Tidal James River, Elizabeth River, and Tidal Tributaries PCB TMDL Technical Advisory Subcommittee Meeting (Tidewater Region)

Meeting Summary

March 30, 2021

1:00 p.m. until 3:00 p.m. via GoToMeeting

Meeting Recording: [https://transcripts.gotomeeting.com/#/s/df622ec15a0c1c12f3cdd6cadc5905647a54a599fdf410e07d45cb15dabdd93c](https://transcripts.gotomeeting.com/%23/s/df622ec15a0c1c12f3cdd6cadc5905647a54a599fdf410e07d45cb15dabdd93c)

Attendance

Andy Winch, VDOT

Ann Marie Gathright, Environmental Standards, Inc.

Ashley Hall, Stantec

Barbara Brumbaugh, City of Chesapeake

Brian Powell

Casey Magruder, City of Norfolk

Chris Burbage, HRSD

Chrisi VanLear, City of Norfolk, Storm Water Management

Clay Cade, Vitesco Technologies

Daniel Terry, Lyon Shipyard Incorporated - Sealift Drydock

David Wilson, VDOT

Doug Thorn, CHEMRES

Frank Wheatley, VA Ship Repair Association

Heather Baggett, City of Suffolk

James Pletl , Lawnes Point

Jamie Brunkow, James River Association

Jeff Duncan, ONE Environmental Group

Jen Rogers, VA DEQ

Jian Shen, VIMS

Jill Sunderland, HRPDC

Jim Milliken, City of Virginia Beach

Joe Rieger, Elizabeth River Project

John Zaragoza, Catalina Cylinders, Inc

Joshua Shrader, Cardno

Josie DeLong, Colonna's Norfolk, VA

June Whitehurst, City of Norfolk, Storm Water Management

Justin Shafer, City of Norfolk, Storm Water Management

KC Filippino, HRPDC

Kelly Hengler

Ken, CHEMRES

Kristie Britt, VA DEQ

Leigh Mitchell, Mattaponi Tribe

Louis Bott (Jr.), City of Newport News

Mark Richards, VA DEQ

Mark Sauer, US Navy, Naval Station Norfolk

Matt Fanghella, City of Suffolk

Mike McFarland, CHEMRES

Oula Shehab-Dandan, Dominion Energy Services, Inc.

Paige Haley, VA DEQ

Phil Campbell, Vitesco Technologies

Richard Sedgley, Aqualaw & VAMWA

Rob Breeding, VA DEQ

Roger Bullock, Citgo Petroleum Corporation

Shelley Bains, Tidewater Community College

Steve Barten, Waste Management of Virginia, Inc.

Steve Winesett, Fairfax County Wastewater Management

Steven Bulleigh, BAE Systems Norfolk Ship Repair Inc.

Thomas Westfall, Nansemond River Preservation Alliance

Yesika Kain, Huntington Ingalls Incorporated-NN Shipbuilding Division

**Meeting started with asking the attendees to share their name and affiliation in the chat box followed by an introduction to GoToMeeting**

**Introductions**

* VA DEQ and VIMs project staff introduced themselves
* This meeting is focusing on the Elizabeth and lower reaches of the James River from the Williamsburg area to the bay

# Mark Richards (VA DEQ) presented the following information:

**Meeting agenda**

* Objective and TAC role, revisit TMDL development process, Overview of TMDL sources, Dr. Shen will present PCB fate and transport model, Mark will follow up with Point source load allocations, and TMDL endpoint
* There will be opportunities for questions and responses throughout

**Meeting objective**

* To provide a more in depth overview of the PCB TMDL, for those who sat on public meeting, this will get into more details in models and endpoints, and to discuss existing loading and allocations of loads for point sources
* NOT deep dive into the fish tissue, sediment, or water data – please refer to the public meeting for that information
* Will be seeking input on certain topics, like deciding on the appropriate river hydrology schematic to use

**Role of TAC**

* Play an advisory role on the tech aspects of the project, want to keep it realistic, reasonable, and reflective of local conditions
* TAC members may influence model assumptions (ex. Hydrology conditions- Dr. Shen will provide his ideas) TAC members may be aware of other sources of PCBs, will discuss site specific endpoint, and allocations for different sources

**Technical Advisory Subcommittee**

* Needed to be divided based on spatial size of watershed (there are 2 meetings)
* Hopefully will be consistent between the 2 meetings, but if something happens to be inconsistent between the meetings, then we will reconvene with all members of the TAC to discuss the decision as a whole

**Questions**

* none

## Overview of the TMDL development process

Overview was provided prior to meeting, but it is a little outdated. Assumptions have changed slightly.

