City of Spokane

Riverside Park Water Reclamation Facility

Toxics Management Plan

Updated September 11, 2017

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1. BACKGROUND

Three groups of toxic chemicals have been identified as pollutants of concern to the Spokane River basin: polychlorinated biphenyls (PCBs), polybrominated diethyl ethers (PBDEs), and polychlorinated dibenzofurans/dioxins (PCDFs/PCDDs). These chemicals pose a threat to human health because of their ability to mimic to varying degrees the endocrine disruption effects of the most toxic of the dioxin/furan group, 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). Additional toxicological effects from exposure have also been demonstrated, such as skin conditions and changes in thyroid, immune, and reproductive systems. The threat these chemicals pose is heightened by their tendency to bioaccumulate in the environment. The compounds are accreted into the fatty tissues of vertebrates such as fish and are further concentrated by those animals higher up the food chain. They do not readily break down and remain in the environment for very long periods of time.[1]

PCBs have been used in a variety of applications in the past, including insulating fluids for transformers and capacitors, hydraulic fluids, and plasticizers in paints and cements. PCBs have been banned by the EPA in all manufacturing processes since 1977 through the Toxic Substances Control Act (TSCA). Some PCBs, however, still get introduced at levels below the 50 ppm TSCA threshold during the production and importation of other chemicals and materials. PBDEs have been primarily used as a flame retardant in household products. While some manufacturers have begun voluntarily curtailing the use of PBDEs because of ecological concerns, there is currently very limited regulation over their production and use. PCDFs/PCDDs often result as a byproduct in the production of herbicides, paper products, and other processes that involve halogenated compounds. Unlike PCBs and PBDEs, PCDFs/PCDDs are naturally occurring in some instances, such as forest fires and volcanic activity, where dioxins and furans can be created by the incomplete combustion of organic material.[2]

1.1 Program Requirements

The National Pollutant Discharge Elimination System (NPDES) discharge permit (No. WA-002447-3) Paragraph S12.A.2 for the Riverside Park Water Reclamation Facility (RPWRF) discusses the need to develop a Toxics Management Plan (TMP) to address source control and elimination of PCBs and other toxics from the Spokane River.[3] The TMP, as outlined in the permit, must address:

- Identifying known and potential sources of PCBs, including industrial and commercial sources, contaminated stormwater, and contaminated soils and sediment.
- Including PCBs as an element of RPWRF's pretreatment program.
- Eliminating active sources of PCBs.
- Changing procurement practices to use PCB-free products over those regulated to only the TSCA threshold.
- Educating the public (individually or collaboratively with other Spokane River dischargers) about the difference between PCB-free products and those which may still contain PCBs below the TSCA threshold.

Ultimately, the goal of the plan will be to help bring the Spokane River water quality, to the maximum extent practicable, into compliance with applicable water quality standards for PCBs. Because certain segments of the Spokane River have exceeded both State and Tribal water quality standards for PCBs and because PCBs have been detected at RPWRF at levels of concern, these toxicants will be the main focus of the plan.

1.2 Local Toxic Chemical Reduction Efforts

Along with Ecology, several organizations in the Spokane area have conducted PCB and other toxic chemical cleanup projects.[4] Some of the Spokane regional toxics reduction measures are summarized below.

- **Upriver Dam and Donkey Island PCB-Laden Sediment (Avista Development Inc., Ecology).** PCB-contaminated sediment was identified behind Upriver Dam and on Donkey Island (just upstream of the dam). In 2006, an engineered cap consisting of coal, sand and gravel was placed over the sediments behind the dam in order to prevent movement of the contaminants. The contaminated soil was physically removed from Donkey Island and replaced with clean sand and replanted with vegetation in 2007.
- **City Parcel Site Cleanup (Ecology).** The City Parcel Site was a former transformer recycling facility located at 708 N. Cook St. More than 8,000 tons of PCB-contaminated soil was removed from this site in 2009. The destruction of the building and removal of an underground storage tank, dry well, and drain lines was also included with this project. In 2014, Ecology is performing an extended soil investigation to identify possible residual contamination on the margins of the property.[5]
- **Kaiser Trentwood Site Cleanup (Kaiser Aluminum, Ecology).** Removal of 1,700 tons of PCB and petroleum contaminated soil was completed during 2007 at the Kaiser Trentwood facility. This cleanup took place in the West Discharge Ravine, an area formerly used to convey wastewater from the plant. Further feasibility studies are currently underway to evaluate additional cleanup options for other areas on the site.
- **GE Transformer Service Site (GE, Ecology).** The GE transformer site located on 4323 E. Mission operated as a service and repair facility until 1980. PCB and TPH contamination was found in moderate concentrations in the soil, leading to the EPA adding the facility to the Superfund List in 1989. Cleanup work was completed in the mid-90s. The cleanup process included the vitrification of soils at the site as well as removal of 22,000 cubic yards of material.

1.3 TMP Program Goals and Scope

The Department of Ecology has taken an adaptive management approach to reducing toxics in the Spokane River. Instead of pursuing the potentially long and costly process of implementing a TMDL, the adaptive management approach seeks to begin identifying and controlling PCBs sooner by collaboration with local dischargers, environmental groups, and regulators.

The Spokane River Regional Toxics Taskforce (SRRTTF) was formed in January, 2012, in response to Spokane River discharge permit conditions directing this collaborative effort. The City is an active participant on the SRRTTF. One of the stated goals of the SRRTTF, as indicated in each of the discharger's NPDES Permits, is to make measurable progress towards meeting the applicable water quality criteria in the Spokane River for PCBs and other toxics. If the Department of Ecology determines that the Task Force is failing to make measurable progress, Ecology may develop a TMDL for PCBs in the Spokane River.

In July 2014, Ecology defined measurable progress as making progress in three specific areas: inputs, outputs, and outcomes. Inputs are those activities that are required for the Task Force to function, organize, and achieve results (e.g., holding regular meetings, engaging with the public, securing adequate funding, etc.). Outputs are work products of the taskforce and include items such as collecting data on PCBs, identifying data gaps and interpreting collected data, and developing BMPs for identified sources of PCBs. Outcomes are the measurable results which show or estimate PCB removal from the system. Outcomes could include measured decreases in fish tissue/river concentrations, improved treatment technologies with lower discharger concentrations, and implemented BMPs with estimates of PCBs removed/reduced. Since some of the outputs and outcomes may not occur until after several 5-year permit cycles, Ecology will focus on determining whether progress has been made on the inputs in the near term, with focus shifting to outputs and outcomes in later permit cycles.[6]

The goal of the TMP will be to aid in achieving the Tasks Force's goal of making measurable progress towards achieving the water quality standards for PCBs. This will be accomplished through identifying PCB

and other toxic chemical sources in the City, implementing BMPs, and educating the community. The TMP will build on previous work completed by the City and other local entities and describes an action plan for developing and implementing additional toxic chemical control measures.

2. PROGRAM DEVELOPMENT

The following sections define potential sources of PCBs in the City and describe the City's approach to controlling PCBs and other toxics released from these potential sources.

2.1 Identification of Sources

PCBs are a manmade chemical with no known natural sources. Because of their widespread use during the mid-20th century, however, PCBs have become pervasive throughout the environment. The Department of Ecology conducted a background study of PCBs in Washington State from 2007 to 2008.[7] The results of this research showed fish tissue to have minimum, maximum, mean and median total PCB concentrations, respectively, of 0.044, 88, 4.9, and 1.4 micrograms per kilogram (µg/kg, wet weight). This compares to Ecology's current screening level for fish tissue of 5.3 µg/kg for total PCBs (adapted from the water quality standard of 0.00017 µg/L and bioconcentration factor of 31,200 L/kg).* The areas chosen for this background study were selected such that the only anthropogenic contribution would be from air deposition (lakes and rivers with very minimal development or nearby potential sources). The results of this study demonstrate the ubiquitous nature of PCB pollution.

A 2005 study from Ecology shows fish caught at various sections along the Spokane River to have PCB concentrations ranging from <9.0 up to 3,000 µg/kg.[8] Samples were taken from as far upstream as the Idaho State Line and as far downstream as Lower Long Lake. The highest results came from Largescale Suckers caught in the Mission Park area of the river (downstream from Upriver Dam). While the results of this study do show a general decrease in PCB concentrations from previous PCB studies conducted on Spokane River fish,[9] there is still a significant gap between the levels in the samples and the water quality standards and State background concentrations. A 2012 Ecology study of fish tissue in the Spokane River showed mostly equivalent results to the 2005 study. Two exceptions were elevated PCB levels in Mountain Whitefish and Large Scale Sucker in the mission park sample location.[10]

Below is a list of four City sectors which have an increased likelihood of containing PCBs and other toxics:

- General industry and public
- Electrical generation and distribution utilities, and related businesses
- Chemical manufacturing, metal mining/forming/processing, and petroleum refining/processing
- Waste processing and recycling facilities

Table 2-1 lists some common sources of PCBs and other toxics associated with each sector. It should be noted that materials produced prior to the EPA's implementation of the TSCA regulations in 1979 have a much greater likelihood of containing PCBs at significant levels. Those materials produced after 1979 may still contain considerable amounts of PCBs (when comparing to the water quality standards), even though they are under the 50 ppm TSCA regulated threshold.

*Note: the EPA promulgated updated Human Health Water Quality Standards (HHWQSs) for the State of Washington in late 2016, including a stricter PCB standard of 0.000007 µg/L (7 pg/L). The Department of Ecology is currently updating their Water Quality 1-11 policy document which will help guide how fish tissue and water column data are used to list impaired water bodies. The screening level of 5.3 µg/kg may change based on the how this policy document is revised.

Table 2-1. Common PCB and Other Toxic Chemical Sources[11,12]
General Industry and Public
• Air deposition Household/Commercial Products: • Fluorescent light ballasts • Old electrical devices or appliances containing PCB capacitors • Brake linings • Cutting oils • Adhesives and tapes • Pesticides • Flame retardants: ceiling tiles, furniture, clothing • Carbonless copy paper • Paints/dyes • Food
Construction Material: • Plasticizers: caulking, gasket sealers, filling materials in concrete joints, PVC, rubber seals • Thermal insulation material: fiberglass, felt, foam, and cork • Oil based paints
Electrical generation and distribution utilities, and related businesses
• Electrical transformers: located throughout an electrical distribution system, can vary greatly in shapes and sizes • Electrical capacitors: power factor correction capacitors, motor start capacitors • Switches • Voltage regulators • Liquid filled electrical cables • Liquid filed circuit breakers
Chemical manufacturing, metal mining/forming/processing, and petroleum refining/processing
• Heat transfer fluids • Hydraulic fluids • Vacuum pumps • Oil used in other types of motors • Chlorinated solvents • Pesticides • Other processes where chlorine-containing chemicals and hydrocarbons are heated
Waste processing and recycling facilities
• Used oil • Repair and decommissioning of PCB-contaminated equipment • Building demolition material • Waste paper • Incineration of industrial and municipal waste

2.1.1 Product Testing 2014

While table 2-1 primarily consists of materials that are known to contain or have contained PCBs and other toxics at significant levels, there are still a wide variety of unknown and untested materials that could contain PCBs at significant concentrations. In order to better define some of these unknowns, the City applied for and received a municipal stormwater grant from the Department of Ecology to determine the PCB content of a portion of the products the City routinely uses. Products were tested during 2014. The study primarily focused on products which could come into contact with stormwater and in turn enter the CSO and MS4 systems in the City. These products include road paint, asphalt sealers, de-icer, adhesives, caulk, lubricants, pesticides, and vehicle wash soap. In addition, the City also tested a handful of consumer products that frequently enter the sanitary waste stream. These included hand soap, dish soap, laundry detergent, shampoo, and toothpaste. Table 2-2 summarizes the findings of this study, sorted by highest total PCB result to lowest. A full report on this study can be found at the City of Spokane website.[13]

Table 2-2. PCB Product Testing Results 2014			
Product	**Total PCB Result (µg/kg)***	**Field Duplicate Result (µg/kg)***	**Lab Duplicate Result (µg/kg)***
Hydroseed (Nature's Own; Hamilton Mfg.)	2,510		
Yellow road paint (Sherwin Williams)	64.9		
Utility Locate Paint (Rustoleum - Green)	21.5		
ShortLiner (Infrastructure Repair Systems Inc.)	17.8		
Thermoplastic road striping tape (Ennis; Yellow)	10.8		
Crack sealer (Special Asphalt Products - SA premier)	7.98		
Pesticide (Portfolio 4F)	6.89		
Dust suppressent (Dustgard liquid Magesium Chloride)	3.57		
Thermoplastic road striping tape (Ennis; White)	3.32		
PVC Pipe (ASTM 3034 8"; Diamond PVC)	2.00		
Deicer (Magnesium Chloride FreezeGard)	1.33	1.95	
Cast in place pipe liner (SAK Construction)	1.11		
Motor oil (5W-30; Valvoline, Synthetic)	0.969		
Gasoline (Regular unleaded)	0.935		0.811
Motor oil (SAE 15W-40; Connell Oil; Recycled)	0.856		0.826
Yellow road paint (Ennis)	0.732	2.69	
Lubricant (SAE 85W-140; Phillips 66; Gear Lube)	0.623		
Dried Yellow road paint (Ennis)	0.565		
Asphalt release agent (Soy What)	0.558		0.443
Used motor oil (SAE 15W-40; Connell Oil; Recycled)	0.502		2.37
White road paint (Ennis #2)	0.414	0.396	
Dried White road paint (Ennis)	0.379		0.335
Pesticide (Crosshair)	0.316		
White road paint (Sherwin Williams)	0.281		0.220
Laundry soap (Tide)	0.174		
Dust suppressant (Emulsified Asphalt Dust Abatement)	0.091		
Dust suppressant (Lignosulfonate)	0.086		
Asphalt tack (Slow Setting, SS-1)	0.085		
Dish soap (Dawn antibacterial)	0.083		
Vehicle wash soap (Simple Green)	0.068		
Shampoo (Suave naturals)	0.058		
Deicer (Enhanced salt brine with Sugar Beet boost)	0.038		
Hand soap (Dial antibacterial)	0.037		
Toothpaste (Aquafresh)	0.032		
Class B Firefighting Foam (Alcoseal)	0.029		
Anti Freeze (Kool Green; Recycled)	0.018		
Pesticide (Roundup)	0.012		
Hydrant paint (Rustoleum - Aluminum)	0.003		0.010
Vehicle wash soap (Hotsy)	0.003		0.068
Pesticide (Weedar 64; 2,4-D)	0.000		0.000
Diesel (#2, dyed)	0.000		

* µg/kg: micrograms per kilogram

2.1.2 Follow-up Product Testing 2015-2016

The City conducted additional product testing during 2015 and 2016. These results are summarized in table 2-3.

Hydroseed and Survey Marking Paint were tested in 2015. The hydroseed results showed significantly lower PCB concentrations than the initially high result that was tested in 2014. Additional hydroseed sampling was also conducted by the Task Force in 2015. This was also much lower than the 2014 result, indicating that the 2014 result was likely anomalous. The Green Survey Marker tested in 2015 also showed lower PCB concentrations.

