

Regional PMF Analysis
Conceptual Scope of Work
(Based on May 2016 Proposal by Dr. Lisa Rodenburg)

Proposed approach:

In order to understand the sources of PCBs to the Spokane River, I will conduct factor analysis on PCB data from the Spokane River watershed using PMF2.

Data groups

I propose to divide the data into four subsets:

1. Surface water data (approximately 159 samples once the 2016 monthly sampling is complete)
2. Groundwater data (approximately 238 samples from on-site monitoring wells, on-site near river monitoring wells, deep supply wells, and site background monitoring wells)
3. Wastewater effluents (about 461 samples including Kaiser, about 122 without Kaiser)
4. Wastewater influents and stormwater (about 151 samples of stormwater plus about 100 wastewater influent samples)

Two criteria are used to group the samples in this way. First, a group of samples should be exposed to roughly the same set of PCB sources. This is why surface water and groundwater are grouped separately. Second, a group of samples should have roughly similar concentrations. This is why wastewater influents are separated from wastewater effluents. This is also why wastewater influents are lumped with stormwater, since these groups of samples usually have similar concentrations. Also, in areas with combined sewers such as the city of Spokane, stormwater and wastewater are hydraulically connected and therefore exposed to similar sources. It may be necessary to remove the 339 samples of Kaiser effluent from the wastewater effluent data set and analyze them separately. This would be necessary if the sources to Kaiser effluent are very different from the sources to the other effluents. In such a case, because almost 75% of all of the wastewater effluent samples are from Kaiser, these samples might dominate the PMF solution, masking the non-Kaiser sources.

This grouping is provisional and may need to be adjusted as the analysis proceeds.

Blank correction

I propose to analyze the wastewater influents and stormwater data without blank correction, since the concentrations in these samples are high enough that blank correction should have little or no effect on concentrations.

For the surface water and wastewater effluent data sets, I will perform PMF analysis both with and without blank correction to determine whether blank correction makes a significant difference in the PMF results.

If the PCB concentrations in the groundwater are at least 100 times higher than blank concentrations, then the groundwater data will be analyzed without blank correction. If the concentrations are generally lower than this, then the analyzed with be performed both with and without blank correction.

I will work with the SRRTF to determine the best method of blank correction. In the PMF analysis of the Spokane County SCRWF data, blank correction was performed by subtracting the average mass in the blanks collected for each sampling event regardless of the type of blank (i.e. field, lab, travel, etc.).

Deliverables

The following data and reports will be provided:

- Spreadsheets of PMF input and output for all data sets analyzed.
- Heat maps of the absolute (concentration) and relative (percent of total) abundance of the PMF factors by sample location and sampling event.