**Continuous Planning Process- required by CWA**

* WQS- DEQ has designated uses that the state must meet via WQS, recreation, aquatic life and fish consumption uses, shellfish and PWS are not as widely used. Fish consumption is the primary reason for this meeting because that is the use that has been impacted. The numeric and narrative components of WQS was also mentioned.
* The steps of the process are monitoring and assessment, integrated report- tells us what waterbodies are impaired and stays that way until standards are met. If standards aren’t met, DEQ moves on to TMDLs (the step we are on now), followed up with a possible IP after approval; the other component of TMDL is a WLA which for non-PCB pollutants turns into a VPDES permit limit. Then TMDL must be approved by SWCB and EPA.
* Important note - PCB TMDLs do not turn into numeric limit, they are BMP based approaches, things that do have limits like metals or nutrients (non-numeric Water Quality Based Effluent Limit).

**Water quality criterion for PCBs**

* DEQ is 18 ppb (both are for fish tissue)- derived from 640 ppq, DEQ is 640 ppq for ambient water
* VDH is 100 ppb, exceedance leads to consumption advisory= impairment
* Will elaborate more on this later
* 18 used to be 20, and that is based on 2022 guidance manual- draft for now

**VDH fish consumption advisory**

* This meeting has more focus on the lower half of the James River and the Elizabeth River, but advisory does extend from 95 bridge all the way to the mouth and tributaries, and Elizabeth River
* Showed list of localities affected, contaminants, and fish species
* South Branch- blue crab listing

**Problem identification**

* PCB impairments are in the IR, table shows the area and the year they were listed

|  |  |  |
| --- | --- | --- |
| Affected waterbody | Listing year | Square miles |
| Upper James & tribs (tidal fresh) | 2002, 2006, 2008, 2012 | 34.2 |
| Middle James & tribs (oligohaline) | 2004, 2006 | 53.8 |
| Lower James & tribs (mesohaline) | 2004, 2006 | 143.1 |
| Elizabeth River & watershed | 2004, 2006 | 17.0 |

The years listed are years of Integrated Reports when the waters were first listed as impaired. In order for them to be delisted, the waterbody must meet the WQC described above. If that doesn’t happen, we have to develop the TMDL.

Question from Frank Wheatley – the chart shows the Elizabeth River only impaired in 2004 and 2006. Are there more recent data? Answer – Mark addressed this in the continuing planning process and stated that once a waterbody is impaired, it stays impaired until fish tissue data show otherwise, which at this point the recent data have not. When this occurs a TMDL is needed.

**Watershed map**

* Map showing color coded waterbody sections. Today discussing the lower tidal James impairments and Elizabeth River.
* Piedmont region subcommittee meeting on March 25 covered the upper and middle tidal James River
* Ultimately, the plan is for the TMDL to have 4 different TMDL equations developed at each of the boundary conditions

**PCBs**

* Polychlorinated biphenyl
* 209 compounds that comprise PCBs, total PCBs are a total concentration of all 209, were manufactured from late 1920s to the late 1970s, there is a current load of PCBs that have become problematic or a potential source due to the toxic substance control act
* Legacy contaminant, but also still produced as byproducts. So this goes beyond just what was spilled or washing off from old spills
* Heat resistant and staple so very persistent in the environment

**TMDL = WLA + LA + MOS**

* TMDL = total maximum daily load, WLA = waste load allocation (point sources), LA = load allocation (non-point sources), MOS = margin of safety (to account for uncertainty in the models)
* Pollution budget that addresses multiple categories, looks at air, land, and water’
* Showed schematic of how TMDLs work- need to bring pollutant load down to TMDL end point to restore the designated use, must meet both numerical water quality value and fish tissue threshold
* The goal is to reduce the existing PCB load to restore the fish consumption use, we need to meet two thresholds to restore), so we need to look at site specific value (WQC) and the threshold which are linked

**The TMDL Process**

* Identify problem, complete source assessment, link sources to targets (assess linkages, and estimate loading capacity), - this is the process that is still underway
* Then set TMDL allocations- reduce loadings from difference sources to meet TMDL condition