Various deicers and traction control materials were tested in winter 2015/2016. These results were all much lower than the deicer results from 2014 with some of the results not showing any detections. Larger sample volumes for the liquids were taken during this study which helped drive down the detection limits. Two different labs were used for some of the samples. The results of the interlaboratory comparison were generally agreeable. Based on it having some of the lowest average PCB concentration in this study, the City used magnesium chloride for its deicer needs in winter 2016/2017.

The City tested a variety of traffic paints in fall 2016. Results were all below 1 µg/kg. With the exception of the 2014 Sherwin Williams Yellow result of 64.9 µg/kg, the 2016 data were generally in line with the 2014 results. PCB-11 was the dominant congener in all of the traffic paint data.

Table 2-3. PCB Product Testing Results 2015-2016

Product	Sample Date	Total PCB Result (µg/kg)	Field Duplicate Result (µg/kg)	Lab Duplicate Result (µg/kg)	Alternate Lab Result (µg/kg)	Alternate Lab Duplicate Result (µg/kg)
Hydrostraw (Undyed, Wilbur-Ellis Corp.)	3/9/2015	1.91				
Wood Fiber Hydromulch (Green Dyed, Rainier Fiber)	3/9/2015	0.263				
Wood Fiber Hydromulch (Undyed, Rainier Fiber)	3/9/2015	0.782				
Green Survey Marker (AERVOE)	3/9/2015	0.960		0.743		
MgCl Deicer	12/22/2016	0.0004	0.0004	0.0002		
MgCl Deicer	2/10/2016	0.0000		0.0000	0.0000	0.0001
CaCl Deicer	1/7/2016	0.0015	0.0012			
CaCl Deicer	2/16/2016	0.0006			0.0039	
WSDOT Salt Brine Soln.	1/7/2016	0.0014	0.0023			
WSDOT Salt Brine Soln.	2/23/2016	0.0001			0.0016	0.0011
COS Road Salt	12/22/2016	0.0288	0.0263	0.0146		
COS Road Salt	2/16/2016	0.0000		0.0000	0.0310	
WSDOT NaCl salt	1/7/2016	0.0141	0.0214			
WSDOT NaCl salt	2/23/2016	0.0053			0.0364	
Sand (Road Traction)	12/22/2016	0.0103	0.0092	0.0099		
Sand (Road Traction)	2/16/2016	0.0124		0.0124	0.0000	0.0639
Enis-Flint White Road Paint	9/12/2016	0.0821	0.0723			
Sherwin Williams White Road Paint	8/24/2016	0.0331	0.0288			
SWARCO White Road Paint	8/24/2016	0.6521	0.6997			
Enis-Flint Yellow Road Paint	9/12/2016	0.4388	0.7168	0.9602		
Sherwin Williams Yellow Road Paint	8/24/2016	0.1038	0.0733			
SWARCO Yellow Road Paint	8/24/2016	0.1281	0.1775	0.2011		

2.1.3 Potential Source Industries

A list of industries in the City that could potentially contain toxics is shown below in table 2-4. All industries on this list are known to be present in the City of Spokane. While nothing conclusive is known yet about which industries are the most important to focus on, areas where these industries are present will be where the City will begin their source tracing activities if elevated toxicant loading is found in a particular area of the collection system. This is described further in section 2.2. Preliminary data appears to indicate that loading from domestic/residential sources could be a significant portion of the PCBs coming into the treatment plant. Further sampling and testing will help define the extent of domestic versus industrial sources.

Table 2-4. Industries in the Spokane Area with Potential for Elevated Toxicant Levels		
Industry	**Potentially Associated Toxics**	**Reasons Why Industry Could Contain Toxics**
Asphalt	PCBs	Refined petroleum products such as motor oil have been shown to contain PCBs at significant levels. Asphalt, being a refined petroleum material could also contain PCBs at a significant level.
Auto Repair	PCBs	Motor oil and other petroleum products.
Battery Service/Repair	PCBs	Insulating fluid. Capacitors. Other electrical equipment.
Car Washes	PCBs, PBDEs	Stormwater shown to contain significant PCBs, PBDEs. Car Washes could contain similar materials found in stormwater in a more concentrated form.
Carpet Cleaning	PBDEs	Wastewater from carpet cleaning could contain flame retardants used in the carpet.
Chemical Distribution	PCBs, TCDDs	Businesses distributing chlorinated chemicals which could contain PCBs and Dioxins
Construction Companies/Contractors	PCBs, PBDEs	May be accumulating and handling demolition debris that could contain PCB-contaminated caulk, and other plasticizers. PBDEs may be present in thermal insulation material.
Dairy/Food Processing	PCBs	PCBs are known to be fat soluble and may be more pronounced in discharges containing significant dairy fat, animal fat, etc.
Electrical Generation/Distribution	PCBs	Old transformers, capacitors, switches, etc. may still contain contaminated PCB material.
Heavy Equipment Sales and Service	PCBs	Hydraulic fluid, and other oils could contain PCBs
Industries where high TSS loading is present	PCBs	PCBs are known to adhere mostly to particulate matter and could be more concentrated in industries that discharge more highly concentrated sewage.
Laboratories (analytical, university, medical, etc.)	PCBs, TCDDs	May use chlorinated chemicals which could contain PCBs and Dioxins, especially if not handled properly.
Landfills	PCBs, PBDEs, TCDDs	Could contain legacy PCBs and other toxic materials.
Laundry (Commercial, Industrial)	PCBs, PBDEs, TCDDs	Flame retardants used in clothing could be washed of and contain PBDEs. Could use chlorinated chemicals which may have PCB/Dioxin contamination. Pigments washed out of clothes could contain PCBs.
Metal Forming/Processing	PCBs	Aluminum refining industry may contain inadvertently generated PCBs. Operations where high voltage equipment is used may contain PCBs in transformers, capacitors, switches, etc.
Paint Manufacturing and Sales	PCBs	Certain inks, dyes and pigments known to contain PCBs. Especially PCB-11.
Plastic Manufacturing	PCBs	Plasticizers could contain PCBs.
Printer Cartridge Recycling	PCBs	Certain inks and dyes known to contain PCBs. Especially PCB-11
Printing	PCBs	Certain inks and dyes known to contain PCBs. Especially PCB-11
Recyclers and Wrecking Yards	PCBs, PBDEs	Could contain legacy PCB materials, materials containing flame retardants, and PCB-contaminated electrical equipment. Other material contaminated by PCB-containing oils.
Screen Printing	PCBs	Certain inks and dyes known to contain PCBs. Especially PCB-11

2.2 PCB Monitoring and Source Tracing

The City has developed a monitoring program for PCBs in the wastewater collection system that corresponds to the requirements of its Municipal Wastewater Discharge NPDES Permit. Two collection system locations are monitored monthly from November through May and once in July. Additional sampling may be pursued if potential sources are identified. Further details on this monitoring can be found in the approved Quality Assurance Project Plan (QAPP)[14].

2.2.1 Source Tracing Procedures

After a year of monitoring each collection system location, data will be analyzed to determine whether a PCB source may be present upstream. The flowchart shown in Figure 2-1 will be followed to determine the course of action depending on the results of the sampling. The number of follow-up sampling events will depend upon the level of certainty that a source is present upstream from a given location. Total PCBs for the RPWRF influent for 2010-2016 averaged 13,500 picograms per liter (pg/L) with a standard deviation of 9,000 pg/L. Criteria is shown below for when total PCB levels are statistically elevated above this level (this criteria will be updated as additional influent data is collected):

- If during the year of sampling, any single sample exceeds the influent average + 3s (40,500 pg/L).
- If during the year of sampling, 2 out of 3 successive samples exceeds the influent average + 2s (31,500 pg/L).
- If during the year of sampling, 4 out of 5 successive samples exceeds the influent average + 1s (22,500 pg/L).
- If 7 consecutive samples exceed the influent average (13,500 pg/L).

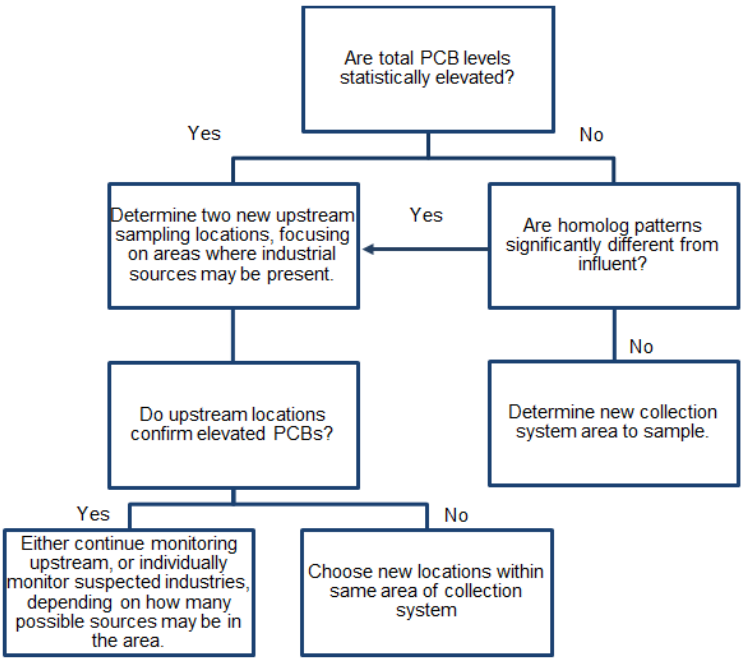


Figure 2-1. Decision Chart for PCB sampling

If a monitoring basin does not appear elevated based upon Total PCBs, homolog patterns will also be analyzed. Percentages of each level of chlorination will be determined for the collection system sample and then compared to influent levels of chlorination (e.g. for influent PCBs from 2010-2013, PCBs with 5 chlorine atoms made up 31.3 % of total PCBs whereas PCBs with 6 chlorines made up 21.5 % of the total PCBs within the sample). Significant deviations from the influent distribution of congeners will be a sign that

a source may be present and further upstream source tracing will be pursued. This determination will be made at the professional judgment of the analyst for the City responsible for reviewing PCB data.

2.2.2 Monitoring Discussion: 2010 - July 2014

The monitoring from 2010 through July 2013 focused on characterizing the collection system locations outside the City limits that feed into the City's sewer system. The locations monitored per the frequency specified in the NPDES permit were the North and South Valley Interceptors. Three other interceptors that made up the outside City flows were also monitored (North Spokane Interceptor, Airway Heights Interceptor, and Fairchild AFB Interceptor). The sampling locations for these interceptors are shown in Figure 2-2. The results of these studies are summarized in a separate report from the TMP (2011, 2012, and 2013 Annual Summary of Toxics Monitoring). The monitoring was generally inconclusive as to whether a significant source besides what would be considered domestic background was present in these areas. For example, total PCB concentrations for both the North Valley Interceptor (primarily serving industrial areas) and the South Valley Interceptor (primarily serving commercial and residential areas) were close to the same. Total PCB concentrations for these two locations also did not differ significantly from the RPWRF influent results. The distribution of PCB homologs throughout the influent and collection system locations monitored during this time was also similar.

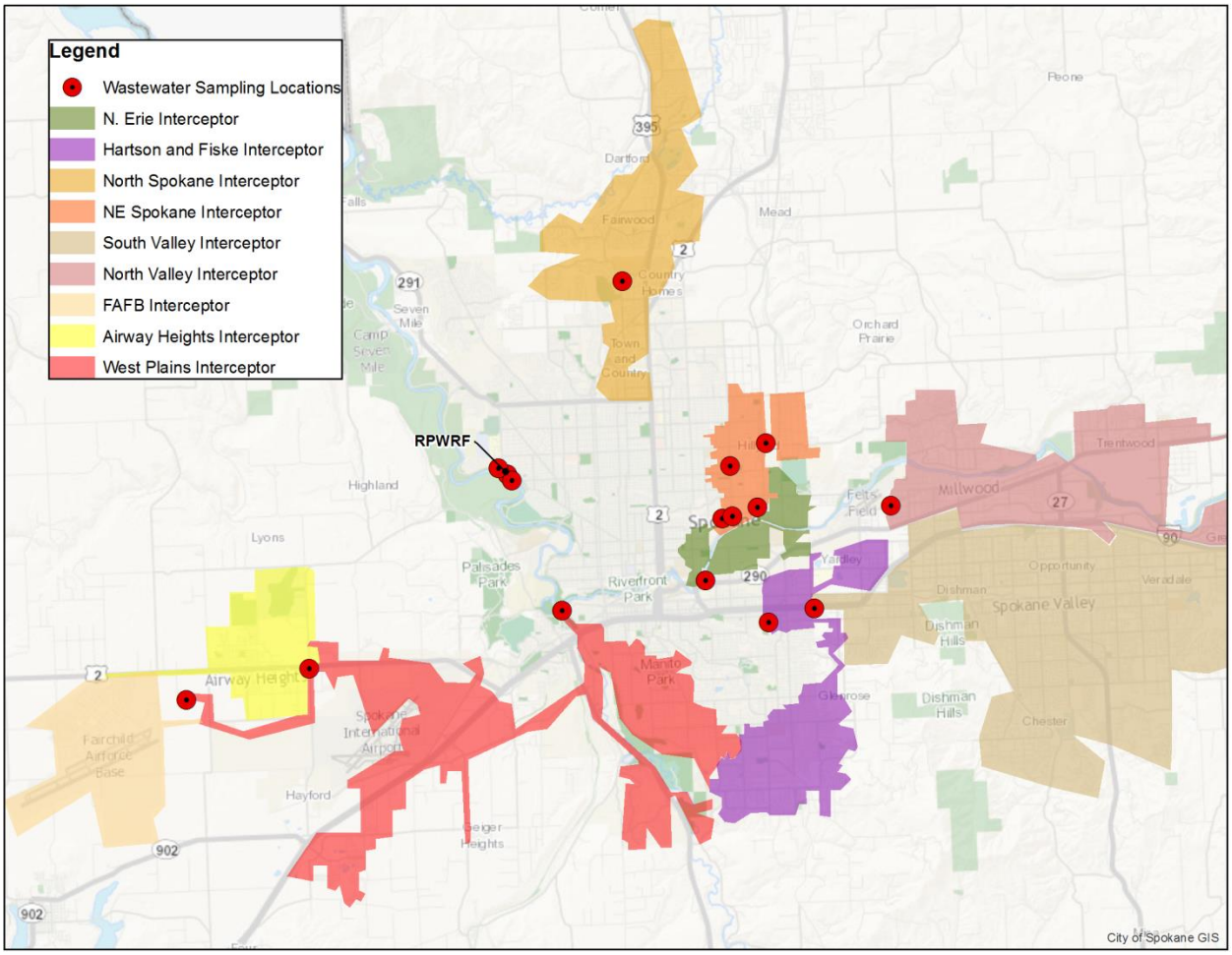


Figure 2-2. PCB sampling locations 2010 - 2017

As part of the City's stormwater program, several stormwater locations and two CSO locations were monitored during 2012 through 2014. These locations are shown in Figure 2-3. These results confirmed heightened PCB loading in the Union Basin area of the system, with occasional elevated results in other parts

of the system. As required by the City's Eastern Washington Phase II Municipal Stormwater NPDES Permit, continued testing of Cochran Basin began again in 2016.

