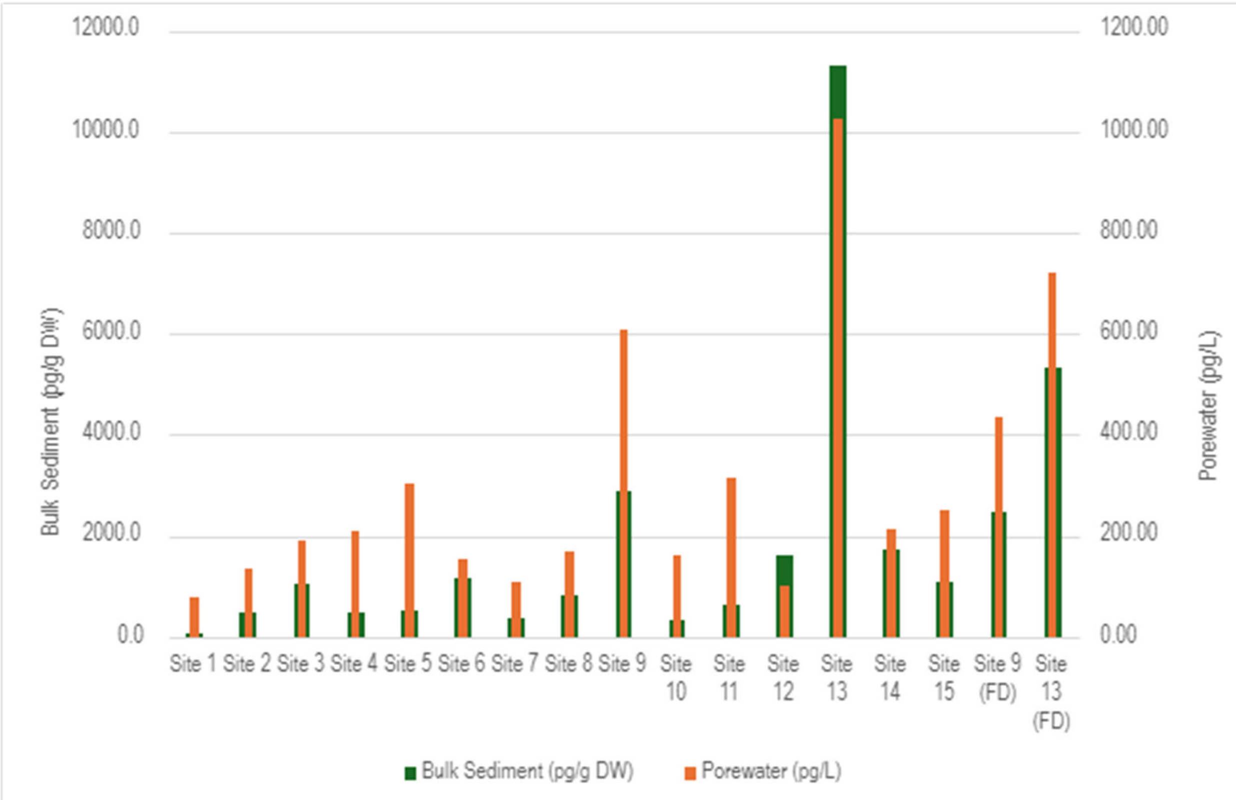

FIGURE 10. BULK SEDIMENT AND POREWATER PCB CONCENTRATIONS ACROSS STUDY SITES

Table 9 presents PCB concentrations measured in LDPE passive samplers, sediment porewater, bulk sediment, and OC normalized bulk sediment for all sampling sites.

LDPE concentrations ranged from **28,635.5 pg/g** at Site 1 to **307,104.2 pg/g** at Site 13. Again, we see that Site 13 has the highest concentrations of PCB's recovered, with site 9 having the second highest concentrations. Porewater concentrations were estimated to evaluate the proportion of PCB's freely available in sediments of each sample. Porewater concentrations followed similar spatial trends, with the highest values observed at Site 13 (**1,027.2 pg/L**) and Site 9 (**607.8 pg/L**).

Bulk sediment concentrations ranged from **74.7 pg/g** at Site 1 to **11,301.1 pg/g** at Site 13. Hydrophobic organic contaminants preferentially bind to organic carbon. Normalizing PCB concentrations to the organic carbon content can account for the variability in OC that might influence a comparison of bulk sediment concentrations across sites (Michelson 1992). When normalized for organic carbon content, bulk sediment concentrations further highlight spatial trends similar to LDPE samples. Site 13 (**610,870.2 pg/gOC**) and Site 9 (**299,795.2 pg/gOC**) are the highest normalized concentrations recovered from the samples.

TABLE 9. SUMMARY DATA TABLE FOR RESULTS FROM EX-SITU LDPE SAMPLERS, (POREWATERS), BULK SEDIMENT AND BULK SEDIMENT NORMALIZED FOR ORGANIC CARBON DATA

Site	Bulk Sediment (pg/g DW)	LDPE (pg/g LDPE)	Sediment porewater (pg/L)	OC normalized bulk sediment (pg/g OC)
Site 1	74.7	28635.5	79.5	39296.7
Site 2	480.9	69521.1	135.5	200389.3
Site 3	1043.7	71742.2	191.1	132116.1
Site 4	498.8	61873.9	208.4	151153.5
Site 5	528.3	82709.9	305.9	203176.7
Site 6	1170.2	62492.8	152.2	79604.7
Site 7	359.6	50877.2	107.6	73387.7
Site 8	813.1	60801.1	168.2	127050.2
Site 9	2878.0	197030.3	607.8	299795.2
Site 10	328.7	86618.7	162.8	102725.9
Site 11	649.7	108301.8	315.8	180481.7
Site 12	1599.5	52360.0	100.1	150895.4
Site 13	11301.1	307104.2	1027.2	610870.2
Site 14	1711.5	81904.2	212.5	178281.9
Site 15	1088.8	108988.3	252.0	151221.0
Site 9 (FD)	2460.5	141490.6	434.1	223684.2
Site 13 (FD)	5336.9	219379.5	720.6	452283.6

The strong relationship between the bulk sediment PCB concentrations (normalized to OC) and the porewater or Cfree concentrations is evident in Figure 10. We found the strongest relationship between these variables using a simple linear regression ($r^2 = 0.92$) and relying on the organic carbon normalized PCB concentrations in the bulk sediments. The congener distributions for the bulk sediment and porewater results are near identical (Figure A-10 and 11), suggesting a reliable dissolution or partitioning of PCBs from the bulk sediments into the porewaters.

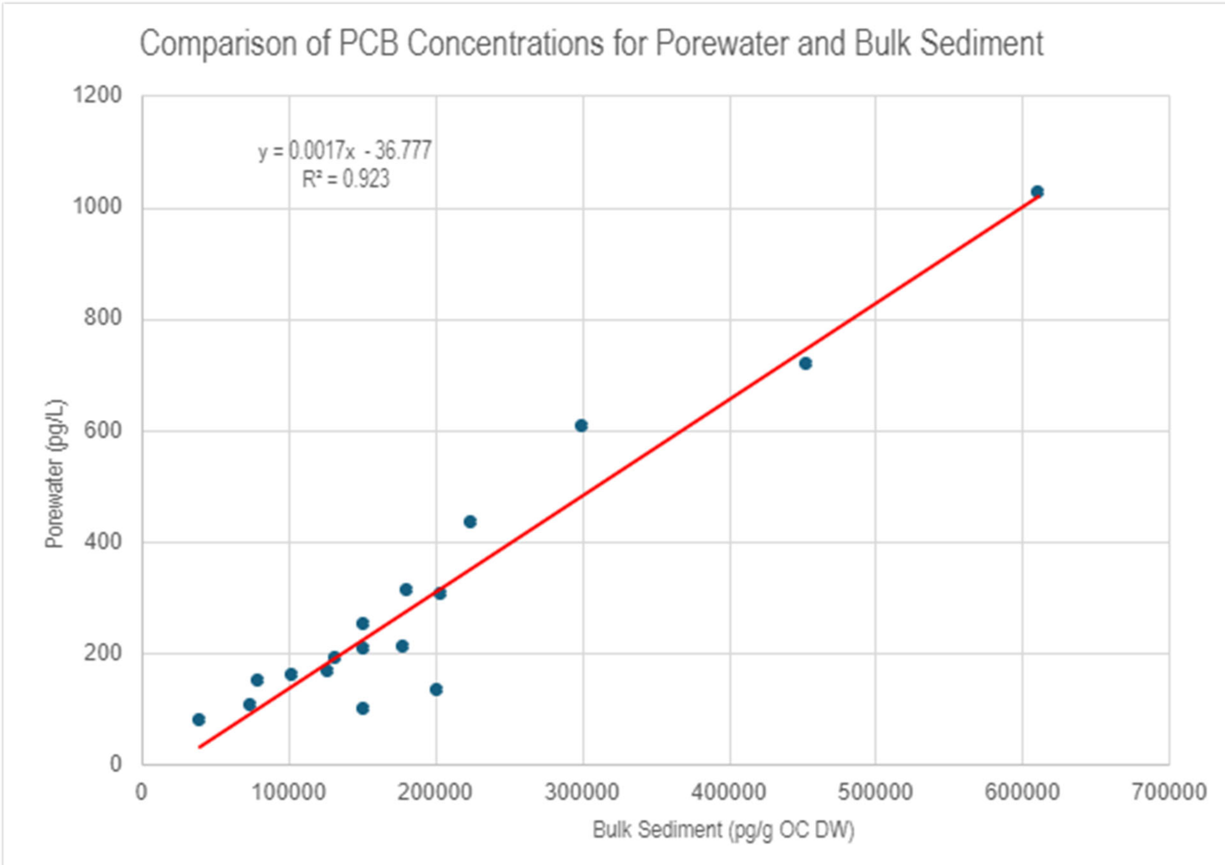

FIGURE 11. COMPARISON BETWEEN TOTAL PCB CONCENTRATIONS FOR BULK SEDIMENT AND PORE WATER DATA USING A LINEAR REGRESSION

In-situ PCB congeners

The in-situ LDPE samplers were deployed at two locations (Figure 12; Site 7 and 13). The in-situ samplers allowed us to assess PCB concentrations in the surface waters overlying the sediments and the porewaters in the sediments; we also know the PCB concentrations in bulk sediments at these two sites. As expected, Site 13 had the highest porewater concentrations as measured in-situ (337 pg/L), resulting in higher concentrations in the overlying waters (101 pg/L vs 62 pg/L at Site 7).

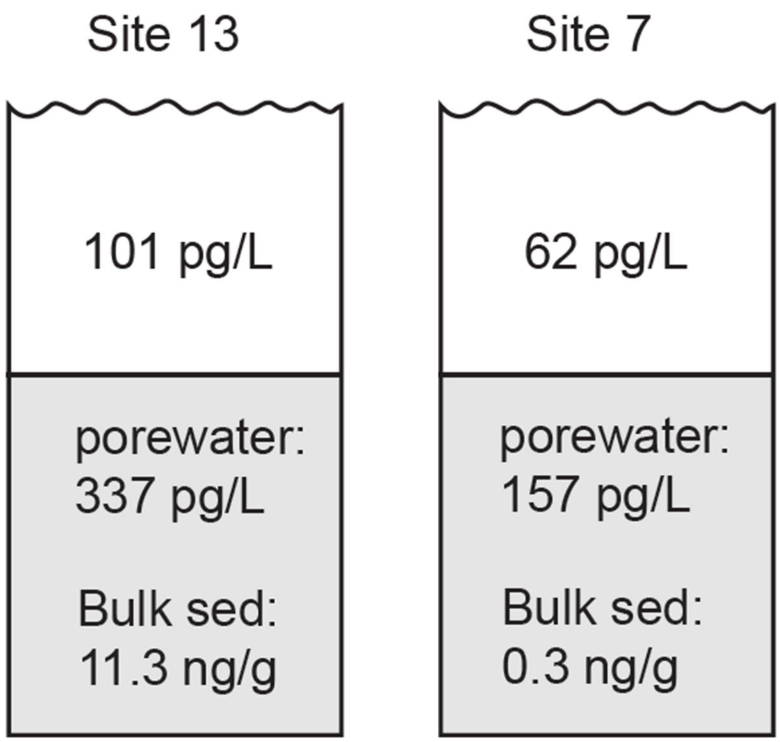

FIGURE 12. REPRESENTATION OF IN-SITU PCB CONCENTRATIONS AT SITE 7 & 13

In general, we see similar patterns in PCB congeners in ex-situ to in-situ (Figure 14 and 15). Figure 14 represents the relative abundance of PCB's recovered for in-situ and ex-situ samples at Site 13. At Site 13, the congener profile does differ slightly between the in-situ and ex-situ, with the ex-situ recovering proportionally higher concentrations of PCB 1-40, and in-situ recovering higher concentrations of PCB 100-130.

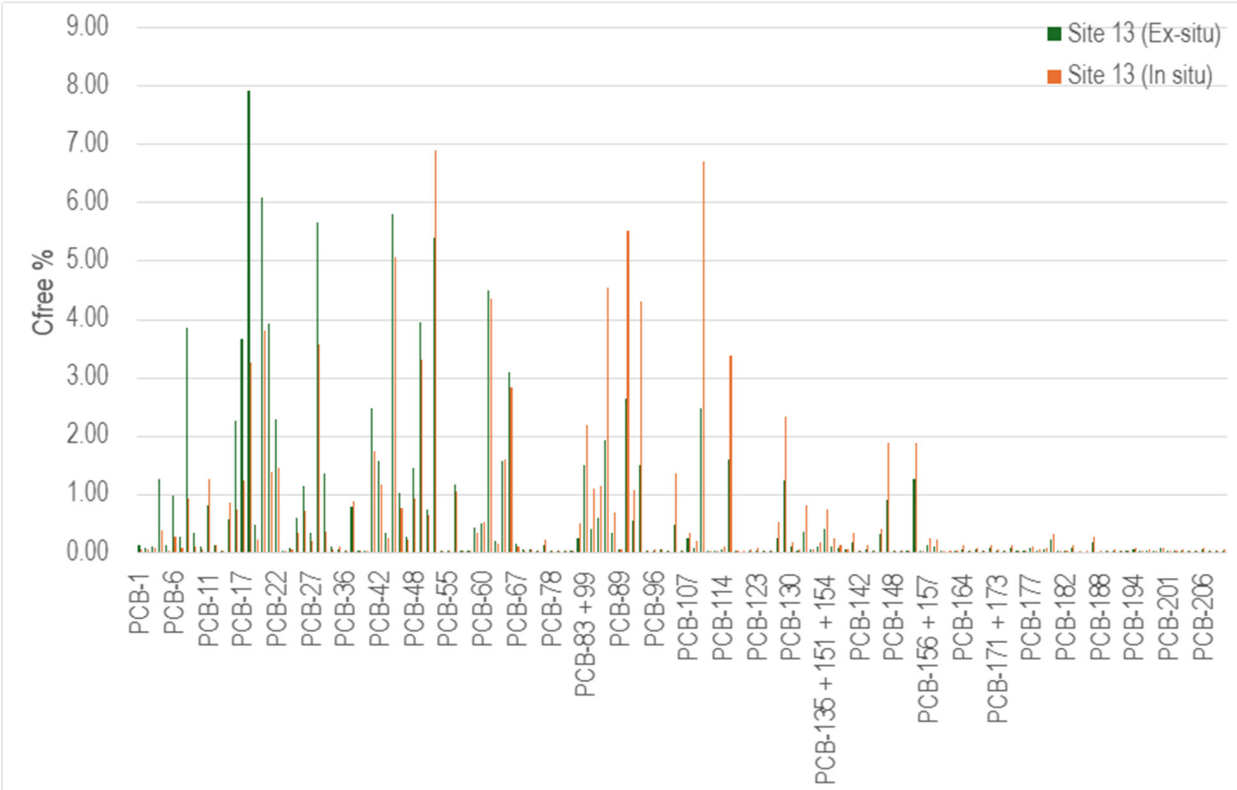

FIGURE 13. RELATIVE PERCENT ABUNDANCE OF PCB CONGENERS FOR IN-SITU AND EX-SITU LDPE AT SITE 13

Figure 15 shows relative percent abundance for site 7. At Site 7, we see the congener profiles follow similar trends for both in-situ and ex-situ, with PCB- 110-115 (7.38 for in-situ, 7.98 for ex-situ) having the highest recovery concentrations. The ex-situ samples generally show higher concentrations of PCB congeners than in-situ at site 7.

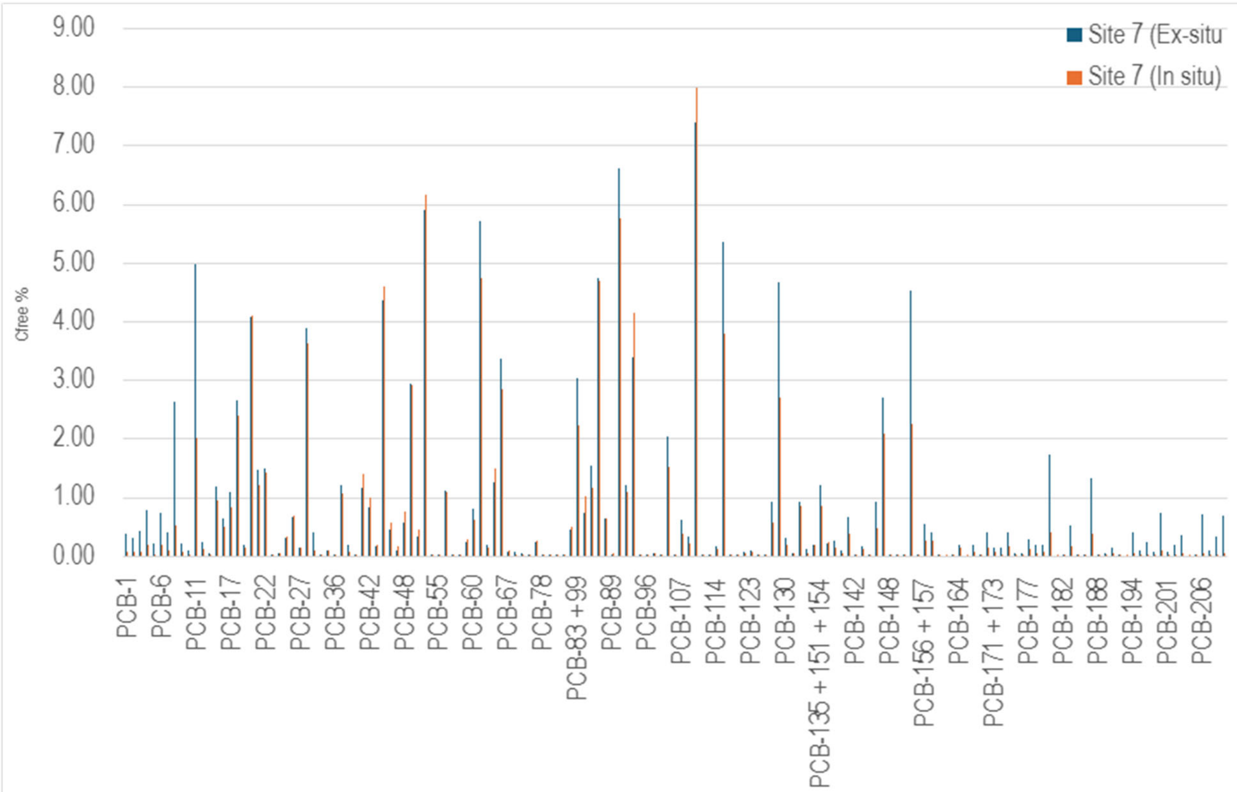

FIGURE 14. RELATIVE PERCENT ABUNDANCE OF PCB CONGENERS FOR IN-SITU AND EX-SITU LDPE AT SITE 7

Discussion

PCBs in Sediments and Porewaters

The main goal of this investigation was to determine if sediments in the Confluence area of the Wenatchee River and Columbia River contain legacy deposits of PCBs that are impacting the Lower Wenatchee food web. Based on the results of the bulk sediments collected during this study, there are measurable PCBs throughout the Confluence area in the back channels of the Horan Natural Area, adjacent to the Confluence State Park. The two highest concentrations (Site 9 and 13) of PCBs in the sediments and porewaters were found on either side of the mainstem Wenatchee River with similar congener distributions (Figure A-9 and 10). Evidence of debris in the river bank from historic activities in the area of Site 13 (Figure 16) coincided with the highest concentrations measured in the sediments (Figure A-10). Several groundwater seeps were observed in the area of Site 13 and 14 near the debris. These groundwater inputs could be acting as a pathway for PCBs from a contaminated area and should be sampled in future investigations.

FIGURE 15. DEBRIS IN THE RIVER BANK NEAR SITE 13

Concentrations of PCBs in samples collected from the mainstem Columbia River, upriver of the confluence area (Site 1, 2 and 10), had a mean (± 95% confidence interval) total PCB concentration of 295 ± 232 pg/g. It's possible that this represents a background concentration of PCBs in Columbia River sediment and could be used to screen hot spots or PCB concentrations that might be investigated further. The majority of the remaining sample sites (10 of 12) are above the upper confidence interval of the upriver ambient concentration.

The concentrations of total PCBs in the sediments did not exceed the state sediment management standards for direct ecological impacts to the sediment benthic communities. However, measurable PCBs were found in the porewaters, which would be more bioavailable for uptake by invertebrates. The amount of PCBs in the porewaters was directly proportional to the amount in the bulk sediments. Furthermore, the congener distribution of the PCBs in the bulk sediments was near-identical to the porewaters, suggesting no alteration during the diffusion or desorption from the sediments (Figure A-11).

The porewater concentrations measured using the ex-situ LDPE and in-situ LDPE differed substantially. At Site 13, with the highest bulk sediment PCB concentrations, the ex-situ LDPE (1027.2 pg/L and 720.6 pg/L duplicate) concentrations for porewaters were much higher than the in-situ LDPE (337.3 pg/L and 422.2 pg/L duplicate). The results are fairly consistent with the work of Apell and Gschwend (2016) in the Duwamish River in Washington's Puget Sound region, where ex-situ PCB results were roughly two-fold greater than in-situ PCB results. The reason for this seems to be due to irrigation of the sediments by biotic activity or hydrologic (i.e. tidal or groundwater flow), which results in lower in-situ equilibrium concentrations.