**TMDL Sampling Approach**

* Primarily capture water column samples- (during high, low, and base flow conditions), and some sediment. Sampled 2009-2012, revisited 2016, revisited again in 2020.
* Objective of monitoring is to assist with source identification and provide support for model development and for Bioaccumulation Factor (BAF) derived endpoints.
* Fish tissue is 2005, 2008, 2012, and 2016. Fish tissue monitoring will continue this summer (2021). Fish tissue concentrations have not diminished over time

**Questions:**

1. Could you provide an example of a decision that would merit another meeting with both subcommittees?

*This is new territory. Ex: We haven’t made a decision of a hydrologic condition to use during the first meeting, if there is more discussion today on that and we are leaning toward a decision, we would have to reconvene the group to decide. We haven’t had much experience with this. If there is disparity between two meetings and a decision is made, or some sort of ramification comes from discussion that may necessitate another meeting. Mark will run this through policy folks before we make another meeting.*

1. Can you elaborate on the process that we anticipate for the development of a PCB implementation plan (IP)? You said earlier that PCB IPs don’t necessarily automatically follow when the TMDL is completed, so what would trigger the next step?

*We had this discussion previously, specifically on the New River PCB TMDL project because we had an uncharacterized source. It was considered that perhaps the IP would include additional monitoring. Traditionally we have not developed IPs for these because the real purpose for bacteria TMDLs or other TMDLs is primarily on the non-point side. Those focus on non-point source because CWA section 319 provides money for non-point sources. Knowing that we have sources that come from WLA component of these projects, then this will be more addressed through VPDES program than IP. We haven’t followed through on this, but it doesn’t have any bearing on permits. Relative to the New River, it was something we explored, but didn’t end up doing IP for that project.*

1. How are inadvertent manufactured PCBs being incorporated into the TMDL and how are they to be mitigated? What percentage are they of legacy PCBs?

*Mark hasn’t really done an assessment in VA relative to this component. He was talking to someone from paper industry and they found inadvertently produces PCBs in effluents associated with paper recycling and production. What component do they comprise of a total PCB sample, we don’t really know. We don’t really tease out that component because PCBs are regulated as a total PCB number, so all of the detected congeners are summed and then that summed value is compared to the water quality criterion. How do we address this- more of an implementation side thru Pollution Management Plans or an action plan? That’s a component that can be addressed. For example, the State of Washington has done research on products that contain inadvertently produced PCBs, so avoiding the use of certain products that might contain certain congers can be a strategy. So, the process to address this- we are still learning. Congeners produced inadvertently are easier to trace because they stand out, but when we have release of Aroclors over years, it is hard to make sense of what the results show. There is a success story about a textile mill in the Roanoke River on the DEQ website.*

1. How did the fish VA DEQ fish tissue limits drop from 20 to 18 if the water quality criterion did not change?  I thought the two were related to one another.

*It’s because of the assumptions that went into the calculation- exposure period changed (went up a couple years) and weight of people that were considered increased. We will talk about this more later. This is going through triennial review, and it will update the WQC from 640 to 580.*

**Sources considered in the PCB TMDL Development Study**

* Examples of sources are point sources through permitting program, atmospheric deposition (wet and dry), non-point sources (unknown contaminated sites), regulated stormwater from MS4s (urban areas), known contaminated sites, and PCB contaminated sediment

*Point sources*

* VPDES permitted facilities, 6 WWTPs, 171 industrial sources (IPs and ISWGPs)- based on SIC- 2016 report based on statewide analysis that showed facilities with a PCB component, 23 MS4s and VDOT, CSO (combined sewer overflow)- only in Richmond, doesn’t apply to lower James and Elizabeth, Richmond is making great strides to fix issues but it’s a huge endeavor.
  + all will receive a WLA

*MS4s*

* Brown areas on map show MS4 areas. Williamsburg is shown on this map too (there was a question about this in Piedmont meeting)
* 2013-2014 timeframe sampled MS4s around Richmond (non-MS4 is forested area), sampling captured residential, commercial, highway, industrial, etc.
* There was a question after the Public meeting asking why DEQ did not include the MS4 about the 2013 data results in that presentation, and will these data be used?- Dr. Shen will talk about how this information can be used to the extent practical.
* Another table shows how MS4s are broken up by Phase I and II