Beginning in November 2013, the City began sampling for PCBs the North East Spokane Interceptor and the West Plains Interceptor (Fig. 2-2, and 2-3). These locations encompass parts of the collection system where industrial/commercial dischargers potentially containing elevated PCBs may be present. As defined by the NPDES permit, monitoring consisted of monthly sampling for PCBs and 2,3,7,8-TCDD from each of the two locations from November, 2013 through May 2014 and again in July 2014.

The West Plains Interceptor showed results all below the influent average listed in the criteria above the November-May average was 6,430 pg/L and the maximum was 8,310 pg/L which occurred in July. Congener distributions appeared to correlate with influent data as well.

The North East Spokane Interceptor exceeded two of the statistical criteria listed above (with the incorporation of the 2014/2015 influent data, only one of the criteria above was exceeded); the average from the November-July samples was 21,300 pg/L; the maximum result of 38,400 pg/L occurred in December, 2013.

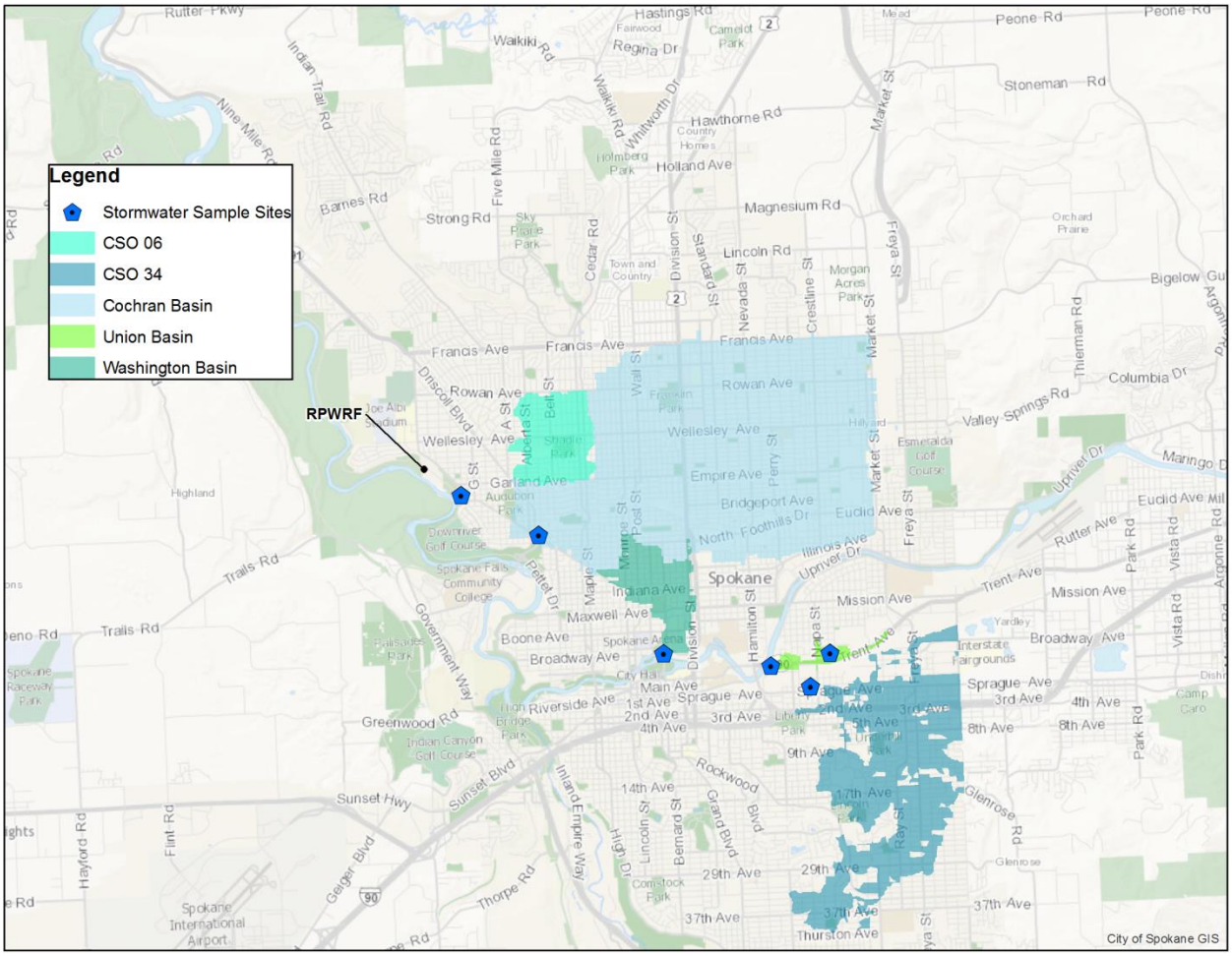


Figure 2-3. Stormwater PCB sampling locations

2.2.3 Upstream monitoring in the North East Interceptor basin: November 2014 - July 2016

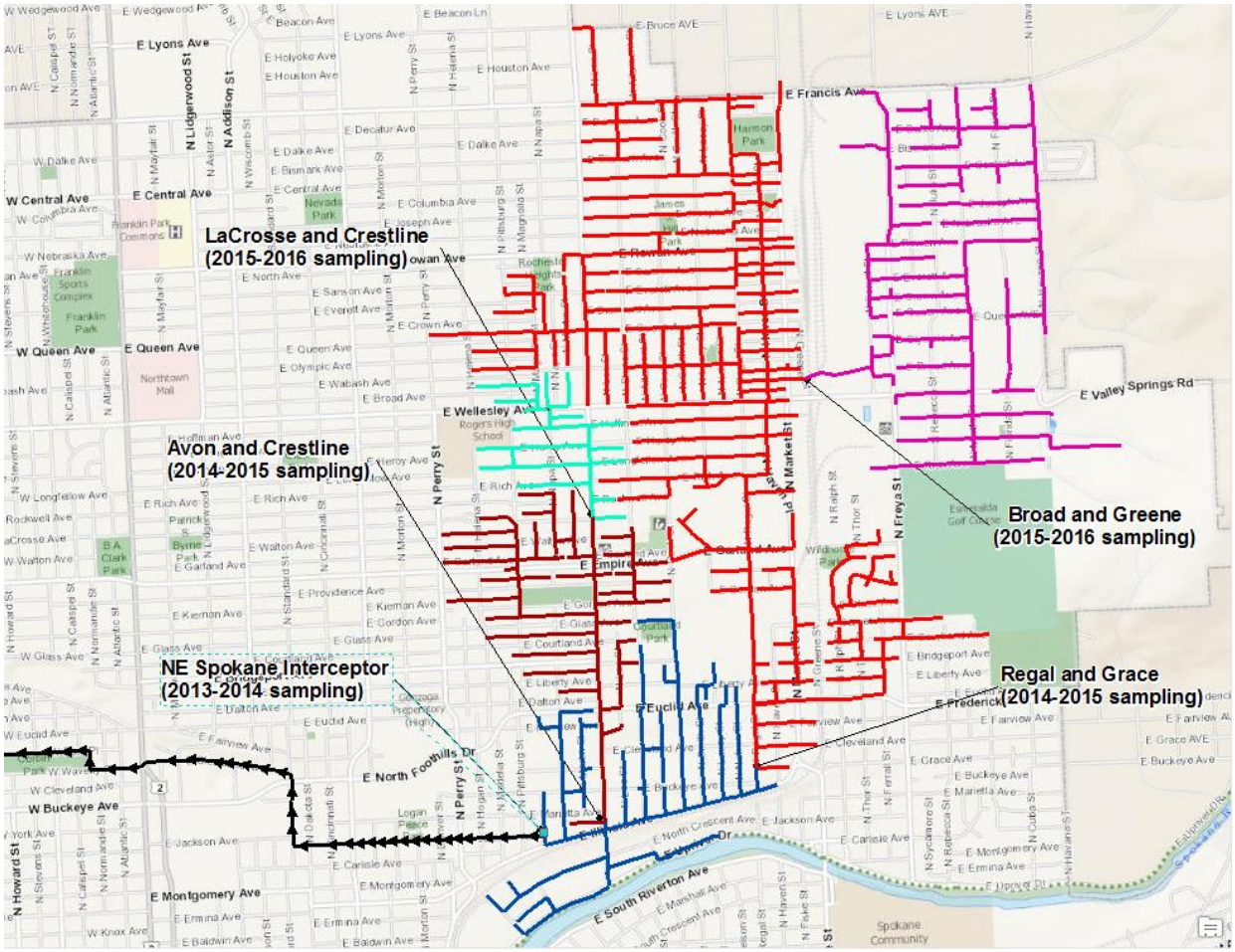


Figure 2-4. North East Spokane Area Sampling 2013-2016

Based on the findings in the N.E. Spokane Interceptor area, the city pursued sampling at two upstream locations for the November 2014 through July 2015 sampling period. These locations were at Avon and Crestline, and Regal and Grace, as shown in Fig. 2-4. Heightened loading was also found at both of these samples locations. For November through July 2015, Avon and Crestline averaged 25,200 pg/L with a maximum result of 41,000 pg/L. Regal and Grace averaged 22,200 pg/L with a maximum result of 44,500 pg/L. Both of these results were statistically in line with the previous year's sampling at the North East Spokane Interceptor. This seemed to point towards the possibility that the elevated levels coming from this area are more diffuse, and that additional PCBs may be present due to this simply being an older area of the collection system.

In order to further determine the extent of PCB sources in the North East Spokane area, two locations were sampled further upstream for the November 2015 through July 2016 period. These sites were located at Lacrosse and Crestline, and at Broad and Greene, as shown in Fig. 2-4. For Nov 2015 through July 2016, Lacrosse and Crestline averaged 49,200 pg/L total PCBs with a maximum result of 249,700 pg/L. The 249,700 pg/L result appears to be an outlier as a duplicate sample was also analyzed on this date with a result of 50,500 pg/L total PCBs. Excluding the high outlier, Lacrosse and Crestline averaged 30,800 pg/L. Broad and Greene averaged 27,700 pg/L total PCBs for the same time period (maximum result: 70,600 pg/L).

Sample results for the North East Spokane Interceptor area are summarized below in Table 2-5.

Table 2-5. North East Spokane Sample Results Summary (Total PCBs, pg/L)					
Sample Location	**Average**	**Median**	**St. Dev.**	**Min**	**Max**
RPWRF Influent (2012 - 2016)	14,300	11,800	9,900	4,400	50,100
N.E. Spokane Interceptor (2013 - 2014)	21,300	19,800	8,000	14,700	38,700
Avon and Crestline (2014 - 2015)	25,200	22,000	11,800	10,700	41,000
Regal and Grace (2014 - 2015)	22,200	21,300	10,500	12,700	44,500
Broad and Greene (2015 - 2016)	27,700	22,700	21,100	6,800	70,600
Lacrosse and Crestline (2015 - 2016)	49,200	30,400	64,700	10,400	249,700

**See Figure 2-4 for relationship between sampling sites. Lacrosse and Crestline is upstream from Avon and Crestline which is upstream from N.E. Spokane Interceptor. Broad and Greene is upstream from Regal and Grace which is upstream from N.E. Spokane Interceptor.*

While the sampling at Broad and Greene and Lacrosse and Crestline showed generally higher total PCB results than the earlier downstream monitoring, the results also had a much wider range. Because of the high variability, the higher averages seen for this most recent round of sampling may not be statistically significant. It appears that, at best, it can be concluded that the upstream results may be equivalent or slightly higher than the earlier downstream results.

It may still be the case that a distinct source or sources could be identified in this collection system area. However, it appears from the data collected to-date that the heightened concentrations are predominately system-wide. Even in the area that showed the highest concentrations (Lacrosse and Crestline), potential upstream sources were very few. Besides residential homes, the following were identified: two churches, a high school, a laundromat, two restaurants, a repair shop, a thrift store, a convenience store, and a drugstore.

2.2.4 N. Erie Interceptor and Hartson and Fiske Interceptor Monitoring: November 2016 – July 2017

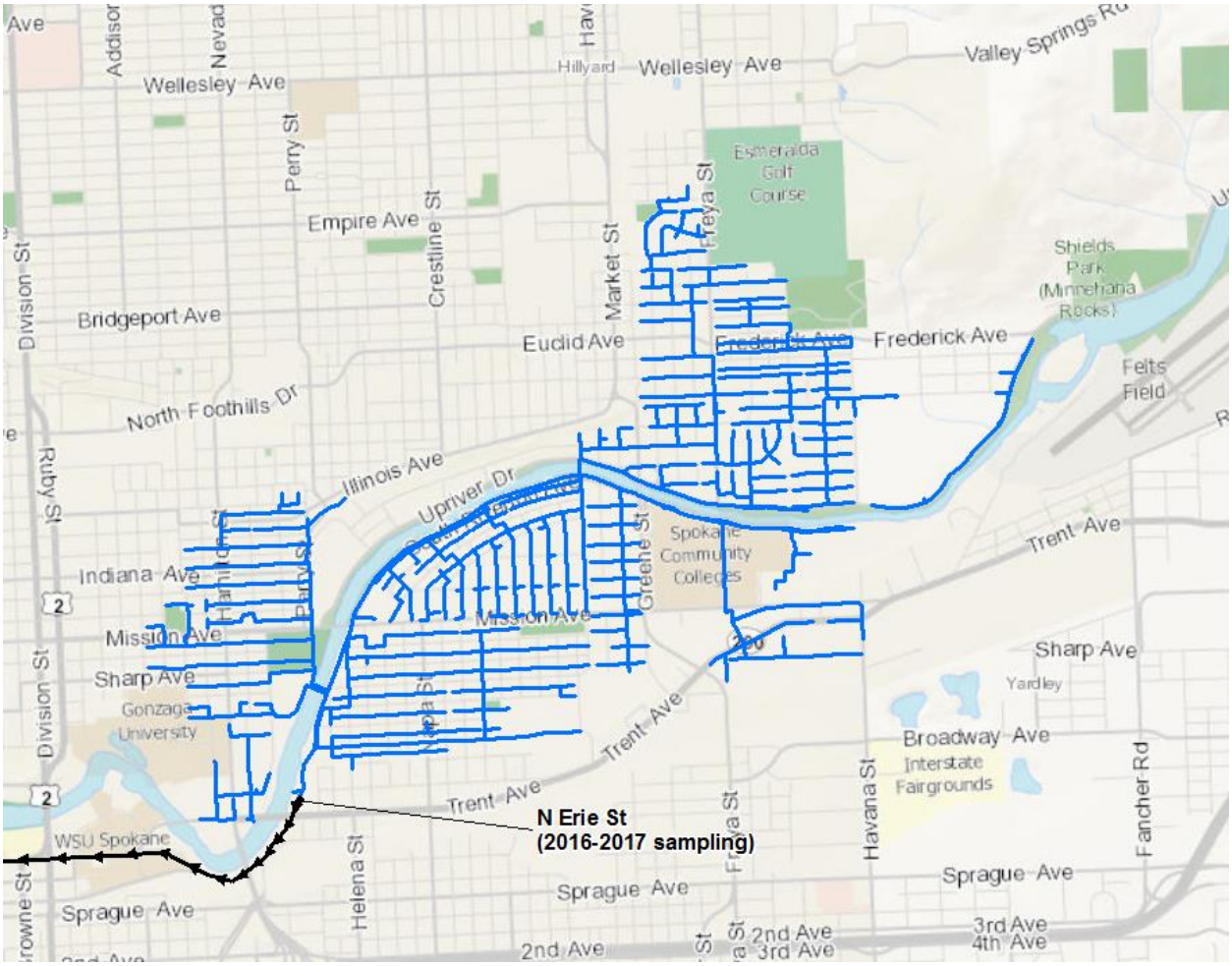


Figure 2-5. N. Erie Street Sampling 2016-2017

Sampling for November 2016 through July 2017 focused on two new areas of the collection system. The first location was on N. Erie St., just north of Trent Ave. The second was located at the intersection of E. Hartson Ave. and S. Fiske St., next to Underhill Park. The collection system areas these locations cover are highlighted in figures 2-5 and 2-6. Both of these locations contain a mixture of residential, commercial, and industrial land use areas.

