

Spokane River Regional Toxics Task Force Technical Workshop Meeting Summary- DRAFT

Tuesday, January 13, 2015 | 8:30 a.m. - 4:30 p.m.
Wednesday, January 14, 2015 | 8:00 a.m. - 3:00 p.m.
CenterPlace, Spokane Valley WA.

Comment [AB1]: Add links to the presentations?

Attendees (95 attendees)

Bijay Adams, Liberty Lake Sewer and Water District
Mahbub Alam, WA Department of Ecology
Chip Andrus,
Dale Arnold, City of Spokane
John Beacham, City of Post Falls
Jim Bellatty, WA Department of Ecology
Joel Bird, WA Department of Ecology
Reanette Boese, Spokane County Water Resources
Kevin Booth, Avista
Adriane Borgias, WA Department of Ecology
Ben Brattebo, Spokane County
Lloyd Brewer, City of Spokane
Galen Buterbaugh, Lake Spokane Association
Michael Cannon, City of Spokane
Gregory Cavallo, Delaware River Basin Commission (DRBC)
Brett Converse, JUB Engineering
Michael Coster, City of Spokane
John R. Crawford, Kaiser Aluminum
Lisa Dally Wilson, Dally Environmental
Marcia Davis, City of Spokane
David Dilks, LimnoTech
Jeff Donovan, City of Spokane
Brendan Dowling, WA Department of Ecology
Dan Duffy, City of Spokane
Ryan Ekre, Inland Empire Paper
Brandee Era-Miller, WA Department of Ecology
Haley Falconer, HDR
Kathy Falconer, Idaho Department of Environmental Quality
Karin Feddersen, WA Department of Ecology
Raylene Gennett, City of Spokane
Rod Glasser, City of Spokane

Erica Haenggi, Pace Analytical
Pat Hallinan, WA Department of Ecology
Ted Hamlin, WA Department of Ecology
John Haney, Geogengineers
Lars Hendron, City of Spokane
Brent Hepner, CI Agent
Mike Hermanson, Spokane County
Thomas Herron, Idaho Department of Environmental Quality
Shelly Hicks, Terragraphics
Shawn Hinz, Gravity
William Hobbs, WA Department of Ecology
Kris Holm (webinar), City of Coeur d'Alene
Donald Hurst, Colville Confederated Tribes
Art Jenkins, City of Spokane Valley
Jeremy Jenkins, Liberty Lake Sewer and Water District
Gary Kaesemeyer, City of Spokane
Don Keil, City of Coeur d'Alene
Pam Kish (not sure if attended)
Paul Klatt, JUB Engineering
Doug Krapas, Inland Empire Paper
Greg Lahti, WA Department of Transportation
Michael LaScuola, Spokane Regional Health District
Bud Leber, Kaiser Aluminum
Bo Li, WA Department of Ecology
Rob Lindsay, Spokane County
Jeff Louch, National Council of Air & Stream Improvement (NCASI)
Martha Maggi (webinar), WA Department of Ecology
Laurie Mann, Environmental Protection Agency
Ashley Marshall, City of Spokane
Dave McBride, WA Department of Health
Rachel McCrea, WA Department of Ecology

Lester McKee, San Francisco Estuary Institute (SFEI)
Jim Montague, City of Spokane
Mike Morris, City of Spokane
Dave Moss, Spokane County
David Newton, Inland Empire Paper
Cheryl Niemi (on webinar), WA Department of Ecology
Dale Norton, WA Department of Ecology
Chris Page, Ruckelshaus Center
Grant Pfeifer, WA Department of Ecology
Sandy Phillips, Spokane Regional Health District
Dan Redline, Idaho Department of Environmental Quality
Bryce Robbert, Avista
Lisa Rodenburg, Rutgers University
Lynn Schmidt, City of Spokane
Jeremy Schmidt, WA Department of Ecology

Beth Schmoyer, City of Seattle
Mark Schneider, Perkins Coie
Elizabeth Schoedel, City of Spokane
Jeff Schut, Gravity
Edgar Scott, Kaiser Aluminum
Susan Spalinger, Terragraphics
Pete Stayton, JUB Engineering
Robert Steed, Idaho Department of Environmental Quality
Melanie Thornton, Washington State University
Kate Tillotson, Washington State University
James Tupper (Webinar), Tupper Mack Wells
Diana Washington, WA Department of Ecology
Jerry White, RiverKeeper
Debra Williston, King County
Kara Whitman, Ruckelshaus Center
Ken Windram, Hayden Area Regional Sewer Board

Tuesday January 13th, 2015: Workshop Day One

Introductions and agenda review:

Chris Page went over the workshop agenda. No changes were made.

Briefing Session 1: SRRTTF - Background, Issues, Goals, Past Workshops, State of the Science

Grant Pfeifer, Ecology

Grant Pfeifer, the Eastern Regional Director of the Washington Department of Ecology, commended the Task Force for its novel approach to a very complex problem. Grant noted how prevalent the discussion of PCBs and toxics (especially in products) is statewide, and observed that the Task Force is providing leadership in this area. The City of Spokane's integrated stormwater plan is leading the way and the Smart Street Program, which is part of the plan, has overwhelming support.

Laurie Mann, EPA

Laurie Mann gave a brief overview of EPA's involvement with the Task Force and explained that she, Tom Eaton (EPA's representative on the Task Force), and the EPA are committed to supporting the Task Force and other Toxics cleanup work in the Spokane River Basin.

Dave Dilks, LimnoTech

Dave Dilks gave an update on the Task Force's technical activities to date, and discussed future direction with respect to identification of sources and source reduction. Dave explained the phased approach to the technical work including data gathering, identifying data gaps, collection of new data, analyzing data and characterizing sources, and developing best management practices and a comprehensive plan (Phases 1-4).

During Phase 1, LimnoTech compiled a large set of existing data that other entities collected prior to the Task Force work. In 2013, LimnoTech evaluated the existing datasets and identified data gaps in

understanding PCBs in the Spokane River. These gaps included the identification of true sources, as well as the significance of PCB contribution to the river from groundwater, atmospheric and upstream sources. The work completed since the 2013 Task Force technical workshop includes confidence limit testing and low flow synoptic sampling.