*Contaminated Sites*

* TSCA-PCB sites (0)- cleaned up under this regulation and have EPA oversite with DEQ cooperation
* RCRA Corrective Action (9)- – need to see if PCBS are associated with these, most are larger facilities, typically have a VPDES permit
* CERCLA (11) or superfund sites, some very large with military component
* Voluntary remediation/Brownfield (9) are old facilities that may have had contamination, develop- site owner/operator has an agreement with DEQ to remediate to a certain level.
* Landfills are associated with PCBs but we do not typically see PCBs in groundwater samples from landfills when monitoring has occurred. This is because the analytical methods lack the sensitivity to detect PCBs.
* Railyards and spurs used to have PCBs on trains where maintenance could have occurred there
* PREP spills (oil spills)
* Electric utility transformer pads
* *How do we find these sites?* Collaborative effort between DEQs TMDL program and Land division to determine what sites might have PCB contamination.
  + Look at DEQ’s databases and GIS based services, coordination between EPA, look through CERCLA’s databases, RCRA’s databases, an intensive review of data and potential sites that may have been contaminated, we do look at CERCLA remediated sites to see if the washoff stormwater meets criteria.

*Atmospheric deposition and contaminated sediment*

* Atmospheric deposition a contributing source- Showed data from Delaware
  + can be a component, Dr. Shen will talk about this and sediment more

**Questions:**

1. We should be very interested in which, if any, RCRA, CERCLA, VRP sites have reported PCB involvement.  Same re the other sources ID'ed on this slide.  Is there data from Rail yards?

*No data from rail yards, but it is an extension from work done in Roanoke- just knowing the activities that have occurred in those yards over time, locomotives are known sources are of PCBs and may still be. So it’s an assumption that goes into the model. CERCLA- yes there are PCB data and we’ve looked at it very closely. Based on, looking at remediation efforts that have occurred. The process is to determine acreage of area and median site concentration even after cleanup, common clean up concentration is 1 ppm, but typically the hotter areas are targeted and there may be extraneous contamination left behind. Even low levels can still contribute to impairment. RCRA- where data are available, a lot are older industrial sites. Many are cleaning up under RCRA corrective action but also have VPDES permits and that helps us determine if PCBs have been a problem. This information will all be incorporated in the source assessment appendix developed with this project.*

1. How did DEQ incorporate unregistered junk yards?  It seems like examining aerial photos would be an easy way to identify many this way.

*In most cases, they should be under the industrial storm water general permit. If not, we could consider as non-point source component that we could assign a loading based on size of facility in the watershed model.*

1. How will the PCB sources be weighted in model?

*Dr. Shen will talk about this later.*

1. Will large facilities like airports and ports be included based off the current SIC codes?

*Mark doesn’t believe they are captured under that classification. Can’t think of any. If there is info that suggests otherwise, DEQ would be interested in that information.*

1. Has there been any research performed on historical industrial sites that manufactured electrical components & circuit boards during the past 50 years? Particularly those with onsite disposal / waste closures?

*Certainly some of those sites have been cleaned up over time and could be a source. That would be of interest. Mark can’t think of any specific research on this. Other than if a site like that has been remediated. Note: The remediation process includes a full characterization of the site and depending on the level of contamination, several iterations of site characterization can be performed.*

1. And has there been research concerning the miscibility / transportability of PCBs? I am curious how far these materials travel from point source

*More of a modeling/fate and transport questions. Really depends on the system. A free flowing system, they could travel far and then get suspended and travel again. Dr. Shen could answer better for the tidal river.*

1. Do the RCRA/superfund cleanup standards address runoff in addition to the soil?

*With some larger facilities, they are permitted and it may be reflected in that depending on if runoff is going through a specific outfall. The watershed model would help determine this. Such as if there is an adjacent MS4, what component of that is that going into the MS4?*

1. Are Dominion power sites included in the source determination?

*Yes*

# Dr. Jian Shen took over presenting from here:

He started by saying he is not getting into details about modeling, but please send specific modeling questions to him at shen@vims.edu

**PCB TMDL Fate and Transport Model**

* Described an overview of the model, see presentation slide for details

*PCB transport process*

* In a watershed – watershed model takes care of the surface runoff and the sub-surface flow which locally increases PCBs and discharges to the stream. The whole modeling process is non-point sources, we do not deal with the deep aquifer or groundwater (assume it is low concentration)
* In estuary –
  + Can be a long time- take a month to a year to move downstream and part of them will be buried and never come out, so all of this needs to be taken into account and the particulate and dissolved organic carbon (POC and DOC) are major substances absorb OCBs in estuary
  + Complex system with PCB sources including runoff, erosion process/deposition, direct deposition from the atmosphere, and subsurface exchange between water and atmosphere. Once PCB discharged into system, then portion of particulates would be dissolved. The dissolved PCBs can remain in the water as dissolved species or absorbed by particulates or chlorophyll-a and DOC. Dissolved particulates can be exchanged with the atmosphere (PCBs lost from the system). Once PCB are sorbed by POC and chlorophyll-a, then they will settle to the bottom sediment and can be re-suspended again with the tides.
  + Water column model- can simulate organic carbon
* Stream free flowing – more dominated by flow, in an estuary – more dominated by tides or wind, high tides or waves could re-suspend sediment and increase concentration