At the other location of the in-situ LDPE sampler (Site 7), PCB concentrations in the sediments were much lower than Site 13 and the measured in-situ porewater concentrations (157.2 pg/L) were actually higher than the ex-situ porewater concentrations (107.6 pg/L). This seems to be because some of the lower weight PCB congeners were not detected in the ex-situ sampler when compared to the laboratory blank, whereas they were detected in the in-situ sampler. This could be explored with further sampling but may just reflect the nature of measuring very low concentrations in this media. The sample location had some of the lowest bulk sediment PCB concentrations.

Diffusion of PCBs from the Sediments

In the Apell and Gschwend (2016) study the authors suggest the difference between in-situ and ex-situ porewater PCB measurements was because of bioturbation and bioirrigation of the porewaters; meaning there is some mechanism of flushing the porewaters so that in-situ measurements don't equal the potential amount as measured by the ex-situ method. In the Confluence area of the Wenatchee River there is a considerable amount of daily water level change as a result of the Columbia River dams and it is unknown what this hydrologic variability means for the irrigation of the upper sediments. The grain size analysis of the sediments has shown that the composition is mostly fine to medium grain sands with some silts, which we would expect to have a decent hydraulic conductivity; however, we did not measure bulk density or porosity of the sediments.

In addition, there were several locations along the banks near Site 13 with visible groundwater seeps, suggesting that groundwater upwelling may also impact the equilibrium concentrations of PCBs in porewaters (reviewed in Ghosh et al 2014). The congener profiles for the Site 13 in-situ and ex-situ LDPE samples shows that there is a greater proportion of lighter congeners (di- and tri-chlorobiphenyls) in the ex-situ LDPE samples, supporting a preferential loss of these congeners by processes impacting the in-situ LDPE (i.e. irrigation of the sediments) (Figure A-11). During our field investigations we did not observe an abundant macroinvertebrate community, so bioturbation seems to be less of a likely mechanism.

Both LDPE deployments (in-situ and ex-situ) established that there are measurable and available PCBs in porewaters in the sediments of the Confluence area. The diffusion of porewater PCBs from contaminated sediments to the overlying waters is generally a function of a concentration gradient across the sediment-water interface. Higher PCB concentrations in the porewaters compared with the surface water overlying the sediment suggests a diffusive flux out of the sediments (Apell et al 2018). The in-situ LDPE measurements represent a time-weighted average of the PCB concentrations and do a good job of capturing the PCB concentration gradient. Following the methods in Apell et al (2018), based on Fick's first law, the diffusive flux across the sediment-water boundary can be modeled using:

$$Flux = \frac{D_w}{\delta_{WBL}} \left(PCB_{pw} - PCB_{ow}\right)$$

Where, Dw is the diffusivity of PCBs in water which is estimated using the molar volume of each congener (as per Schwarzenbach et al 2016), δ_{WBL} is the thickness of the water boundary layer (the value presented in Apell et al 2018 of 0.013cm is used), PCB_{pw} is the porewater PCB concentration (pg/L) and PCB_{ow} is the overlying water concentration (pg/L). Based on the in-situ PCB concentrations measured in this study, the flux rate for PCBs across the sediment-water interface at Site 13 is 68.1 ng/m^2/day and 27.4 ng/m^2/day at Site 7. It's noteworthy that Site 7 had some of the lowest concentrations of PCBs in bulk sediments, yet there is still a measurable PCB flux from the sediments. The fluxes measured in this study are comparable with those calculated in the Duwamish River waterway (Apell et al 2016). It's not clear whether the flux of PCBs from the sediments is being driven by the concentration gradient as well as the irrigation of the sediments with changing water levels.

Uptake of PCBs in the Local Food Web

Previous work on PCB sources in the confluence area of the Wenatchee and Columbia has shown that PCBs are bioaccumulating through the river food web, from water to fish (Hobbs and Friese 2016; Hobbs 2018). The estimated PCB concentrations in water using semi-permeable membrane devices (SPMDs) in the previous studies ranged from 652 – 1580 pg/L in 2014/15 and 87 – 310 pg/L in 2016/17. The measured water concentrations during this site investigation were 101 pg/L (Site 13) and 62 pg/L (Site 7). These concentrations were at the lower end of the range measured in previous investigations. It is worth acknowledging that LDPE is an equilibrium sampler, while SPMDs contain a triolein oil that actively accumulates organic compounds and therefore the mass of PCB in an SPMD would be higher if they were side-by-side.

The congener distribution of measured PCBs in various media has remained consistent over time, which has been interpreted as suggesting a continuous PCB source (Hobbs 2018). Comparing the congener distribution of PCBs from the previous work to the sediment-porewater samples from this study, continues to suggest a similar source (Figure A-12). The congener profile found among all the samples resembles the lighter Aroclor mixture 1242 (Figure 15), which was used historically in capacitors (Durfee et al 1976; Rodenburg and Ralston 2017) and as an extender for pesticide use to lengthen the life or effectiveness of the pesticide.

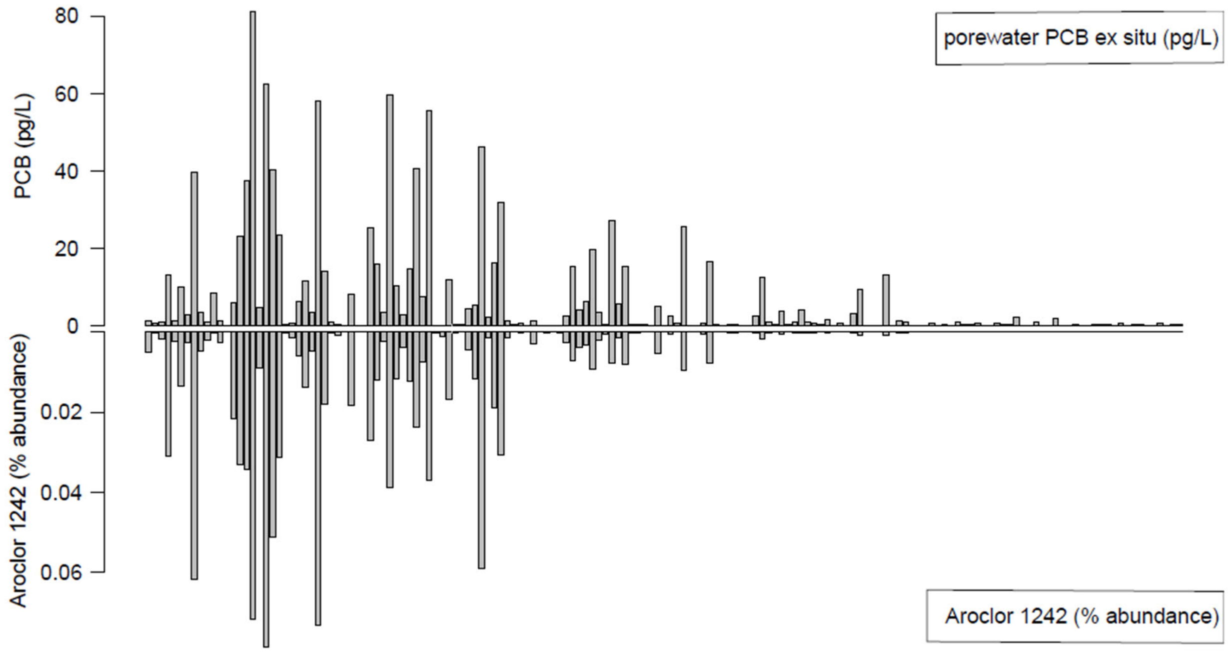

FIGURE 16. COMPARISON OF PCB CONGENER DISTRIBUTIONS IN SEDIMENT POREWATER (SITE 13) AND TECHNICAL MIXTURE AROCLOR 1242

Based on the similarity of the congener profiles among the sediment, porewaters and past passive water sampling data it appears that the backwater or side channel sediments contain sufficient PCB burdens to act as a source. It is not clear whether the contamination source is confined, perhaps in the vicinity of Site 13, and being dispersed throughout a broader area. The uptake of PCBs from water to biofilm or the river primary producers to benthic invertebrates appears to result in the loss or metabolism of some of the lower chlorinated congeners (Figure A-11).

Conclusions

We conducted a detailed sediment survey of the backwaters and side channels of the Wenatchee River confluence area with the Columbia River. Results of this 2023 study support the following conclusions:

- Measurable PCBs are present in the sediments throughout the Confluence area. An upriver ambient PCB concentration of 295 ± 232 pg/g can be used as a study area background to guide hot spot detection. Ten of the remaining 12 samples in the confluence area are above the upper confidence limit of the study area background.
- The highest PCB concentration measured in the sediments was at Site 13 (11.3 ng/g or 11,301 pg/g), where there was evidence of debris in the river bank from historic activities. PCB concentrations were not above the State of Washington Sediment Management Standards screening level of 2500 ng/g.
- Ex-situ low-density polyethylene samples were used to establish estimated PCB concentrations in porewater. There was a strong ($r^2 = 0.92$) linear relationship between porewater concentrations and bulk sediments normalized for organic carbon content.
- In-situ low-density polyethylene samples at two sample sites demonstrated a flux of dissolved PCBs from the sediments into the overlying water. At the site with the highest PCB concentrations in sediment (Site 13), the flux rate was 68.1 ng PCB/m^2/day.
- The PCB congener pattern of the porewaters resembled the technical mixture Aroclor 1242, which was used in electrical capacitors and possibly mixed with pesticides during application as an extender.
- The porewater PCB congener pattern was similar to the pattern described in previous investigations (2015-2017) of the water (dissolved-phase SPMDs), biofilm and macroinvertebrate tissues. It is therefore possible that the sediments in some of the confluence backwater areas are acting as a PCB source to the lower Wenatchee/Columbia food web.

Recommendations

The results of this 2023 study support the following recommendations:

- Further delineation of PCBs in the sediments near Site 13 (south of the Wenatchee River mainstem in the Horan Natural Area) is warranted based on the visible debris and high PCB concentrations. This could include:
    - Additional in-situ LDPE samples
    - Further bulk sediment samples
    - Sampling of groundwater seeps for PCB concentrations and congener patterns
    - Analysis of some of the debris (e.g. brick) for Aroclor 1242.
- An understanding of the hydrology in the backwater area, including groundwater seeps and inputs, would be helpful for further investigations.

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Glossary, Acronyms, and Abbreviations

Glossary

Bioaccumulation: the process in which a chemical substance is absorbed in an organism by all routes of exposure as occurs in the natural environment (i.e. dietary and ambient environmental sources). Expressed as a bioaccumulation factor (BAF); the ratio of the chemical concentration in an organism to the dissolved and bioavailable concentration in the water phase.

Bioconcentration: the process by which a chemical substance is absorbed by an organism from the ambient environment only through its respiratory and dermal surfaces (i.e. chemical exposure through diet is not included). Expressed as a bioconcentration factor (BCF); in upper trophic level organisms (i.e. fish), BCFs can only be calculated in the lab where dietary intake is not included.

Biofilm: growth of benthic algae and microbial biomass and the collection of detrital organics and inorganics on river substrates.

Clean Water Act: A federal act passed in 1972 that contains provisions to restore and maintain the quality of the nation's waters. Section 303(d) of the Clean Water Act establishes the TMDL program.

Congener: similar chemical compounds related to each other by origin, structure and function, but having slightly different composition. PCB congeners all have 2 biphenyl (benzene) rings with 1 to 10 chlorine atoms; however, the chlorine and benzene rings are in different positions yielding a total of 209 possible congeners. Congeners are sometimes referred to as isomers.

Parameter: Water quality constituent being measured (analyte). A physical, chemical, or biological property whose values determine environmental characteristics or behavior.

Pollution: Contamination or other alteration of the physical, chemical, or biological properties of any waters of the state. This includes change in temperature, taste, color, turbidity, or odor of the waters. It also includes discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state. This definition assumes that these changes will,
or are likely to, create a nuisance or render such waters harmful, detrimental, or injurious to
(1) public health, safety, or welfare; (2) domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses; or (3) livestock, wild animals, birds, fish, or other aquatic life.

Stormwater: The portion of precipitation that does not naturally percolate into the ground or evaporate but instead runs off roads, pavement, and roofs during rainfall or snow melt. Stormwater can also come from hard or saturated grass surfaces such as lawns, pastures, playfields, and from gravel roads and parking lots.

Watershed: A drainage area or basin in which all land and water areas drain or flow toward a central collector, such as a stream, river, or lake at a lower elevation.

303(d) list: Section 303(d) of the federal Clean Water Act requires Washington State to periodically prepare a list of all surface waters in the state for which beneficial uses of the water – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These are water quality limited estuaries, lakes, and streams that fall short of state surface water quality standards and are not expected to improve within the next two years.

Acronyms and Abbreviations

Ecology	Washington State Department of Ecology
EIM	Environmental Information Management database
EPA	U.S. Environmental Protection Agency
LDPE	low-density polyethylene

MEL	Manchester Environmental Laboratory
MQO	Measurement Quality Objectives
PE	polyethylene
PCB	polychlorinated biphenyl
RPD	relative percent difference
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WRIA	Water Resource Inventory Area

Units of Measurement

°C	degrees centigrade
dw	dry weight
ft	feet
g	gram, a unit of mass
kg	kilograms, a unit of mass equal to 1,000 grams
m	meter
mm	millimeters
ng/g	nanograms per gram (parts per billion)
pg/g	picograms per gram (parts per trillion)
pg/L	picograms per liter (parts per quadrillion)
µg/g	micrograms per gram (parts per million)
µm	micrometer

Appendix A. Supporting Figures

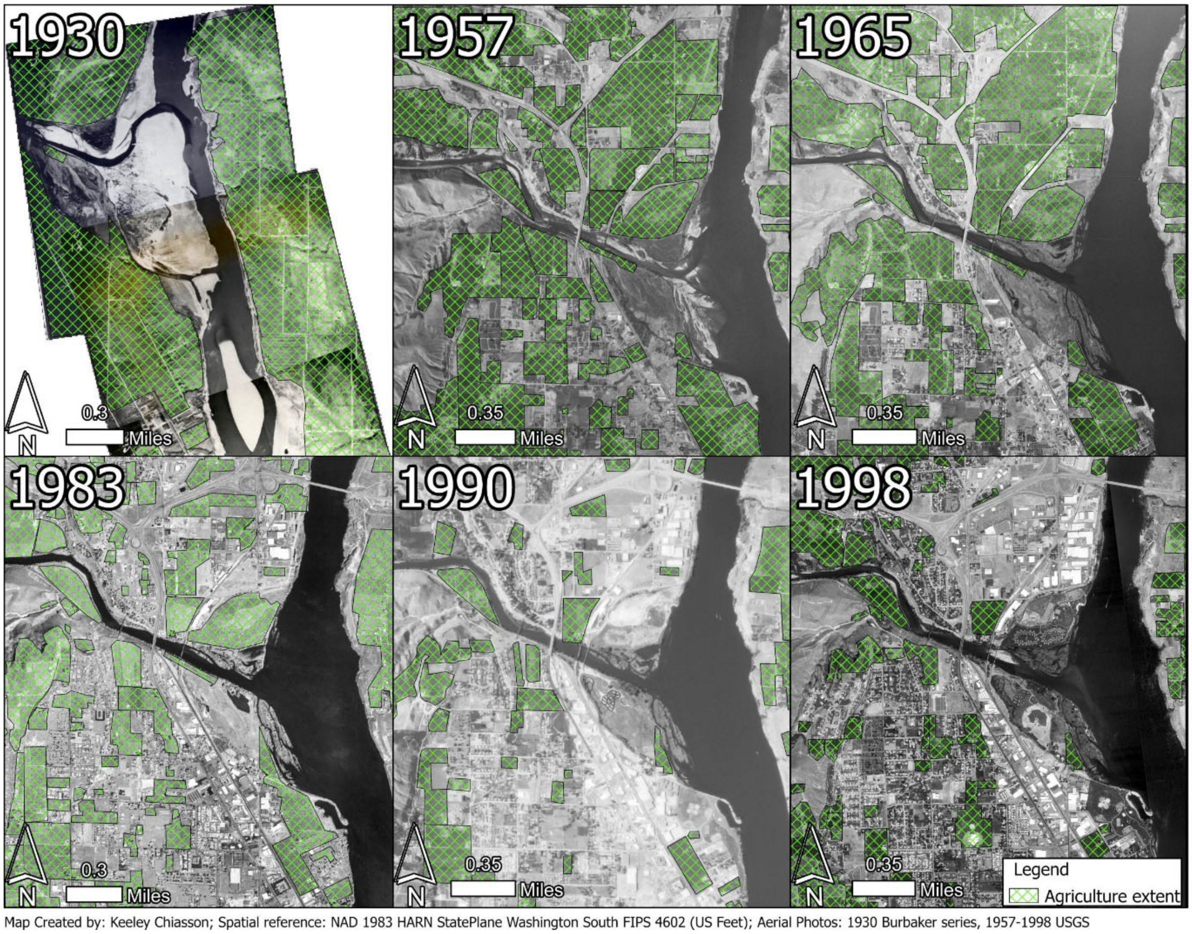

FIGURE A- 1. HISTORY OF LAND USE CHANGES SURROUNDING THE LOWER WENATCHEE RIVER WITH EMPHASIS ON HOW AGRICULTURAL AREAS HAVE CHANGED FROM 1930 TO 1998. HISTORIC AERIAL PHOTOS ALSO SHOW HOW THE RIVER MORPHOLOGY HAS CHANGED AT THE MOUTH OF THE WENATCHEE RIVER.

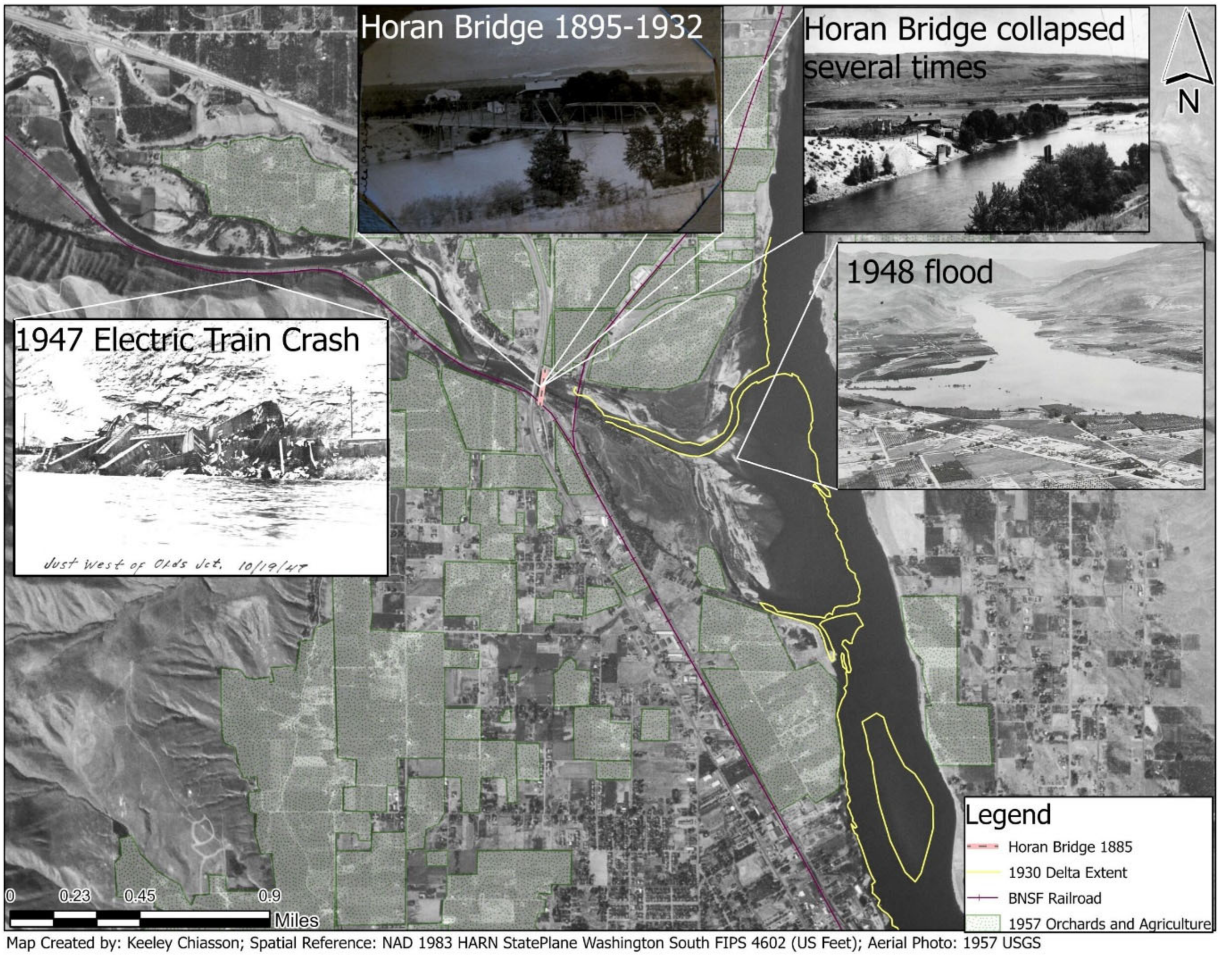

Figure A- 2. Overview of historic events that occurred in the lower Wenatchee River from the late 1800's to 1948 and includes an outline of Wenatchee River delta for reference.