Sampling results for the Hartson and Fiske location were generally lower than typical RPWRF influent. Total PCB levels averaged 5,800 pg/L with a maximum concentration of 9,600 pg/L. Homolog and congener patterns appeared similar to the RPWRF influent results. Based on these lower results, additional sampling in this area is not being pursued at this time.

PCB sampling from the N Erie location averaged 53,900 pg/L with a maximum concentration of 290,000 pg/L. Results exceed all 4 of the statistical criteria listed in 2.2.1. Previous stormwater testing in this area (Union Basin) also showed elevated PCB levels.

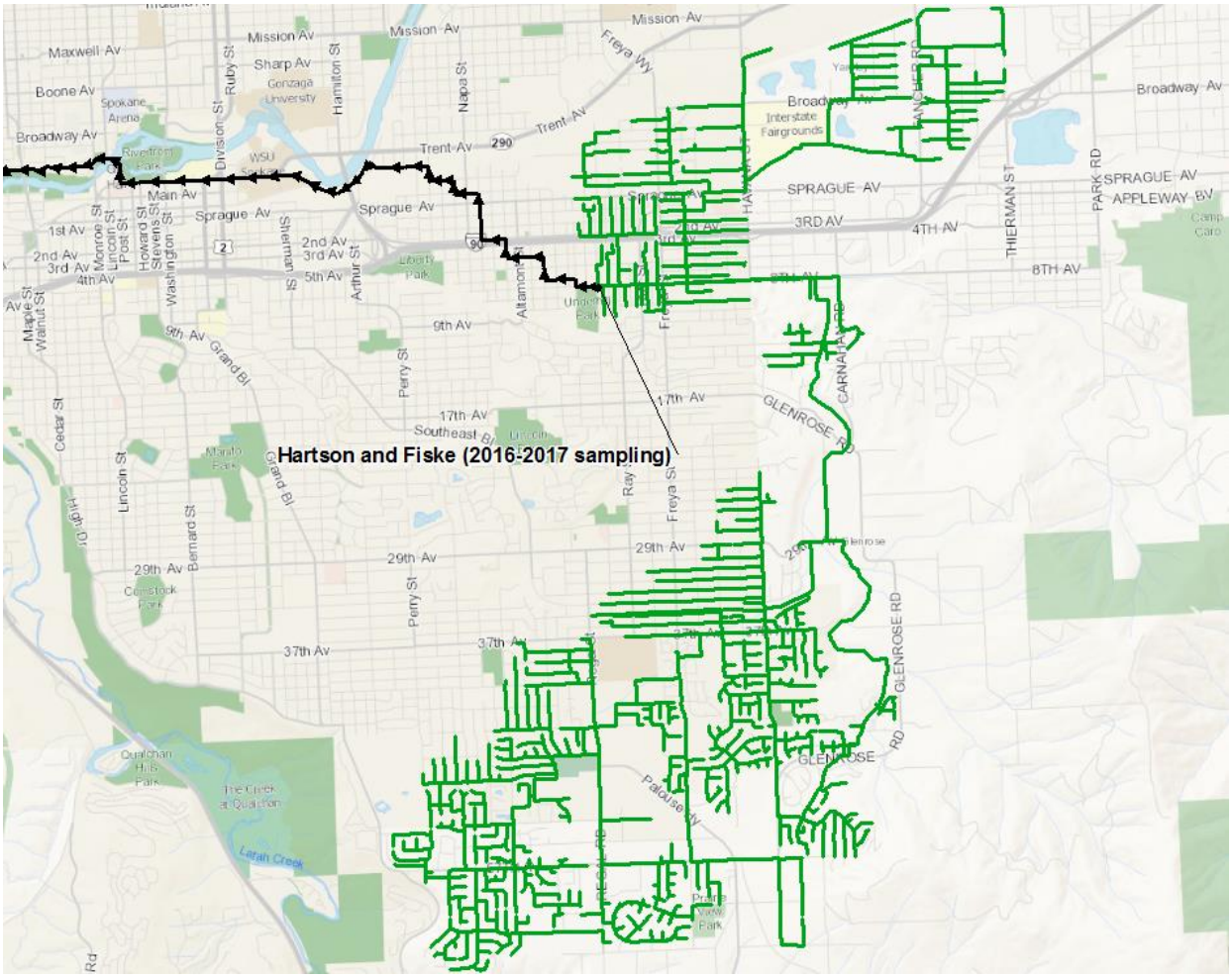


Figure 2-6. Hartson and Fiske Sampling 2016-2017

2.2.5 Future Monitoring: Nov 2017 – Jul 2018

Based on the higher concentrations found in the N Erie sample location, one of the locations chosen for the next sampling period is upstream from here at Riverton and Regal as shown in figure 2-7. The second location is at Assembly and NW Blvd. and is highlighted in figure 2-8. The Riverton and Regal location contains a mixture of residential, commercial and industrial land use. The Assembly and NW Blvd location contains mainly residential with some commercial land use.

Once sampling has been completed in the Assembly and NW Blvd and Riverton and Regal areas, potential future areas could include the Lower South Hill, Downtown, and North/North-Central Spokane. Future areas will be chosen based upon whether any sources were identified in previous sampling efforts. The flowchart in Fig 2-1 will also be used in future monitoring activities.

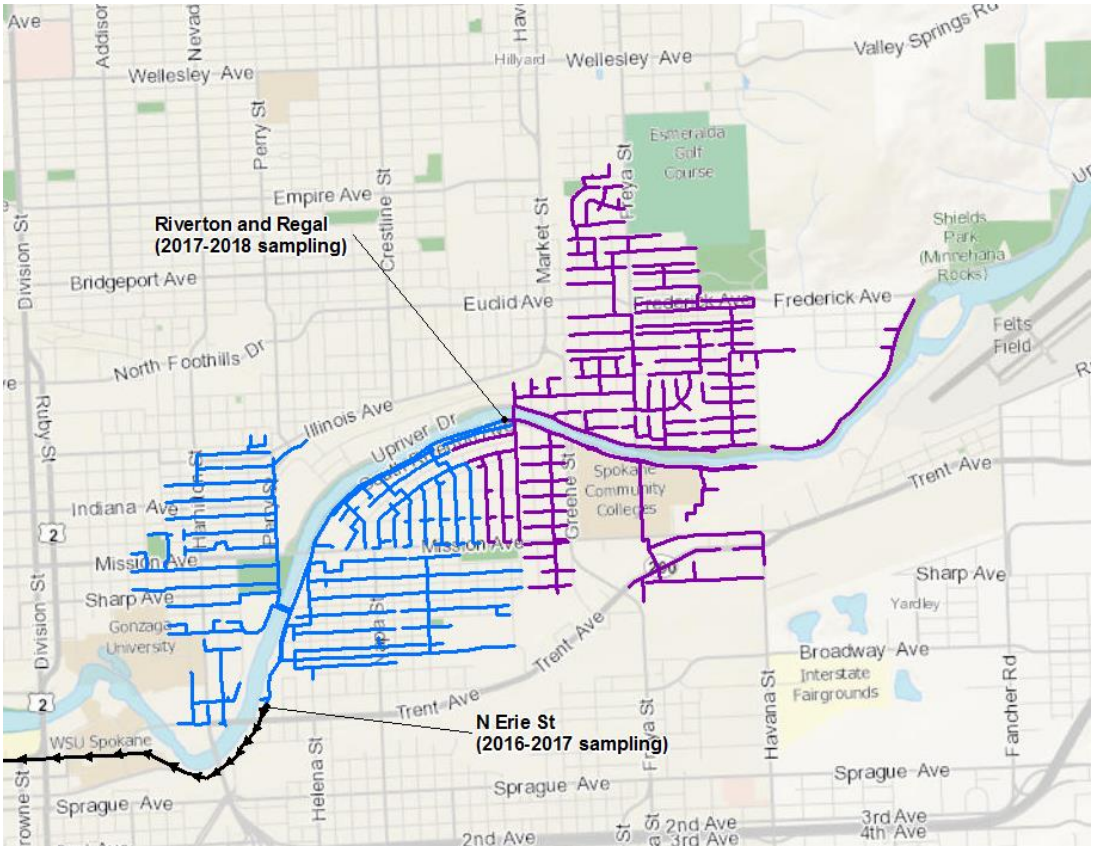


Figure 2-7. Riverton and Regal Sampling 2017-2018

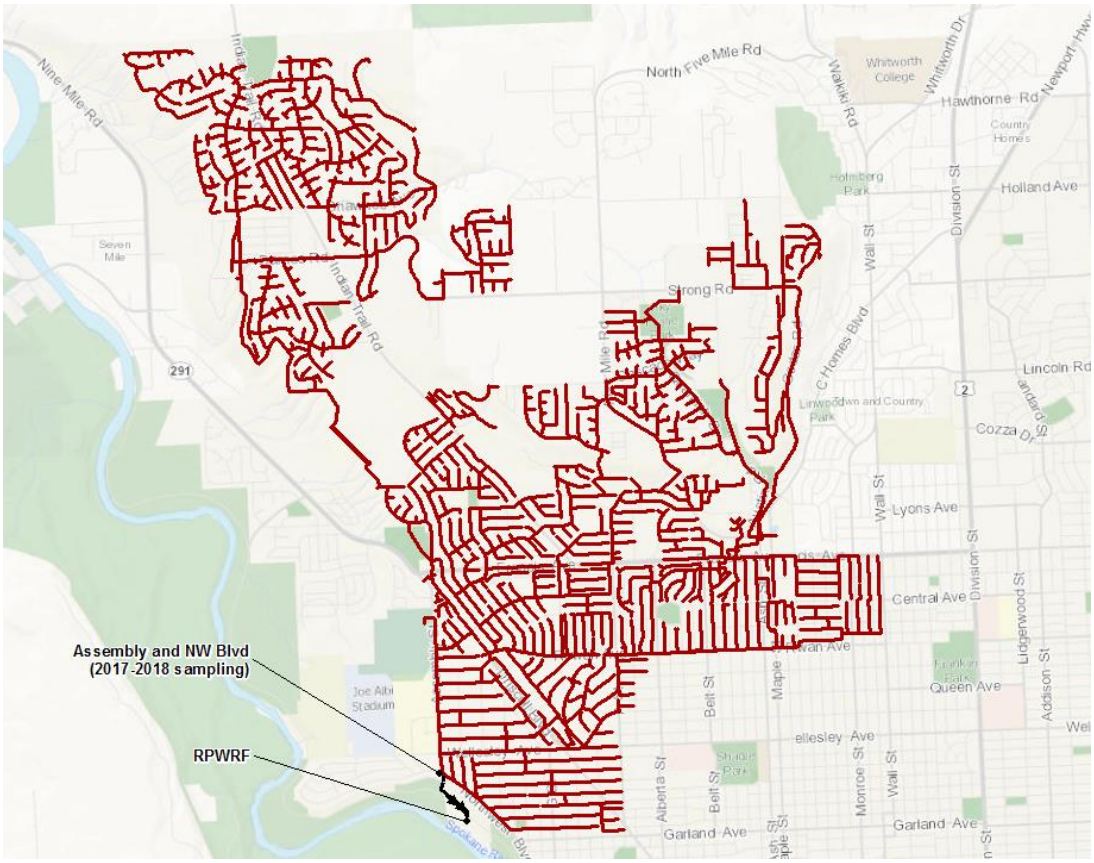


Figure 2-8. Assembly and NW Blvd. Sampling 2017-2018

2.3 PCB Congener Pattern Analysis

Congener patterns were analyzed to determine the extent to which Aroclors represent the loading to RPWRF. Figure 2-9 shows the congener distribution of the RPWRF influent compared to a mixture of some of the more commonly produced Aroclors. The linear combination of 11% Aroclor 1242, 12% Aroclor 1248, 50% Aroclor 1254, and 27% Aroclor 1260 was found to be the best-fit solution for RPWRF influent. As can be seen in Figure 2-9, Aroclors appear to be the predominant PCB source to RPWRF. The only significant congener that is not accounted by Aroclors is PCB-11, representing approximately 2% of the influent mass of PCBs. PCB-11 has been known to occur inadvertently through the production of other chemicals (such as diarylide yellow pigment).

In order to determine if the heightened loading coming from the N.E. Spokane Interceptor area represented a distinct source of PCBs, congener patterns for these samples were compared to the RPWRF Influent. As can be seen in figure 2-10, all three of the initial sampling sites in the N.E. Spokane area corresponded very closely to the influent congener pattern. This suggests that any potential sources in this area have a similar Aroclor makeup to that of the RPWRF influent. This also points to the previous assertion that sources in this area may be more widely dispersed and not necessarily attributable to single dischargers to the sewer system.

