TECHNICAL ADVISORY COMMITTEE MEETING #6

12424 42nd Ave South, Tukwila, WA 98168

July 16, 2015

TAC PARTICIPANTS

- Kym Anderson, Port of Seattle
- Kevin Buckley, Seattle Public Utilities
- Marilyn Guthrie, Port of Seattle
- Mike Mactutis, City of Kent
- James Rasmussen, Duwamish River Cleanup Coalition
- Ron Straka, City of Renton
- Jenee Colton, King County DNRP

ADDITIONAL MEETING PARTICIPANTS

- Jon Butcher, Tetra Tech (via phone)
- Becky Chu, USEPA CERCLA
- Kathy Conn, USGS
- Ben Cope, EPA
- Mark Dagel, Hart Crowser
- Kelly Foley, EnviroIssues
- Dave Garland, Ecology Water Quality Program
- Alex Horner-Devine, University of Washington
- Erkan Istanbulluoglu, University of Washington
- Todd Kennedy, Tetra Tech
- Marty Jacobson, EPA
- Bo Li, Ecology Water Quality Program
- Laurie Mann, USEPA Office of Water
- Rachel McCrea, Ecology Water Quality Program
- Maggie McKeon, University of Washington
- Mike Milne, Brown and Caldwell
- Joan Nolan, Ecology Water Quality Program
- Jenna Ratliff, WSDOT
- Rick Schaefer, Tetra Tech
- Angie Thomson, EnviroIssues
- Debra Williston, King County DNRP
- Iris Winstanley, Leidos

WELCOME AND INTRODUCTIONS

Angie Thomson, facilitator, welcomed everyone and led the group in a round of introductions. Angie provided a brief overview of the agenda. She made note that during the previous meeting, TAC members went over the key feedback from the interested parties meeting and discussed the data gaps and pollutant groupings memo. Angie explained that the purpose of this meeting was to continue the discussion of the data gaps and pollutant groupings memo, provide an overview of Quality Assurance Project Plan (QAPP) development and identify next steps for PLA development and the TAC.

DATA GAPS AND POLLUTANT GROUPINGS MEMO

Rachel McCrea, Department of Ecology, provided an overview of the feedback that was received on the data gaps and pollutant groupings memo in the previous meeting. She asked TAC members for additional feedback on the recommendations outlined in the summary tables and made note of any action items required from the Department of Ecology and EPA regarding each recommendation.

TAC members also provided general feedback that Ecology and EPA should consider building the EFDC and watershed models and testing them for key data sensitivities before prioritizing data collection. TAC feedback specific to knowledge gaps in the data gaps and pollutant groupings memo heard at this meeting is outlined in tables 3, 15, 16, and 24 in red text (feedback from the previous meeting outlined in black text). Action items are identified with **bold lettering**.

TAC members also discussed some of the key hydrodynamic features in the Green-Duwamish Watershed to be considered in PLA development, including the following:

- Howard Hansen dam releases
- Drinking water withdrawals (e.g. City of Tacoma above Howard Hanson Dam)
- Agricultural withdrawals
- Pump stations
    - The Black River Pump Station is a King County station
    - Renton manages three pump stations (each one feeds into a gravity-flow system that discharges to Springbrook Creek)
    - Kent manages five pump stations which flow directly to the Green River. An additional station is being installed also to discharge to the Green River. Kent has additional smaller pumps in the tributary creek system.
    - Tukwila manages five pump stations; one flows directly to the Duwamish River.
    - Generally, the pump stations only pump water during high flows, allowing gravity flow under low flow conditions.
    - The amount of settling that occurs in each pump station forebay varies with age (newer stations have a water quality component) and with flow characteristics (less forebay retention time when system is flowing).

Ecology requested that TAC members please send information about data availability and additional comments on the data gaps and pollutant groupings memo by August 10, 2015. It was noted that data sets do not need to be received in this time frame.