*Estuarine model*

* Simulates a biochemical process, an organic carbon based model, used organic carbon because PCBs are absorbed more by OC than sediment itself, couples the water column and the bottom sediment, models exchange of PCBs between Bay water and the atmosphere
* Used in the Baltimore Harbor PCB, peer reviewed and published in Ecological Modeling, also OC model is used in DEQ’s assessment of chlorophyll-a in the James River, simulations of Chl a and OC are already available and are consistent
* Showed Flow chart of Estuarine model Elements
  + Dynamic model – simulates surface elevation, salinity, temp, and suspended sediment
  + Carbon model – basic eutrophication model, simulates dissolved particulate organic carbon and chlorophyll-a, add carbon into the PCB model, simulates sorption, settling, resuspension, and burying
  + PCB Model- can simulate PCB transport dynamic in water and bottom sediment coupled with carbon model

*PCB Model sorption process*

* Key process is the sorption/desorption
* Assumes equilibrium between water and dissolved and particulate carbon
* Carbon is divided into 4 pieces – dissolved PCB, particulate carbon bound PCB, algae bound PCB, and DOC bound PCB
* Each one has different partition coefficients based on equilibrium of the PCB homolog
* Model individual homologs to ensure a more accurate partition coefficient simulated PCB process

*Selecting homologs*

* Can see distribution of different homologs, selected the homologs to do the simulations
* If you select 3 major homologs, you get a good correlation coefficient. VIMS selected 4 major homologs and got a total PCB correlation of 0.9.

*Loading estimation*

* Upstream loading, atmospheric deposition, lateral loading, contaminated sites, point source/MS4s, and CSOs
* Atmospheric deposition – CBP did a survey of the atmospheric dep in 1999, 1 measurement in the James River basin showed wet and dry deposition of PCBs were 1.1 and 1.0 kg/yr respectively, the atmospheric deposition rate was about 3.08 micrograms/m^2/year, estimated loading is 569 g/yr. (assuming 1% of runoff) below fall line, direct deposition on the surface is 1,056 g/year (still high), net transport between atmosphere and estuary is out (PCB loss to atmosphere)
* Upstream loading estimation –1,027 g/yr. is low estimation and 2,327 g/yr. is high estimation, model used high estimation based on regression because there was a high correlation coefficient

*Watershed model approach*

* Used to simulate non-point sources loadings based on land used below fall-line (downstream of Richmond)
* Added point sources and contamination sites, and then calibrated based on measurements from the edge of stream
* Land use – used latest data from USGS, can partition for county or different areas, VA Beach and Norfolk very urbanized
* Contaminated and Remediated sites – not all have measurements, 11 sites have recorded PCB concentration measurements, 48 total sites, so the model used an average as a start, use downstream measurements to adjust the model for calibration, watershed model is a very fine resolution model because we can fine tune with direct measurements
* CSOs (Richmond) – CSO on the Richmond side with measurements gives us a guideline to estimate the flow and concentration
* Point sources – all discharge to this project area. Estimate loading based on concentration and flow or size of industrial property, Point sources in Tidewater area are much higher than Richmond area
* MS4– estimate based on land use for each county and then can estimate loads for MS4s based on the load from the counties
* Provided load estimation in areas without point sources

*Preliminary model results*

* Concentrations do not change much over time, so even data that is older is still good
* Have observations in the estuary – because the tide goes to Richmond, the loads can be transported upstream and downstream (high exchange), must model the entire estuary as one piece, all data points used for model calibration
* Example shows 2006-2013, observations were acquired during this time period, also James River chlorophyll-a project simulates the organic carbon and chlorophyll and the model requires nutrient input and runoff data provided by CBP, their data covers 2005-2013 so we can only simulate this period (for eutrophication model)
* Need to use a long period to compare PCB data against the model, if you model a long period (8 years), if you can catch the range of the data then you can have confidence (missing one or two data points is ok, missing many is bad)
* Model does seem to catch the data points ok
* 640 nanograms of tPCB is the guideline, if the values are above the guideline then you need to pay attention, if it is below, then it is not as big of a concern. If there are discrepancies, then we need to go back to the model to calibrate the loading again
* Date before 2006 in the sediment is used as the initial condition for the model