The confidence testing showed that under high flow conditions, concentrations of PCBs were low enough that concentrations in the lab blanks were very close to PCB concentrations measured in the samples. The synoptic sampling event (during low flow) was originally intended to calculate a mass balance and estimate the contribution of PCB from groundwater, but was later modified to a semi-quantitative mass balance assessment and adaptive management approach. The sampling was done during low flow conditions in order to:

- Isolate groundwater PCB contributions
- Develop a best estimate of loading to the river by collecting a series of samples and corresponding flow rates over a discrete set of locations and timeframes, and
- Identify unknown sources.

The synoptic survey identified an area between Barker Road and Trent Avenue Bridge (in the valley) that is a potential groundwater source of contamination.

Work Session #1: Analytical

This session focused on improving the understanding of workshop attendees relative to PCB analytical details and the quality and usability of the laboratory data generated during the May 2014 and August 2014 sampling events.

Richard Grace (AXYS Analytical Labs):

Richard gave a presentation on the basics of PCBs, who AXYS is and what the laboratory does, the basics of High Resolution Mass Spectrometry (HRMS), the EPA 1668 PCB detection method, and the limitations of using this method to measure PCB concentrations in the water column.

A few highlights:

- PCBs are generally biphenyl rings with chlorine substitutions. There are 209 possible configurations, or “congeners”. 12 congeners are considered to be “WHO toxic” congeners because they have chemical structures, properties, and toxic responses similar to 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) (“dioxin”).
- Richard discussed the PCB-Body Burden study from 2003-2004. The results showed higher concentrations in older age groups of congeners associated with legacy Aroclors. Younger age groups have a larger percentage of lower atomic weight congeners relative to the Aroclor congeners. This can be interpreted to mean (1) that exposure of younger groups to the non-legacy sources is occurring and, (2) breakdown of legacy sources over time via dechlorination is resulting in exposure of lighter weight congeners on younger groups.
- Richard also explained:
 - The 1668C analysis process for Aqueous and High Volume samples and Passive matrices
 - The reporting structure using 1668A
 - Different analytical methods and positive identification (1668, EU 657)
 - Blanks in 1668A/C: Laboratories use a Blank QC method and acceptance Criteria to qualify the data. If a congener is found in the sample and also in the blank in exceedance of the acceptance criteria, then it is “B” flagged. Laboratories also maintain control charts for each congener that track the mean and standard deviations of the concentrations of that congener in the blanks. This is used to assess the confidence level

of the data and also identify if there is significant contamination in the laboratory environment (in which case action is taken to address it).

Discussion/Questions/Comments:

- What is the PCB half-life or de-chlorination process? Answer: A PCB will go through a series of de-chlorination steps. Anaerobic bacteria will remove chlorines until there are one or two chlorines remaining on the congener. These mono- and di- chloro PCBs are more likely to be transported because they have a lower molecular weight, and can be volatilized and then broken down further by aerobic bacteria.
- What is meant by “Total PCBs”? Sum of PCBs *measured* (this is important when reviewing laboratory data. If the congener was not part of the analysis, and not measured, it could be in the sample but not indicated in the total).
- Do you see less and less Aroclors over time? Answer: Measurements are changing over the years, becoming more sensitive and complete. De-chlorination is also occurring. The total concentrations are going down, but the whole basis of measurement is in flux:
 - Greg Cavallo explained that they have more field data and there is a lot of de-chlorination and degradation. Have a fingerprint for all of those Aroclor mixtures using 1668A, so they can identify Aroclors using this method. They are still seeing some of those in the environment (uncommon, but it happens).
- Transformer Oil, does it not go through this de-chlorination process?
- Is there a difference between 1668A-C? Answer: as a method they are fundamentally equally capable. *NOTE: for more detail, see http://water.epa.gov/scitech/methods/cwa/upload/M1668C_11June10-PCB_Congeners.pdf*
- Identification vs. Quantification? Answer: J-flagged means the congener has been identified, but the concentration is below the lowest point of calibration (*NOTE: the EPA definition of J-flagged data is at <http://www.caslab.com/EPA-Data-Qualifiers/>*)
- Doing a clean-up procedure on the sample can remove unwanted contaminants and improve detection by reducing the baseline. However, if there are PCB congener contaminants in the blank, that can affect the result. There may be a positive identification for a congener in a sample but it can't be quantified because it is also in the method blank.
- Comment (Mahbub Alam): There is a lot of data on PCBs on solids, not much on water, mostly on Aroclors. We are now looking at water samples/stormwater. Quantification of total PCBs (total congener and total Aroclors) may result in different values for total PCB.
- Composition of Aroclors: there is a wide variety of trace elements in Aroclors (1/1000 of total mass does not impact the analysis). Congeners vs. Aroclors totals, if you include more types of PCBs congeners, then you may see a higher PCB total when reported as congeners vs. reported as Aroclors.
- Is there a point of diminishing returns/break point in the sampling method, at which point a different method is needed? Answer: Eventually going to a high volume sampling method may be necessary when concentrations of PCB are very low.
- Greg Cavallo explained that the best you can do with blank methods is to work with the laboratory to drive the method blank lower and manage the field blank so it is as close to the method blank as possible. Sample size matters. With larger samples, there is potential to measure lower concentrations.
- Dave Dilks explained that in the Spokane River at higher flows, even with a 4-liter sample size we may have trouble with detection. We may need to use a sampling technique that allows more mass of PCB to be collected.

- Each type of blank can have different PCB signatures; do we evaluate each of 209 and subtract out each? Answer: yes.

Work Session #2: Sampling

This session focused on improving the understanding of workshop attendees relative to the details of the synoptic sampling event of August 2014. The session addressed lessons learned related to sample collection in both riverine settings and at point sources, and the potential impact of higher flow conditions on sample collection methods.

Jeff Schut, Gravity: Jeff is the senior environmental scientist for Gravity and has experience in risk assessment, site characterization, water and sediment quality, and toxicology. Jeff has extensive experience with field sampling techniques. Jeff was a project lead in the Task Force low flow synoptic sampling. (Bio from <http://gravityenv.com/people/>.)

Shawn Hinz, Gravity: Shawn is the principal research scientist and senior managing partner for Gravity and has extensive experience with aquatic assessment, research, and planning and implementing highly technical projects. Shawn was a project lead in the Task Force low flow synoptic sampling. (Bio from <http://gravityenv.com/people/>.)