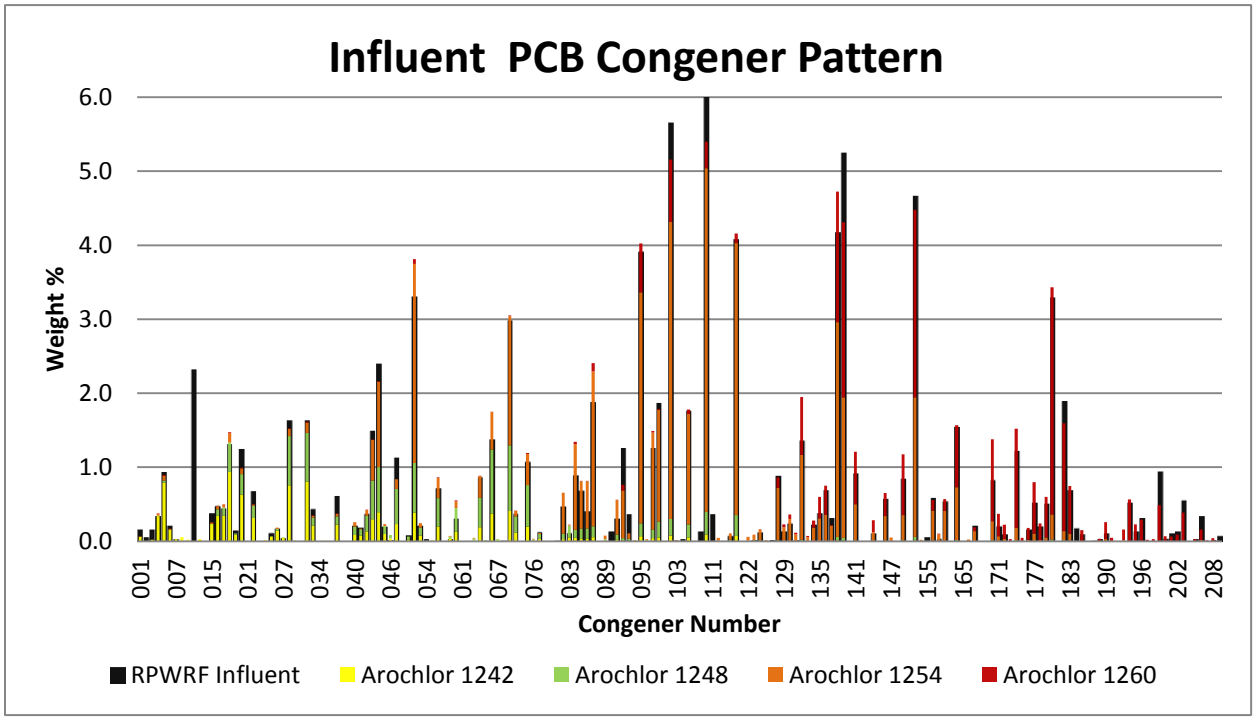


Figure 2-9. Best-fit comparison between RPWRF Influent and Aroclor mixture

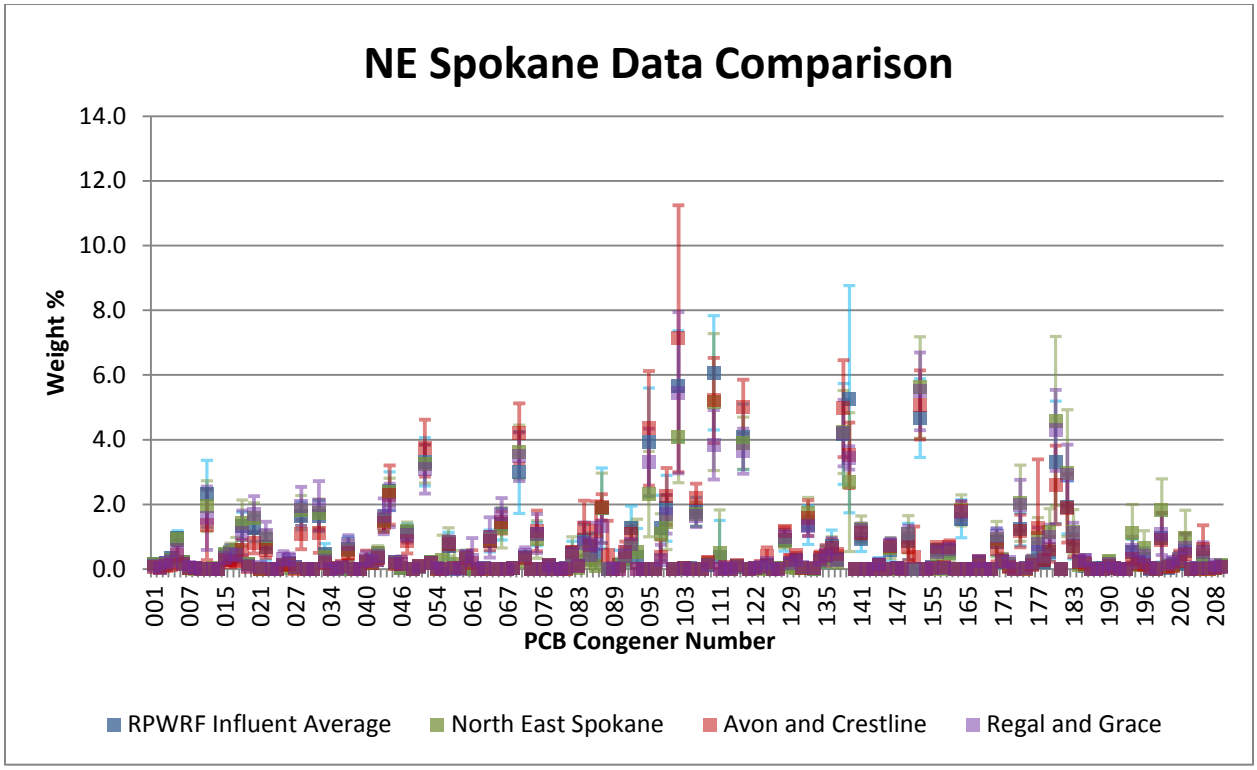


Figure 2-10. RPWRF Influent compared to NE Spokane sample locations. Errors bars represent ± 1 standard deviation.

Congener patterns were compared to determine similarities between RPWRF results and results from other dischargers in the Spokane area. Figure 2-7 shows the results of this comparison between RPWRF influent sampling and Spokane County's two influent streams (South Valley Interceptor Pump Station, SVIPS, and North Valley Interceptor Pump Station, NVIPS). The chart shows the ratio of each individual congener to the total PCB value for a given sample, averaged together for 2014 (with error bars representing the standard deviation). The congener patterns at all three of these locations correlate with one another strongly. The only major statistical difference that can be seen is in PCB-11 for NVIPS (7.6 ± 4.3% in NVIPS vs. 2.3 ± 1.2 % in RPWRF Influent).

Congener patterns were also compared between the City of Spokane Influent and Liberty Lake Influent (see: Figure 2-8). As with the NVIPS interceptor, PCB-11 was significantly more pronounced in the Liberty Lake sample (12.3 ± 4.4% in Liberty Lake vs. 2.3 ± 1.2 % in RPWRF Influent). All other congeners appear to conform closely to the Aroclor distribution found in the RPWRF Influent.

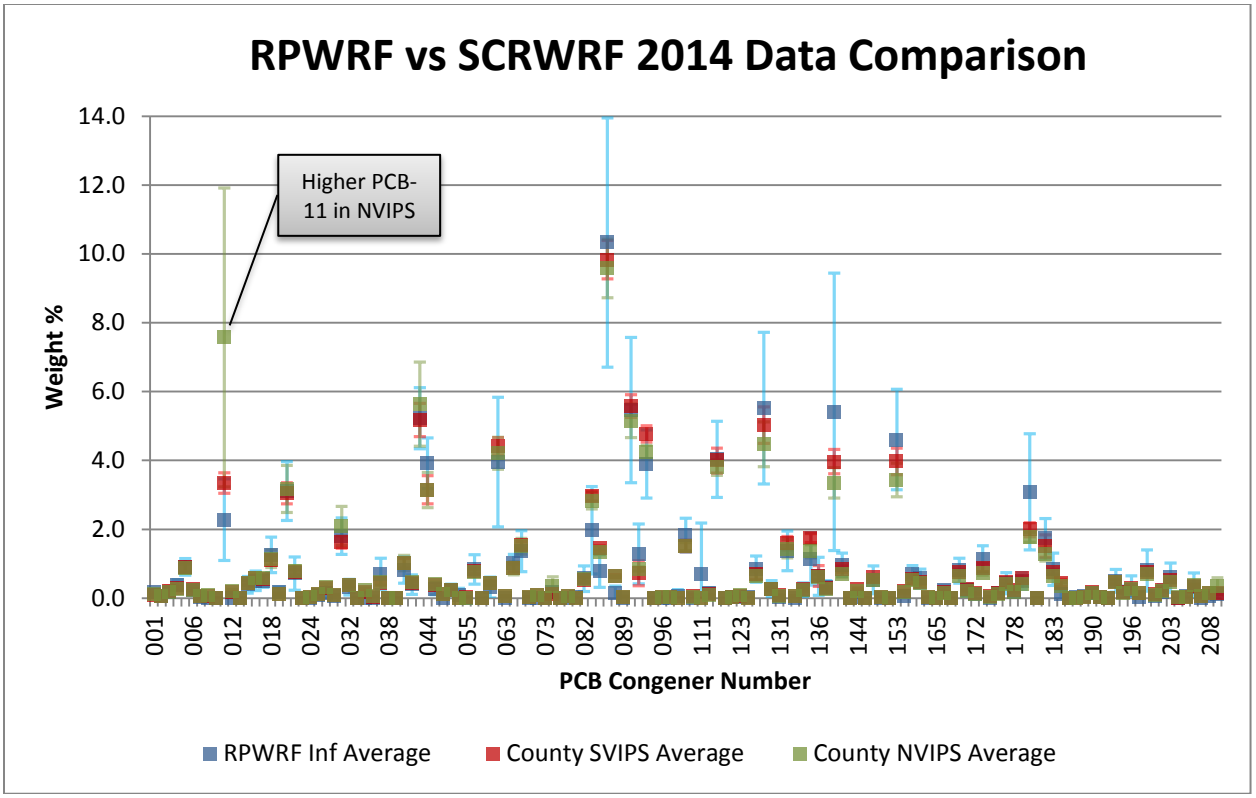


Figure 2-8. 2014 RPWRF Influent compared to SVIPS and NVIPS. Errors bars represent ± 1 standard deviation.

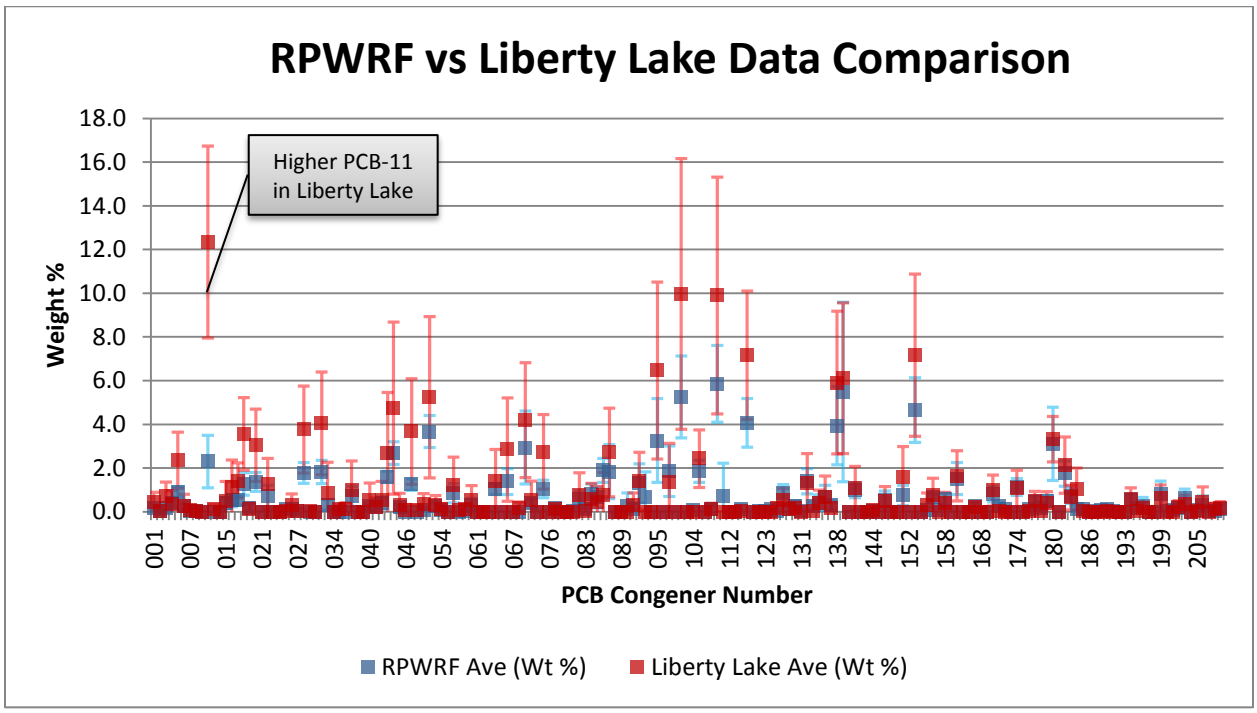


Figure 2-9. 2014 RPWRF Influent compared to Liberty Lake. Errors bars represent ± 1 standard deviation.

2.4 Reporting of Monitoring Results to Ecology

As outlined in the NPDES permit, a summary of the previous year's monitoring data will be reported to Ecology annually on September 15 along with updates to the TMP. The report will contain all RPWRF and collection system data for PCBs, PBDEs, and 2,3,7,8-TCDD for the previous year. This will include copies of the original laboratory reports, homolog totals, and QA/QC results, including a description of any QA/QC discrepancies. The report will also graph total PCBs and totals by homolog to aid in pattern analysis. PBDE and TCDD results will also be graphed. Annually, the City and Ecology should confer and if necessary, revise any locations and frequency of the raw sewage sampling in the collection system for the above pollutants.

2.5 Approach to Establishing PCB Reduction Measures

Wastewater utilities generally use three approaches to control pollutants for dischargers[15]:

1. **Monitoring to demonstrate no discharge of concern.** In this approach, the treatment plant routinely gathers pollutant information in its discharge to determine whether specific pollutants need to be controlled. If monitoring at a frequency sufficient to characterize the discharge demonstrates no discharge of concern, additional control measures are not necessary. Although the City will monitor plant influent and effluent as required by the NPDES permit, this approach alone is likely not sufficient to meet the program goal stated in Section 1.3.
2. **Issue a control mechanism to dischargers (Pretreatment Program).** This approach establishes controls for non-domestic users through the use of permits and the establishment of a pretreatment program. The City has already established a pretreatment program. Additionally, the program establishes requirements for permitting, monitoring, and reporting and gives the City the legal authority to enforce these requirements. The pretreatment program is further defined in Spokane Municipal Code Chapter 13.03A.
3. **Establish specific Best Management Practices (BMPs**). This approach involves the issuance of a control mechanism that defines BMPs which a non-domestic user must implement as a condition of discharge to the Plant. Once users have implemented BMPs, monitoring or analytical sampling by dischargers may or may not be required.

The City will primarily use the BMP approach and will implement a program which establishes both mandatory and voluntary BMPs. Where mandatory BMPs are developed the City will establish specific action items and dates for completion. The City will promote voluntary BMPs and identify ways to increase awareness of, and participation in, these programs. In the future, the City may choose to develop mandatory practices for specific users.

3. CITY OF SPOKANE PCB REDUCTION ACTIVITIES

3.1 Completed and Ongoing Toxics Reduction Measures

The City has taken a number of steps to control Toxics in the Spokane River. A majority of these activities are ongoing efforts. Some of these projects include the actual removal of known PCB sources while others are more focused on creating the framework for reduction efforts in the future. Below is a list of projects that have been completed by the City or are ongoing:

1. **Developed Quality Assurance Project Plans (QAPPs) to guide toxics sampling and analysis.** QAPPs were developed for the NPDES wastewater permit, stormwater sampling efforts, and PCB product sampling. These plans define the locations of where PCB sampling will take place as well as dictate the protocol to be followed for the generation of defensible analytical data. These QAPPs were all developed with input from the Department of Ecology. QAPPs were also approved by Ecology when they were related to stormwater and wastewater permitting or where funding sources came from Ecology.
2. **Monitoring PCBs in stormwater and wastewater.** Wastewater is sampled and analyzed in both the influent and effluent of the treatment plant as well as at various points in the collection system. Additional stormwater sampling was also conducted for the ICWP, and included PCB analysis. Sampling locations have included the Cochran, Washington and Union stormwater basins (including both at the Union outfall and in the vicinity of the City Parcel site). CSO 34 and CSO 6 have also been sampled during storm overflow events.
3. **Removed and continue to remove PCB-laden stormwater sediment from the system.**[16] Stormwater sediment has been removed from catch basins in the Union stormwater basin and industrial and commercial portions of the CSO 34 basin and analyzed for PCBs. Because none of the Aroclor analytical data exceeded the 1 mg/kg residential cleanup threshold, all sediment was able to be disposed of at the City's Northside Landfill. Of the 280,000 lbs of sediment removed in 2010 (Union Basin and heavy industrial CSO 34), approximately 26 grams of PCBs were removed from the system. In 2011, 268,000 lbs of sediment was removed (CSO 34 between the heavy industrial zone and I-90) and resulted in a reduction of approximately 3.7 grams of PCBs. In 2012, 39,600 pounds of sediments were removed, resulting in a reduction of about 2.7 grams of PCBs.
4. **Completed construction of a stormwater decant facility.** In August 2014, the City completed construction of a decant facility at the Playfair site to manage catch basin cleaning solids and liquids. The facility uses evaporation to manage the liquid waste rather than discharge to the sewer, effectively preventing this PCB source to the sanitary system.