Table 3. Summary of knowledge gaps and options for candidate pollutants

Knowledge Gap	Options and Recommendations	TAC Feedback
There is a lack of paired filtered/unfiltered data for site-specific determination of partition coefficients for PCBs, PAHs, dioxin/furans, and phthalates in both the water column and the sediments.	Options: 1. Use literature values that may not reflect local conditions. 2. Collect paired data to evaluate coefficients and improve accuracy Recommendation: Team should consider Option 2.	• Toxicity equivalence Quotients (TEQs) are used in CERCLA human health risk assessment. Did you consider TEQs are they relate to the parameters being modeled? o TEQs will be considered in modeling and analysis since they relate to equivalent toxicity for human health risk assessment as done in LDW RI/FS, but we need to remember, CWA water quality standards are not based on TEQs. TEQs themselves are not model state variables but are derived from the concentrations of individual chemical forms. • Data may already exist for dioxins/furan coefficient • **Action item: The PLA Project Team will address this in the scope of the next phase of the PLA to include alternative methodologies, timing, and level of effort needed.**
No data are currently available to directly constrain rates of exchange from the sediment into the water column of non-polar organic pollutants (PCBs, dioxin/furans, PAHs, phthalates), which may be enhanced above typical diffusion rates by biological action.	Options: 1. Treat exchange rates as calibration parameter. 2. Constrain rates based on field evidence. Recommendation: Ongoing work by MIT for USACE may provide field data for the LDW, enabling use of Option 2.	• No TAC feedback. • **Action item: The PLA Project Team will follow-up with the Army Corps of Engineers to see if there is any existing field data to fill this data gap.**
Data for PCBs reported as Aroclors is problematic for comparison to congeners and homologs due to changes in composition from differential weathering. This creates uncertainty in estimating total PCBs as well as the concentration of individual congeners with high TEFs.	Options: 1. Use Aroclor data only, providing a consistent basis for analysis. 2. Assume unaltered Aroclors to interpret congener concentrations and total PCBs from Aroclors; combine with congener data. 3. Use samples analyzed for both Aroclors and congeners to evaluate site-specific relationships between environmentally altered Aroclors and congeners in the LDW. Recommendation: Option 3 is preferable for accurate analysis of PCBs. This takes advantage of available data and allows better specification of kinetic parameters.	• Geographic analysis should also be considered because data availability may vary greatly by geographic region. • Can both Aroclors and PCB congeners be modeled? o Both Aroclors and PCBs could be modeled. Aroclors are mixtures of congeners that are gradually altered by weathering in the environment; however, approximate translations between congeners and Aroclor equivalents can be developed. The goal of the modeling will drive which parameter to model, and what tool will be used for data analysis. • **Action item: The PLA Project Team will conduct further research to identify which PCB types to model based on the available PCB data in the watershed.**
Dioxin/furan data are limited, with few water column and biological samples available at this time.	Options: 1. Simulate behavior of selected dioxins/furans using available data and literature coefficients. 2. Delay simulation of dioxins/furans until ongoing data collection efforts produce sufficient information to calibrate a model. Recommendation: Option 2. The same simulation framework employed for PCBs can be used for dioxins/furans once additional monitoring data are available.	• Dioxins should be modeled regardless of current data availability as more data becomes available. o Ecology noted that it may be possible to model dioxins (2,3,7,8 TCDD) using PCBs as a surrogate because both PCBs and 2,3,7,8 TCDD exhibit similar behavior provided a stable relationship between the PCBs and 2,3,7,8 TCDD exists which may not be likely. In addition, modelling dioxins may not be useful because 2,3,7,8 TCDD is not often detected in sediments or the water column, and is only found in fish tissue, making calibration difficult. o It is possible to build the model to accommodate future modeling of dioxins and furans, but not necessarily right away. • **Action item: The PLA Project Team will consider whether TEQs could be modeled and still meet project goals.**
For mercury, there is a lack of methylmercury data as well as information on factors that influence methylation (redox, sulfate balance).	Options: 1. Simulate total mercury only. 2. Attempt to simulate mercury methylation using literature values. 3. Collect methylmercury data to support modeling. Recommendation: Option 3 is preferable if mercury is to be modeled; however, lack of data suggests that mercury should not be modeled at this time (see below).	• No TAC feedback. • **Action item: None. Lack of data suggests mercury should not be modeled at this time.**