Jeff and Shawn went over the sampling events completed in August of 2014 including the planning, revisions to the Sampling and Analysis Plan, Health and Safety Plan, Invasive Species Plan, sample collection and methods, and deviations from the plan. Gravity collected over 200 samples. Samples included normal, archive, composite, and QA/QC samples.

Jeff explained the methodology used for collecting samples was consistent with EPA Method 1669 (“clean hands, dirty hands”). At most locations direct submersion samples (which reduces air contamination) were collected. There were a few locations where they could not do the immersion sampler and had to use a dip sampler. They also collected general water quality parameters at each sampling location. Samples were kept on ice and secured in a locked vehicle. Custody records and seals were used and samples were hand delivered to Silver Valley Labs (SVL) in Coeur d’Alene and then shipped to AXYS by FedEx. Archive samples were stored at SVL. Jeff and Shawn explained a few deviations from the sampling and analysis plan and corrective actions taken due to environmental circumstances and a FedEx computer shutdown. These events demonstrate the need to continue to have redundancy in sampling efforts moving forward.

Gravity also collected stream flow data; however there were a few locations where data was either incomplete or not available:

- SR-9 (Green Acres) no stream gauge data; however they did collect in-stream measurements.
- Green Street Gauge data not available due to station shutdown
- Coeur d’Alene gauge: no flow data (only height)

Gravity prepared a draft field sampling report in October 2014 that summarized methods, handling, analysis, samples collected, field parameters measured, gauge station flow data, and deviations. A final report will be completed by the end of January 2015 after receiving feedback from the workshop.

Shawn discussed some high level observations of the data:

- The concentrations of PCBs progressively increased from Lake Coeur d’Alene to Nine Mile.
- The results from some sampling locations had a very high standard deviation (e.g. Latah Creek).
- There was no obvious trending of congeners to lower chlorinated states.

- Top PCB congeners found in the river include 11, 61, 52, and 20.
- Top PCB congeners found in facilities discharge include 20, 118, 52, and 61.
- SR-12 composite was 3X higher than the discrete samples.
- High blank contamination, possibly from a dust storm, was observed on one of the sampling days.

Shawn explained the High Volume Sampling (HVS): 125-145 congeners detected with HVS; and 60-85 congeners through traditional sampling. Dissolved (on the dissolved filter) phase PCBs were found at concentrations approximately 4 times those in the solid phase. This is unusual; typically they would see most of the congeners in the solid phase.

Discussion/Questions & Answers:

- Dissolved phase concentration: You used .45 micron filter, have you used .1? A: We have looked at that, and the HVS theoretical efficiency.. .1 micron filter really reduces the flow rate, so it takes longer to collect a sample. HVS is a closed system.
- **Could ask the Ecology hydrogeologist about the Spokane River model; this may help pinpoint flows at the stations where the data was not available.**

Recommendations from Gravity:

- Collect multi-season data
- Additional HVS sampling stations on the river and at facilities. The HVS may provide more sensitive PCB measurements.
- Install current profiler (ADCP) at the Coeur d'Alene station
- Investigate hyporheic zones

Dave Dilks, LimnoTech

Dave Dilks gave a presentation on blank contamination. A trip blank is a jar sealed in the lab, taken out in the field, then sent back to the lab. Transfer blanks (or atmospheric blanks) are obtained by pouring deionized water into the sample container in the field. The trip blank (unopened bottles taken into the field) resulted in a contamination level of approximately 20 pg/L. Exposing sample bottles to the atmosphere generally does not add contamination. The transfer blank obtained on the day of the dust storm had contamination. This may signify a source pathway of atmospheric deposition. The group also discussed modifications to 1669 methods in field sampling; at these low levels of PCBs there is concern over uncertainty in blank contamination and seeing a signal beyond the noise of the blanks.

Contamination from blanks:

- Frequency distribution: Lab blanks: average 35, median 27;
- Trip Blanks: Average 56, median 50 PG/L,
- Transfer Blanks: Average 268, Median 39) 980 transfer blank was collected during the dust storm.

Discussion/Questions & Answers:

- Need to look at blank levels relative to the blank limit/blank uncertainty.
- How do you calculate total PCBs? A: multiple methods were used.
- How different were the field blanks from the method blanks? A: This information will be available down to congener level detail in a final report.

Brent Hepner, CI Agent

Brent gave a presentation on the Continuous Low Level Aquatic Monitoring (CLAM). Brent went over the CLAM sampling method, CLAM equipment, components and operation. CLAM can separate the dissolved phase and solid phase. Brent also discussed projects where the CLAM has been used in PCB work and compared results of CLAM samples as compared to Grab samples.

Shawn Hinz, Gravity

Shawn Hinz gave a short presentation on High Volume Sampling (HVS) XAD and PUF systems. HVS helps to meet the need for detecting low concentrations of PCBs. There are a few other HVS systems out there including Infiltrax (AXYS) and TOPS (USGS). Gravity's HVS is a combination of these two systems. Key components: process pump (flow and volume monitoring) → Solids separator (glass fiber filter wound or flat disk) → Dissolved filter (XAD resin or polyurethane foam). Challenges exist in the separation process. XAD resin is more expensive than the PUF. PUF material is less prone to field and lab contamination. Each media will have some losses (sticking to the sides etc).

Richard Grace commented on the sampling methods. HVS in the context of a TMDL. AXYS has been involved in HVS for many years. Most of the devices are fairly similar. The choice depends on the context of the project.

Lisa Rodenburg, Rutgers University: Lisa is an Associate Professor of Environmental Organic Chemistry at Rutgers University. She has a Ph.D. in Environmental Engineering from The John Hopkins University and a BA in Chemistry, Wittenberg University.

Lisa gave a presentation of PCB fingerprinting and Positive Matrix Factorization (PMF), an analytical technique which enables general PCB source identification based on congeners found. Lisa also discussed insights from multiple case studies where these methods have been applied.

Key points

- Good data management is critical.
- All data transmitted and maintained including Metadata
- Method 1668: not all labs do it well.
- The DRBC protocols are the best. Use them as an example.

Fingerprinting

- PCB 11 is everywhere in the water column
- Whenever you see de-chlorination it is dominated by congeners 4 and 19

Question: Have you looked at DDT/weathered, un-weathered? Answer: Yes, to a large extent these are not degrading. In the Delaware River, PCB 11 was used as a tracer for stormwater.