   Based on available data, it is estimated that about 25 grams of PCBs are contained in the catch basin sediments removed from the storm sewer system on an annual basis through routine maintenance activities.

   The City partnered with the Toxics Taskforce in 2015 to further test the PCB content of the materials at the Playfair facility as well as a decant facility operated jointly by the City of Spokane Valley and WA-DOT. This study sought to determine the effectiveness of PCB treatment at these locations and provide additional data for estimating PCB load reductions to the stormwater system. A report on this study is now finalized and can be found at the SRRTTF website: http://srrttf.org/?page_id=4280
5. **Install Best Management Practice controls to prevent PCB-laden stormwater from entering the Spokane River**. The City received a grant from the Department of Ecology to disconnect the Union Basin MS4 system from its outfall and treat and infiltrate the stormwater rather than discharging it to the river. Once completed, this project will result in significant reductions in PCB contributions to the Spokane River.

   As of August, 2017, a majority of this basin has been converted to infiltration but there still remains a small active discharge to the river. A future, Erie Stormwater Project has been planned to remove and infiltrate a majority of the remaining flow to this outfall. The existing outfall pipe will remain in place as an emergency overflow point once the Erie project has been completed.

6. **Removed PCB containing equipment from City Departments.** An effort was undertaken in the mid-90s to remove PCB-contaminated and PCB-containing equipment from City departments where equipment of this nature was used. The city no longer contains any equipment that is reported under TSCA. The City routinely upgrades its older mechanical and electrical equipment as part of ongoing Capital Programs.
7. **Collaborated with other dischargers, regulators, and other environmental organizations through participation in the Spokane River Regional Toxics Task Force (SRRTTF).** As part of the NPDES permit requirements, the SRRTTF was formed in 2011 with the goal to reduce PCBs and other toxics in the Spokane River. The Task Force will play a key role in supporting the implementation of this TMP. The City of Spokane is an active member of the Task Force, the Technical and Funding Work Groups, and the Task Force's Administrative and Contracting Entity.
8. **Built and continue to build CSO storage facilities.** A majority of the City's original sewer infrastructure was built as a combined sewer system, combining stormwater with sanitary sewer flows. The sewer system, as it was originally designed, could not handle the vast fluctuations in flow due to storm events and would divert portions of the flows to the river at various Combined Sewer Overflow (CSO) points along the river. In order to curtail the number of overflows occurring throughout the year at CSOs, the City's approach has been to build CSO storage tanks in order to equalize storm flow and fully treat the stormwater/wastewater at RPWRF. The current treatment processes at RPWRF have shown to typically remove around 90% of the PCBs entering the plant. This means that as less volume from CSOs goes to the river and more is treated at RPWRF, a larger amount of PCBs would theoretically be removed from the system.
9. **Public education.** The City has completed several public education efforts which in turn should lead to increased protection of the Spokane River. The first of these was the promotion of Low Impact Development (LID). A utility bill insert, a brochure handed out with commercial building permit applications and available in the City's permit center, and an associated web page on Wastewater Management's web site (http://www.spokanewastewater.org/LID.aspx), highlighted ways to use natural features within development projects in order to filter and retain stormwater as close to where it falls as possible. An LID demonstration site was constructed at the Hazel's Creek regional stormwater facility, where the public can take a self-guided tour to learn about the natural hydrology and LID. A brochure can be downloaded on our website at http://www.spokanewastewater.org/HazelsCreek.aspx. Implementation of LID will prevent PCB-contaminated runoff from entering both the CSO and MS4 systems within Spokane.

   Storm drain markings continue to be installed throughout the city. The markings give a phone number to report illicit discharges and encourage "only rain down the drain." Priority areas were developed where the markers would have the most effect. The markers were installed in these priority areas and are now being installed throughout the City as part of Wastewater Management's maintenance activities.

   A stormwater educational guide was developed by the City in collaboration with the Spokane Riverkeeper and Spokane River Forum. This guide informs industry and the public about how the stormwater system works, what can be done to prevent pollution from entering the system, and how to address stormwater requirements in the City's commercial building permit and Ecology's stormwater permit processes. It is available on the Spokane River Forum website (http://www.spokaneriver.net/?page_id=7688) and in hard copy at the City's Development Services Center.

   A public education presentation has been developed by the collaborating public information officers for the entities that make up the SRRTTF. This presentation was designed to be used for public meetings, presentations at schools, and possibly the city government cable TV station. The presentation will inform the public of the PCB issue, describe what actions the SRRTTF is doing to help combat the problem, and offer suggestions on how the public can help.

   City staff and SRRTTF members have contributed to Spokesman Review newspaper articles surrounding PCBs and toxics in the river. Taskforce members have also made presentations at conferences and taken part in discussion panels surrounding the issue. A media specialist for the City has been working solely with the Utilities division on PCB and other related public outreach activities.

   City staff participated in educating a group of WSU students in February 2014 on the PCB issue in the Spokane River. The students were part of a multidisciplinary competition entitled *Saving the Spokane*. The

goal of the competition was to look for innovative ways to reduce PCBs and other pollutants from entering the Spokane River. City staff led a group of students on a tour of the Union Basin and City Parcel cleanup site, Cochran Basin outfall, and the RPWRF outfall. Discussions on the tour centered on the background of the PCB issue and the City's efforts in this area.

A PCB information page was added in 2015 to the City of Spokane website (https://my.spokanecity.org/publicworks/wastewater/pcbs/). The page outlines the PCB issue in the Spokane River, what the City is currently doing about it, and how the public can help.

A PCB information packet was developed in 2017 for distribution to City of Spokane Pretreatment Significant Industrial Users (SIUs). This info is attached in Appendix I. The packet is being mailed out and discussed with SIUs during the annual inspection process. The main goal with providing this information is to increase awareness among the City's permitted industrial users of the PCB issue in Spokane, the steps that are being taken to address PCBs, and how dischargers to the sewer system can reduce PCBs. The packet was compiled from information developed by Ecology, Spokane County, SRRTTF, and the City of Spokane.

10. **Low Impact Development incentive ordinances.** In August 2013, revisions to the Spokane Municipal Code were adopted to encourage and incentivize the use of LID in Spokane. LID incentive ordinances were required by August, 2013 as per the consent decree between the City of Spokane and the Spokane Riverkeeper, Center for Justice, and the Gonzaga University School of Environmental Law Clinic. The ordinance process involved the formation of an internal Technical Advisory Committee as well as public involvement through a Stakeholders Group. Technical standards and LID best management practices were developed for inclusion in the LID ordinances through work pursued by Spokane County and other Eastern Washington Phase II jurisdictions on an Ecology funded Eastern Washington Low Impact Development Guidance Manual. The guidance manual is now available on the Washington Stormwater Center's website.

11. **Effectiveness Studies.** The Eastern Washington Phase II Municipal Stormwater Permit requires permittees to collaborate with other permittees to select, propose, develop and conduct Ecology-approved studies to assess, on a regional or sub-regional basis, effectiveness of permit-required stormwater management program activities and best management practices. The City of Spokane collaborated with other permittees and will be a lead entity for two effectiveness studies. One study is the Garland Stormwater Gardens with Biochar Amended Soil. The other study is the Sharp Avenue Porous Pavement. A description of each study is provided in the following paragraphs.

    a. **Garland Stormwater Gardens with Biochar Amended Soil.** Storm gardens are a type of low impact development (LID) method that intercepts and treats stormwater through plants and engineered soil mixture prior to discharging the treated water through infiltration or underdrains. Both eastern and western LID guidance manuals recommend a standard soil mixture of sandy soils and compost for bioretention. However, recent research concluded that phosphorus, nitrogen, and copper can leach from the compost component of the soil mix. Nutrients, some metals, and PCBs, are a concern for the Spokane River and the Spokane Valley Rathdrum Prairie (SVRP) aquifer. Biochar could be a potential alternative to the compost portion of the soil mixture. It is a carbon-rich material produced from thermal decomposition of biomass at elevated temperatures with little or no oxygen. The biomass originates from a multitude of different feed stocks, such as wood or grass. Its high surface area and porosity are desirable characteristics for capturing pollutants. The goal of this study pertains to real world field application of a storm garden with engineered soils amended with biochar. The City will collect, analyze, and review samples of stormwater before and after treatment through the biochar.

    b. **Sharp Avenue Permeable Pavement.** Permeable pavement is a newly emerging stormwater best management practice in Washington State. Some research studies conclude that porous pavement is effective at flow control for stormwater management. However, little information exists regarding the treatment capacity of stormwater pollutants that permeable pavement could provide. The City is interested in gaining a better understanding of treatment capacity through the permeable pavement profile. This study will evaluate the

effectiveness of the permeable pavement system with respect to durability, infiltration rates, and water quality. Design and construction of this study is anticipated to occur in 2017/2018. The assessment is to begin after construction.

12. **City of Spokane Integrated Clean Water Plan.** During 2012 the City of Spokane revealed its integrated planning strategy for reducing the discharge of pollutants to the Spokane River. Whereas before, the City was focused on eliminating only CSO discharges to the Spokane River, the integrated planning approach will work to reduce both stormwater and CSO discharges by focusing on the basins where the greatest amount of pollutants on a pounds per year basis are entering the river. PCBs will be one of the major pollutants considered when selecting the basins to focus on.

    In March 2014, the City of Spokane submitted its Integrated Clean Water Plan (ICWP), a strategy for reducing the discharge of pollutants to the Spokane River. The holistic approach considers all Clean Water Act discharges and works to reduce sanitary effluent, stormwater, and CSO discharges by focusing on projects that have the greatest positive impact to the river. PCBs were one of the major pollutants considered when selecting alternatives. The plan anticipates additional data collection and additional state and federal funding so that the City can operate the Next Level of Treatment year-round to provide enhanced PCB removal and manage stormwater from the Cochran Basin in addition to controlling overflows from the CSO system.[17]
13. **Cochran Basin Monitoring.** The Cochran basin is the largest MS4 basin in the City of Spokane and is comprised of stormwater runoff from residential and commercial land uses. Land uses include approximately 85% residential, 12% commercial, and 3% industrial, spanning nearly half of the entire MS4 system. The basin encompasses about 5,160 acres of the City and is approximately 26% impervious surface. The goal is to comply with DO TMDL requirements by monitoring pollutant concentrations. PCBs will also be monitored from the outflow. The City will collect, analyze, and review samples of stormwater. In addition, the City is looking for opportunities to reduce peak stormwater outflow, provide treatment, and infiltrate stormwater runoff from this basin.
14. **Change City procurement practices to use PCB-"free" products.** In June 2014, the City adopted the ordinance SMC 07-06-172. This ordinance establishes a procurement preference for purchasing PCB-free products over those containing PCBs above the practical quantification limit using EPA method 1668. This ordinance directs those making purchases for the city to select PCB-free products over those containing PCBs unless the cost is 25% more than a comparable product or if it is not technically feasible to do so. This ordinance aligns closely with legislation passed in early 2014 for Washington State which directs purchasing at the state level to use a similar preference for PCB-free products.
15. **Received an Ecology grant to measure PCB levels in City-used products.** During late 2013 the City applied for and received a grant funded by DoE to sample and test various products which could enter the stormwater/CSO system. Around 45 different product samples were collected. See discussion in section 2.1 for further information
16. **Pursuing Legal action against Monsanto.** The City of Spokane filed a lawsuit in August 2015 against Monsanto, the former manufacturer of Aroclors in the US. The City is represented by Baron & Budd PC and Gomez Trial Attorneys, who are involved in similar lawsuits on behalf of the cities of San Diego and San Jose. The City hopes to use any proceeds awarded as a result of this lawsuit to supplement the more than $300 million the City intends to spend on reducing PCBs and other pollutants from the Spokane River.
17. **Fungal Remediation Research.** The City of Spokane funded a research project in 2016 in collaboration with the Lands Council to determine the feasibility and effectiveness of using fungi to break down PCBs in stormwater sediment. The Lands Council tested various strains of mycelium to determine what grows best in the stormwater sediment and sought to determine which types of fungi have the best PCB destruction.

    A final report for this study was provided to the City in July, 2017.[18] All species of mushroom that were tested were able to survive in the incubated stormwater sediment (vactor waste) mixture. The report found that certain congeners tended to decrease in the myceliated vactor waste samples while others tended to increase. It was hypothesized that a biochemical degradation process was responsible for these changes. Changes in total PCB levels through this study were found to be inconclusive.

18. **Developed comprehensive plan for Spokane River collaboratively as part of SRRTTF.** The SRRTTF finalized a comprehensive plan in December, 2016. The goal of the plan is to work towards bringing the Spokane River into compliance with applicable water quality standards for PCBs. Included in this plan is a prioritized list of control actions developed to help achieve the plan's goal. The control actions were developed and compiled by the Taskforce's technical advisor, LimnoTech, and were refined and prioritized by participating taskforce entities. The plan was developed as a living document that will be reviewed and updated regularly based on the current best information.

3.2 Future Toxics Reduction Activities

The following list identifies future potential projects which will be prioritized in consultation with Ecology and the SRRTTF. Some of the projects listed are already in the developing stages, whereas others are solely in the idea stage and may or may not be pursued depending upon their feasibility.

1. **Next-Level Treatment (NLT) at RPWRF.** Facility Plan Amendment III was submitted to ecology in 2013 detailing the City's planned upgrades to RPWRF to address growth and DO-TMDL requirements. Tertiary membrane filtration has been selected as the best option for meeting strict phosphorus removal limits. While the initial purpose of pursuing this NLT system was to address nutrient loading to the Spokane River, PCB reductions should also be expected with the completion of the project. Since PCBs tend to adhere to the particulate portion of the waste stream, further filtration of solids will lead to lower PCB concentrations in the RPWRF effluent. While the City will likely only be required to operate the system in the critical phosphorus removal seasons, operation of the membranes year-round may be pursued for PCB treatment purposes if that is justified by the data and if additional state and federal funding sources are available.

   Pall membranes were selected by the City for NLT in a competitive bidding process during 2016. This pressurized system will be installed as tertiary treatment after the current secondary activated sludge process. Work began in 2017 to build the fifth primary clarifier, a new chemical storage facility, and groundwork to prepare the area where the membrane facility will be constructed. Design and construction of NLT is on schedule to meet the 2021 deadline for achieving the DO-TMDL related water quality goals.

