Comments on
Spokane River
PCB Stormwater Loading Analysis
Final Technical Report

Prepared by
Environmental Stewardship Concepts
On Behalf of
The Center for Justice
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Issues and Recommendations

- **The estimate of daily PCB loadings from the City of Spokane's stormwater system is far too broad to be useful for making decisions regarding the TMDL**
- **The data used in this report are highly suspect because of major issues in QA/QC**
- **Not all of the stormwater basins in the City of Spokane were sampled. Estimations of these loadings are not sufficient**
- **The report underestimates loadings because it fails to account for stormwater drains and infiltration basins that do not discharge directly into the Spokane River but still contribute to overall loadings through indirect pathways**
- **The difference between the high and low CSO load scenarios suggests that there are significant leaks in the stormwater infrastructure within the City of Spokane**
- **The solids within stormwater drains should be sampled since they are a potential source of PCBs in stormwater effluent**
- **Ecology needs to attempt to identify legacy sites within the city where PCBs are present and contributing to stormwater loadings or running off directly into the river**
- **There needs to be some attempt to verify the data obtained in this report by comparing up and downstream conditions relative to the City of Spokane**

General Comments

In 2006, we urged Ecology to obtain more data on PCB loadings from the City of Spokane's stormwater system. This report attempts to address these issues, and Ecology should be commended for considering the community's concerns. Any estimations of non point source loadings will always be difficult to estimate precisely, and we understand that these numbers are estimations and not exact values. However, there are a number of problems within the report that suggest these estimations may not be entirely accurate.

The conclusion that the actual loading is somewhere between the high and low estimates of 687 and 159 mg/day is not at all useful. The difference between these two values is 528 mg/day, and over the course of a year this could lead to wildly varying estimates of PCB loadings. Ecology needs to develop a much more specific estimation of PCB loadings from stormwater to make these data useful for management decisions.

These estimations of PCB loadings are highly suspect. Major QA/QC issues were identified in the report. The relative percent differences (RPD) between duplicate samples far exceeded reasonable limits, and Ecology's own limit of 15% in many instances. Of the 6 duplicate samples for total PCBs, three had percent differences above 15%, and two over 50%. The data are even worse for total suspended solids (TSS), where all but one of the duplicate samples had RPDs of greater than 15%. The report accepts these data, claiming "In some instances those high values were the result of small absolute differences at low concentrations, which tend to amplify RPDs. In other cases, the high values reflect the heterogeneous nature of environmental samples, and are considered reasonable. Therefore, none of the data have been rejected." While the differences in low concentrations may be applicable for individual PCB congeners, total PCB and especially TSS values should not have this level of variability in duplicate samples. Environmental samples are heterogeneous, but the method in which duplicate samples are collected is meant to minimize this natural variability. RPDs this consistently high mean that either the samples were either collected or analyzed improperly.

These QA/QC issues also appear to have manifested themselves in the data contained in Table 8- the data on PCB and TSS loadings from the sample stormwater basins. These data were recently revised to change most of the values for total PCBs from unqualified to "J Flagged" data which means that they are considered estimates. The revision has resulted in only 6 out of 45 samples being considered unqualified. The reasons for this revision have not been given. Poor sample handling, miscalibrated equipment, or detections at the extremes of the calibration range could all be at fault. Data may be "J flagged" if the numerical value is higher than the range of values over which the equipment was calibrated. Any of these conditions could have led to substantial underestimations of total PCB concentrations. Ecology needs to explain these data and provide an indication of whether the values reported may be too high, too low, or not reliable. Considering the uncertainty in these data, Ecology should provide as much explanation as possible.

Ideally, these quality assurance issues should require that all the samples be repeated, especially if original samples were retained and preserved. If Ecology wants to accept these data as they are, then they have to acknowledge that the samples are unreliable and have a level of heterogeneity that the rest of the report fails to acknowledge. Samples could contain as much as 75% more PCBs

based on these field duplicates. The fact that 87% of the samples for total PCBs were flagged as estimates reinforces this conclusion.

Accepting these samples means that Ecology needs to take a significantly more conservative approach to estimating PCB loadings that includes using 95% upper confidence limits (UCLs) or maximum values instead of average concentrations.

Ecology uses two methods to estimate PCB loadings from the Spokane stormwater system- called the High and Low CSO Loading Scenarios. The High CSO Loading Scenario (or “Simple Method”) is derived from data on precipitation and impervious surfaces within each stormwater basin. The Low CSO Loading Scenario uses discharge data from the City of Spokane and the mean concentrations of PCBs from each basin to calculate loadings. Neither of these approaches is perfect, and each has its own advantages and flaws.

The report needs to note that the “Simple Method” (or “High CSO Load Scenario”) is far more complicated than load estimates derived from the Spokane CSO report, and that the name was developed independently. A citation needs to be provided. The large differences between the two estimates in this report imply serious problems with these calculations. The differences can be directly linked with different flow estimates under each scenario. The “Simple Method” could be overestimating runoff by giving too much weight to impervious surfaces and assuming too little groundwater recharge. It is unlikely that the relationship between runoff and PCB concentrations is linear. They are more likely to be logarithmic, and as a result the model may overestimate low flow concentrations and underestimate PCB concentrations during high flow events.