*PCB Budget*

* At the end, we will have this- combine model simulations and loadings estimation to estimate the PCB budget and determine load reduction
* Diagram on slide shows an example from the Baltimore Harbor, but eventually James will have a similar diagram which shows the loads from all the different sources and the losses

*TMDL Study*

* Will not change quickly like bacteria TMDL, once you remove the point source, the sediment is still waiting to recover
* If you don’t remove the source or reduce it, then you will not recover and will gradually increase
* The Baltimore Harbor did gradually decrease over time with the TMDL in place
* TMDL implementation improves water quality much faster

*Flow distribution*

* High discharge does not increase velocity in an estuary, velocity in an estuary increases due to the tide and wind, resuspension is mainly driven by the tide, and wind
* High flow does increase gravitational circulation, so the water in the surface layer will move PCBs out and the bottom water will move in, so if you have a low flow, gravitational circulation is not strong and less stuff moves out, versus high flow where more stuff moves out
* Two options for a TMDL – can use the free flow approach with the harmonic mean (using just one year to simulate flow), or you can use more realistic dynamics of estuary approach which is a combination of low flow, high flow, and mean flow (3 year window)
* In Baltimore harbor, used 3 year flow period.
* Dr. Shen prefers 3-year option because it is closer to reality- doesn’t change much in TMDL, but changes recovery time.

*Procedure for how to allocate*

* Will allocate loads for each jurisdiction (city, county, or federal land)
* Regulated area for each jurisdiction is based on GIS layer for each land
* Two options for estimating loading – the first is to compute the % of regulated area to total jurisdiction area and use the % to partition loads for each sub-watershed then sum the load for all sub-watersheds, the second is to estimate loading based on land use and then partition based on % of land use for each jurisdiction, a method which is harder.

*Climate change*

* Most uncertain part is dynamics transport
* Sea level rise is going to increase salinity intrusion and will change estuarine circulation (top layer will move out and bottom layer will bring water in from the Bay). Will help to reduce PCB concentrations in James as PCB concentration in the lower Bay is low
* changes in discharge will change the residence time (an increase in residence time will increase concentrations), temperature will change the carbon distribution, PCB TMDL is basically a carbon TMDL, so if you change temperature it will increase growth rate, respiration rate, and grazing will change the model
* Have already looked to update the TMDL based on climate change – temperature will affect growth and respiration rates, loading from nutrients in the watersheds, CBP already looked at this
* How does this impact things? Red and blue lines take into account transport change and temperature change, and the changes are very minor, based on the current scenario, there will not be a dramatic effect on the carbon
  + Change in transport
  + Change in temperature- increase temp=increase algae
* Bringing in more water from the Bay will help with PCB cleanup because the Bay is low in PCBs, so climate change will not impact our TMDL significantly

**Questions:**

1. Have you considered using passive sampling to determine sources? Like what was done in the Anacostia to look at gas to water and sediment to water exchanges? Looking at stormflow vs baseflow, it allowed for source/sink determinations and in some cases showed that sediments from stormflow were less of a source than baseflow sediment/water exchange.

*Mark provided more clear answer to address this, he added that we started down this path for Potomac PCB TMDL. It was a multi-jurisdictional approach. Used semi-permeable devices, which is a passive sampling technique. But we are developing total load, so that didn’t work because that was targeting the dissolved component. We determined that it wasn’t an appropriate approach to use for this type of project. Could be good for source investigations to look for where main contributions are coming from.*

1. Is 1999 the most recent atmospheric deposition data that is available? Is all of the data from the Richmond area?

*Data is below the fall line, so yes in Richmond area*

1. How old is the land use data?

*Believe 2012 maybe? 3 or 4 years ago was the latest data (actually, the land use data is 2016 USGS data). The bigger challenge is the loading to the land use. Even using the latest land use, that is more uncertain. If we have the latest land use but don’t have the source info, there will be errors. Dr. Shen will check and make sure we are using the updated version if there is a difference.*

