General comments:

Recommend that we begin to describe the watershed more comprehensively using existing understandings and descriptions of the Spokane watershed and subunits.

Propose that the watershed boundary be the entire watershed a (See Section 1.7 in the County’s “Spokane River Watershed Nonpoint Source Phosphorus Reduction Plan” December 2011. – County should have the GIS layers and data for this. To describe the watershed and subunits, you can probably lift much of the data you need to do this directly out of the 2011 document.

If needed, the comp plan could focus on a subset of watersheds (the “urban area”) within this larger area.

This comprehensive plan would benefit by using a “systems thinking” approach (see diagrams submitted earlier). The Spokane River is a series of “bathtubs” and “faucets” with groundwater interactions as well as embedded sources and sinks.

Once sources and pathways are mapped to the compartments, then there is a visualization of the “system” and the places at which control actions become more effective are evident.

For example, fish are embedded sinks in the system. Inputs to the fish include PCBs in fish food and fish introduced from hatcheries outside the watershed. Outputs include PCBs in fish removed from the watershed. Addressing control actions at inputs and outputs addresses reductions of toxics at the source and also permanent removal from the system. Once sources and pathways are mapped to the compartments, then there is a visualization of the “system” and the places at which control actions become more effective are evident.

Another example: the proper disposal of PCB building materials is a control point. This can be managed by actions such as surveys, and implementing renovation and demolition standards.

Regarding the estimate in the “Mobilization in the watershed” section, by drawing a diagram in my head:

Building sources outside to air to dust to stormwater to stormwater drain to river

Building sources inside to air to dust? to ventilation system or flooring/washwater. Then to air or to sewer system to WWTP to river.

Building sources could also come from demolition: direct exposure from rain to materials to stormwater (either infiltration to ground) or to stormwater system to river (or to soils or groundwater to river). Building sources outside could also attach to dust to regional deposition or local stormwater.

All of this calls into question the assumptions that go into the release rate and then the pathway to the river. The estimate from stormwater is .014 kg/year based on the data we see; the estimate from WWTP is 102 – 115 kg/year. Compare with the 53.4 kg/year estimate and this would imply that a majority of the load to WWTP comes from the buildings source? Is this a realistic assumption? If so, a control point might be more relevant inside the building than out. We really don’t have data on what is inside buildings here and whether this is a plausible/reasonable pathway.

If non-fixed building materials go to recycling facilities, then this should be presented as a potential reduction in PCB sources from the watershed (a pathway out). This assumes there is a viable option to manage these materials and control actions would include an education campaign and local ordinances covering demolition, remodel, and disposal activities.

Sources and pathways thinking can be applied on specifically identified sources, which simplifies the discussion on available options.

Inventory of sources:

Legacy – building and building materials

Legacy – spills (known, Toxic Cleanup Sites)

Legacy - spills in the environment (unknown)

Consumer products – Inadvertent (pigments – paints and printed materials)

Consumer products – Inadvertent (other, ag chemicals)

Consumer products – Recycled oil

Industrial equipment – Electric companies (more than one)

Industrial equipment – private electrical

Wastewater treatment plants

The “Transport of PCBs Generated outside the Watershed” can be more clearly written. I think this section (actually most of the pathways section) can be reorganized and more clearly written if some pathway diagrams are drawn first and the text taken from that.

There are inputs to the watershed (these are more than just atmospheric delivery), outputs from the watershed and then a set of values that can be constructed based on what we know (or can reasonably assume) to be pathways to the river.

For example, anything that contains PCBs that is manufactured and brought into the watershed is in this category (pigments, printed materials, consumer products, etc.)

Outputs include wastes disposed of or recycled outside the watershed, atmospheric transport, products or goods assembled here that are delivered elsewhere.

This gets into the minutiae pretty quickly so that is why putting some numbers into diagrams really helps understand the situation. This creates a Spokane river system with “control points” where actions would be the most effective. Second, when the numbers showing orders of magnitude are combined with control points then we begin to identify areas where actions would be most effective.

Whenever a calculation or estimate is made, it should be accompanied by specific references/citations, data, and assumptions used in making the calculation. This may mean including an Appendix at the end with explanatory information. Basically, we should be able to revisit the plan at a later date, as we gain a better understanding of the river, and revise the plan as appropriate. This comment applies for most of the sections.

Blank correction: Whenever blank correction is employed, discuss what method is used and explain the method. There are some situations where this makes a difference (i.e., low concentrations) and other situations where the PCB concentrations are high enough that blank correction is moot. The typical guidelines for what factor is used are as follows:

None, 3x, 5x used for more qualitative aspects and identifying sources or congener pattern analysis.

10x used to imply a statistical certainty about whether or not a congener is present. This is consistent with EPA’s National Functional guidelines (let me know if you need the citation) and often used with respect to toxic clean ups. 10x is typically used for regulatory agency decision making.

This memo combines two concepts, which can be confusing:

Known – what we reasonably have identified as relevant to the watershed and can address

Speculation – what we have identified through literature research about other watersheds and can apply here.