A more likely scenario is that the lower discharges recorded by the City of Spokane are the result of leaks and decay in the stormwater system’s pipes etc. The differences between the low and high estimations of loadings are simply too great to rule out this possibility. These leaks would discharge PCBs and other contaminants directly to the groundwater before they can be treated. This groundwater will eventually make it into the Spokane River and increase PCB loadings because of the highly permeable nature of the Spokane Valley-Rathdrum Prairie Aquifer. The “Low CSO Load Scenario” would not be able to capture these leaks in its estimations, and should be considered suspect without an in depth review of the City of Spokane’s stormwater infrastructure.

In conjunction with this investigation, Ecology should make an attempt to identify where solids and sediments are building up in the stormwater system and sample them for PCBs. Much like buried sediments in the Spokane River, these solids are a potential source of PCBs in stormwater. Significant reductions in PCB loadings could potentially be achieved just by removing these sediments.

The potential for PCBs to enter the Spokane River through pathways other than the stormwater system should be investigated. The TMDL and this report seem to take the view that all of the PCBs captured by runoff within the City of Spokane will enter its stormwater system. Ecology needs to begin an effort to identify sources like contaminated sites, industrial parks, and other locations where runoff could be going directly into the river and not be captured by the stormwater system. While these sources may not be directly related to stormwater loadings, Ecology has a responsibility to identify all categories of non-point sources and develop a plan to address them. Delineating the gaps in stormwater capture should be a priority for Ecology.

Even components of the stormwater system itself do not appear to be fully addressed. The original TMDL stated that "The City of Spokane also delivers some of the stormwater directly to the river through storm sewers and into ground via drywells or infiltration basins" (Sedar et al. 2006). Why are these drywells not considered in the current analysis? As previously noted, the aquifer under the City of Spokane is highly permeable and does not have the proper geology to retain PCBs (SAJB 2004). PCB contaminated groundwater would flow directly into the river to add to overall PCB loadings. This report also does not address outflows that do not discharge directly into the Spokane River. Even if they are not directly discharged into the river, PCBs from these outfalls will make it into the river eventually. Not including these stormwater system components means that overall loadings are likely underestimated in the analysis.

The decision not to sample all stormwater basins within Spokane has left substantial data gaps in the report. Land use (industrial vs. residential etc) can drastically affect the PCB concentrations within the stormwater. Ecology should find a way to sample all of these basins, particularly since this level of resolution in the data would greatly assist project managers in determining where to best use their resources. At a minimum, Ecology should use the 95% upper confidence limit (UCL) of the mean instead of averaging all samples to estimate loadings in these basins.

The report lacks any sort of verification of its conclusions. The data from other sources could be used in conjunction with sediment and fish tissue data to at least check the assumptions within this report. Given the incredibly wide rage of potential loading values identified in this report, an analysis of downstream concentrations would be incredibly useful.

Specific Comments

Section 1.5.2, pg 6- What exactly is meant by "assimilative capacity" for PCBs? This phrase should be defined because the term is supposed to be used with conventional pollutants that breakdown, are taken up or otherwise do not persist in the active "toxic" form in which first introduced.

Section 2.1, pg 11, first bullet- Even stormwater outfalls that do not directly discharge into the river can contribute to PCB loadings. While PCBs don't enter the river immediately from these sources, they will get there eventually and therefore should have been sampled.

Section 2.2, pg 11, last full paragraph- When stormwater drains are dry, it is the perfect opportunity to collect sediment samples. The concentrations of PCBs in the sediment that accumulates within the stormwater system are valuable data and Ecology should have sampled them.

Section 2.4.2, Table 7, pg 13- There is far too much variation between field duplicates for these data to be accepted. The reasons given for accepting these data may be acceptable for the individual congeners, but for PCBs and TSS the difference between field duplicates should not be this high.

Section 3, pg 13- The link provided to the database of PCB congener data (http://apps.ecy.wa/eimreporting) is dead.

Section 3, pg 13, last paragraph- The mean concentration of PCBs is the wrong metric to use for these calculations. It is more correct to use the 95% upper confidence limit of the mean (UCL) for environmental data such as these, particularly when the sample size for each location is so small.

Table 8, pg 15-16- Data were only collected during two months- what was the rationale for limiting the sampling as such? The months sampled were not during the peak months of precipitation for the area. Ecology should collect samples year round to estimate seasonal variation in the PCB loadings.

Table 8, pg 18- Why was only the 75% UCL calculated for these data instead of the 95% UCL? The 95% UCL is much more appropriate.

Tables 10-11, pg 24-27- These tables contain a large amount of unnecessary data. The types of impervious surfaces do not seem relevant to this analysis.

Section 4, pg 32, third paragraph- When estimating loadings from basins not sampled, the average PCB concentration is not the correct measure. Ecology should attempt to obtain samples from all of these basins. There is a tremendous amount of variation in these data, and different basins have significantly different uses and the runoff from these areas could contain higher concentrations of PCBs. At the very least, Ecology should use the 95% UCL for these estimations.