1. Hampton Roads generated some MS4 data for various land uses, will this be used in the model?

*Yes, he received updated data. He will use all data that has passed QAQC.*

*Mark added that the data he presented earlier on the MS4 slides (slide 22) represent the most recent data that he is aware of.*

1. Will climate change incorporate more frequent/stronger storms?

*The watershed runoff is based on Chesapeake Bay program and they consider different scenarios. Lateral flow runoff data is provided by the Bay program. So might increase storm and increase precipitation and wind, but these are still considered as events. Basically you will see that if there is a storm with more runoff, this will quickly deposit to the sediment and you will see the short-term effects. Historically, we have so many storms and big wind events and you can see PCBs spikes immediately following these events but will quickly settle to the bottom. The current model incorporates many years including these storms. So you can increase frequency, but it will be similar to the long term variation. The TMDL is really looking for the long term processes. Again, a good reason to use high flow, low flow, mean flow method, which will address this.*

1. Have you considered how inputs of PCBs might increase in the water column with more frequent flooding of uplands which might be sources for PCBs?  How will this be accounted for in the model?

*Right now, you can see in his model the simulation with flooding. Most loading from watershed are from the background deposition, we are not too worried because accumulation is low. The only large source during flooding is what is buried in the sediment will come out with some erosion. So there will be increase with runoff (high discharge flow), but if you increase the discharge than the concentration gets low because you wash it out. Unless you have a dramatic change in the environment, overall the annual average is already accounted for in the model.*

1. Will the model differentiate for the different flow patterns and tidal influence experienced in the Upper James vs the lower James and Elizabeth R? There are no USGS flow stations south of Richmond, how or will these systems be treated differently?

*The model does not handle upstream above Richmond, basically we’ll just have the loading. The model is very fine resolution, model grid size is about 200-300x300, so you can see high and low concentrations in different areas. In preliminary model results- you can see concentrations going down further downstream. The model takes care of all these because we simulate particulate and dissolved transport and we can distinguish between different locations.*

1. Has this model been peer reviewed?

*Yes. This is a basic hydrodynamic model has been reviewed many times. The complex OC model has been reviewed for Chesapeake Bay. PCB model has been peer revised and published in Journal, which is one of the most advanced PCB models.*

# Mark Richards took over presenting again from here:

**VPDES load calculations**

* Developed outside the model, applicable to WWTP, ISWGPs, and IPs, all calculated existing loads on a spreadsheet through the standard method and that info is incorporated into the model
* This is very transparent and easily reviewed how it is derived
* Once TMDL developed, DEQ will have a full idea as to how the WLAs were developed and can be updated if necessary.
* Prefer to use the permit data, but in lieu of the data we use standard concentrations derived from the statewide PCB data using SIC codes. And looking at comparable facilities
* One of the first steps after TMDL is developed is for facilities to generate real data from which the existing load is recalculated and then compared to the WLA.
* Monitoring requirements are included in TMDL GM 14-2004 for permittees measuring concentrations
* WLA concentration is calculated by substituting the TMDL endpoint
* Municipal – Use design flow for WLA and 8 years monthly average flow for existing load
* ISWGPs – flow calculated from industrial activity and impervious activity acreage, consistent with GP regulation. For concentration use either real data or data from comparable facilities
* IPs – process water and comingled = mean DMR monthly average flow for existing/baseline load, mean of DMR daily max flow for WLA, stormwater = acreage to outfall drainage area
* Each facility has one load
* Larger facilities with many outfalls, load is summed for that facility and is written like that into the TMDL

**Discuss TMDL endpoints**

* Gets back to WQS
* Have 2 values that the TMDL has to meet, but they are directly associated with each other
* Narrative WQS- 9VAC25-260-20 General criteria
* Why is there a disparity between VDH and DEQ? Screening value is directly related to the 640, the WQC follows the method the EPA has decided to use, uses an actual numeric water quality criterion, it is set to keep the water safe throughout the state (difference between DEQ and VDH = keep water from getting contaminated vs. keep fish safe to eat after water has been contaminated)
* TMDL must be consistent with the WQS, because fish tissue threshold is consistent with the WQC it requires us to adhere to the DEQ numbers, not VDH’s
* In support of the values – narrative WQS says specific substances must be controlled, including those toxic substances that bioaccumulate

*How was the WQC calculated?*

* Follows EPA guidelines
* WQC and fish screening value differs in the BCF (bioconcentration factor), ultimately it develops a fish screening value that is safe for humans to consume fish and then is translated to a water based number and becomes the WQC.
* Weakness of this approach is that BCF only accounts for a fraction of the PCBs that these fish are exposed to. What about other exposure pathways? Looking at a different approach to be more protective. This EPA based approach is called bioaccumulation factor process.