- Q: Can un-weathered PCBs be getting into the water column still from legacy sources? A: Yes, not all sites have been remediated, not all transformers have been refilled. De-chlorination is not only happening in river sediment, in fact it also happens in groundwater. Q: In water samples, are you considering the dissolved and solid separately? A: I sum them together for the purposes of this work.

Case Study: Hanford Nuclear Site Fish Data

- Congener 153 is effective at bioaccumulation.
- Different species have different bioaccumulation patterns.

Case Study: Influent and effluent to Spokane County Regional Reclamation facility.

- 36 samples, not a large data set. Will get another year of data to analyze soon. Not enough data yet to do a full PMF.
- PCB is significant in effluent, pigments are a major source, and removing legacy sources will not fix this problem.
- High confidence that Aroclors are a problem.
- If certain/same congeners keep appearing in the blanks then those particular congeners may be removed as a factor in the PMF analysis.
- Very different source terms for the influent versus effluent. Wastewater has lots of PCB 153 (bioaccumulation).

Discussion/Questions & Answers:

- Bud Leber: on the river we have 7 sets of data. It would be good to compile all of the data sources.
- Is there not a huge difference between the fingerprinting during different conditions? There are differences in concentrations, but not necessarily the fingerprints. WWTP will remove 99% of PCBs.
- Does UV de-chlorination occur in very shallow/clear water? Is de-chlorination desirable? Yes, however PCB toxicology, low molecular weight PCBs will hydroxylate instead of de-chlorinate.
- Atmospheric deposition fingerprint signal in the Spokane, is this an option? Spokane influent to the Valley treatment plant is like what is seen in Philadelphia. The wastewater looks like any other wastewater treatment plant (WWTP). Atmospheric deposition could be a significant source in the Spokane Basin.
- Air deposition does not look like an Aroclor. The molecular weight of congeners in air-deposited PCBs would typically be lower in molecular weight, but not always. Gas-phase PCBs can travel much farther than particles in the air.

Work Session #3: Statistical Results and Mass Balance

This session focused on providing a detailed analysis and breakdown for workshop attendees of the August 2014 data. The session also included a basic "Statistics 101" overview in order to provide a better understanding of the methodologies used in the data analysis work.

Dave Dilks, LimnoTech

Dave Dilks gave a presentation on the synoptic survey results, including statistical analysis and mass balance calculations. The intent of the survey is to support a dry weather mass balance assessment and identify unknown sources (likely groundwater) of PCBs. Dave reviewed the calculations in the mass balance approach as presented in the December Technical Track Work Group (TTWG) meeting.

Q: Did you do the same with loss of mass via evaporation? A: No, but we will look into it.

Dave noted that groundwater interactions in the Spokane River are significant; this requires adjustments in the mass balance equations. The calculations are more complicated if the river is losing and gaining in the same reach. This happens in a few reaches in the Spokane River; however, only one reach appears to be an issue in regards to mass balance calculations. That particular reach houses some industrial land uses.

Dave reviewed the data sources used in the calculations, including daily flow (CFS) at each gauge, flows from dischargers, river PCB concentration. Other water quality parameters were used to help better understand the results of the mass balance calculations. This was not a rigorous outlier study. Analysis was done with and without the outliers.

Dave discussed the use of probability distributions to characterize the input parameters to the mass balance calculations, allowing for characterization of the uncertainty in the unknown load (done using a Monte Carlo Simulation).

The low-flow synoptic survey identified a potential unknown source (or sources) of PCBs between Barker Road and Trent Avenue. The magnitude of the unknown source(s) is not large enough to conclude that it is the primary cause of PCB issues; however, it is large enough to be a contributor. The unknown loads in other sections, if there are any, are likely much smaller.

- Put into context
 - Standard Deviation of the load is 15 picograms/Liter. This is not a dominant load.
 - 700 mg/day is coming from stormwater (just City of Spokane stormwater. There was discussion of whether this figure for stormwater is correct, with a much lower number coming in from stormwater (from Lynn Schmidt). If you shrink this stormwater piece they don't add up.
 - If the flows were not correct at Nine Mile Dam, then that would explain the loss of load between Spokane St and Nine Mile.
 - 50 mg/day = Point sources added together

Discussion/Questions & Answers:

- Nine Mile flow data: where did it come from? There may be greater flows at the Nine Mile gauge than what was used by LimnoTech. ACTION ITEM: Ask Avista for this flow data
- Q: When you build these models initially, is it congener by congener or total PCBs? A: Blank correction is done congener by congener, but the mass balance and uncertainty analysis is "total PCB".
- USGS flow data is very high quality data.
- Q: What is the geometry of the river? Shawn Hinz explained that the river is knee deep in some areas and "over your head" in others. Approximately ¾ of sampling stations were knee deep during the sampling period. It was shallow and rocky with some UV light penetration (which could cause de-chlorination). Jeff Schut noted there were noticeable fluctuations in water level over short periods of time (a few hours) from Nine Mile dam. The station near Plantes Ferry Park was noticeably colder than other stretches. Flow jumps up significantly there, which could be due to groundwater recharge.
- Check with USGS about reliability at the gauge locations.
- Q: What was the estimate for the concentration needed for the incremental load? A: 200-300 pg/L to explain the jump that was seen.
- Check with hydrogeologist on the flows. May be able to narrow the error bars a bit. Bijay Adams said they took two samples from two drinking water wells in Liberty Lake. One came in at 40 and one came in at 400, this is very "patchy".

Comment [LDW2]: But what is the estimated load? The std deviation doesn't determine whether it is dominant, the load plus or minus the std deviation does. LET'S CHECK WITH DAVE DILKS

Comment [AB3]: Specifically, my notes say this: "Variability due to different blank correction treatments = +/-15 pg/L." My understanding is that "this" refers to the fact that if we take into account differences in the blank calculations that it does not change the conclusions; i.e., differences in how the blanks are treated do not represent a dominant load (and don't affect the management conclusions).
Check with Dave.