<table>
<tr><th>Knowledge Gap</th><th>Options and Recommendations</th><th>TAC Feedback</th></tr>
<tr><td>For copper, zinc, and arsenic, the information on competing common ions and chemical conditions appears insufficient for a full analysis of solid and aqueous speciation incomplete to support redox chemistry.</td><td>Options:
1. Simulate ionic metals as general quality constituents that can deposit to or erode from the sediment but are otherwise conservative.
2. Represent ionic metals partitioning to solids and solubility using the method recommended by USEPA (1996); modify EFDC and LSPC model codes to represent this behavior.
3. Collect additional data and develop a detailed geochemical simulation.
Recommendation: Option 2 appears to be the most feasible alternative for copper and zinc. Option 1 should be sufficient for arsenic.</td><td>• Is modeling copper and zinc useful as it relates to the goals of the PLA?
o Copper is related to Endangered Species Act (ESA) impacts, while zinc is related to the built environment. It is helpful to include these parameters, but we will be thoughtful as to whether or not it would be useful to collect new data. In addition, there are 303 (d) listings of Cu in water column of the watershed.
• Action item: The PLA Project Team will evaluate whether bioavailability can be considered when modeling these metals. It was noted that BLM has not yet been developed for marine waters.</td></tr>
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TABLE 15. SUMMARY OF DATA, KNOWLEDGE GAPS AND OPTIONS FOR EFDC MODEL

Data and Knowledge Gap	Options and Recommendations	TAC Feedback
In general, data are available but limited in some media. Data gaps and knowledge gaps exist for initial, boundary, and calibration data.	Options: 1. Use all available information including data and previous models to develop a model now of recent historic conditions. 2. Collect additional data and delay modeling to the future. Data collection needs to be coordinated to obtain initial, boundary, and calibration data sets in all media. Recommendation: Start developing and calibrating the model with available data and use model to guide needs for new data collection.	• There are data available for water quality and surface sediments in the east and west waterways, and CSO data across the City of Seattle and King County that could be used to support calibration of the model. • There are dynamic flow issues between the east and west waterways. o In the model, the main waterway is divided into segments that represent the east and west waterway to account for these differences. • There are air deposition data available that could be used to support model development.
Limited data for assigning initial conditions in the water column for all toxics	Options: 1. Assign low levels of initial toxics and equilibrate with sediment using a model spin-up period. 2. Collect data if the modeling period is in the future. Recommendation: Use model spin-up combined with existing data; test sensitivity of model results to this assignment. We anticipate low sensitivity to initial conditions in the water column.	• No TAC feedback.
Data for sediment initial conditions (depending on the modeling period) and need to account for remedial actions over time.	Options: 1. Rely on existing data and use previous model results if modeling a historical period. 2. Collect new data if the modeling period is in the future. Recommendation: It is unlikely that the massive characterization effort for sediment conditions undertaken in the RI can be repeated. The PLA model should thus rely on existing sediment data, but also needs to account for interim remedial actions over time. Applying the model to multiple years can be used to test simulated responses to remedial actions. In addition, use long model spin-up time and conduct multiple model tests.	• No TAC feedback.
SSC and toxic loadings from upstream	Options: 1. Use watershed model results for modeling a historical period. 2. Continue collection of comprehensive toxics data from the watershed and develop the model in the future. Recommendation: Existing HSPF models are calibrated for flow and sediment. Develop the upstream loading with a combination of these models and existing data; continue collection of new data to fill knowledge gaps for LSPC simulation.	• No TAC feedback.
SSC and toxics loadings from CSOs	Options: 1. Use existing CSO monitoring data and event volume modeling combined with best estimates of pollutant concentrations. 2. Combine CSO model and monitoring data with watershed model simulations of surface stormwater-derived loads. Recommendation: Use CSO model to develop time series of mixing ratios and estimate CSO concentrations based on fractions of stormwater and sanitary sewage. Use HSPF/LSPC to estimate stormwater concentrations and monitoring data for sanitary sewage concentrations. Confirm model performance relative to CSO outfall monitoring.	• Are you modelling the CSOs as controlled? o For the LDW EFDC model we will want to use the actual historic CSO data if available. In modelling future scenarios, CSOs would be represented with appropriate controls. • When modeling CSO inputs, will storm drains be considered a separate event in the model? How will the 200+ stormwater outfalls be accounted for in the model? o For the drainage areas where surface runoff flows into CSO pipes, the CSO model will simulate them. For the drainage areas where runoff will enter the stormwater pipes or directly enters the Duwamish, LSPC will be used. Individual drains will be aggregated so that the total flow and contaminant loadings can be allocated to EFDC cells. It will be dependent on subcatchment delineations in the watershed model. • **Action item: Ecology to set up a meeting with the City of Seattle, King County, and Tetra Tech to discuss how to best represent sediment (SSC) and toxics loading from CSOs.**
Limited toxics data in the water column; lack of information to do site-specific evaluation of some kinetic parameters such as partition coefficients.	Options: 1. Use available data and literature to approximate kinetic parameters. 2. Collect new field data to gain knowledge. 3. Conduct laboratory experiments to fill knowledge gaps. 4. Conduct literature review to fill knowledge gaps. 5. Conduct model sensitivity and uncertainty analyses to fill knowledge gaps. 6. Collect synoptic data for a modeling period in the future and delay model implementation. Recommendation: Develop model beginning with available data. Options 1 to 5 can all be potentially used to further constrain the data and knowledge gaps the model based on resource availability. Initial model development will greatly assist in determining the cost:benefit ratio of specific types of data collection.	• Will the partition coefficients be dependent on salinity or temperature? o Organic carbon content of the sediment is the most important factor affecting partitioning of PCBs and other non-polar organics. The effective partition coefficients can be represented as temperature dependent. Dependence on salinity is less well-established but could be considered if evidence is available.