2. **Public education: utility brochure distribution.** An additional public education component that is slated to be pursued in the future is by distributing pertinent information on PCBs with utility bills. The information contained in these distributions would describe the PCB issue for the Spokane River and highlight specific household products which can contain PCBs. To date, specific information is not readily available regarding the differences between truly "PCB-free" products and those labeled "non-PCB" that contain PCBs under the TSCA threshold. This information will be included in public education materials as it becomes available, in coordination with the SRRTTF.
3. **Expand PCBs as an element of the RPWRF pretreatment program.** Another future goal would be to focus portions of pretreatment inspections on those materials listed in Table 2-1 and other potential PCB sources, once more information is available. Additionally, the RPWRF Industrial Waste Survey (IWS) program could incorporate survey questions which would identify specific businesses in Spokane that would have an increased likelihood of contributing PCBs to the system. Once BMPs are developed to address PCB sources, following up on their implementation with self reporting and random inspections would be a way to ensure compliance.
4. **Correlate GIS mapping, IWS, and PCB results.** Wastewater management has developed a Geospatial Information System (GIS) which maps the entire City stormwater and sanitary sewer system. Work has been completed to incorporate the data collected from the IWS program into the GIS maps. PCB results could also be mapped within this system. Having this information mapped would greatly enhance the ability to trace upstream from a PCB sampling site the possible sources that might contribute to increased PCB loading in a particular area.

5. **Pursue Funding Contingent Options in Integrated Clean Water Plan.** As is mentioned in Section 3.1, the City proposed additional stormwater diversion from the Cochran Basin and potentially year round NLT operation in the ICWP. The ability for the City to undertake these options is highly dependent upon securing either state or federal funding. While this funding has yet to be allocated, the City is hopeful that State and/or Federal agencies will see the value in these projects and work with the City to move forward on these actions.

4. TMP IMPLEMENTATION

The schedule for implementation of this TMP will be dependent upon input received by Ecology and the SRRTTF. While efforts are underway to implement portions of the actions discussed in this TMP, the City's resources are finite and, therefore, knowing where those resources can be best used will be valuable. When possible, collaboration with Ecology and other Spokane River dischargers will be the preferred route of addressing how the City handles source control and reduction of PCBs and other toxic pollutants in the area.

Table 4-1 below lists a schedule of activities to be completed under the TMP. The schedule will be updated more extensively as the timelines are further defined for activities to be completed under this TMP.

Table 4-1. Schedule for TMP Implementation

Date	TMP Activity	Status
9/15/2012	Due date for submission to Ecology of first draft TMP	Completed
9/15/2012	Submission of 2011 Annual Toxics Monitoring Report	Completed
9/15/2013	Due date for submission to Ecology of updated TMP	Completed
9/15/2013	Submission of 2012 Annual Toxics Monitoring Report	Completed
9/15/2014	Due date for submission to Ecology of updated TMP	Completed
9/15/2014	Submission of 2013 Annual Toxics Monitoring Report	Completed
9/15/2015	Due date for submission to Ecology of updated TMP	Completed
9/15/2015	Submission of 2014 Annual Toxics Monitoring Report	Completed
9/15/2016	Due date for submission to Ecology of updated TMP	Completed
9/15/2016	Submission of 2015 Annual Toxics Monitoring Report	Completed
12/31/2016	SRRTTF Completes Comprehensive Plan	Completed
9/15/2017	Due date for submission to Ecology of updated TMP	Completed
9/15/2017	Submission of 2016 Annual Toxics Monitoring Report	Completed
Spring 2017-	Begin Implementing BMPs recommended by Comprehensive Plan	Ongoing
Estimated 2018	New NPDES Permit for RPWRF (delayed due to HHWQS issue)	Pending

4.1 Revisions

This TMP will be reviewed annually by City staff. The plan will be revised as future projects and BMPs are developed/refined.

4.2 Department of Ecology Collaboration

Table 4-2 below lists how and when Ecology has collaborated with the City in defining, developing and implementing the TMP and related activities.

Table 4-2. Completed Department of Ecology Collaboration Activities	
Date	**Collaboration Activity**
7/1/2011	NPDES Permit issued to City defining goals and scope of toxics monitoring and TMP.
5/9/2012	Department of Ecology approved the City's QAPP for toxics monitoring. This came after several discussions with DoE staff on how sampling and analysis should be conducted to fulfill the City's NPDES permit.
10/1/2013	Ecology provided comments on the City's previously submitted TMPs. These comments gave suggestions on how the TMP should be expanded as well as what would be expected from the TMP submissions in the future.
10/13/2014	Ecology provided additional comments on the 2014 TMP submittal. These comments were addressed in the 2015 TMP.

4.3 Limitations of PCB Reduction Measures

There are several challenges going forward for controlling PCB discharges to the Spokane River. The first of these is the limited knowledge of what specific materials, while still being under the TSCA limits, contain PCBs at appreciable levels. An informal study of motor oils conducted by the City found PCB concentrations ranging from 8.8 up to 116 ppb. The oils tested included SAE 5W-30 oil, synthetic 5W-30, and transmission fluid (with the highest result coming from the synthetic oil). With these values being nearly a million times greater than the State/Tribal water quality standards, it can be reasoned that motor oil alone may be a significant PCB source for Spokane. Without additional data on other products, it is difficult to advise the public on what should be avoided. Furthermore, with TSCA standards being nearly a billion times more lenient than the water quality standards, there are a myriad of products which all contain significant amounts of PCBs.

The second challenge is overcoming the high analytical costs associated with testing for PCBs and other toxics, especially at the lower detection levels required by the NPDES permits. With PCB analyses of a single sample costing about $1,000 (EPA Method 1668), testing all of the potential sources in Spokane will simply not be feasible. If a source is identified which is believed to have high PCB concentrations (above 0.5 ppm), the less expensive, less sensitive test method will be used (EPA Method 8082).

The final challenge is that even if significant reductions in PCBs from individual point sources are made, it is unclear whether PCB levels will ever meet the water quality standards. With several of the background studies showing PCB levels well above the water quality standards (§ 2.1), it is difficult to conceive returning an urban water system to below the state background levels.

With these challenges in mind, it is important to remember that the Spokane River represents one of the major drawing points to the City. Having a healthy river system will ensure the continued vitality of the Spokane area. The City has devoted significant resources to prevent PCBs from entering its wastewater and stormwater systems and to remove PCBs that nonetheless enter those systems, and the City will continue to do so into the future as an active participate in the SRRTTF.

PCB Chemical Action Plan Overview

DEPARTMENT OF ECOLOGY State of Washington

Reducing Toxic Threats **February 2015**

Tackling a toxic legacy

Reducing toxic threats affecting Washington's people and environment is one of Ecology's priorities. Those toxic chemicals that are persistent in the environment and bioaccumulate in people and animals pose the greatest threat and receive special attention. One of these toxics is polychlorinated biphenyls, or PCBs. PCBs can cause adverse health effects in humans and wildlife including cancer and harm to immune, nervous, and reproductive systems. In 2015, the Washington departments of Ecology and Health released a chemical action plan to guide our state's strategy to find and remove PCBs, and reduce exposures.

From 1929 to 1979, about 600,000 metric tons of PCBs were commercially manufactured in the United States. Although federal law banned PCBs in 1979, there are widespread reservoirs of this toxic chemical in old caulk, electrical transformers, fluorescent light ballasts and paint. In addition, the federal law allowed some historical uses to continue, and set allowable levels of inadvertent production of PCBs in other products, such as in pigments and dyes.

Although a great deal of work has already been done to reduce PCBs, this plan identifies important gaps that need to be filled in order to protect people and the environment. Ecology worked with stakeholders to identify these gaps and prioritize measures to reduce the risk posed by this toxic chemical in Washington.

Recommendations

The departments of Ecology and Health will continue their existing programs, such as cleanup, permitting, stormwater management, and fish advisories. The following recommendations are for new actions in addition to our existing efforts to reduce PCBs.

- Identify PCB-containing lamp ballasts in schools and other public buildings. Encourage replacement with more energy-efficient PCB-free fixtures.
- Develop and promote best management practices (BMPs) to contain PCBs in building materials, both in structures currently in use and those slated for remodel or demolition.
- Assess schools and other public buildings for the presence of PCB-containing building materials.
- Learn more about what products contain PCBs and promote the use of processes that don't inadvertently generate PCBs. Start with an alternatives assessment for pigments and dyes.
- Survey owners of historic electrical equipment to confirm disposal and provide technical assistance.
- Expand environmental monitoring to identify new areas requiring cleanup and investigate air deposition.
- Conduct a public education campaign.
- Conduct a study on PCBs in Washington residents to prioritize future actions.

WHAT IS A CHEMICAL ACTION PLAN?

A chemical action plan identifies, characterizes, and evaluates uses and releases of a chemical, and recommends actions to protect human health and the environment from chemicals that are persistent, bioaccumulative, and toxic.

In developing a chemical action plan, Ecology works with stakeholders and reviews all available information and research on a chemical to identify the most effective means to reduce the use of toxics chemicals.

Ecology has already developed chemical action plans for four chemicals:

- Mercury
- Polybrominated diphenyl ethers (PBDEs)
- Lead
- Polycyclic aromatic hydrocarbons (PAHs)

More information

http://www.ecy.wa.gov/programs/swfa/pbt/pcb.html

Contact

Holly Davies
(360) 407-7398
Holly.Davies@ecy.wa.gov

Learn About PCBs

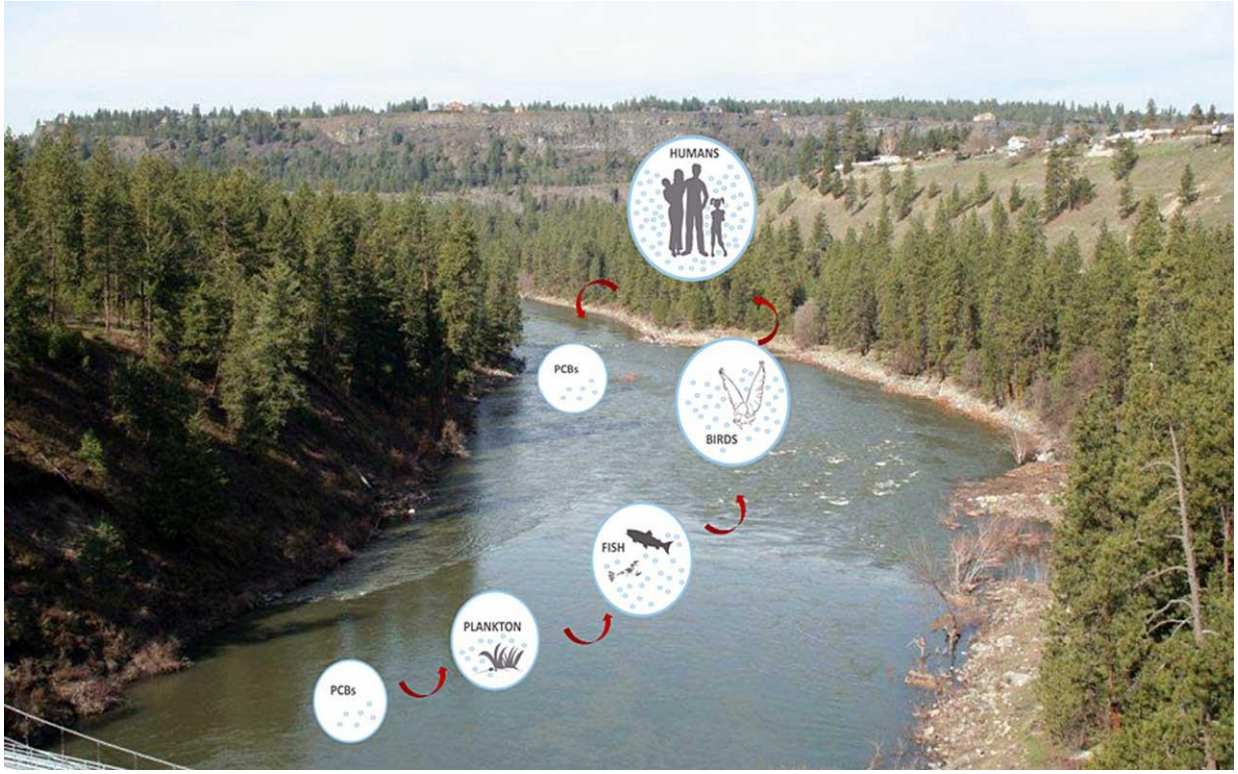
The City of Spokane is working to improve the health of the Spokane River and reduce the amount of pollution that enters it. One important pollutant of concern for the City is PCBs.

What are PCBs?

Polychlorinated biphenyls (PCBs) are a toxic manmade chemical found nearly everywhere in the environment. Historically, PCBs were primarily used in coolants and lubricants in electrical equipment, such as transformers and capacitors. In the United States, PCBs were largely sold under the trade name Aroclor. Direct production of PCBs was halted in the US in the 1970's due to evidence of human toxicity and persistence in the environment. Since that time, however, PCBs have been incidentally produced in a multitude of manufacturing processes as an unintended byproduct of processes that use heat, chlorine, and carbon.

Low levels of PCBs can be found in our wastewater, stormwater, air, groundwater, and even in our own bodies. They enter the environment through a number of different pathways, including inks and dyes (paint, dyed clothing, colored paper and packaging, etc.), motor oil, gasoline, pesticides, personal care products, caulks, and many other products. These products often enter the wastewater system or are washed off the roadway into the stormwater system and enter the river. Once released, PCBs do not break down easily and continuously cycle through the environment. PCB molecules prefer to stick to solids and fats rather than dissolve in water.

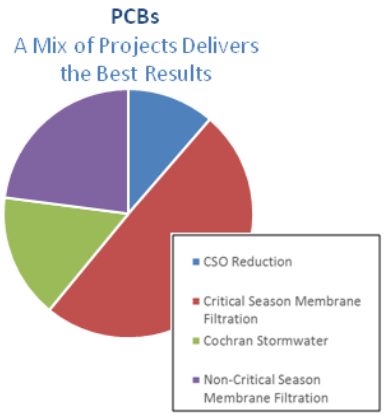
PCB concentrations increase in animals through the food web. Because there are PCBs present in the Spokane River and subsequently high concentrations of PCBs in its fish, the Department of Health has placed limits on the amount of fish you can eat from certain sections of the Spokane River.



PCBs Bioaccumulate in the Food Web

5.1.1.1 Integrated Clean Water Plan & PCBs

The City of Spokane voluntarily developed a comprehensive Integrated Clean Water Plan that will greatly enhance the health of the Spokane River. The plan includes projects to reduce overflows from combined sewers to the river, reduce stormwater runoff entering the river, and to improve the treatment at the City's wastewater treatment plant. The plan includes work that is mandated and other voluntary work that just makes sense for the health of the river.



The plan takes aim at a variety of pollutants and will deliver magnitudes greater pollution reduction benefits to the river than if the City chose to complete only the work that is required by the Clean Water Act and other mandates.

PCBs and related toxics are of particular interest. The Spokane River and Lake Spokane are on the State of Washington's 303(d) list of impaired water bodies for PCBs. As a result, the City is participating in the work of Spokane River Regional Toxics Task Force, which is tasked with developing direct-to-implementation projects to reduce PCBs. The City ranked PCB removal high when it evaluated the environmental benefits of the projects it selected for the Integrated Plan.