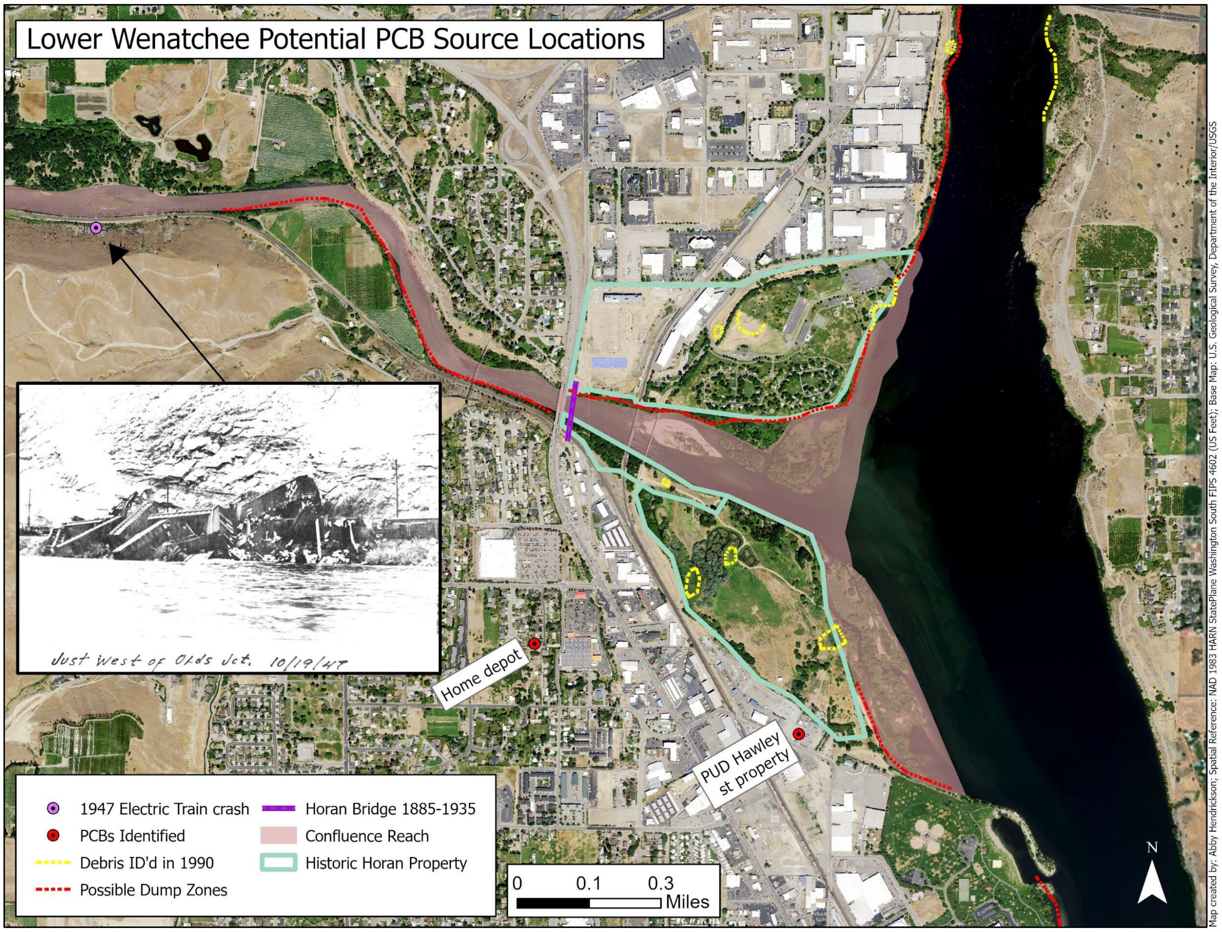

FIGURE A- 3. MAP OF THE CONFLUENCE REACH STUDY AREA HIGHLIGHTING THE HISTORIC HORAN FAMILY FARMS PROPERTY LINE, 1947 TRAIN CRASH, DEBRIS ID'D IN THE CCPUD DESIGN MAPS FOR CONFLUENCE STATE PARK, HYPOTHESIZED POSSIBLE RIVER DUMPING AREAS, AND CONFIRMED PCB CLEANUP SITES.

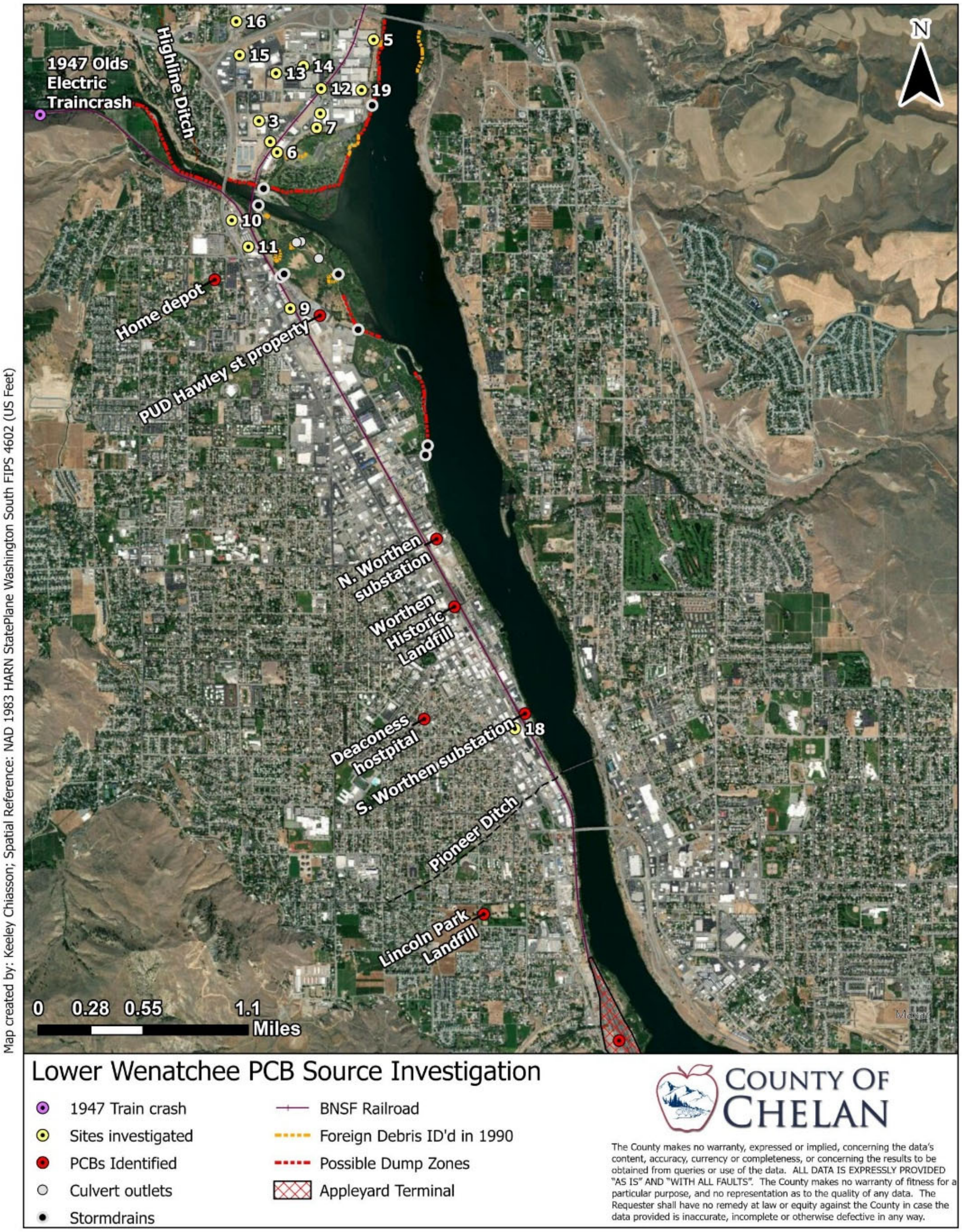

FIGURE A- 4. MAP OF WENATCHEE THAT HIGHLIGHTS ALL AREAS INVESTIGATED WITH A FOCUS ON SITES WHERE PCBS HAVE BEEN IDENTIFIED.

FIGURE A- 5. HIGHLIGHTS STORM DRAINS THAT OUTFLOWED INTO THE HORAN NATURAL AREA UNTIL 2012. *(VIEW WITH FIGURE A-4 TO SEE WHERE PIONEER STORM DRAIN STARTS)*

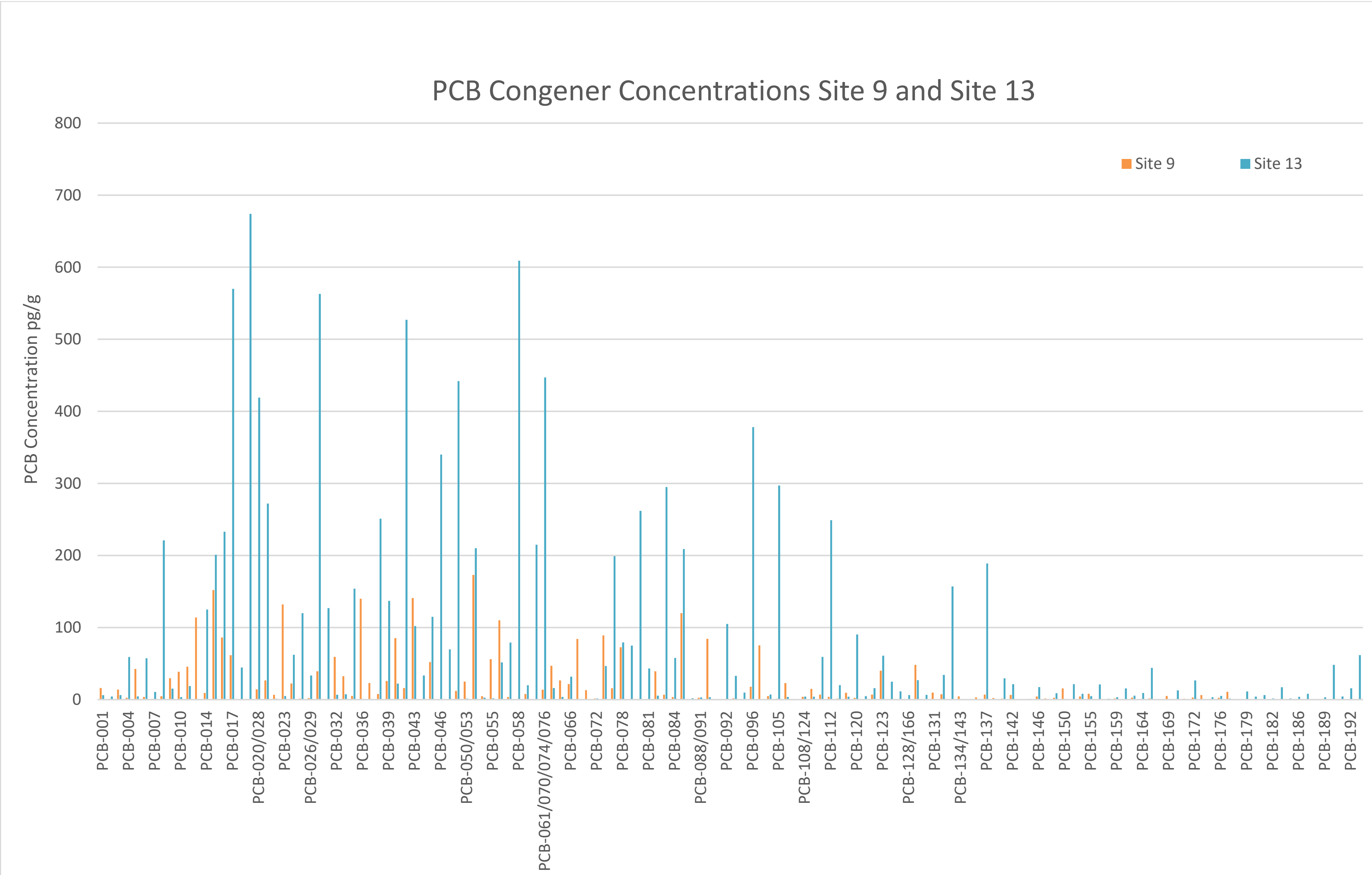

FIGURE A- 6. EX-SITU PCB CONGENER CONCENTRATIONS AT SITES 9 AND 13.