Comment [LDW4]: I thought he said it was congener by congener in the mass balance—but am unsure. CHECK WITH DAVE

Comment [AB5]: This would be good to clarify if this refers to the concentration in the river or the concentration in the groundwater. Along the same lines, what is the flow rate for groundwater vs river water in this area? CHECK WITH DAVE

Session 3: Discussion of the Implications and Recommendations for Moving Forward

Lisa Dally Wilson posed four questions to the experts and workshop attendees:

1. How clear are the environmental signals relative to method/field blanks?
2. For purposes of source identification, how confident can we be in the data we've collected?
3. What are the takeaways?
4. What should be the treatment of blanks/blank correction U and J Values?

Lisa Rodenburg stated that given the challenge that the Task Force is facing, she is very impressed with the work to date. The Task Force is doing the best that can be done at this point.

Greg Cavallo explained that to paint a clear picture, the Task Force will have to put data into a useable framework so the modelers can use it. Information needs to be integrated and located in one place. Greg expressed that the Task Force needs to define what the endpoint looks like, to define a “map” moving forward. What is the endpoint? Is it PCBs in fish, the water column, or permit discharge? The framework will be dictated by the endpoint and will help define the next steps.

Questions/Comments from Experts to address:

- What can be done with the current information? The synoptic sampling was meant to look for unknown sources. Did the synoptic sampling help the Task Force to better understand this missing information?
- What are the sediment concentrations?
- What are the concentrations of Total Suspended Solids (TSS) and are they in dissolved phase? The Task Force should look at long term sampling and TSS samples (hysteresis effect – i.e. relative concentrations in PCBs at the same flow rate during flow-increases vs. flow-decreases). Integrate what comes over that flow duration curve.
- How does the dissolved phase get into the food web, and what does this tell us about sampling moving forward?
- PCB loads may be different during different times of year and different weather. Is this side of the story known? Need to better understand the wet weather side of the story. What is the stormwater contribution?
- What congeners should the Task Force focus on for future source control? Which congeners are moving through the food web?
- Can the Task Force resolve samples in space and time? What are the boundary conditions?
- The Task Force probably won't have a choice but to move to HVS or similar alternative. High volume sampling could help dampen the outliers. However, if the Task Force wants to find point sources, they may want to go to grab sampling.
- The group discussed the use of J-flagged data. There was consensus of the experts that J-flagged data should be used. Ecology always uses the J-flagged data. Lisa Rodenburg uses the J values in everything she does. Richard Grace explained that a lot of the J-flagged data is useable; however, it is truncated, as it decreases into the background level. This means you lose the ability to see the peaks. Reporting is intended to be very transparent. It was mentioned that using the J-flag data would require a modification to the QAPP. The TTWG will discuss prior to the next sampling event on the River.
- Are there known contaminated sites? Is there a database of these sites, mapped? If yes, then do they match up with the missing loads? This can be evaluated using data mining.

ACTION ITEM: Ruckelshaus Center to add discussion of J-flagged data at a future Task Force meeting agenda.

Lester McKee expressed that ultimately Mass balance is not the end point. The Task Force should care about the group of congeners that are toxic and move through the food web. The Task Force needs to determine what congeners to focus on for future source control.

The group discussed resolving samples in space and time. If HVS is used, then you lose time resolution; if you use Grab samples then you lose congener concentration resolution. There is a 40% increase in number of congeners detected using the HVS, however concentrations were similar. High volume

sampling in a wet weather event can be done, there are a few other options (DRBC has used 20 liter carboys to collect wet water grab samples, allows for partitioning between dissolved and solid phase, separation is done in the lab).

“Parking Lot” for Day 2

1. High Volume Sampling
 - a. Necessary for future Spokane River sampling?
 - b. First identify needs for Task Force, then identify sampling method
 - c. Comparability with synoptic data
 - d. Input from experts
 - e. Takeaways for future work
2. Data Management
 - a. Database (DRBC protocol, EIM, other?)
 - b. Comparable data (Ecology, Task Force, dischargers, Department of Fish and Wildlife, etc.)
 - c. Public access
3. Endpoint
4. Atmospheric Deposition
 - a. How, when, weather, potential sources
 - b. Consider as a source to stormwater
5. Master Plan-Work Plan
 - a. Endpoint
 - b. Data management and coordination
 - c. Next level of detail on source characterization
6. Budget

Wednesday January 14, 2015: Workshop Day Two

Work Session # 4: Where to From Here?

This session focused on obtaining perspectives and input from invited guests on the body of work performed (analytical, sampling, and data analysis) and any insights they have about additional data collection and analysis that would assist with future source identification and reduction efforts. In addition, the session focused on identifying potential next steps for the Task Force to take regarding the analysis of data generated during the August 2014 sampling event, the collection and analysis of additional field samples, and source identification and reduction actions.

Introductions and Agenda Review

Lisa Dally Wilson gave an overview of the approach for the workshop Day 2, focusing on taking advantage of the collective wisdom in the room to develop a scope of work for the next phase of the Task Force’s technical work. The group discussed two main topics for the second day of the workshop: 1) next steps and activities associated with the current mass balance assessment; and 2) Identifying next steps that follow the vision¹ of the Task Force.

Dave Dilks addressed a question from Day 1 related to stormwater sources. Stormwater data from the City of Spokane indicate that stormwater sources may be lower than previously assumed in the mass

¹The Task Force Vision from http://srrttf.org/?page_id=607. “The Regional Toxics Task Force will work collaboratively to characterize the sources of toxics in the Spokane River and identify and implement appropriate actions needed to make measurable progress towards meeting applicable water quality standards for the State of Washington”.

balance calculations. If that is the case, the mass balance will be revised. Calculation of stormwater flow and concentration will need to be addressed for this sampling event.

Discussion and Suggested Activities associated with Current Mass Balance Assessment

Discussion

Nine Mile flows:

The mass balance calculations assume there is groundwater contribution of PCB load to the River. There is the potential that the flow is higher than what was assumed for the mass balance at Nine Mile, which would impact the mass balance. The Task Force needs to know more about the flow at Nine Mile. Grant Pfeifer explained that the system is fairly stable during dry conditions, and this reach is a gaining reach.