An analysis of PCB removal demonstrates the value of the City's Integrated Plan. Mandated projects would deliver about 17 grams of PCB removal annually for the River. When the voluntary components of the City's Integrated Plan—running the membrane filtration technology at the wastewater plant during the non-critical season and addressing the stormwater runoff from the Cochran Basin—the results reach nearly 30 grams of PCB removal annually.

Additionally, it's important to note that PCBs are ubiquitous in the environment, and multiple strategies are needed to address the problem in any significant way. A holistic approach and multiple strategies employed in the City’s Integrated Plan add up to the best PCB reduction for the river.

The Integrated Plan also includes an adaptive management approach. The approach would remove stormwater from combined and separated stormwater piping as part of street and other public works projects. The City has budgeted for a $5 million annual investment for the utility portion of such projects. This work would capture PCBs on site, although the City hasn't quantified the PCB reduction benefit of this approach yet.

Other Efforts on PCBs

The City is continuing with other work to reduce PCBs entering the Spokane River. Among other things, the City is:

- Working on a project to disconnect the stormwater outfall from the Union Basin to the Spokane River. Historically, this basin is heavy industrial area, and testing has shown higher concentrations of PCBs than other areas within the City. The City received a grant from the state Department of Ecology for this work.
- Completing more regular cleaning of sediments in catch basins, particularly in industrial areas, to remove PCBs before they reach the river. Testing of these sediments shows ongoing and diffuse sources of PCBs in some areas.
- Working to identify sources of PCBs. The City received a grant in late 2013 to test for PCB levels in products that may come in contact with stormwater that are purchased by local governments. See the PCB product testing report on our website for more information.
- Implementing its PCB-free product preference purchasing policy. In June 2014, the City Council adopted new policies that require the City to give preference to PCB-free products.
- Encouraging the use of low-impact development techniques by private developers to more effectively manage stormwater on site.

5.1.1.2 What can I do?

We are only beginning to understand the complexity of PCBs in the environment and there is much to learn before we can definitively say how to reduce our impacts. Some things you can do now include:

- Purchase dye-free products whenever possible. PCBs are associated with pigments, especially some yellows, greens, and blues.
- Use all-natural products with the least amount of chemical ingredients.
- Do not flush or dump into the storm drain oils, pesticides, paints, solvents, or other chemicals. Check the Spokane EnviroStars Waste Directory to learn how and where to dispose of them properly.
- Be aware of fish consumption advisories on the Spokane River. Eating lean cuts of meat and low-fat dairy products also may help reduce your exposure to the low levels of PCBs that can be found in animal fats.
- When purchasing pesticides, motor oils, and paints, ask the seller if the product has been tested for PCBs. They may not know the answer, but you will be helping to raise public awareness of the issue.

THE CITY OF SPOKANE

FOR MORE INFORMATION, VISIT OUR WEBSITE:

https://my.spokanecity.org/publicworks/wastewater/pcbs/

PCBs

polychlorinated biphenyls

Spokane County

Advanced treatment technologies used by the Spokane County Regional Water Reclamation Facility are part of the solution.

THE PCB CHALLENGE

PCBs CAN BE FOUND IN EVERYDAY PRODUCTS

How Do PCBs Enter the Wastewater System?

- Atmospheric deposition → Residue rinsed off in showers and through human waste
- Consumer products used in our homes → Dyes washed from clothing and fire retardant materials
- Stormwater runoff → Pigments from recycled newsprint

DID YOU KNOW?

Yellow dyes have higher concentrations of PCBs!

PCB Regulatory Relationships (in parts-per-million)

Federal Allowance in Products	50 ppm
Federal Allowance in Drinking Water	0.0005 ppm
WA State Human Health Water Quality Criteria (allowable in lakes and streams)	0.00000017 ppm
Federal Human Health Water Quality Criteria (allowable in lakes and streams)	0.00000064 ppm
Spokane Tribe Water Quality Standard (allowable in lakes and streams)	0.000000137 ppm

This is often referred to as "PCB-Free".

IMAGINE...

1 part-per-million =

1 inch in 16 miles

1 minute in two years

1 ounce in 32 tons

$0.01 in $10,000

WHAT CAN I DO?

Visit the PCB page at www.spokanecounty.org/water for general consumer awareness. The science community is still learning too, so stay tuned!

Be a consumer advocate for plain packaging that uses less ink since a lot of common packaging contains PCBs due to inks and dyes.

Don't rinse chemicals, solvents, oil, paints, etc. down your home drains or stormwater drains. *"Only rain down the storm drain."*

Learn what, why and where to dispose of hazardous waste at www.spokanewastedirectory.org.

Be aware of fish consumption advisories since PCBs can bio-accumulate in them. Allow fatty tissue to drip away when grilling/cooking.

Wastewater Treatment Facility
Industrial Pretreatment Program

PCB Information Agenda - 2017

1.) Reason for discussion
- Informational only
- NPDES Permit Requirement
- Potential for limits in the future

2.) Packet Overview
- City of Spokane "Learn About PCBs"
- Spokane County "The PCB Challenge"
- Spokane River Regional Toxics Task Force "Help Us Address PCBs…"
- Dept. of Ecology "PCB Chemical Action Plan Overview"

3.) PCB Overview
- Ubiquitous, persistent
- Difficult problem to address
- Current PCB Regulations/Relationships

4.) Finding the Sources
- Legacy
- Current known sources
- City of Spokane study

5.) What Can You Do?
- Educate yourself on this chemical of concern
- Contact materials suppliers and ask for PCB content of products
- Purchase dye-free products whenever possible
- Consider giving preference to low or no-PCB-containing products
- Properly dispose of waste materials from your business. Visit http://spokaneriver.net/wastedirectory/

SPOKANE RIVER
REGIONAL TOXICS TASK FORCE

COLLABORATION INNOVATION PROGRESS

Help us address Polychlorinated Biphenyls (PCBs) in the Spokane River!

The Spokane River Regional Toxics Task Force (SRRTTF) is a collaborative group of governmental agencies, private industry and environmental organizations from Idaho and Washington formed in 2012 to reduce toxics in the Spokane River. These toxics accumulate in fish, and can impact the health of humans that consume the fish.

The goal of the SRRTTF is to characterize sources of toxics in the River and identify and implement appropriate actions to make measurable progress towards meeting applicable water quality standards.

The Task Force and its members have:

- Made measurable progress toward identifying, reducing, and controlling PCBs in the Spokane River, as determined by Ecology progress review—preventing 283 pounds of cancer-causing PCBs from entering the River
- Supported policies that encourage purchasing of PCB-free products, if available (adopted by the State of Washington, City of Spokane and Spokane County)
- Encouraged EPA regulation reform (Toxic Substances Control Act or TSCA) to reduce or preferably eliminate PCBs from new products
- Identified a previously-unknown contribution of PCBs to the River from groundwater
- Held regular workshops to determine the path forward and consult with experts from universities and other areas with PCB contaminated water bodies (Delaware River Basin, San Francisco Bay, Duwamish River)
- Conducted PCB sampling during dry weather along the river from Lake Coeur d'Alene to Lake Spokane to identify PCB loading to the river
- Initiated a ground water sampling study with Ecology
- Conducted and supported studies that sampled commercial and consumer products for PCB content
- Studied PCB levels in sediments and effluents removed from catch basins in Spokane
- Contracted with independent third party advisors – the William D. Ruckelshaus Center, facilitator for meetings and workshops, and LimnoTech of Ann Arbor, Michigan, environmental engineering consultant to guide sampling, identification of PCB sources and development of a Comprehensive Plan of Action
- Worked cooperatively with Ecology's Environmental Assessment Program (EAP) and Urban Waters program (UW) to support and comment on PCB studies impacting the Spokane River (Little Spokane River Listing Verification, and Lake Spokane Long-term PCB Monitoring studies)

Background on Polychlorinated Biphenyls (PCBs)

Spokane River Work Currently in Progress for 2016

- Continued Ecology Urban Waters Ground Water sampling study
- Ecology Atmospheric PCB Deposition study in Spokane
- Ecology Little Spokane River Fish Hatchery Case Study sampling PCBs in effluents and sediments
- SRRTTF Spokane River Monthly Monitoring study (up to 6 months) to determine seasonal variation of PCB loading to the Spokane River
- A SRRTTF Comprehensive Plan with toxics control strategies to reduce PCB loading to the River
- Task Force member projects addressing PCBs: stormwater and wastewater advanced treatment projects, PCB contaminated soil remediation research, and product testing and outreach work.

(See reverse for What You Can Do!)

What are PCBs and Why are they a Concern?

- Manufactured organic chemicals produced from 1935 to 1979
- Currently are "inadvertently" produced in the manufacture of pigments used in industrial and consumer products
- Do not break down in the environment (persistent) and bioaccumulative (build up) in fish, animals and humans
- PCBs can have serious health effects on the immune, reproductive, nervous and endocrine (hormonal) systems in humans and animals. PCBs are considered probable carcinogens in humans
- Can be in the form of 209 different PCB molecules (congeners). Historically these were mixed together to form compounds called "Aroclors"
- Were historically used in an array of industrial, commercial and household products, including transformers, light ballasts, hydraulic fluids, paints and caulks
- Today PCBs may be found in consumer products such as the color pigments in cereal boxes, in deicers and in hydroseeds used in landscaping

Weren't PCBs Banned by EPA in 1979?

- Intentional production was banned by EPA under the Toxic Substances Control Act (TSCA) of 1976
- Continued "inadvertent" production of PCBs during the manufacturing process is permitted in many products, allowing levels up to 50 parts per million
- PCBs are found today in new products such inks and dyes used in some food packaging, paper products, clothing, and paints

How do PCBs Impact Human Health and the Spokane River?

- PCBs are pervasive in the environment and are found in air, soil, fish and water
- PCBs accumulate in the food chain and build up in fish that people catch and eat
- PCBs enter the River through inflow of sediments, storm water, waste water, and ground water along with atmospheric deposition directly to the surface of the River
- Segments of the Spokane River exceed federal, state and tribal water quality standards for PCBs (and Dioxins)
  Many of the species of fish in the River exceed the standards for human consumption. As a result, the Spokane Regional Health District placed a fish consumption advisory on the river in 1995, which continues today.

What Can You Do to Reduce PCB Exposure and Releases to the Environment?

- Purchase and be a consumer advocate for dye-free products when possible (PCBs can be in pigments and dyes, especially yellows, greens and blues)
- Use all-natural products with the least amount of chemical ingredients
- Do not dispose of oils, pesticides, paints, solvents or other chemicals by flushing down the drain or dumping in a storm drain. Check the on-line directory www.SpokaneWasteDirectory.org for proper disposal options
- Do not burn printed paper materials in the fireplace or campfire
- Contain all solid waste in closed bags and garbage cans – prevent contact with stormwater
- Follow fish consumption advisories and allow fatty tissue to drip away when grilling/cooking fish

Where Can You Learn More About PCBs?

SRRTTF Website www.srrttf.org EPA www.epa.gov/PCBs Washington Department of Ecology www.ecy.wa.gov
Idaho Department of Environmental Quality www.deq.idaho.gov/water-quality/surface-water/water-quality-criteria
The Lands Council www.landscouncil.org City of Spokane https://my.spokanecity.org/publicworks/wastewater/
Spokane County www.spokanecounty.org/water (Locate the "PCB" page under "Rivers, Lakes and Streams")

SRRTTF Participants:

City of Coeur d'Alene • City of Post Falls • City of Spokane • City of Spokane Valley • Coeur d'Alene Tribe • Hayden Area Regional Sewer Board • Idaho Department of Environmental Quality • Inland Empire Paper Company • Kaiser Aluminum • Kootenai Environmental Alliance • Lake Spokane Association •Liberty Lake Sewer and Water District • Spokane County • Spokane Regional Health District • Spokane Riverkeeper • The Lands Council • US Environmental Protection Agency • Washington State Department of Health • Washington State Department of Ecology • Washington State Department of Transportation

6. REFERENCES

[1] *Toxicological Profile for PCBs,* US Department of Health and Human Services, 2000. http://www.atsdr.cdc.gov/toxprofiles/tp17.pdf

[2] *Toxicological Profile for Chlorinated Dibenzo-p-dioxins (CDD),* US Department of Health and Human Services, 1998. http://www.atsdr.cdc.gov/ToxProfiles/TP.asp?id=366&tid=63

[3] *National Pollutant Discharge Elimination System Waste Discharge Permit No. WA-002447-3, July 2011.*

[4] *Spokane River Toxics Reduction Strategy, August 2012, Department of Ecology Publication No. 11-10-038.*

[5] *Department of Ecology City Parcel Page.*https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=1023

[6] *Measurable Progress Definition.* *http://srrttf.org/wp-content/uploads/2014/07/Measurable-Progress-Definition-07152014-Final-Revised-Header.pdf*

[7] *An Assessment of the PCB and Dioxin Background in Washington Freshwater Fish, with Recommendations for Prioritizing 303(d) Listings. January 2010.* Department of Ecology Publication No. 10-03-007.

[8] *PCBs, PBDEs, and Selected Metals in Spokane River Fish,* 2005. August 2006. Department of Ecology Publication No. 06-03-025

[9] *Spokane River PCB Source Assessment 2003-2007,* April 2011, Department of Ecology Publication No. 11-03-013.

[10] *Freshwater Fish Contaminant Monitoring Program,* May 2014, Department of Ecology Publication No. 14-03-020

[11] *Guidelines for the Identification of PCBs and Materials Containing PCBs,* 1999, United Nations Environment Programme. http://www.chem.unep.ch/pops/pdf/PCBident/pcbid1.pdf

[12] *Washington State Polybrominated Diphenyl Ether (PBDE) Chemical Action Plan: Final Plan,* Department of Ecology Publication No. 05-07-048.

[13] *PCBs in Municipal products Testing Report 2015.* March 2015. City of Spokane Wastewater Management. *https://static.spokanecity.org/documents/publicworks/wastewater/pcbs/pcbs-in-municipal-products-report-final-2015-03-02.pdf*

[14] *City of Spokane Quality Assurance Project Plan (QAPP) for NPDES Permit Required Study of PCBs, PBDEs, and 2,3,7,8 TCDD,* April 2012.

[15] *Mercury Control and Abatement Plan,* City of Spokane Pretreatment Program, 2012, Draft.

[16] *Adaptive Management Plan for Reducing PCBs in Stormwater Discharges,* City of Spokane Wastewater Management, June 2014. https://static.spokanecity.org/documents/publicworks/stormwater/management/2014-annual-report.pdf

[17] *City of Spokane Integrated Clean Water Plan- Draft,* prepared by CH2M Hill for the City of Spokane, March 2014. https://static.spokanecity.org/documents/publicworks/wastewater/integratedplan/integrated-clean-water-plan-draft.pdf

[18] *Use of Fungi to Degrade Polychlorinated biphenyls (PCBs),* The Lands Council, July 2017

[20] *Recommendations for the Design of a Long-term Toxics Monitoring Program in the Mainstem of the Spokane River,* Department of Ecology Environmental Assessment Program, June 2012, Draft.