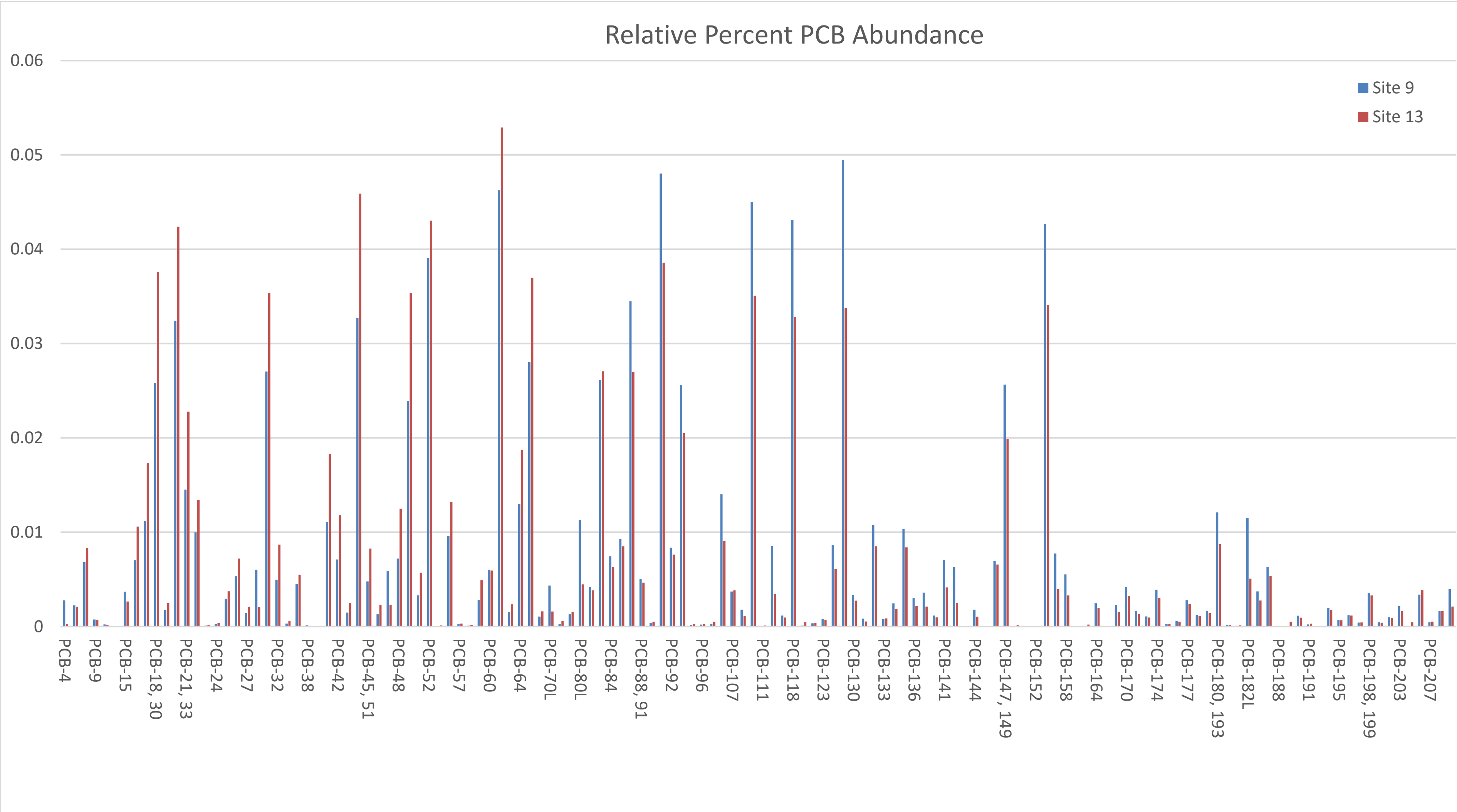

FIGURE A- 7. RELATIVE ABUNDANCE OF PCB CONGENERS FOR SITES 9 AND 13

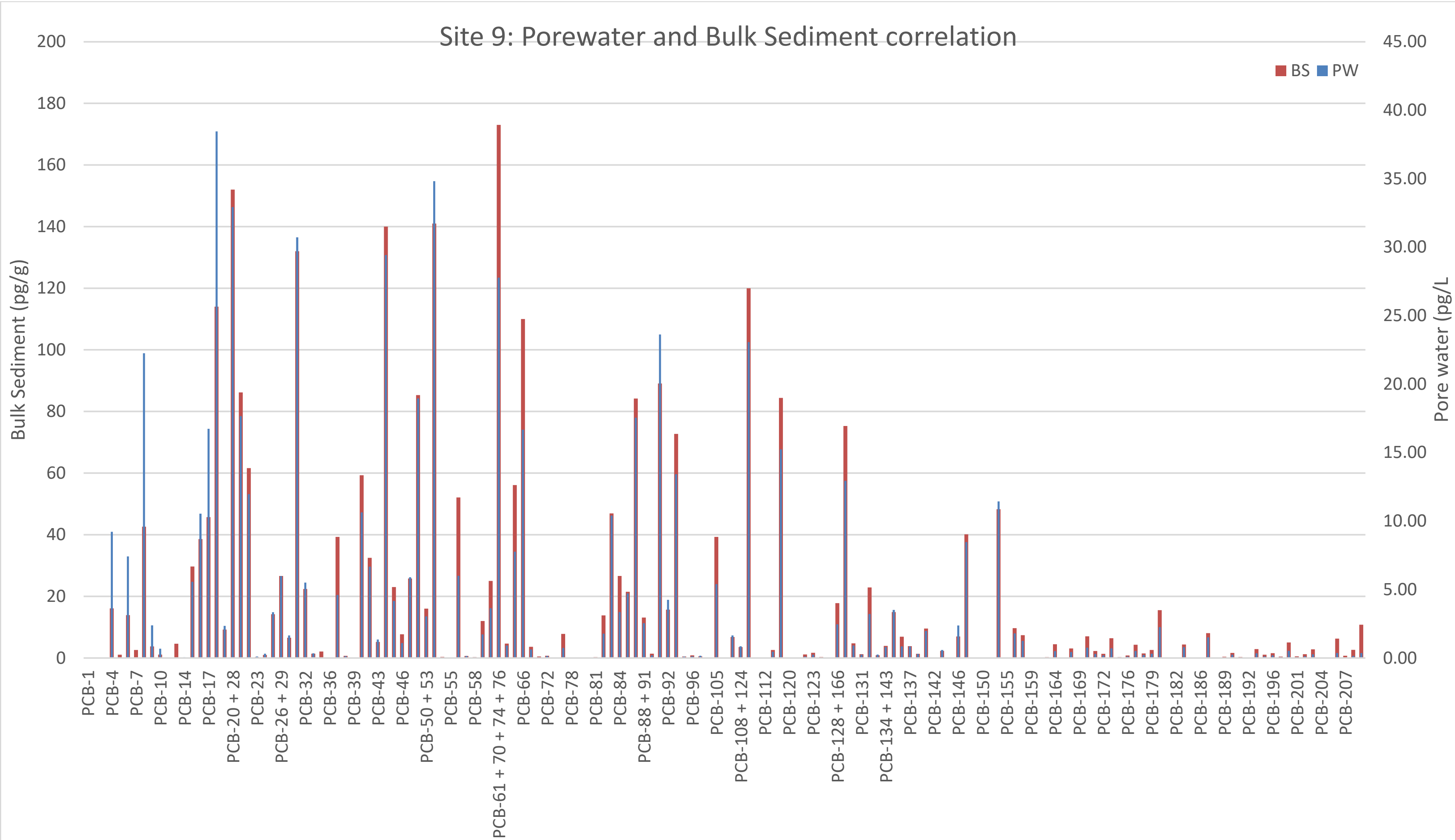

FIGURE A- 8. BULK SEDIMENT AND POREWATER PCB CONGENER DATA FOR SITE 9. BS = BULK SEDIMENT; PW = POREWATER

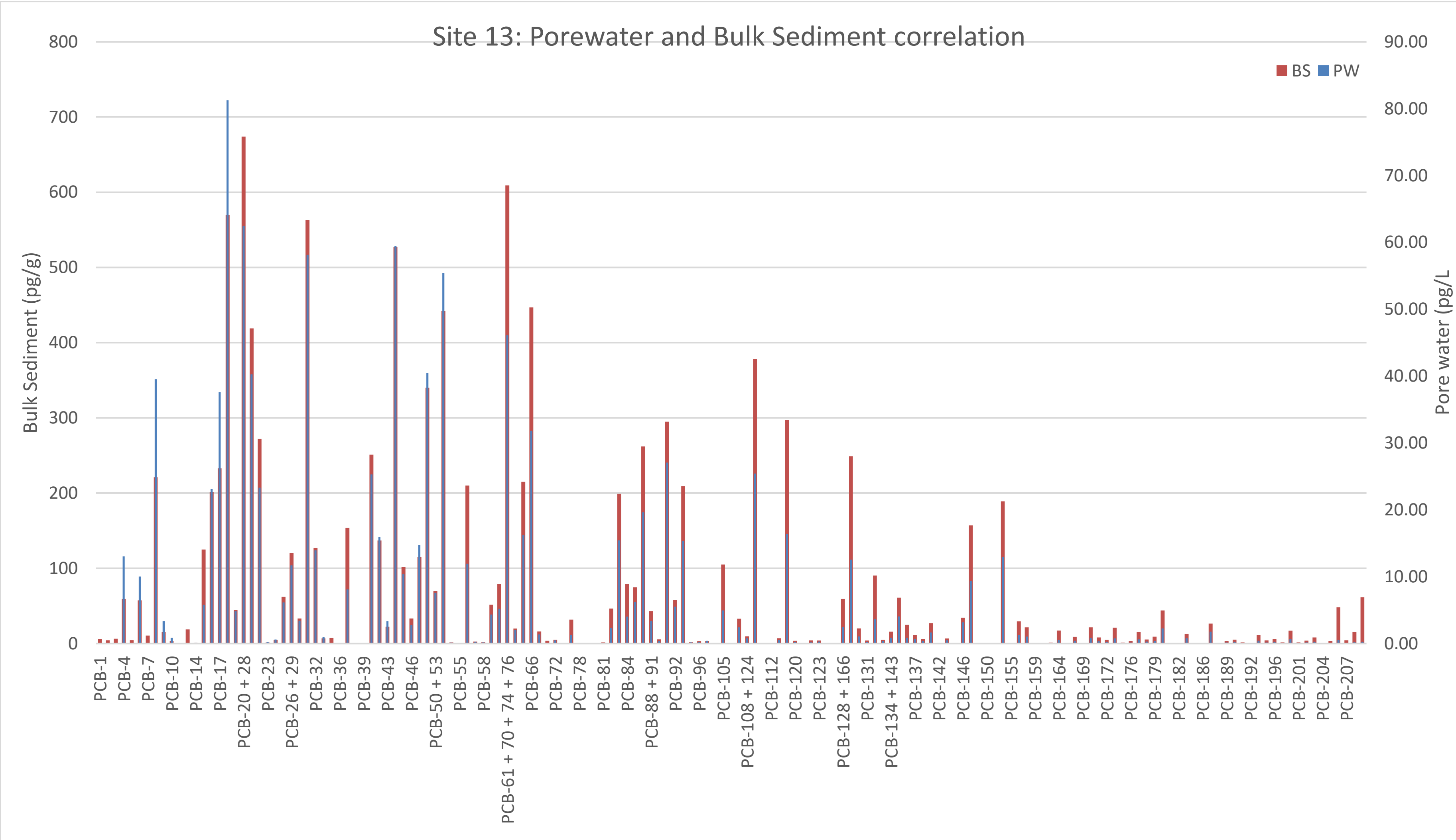

FIGURE A- 9. BULK SEDIMENT AND POREWATER PCB CONGENER DATA FOR SITE 13. BS = BULK SEDIMENT; PW = POREWATER

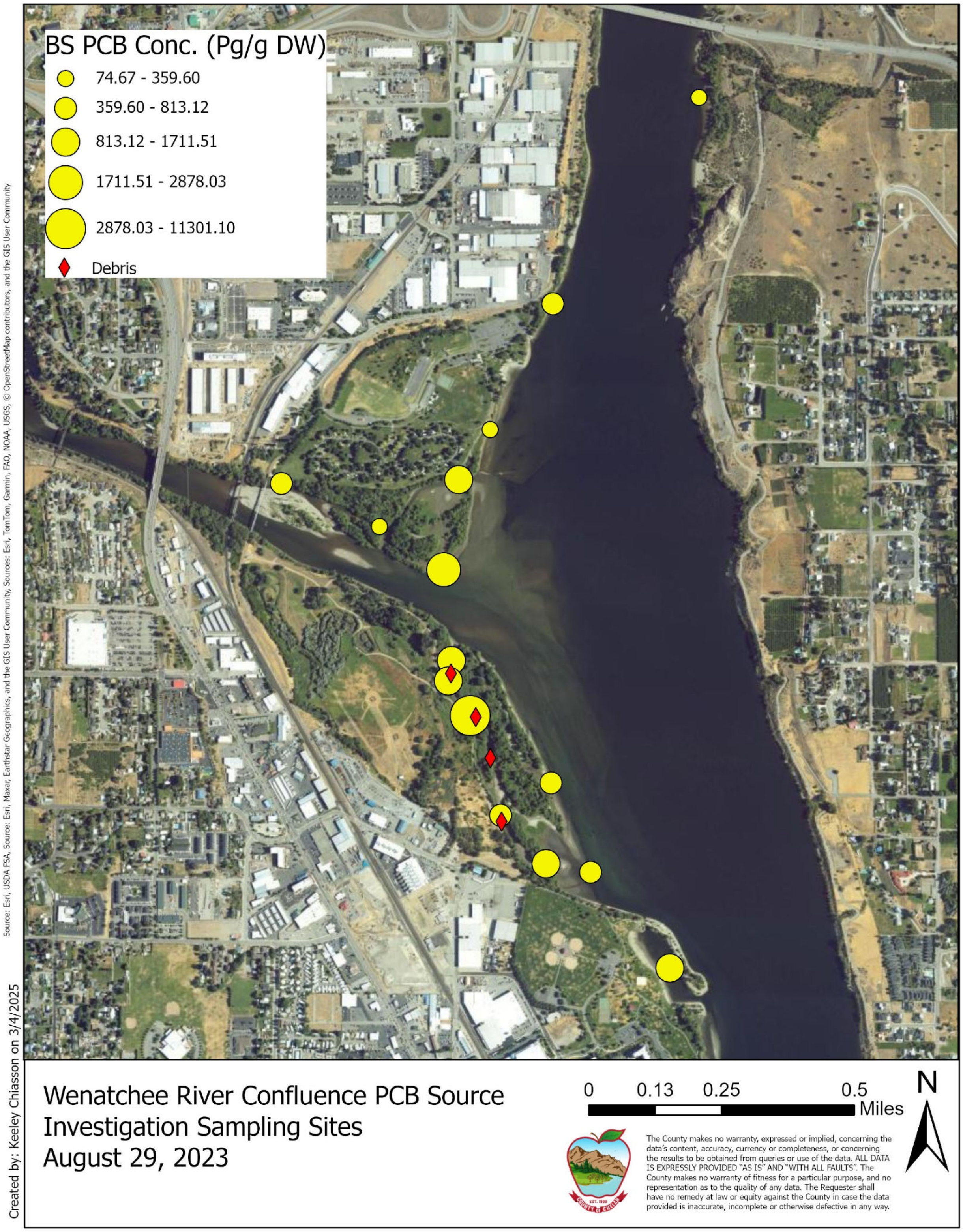

FIGURE A- 10. FIGURE HIGHLIGHTS BULK SEDIMENT PCB CONCENTRATIONS AND AREAS WHERE DEBRIS WAS IDENTIFIED IN THE WATER

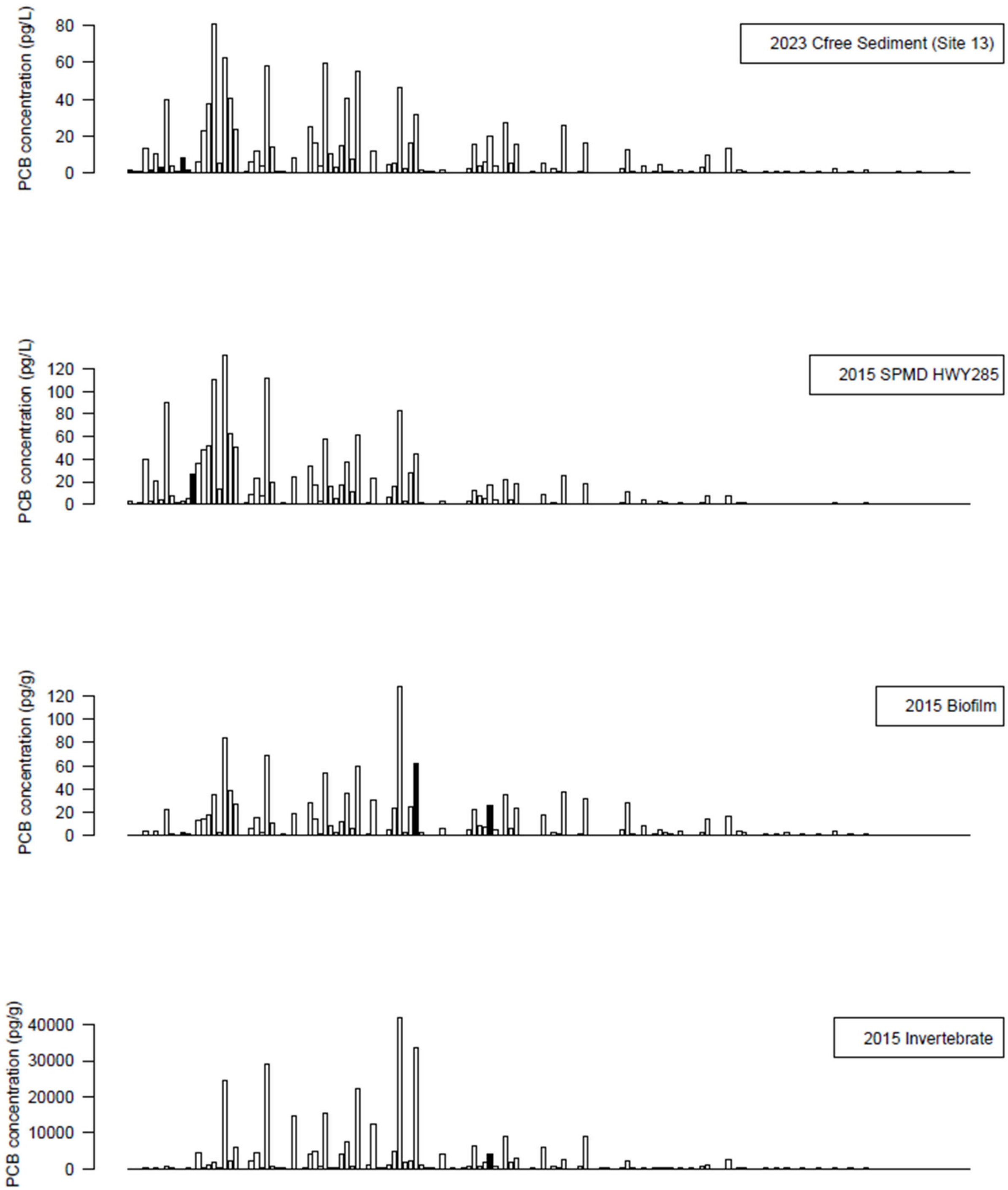

FIGURE A- 11. PCB CONGENER DISTRIBUTION FOR THE SEDIMENT POREWATERS (2023), SPMD, BIOFILM, AND INVERTEBRATE SAMPLES (2015)

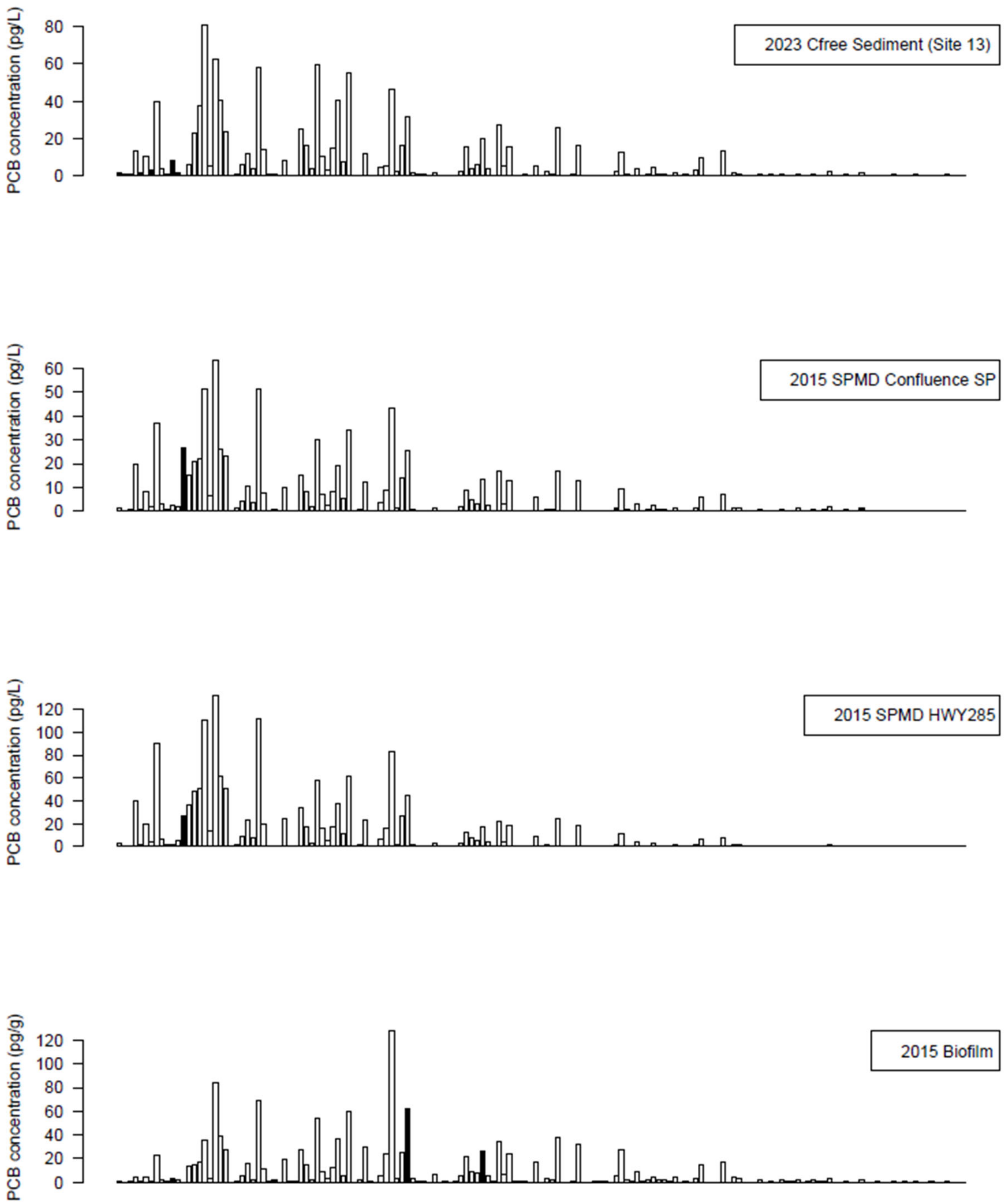

FIGURE A- 12 PCB CONGENER DISTRIBUTION FOR THE SEDIMENT POREWATERS (2023) AND WATER/BIOFILMS (2015)

Appendix B. Supplementary Data Tables

TABLE B- 2. DESCRIPTION OF EACH SAMPLING SITE

Site ID	Description	Latitude	Longitude
1	mainstem Columbia River (LB)	47.46896163	-120.3148604
2	Mainstem Columbia River (RB) north boundary CSP	47.463347	-120.320739
3	Walla Walla Point Park, (RB) river behind sandbar	47.445248	-120.316114
4	mainstem Columbia River (RB) southern end backwater channels near Horan Natural area	47.447875	-120.319289
5	mainstem Columbia River (RB) ~mid backwater channels near Horan Natural area	47.45031	-120.32086
6	backwater channels in confluence nearest to Columbia River mainstem	47.458573	-120.324552
7	backwater channels in confluence off mainstem of Wenatchee River Mid system	47.457298	-120.32774
8	backwater channels in confluence off mainstem of Wenatchee River Furthest west near boundary to Confluence State Park	47.458476	-120.331672
9	outside of backwater channels at confluence of Wenatchee and Columbia River	47.456121	-120.325151
10	mainstem Columbia River RB just north of backwater channels	47.45993	-120.323271
11	Horan Natural area backwater channels close to land south edge of park	47.44943	-120.322889
12	Horan Natural area backwater channels south edge of park at start of channel	47.448103	-120.321079
13	Horan Natural area backwater channels north-mid channel system, close to park boundary	47.452147	-120.324112
14	Horan Natural area backwater channels north channel system, close to park boundary	47.453065	-120.324989
15	Horan Natural area backwater channels northern most channel system, close to park boundary	47.453608	-120.324856

TABLE B- 1 GRAIN SIZE COMPOSITION FOR BULK SEDIMENT SAMPLES

Values represent the % fraction; Total AR (as received) is the mass of the sample in grams; the total dry (%) is the sum of the measured fractions.

Site Totals			Grainsize (%)							
Site name	**Total (AR)**	**Total Dry (%)**	**Gravel**	**Sand, Very Coarse**	**Sand, Coarse**	**Sand, Medium**	**Sand, Fine**	**Sand, Very Fine**	**Silt**	**Clay**
Site 1	69.9	100.97	0	0.14	0.38	39.04	49.58	6.51	4.98	0.34
Site 2	66.3	97.38	0	0.16	0.19	3.18	46.93	28.11	18.22	0.59
Site 3	58	98.69	0.22	0.33	0.44	3.54	45.38	33.01	15.77	0
Site 4	63.3	96.13	0.07	0.11	0.25	3.3	59.69	22.67	9.53	0.51
Site 5	65.4	102.59	0.17	0.14	1.38	19.07	66.04	11.43	3.71	0.65
Site 6	54.1	93.54	0.68	0.44	0.9	1.25	8.98	23.57	55.45	2.27
Site 7	64.5	96.42	0.04	0.17	1.39	26.83	40.27	16.35	10.36	1.01
Site 8	63.1	108.46	0	0.06	0.14	3.83	44.9	26.88	29.89	2.76
Site 9	57.9	103.21	0.19	0.43	3.21	24.06	31.98	23.21	18.76	1.37
Site 10	63.8	94.64	0	0.09	0.28	7.12	36.35	16.66	33	1.14
Site 11	63.7	99.36	0	0.13	1	7.23	45.72	31.83	12.24	1.21
Site 12	60.9	95.83	3.05	0.15	1.83	15.87	44.08	6.06	23.94	0.85
Site 13	46.1	91.23	0	0.36	0.54	1.57	11.21	33.59	40.76	3.2
Site 14	55.7	90.12	0	0.18	0.75	4.86	32.58	11.97	39.14	0.64
Site 15	54.5	102.51	0	0.14	1.03	12.76	40.47	29.08	17.24	1.79

TABLE B- 3. PCB CONCENTRATION SUMMARY TABLE SHOWING EX-SITU SAMPLER DATA AND PORE WATER (CFREE) DATA, SITE 1-4.

PCB Congener	**Site 1**			**Site 2**			**Site 3**			**Site 4**		
	Conc. pg/g PE	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**	
PCB-1	33.1	0.66	UJ	17.1	0.32	UJ	23.6	0.40	UJ	48.3	0.84	UJ
PCB-2	39.9	0.80	UJ	27.9	0.52	UJ	15.9	0.26	UJ	42.7	0.74	UJ
PCB-3	41	0.83	UJ	27.1	0.51	UJ	23.3	0.39	UJ	48	0.83	UJ
PCB-4	38.5	0.78	UJ	19.6	0.37	UJ	193	3.18	UJ	232	3.99	UJ
PCB-5	32.7	0.66	UJ	5.33	0.10	UJ	14.6	0.24	UJ	29.5	0.51	UJ
PCB-6	40.1	0.81	UJ	27.2	0.51	UJ	170	2.77	UJ	182	3.13	UJ
PCB-7	22.4	0.46	UJ	24.3	0.45	UJ	58	0.94	UJ	67.5	1.16	UJ
PCB-8	117	2.38	UJ	78.8	1.46	UJ	583	9.40	UJ	725	12.42	UJ
PCB-9	11	0.22	UJ	5.75	0.11	UJ	56.5	0.91	UJ	66.4	1.14	UJ
PCB-10	3.92	0.08	UJ	3.62	0.07	UJ	14.9	0.24	J	18.1	0.31	J
PCB-11	1000	16.04	UJ	521	7.49	UJ	296	3.67	UJ	1110	14.80	UJ
PCB-12 + 13	26.2	0.33	UJ	28.3	0.32	UJ	58.1	0.56	UJ	45.5	0.47	UJ
PCB-14	3.92	0.04	UJ	6.03	0.05	NJ	6.34	0.05	NJ	6.91	0.06	NJ
PCB-15	66.9	0.66	UJ	95.1	0.83	UJ	349	2.60		322	2.61	
PCB-16	45	0.45	UJ	51.2	0.45	UJ	301	2.23		392	3.18	
PCB-17	49.6	0.49	UJ	77.1	0.67	UJ	500	3.69		589	4.77	
PCB-18 + 30	136	1.36	UJ	186	1.62	UJ	1200	8.81		1430	11.58	
PCB-19	10.1	0.09	UJ	9.78	0.08	UJ	79.6	0.53	J	97.2	0.71	J
PCB-20 + 28	188	1.30	UJ	382	2.29	UJ	2310	11.57		2040	11.37	
PCB-21 + 33	95.2	0.80	UJ	141	1.01	UJ	725	4.35		788	5.29	

PCB Congener	Site 1			Site 2			Site 3			Site 4		
PCB-22	58.4	0.49	UJ	111	0.79	UJ	652	3.85		658	4.36	
PCB-23	3.92	0.03	UJ	3.62	0.03	UJ	2.68	0.02	UJ	3.63	0.02	UJ
PCB-24	3.92	0.03	UJ	3.62	0.03	UJ	15.1	0.09	J	18.3	0.12	J
PCB-25	13.4	0.11	UJ	31.5	0.22	UJ	238	1.34		175	1.12	J
PCB-26 + 29	32.6	0.26	UJ	55.9	0.38	UJ	356	1.97		355	2.24	
PCB-27	8.56	0.07	UJ	10.1	0.07	UJ	73.2	0.41	J	87.8	0.56	J
PCB-31	166	1.38	UJ	286	1.97	UJ	1710	9.56		1730	11.17	
PCB-32	28.7	0.24	UJ	39.1	0.26	UJ	235	1.29		302	1.92	
PCB-34	3.92	0.03	UJ	3.62	0.02	UJ	11.9	0.06	NJ	10.4	0.06	J
PCB-35	19.6	0.16	UJ	5.49	0.04	UJ	22.8	0.12	UJ	41.3	0.25	UJ
PCB-36	5.95	0.05	UJ	3.62	0.02	UJ	2.68	0.01	UJ	3.63	0.02	UJ
PCB-37	39.1	0.31	UJ	91.3	0.58	UJ	392	1.97		403	2.39	
PCB-38	15.3	0.12	J	15.3	0.10	J	35.2	0.17	J	30.8	0.18	J
PCB-39	4.92	0.04	UJ	3.62	0.02	UJ	2.68	0.01	UJ	3.63	0.02	UJ
PCB-40 + 41 + 71	84.2	0.64	UJ	181	1.09	UJ	635	2.99		608	3.44	
PCB-42	48.5	0.36	UJ	128	0.75	J	440	2.03		392	2.18	
PCB-43	6.61	0.05	J	22.8	0.13	J	74.3	0.34	J	66.1	0.36	J
PCB-44 + 47 + 65	478	3.52	UJ	778	4.43	UJ	2120	9.37	UJ	1990	10.72	UJ
PCB-45 + 51	55.9	0.39	UJ	69.6	0.38	UJ	236	1.01	UJ	263	1.37	UJ
PCB-46	9.69	0.07	UJ	16.5	0.09	UJ	60.1	0.25	J	64.3	0.32	J
PCB-48	37.5	0.24	UJ	91.5	0.47	UJ	356	1.43		346	1.67	