Stormwater Impacts

The assumption was that there was no stormwater impact during the synoptic sampling event; however, an August 2014 Combined Sewer Overflow (CSO) report shows that during that period there were four days where CSO events in the City of Spokane occurred, contributing 7.5 million gallons of stormwater to the River² at [REDACTED]. It was suggested that the Task Force incorporate CSO testing results into the mass balance if they are found to be significant. If a storm event happens during the dry weather season, the stormwater contribution will need to be assessed basin-by-basin, based on the stormwater system response (runoff/sewage).

Comment [AB6]: http://www.spokanewastewater.org/Docs/CSO/Monthly_Reports/2014/CSOMonthly2014-08.pdf

Comment [LDW7]: Location?? LOOKS LIKE DILKS IS GETTING THIS FROM THE CITY—BUD CAN YOU CHECK IF HE'S GOT THE LOCATION/S?

Discussion/Questions & Answers:

- Q: Can stormwater events explain the outliers seen in the synoptic sampling? A: Dave explained that there were some isolated storms, and this could explain the outliers. He would like to see CSO data and compare to the outliers. This may not impact the mass balance calculations, but it is worth looking at.
- Q: What about sampling in a “worst case weather scenario” (heavy flows)? A: There was dry weather during the event, except for isolated storms in the watershed. On August 22nd, there were no changes in the flow data overall. There was a storm at the end of the day, after sampling, which probably had no impact on the mass balance.
- Can we see where the rain actually fell during the time period in question? (Rain gauges, City overflow events?)
 - 0.1” is needed for runoff from the stormwater basins; ¼ - 1/2 inch triggers CSO. City of Spokane has data on overflows from CSOs.
 - There are about a dozen rain gauges around the area.
- Lars Hendron (City of Spokane) explained that they can pin down bigger stormwater basins, but smaller ones would have to be interpolated.
- Latah Creek could be a significant nonpoint/unknown source. Latah Creek has turbid discharge at times and there are lots of townships in that area.

² 7.5 MM gallons is total (see report). Yellow sites below are just upstream of sampling locations (Near Peacefull Valley footbridge), and High drive is on Latah Creek. August 22: (gallons) Riverside/Napa 50,582 CSO34: Arthur at 1st 13,299 CSO33D: Arthur at 3rd 17,791 CSO33C: Perry at 3rd 722,143 CSO33B: Arthur at 5th 6,362 CSO33A: Riverside at Lincoln 1,490,679 CSO26: Cedar at Main 43,440 CSO25: Riverside at Cedar East 28,813 CSO24B: Riverside at Cedar West 1,604,374 CSO24A: Cedar at Ide 11,225 CSO23: High Drive 3500 CSO20 on Latah Creek: Nora at Pettit 241,589 CSO12: Columbia at downriver 4,203 CSO7: NW Blvd at Kiernan 39,467 CSO6.

We can probably get times of overflows and then compare with the sampling times. If sampling occurred before overflow event, then this is not relevant. Other dates of overflows: 8/12, 8/15, and 8/20. Also, general CSO page with map links and rain information: <http://www.spokanewastewater.org/csoupdate.aspx>

The group discussed dust/aerial deposition associated with stormwater as a potential source during the sampling event. This could be a substantial contribution. We need to look at this as a loading source to the watershed. A dust event is compounded in the stormwater. The Task Force needs to understand the portion of atmospheric deposition coming with stormwater (Snowmelt factor and Direct Deposition). Lester McKee suggested that it may not be dust, and that there could be all kinds of reasons for the outlier.

ACTION ITEM: LimnoTech to get overflow data from CSOs during the sampling event from City of Spokane (from Lars Hendron and/or Lynn Schmidt)

Summary: There are indications that there are some unknown sources, potentially from groundwater.

What is missing, what can we do with existing data? Suggestions for projects and actions include:

1. Examine the groundwater concentration assumption.
2. Revisit flows at Nine Mile.
3. Graph sources – future picture assuming waste water treatment plant upgrades.
4. Stormwater – four days in August during synoptic sampling (7.5 mg /4 days). Consider this information in the mass balance assessment.
5. Look at the outlier data with respect to stormwater, particularly at Latah/Hangman Creek. Shawn Hinz explained that this was the only location they noticed a change in flow.
6. Dust Event – Increasing concentration in transfer blanks (called atmospheric blanks by Gravity). Consider components of atmospheric deposition such as snow melt and direct deposition.
7. Consider Latah Creek/ Hangman Creek as potential source during synoptic sampling.
8. Congener analysis, Homologs (tetra, hexa, hepa, penta, and individual). Is there enough data to do a multivariate analysis?
9. Data Management/Database.
10. Green Street Flows: review all flows in light of aquifer data. Consider analysis to synthesize flows where gage was inactive. Look to community college gage information to pull these numbers out.
11. Association between TSS, Total Dissolved Solids (TDS), Dissolved Organic Carbon (DOC) and Total Organic Carbon (TOC) field measurements.
12. Flows at Coeur d'Alene Lake outlet. Install in-situ profiler at the outlet to account or lake effects. Not needed for the current mass balance, but will be for future work.
13. Fish tissue concentrations as compared to data collected in water column: do they match up? (Time lag consideration). Bioaccumulation factor?

Data Management Discussion

- Ecology: Data systems. PARIS system, and EIM database. Discharge Monitoring Reports are not set up to handle PCB data. EIM can handle the congener information while it can hold several types of metadata, it will not hold certain QA/QC metadata about blank censoring, J-flags, etc. Everything except discharge data goes into EIM. Organics, etc. can all be entered into EIM, however there is no surrogate recovery.
 - Greg: we like to include GIS location data in the database, along with who collected it and when. Q: Is there a way to get discharge data into EIM? A: Likely yes, but will need to research that.
- Database: California data exchange network (nodes). One node spends .5 million dollars a year on data management.