TABLE 16. SUMMARY OF KNOWLEDGE GAPS AND OPTIONS FOR FOOD WEB MODEL

Knowledge Gap	Options and Recommendations	TAC Feedback
Lack of contemporaneous data in all media and biota	Options: 1. Conduct comprehensive new round of synoptic data in all compartments 2. Use models to estimate temporal changes in stores Recommendation: Option 2 is recommended despite being suboptimal due to the large cost of new comprehensive surveys.	• New fish tissue and sediment data may be available in the next five years as a result of sediment cleanup design efforts. • Consider using the existing Food Web Model as it was built using the best available data and has been peer reviewed. o The existing model is a great starting point since it was built upon for PCBs, but it might not work for other parameters. Sensitivity analyses were conducted on this model and it was determined that additional efforts could reduce uncertainty levels. • Phthalates are rapidly metabolized in fish. Occasional high tissue concentrations reflect recent exposure to hotspots. Given these observations, it may not be necessary to address phthalates in the food web model.
Limited information on dietary sources of individual species	Options: 1. Conduct gut content surveys 2. Rely on existing data Recommendation: Rely on existing data (2), but supplement prior FWM effort by soliciting additional information from wildlife and university sources.	• No TAC feedback.
Limited tissue and exposure data for dioxins/furans	Options: 1. Collect additional data 2. Perform modeling based on limited extant data 3. Do not model dioxins/furans at this time Recommendation: Based on the contaminant-specific analyses, do not apply FWM to dioxins/furans at this time.	• No TAC feedback.
Lack of environmental exposure data for methylmercury	Options: 1. Collect additional data to characterize methylmercury exposure 2. Simulate based on approximations from total mercury Recommendation: Do not pursue FWM simulation of mercury at this time.	• No TAC feedback.
Limited modeling tools for evaluating bioaccumulation of arsenic, copper, and zinc; limited data on factors controlling bioavailability	Options: 1. Do not model bioaccumulation of metals 2. Use DYMBAM model for bioaccumulation of metals Recommendation: Base analysis for these constituents on ambient WQS for protection of aquatic life rather than bioaccumulation models. Do not implement DYMBAM.	• Consider using bioavailability in addition to bioaccumulation in the context of metals. • The food web is benthic driven, not water column driven. As a result, exposure to metals is a greater concern than bioaccumulation. • The model should be considered a benthic toxicity model. o It is premature to dismiss water column accumulation pathways. The model can be used to test sensitivity to this component. • Bioavailability of metals should not be modeled in the food web model, but may serve as a good indicator for mercury and zinc. • **Action item: The PLA Project Team will evaluate whether bioavailability can be considered when modeling these metals. It was noted that BLM has not yet been developed for marine waters.**