PCB Congener	Site 1			Site 2			Site 3			Site 4		
PCB-49 + 69	228	1.41	UJ	592	2.92		1630	6.34		1420	6.62	
PCB-50 + 53	22.4	0.16	UJ	51	0.29	UJ	168	0.76		170	0.92	J
PCB-52	469	3.20	UJ	1060	5.81		2430	10.62		2160	11.22	
PCB-54	3.92	0.02	UJ	3.62	0.02	UJ	4.16	0.02	NUJ	5.59	0.03	NUJ
PCB-55	3.92	0.02	UJ	3.62	0.01	UJ	2.68	0.01	UJ	3.63	0.01	UJ
PCB-56	86.3	0.40	UJ	212	0.80		683	2.09		677	2.44	
PCB-57	3.92	0.02	UJ	3.62	0.01	UJ	17	0.05	J	13.5	0.05	J
PCB-58	3.92	0.02	UJ	3.62	0.01	UJ	5.61	0.02	J	3.63	0.01	UJ
PCB-59 + 62 + 75	26.8	0.12	J	57	0.21	J	193	0.58		166	0.58	J
PCB-60	56.3	0.24	UJ	136	0.49	J	455	1.35		405	1.39	
PCB-61 + 70 + 74 + 76	551	2.34	UJ	1240	4.42		3770	11.09		3090	10.47	
PCB-63	24.2	0.10	J	40.6	0.15	J	115	0.34	J	99.8	0.34	J
PCB-64	140	0.60	UJ	293	1.05		896	2.62		777	2.65	
PCB-66	308	1.32		758	2.73		2500	7.30		1910	6.55	
PCB-67	7.07	0.03	UJ	15.8	0.06	J	70.6	0.20	J	63.8	0.22	J
PCB-68	31.8	0.14	UJ	23.3	0.08	UJ	21.3	0.06	UJ	40.7	0.14	UJ
PCB-72	3.65	0.02	UJ	18	0.06	J	22.9	0.06	J	20.4	0.07	J
PCB-73	3.92	0.02	UJ	3.62	0.01	UJ	2.68	0.01	UJ	3.63	0.01	UJ
PCB-77	15.7	0.07	UJ	52	0.18	UJ	139	0.39		123	0.42	J
PCB-78	3.92	0.02	UJ	4.4	0.02	UJ	2.88	0.01	UJ	3.63	0.01	UJ
PCB-79	4.97	0.02	UJ	4.96	0.02	UJ	3.24	0.01	UJ	3.89	0.01	UJ

PCB Congener	Site 1			Site 2			Site 3			Site 4		
PCB-80	3.92	0.01	UJ	4.27	0.01	UJ	2.8	0.01	UJ	3.63	0.01	UJ
PCB-81	8.48	0.03	UJ	5.4	0.02	UJ	7.43	0.02	UJ	6.02	0.02	UJ
PCB-82	83.6	0.28	J	165	0.46	J	338	0.71		296	0.78	
PCB-83 + 99	699	2.20		1350	3.50		2610	5.14		1720	4.25	
PCB-84	136	0.49	J	297	0.87		621	1.38		492	1.38	
PCB-85 + 116 + 117	258	1.06		476	1.58		902	2.27		666	2.12	
PCB-86 + 87 + 97 + 109 + 119 + 125	756	3.13		1520	5.09		2920	7.35		2370	7.59	
PCB-88 + 91	105	0.43	UJ	226	0.75		418	1.04		336	1.07	
PCB-89	6.54	0.03	J	10.2	0.03	J	27.7	0.07	J	25.4	0.08	J
PCB-90 + 101 + 113	1220	5.03		2540	8.31		4090	9.96		3150	9.88	
PCB-92	224	0.96		464	1.57		687	1.73		538	1.75	
PCB-93 + 95 + 98 + 100 + 102	562	2.52		1320	4.64		2100	5.46		1680	5.67	
PCB-94	3.92	0.02	UJ	5.1	0.02	J	13.1	0.04	J	14	0.05	J
PCB-96	4.32	0.02	J	7.62	0.03	J	13.7	0.04	J	13.6	0.05	J
PCB-103	7.88	0.04	J	22.3	0.09	J	22.1	0.06	J	19.5	0.07	J
PCB-104	3.92	0.02	UJ	3.62	0.01	UJ	2.68	0.01	UJ	3.63	0.01	UJ
PCB-105	467	1.62		805	2.12		1310	2.50		1190	3.02	
PCB-106	3.92	0.01	UJ	5.7	0.02	UJ	3.4	0.01	UJ	4.21	0.01	UJ
PCB-107	140	0.57	J	202	0.62		322	0.71		280	0.83	

PCB Congener	Site 1			Site 2			Site 3			Site 4		
PCB-108 + 124	57.7	0.26	J	94.8	0.31	J	152	0.36		140	0.45	J
PCB-110 + 115	1290	6.22		2600	9.26		4070	10.37		3460	11.93	
PCB-111	3.92	0.02	UJ	3.62	0.01	UJ	2.68	0.01	UJ	3.63	0.01	UJ
PCB-112	3.92	0.02	UJ	3.62	0.01	UJ	2.68	0.01	UJ	3.63	0.01	UJ
PCB-114	27.6	0.10	J	62.4	0.17	J	118	0.23	J	95.8	0.25	J
PCB-118	1360	4.50		2480	6.05		4350	7.63		3400	8.07	
PCB-120	7.34	0.02	J	13.3	0.03	J	15.1	0.03	J	10.4	0.02	J
PCB-121	3.92	0.01	UJ	3.62	0.01	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-122	3.92	0.01	UJ	20.5	0.05	J	46.9	0.07	J	41.3	0.09	J
PCB-123	25.4	0.07	UJ	45.8	0.10	J	86.1	0.13	J	64.8	0.13	J
PCB-126	3.92	0.01	UJ	15.6	0.03	UJ	6.99	0.01	UJ	8.29	0.02	UJ
PCB-127	3.92	0.01	UJ	9.02	0.02	UJ	5.38	0.01	UJ	6.66	0.01	UJ
PCB-128 + 166	382	0.98		653	1.25		739	1.04		721	1.35	
PCB-129 + 138 + 160 + 163	2790	6.54		4920	8.64		4410	5.70		3760	6.48	
PCB-130	170	0.41	J	254	0.46		257	0.35		252	0.45	
PCB-131	20.7	0.05	J	39	0.07	J	59.8	0.08	J	45.5	0.09	J
PCB-132	426	1.12		862	1.71		779	1.15		793	1.55	
PCB-133	58.7	0.16	UJ	84.5	0.17	UJ	81.4	0.13	UJ	62.2	0.13	UJ
PCB-134 + 143	74	0.21	J	150	0.32	J	160	0.26		146	0.31	J
PCB-135 + 151 + 154	655	1.93		1350	3.02		784	1.31		708	1.56	
PCB-136	118	0.29	J	289	0.53		213	0.29		203	0.37	

PCB Congener	Site 1			Site 2			Site 3			Site 4		
PCB-137	103	0.21	J	174	0.26	J	293	0.33		253	0.38	
PCB-139 + 140	10.1	0.02	UJ	66.8	0.11	J	99.3	0.12	J	74.2	0.12	J
PCB-141	391	0.93		778	1.41		495	0.68		472	0.85	
PCB-142	4.39	0.01	UJ	3.62	0.01	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-144	73.2	0.21	J	168	0.36	J	121	0.19	J	113	0.24	J
PCB-145	3.92	0.01	UJ	3.62	0.01	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-146	501	1.50		829	1.85		674	1.13		507	1.13	
PCB-147 + 149	1340	3.93		2810	6.10		1930	3.14		1790	3.87	
PCB-148	4.92	0.01	J	21	0.04	J	5.18	0.01	J	5.34	0.01	J
PCB-150	3.92	0.01	UJ	16.9	0.03	J	3.81	0.01	J	4.08	0.01	J
PCB-152	3.97	0.01	UJ	3.62	0.01	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-153 + 168	2960	7.30		5280	9.42		4240	5.61		2950	5.25	
PCB-155	4.77	0.01	UJ	4.07	0.01	UJ	6.76	0.01	UJ	4.45	0.01	UJ
PCB-156 + 157	276	0.60	J	482	0.75		536	0.61		512	0.80	
PCB-158	220	0.47		415	0.63		471	0.52		391	0.59	
PCB-159	4.17	0.01	UJ	3.62	0.01	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-161	3.92	0.01	UJ	3.62	0.01	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-162	15.5	0.03	UJ	10.8	0.02	UJ	18	0.02	UJ	22.1	0.03	UJ
PCB-164	149	0.29	J	260	0.35		178	0.18		187	0.26	
PCB-165	3.92	0.01	UJ	3.62	0.00	UJ	2.68	0.00	UJ	3.63	0.00	UJ
PCB-167	115	0.22	J	198	0.26		218	0.20		185	0.24	
PCB-169	4.01	0.01	UJ	6.78	0.01	UJ	2.68	0.00	UJ	6.42	0.01	UJ

PCB Congener	Site 1			Site 2			Site 3			Site 4		
PCB-170	586	1.07		1130	1.39		393	0.35		375	0.46	
PCB-171 + 173	210	0.39		363	0.45		160	0.14		132	0.16	J
PCB-172	145	0.27	J	286	0.36		98.5	0.09	J	87.1	0.11	J
PCB-174	605	1.16		1180	1.48		283	0.25		326	0.41	
PCB-175	36.8	0.07	J	69.3	0.09	J	29	0.03	J	20.8	0.03	J
PCB-176	71.9	0.14	J	151	0.19	J	41.7	0.04	J	46.9	0.06	J
PCB-177	460	0.93		831	1.07		249	0.23		233	0.30	
PCB-178	206	0.42		378	0.49		153	0.14		103	0.14	J
PCB-179	276	0.58		569	0.74		124	0.11	J	142	0.19	J
PCB-180 + 193	1950	4.14		3980	5.23		1340	1.24		1070	1.43	
PCB-181	4.09	0.01	UJ	3.62	0.00	UJ	11.4	0.01	J	3.63	0.01	UJ
PCB-182	7.89	0.02	J	3.62	0.01	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-183 + 185	515	1.29		1050	1.58		418	0.44		297	0.46	
PCB-184	4.18	0.01	UJ	3.62	0.01	UJ	5.46	0.01	J	3.63	0.01	UJ
PCB-186	3.92	0.01	UJ	3.62	0.01	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-187	1140	3.37		2300	3.97		809	0.96		556	0.98	
PCB-188	4.13	0.01	UJ	13	0.02	J	2.68	0.00	UJ	3.63	0.01	UJ
PCB-189	43.6	0.12	UJ	67.9	0.11	UJ	32.8	0.04	UJ	27.6	0.04	UJ
PCB-190	172	0.46	J	311	0.47		111	0.11	J	94.5	0.14	J
PCB-191	14.7	0.04	J	20.5	0.03	J	24.2	0.02	J	22.2	0.03	J
PCB-192	4.17	0.01	UJ	3.62	0.00	UJ	2.68	0.00	UJ	3.63	0.01	UJ
PCB-194	357	0.85		1020	1.33		189	0.17		178	0.24	J

PCB Congener	Site 1			Site 2			Site 3			Site 4		
PCB-195	139	0.32	J	325	0.40		62.3	0.05	J	61.1	0.08	J
PCB-196	199	0.44		544	0.64		119	0.09	J	107	0.13	J
PCB-197 + 200	70.8	0.15	J	197	0.22		33.8	0.03	UJ	35.4	0.04	UJ
PCB-198 + 199	644	1.35		1760	1.90		338	0.24		335	0.37	
PCB-201	67.9	0.14	J	209	0.21		47.8	0.03	J	39.7	0.04	J
PCB-202	153	0.30	J	472	0.46		123	0.08	J	84.6	0.09	J
PCB-203	366	0.70		1090	1.02		196	0.12		193	0.19	
PCB-204	3.92	0.01	UJ	6.79	0.01	UJ	2.68	0.00	UJ	3.63	0.00	UJ
PCB-205	23.4	0.04	UJ	55.5	0.05	UJ	7.98	0.00	UJ	4.05	0.00	UJ
PCB-206	708	1.23		2260	1.84		249	0.13		490	0.42	
PCB-207	65.8	0.11	J	545	0.42		35.3	0.02	J	46.7	0.04	J
PCB-208	316	0.52		1360	1.01		114	0.05	J	209	0.16	
PCB-209	696	1.11		7770	5.50		255	0.12		524	0.39	
total	**28635.5**	**79.5**		**69521.1**	**135.5**		**71742.2**	**191.1**		**61873.9**	**208.4**	

TABLE B- 4. PCB CONCENTRATION SUMMARY TABLE SHOWING EX-SITU SAMPLER DATA AND PORE WATER (CFREE) DATA CONTINUED, SITE 5-8.

PCB Congener	Site 5			Site 6			Site 7			Site 8		
	Conc. pg/g PE	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**	
PCB-1	34	0.57	UJ	28.4	0.45	UJ	24.4	0.41	UJ	48.4	0.82	UJ
PCB-2	35.8	0.60	UJ	18.3	0.29	UJ	19.1	0.32	UJ	50.4	0.85	UJ
PCB-3	46	0.77	UJ	21	0.33	UJ	27	0.45	UJ	53.3	0.89	UJ
PCB-4	145	2.44	UJ	186	2.91	UJ	51.8	0.85	UJ	176	2.93	UJ

PCB Congener	Site 5			Site 6			Site 7			Site 8		
PCB-5	31.8	0.54	UJ	22.1	0.34	UJ	13.4	0.22	UJ	25.9	0.43	UJ
PCB-6	187	3.15	UJ	119	1.84	UJ	47.9	0.78	UJ	123	2.03	UJ
PCB-7	59.6	1.00	UJ	44.6	0.69	UJ	25.8	0.42	UJ	49.5	0.81	UJ
PCB-8	826	13.91		467	7.14	UJ	174	2.82	UJ	519	8.48	UJ
PCB-9	72.7	1.22	J	42.6	0.65	UJ	14.4	0.23	UJ	40.1	0.65	UJ
PCB-10	10.5	0.18	J	13.7	0.21	J	5.51	0.09	J	14.2	0.23	J
PCB-11	890	11.72	UJ	242	2.85	UJ	427	5.36	UJ	1110	13.98	UJ
PCB-12 + 13	78.1	0.80	UJ	23.1	0.21	UJ	25.6	0.25	UJ	45.4	0.44	UJ
PCB-14	5.88	0.05	NJ	10.3	0.07	NJ	4.96	0.04	NJ	13.8	0.11	NJ
PCB-15	462	3.72		160	1.13	UJ	168	1.27	UJ	315	2.39	
PCB-16	402	3.24		363	2.56		89.4	0.68	UJ	273	2.06	
PCB-17	678	5.47		588	4.12		154	1.16	UJ	410	3.09	
PCB-18 + 30	1600	12.92		1360	9.48		380	2.85	UJ	1020	7.65	
PCB-19	76.6	0.56	J	92.6	0.58	J	27.3	0.19	UJ	79.2	0.54	J
PCB-20 + 28	3470	19.35		1560	7.42		851	4.37		1870	9.58	
PCB-21 + 33	1660	11.16		765	4.36		257	1.59	UJ	748	4.60	
PCB-22	1140	7.59		504	2.83		264	1.61	UJ	613	3.71	
PCB-23	4.93	0.03	J	3.37	0.02	UJ	3.53	0.02	UJ	3.82	0.02	UJ
PCB-24	22.9	0.15	J	15.1	0.08	J	6.21	0.04	J	10.1	0.06	J
PCB-25	307	1.98		142	0.76	J	58.3	0.34	UJ	128	0.74	J
PCB-26 + 29	587	3.75		261	1.37		125	0.72	UJ	311	1.77	
PCB-27	102	0.66	J	75.1	0.40	J	28	0.16	UJ	67.9	0.39	J

PCB Congener	Site 5			Site 6			Site 7			Site 8		
PCB-31	3060	20.04		1340	7.12		719	4.19		1630	9.39	
PCB-32	292	1.88		228	1.19		73.9	0.42	UJ	214	1.21	
PCB-34	26	0.17	J	17.1	0.09	J	3.53	0.02	UJ	33.1	0.18	NJ
PCB-35	28	0.18	UJ	9.43	0.05	UJ	17.2	0.09	UJ	32.4	0.18	UJ
PCB-36	3.63	0.02	J	3.37	0.02	UJ	3.53	0.02	UJ	3.82	0.02	UJ
PCB-37	499	3.04		232	1.11		244	1.29		399	2.07	
PCB-38	22.3	0.13	J	33.6	0.16	J	41.2	0.21	J	50.7	0.26	J
PCB-39	3.28	0.02	UJ	3.37	0.02	UJ	3.53	0.02	UJ	3.82	0.02	UJ
PCB-40 + 41 + 71	884	5.15		603	2.70		248	1.24	UJ	621	3.04	
PCB-42	606	3.48		416	1.83		182	0.89		390	1.87	
PCB-43	102	0.58	J	83.5	0.36	J	34.5	0.17	J	66.8	0.31	J
PCB-44 + 47 + 65	2660	14.84		1780	7.49	UJ	996	4.68	UJ	2050	9.43	UJ
PCB-45 + 51	313	1.68	UJ	278	1.13	UJ	104	0.47	UJ	250	1.11	UJ
PCB-46	74.5	0.39	J	74.7	0.30	J	24.3	0.11	UJ	60.3	0.26	J
PCB-48	545	2.71		406	1.55		147	0.62	J	348	1.45	
PCB-49 + 69	2030	9.73		1410	5.23		770	3.17		1450	5.84	
PCB-50 + 53	206	1.14		191	0.82		72.6	0.35	UJ	157	0.73	J
PCB-52	2760	14.68		1980	8.26		1380	6.35		2350	10.61	
PCB-54	4.73	0.02	NUJ	7.7	0.03	UJ	4.3	0.02	UJ	5.75	0.02	UJ
PCB-55	3.28	0.01	UJ	3.37	0.01	UJ	3.98	0.01	UJ	3.82	0.01	UJ
PCB-56	856	3.14		520	1.52		372	1.19		729	2.30	

PCB Congener	Site 5			Site 6			Site 7			Site 8		
PCB-57	16.8	0.06	J	14.9	0.04	J	4.2	0.01	UJ	13.1	0.04	J
PCB-58	3.28	0.01	UJ	10	0.03	J	3.67	0.01	UJ	3.82	0.01	UJ
PCB-59 + 62 + 75	253	0.89		178	0.51		82.4	0.26	J	164	0.50	J
PCB-60	479	1.66		294	0.83		277	0.86		550	1.67	
PCB-61 + 70 + 74 + 76	3780	12.93		2400	6.76		2010	6.15		3550	10.69	
PCB-63	131	0.45	J	101	0.28	J	64.9	0.20	J	111	0.33	J
PCB-64	1170	4.01		733	2.05		441	1.35		834	2.50	
PCB-66	2270	7.79		1590	4.43		1180	3.61		2090	6.26	
PCB-67	82.4	0.28	J	59.5	0.16	J	26.4	0.08	J	71.2	0.21	J
PCB-68	43.2	0.15	UJ	27.2	0.07	UJ	22.7	0.07	UJ	40.2	0.12	UJ
PCB-72	27.9	0.09	J	27.1	0.07	J	14.7	0.04	J	18.2	0.05	J
PCB-73	3.28	0.01	UJ	3.37	0.01	UJ	3.53	0.01	UJ	3.82	0.01	UJ
PCB-77	97.8	0.33	J	81.2	0.21	J	87.1	0.26	J	149	0.43	J
PCB-78	3.28	0.01	UJ	4.15	0.01	UJ	5.13	0.02	UJ	4	0.01	UJ
PCB-79	3.6	0.01	UJ	4.7	0.01	UJ	5.82	0.02	UJ	4.53	0.01	UJ
PCB-80	3.28	0.01	UJ	4.03	0.01	UJ	4.98	0.01	UJ	3.88	0.01	UJ
PCB-81	4.7	0.01	UJ	10.5	0.02	UJ	6.39	0.02	UJ	7.2	0.02	UJ
PCB-82	300	0.77		228	0.46		216	0.49		301	0.66	
PCB-83 + 99	2000	4.85		1900	3.54		1550	3.27		2030	4.13	
PCB-84	510	1.40		398	0.84		336	0.80		468	1.08	

PCB Congener	Site 5			Site 6			Site 7			Site 8		
PCB-85 + 116 + 117	798	2.49		641	1.52		612	1.65		803	2.09	
PCB-86 + 87 + 97 + 109 + 119 + 125	2470	7.76		1950	4.65		1880	5.10		2400	6.26	
PCB-88 + 91	385	1.20		303	0.71		254	0.68		352	0.91	
PCB-89	26.2	0.08	J	23.3	0.05	J	3.92	0.01	J	24.5	0.06	J
PCB-90 + 101 + 113	3450	10.63		2880	6.63		2700	7.12		3330	8.40	
PCB-92	617	1.97		562	1.34		476	1.30		585	1.52	
PCB-93 + 95 + 98 + 100 + 102	1790	5.94		1460	3.58		1290	3.64		75.7	0.20	UJ
PCB-94	13.2	0.05	J	10.9	0.03	J	7.19	0.02	J	9.37	0.03	J
PCB-96	15.5	0.06	J	12.5	0.03	J	7.18	0.02	J	11.8	0.03	J
PCB-103	22.8	0.08	J	25.1	0.07	J	15	0.05	J	18.4	0.05	J
PCB-104	3.28	0.01	UJ	3.37	0.01	UJ	3.53	0.01	UJ	3.82	0.01	UJ
PCB-105	1250	3.12		861	1.55		1050	2.19		1300	2.57	
PCB-106	3.28	0.01	UJ	3.45	0.01	UJ	5.33	0.01	UJ	4.66	0.01	UJ
PCB-107	294	0.86		327	0.68		274	0.66		294	0.67	
PCB-108 + 124	151	0.48	J	115	0.26	J	134	0.35	J	157	0.39	J
PCB-110 + 115	3780	12.86		2770	6.64		2830	7.94		3440	9.11	
PCB-111	3.36	0.01	UJ	3.68	0.01	J	4.09	0.01	UJ	3.82	0.01	UJ
PCB-112	3.28	0.01	UJ	3.37	0.01	UJ	3.53	0.01	UJ	3.82	0.01	UJ
PCB-114	96.2	0.25	J	75.8	0.14	J	85.4	0.18	J	113	0.23	J