*Biannual WQA guidance*

* Guidance memo used for several years, in 2012 the values were similar and then VDH changed their values because they wanted to account for assumptions that went into their risk assessment.
* Most recent Assessment guidance document is undergoing final internal review (it was public noticed) – value will be 18. This is not a TMDL or watersheds program decision, this has been entrenched in DEQ for a long time.
* Triennial review is in the early stages (may move from 640 to 580), change because exposure factors have changed

*Why is a Bioaccumulation Factor (BAF) more reasonable approach?*

* As you move up in chlorine content in PCBs, the homologs are more hydrophobic and less dissolved. The assumption for the Bioconcentration is that PCBs are dissolved (for the large part they are not).
* Biomagnification of PCBs increases concentration dramatically, the trophic levels that we consume now are the ones higher in PCBs, this is not taken into account in BCF
* Bioaccumulation deals with exposure from water, food, and sediment. Bioconcentration is exposure from water only.
* Graphs shows the fish tissue values (x-axis) versus average water concentrations (y-axis), graph is divided into A, B, C, and D quadrants by fish tissue WQC and water concentration WQC, shows that fish are getting PCBs from more than just the water column because
* Looking at the Elizabeth River, the water concentrations are so elevated, many data points show high levels of water exceedances. Both water and fish numbers are exceeded, and data don’t support using a site specific endpoint
* For the upstream sections, the site specific method will be more protective
* EPA method supports the use of Bioaccumulation Factor (BAF)
  + Has been used in other projects in VA and MD

Bioaccumulation Factor (BAF) *in a nutshell*

* Review slide presented for more information
* Home range versus watershed, determines a ratio of PCBs in the water column versus in the fish themselves, normalized based on freely dissolved PCBs and fish tissue lipid content, also normalized for each fish species
* Fish tissue threshold value is divided by the 18 and then we get a site specific value for the species

Bioaccumulation Factor (BAF) *endpoint selection*

* Bioaccumulation Factors (BAF) are calculated for each fish species in the four TMDL watershed sections (not shared today because they need to be updated based on the information that went into the derivations)
* If we do decide on site specific endpoints, then we can consider recreational and commercial interest on those species, fish advisories, or use a central tendency statistic
* Knowing the upper James TMDL will reduce the load that comes over the fall line, we will need to take that into account to decide which endpoint is derived/used for the upper tidal portion of the watershed; VIMS can model different scenarios
  + Questions we still don’t know. Will need to include different modeled scenarios to look at this.
* Will revise the endpoints based on comments we received, like the use of older fish tissue data sets. At what point should we cut that data off? How do we account for changes in analytical methods? We have always used VIMS, so that is consistent but it can be investigated

**Questions:**

1. Can DEQ provide the point source data used here for TMDL inputs to committee members?

*Yes, that can be provided.*

1. Can DEQ provide the PCB analytical data to be used in the model? Including how many of each type of discharger submitted PCB data and how DEQ is estimating concentrations in the model based on SIC code?

*Yes, that can be provided.*

**Anticipated timeline**

* First meeting today, second TAC is this summer (hope to have TMDL allocations with different scenarios) will be more of a decision type meeting, third TAC will be when a draft is ready (Nov/Dec 2021). Final public meeting Winter 2022
* Certain groups (i.e. MS4s) may reach out to have a specific interest meetings as well (like with City of Richmond about CSOs)

**Next steps**

* Still working on responses to public comments, will be coming out shortly
* TAC contact list – A list of all members will be shared with all participants. Let Paige Haley know if you are not comfortable being included on the list.
* Watershed modeling will go on throughout 2021
* Please fill out meeting comment form!

**Questions:**

1. Is there any data on the Nansemond River?

*No ambient water column data, Mark believes there may be fish data. We can follow up*

1. Can data and information be provided with ample time in advance of the next meeting to review and can future meetings be more interactive with the ability to speak?

*Yes, we can get materials posted online or send out to the TAC earlier.*

*Future meetings will not be as heavy on DEQ presented material and should be more interactive*

*\** The Piedmont Technical Advisory Subcommittee meeting was held Thursday, March 25 from 1-3pm. It focused more on the middle and upper tidal James, but most of the content covered in this meeting is consistent with what was covered then.