TABLE 24. SUMMARY OF KNOWLEDGE GAPS AND OPTIONS FOR WATERSHED MODEL

Knowledge Gap	Options and Recommendations	TAC Feedback
Limited data for dioxins/furans in general	Options: 1. Do not model dioxins/furans in the watershed 2. Pursue additional data collection prior to modeling 3. Use model to develop a preliminary analysis of key dioxins/furans Recommendation: A combination of options 2 and 3 should be pursued. The watershed model should be used to develop a preliminary scoping analysis of dioxins/furans (focusing on 2,3,7,8-TCDD as a surrogate) using an approach similar to PCBs. This scoping model can be used to conduct sensitivity analyses to guide additional data collection needs for an eventual comprehensive model of these constituents.	• No TAC feedback.
Limited data for copper, zinc, mercury, and DEHP in the Upper Green River*	Options: 1. Collect additional data prior to modeling 2. Assume loads are driven by geology and/or atmospheric deposition and proceed with modeling. Recommendation: Option 2 is recommended because loads are expected to be small from this relatively undeveloped area. Sensitivity analyses with the model can be used to determine the value of additional information.	• Consider evaluating carcasses of migrating fish (salmon) as a potential pollutant loading source in the models. • **Action Item: The Project Team will obtain City of Tacoma's water quality data and evaluate it for potential use in representing water quality above the dam.**
Poor status of existing TSS calibrations in certain sub-basins	Options: 1. Use existing calibrated parameters 2. Expend effort to improve calibration Recommendation: Because movement of sediment is key to the movement of sediment/solids-sorbed pollutants, effort should be expended to improve the existing TSS calibration.	• It is important to remember that sediment transport is an integral part of the model and also impacts conditions in the LDW. o Agreed. Performance of the model relative to sediment transport should be carefully examined. o Tetra Tech noted that the watershed model will be modeled using sand, silt, and clay, but calibrated using observed TSS or suspended sediment concentration. • **Clarification: As part of QAPP development, TetraTech will be looking at the existing basin calibrations and will fold in new data where possible to improve TSS calibrations where feasible.**
Need for further instream watershed data for parameters in general to support model validation	Options: 1. Collect additional data prior to modeling 2. Proceed with model calibration and collect additional data to support further validation in the future Recommendation: Option 2 is recommended. While data are deemed sufficient for initial model configuration and calibration, the data sets to support instream calibration do not span long periods of time. Sensitivity analyses with the model can be used to inform additional data collection.	• How does the model account for land use change in the future? o The model is based on Hydrologic Response Units (HRUs) that combine land use and soil characteristics. These are simulated on a unit-area basis, then multiplied by area occurring in each subbasin. It is an easy matter to alter the model table of areas in each HRU to reflect land use changes over time. • It is recommended that a separate data gaps and knowledge analysis be conducted on direct stormwater inputs to the LDW as it is not clear how the stormwater system will be handled in any of the proposed models. There are one or more models of direct stormwater drainage in the Seattle portion of the watershed. o Seattle stormwater models have not been obtained and reviewed at this time. We agree that further work is needed on this component. o **Action Item: Ecology to set up a meeting with the City of Seattle, King County, and Tetra Tech to discuss how stormwater inputs and lateral sources should be modeled.** • The drainage basin delineations are an important consideration because sometimes key inputs into any given basin extend beyond the topographic boundary of the basin. o **Action item: Ecology has already obtained the municipal separate stormwater system maps in the watershed and will work with TetraTech to reflect this information as appropriate in the draft modeling QAPP.**

*The upper Green River refers to the Green River above the Howard Hanson dam.