PCB Congener	Site 5			Site 6			Site 7			Site 8		
PCB-118	3490	8.25		2860	4.75		2980	5.75		3380	6.15	
PCB-120	4.22	0.01	UJ	33.4	0.05	J	11.3	0.02	J	3.82	0.01	UJ
PCB-121	3.28	0.01	UJ	3.37	0.01	UJ	3.76	0.01	UJ	3.82	0.01	UJ
PCB-122	46.2	0.10	J	33	0.05	J	39.6	0.07	J	48.2	0.08	J
PCB-123	80.4	0.17	J	69.2	0.10	J	64.7	0.11	J	97.5	0.16	J
PCB-126	6.6	0.01	UJ	18.7	0.03	UJ	19.8	0.03	UJ	8.92	0.01	UJ
PCB-127	5.11	0.01	UJ	5.33	0.01	UJ	8.24	0.01	UJ	7.2	0.01	UJ
PCB-128 + 166	860	1.64		713	0.96		638	0.98		619	0.90	
PCB-129 + 138 + 160 + 163	4710	8.28		4360	5.44		3560	5.02		3520	4.71	
PCB-130	286	0.53		304	0.40		227	0.33		230	0.32	
PCB-131	48.5	0.09	J	45.4	0.06	J	38.7	0.06	J	41.7	0.06	J
PCB-132	909	1.83		794	1.13		613	0.98		654	0.99	
PCB-133	79.6	0.17	UJ	94.6	0.14	UJ	70	0.12	UJ	66.4	0.11	UJ
PCB-134 + 143	164	0.36	J	169	0.26		121	0.21	J	141	0.23	J
PCB-135 + 151 + 154	881	2.02		996	1.63		719	1.30		674	1.16	
PCB-136	238	0.45		209	0.28		150	0.22	J	174	0.25	J
PCB-137	279	0.44		218	0.24		225	0.28		231	0.27	
PCB-139 + 140	82.9	0.14	J	87.4	0.11	J	63.9	0.09	J	70.8	0.09	J
PCB-141	606	1.15		540	0.73		487	0.72		457	0.65	
PCB-142	3.28	0.01	UJ	3.37	0.00	UJ	3.53	0.01	UJ	3.82	0.01	UJ
PCB-144	130	0.29	J	121	0.19	J	106	0.18	J	103	0.17	J

PCB Congener	Site 5			Site 6			Site 7			Site 8		
PCB-145	3.28	0.01	UJ	3.37	0.01	UJ	3.53	0.01	UJ	3.82	0.01	UJ
PCB-146	662	1.56		791	1.33		542	0.99		502	0.87	
PCB-147 + 149	2190	5.01		2220	3.62		1650	2.91		1710	2.87	
PCB-148	4.12	0.01	J	10.2	0.02	J	3.53	0.01	UJ	3.82	0.01	UJ
PCB-150	4.55	0.01	J	4.37	0.01	J	3.92	0.01	J	3.82	0.01	UJ
PCB-152	3.28	0.01	UJ	3.37	0.00	UJ	3.82	0.01	NJ	3.82	0.01	UJ
PCB-153 + 168	3870	7.35		4500	6.05		3360	4.86		3080	4.21	
PCB-155	3.28	0.01	UJ	5.32	0.01	UJ	4.54	0.01	UJ	4.04	0.01	UJ
PCB-156 + 157	571	0.95		464	0.55		469	0.59		462	0.55	
PCB-158	468	0.76		399	0.46		346	0.42		357	0.41	
PCB-159	3.28	0.01	UJ	6.48	0.01	J	5.29	0.01	J	3.82	0.00	UJ
PCB-161	3.28	0.01	UJ	3.37	0.00	UJ	3.53	0.00	UJ	3.82	0.00	UJ
PCB-162	26.6	0.04	UJ	13.5	0.01	UJ	29.5	0.03	UJ	25.7	0.03	NUJ
PCB-164	235	0.35		246	0.26		179	0.20		174	0.18	J
PCB-165	3.28	0.00	UJ	3.37	0.00	UJ	3.53	0.00	UJ	3.82	0.00	UJ
PCB-167	211	0.30		189	0.19		193	0.20		216	0.21	NJ
PCB-169	4.1	0.01	UJ	18.2	0.02	UJ	16.4	0.02	UJ	5.84	0.01	UJ
PCB-170	692	0.93		541	0.51		440	0.43		364	0.33	
PCB-171 + 173	223	0.30		197	0.19		145	0.14	J	122	0.11	J
PCB-172	159	0.22	J	154	0.15	J	159	0.16	J	98.6	0.09	J
PCB-174	595	0.83		592	0.57		419	0.42		348	0.32	
PCB-175	35.6	0.05	J	37.5	0.04	J	35.8	0.04	J	24.3	0.02	J

PCB Congener	Site 5			Site 6			Site 7			Site 8		
PCB-176	73.3	0.10	J	80.3	0.08	J	54.7	0.06	J	41.4	0.04	J
PCB-177	410	0.59		442	0.44		292	0.30		239	0.23	
PCB-178	172	0.25		231	0.23		191	0.20		123	0.12	J
PCB-179	238	0.35		288	0.29		203	0.21		151	0.14	J
PCB-180 + 193	2060	3.07		1730	1.77		1770	1.85		1100	1.06	
PCB-181	3.89	0.01	J	9.02	0.01	J	4.58	0.00	UJ	11.9	0.01	J
PCB-182	3.28	0.01	UJ	3.37	0.00	UJ	7.78	0.01	J	4.27	0.00	J
PCB-183 + 185	508	0.88		511	0.60		476	0.57		303	0.33	
PCB-184	3.28	0.01	UJ	3.37	0.00	UJ	4.49	0.01	UJ	3.82	0.00	UJ
PCB-186	3.28	0.01	UJ	3.37	0.00	UJ	4.01	0.01	UJ	3.82	0.00	UJ
PCB-187	921	1.84		1130	1.53		1050	1.43		637	0.79	
PCB-188	3.28	0.01	UJ	3.37	0.00	UJ	4.51	0.01	UJ	3.82	0.00	UJ
PCB-189	42.3	0.08	UJ	38.2	0.05	UJ	39.6	0.05	UJ	33.2	0.04	UJ
PCB-190	176	0.31		177	0.21		133	0.16	J	114	0.12	J
PCB-191	33.3	0.06	J	39.4	0.04	NJ	21.9	0.02	J	20	0.02	J
PCB-192	3.28	0.01	UJ	3.37	0.00	UJ	4.52	0.00	UJ	3.82	0.00	UJ
PCB-194	437	0.67		291	0.30		433	0.44		238	0.22	
PCB-195	153	0.23	J	113	0.11	J	118	0.11	J	79.7	0.07	J
PCB-196	230	0.33		177	0.17		265	0.24		122	0.10	J
PCB-197 + 200	70.7	0.10	J	70.2	0.06	J	88.2	0.08	J	47.8	0.04	UJ
PCB-198 + 199	593	0.77		574	0.50		927	0.78		465	0.35	
PCB-201	65.1	0.08	J	60.5	0.05	J	106	0.08	J	46.8	0.03	J

PCB Congener	Site 5			Site 6			Site 7			Site 8		
PCB-202	136	0.16	J	155	0.12	J	258	0.20		130	0.09	J
PCB-203	365	0.42		314	0.24		513	0.37		264	0.17	
PCB-204	3.28	0.00	UJ	3.99	0.00	UJ	4.81	0.00	UJ	3.82	0.00	UJ
PCB-205	23.8	0.03	UJ	23.4	0.02	UJ	32.2	0.02	UJ	21.5	0.01	UJ
PCB-206	416	0.42		328	0.22		1200	0.75		482	0.27	
PCB-207	50.6	0.05	J	45.7	0.03	J	144	0.09	J	51.3	0.03	J
PCB-208	177	0.17		165	0.10	J	609	0.35		223	0.11	
PCB-209	359	0.32		338	0.20		1360	0.74		496	0.24	
total	**82709.9**	**305.9**		**62492.8**	**152.2**		**50877.2**	**107.6**		**60801.1**	**168.2**	

TABLE B- 5. PCB CONCENTRATION SUMMARY TABLE SHOWING EX-SITU SAMPLER DATA AND PORE WATER (CFREE) DATA CONTINUED, SITE 9-12.

PCB Congener	Site 9			Site 10			Site 11			Site 12		
	Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)	
PCB-1	56.9	0.92	UJ	33.3	0.62	UJ	35.6	0.56	UJ	34.2	0.56	UJ
PCB-2	46	0.74	UJ	51.9	0.96	UJ	37.9	0.60	UJ	49.6	0.80	UJ
PCB-3	58	0.93	UJ	48.7	0.89	UJ	44.3	0.70	UJ	49.7	0.80	UJ
PCB-4	576	9.22		41.8	0.77	UJ	142	2.25	UJ	82.4	1.32	UJ
PCB-5	50.1	0.80	UJ	42	0.77	UJ	25.2	0.40	UJ	25.7	0.41	UJ
PCB-6	468	7.41		41	0.75	UJ	110	1.74	UJ	79.6	1.25	UJ
PCB-7	115	1.81	UJ	20.9	0.38	UJ	47.8	0.75	NUJ	37.1	0.58	UJ
PCB-8	1420	22.25		130	2.36	UJ	432	6.81	UJ	318	4.95	UJ
PCB-9	153	2.39	J	12.7	0.23	UJ	38.5	0.61	UJ	24.6	0.38	UJ
PCB-10	43.7	0.68	J	3.53	0.06	UJ	9.97	0.16	J	7.14	0.11	J
PCB-11	951	11.46	UJ	1190	16.71	UJ	995	12.22	UJ	2350	28.01	UJ
PCB-12 + 13	147	1.38	UJ	30.7	0.34	UJ	40.2	0.39	UJ	54.2	0.50	UJ

PCB Congener	Site 9			Site 10			Site 11			Site 12		
PCB-14	6.83	0.05	J	7.49	0.06	NJ	6.13	0.05	NJ	3.15	0.02	UJ
PCB-15	767	5.56		93.3	0.79	UJ	208	1.56	UJ	242	1.73	UJ
PCB-16	1460	10.53		52.1	0.44	UJ	329	2.46		135	0.96	UJ
PCB-17	2330	16.73		70.4	0.60	UJ	568	4.25		231	1.63	UJ
PCB-18 + 30	5380	38.45		170	1.44	UJ	1340	10.03		546	3.83	UJ
PCB-19	363	2.34		11	0.08	UJ	75.9	0.52	J	33.5	0.21	UJ
PCB-20 + 28	6750	32.92		317	1.84	UJ	2250	11.60		1150	5.49	
PCB-21 + 33	3020	17.66		133	0.93	UJ	831	5.16		407	2.33	UJ
PCB-22	2080	11.96		94.2	0.65	UJ	680	4.18		342	1.92	
PCB-23	18.3	0.10	J	3.53	0.02	UJ	3.08	0.02	UJ	3.15	0.02	UJ
PCB-24	56.7	0.32	J	3.53	0.02	UJ	15	0.09	J	6.23	0.03	J
PCB-25	611	3.34		20.3	0.13	UJ	168	1.00		75.2	0.40	J
PCB-26 + 29	1110	5.98		43.5	0.28	UJ	344	2.02		171	0.89	
PCB-27	303	1.64		9.69	0.06	UJ	83.7	0.50	J	35.6	0.19	UJ
PCB-31	5630	30.71		263	1.74	UJ	1920	11.52		1010	5.33	
PCB-32	1030	5.50		40.4	0.26	UJ	190	1.12		118	0.61	UJ
PCB-34	64.9	0.34	J	3.53	0.02	UJ	17.8	0.10	J	6.51	0.03	NJ
PCB-35	32	0.16	UJ	5.09	0.03	UJ	25.3	0.14	UJ	107	0.53	J
PCB-36	3.93	0.02	UJ	4.57	0.03	J	3.08	0.02	UJ	29.9	0.14	J
PCB-37	938	4.60		79.2	0.48	UJ	366	2.03		236	1.11	
PCB-38	26.6	0.13	J	14.2	0.08	J	11.8	0.06	J	12.9	0.06	J
PCB-39	4.62	0.02	UJ	3.53	0.02	UJ	3.08	0.02	UJ	3.63	0.02	UJ
PCB-40 + 41 + 71	2310	10.63		124	0.71	UJ	906	4.78		316	1.39	
PCB-42	1480	6.67		82.6	0.46	UJ	632	3.29		209	0.90	
PCB-43	305	1.35		11.5	0.06	J	119	0.61	J	38.1	0.16	J
PCB-44 + 47 + 65	6810	29.42		708	3.83	UJ	3170	15.97		1210	4.98	UJ
PCB-45 + 51	995	4.16		69.7	0.36	UJ	336	1.63	UJ	138	0.55	UJ

PCB Congener	Site 9			Site 10			Site 11			Site 12		
PCB-46	267	1.08		12	0.06	UJ	85.2	0.40	J	29.4	0.11	UJ
PCB-48	1500	5.89		59.9	0.29	UJ	570	2.58		184	0.69	
PCB-49 + 69	4980	18.95		453	2.13		2480	10.82		848	3.09	
PCB-50 + 53	687	3.03		32.2	0.18	UJ	242	1.22		83.4	0.35	J
PCB-52	8140	34.81		817	4.30		4010	19.50		1460	5.99	
PCB-54	13.5	0.05	UJ	4.31	0.02	UJ	7.09	0.03	UJ	3.21	0.01	UJ
PCB-55	4.06	0.01	UJ	4.08	0.02	UJ	3.08	0.01	UJ	3.21	0.01	UJ
PCB-56	2000	6.00		257	0.94		1080	3.64		407	1.18	
PCB-57	47.4	0.14	J	4.31	0.02	UJ	19.9	0.07	J	3.39	0.01	UJ
PCB-58	16.6	0.05	J	3.76	0.01	UJ	14.3	0.05	J	3.15	0.01	UJ
PCB-59 + 62 + 75	588	1.72		44.6	0.16	J	258	0.84		89	0.25	J
PCB-60	1250	3.63		165	0.58	J	591	1.90		239	0.67	
PCB-61 + 70 + 74 + 76	9630	27.77		1350	4.67		5250	16.66		2050	5.72	
PCB-63	318	0.91		58.9	0.20	J	199	0.63		64.9	0.18	J
PCB-64	2710	7.76		351	1.22		1360	4.33		497	1.37	
PCB-66	5840	16.67		852	2.98		3270	10.43		1200	3.30	
PCB-67	219	0.62		14.5	0.05	J	102	0.32	J	32.1	0.09	J
PCB-68	56.7	0.16	UJ	40.6	0.14	UJ	59.2	0.19	UJ	34.7	0.09	UJ
PCB-72	51.8	0.14	J	4.31	0.01	UJ	46.2	0.15	J	16.1	0.04	J
PCB-73	3.38	0.01	UJ	3.53	0.01	UJ	3.08	0.01	UJ	3.15	0.01	UJ
PCB-77	269	0.73		59.4	0.21	J	189	0.59		114	0.30	J
PCB-78	5.24	0.01	UJ	5.26	0.02	UJ	3.74	0.01	UJ	4.14	0.01	UJ
PCB-79	5.94	0.01	UJ	5.96	0.02	UJ	4.24	0.01	UJ	4.7	0.01	UJ
PCB-80	5.09	0.01	UJ	5.11	0.02	UJ	3.64	0.01	UJ	4.02	0.01	UJ
PCB-81	15	0.03	UJ	6.38	0.02	UJ	7.85	0.02	UJ	5.13	0.01	UJ
PCB-82	870	1.78		141	0.38	J	501	1.21		214	0.42	
PCB-83 + 99	5440	10.40		1610	4.05		3600	8.16		1430	2.60	

PCB Congener	Site 9			Site 10			Site 11			Site 12		
PCB-84	1550	3.35		174	0.50	J	878	2.26		369	0.76	
PCB-85 + 116 + 117	1930	4.71		728	2.35		1260	3.68		562	1.30	
PCB-86 + 87 + 97 + 109 + 119 + 125	7180	17.55		1400	4.53		4110	12.09		1780	4.12	
PCB-88 + 91	1050	2.54		220	0.71		655	1.92		267	0.61	
PCB-89	80.3	0.19	J	8.01	0.03	J	42.8	0.12	J	15.6	0.04	J
PCB-90 + 101 + 113	10000	23.62		2450	7.72		6000	17.32		2550	5.68	
PCB-92	1740	4.24		476	1.55		1070	3.21		470	1.08	
PCB-93 + 95 + 98 + 100 + 102	5330	13.42		967	3.26		3260	10.14		1360	3.22	
PCB-94	37.1	0.10	J	5.39	0.02	J	22.6	0.07	J	10.7	0.03	J
PCB-96	43	0.12	J	4.81	0.02	J	22.1	0.07	J	8.03	0.02	J
PCB-103	57.6	0.16	J	15.8	0.06	J	40.9	0.14	J	16.1	0.04	J
PCB-104	3.38	0.01	UJ	3.53	0.01	UJ	3.08	0.01	UJ	3.15	0.01	UJ
PCB-105	2920	5.39		1080	2.70		1770	4.14		932	1.60	
PCB-106	4.89	0.01	UJ	4.28	0.01	UJ	4.07	0.01	UJ	6.31	0.01	UJ
PCB-107	772	1.65		298	0.87		510	1.39		243	0.48	
PCB-108 + 124	371	0.85		134	0.42	J	222	0.66		120	0.26	J
PCB-110 + 115	9370	23.06		2930	9.87		6210	19.83		2790	6.36	
PCB-111	3.38	0.01	UJ	3.53	0.01	UJ	3.08	0.01	UJ	3.15	0.01	UJ
PCB-112	3.38	0.01	UJ	3.53	0.01	UJ	3.08	0.01	UJ	3.15	0.01	UJ
PCB-114	242	0.45		80.9	0.21	J	154	0.37	J	68.6	0.12	J
PCB-118	8980	15.24		2970	6.85		5490	12.11		2620	4.12	
PCB-120	16.3	0.03	J	11.5	0.03	J	22.9	0.05	J	12.6	0.02	J
PCB-121	3.38	0.01	UJ	3.53	0.01	UJ	3.08	0.01	UJ	3.15	0.00	UJ
PCB-122	70.1	0.11	J	32.9	0.07	J	65.9	0.13	J	33.3	0.05	J
PCB-123	161	0.24	J	50.6	0.10	J	95.6	0.19	J	55.2	0.08	J

PCB Congener	Site 9			Site 10			Site 11			Site 12		
PCB-126	15.6	0.02	UJ	8.39	0.02	UJ	15.8	0.03	UJ	12.3	0.02	UJ
PCB-127	7.56	0.01	UJ	6.61	0.01	UJ	6.28	0.01	UJ	9.74	0.01	UJ
PCB-128 + 166	1800	2.45		910	1.65		1170	2.06		616	0.78	
PCB-129 + 138 + 160 + 163	10300	12.94		7600	12.64		6500	10.52		3540	4.14	
PCB-130	695	0.91		359	0.62		415	0.70		236	0.29	
PCB-131	174	0.24	J	40.8	0.07	J	81.6	0.14	J	45.2	0.06	J
PCB-132	2240	3.21		1100	2.07		1380	2.54		727	0.97	
PCB-133	166	0.25	J	128	0.25	J	107	0.21	UJ	62.5	0.09	UJ
PCB-134 + 143	511	0.80	J	191	0.39		287	0.57		145	0.21	J
PCB-135 + 151 + 154	2150	3.51		2090	4.44		1430	2.99		760	1.16	
PCB-136	624	0.84	J	340	0.59		377	0.65		191	0.24	
PCB-137	747	0.83	J	227	0.33		399	0.57		217	0.23	
PCB-139 + 140	242	0.30	J	81.6	0.13	J	131	0.20	J	67.9	0.08	J
PCB-141	1470	1.97	J	1340	2.31		870	1.49		491	0.62	
PCB-142	7.54	0.01	UJ	3.53	0.01	UJ	3.08	0.01	UJ	3.15	0.00	UJ
PCB-144	372	0.58	J	231	0.47		198	0.40		110	0.16	J
PCB-145	5.36	0.01	J	3.53	0.01	UJ	3.08	0.01	UJ	3.15	0.00	UJ
PCB-146	1450	2.37		1250	2.66		882	1.87		536	0.81	
PCB-147 + 149	5340	8.46		4040	8.36		3470	7.16		1870	2.75	
PCB-148	10.3	0.02	J	6.62	0.01	J	8.54	0.02	J	4.56	0.01	J
PCB-150	7.93	0.01	J	5.05	0.01	J	3.38	0.01	NJ	3.15	0.00	UJ
PCB-152	7.37	0.01	J	4.2	0.01	NJ	3.08	0.01	UJ	3.15	0.00	UJ
PCB-153 + 168	8880	11.43		8820	15.03		5790	9.87		3230	3.83	
PCB-155	4.84	0.01	NUJ	5.23	0.01	UJ	3.81	0.01	UJ	4.54	0.01	NUJ
PCB-156 + 157	1610	1.79	J	624	0.93		742	1.11		435	0.45	
PCB-158	1150	1.25		592	0.86		628	0.91		360	0.36	
PCB-159	9.19	0.01	UJ	3.53	0.00	UJ	3.08	0.00	UJ	3.15	0.00	UJ