- What goes into the database and how will it be populated and used to support work in the Spokane River Basin? First, we need to define the key questions, then look to how the database would support answering those questions. Points to consider related to database and data management included:
 - Point sources (dischargers)
 - Stormwater (City of Spokane)
 - Fish Tissue
 - PCBs in products
 - Scale of question (temporal, spatial)
 - River load sites: re-monitor every five years under different conditions
 - Base load hydrology
 - Either DRBC or SFEI could do a show and tell of their database system. Recognize that the costs will be considerable.
 - Start off with a definition of the valid values within a field format to make sure that all receptor fields are there. (customizable)
 - Program transcription (not manual—be able to download directory from laboratory)
 - If you change requirements for information, this is a very onerous process. Define the fields at the beginning. What fields would come from the labs? What kind of dataset comes from the lab? More is better up front; don't want to change later on.
 - Look to Delaware, SF, EQUIS
 - Need to capture the data quality/validation, and the purpose/agency all of this information needs to be captured.
 - PCB data in many mediums for Spokane River: many people are collecting data, using different databases.
- Idaho has separate data requirements, and are now collecting data on PCBs reporting to EPA and IDEQ.
- Hold a workshop to evaluate existing/available databases and what additional technology can be added. Don't focus on retroactively inputting data in other formats (this can happen later).
- EIM may be a good option for the Task Force. QA and QC data are currently not included in EIM; this is a discussion that the Task Force would need to have with Ecology.
- Think about the cost, and getting the most out of the money spent. Be sure that all point sources are identified. Look at available resources, balancing data management vs. investing dollars in understanding PCB sources.

Discussion and Suggested Activities Moving Forward

Adriane Borgias explained that the Task Force has a mission: to identify and remove sources of Toxics to the river and develop best management practices (BMPs) to achieve that goal. The kind of data needed are the data that help identify those actions, and help show measurable progress by measuring trends toward meeting water quality standards through a clearly delineated process.

Fish Tissue Discussion

Jerry White of Riverkeeper explained that they advocate an endpoint that includes fish tissue. Part of the Task Force mission is to provide public information and this includes fish and people. This is where the river meets the public.

Discussion/Questions:

- The river flushes quickly. This potentially affects the downstream fish.
- What is the mechanism by which PCB gets into fish tissue?

- There are fish advisories for PCBs and PBDEs. These should be tackled at the same time. May solve PCB with the current approach, but not PBDEs. All forms of PBDEs are banned in Washington (in consumer products and toys) but are likely still in landfills, etc.
- In fish, PCBs can
 - Accumulate
 - Depurate
 - Be metabolized
 - Be excreted
- Hanford fish study looked at bioaccumulation (PCB 153?). Bioaccumulation factors vary by species.
- Pathways, prey items, and sediment are not being accounted for. A food web model needs to be looked at.
- The group should not lose track that there has been significant drops in the fish tissue concentrations of PCBs (from Washington reaches).
- Uncertainty and reduction should be a focus, including groundwater input, wet weather contribution and seasonal flow impact.

Greg Cavallo suggested it would not be much of an effort to do a Bio-Concentration Factor (BCM) study (concentration in water, concentration in fish). The fish will tell you how well your remedial actions are working. Jeff Louch explained that BCM is not a driver in the Spokane River. In this system, it is the loading that needs to be reduced. Ecology monitors fish tissue as a background activity to the Task Force work. Hatcheries may be a good place to look.

Moving Forward: Discussion

- Need to further investigate the up-gradient of the groundwater (particularly in the Barker to Trent reach)
 - Groundwater assumptions, samples, look to Kaiser for data for up gradient groundwater source
- Loading from L. Spokane and Latah Creek
- Seasonal Sampling – Lake Coeur D’Alene outlet
 - 3rd sample, future needs, purpose
 - Winter sampling effort (part of the scope, but is it needed? We have seen very little at this outlet in previous two sampling efforts). Advisable if associated with a storm event.
 - Go upstream ahead of Lake Coeur D’Alene? Not complicated by high stream flows during spring time?
 - 1 shot HVS at this location instead of a grab sample. Different congener signature and concentration at that location using the HVS.
 - Gravity and AXYS, potential pilot study: missing colloidal portion.
 - Set aside winter sample for this year because there is limited snow pack and river level has not changed much throughout warm and cool periods this season.

Richard Grace explained that sampling needs to be designed with a question in mind. The Task Force needs to determine the purpose of a winter wet weather sample event. Look at what is already known and focus on closing the data gaps. AXYS could help connect the data.

ACTION ITEM: Winter sampling discussion to be addressed by the Task Force TTWG.

- Wet Weather Sampling

- Stormwater Concentration
- Track upstream Sources
 - Known contaminated sites – groundwater data analysis
- Atmospheric deposition
- General Discussion of High Volume Samplers – where to use and when to use
- Congener analysis, fish analysis
- Map – update and include other information.
- Fully evaluate point sources (Duwamish has over 200 outfalls)
 - All the outfalls for CSO in city of Spokane are identified (did inventory).
 - Bridges/runoff should not be ignored. Also private outfalls.
 - City of Spokane Valley has no outfalls and only one bridge.
- Source identification/inventory:
 - Need to make sure all sources have been identified, including waste sites
 - Concentrations in building materials, dust suppression, transfer yards, rail yards, and any place spillage could have occurred, industrial use of paint (caulking, joints, etc) environmental exposure because they are open to the weather. Direct to stormwater. Keep sampling design adaptive, there will be surprises.

How do we prioritize where to look?

- GIS mapping: map knowledge about properties, sources, source sites, and land uses. Subdivided new and old (industrial, urban).
- Dry recycling facilities, wet goods recyclers (old appliances have PCBs), general metals recyclers (drum).
- Single composite samples during storm events.
- The City of Seattle focused on outfalls, inline (in the storm drain) sediment sampling, then gradually move upstream to look for sources. Found primarily building paint, caulking and metal recycling. Inspection program looking at their practices/on site activities and collecting samples on site to confirm that a site is not a source. This has been very effective, not had much of an access issue.
- Lynn Schmidt: discussed the work done by the City of Spokane work sampling catch basins.
- It is a challenge to track down PCB sources on private land. Instantaneous blast of unknown concentrations.
- Transect sampling for PCBs?

Donald Hurst pointed out that Nine Mile is the current boundary for Task Force work, yet PCBs travel downstream beyond this boundary. Sediment as a source may gain in magnitude as you move down river past Nine Mile. Response: Sediment and coring samples have been taken, also [Department of Ecology \(EAP\)](#) is establishing a long term monitoring station at the Little Falls Dam. (Will look at times a year, length).

Lloyd Brewer pointed out that the Task force needs to keep the aquifer in mind, particularly with PCB remediation which contributes PCBs over the aquifer.

Priority Management Questions (designed to lead to actionable management decisions):

1. What are the pathways for PCBs into the Spokane River?
2. What is the magnitude of those sources?
3. Where are the sources originating?
4. Where can we remove sources and/or apply BMPs to reduce loads?