MODELING QAPP DEVELOPMENT

Todd Kennedy, Tetra Tech, provided an overview of the initial modeling QAPP and how it fits into the development of the PLA. He noted that the QAPP should be considered a living document as the initial QAPP will be revised as the work progresses. He explained that the QAPP will include the purpose the PLA, model boundaries, parameter selection, the basis for model selection, model development/setup, data needs and gaps, data gaps approach, the simulation period, and the model development sequence.

TAC members had the following questions and comments about the modeling QAPP:

- What kind of acceptance criteria will be used for data?
  - One example of acceptance criteria could be a documented quality control plan. However, the acceptance criteria for the PLA still need to be developed.
- Are there time frame constraints on data acceptance?
  - Yes, but the time frame has not yet been determined. Ecology and EPA may need to go outside of the time frame constraint if there is no other data in a particular location and/or media.
- What kinds of data are being used for sediment transport and calibration in the estuary?
  - There is some suspended sediment concentration data and deposition rates, but a comprehensive list of existing models is still being developed. Ecology and EPA welcome additional data to support this effort.
  - It was also noted that the USGS is installing a second gauging station at river mile (RM) 6.3 which will collect continuous turbidity data which can be used to calibrate the behavior of suspended sediments in both directions.
- Why is there a mismatch of EFDC and HPSF timeframes?
  - Practically, the EFDC is more complex and takes longer to run and calibrate. Technically, it is typical to run the watershed model for a longer period because there is a longer hydrologic record for the watershed model, and the "memory" of the watershed is longer than that of the estuary.
- Will dredging be incorporated into the model?
  - Yes, but data availability needs to be confirmed. Including dredging data may increase the complexity of the model runs, but it can be included.
  - University of Washington research shows Duwamish hydrodynamics to be sensitive to dredging.
- Why is jurisdictional information important for Hydrologic Response Unit (HRU) development?
  - It will be used to develop localized management strategies, including how and where to prioritize work.
- Is the Black River Pump Station included in the existing models?
  - No, the Black River Pump Station is not connected in the existing HSPF model. It does not respond the same way as other rainfall-runoff relationships and it does not supply sediment to the river. In the future, it may be connected to the PLA model as a unique hydrologic input.

MODEL DEVELOPMENT: FLOW AND SUSPENDED SEDIMENTS

Todd provided an overview of how flow and suspended sediments will be modeled. He noted that the hydrologic model will be a dynamic, continuous simulation over long periods of time to capture runoff and erosion events. He went over the hydrologic components of the LSPC model and explained that the model would capture sediment inputs from overland, in-stream, and stream bank erosion and aggradation processes.

TAC members had the following questions and comments about the hydrologic model and the capture of suspended sediments:

- Will dam releases be included as a hydrologic component?
  - Yes, it will be considered as part of a management action time series.
- Will the flow record be used to calibrate the model?
  - The flow record will be used to calibrate the model. Management actions that impacted the flow record will be included, just not as an upland rainfall-runoff response component (e.g. stormwater systems).
- Will systems where most rainfall/runoff is converted to groundwater be considered in the model?
  - The ultimate fate of each rainfall/runoff system will be included in the model.
- How are the impacts of the Howard Hanson dam on hydrology and total suspended sediment considered in the model?
  - The Howard Hanson dam is the boundary condition for the current model. One way to incorporate these impacts is to consider flows from the dam as an upstream input to the model. An alternative is to develop a sub-model for above the dam.
- Can the coefficient for any given aggradation factor (e.g. stream bank erosion, incision) be changed after the model is built?
  - Yes, the model will be designed so that coefficients can be changed for each factor.
- How will continuous turbidity data be included in the model?
  - Tetra Tech will consider how this data could be used more broadly in the receiving water and watershed models. It could be used as a data source in the LSPC model, then the output of the LSPC model could be used as an input to the EFDC model.
  - Continuous turbidity data are available since November 2013 from the USGS station at RM10. A second gauging station at RM6, currently proposed for installation, will gather similar turbidity data.

MODEL DEVELOPMENT: CONTAMINANTS

Todd provided an overview of the candidate parameter list, land units, the buildup-washoff process, and the proposed approach to HRU development. He further explained how outputs from the LSPC and CSO models would be incorporated into the EFDC model as watershed loading inputs.