We should be clearer about what data in this memo is known or measured and what we are speculating on or calculating based on other watersheds or studies.

There needs to be a category of “reservoirs” (or “sinks” or “compartments”). A reservoir is a source that does not have a defined pathway to the environment but could become a source if there is a release through a spill, improper disposal, or environmental conditions leading to the release of the pollutant.

Use “pathways” represent the way PCBs travel between compartments ultimately reaching the river.

So, for example: PCBs in the atmosphere travel from regional air to watershed air to snow, to surface water runoff (nonpoint source) to Spokane River. It would help to represent these compartments pictorially. And then individually map the sources from the inventory onto the diagram. (see drawings)

The section “Magnitude of Delivery Mechanisms of PCBs to the Spokane River”: suggest that it be relabeled as “Pathways of PCB movement in the Spokane River.” This section should focus on what we know or can reasonably estimate about the compartments in the watershed and the data that we have. For example, what data do we have that describes the pathway of upper watershed to the Spokane River? Then discuss that that means in terms of contributing sources.

Here are some suggested compartments:

Atmosphere

Regional

Local

Snow

Rain

Tributaries

Latah (Hangman) Creek

Little Spokane River

Lake Coeur d’Alene

Stormwater runoff (nonpoint source category)

Urban stormwater

MS4- direct discharge; infiltration

CSO

Soils

Groundwater

Spokane River

water

“mobile sediment”

Fish

Lake Spokane

Water

Surface sediment

Deep sediment

Fish

Outlet (Long Lake Dam?)

Table 1.

Given the huge range in the estimates, these numbers could be misleading. Recommend presenting them as ranges. Also, was the data checked against the Ecology Chemical Action Plan estimates?

Contaminated subsurface soils: TCP has a cornucopia of information about subsurface soils. This is available but it might take some focused research. The purpose of the Maggi memo was to help prioritize what sites should be considered as we move forward with the comprehensive plan. There is enough information in the memo to do this and select the sites of highest priority for inclusion in the plan.

These are the relevant sites to consider:

Kaiser

Upriver Dam/Donkey Island

GE (near Fancher Rd)

City Parcel

There is LOTS of data on these. Recommend for the others be assessed for potential PCB pathways to the river.

The state requires agencies to use Plain Talk in our documents. Aside from the regulatory requirement, it makes sense. Plain Talk creates a more active voice and makes concepts easier to understand. Using the Rivers and Sediments section, an example of how that language can be “plain talked” follows:

The Spokane River generally lacks fine depositional sediments. In the upper watershed, sediments settle to the bottom of Lake Coeur d’Alene. Below the lake, Spokane River generally flows freely downstream, passing through [eight?] dams. Relatively high river velocities result in few placid areas and generally prevent settling of significant fine particulate matter, even behind the dams. As a result, gravel, cobble and boulders make up almost the entire riverbed upstream of Lake Spokane. Finer sediments are found in limited locations behind the dams, interstitial spaces within the river bed, isolated shoreline deposits, and certain fluvial bar features.

Basically, great improvements result when you replace the verbs “is” or “are” with active doing verbs. . . . this is just for your consideration.

Table 2: Fish Hatcheries and Fish Hatchery discussion

The Spokane Hatchery effluent estimate in the Little Spokane River is embedded in the tributary value.

As far as true sources, there are the PCBs introduced via fish food and the hatchery fish introduced from outside the watershed. As previously mentioned, creating diagrams with compartments and pathways, showing sources and sinks, inputs and outputs, really helps to understand the system.

From the perspective of pathways, the wastewater is one pathway (consumer products to hatchery use to discharge) and the fish are a separate pathway (fish eggs and fish feed to discharge (solids and liquids).

Fish from outside the system (other hatcheries) can also be introduced and loading would be relative to the number of fish x concentration.

Once in the system, the “contribution” of PCB remains from fish to water is a net zero (assumed to be in equilibrium in the system). But there could be pathway out through catch (if the catch is disposed of properly).

So the two control points for managing PCB in fish are the food and the removal. There may be some intermediate management actions that can also be considered.

There are three fish hatcheries on the Spokane River. Two discharge to Spokane Indian Reservation waters. So, depending on where the “boundaries” are drawn for the watershed, this could include those as well.

From PCB CAP (might be useful to express a range of background concentrations in soil based on Washington data):

Meijer *et al*. (2003) estimated that the contemporary PCB burden in background soils is about 2% of the known production volume. PCB levels in U.S. background soils generally average from several hundred to several thousand ppt dry weight (Hornbuckle and Robertson, 2010). An EPA nation-wide survey of soil at 27 remote or rural sites in 2003 put the average total PCB concentration at 3,089 ppt (EPA 2007). The single Washington site sampled during the study – Lake Ozette on the northwest coast – had 2,419 ppt.

With the exception of site-specific determinations for contaminated sites, the PCB background in Washington soils has not been well characterized. Relatively more is known about PCBs in Washington’s marine and freshwater environment, as discussed below.