PCB Congener	Site 9			Site 10			Site 11			Site 12		
PCB-161	7.95	0.01	UJ	3.53	0.00	UJ	3.08	0.00	UJ	3.15	0.00	UJ
PCB-162	50.6	0.05	UJ	26.4	0.04	UJ	35.3	0.05	UJ	21.9	0.02	UJ
PCB-164	513	0.49		427	0.56		342	0.45		191	0.17	
PCB-165	8.38	0.01	UJ	3.53	0.00	UJ	3.08	0.00	UJ	3.15	0.00	UJ
PCB-167	477	0.43		277	0.34		280	0.35		202	0.17	
PCB-169	11.3	0.01	UJ	3.53	0.00	UJ	3.81	0.00	UJ	3.15	0.00	UJ
PCB-170	874	0.75		2150	2.54		764	0.92		512	0.40	
PCB-171 + 173	343	0.30		745	0.89		268	0.32		172	0.13	
PCB-172	222	0.19		548	0.66		200	0.24		143	0.11	J
PCB-174	811	0.71		2390	2.90		848	1.05		542	0.42	
PCB-175	52.8	0.05	J	134	0.16	J	47.8	0.06	J	36.2	0.03	J
PCB-176	119	0.10	J	307	0.38		106	0.13	J	66	0.05	J
PCB-177	581	0.51		1660	2.07		570	0.72		357	0.28	
PCB-178	252	0.22		757	0.95		277	0.36		184	0.15	
PCB-179	347	0.31		1180	1.49		407	0.53		250	0.20	
PCB-180 + 193	2520	2.25		7590	9.69		2460	3.22		1880	1.50	
PCB-181	30.2	0.03	J	16.5	0.02	J	3.08	0.00	UJ	10.8	0.01	J
PCB-182	3.38	0.00	UJ	3.53	0.00	UJ	3.08	0.00	UJ	3.15	0.00	UJ
PCB-183 + 185	775	0.78		2090	3.06		688	1.04		506	0.45	
PCB-184	3.38	0.00	UJ	5.75	0.01	J	3.08	0.00	UJ	7.52	0.01	NJ
PCB-186	3.38	0.00	UJ	3.53	0.01	UJ	3.08	0.01	UJ	3.15	0.00	UJ
PCB-187	1310	1.50		4200	7.07		1460	2.54		1100	1.11	
PCB-188	3.38	0.00	UJ	4.97	0.01	J	3.08	0.01	UJ	3.15	0.00	UJ
PCB-189	56	0.06	UJ	103	0.16	J	42.2	0.07	UJ	38.5	0.03	UJ
PCB-190	238	0.23		618	0.91		227	0.35		144	0.12	J
PCB-191	44.4	0.04	J	118	0.17	J	40.6	0.06	J	26.2	0.02	J
PCB-192	3.38	0.00	UJ	3.53	0.00	UJ	3.08	0.00	UJ	3.15	0.00	UJ
PCB-194	405	0.34		1540	1.97		499	0.67		640	0.47	

PCB Congener	Site 9			Site 10			Site 11			Site 12		
PCB-195	141	0.11	J	585	0.71		188	0.24		179	0.12	
PCB-196	248	0.19		858	1.00		286	0.35		322	0.21	
PCB-197 + 200	84.7	0.06	J	283	0.31		101	0.12	J	107	0.07	J
PCB-198 + 199	745	0.51		2270	2.41		947	1.06		1110	0.66	
PCB-201	94.8	0.06	J	276	0.28		102	0.11	J	116	0.07	J
PCB-202	203	0.13		535	0.52		255	0.26		279	0.15	
PCB-203	449	0.27		1330	1.23		550	0.54		723	0.37	
PCB-204	3.38	0.00	UJ	4.3	0.00	UJ	3.47	0.00	UJ	3.15	0.00	UJ
PCB-205	25.8	0.01	UJ	79.1	0.07	J	34.1	0.03	UJ	31.6	0.01	UJ
PCB-206	704	0.36		1170	0.95		664	0.57		862	0.37	
PCB-207	95.2	0.05	J	187	0.14		83.2	0.07	J	116	0.05	J
PCB-208	345	0.16		546	0.40		318	0.25		310	0.12	
PCB-209	824	0.36		1410	1.00		758	0.57		756	0.28	
total	**197030.3**	**607.8**		**86618.7**	**162.8**		**108301.8**	**315.8**		**52360.0**	**100.1**	

TABLE B- 6. PCB CONCENTRATION SUMMARY TABLE SHOWING EX-SITU SAMPLER DATA AND PORE WATER (CFREE) DATA CONTINUED, SITE 13-15 AND FIELD DUPLICATES.

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)	
PCB-1	78.1	1.23	UJ	20.3	0.33	UJ	35.8	0.59	UJ	68.2	1.11	UJ	105	1.66	UJ
PCB-2	47.7	0.75	UJ	13.4	0.22	UJ	36	0.59	UJ	44	0.71	UJ	31.7	0.50	UJ
PCB-3	59	0.92	UJ	21.8	0.36	UJ	43.8	0.71	UJ	53	0.85	UJ	44.2	0.69	UJ
PCB-4	841	13.02		105	1.70	UJ	92.8	1.50	UJ	530	8.45		1180	18.39	
PCB-5	76.7	1.18	UJ	19	0.31	UJ	20	0.32	UJ	40.3	0.64	UJ	39.9	0.62	UJ
PCB-6	654	10.02		109	1.75	UJ	77.6	1.24	UJ	309	4.87		402	6.20	

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)	
PCB-7	176	2.68	UJ	40.2	0.64	UJ	32.6	0.52	UJ	95.7	1.50	UJ	118	1.81	UJ
PCB-8	2610	39.53		449	7.15	UJ	298	4.73	UJ	1120	17.46		1570	23.95	
PCB-9	222	3.34		36.5	0.58	UJ	23.9	0.38	UJ	105	1.63	J	141	2.14	J
PCB-10	57.7	0.86	J	9.47	0.15	J	8.84	0.14	J	36.8	0.57	J	72.5	1.09	J
PCB-11	720	8.38	UJ	255	3.13	UJ	822	10.08	UJ	872	10.44	UJ	198	2.32	UJ
PCB-12 + 13	134	1.21	UJ	34.8	0.33	UJ	33	0.31	UJ	77.7	0.72	UJ	92	0.84	UJ
PCB-14	16.7	0.12	NJ	7.14	0.05	NJ	5.66	0.04	NJ	13.6	0.10	NJ	18.8	0.13	NJ
PCB-15	829	5.80		392	2.90		196	1.45	UJ	589	4.24		612	4.31	
PCB-16	3320	23.10		291	2.14		176	1.30	UJ	971	6.95		2230	15.64	
PCB-17	5430	37.58		508	3.73		296	2.17		1550	11.04		3530	24.64	
PCB-18 + 30	11800	81.25		1220	8.91		761	5.57		3660	25.93		7970	55.36	
PCB-19	776	4.83		64.1	0.42	J	50.7	0.34	UJ	262	1.68		621	3.90	
PCB-20 + 28	13300	62.46		2490	12.43		1390	6.95		5090	24.59		8800	41.70	
PCB-21 + 33	7150	40.24	J	939	5.62		470	2.82	UJ	2190	12.68		3840	21.81	J
PCB-22	4210	23.30		767	4.52		432	2.55		1570	8.94		2860	15.98	
PCB-23	41.1	0.22	J	3.37	0.02	UJ	3.34	0.02	UJ	13.2	0.07	J	34.3	0.19	J
PCB-24	114	0.61	J	17.9	0.10	J	9.62	0.06	J	46	0.25	J	94.7	0.51	J
PCB-25	1170	6.16		192	1.08		95.8	0.54	J	434	2.35		703	3.74	
PCB-26 + 29	2260	11.69		388	2.15		214	1.19		804	4.28		1450	7.58	
PCB-27	655	3.41		75.6	0.42	J	48.6	0.27	J	202	1.08		448	2.36	
PCB-31	11100	58.13		2010	11.28		1290	7.28		4150	22.35		6950	36.78	

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)	
PCB-32	2720	13.94		220	1.21		140	0.77	UJ	638	3.36		1810	9.38	
PCB-34	188	0.94		39.5	0.21	NJ	24.4	0.13	NJ	68.2	0.35	NJ	136	0.69	J
PCB-35	83	0.41	UJ	25.6	0.14	UJ	20.9	0.11	UJ	40.7	0.21	UJ	65.8	0.33	UJ
PCB-36	3.51	0.02	UJ	3.37	0.02	UJ	3.34	0.02	UJ	2.84	0.01	UJ	3.21	0.02	UJ
PCB-37	1720	8.09		490	2.48		185	0.94		687	3.32		1220	5.80	
PCB-38	13.1	0.06	J	30.3	0.15	J	33.9	0.17	J	29.1	0.14	J	26.9	0.13	J
PCB-39	17.8	0.08	J	3.37	0.02	UJ	3.45	0.02	UJ	2.84	0.01	UJ	12.8	0.06	J
PCB-40 + 41 + 71	5740	25.29		726	3.46		463	2.22		1740	7.88		3820	17.04	
PCB-42	3700	15.96		499	2.33		345	1.62		1150	5.10		2450	10.70	
PCB-43	790	3.33		101	0.46	J	65.2	0.30	J	223	0.97		520	2.22	
PCB-44 + 47 + 65	14400	59.48		2160	9.67	UJ	2110	9.55	UJ	4890	20.77		9610	40.19	
PCB-45 + 51	2590	10.37		272	1.18	UJ	199	0.87	UJ	724	2.98		1710	6.93	
PCB-46	711	2.76		69.6	0.29	J	39.8	0.17	J	189	0.75		472	1.85	
PCB-48	3920	14.75		486	1.97		289	1.18		1150	4.45		2500	9.52	
PCB-49 + 69	11100	40.48		1830	7.20		2080	8.24		3730	13.97		7500	27.68	
PCB-50 + 53	1790	7.58		190	0.87		137	0.63	J	489	2.13		1190	5.10	
PCB-52	13500	55.38		2510	11.07		4010	17.81		5380	22.67		9550	39.63	
PCB-54	34.9	0.12	J	7.91	0.03	UJ	8.02	0.03	UJ	12.6	0.05	UJ	25.2	0.09	UJ
PCB-55	4.18	0.01	UJ	3.37	0.01	UJ	3.35	0.01	UJ	2.84	0.01	UJ	3.21	0.01	UJ

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**	
PCB-56	4140	11.93		943	2.91		776	2.41		1710	5.06		2920	8.51	
PCB-57	96.9	0.28	J	25.2	0.08	J	3.49	0.01	UJ	33.9	0.10	J	62.2	0.18	J
PCB-58	56	0.16	J	10.7	0.03	J	3.34	0.01	UJ	14.4	0.04	J	38.9	0.11	J
PCB-59 + 62 + 75	1540	4.34		228	0.69		155	0.47	J	465	1.34		1010	2.88	
PCB-60	1860	5.20		653	1.95		484	1.45		1040	2.98		1400	3.96	
PCB-61 + 70 + 74 + 76	16600	46.10		4200	12.41		4780	14.16		7530	21.44		11600	32.54	
PCB-63	736	2.04		152	0.45	J	150	0.44	J	267	0.76		493	1.38	
PCB-64	5880	16.19		1060	3.12		1190	3.51		2090	5.91		3960	11.02	
PCB-66	11600	31.80		2820	8.29		2340	6.88		4840	13.64		7960	22.06	
PCB-67	503	1.36		98.1	0.29	J	47.2	0.14	J	186	0.52		328	0.90	
PCB-68	157	0.42	UJ	28.9	0.08	UJ	41.4	0.12	UJ	52.3	0.14	UJ	90	0.24	UJ
PCB-72	178	0.47		29.7	0.08	J	30.5	0.09	J	48.6	0.13	J	120	0.32	J
PCB-73	3.11	0.01	UJ	3.37	0.01	UJ	3.34	0.01	UJ	2.84	0.01	UJ	3.21	0.01	UJ
PCB-77	484	1.25		177	0.50		116	0.33	J	266	0.71		361	0.95	
PCB-78	5.39	0.01	UJ	4.25	0.01	UJ	4.28	0.01	UJ	3.27	0.01	UJ	3.68	0.01	UJ
PCB-79	6.11	0.01	UJ	4.8	0.01	UJ	4.83	0.01	UJ	3.69	0.01	UJ	4.15	0.01	UJ
PCB-80	5.23	0.01	UJ	4.18	0.01	UJ	4.2	0.01	UJ	3.21	0.01	UJ	3.62	0.01	UJ
PCB-81	23	0.05	UJ	11.3	0.03	UJ	5.39	0.01	UJ	17.9	0.04	UJ	27.8	0.06	UJ
PCB-82	1200	2.34		341	0.73		528	1.13		611	1.23		887	1.75	

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)	
PCB-83 + 99	8490	15.44		2450	4.90		4350	8.67		3900	7.35		5950	10.97	
PCB-84	1970	4.04		520	1.17		1000	2.25		1020	2.17		1550	3.23	
PCB-85 + 116 + 117	2670	6.19		932	2.38		1660	4.23		1450	3.48		1980	4.66	
PCB-86 + 87 + 97 + 109 + 119 + 125	8460	19.62		2820	7.22		5330	13.63		4880	11.74		6410	15.09	
PCB-88 + 91	1460	3.35		417	1.06		908	2.30		730	1.74		1140	2.65	
PCB-89	157	0.36		33.1	0.08	J	31.8	0.08	J	63.7	0.15	J	116	0.27	J
PCB-90 + 101 + 113	12100	27.06		4030	10.00		8630	21.41		6880	15.99		9270	21.07	
PCB-92	2390	5.51		727	1.86		1560	4.00		1200	2.88		1740	4.08	
PCB-93 + 95 + 98 + 100 + 102	6430	15.30		1910	5.06		4710	12.49		3460	8.57		5010	12.13	
PCB-94	70.3	0.17	J	14.3	0.04	J	22.7	0.06	J	28.8	0.07	J	50.2	0.13	J
PCB-96	80.9	0.20	J	14.1	0.04	J	21.2	0.06	J	31.8	0.08	J	58.5	0.15	J
PCB-103	159	0.42		26.7	0.08	J	51.5	0.15	J	44.4	0.12	J	100	0.27	J
PCB-104	3.11	0.01	UJ	3.37	0.01	UJ	3.34	0.01	UJ	2.84	0.01	UJ	3.21	0.01	UJ
PCB-105	2850	4.95		1420	2.77		2180	4.27		2310	4.19		2310	4.09	
PCB-106	4.92	0.01	UJ	4.64	0.01	UJ	4.27	0.01	UJ	3.87	0.01	UJ	4.09	0.01	UJ
PCB-107	1200	2.41		358	0.81		539	1.22		536	1.12		747	1.53	

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)	
PCB-108 + 124	356	0.77		185	0.45		288	0.70		274	0.62		291	0.64	
PCB-110 + 115	11000	25.42		4040	10.55		7650	20.07		6600	15.95		8610	20.30	
PCB-111	29.6	0.06	J	4.19	0.01	UJ	3.34	0.01	UJ	2.84	0.01	UJ	16.3	0.04	J
PCB-112	3.11	0.01	UJ	3.37	0.01	UJ	3.34	0.01	UJ	2.84	0.01	UJ	3.21	0.01	UJ
PCB-114	296	0.52		136	0.27	J	182	0.36		203	0.37		238	0.43	
PCB-118	10300	16.42		4250	7.65		6320	11.44		6730	11.21		7870	12.81	
PCB-120	146	0.23	J	18.3	0.03	J	12	0.02	J	21.6	0.03	J	64.2	0.10	J
PCB-121	3.21	0.00	UJ	3.87	0.01	UJ	3.34	0.01	UJ	2.84	0.00	UJ	3.21	0.00	UJ
PCB-122	122	0.18	J	57.6	0.09	J	76.2	0.13	J	82.2	0.12	J	98.9	0.15	J
PCB-123	211	0.30		111	0.18	J	152	0.24	J	154	0.23		158	0.23	J
PCB-126	35.9	0.05	UJ	22.3	0.03	UJ	12.9	0.02	UJ	18.1	0.03	UJ	49.1	0.07	UJ
PCB-127	7.59	0.01	UJ	7.43	0.01	UJ	6.83	0.01	UJ	6.2	0.01	UJ	6.54	0.01	UJ
PCB-128 + 166	1910	2.45		930	1.34		1300	1.89		1260	1.69		1550	2.03	
PCB-129 + 138 + 160 + 163	10600	12.56		5160	6.84		7490	10.02		6990	8.63		8430	10.19	
PCB-130	859	1.06		349	0.48		477	0.67		466	0.60		604	0.76	
PCB-131	165	0.21		66.7	0.10	J	102	0.15	J	98.3	0.13	J	133	0.18	J
PCB-132	2670	3.61		933	1.41		1550	2.36		1390	1.96		1940	2.68	
PCB-133	268	0.38		86.9	0.14	J	132	0.21	J	126	0.19	J	165	0.24	

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**	
PCB-134 + 143	581	0.86		195	0.32		341	0.57		294	0.45	J	422	0.64	
PCB-135 + 151 + 154	2630	4.06		958	1.65		1680	2.92		1360	2.18		1840	2.90	
PCB-136	686	0.88		237	0.34		493	0.71		367	0.49	J	520	0.68	
PCB-137	664	0.70		339	0.40		487	0.58		443	0.49	J	546	0.59	
PCB-139 + 140	302	0.35		104	0.13	J	168	0.22		143	0.17	J	209	0.25	
PCB-141	1300	1.66		595	0.84		968	1.38		840	1.11	J	1000	1.30	
PCB-142	5.18	0.01	J	3.84	0.01	J	3.34	0.01	UJ	2.84	0.00	UJ	3.21	0.00	UJ
PCB-144	328	0.49		140	0.23	J	258	0.43		211	0.32	J	263	0.40	
PCB-145	5.54	0.01	NJ	3.65	0.01	J	3.34	0.01	UJ	5.59	0.01	UJ	4.66	0.01	J
PCB-146	2060	3.18		753	1.30		1050	1.84		999	1.61		1330	2.11	
PCB-147 + 149	6240	9.34		2310	3.87		4010	6.81		3390	5.28		4590	7.05	
PCB-148	41.4	0.06	J	8.03	0.01	J	9.61	0.02	J	8.39	0.01	J	18.6	0.03	J
PCB-150	14	0.02	J	6.37	0.01	J	9.17	0.01	J	7.15	0.01	J	13.6	0.02	J
PCB-152	13	0.02	J	3.37	0.00	UJ	9.18	0.01	J	6.29	0.01	J	9.92	0.01	NJ
PCB-153 + 168	10700	12.96		4480	6.13		6410	8.92		6080	7.70		7730	9.67	
PCB-155	6.07	0.01	UJ	3.37	0.00	UJ	4.83	0.01	UJ	5.86	0.01	UJ	5.58	0.01	UJ
PCB-156 + 157	1240	1.30		659	0.78		830	1.00		922	1.01	J	1040	1.13	

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)	
PCB-158	1030	1.05		512	0.59		744	0.88		707	0.75		846	0.89	
PCB-159	12.2	0.01	J	4.7	0.01	NJ	3.34	0.00	UJ	2.97	0.00	NJ	15.7	0.02	J
PCB-161	3.11	0.00	UJ	3.37	0.00	UJ	3.34	0.00	UJ	2.84	0.00	UJ	3.21	0.00	UJ
PCB-162	65.2	0.06	J	27.3	0.03	UJ	35.2	0.04	UJ	43.2	0.04	UJ	56.7	0.05	UJ
PCB-164	616	0.56		252	0.26		388	0.41		351	0.33		488	0.46	
PCB-165	8.17	0.01	J	3.37	0.00	UJ	3.34	0.00	UJ	3.59	0.00	J	7.62	0.01	J
PCB-167	478	0.41		264	0.26		327	0.33		350	0.31		397	0.35	
PCB-169	27.3	0.02	UJ	21.9	0.02	UJ	12.4	0.01	UJ	7.75	0.01	UJ	30.5	0.03	UJ
PCB-170	1020	0.82		546	0.51		709	0.67		684	0.58		841	0.71	
PCB-171 + 173	421	0.34		200	0.19		269	0.26		250	0.21		345	0.29	
PCB-172	298	0.24		154	0.14	J	197	0.19		182	0.16		257	0.22	
PCB-174	952	0.77		488	0.46		683	0.66		592	0.51		727	0.62	
PCB-175	79.7	0.06	J	32.2	0.03	J	45.5	0.04	J	43.7	0.04	J	67.7	0.06	J
PCB-176	158	0.13		68.4	0.07	J	98.6	0.10	J	83.6	0.07	J	114	0.10	J
PCB-177	751	0.61		367	0.35		507	0.50		462	0.40		535	0.46	
PCB-178	355	0.29		184	0.18		245	0.24		222	0.19		253	0.22	
PCB-179	444	0.37		223	0.22		320	0.32		276	0.24		321	0.28	
PCB-180 + 193	2740	2.26		1720	1.68		2150	2.17		1970	1.73		2190	1.93	
PCB-181	41.3	0.04	J	20.1	0.02	J	25.6	0.03	J	20.7	0.02	J	33.3	0.03	J

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)		Conc. pg/g PE	Cfree (pg/L)	
PCB-182	39.5	0.04	J	11.8	0.01	J	10.8	0.01	J	2.84	0.00	UJ	24	0.02	J
PCB-183 + 185	862	0.80		484	0.54		660	0.76		581	0.58		722	0.72	
PCB-184	3.11	0.00	UJ	4.26	0.00	NJ	3.34	0.00	UJ	2.84	0.00	UJ	13	0.01	J
PCB-186	3.11	0.00	UJ	3.37	0.00	UJ	3.34	0.00	UJ	2.84	0.00	UJ	3.21	0.00	UJ
PCB-187	1690	1.78		1010	1.28		1290	1.70		1140	1.29		1280	1.45	
PCB-188	4.4	0.00	J	3.37	0.00	UJ	3.34	0.00	UJ	2.84	0.00	UJ	3.21	0.00	UJ
PCB-189	158	0.15		41.6	0.05	UJ	50.2	0.06	UJ	48.1	0.05	UJ	179	0.18	
PCB-190	294	0.27		163	0.18	J	204	0.23		195	0.19		253	0.25	
PCB-191	93.5	0.08	J	31.9	0.03	J	41.3	0.04	J	39.4	0.04	J	83.2	0.08	J
PCB-192	10.1	0.01	J	3.37	0.00	UJ	3.34	0.00	UJ	2.84	0.00	UJ	3.21	0.00	UJ
PCB-194	546	0.42		350	0.33		378	0.37		331	0.28		525	0.44	
PCB-195	209	0.15		120	0.11	J	136	0.13	J	120	0.09	J	190	0.15	
PCB-196	363	0.25		223	0.19		231	0.21		199	0.15		330	0.25	
PCB-197 + 200	132	0.09	J	84.2	0.07	J	84.5	0.07	J	64.2	0.05	J	115	0.08	J
PCB-198 + 199	1030	0.65		825	0.64		763	0.62		678	0.46		857	0.59	
PCB-201	127	0.08	J	85.7	0.06	J	88.6	0.07	J	74.9	0.05	J	104	0.07	J
PCB-202	280	0.16		239	0.17		200	0.15		182	0.11		211	0.13	
PCB-203	515	0.28		449	0.30		439	0.31		396	0.23		435	0.26	
PCB-204	10.9	0.01	UJ	3.37	0.00	UJ	3.99	0.00	NUJ	2.84	0.00	UJ	11.8	0.01	UJ