TAC members had the following questions and comments about contaminant modeling and HRUs:

- Is the buildup-washoff process only used for impervious surfaces?

- Typically, but it can also be applied to pervious surfaces. It is proposed that erosion models be used on pervious surfaces because of the focus on soil erosion and sediment transport.

- Will you be able to determine how buildup-washoff impacts the input of pollutants on any timeframe?
    - Yes, because the model timeframe is continuous, rather than discrete.
- How will mean annual erosion data be incorporated into the model?
    - Erosion processes are implemented on a continuous basis within the model. Data on mean annual erosion rates can be used as a calibration target.
- What is the maximum storage capacity of a contaminant?
    - There is an assumed rate of buildup and washoff at the same time, creating an asymptotive curve. At some point in time, the curve reaches a limit, or steady state for accumulation.
- How could PCBs from a specific location be modeled?
    - The King County HSPF models will be used as the basis for modeling PCBs and other contaminants. These HSPF models have already identified HRUs. The PLA Project Team will need to consider other available information that may support delineating HRUs differently based on an individual pollutant's source characteristics. It is unlikely that HRUs will be developed at a scale that could be used to pinpoint any single, specific source of PCBs.
- How do you create a new HRU?
    - The existing King County HSPF models divide the land into units of area based on factors such as flows, soils, and land use. Existing HRUs may be broken up into smaller segments (i.e., more categories), depending on the data available to support them.
- What is the smallest possible area for an HRU?
    - The area of an HRU is determined by the desired complexity or scale of the model and the data availability at each scale.
- How is land use/land cover variability accounted for within an HRU?
    - There are four categories of impervious surfaces and additional pervious surface categories. HRUs can be broken into smaller areas if there is additional data.
- How will HRUs be described in the QAPP?
    - The QAPP will describe HRUs, how they have been developed in existing models, how they could be refined, and types of factors to be considered in HRUs development.

COMMENTS FROM THE AUDIENCE

- Have you considered using a distributed model instead of a lumped model?
    - The lumped model was chosen because it is a well-tested tool that has been successfully implemented in similar simulations, a foundation has already been built, and distributed models are not always successful on a model of this scale.
- Consider using criteria in addition to documented quality control for data selection because documented quality control does not mean data was collected for regulatory use.

NEXT STEPS

Rachel McCrea, Department of Ecology, went over the next steps for PLA development, explaining that Ecology and EPA plan to use an inclusive outreach and involvement process during development of the PLA and encourage participation from government agencies, community organizations, businesses, and the general public.

Rachel explained that the near term next steps include providing a recap of TAC and Interested Parties input for the Steering Committee. This includes describing the candidate parameter list and associated recommendations for modeling as well as input regarding the make-up of the TAC. Direction from the Steering Committee will inform future project scoping and the draft initial modeling QAPP.

TetraTech will proceed with developing a draft initial modeling QAPP. She noted that TAC members and Interested Parties will have an opportunity to review a draft of the QAPP in late 2015 (or in early 2016 following the holidays). In 2016, Ecology and EPA plan to move forward with the development of hydrologic and hydrodynamic models, some data assessment, and development and testing of the initial water quality models. These initial models will be used a basis to evaluate model sensitivities and prioritize future work to refine the models.

Ecology and EPA thanked TAC members for their continued patience and input during the PLA development process.

Action items:

- Follow-up on action items outlined in the summary tables of the data gaps and pollutant groupings memo.
- Consider posting comments on the data gaps and pollutant groupings memo on the website.
- Provide a summary of TAC and Interested Parties input to the steering committee.
- Develop a draft initial modeling QAPP to be reviewed by TAC members and Interested Parties in late 2015/early 2016.

TAC homework:

- Alert Ecology or EPA to any existing data sets that were not included in the data gaps and pollutant groupings memo by August 10, 2015.
- Provide additional comments on the data gaps and pollutant groupings memo by August 10, 2015.
- Review the meeting #6 summary and provide edits before August 10, 2015.

The date and time of the next TAC meeting is TBA, but tentatively planned for late 2015/early 2016.