

**PMF Work Group call summary**  
**Zoom Meeting – 08/18/2021**

**Attendees:**

Mike Hermanson – Spokane County  
Amy Sumner – Spokane County  
Dave Dilks – LimnoTech  
Lisa Rodenburg – Rutgers University/consultant  
Lisa Dally Wilson – SRSP  
Brandee Era-Miller – Ecology  
Will Hobbs – Ecology  
Jeff Donovan – City of Spokane  
Ben Floyd – White Bluffs Consulting

**Meeting purpose:**

Discussion of the Spokane River PCB holistic analysis

**Meeting summary:**

In advance of the meeting the scope of work with Dr. Rodenburg for the holistic analysis and a report by Dr. Rodenburg entitled “Fingerprinting of PCB congener patterns in samples from the Spokane, WA area” was distributed to the workgroup.

Mike Hermanson summarized what analyses have been completed to date. He also indicated that there is on-going work with the last report to include the recent rounds of SPMD sampling, and that Dr. Rodenburg was going to use the raw SPMD data in the PMF analysis because the biofilm samples were also in a raw mass and not estimated concentration. Dr. Rodenburg added that the prior work included PMF analyses as well as comparing raw data to Aroclor fingerprints using regression analysis when there was not enough data for full PMF analysis. Dr. Rodenburg stated her purpose for the meeting is to brainstorm what data sets would be useful. She indicated that the surface water, fish, biofilm, and SPMD data are the core datasets that tell what is going on in the river, and provided a spreadsheet of what questions each data set can answer. The questions in the scope of work are based on three themes: sources, trends, and comparisons with other waterbodies. Dr. Rodenburg opened discussion by asking the group to identify what data and topics would be useful.

Discussion included several topics: financial budget, the use of mass balance, accounting for stormwater PCB contributions, use of fish tissue data to identify sources and trends, use of SPMD and biofilm data, and use of other systems and Wenatchee River as a comparison to the Spokane River. Each of these are summarized below.

**Financial budget:** There was a question from Dave Dilks and Lisa Dally Wilson whether the budget is adequate for the analysis and if items need to be prioritized. The remaining tasks include PMF for the recent SPMD data, the mass balance and writing the report. Much of the analysis was previously done, and it was determined there is enough budget for the work.

**Mass Balance:** Dr. Rodenburg is planning on using the PMF results of the synoptic data and the associated flow data to do mass balance of the PMF Factors. Dr. Rodenburg and Mike Hermanson indicated that a mass balance on total PCBs and homologs had been previously completed by Limnotech. The process for the mass balance was briefly described and confirmed to be consistent with

the process done by Limnotech. There was some discussion as to whether Dr. Rodenburg could make the necessary connections for a mass balance given that the PMF factors for each media, which are analyzed separately, may be slightly different. Dr. Rodenburg was hopeful that the connections could be made because most of the factors largely resemble Aroclors and there is enough similarity in factors. She confirmed it made sense to analyze the media separately because what is in one media is not going to necessarily be reflected in another due to different processes acting on the PCBs. There was also discussion on combining effluent data with surface water data in PMF to generate more cohesive factors for mass balance. Dr. Rodenburg expressed concern about the blank contamination due to different collection methods used for the effluent vs the surface water samples, particularly as it relates to the silicon factor. Mike Hermanson suggested using the SRRTTF effluent data only in this combined analysis because they were collected in same manner as the SRRTTF surface water samples (e.g. grab samples). Dr. Rodenburg confirmed it might make sense to combine synoptic data since these are all grab samples.

It was determined that a separate mass balance will be needed for each of the synoptic survey years. Dave Dilks questioned whether we would gain much from mass balance in PMF. He is more interested in what is going on in Mission Reach and what can be learned about this from PMF. Brandee Era-Miller stated that the GE site is also interesting because the data shows Aroclor 1260 in the groundwater but when mixed with the river the signature is more like 1254. She noted this is like the Mission reach in which the 2018 high concentration appeared to be 1260 but other years looked more like 1254, possibly due to mixing. Brandee Era-Miller noted that there is a known source at the GE site, but sources are unknown within the Mission reach, and maybe that is where PMF can help.

Stormwater contribution: Dave Dilks confirmed that synoptic sampling focused mainly on low flow so will provide little information regarding stormwater contributions. Mike Hermanson pointed out that the 2014 and 2015 synoptics were low flow conditions, but 2018 included monthly sampling that may account for some stormwater. It was discussed how data from the City of Spokane may provide rough estimate but there is a large uncertainty about what the stormwater loads are over range of conditions.

Fish Tissue: Lisa Dally Wilson asked whether fish tissue could be used as indication of sources or do the metabolic processes change the signature such that they shouldn't be used. Her concern was in consideration of inadvertent PCBs/PCB-11 that are in the water column but do not show in fish tissue. Dr. Rodenburg indicated that metabolic processes are significant, but they do not alter fingerprint beyond recognition. However, in the case of PCB-11, the fish are not going to be helpful in finding the source because it does not bioaccumulate. Later discussions regarding fish tissue noted the importance of separating this data out by time period due to differences in fish age and tissue matrix used (whole vs filet). Fish tissue does not easily allow for temporal trends due to small sample sizes.

Comparison with other systems: Lisa Dally Wilson expressed interest in seeing the comparison of the Spokane to other systems but noted a concern about the proposed systems as having much larger sediment loads than the Spokane, which is sediment deficient. Dr. Rodenburg pointed out that the Spokane River's lack of sediment should mean it responds more quickly to changes in load and that this is already seen in the surface water data. Dr. Rodenburg stated that while the systems listed are different in dynamics, there are similarities in terms of industries and uses. Brandee Era-Miller suggested using the Wenatchee River because it is similar in terms of low sediment and regional setting, but is simpler because there are no dams and there is less development. Will Hobbs offered to share his datasets from the Wenatchee, which includes biofilm, fish and SPMD data. He noted that he does not have flow data. Brandee Era-Miller offered to help Will Hobbs with getting the Wenatchee data to Dr.

Rodenburg. There was question about whether this data needed to be corrected before being sent, due to lack of a PCB-11 signature in the Wenatchee.

SPMDs vs biofilm: There was discussion with how to use the SPMD data. Mike Hermanson pointed out Lisa's finding that the biofilm data is more like fish data and the SPMDs are a good surrogate for water column. Will Hobbs stated in the Wenatchee data, the SPMD data was found to closely correlate with biofilm after corrected to water column concentration. He also noted that there are only two sources (an upriver and downriver source) with different congener patterns that persist through the food web, so there is a clear distinction. Will Hobbs postulated that because there are more sources in the Spokane River, the biofilm may be picking up various signatures and integrating them over time.

Will Hobbs recommended using calculated dissolved concentration in water column for SPMD data, which normalizes the uptake across sites. Dr. Rodenburg pointed out that this conversion is important when discussing the absolute concentrations, but it is less important when discussing relative amounts of different congeners which is what the PMF analysis cares about. The correction changes the proportion of the congeners which is important in finger printing. It was concluded it might be interesting to compare the normalized water column concentrations with the uncorrected data.

**Next Steps:**

Dr. Rodenburg will evaluate the comments on the report and include analysis of the 2<sup>nd</sup> and 3<sup>rd</sup> round of SPMD results in the next revision of the report. Once completed the revision will be sent to the workgroup for review. She will also begin work on the holistic analysis which includes a separate mass balance for each year of synoptic data and a report centered on the questions presented. The next workgroup meeting will likely be to provide input on the holistic analysis.