PCB Congener	Site 13			Site 14			Site 15			Field Duplicate Site 9			Field Duplicate Site 13		
	Conc. pg/g PE	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**		**Conc. pg/g PE**	**Cfree (pg/L)**	
PCB-205	142	0.07	J	27.9	0.02	UJ	24.8	0.02	UJ	19.9	0.01	UJ	171	0.09	
PCB-206	1210	0.56		1130	0.65		591	0.36		548	0.27		1320	0.67	
PCB-207	160	0.07		107	0.06	J	72.5	0.04	J	72.1	0.03	J	189	0.09	
PCB-208	512	0.21		558	0.29		278	0.15		264	0.12		508	0.23	
PCB-209	662	0.26		905	0.45		543	0.29		570	0.25		1100	0.48	
total	**307104.2**	**1027.2**		**81904.2**	**212.5**		**108988.3**	**252.0**		**141490.6**	**434.1**		**219379.5**	**720.6**	

Appendix C. QA/QC Supplementary Figures

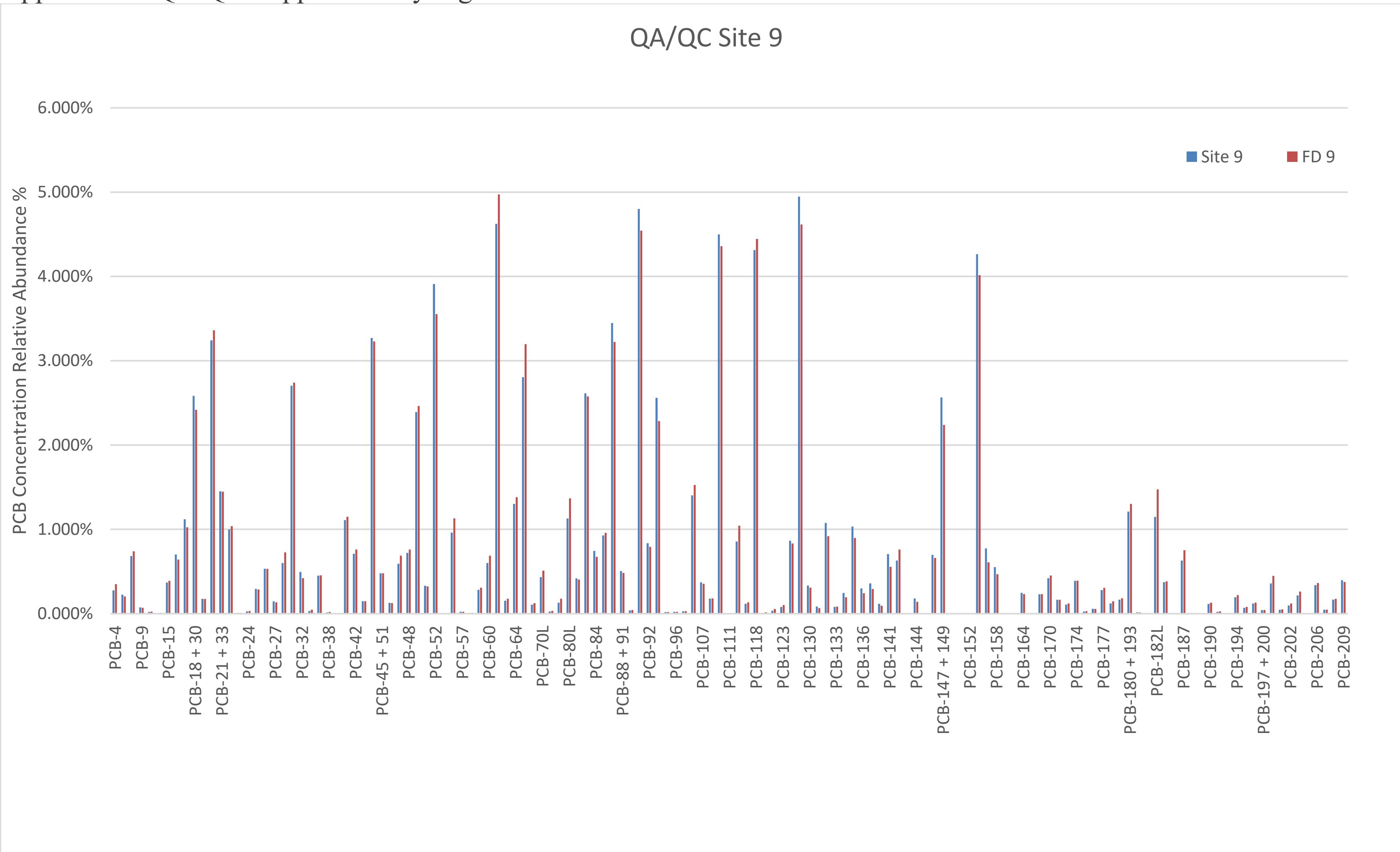

FIGURE C- 13. QA/QC FOR SITE 9 SHOWING THE RELATIVE ABUNDANCE OF PCB CONCENTRATIONS FOR EACH CONGENERS TESTED.

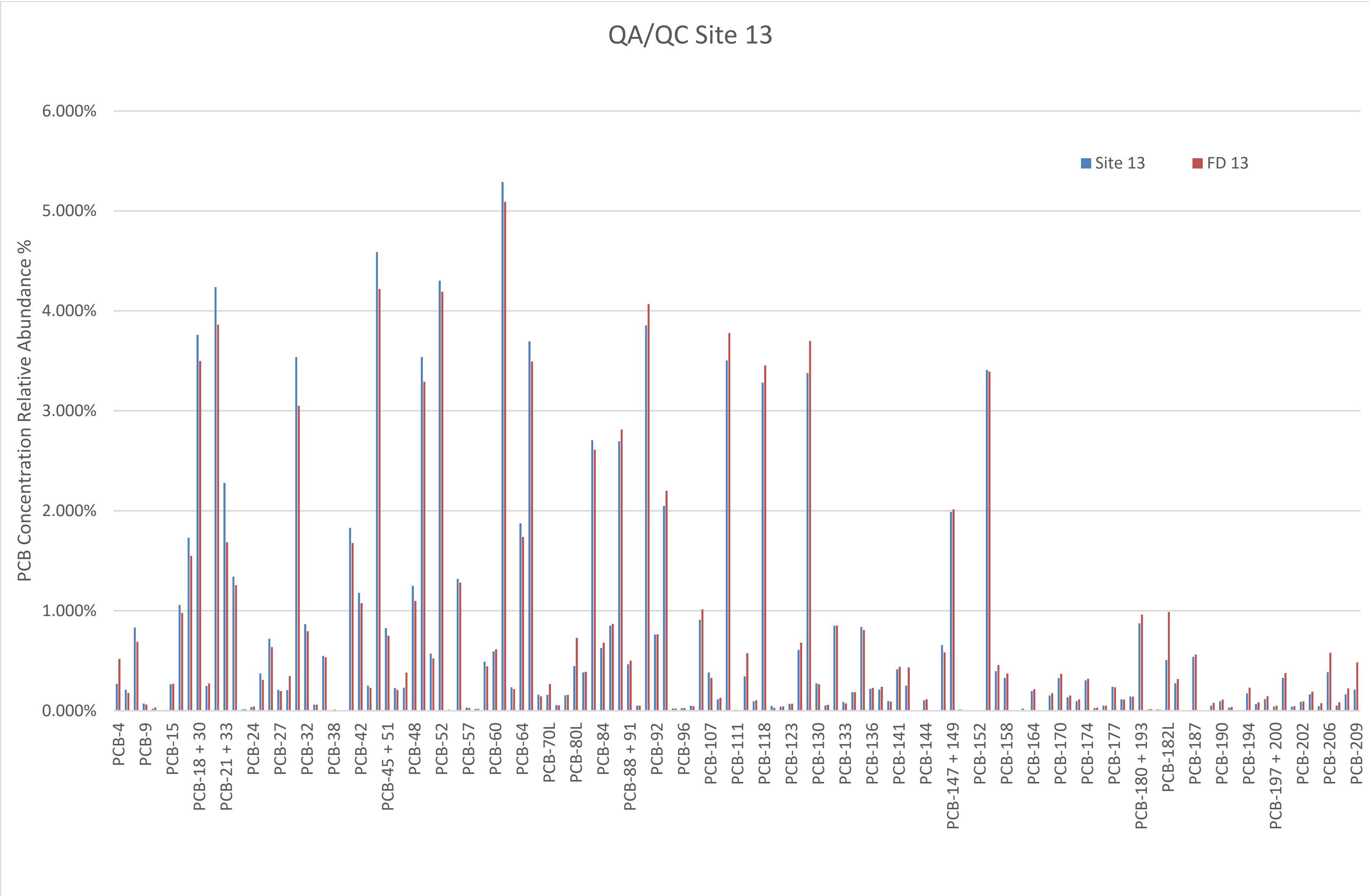

FIGURE C- 14. QA/QC FOR SITE 13 SHOWING THE RELATIVE ABUNDANCE OF PCB CONCENTRATIONS FOR EACH CONGENERS TESTED.

Appendix D. QA/QC Supplementary Tables

TABLE D- 7. LABORATORY QA/QC DATA SUMMARY TABLE FOR LAB DUPLICATES

PCB Congener	**Site 7- water**	**Site 7 - sediment**	**Site 13- water**	**Site 13- sediment**	**Site 13 (duplicate)- water**	**Site 13 (duplicate)- sediment**	**Spiked Matrix (102)**	**Lab Blank (101)**	**FB_1-a**	**FB_1-b**	**Day(0)**
PCB-1L (% Recovery)	43.4	47.1	41.1	39.8	35.2	28.9	46.2	44.8	30.8	41.1	47.5
PCB-3L (% Recovery)	47.7	50.5	46.7	42.7	40.9	34.6	47	46.9	38.6	41.6	51.2
PCB-4L (% Recovery)	47.5	49.6	46.6	43.2	41.1	36.2	45.7	46	39.3	44.1	49.4
PCB-15L (% Recovery)	54.8	53.1	57	52.4	50.9	46.5	43.9	44.5	51.2	44.8	54.6
PCB-19L (% Recovery)	54.1	55.9	57	49.8	50.7	44.3	50.1	52	52.2	49.7	54.8
PCB-37L (% Recovery)	64.5	61.7	66	58.8	60.2	54.1	54.2	54.8	65.3	57.4	64.8
PCB-54L (% Recovery)	54.9	54.9	58.9	49.5	51.9	46	49.1	51.1	56.3	49.9	55.2
PCB-77L (% Recovery)	74.6	72.2	73.9	69.6	68.7	64.3	66.2	65.4	76.7	71.2	77.2
PCB-81L (% Recovery)	73.7	71.6	74.3	68.9	68.9	63.4	64.8	65.9	74.7	68.8	76
PCB-104L (% Recovery)	63.3	61.9	66.5	58.2	62	54.2	56.1	57.4	66.3	56.6	63.6
PCB-105L (% Recovery)	77.3	75.7	77.3	73.6	74	68.6	70.9	71.2	82.9	73.8	81.2

PCB Congener	Site 7-water	Site 7 -sediment	Site 13-water	Site 13-sediment	Site 13 (duplicate)-water	Site 13 (duplicate)-sediment	Spiked Matrix (102)	Lab Blank (101)	FB_1-a	FB_1-b	Day(0)
PCB-114L (% Recovery)	75.9	75.3	76.8	72.4	72.8	66.6	69.2	69.4	80.5	72.2	79.3
PCB-118L (% Recovery)	76.2	74.7	76.7	72.9	72.8	68.1	69.5	70.4	80.5	73.1	80.7
PCB-123L (% Recovery)	75.2	74	75.9	71.1	73.4	66.1	68.3	69	80.3	71.6	78.8
PCB-126L (% Recovery)	78.1	75.5	76.5	73.1	72.6	67.7	70.7	70.2	81.3	74.5	81.3
PCB-155L (% Recovery)	68.8	69.1	72.7	65.6	67.7	60.6	63	63.1	74.4	65.1	73.4
PCB-156L + 157L (% Recovery)	80	76.8	78.9	74.2	74	70.6	75.7	74	85.8	76.3	83.7
PCB-167L (% Recovery)	80	77.2	78.6	73.6	74.4	70.5	75	73.3	84.9	76.9	84
PCB-169L (% Recovery)	76.4	73.1	74.3	70.6	69.8	66.5	71.4	71	80.3	72.7	80.5
PCB-170L (% Recovery)	87.6	86.1	85.7	80.4	83.8	76.6	83.4	84.9	94.8	86.5	97.2
PCB-180L (% Recovery)	86.2	84.7	84.7	80.6	82.6	76.4	81.6	84.6	93.5	83.7	97.3
PCB-188L (% Recovery)	81.2	84.6	85.1	79.2	82.3	74.1	74.7	79.5	90.9	80.9	93
PCB-189L (% Recovery)	84.7	83.5	84.6	76.5	81.7	75.2	80.9	80.3	90.7	83.6	91.9
PCB-202L (% Recovery)	86	87.6	87.5	81.7	85.5	77.2	80.6	82.7	94.6	87.4	95.8

PCB Congener	Site 7-water	Site 7 - sediment	Site 13-water	Site 13-sediment	Site 13 (duplicate)-water	Site 13 (duplicate)-sediment	Spiked Matrix (102)	Lab Blank (101)	FB_1-a	FB_1-b	Day(0)
PCB-205L (% Recovery)	82.1	79.3	80	75.3	76.3	71.3	78.2	78.1	87.9	79.7	87.3
PCB-206L (% Recovery)	80.1	79.2	77.4	73	73.1	69	79.4	77.5	85.3	77.4	84.9
PCB-208L (% Recovery)	86.2	85.6	86.4	80.6	84.2	76.3	84	83.3	91.8	85	88.8
PCB-209L (% Recovery)	78.9	79.9	81.9	73.5	76.2	70	79.5	80	88.6	79.1	89.7

TABLE D- 8. LABORATORY QA/QC DATA SUMMARY TABLE FOR THE PERCENT RECOVERY OF LABORATORY DATA ANALYSIS

PCB Congener	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
PCB-1L (% Recovery)	48	60.8	68.2	56.6	65.8	63.3	57.8	50.4	59.6	48.7	46	61.4	58.4	59.8	49.9
PCB-3L (% Recovery)	46.4	59.7	65.6	58	64	61	55.5	51.9	57.6	48.4	50.6	60.4	58	59.4	51.2
PCB-4L (% Recovery)	45.4	57.2	63	56.8	63.1	63.1	57.3	53.6	59.8	49.6	53.8	62.4	59.3	56.4	53.7
PCB-15L (% Recovery)	51.2	62	66	64.2	64.8	59.6	55.6	60.3	57.7	55.1	58.7	62.4	60.9	61.6	58.5
PCB-19L (% Recovery)	52.5	64.5	69.6	65.8	67.4	67.5	61.1	61.2	62.8	55.4	60.6	66.5	63.2	65.5	60.7
PCB-37L (% Recovery)	60.5	69.7	70.5	71.1	67.6	67.5	67	67.6	66.6	64.5	67.5	71.9	68.5	71	66.2
PCB-54L (% Recovery)	54.5	65.3	68.9	66.6	66.5	65.5	61.6	62.2	61.7	56.3	60.8	66.6	61.7	65.7	60.7

PCB Congener	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
PCB-77L (% Recovery)	66.7	74.1	74.1	77.5	71.4	74.8	76.9	73.3	73.9	71.3	74.9	77.8	75.1	80.5	73.2
PCB-81L (% Recovery)	66.8	75.3	74.4	76.9	71.8	75.4	75.7	73.5	74	71.5	75.6	79	75.2	80.4	73
PCB-104L (% Recovery)	61.4	70.2	71.8	72.6	68.7	69.3	66.9	67.7	67.7	64	67.1	71.5	68.4	71.9	66.6
PCB-105L (% Recovery)	70.7	77.9	75.8	79.9	74.8	78.4	78.6	74.6	76.5	73	77.5	80.6	78.5	83.8	75.6
PCB-114L (% Recovery)	69.1	76.6	75.2	80	74.3	77.3	78.5	72.9	76.1	73	77.8	80.3	77.5	82.2	75.6
PCB-118L (% Recovery)	69.1	77.8	75.2	78.9	74.6	78.1	77.7	73.4	76.2	73.6	77.8	81.6	78.1	82.8	76.2
PCB-123L (% Recovery)	68.5	77.5	73.9	78.3	74.2	76.9	77.2	73.4	75.2	72.8	75.9	80.1	77.5	81.7	74.2
PCB-126L (% Recovery)	68.7	75.8	74.3	78.8	72.6	79.2	78.7	73.6	74.5	73.8	77.1	78.5	77.8	84	74.9
PCB-155L (% Recovery)	67.9	75	74.1	74.9	67.5	64.6	74.7	71.3	73.6	69.5	73.6	78.1	73.4	76.1	70.3
PCB-156L + 157L (% Recovery)	71.3	79.1	76.1	78.3	77.6	81.1	81.9	75.7	60.1	75.5	79.8	81.1	78.1	84.3	76
PCB-167L (% Recovery)	72.5	79.8	77	81.2	76.8	80.6	81.6	75.9	76.8	75.5	79.3	82.5	78.3	85.4	77.1
PCB-169L (% Recovery)	67.3	74.5	72.4	76	73.4	78.3	77.5	71.7	73.2	71.9	75.9	77.6	73.5	82.3	70.9
PCB-170L (% Recovery)	78.7	87.8	84.5	87.8	84.6	88.6	88.3	83.2	85	82	85.4	85.9	86	94.2	83.7
PCB-180L (% Recovery)	77.7	88.4	83.5	86	85.1	88.5	88.8	84.8	83.9	82.2	85.9	86.8	85.3	93.5	83.8

PCB Congener	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11	Site 12	Site 13	Site 14	Site 15
PCB-188L (% Recovery)	78.4	86.9	83.7	87.2	82.1	82.5	86.6	80.7	84.1	79.9	84.8	86.1	85.2	88.9	81.1
PCB-189L (% Recovery)	74.2	83.9	81.1	82.8	79.8	85.6	86	79.8	81.7	78.6	83	82.9	82.7	91.5	79.8
PCB-202L (% Recovery)	80.3	89.3	85.2	89.6	83.9	87.1	89.1	83.8	86.2	81.8	86.1	88.3	86.5	92.5	85.9
PCB-205L (% Recovery)	72.5	81	79.5	81.6	79.5	84.8	84.2	77.7	78.5	77.5	80.2	80.6	80.9	88.5	76
PCB-206L (% Recovery)	73.2	83.6	79	80.5	77.7	84.4	83.2	76.6	78.4	76.7	80.8	79.9	78.6	86.6	76.6
PCB-208L (% Recovery)	78.8	88.1	84.3	86	83.3	85.8	88.3	82.9	84.5	82.2	85.8	86.8	85.5	92.6	81
PCB-209L (% Recovery)	76.3	87.2	83.9	84.9	74.2	75.4	86.3	80.6	81.6	79.3	83.9	81.9	83.6	90	81.9

TABLE D- 9. LABORATORY QA/QC DATA SUMMARY TABLE FOR THE PERCENT RECOVERY OF LABORATORY DATA ANALYSIS CONTINUED

PCB Congener	Site 9 FD	Site 13 FD	Lab Blank (101)	Spiked Matrix (102)	Day(0)
PCB-1L (% Recovery)	55.5	51.5	56.2	60.5	62.3
PCB-3L (% Recovery)	56.4	52.1	55.4	59.1	59.6
PCB-4L (% Recovery)	58.8	53.7	54.2	59.2	59.4
PCB-15L (% Recovery)	65	60	55.7	59.3	60.4
PCB-19L (% Recovery)	65.2	60.4	60.2	63.6	63.5
PCB-37L (% Recovery)	73.4	72.1	66.8	67.1	66.2
PCB-54L (% Recovery)	66.5	61	62.6	61.4	60.8

PCB Congener	Site 9 FD	Site 13 FD	Lab Blank (101)	Spiked Matrix (102)	Day(0)
PCB-77L (% Recovery)	80.2	82.2	74.3	73.6	73.7
PCB-81L (% Recovery)	80.1	80.3	73.4	73.5	72.5
PCB-104L (% Recovery)	71.7	69.4	67.8	68.7	68.2
PCB-105L (% Recovery)	81.6	82.9	75.4	76.7	76.4
PCB-114L (% Recovery)	81.5	82.4	75.6	75.9	75.2
PCB-118L (% Recovery)	82.3	82.9	76.8	75.5	75.2
PCB-123L (% Recovery)	79.9	82.8	76.3	74.9	74
PCB-126L (% Recovery)	80.6	84.2	74.5	74.9	73.1
PCB-155L (% Recovery)	76.6	76.9	72.9	74.4	72
PCB-156L + 157L (% Recovery)	81.1	84.6	78.4	79.6	77.3
PCB-167L (% Recovery)	81.4	84.8	77.7	79.6	76.3
PCB-169L (% Recovery)	77.8	81.4	75.1	74.5	71.9
PCB-170L (% Recovery)	87.2	91.8	85.4	85.1	81.3
PCB-180L (% Recovery)	87.2	91.1	86.7	85.7	83.5
PCB-188L (% Recovery)	87	88.7	83.6	83.1	83.4
PCB-189L (% Recovery)	84.6	87.6	83.1	81.6	79.8
PCB-202L (% Recovery)	89.1	92.5	87.7	86.9	84.3
PCB-205L (% Recovery)	81.8	85.2	78.8	79.5	77.4
PCB-206L (% Recovery)	80.4	83.5	80.5	79.1	78
PCB-208L (% Recovery)	86.4	89.9	87.2	85.6	83.1
PCB-209L (% Recovery)	84.6	88.3	84.7	83.5	79.1