Comment [LDW8]: Who? Was there anyone from AVISTA at the meeting. Seems like we need to engage them. **THIS ACTION ITEM NEEDS ASSIGNING**

Comment [AB9]: Avista has two representatives on the Task Force. Avista is not a signatory, but signed a letter of support. Agree that this should be addressed. Perhaps CP could start with an inquiry to Bruce Howard at Avista.

5. How do we track progress? (data management)

2015 Scope of work priorities (based on vote of Task Force member entities present):

1. Data Management- WORKSHOP (recommend as a priority to the Task Force, take to TTWG)
 - a. Data is complex, lots of data, workshop very soon, Ecology and EIM
2. Further investigate increased GW concentrations and other potential sources in Barker to Trent reach (13 votes)
3. Wet weather sampling (12 votes) [ID non-point source loads during wet weather]
 - a. Stormwater
 - b. Unmonitored sources
 - c. Little Spokane River and Latah Creek (investigate concentrations and focus on these sources if they prove to be significant loads)
 - d. Upgrade the gauge at Green Street for future use. Address measurement of Lake CDA outflows
4. Track upgradient/ upland sites, laterally above Barker to Trent reach (9 votes) (Ecology could take the lead on this work item) ** Base this on concentrations measured and track upland, not haphazard approach.
 - a. Know contaminated sites
 - b. Groundwater data
 - c. Past land use
 - d. Business inspections, fire maps
 - e. Map sites
 - f. Historic rail systems
 - g. data mining
 - h. Atmospheric deposition
5. Sediment Sampling (8 votes) (not had a thorough discussion on this)
 - a. Inventory – what do we know?
 - b. Latah Creek
 - c. Upriver Dam
 - d. Soil-“bath tub ring”
 - e. Consider bio accumulation study (invertebrates)
6. Seasonal Sampling (0 votes) [Wait until next season, with more representative snowfall]

Additional work from this year's data

1. Green Street Flows (Data mining for synoptic survey)
2. Congener Analysis (data mining for synoptic survey)
 - a. Homologs, individual congeners, Screen
 - b. Associate with other chemical parameters
3. Lake Coeur D'Alene Outlet

Feedback from the experts on the work priorities identified:

Greg Cavallo expressed his opinion on Task Force priorities. He explained that wet weather sampling is very important. Greg was not sure if sediment is an issue in the Spokane River system. Question to answer: Is there the ability to see the movement from sediment to fish? Ted Hamlin explained that there was a set of sediment samples taken last summer (at same time as confidence sampling) also did groundwater seep samples. Upriver sample just below Upriver Dam, one taken at Green Street Bridge gauging station, one just upstream from Mission Park. Method: Teflon scoop samples from high water mark, all congeners. **There was a request that the Department of Ecology organize these data and make a presentation at a future Task Force meeting.**

The Ecology Toxics Clean Up project manager for Upriver Dam (Brendan Dowling) explained that the Upriver Dam site was cleaned up for PCBs (2006). (NOTE: a complete list of Ecology's Toxics Cleanup Program on the Spokane River is at http://www.ecy.wa.gov/geographic/spokane/srb_toxics.htm.) In 2008 there was one foot of sediment accumulation; by 2009 the sediment was gone following a major flood event.

ACTION ITEM: Task Force to follow up with Ted Hamlin on sediment samples taken during confidence sampling, and groundwater seep samples.

ACTION ITEM: Brandee Era Miller to present sediment sampling data at a future Task Force meeting (February or March of 2015)

Greg Cavallo expressed that the Task Force should let the data lead the Task Force to get the most "bang for their buck". Lester McKee explained that in their system, 50% of pathways are from urban stormwater (pump stations, modified natural river systems, round pipes). Initially, the majority of the funding needs to be focused on finding these pathways. Sanborn maps may help to identify legacy sources. Once these pathways are identified, move to BMPs. With respect to sediment, do an inventory first, including a synoptic sediment survey to verify the water column survey (left bank, right bank).

Lester also discussed the need to measure turbidity constantly, which can be used as a surrogate and helps to get an accurate mass loading. However this may not work as well with the snow melt. The Task Force could also do shoulder season sampling (quantify mass during a wet weather/stable flow conditions where you quantify mass effectively).

Dave Dilks explained that he will take all of this input and develop a draft scope of work for the next phase and bring it back to the Task Force. The wet weather sampling is high priority at this time. There are high error bars, so the Task Force is going to have some hard technical discussions.

Dave McBride reiterated the need to understand how the PCBs get into fish tissue. Dave also expressed need to look at PBDEs with PCBs, noting that there was a Governmental policy change in Washington regarding PBDEs (in Washington several types of products containing PBDEs are banned; more info at <http://www.ecy.wa.gov/programs/swfa/pbt/pbde.html>).

Dan Redline asked the experts what their opinion is on the Toxic Substances Control Act (TSCA) and TSCA reform.

- o Rachael McCrea said they are working to build bridges to EPA and to TSCA. They are interested in coordinating state-wide to prepare and make known their position on TSCA. **ACTION ITEM:** Task Force to follow up with Rachael McCrea on coordinating efforts for TSCA reform.
- o Lester and Greg agree that TSCA reform could remove a significant amount of PCBs still in use. (dielectric fluid, transformers)

ACTION ITEM: Task Force follow up with regional partners that attended the workshop to coordinate action on TSCA reform efforts.

Greg explained that DuPont and BASF have changed practices to reduce PCB inadvertent production.

Comment [LDW10]: I believe there was another action item regarding looking further into the sediment contribution from UpRiver Dam????? !
DON'T RECALL THIS. BUD, DO YOU?

Comment [AB11]: I don't recall an action item specific to Upriver Dam. I do have notes about Ted and Brendan's comments on this topic that are addressed above. Later, Lester commented that we should inventory what sediment data we have and verify what is there before sampling major pathways and verifying the water column data. Sediment is less relevant to water than the food web model.
Maybe this is the action item?

The next meeting of the Task Force is February 25, 2015 from 9am – 12:30pm at Liberty Lake Sewer & Water District Office

The next meeting of the Task Force Technical Track Work Group is February 4, 2015 at the Department of Ecology, Spokane from 10am – 12pm

DRAFT

