Jackson River, Maury River, and James River PCB TMDL

2nd Technical Advisory Committee Meeting

Location: Virginia Department of Forestry Office Building located at 900 Natural Resources Drive, #800, Charlottesville, VA 22903

Date and Time: August 2, 2022, 2:00 pm

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TAC Members:

Mark Richards (DEQ)**, Lucy Smith (DEQ)*, Nesha Mcrae (DEQ)*, Denise Moyer (DEQ)*, Karen Kline (VT BSE)**, Brian Benham (VT BSE)*, Jennifer Palmore (DEQ), Barbara Walsh (RACC), Joe Dinardo (RACC), Jen Rogers (Dominion), David Blye (Environmental Standards Inc./ VMA), Ann Marie Gathright (Environmental Standards Inc.), Jim Taylor (WestRock), Sandra Stuart (RACC), Jess Wenger (UVA), Todd Asselborn (Greif Packaging), Kimberly Mervine (Chesterfield VA), Sean Ryan, Justin Williams (DEQ), Erin Reilly (JRA), Christina Perry (Stantec, (on behalf of VDOT)), Renee Clark (VDOT- Staunton)

*** Presenters*
**Project team*

Meeting Summary

Welcome and Introductions

The attendees introduced themselves, organization, and interest in the project

Background: PCBs Standards

Mark Richards (VA Department of Environmental Quality, DEQ) presented background information on PCBs including DEQ's water quality criterion, fish tissue criterion is 18 (screening value) and VDH's fish consumption advisory of 100 ppm. Currently the water quality criterion is going through a revision, and has been proposed to be changed to 580 pg/L. This change is based on updates to the assumptions used in supporting calculations like average body weight, fish consumption rates etc. Standards are typically implemented on a magnitude, frequency, and duration basis. The previous standard did not account for duration and frequency. Mark noted that frequency has been a sticking point in previous TMDL projects. The TMDL process typically uses the time frame of a year for the duration over which compliance with the standard is evaluated. The current standard allows for 0% exceedance per the requirement of EPA. There is a footnote included in the new proposed standard regarding how we interpret an exceedance rate. The footnote allows for consideration of the average amount of exposure on a long term basis when determining if the standard is met.

The new criterion will go to the State Water Control Board (SWCB) in August 2022, then on to Executive Review which could take an unknown period of time (e.g., past occurances have taken 1-3 years). The standard will then need to be approved by EPA. DEQ's objective is to move forward with the current TMDL, but still account for the new standard. EPA will not accept a TMDL that uses a draft standard. DEQ plans to develop TMDL endpoints for the watershed based on the new proposed standard, and

include them in an appendix in the TMDL report. This way, we will be able to easily modify the TMDL once the standard is approved.

Background: The TMDL Process

Mark provided the group with an overview of the TMDL process, which includes the identification of a problem (fish consumption advisory), a source assessment, linking sources to targets, and then developing TMDL allocations. We are in the developing of TMDL allocations phase of this project.

The objective of the TMDL process is to reduce the pollutant load to meet the numeric WQC (or site-specific TMDL endpoint) and fish tissue threshold. DEQ reviewed which rivers and streams are impaired for Fish Consumption and have associated advisories, and presented the fish tissue data used to designate the impairments. Mark noted that the Maury River exceeds the VDH threshold at Glen Maury Park. The Jackson River is impairment based on Carp contamination using DEQ's fish tissue screening value. The Upper and Lower James Rivers also have a fish tissue consumption advisory. Mark also shared a table of additional PCB impairments identified by DEQ (Jackson River, Hardware River, Slate River, Fishing Creek and Reedy Creek).

In PCB TMDL development, we have two endpoints to meet (the water quality criteria, WQC, and fish tissue threshold), the latter is the real challenge.

PCB Monitoring

Sampling was conducted in 2017-2019. Fish tissue collection is ongoing through DEQ's fish tissue monitoring program, but water quality and sediment samples were collected to inform the TMDL study and are not routinely conducted during the monitoring program cycle. Mark shared maps and graphs of water column and sediment PCB sampling results. Water column sampling was conducted at base flow and wet weather (the higher values occur in wet weather). Some of the sediment samples were collected above dams where you would expect sediment to back up. We saw the most significant concentrations around Richmond, and concentrations were also slightly elevated up around Eagle Rock.

Q: Were dioxin PCBs collected?

- Yes, low level PCB analysis was conducted including a concentration for all 209 PCB congeners.

Q: Was PCB sampling conducted on the upstream (unimpaired) portion Maury River?

- No, water samples were collected at the upstream extent of the impairment, which served as the upper boundary for model development. Fish Tissue data collected historically indicates that there is not PCB contamination in the fish in the upstream portion of the Maury River.

Q: When was the last sample collected? Is there any anticipation of doing additional data collection?

- 2017-2019 for water column data, Fish Tissue program collects data in each basin periodically. There will not be additional data collection for TMDL development, if results of TMDL show areas of interest where we need to pin point a source, we can conduct follow up monitoring.

Q: Has there been any evaluation of the older data (1995) vs. current data?

- More recent data has been used for this project. There is fish tissue data from 2005, 2014, and 2017. VDH has reviewed the most recent data, which do not support removing the consumption advisory from the James River mainstem. Plus, the upper section of the James River (from headwaters near Iron Gate to Balcony Falls below Glasgow) was just listed as a consumption advisory for carp which suggests PCBs are pervasive in the system.
- A part of the river we thought was unimpaired was listed in 2020—Upper James section. We do the evaluation on a 3-5 year basis to look at every basin for the Fish Tissue program. VDH requires two years of data that indicates PCBs are not impairing a waterbody.
- We do not have long-term water samples because those are only collected for TMDLs. Water samples are collected to help find source areas and for model development. We do not have enough data to establish historical trends in water.

TMDL Endpoint Development

DEQ began using site specific TMDL endpoints to support PCB TMDL development after learning that TMDL endpoints derived using the water quality criteria alone were not protective of fish. This is primarily because the water quality standard takes into account only a single exposure pathway. PCBs are very hydrophobic and therefore are tied up in sediment and fish. Typically, dissolved PCBs comprise an approximate 10-20% of total PCBs in a water sample while the remaining PCBs are in the particulate form. PCBs also move up a food chain and biomagnify. We tend to see the highest concentration of PCBs in bottom-feeding fish, and concentrations do not diminish over time. We can have instances where the fish tissue PCB concentration is very high, but PCB concentrations in the water meet the standard, therefore it supports the need to apply a bioaccumlation factor (BAF) to designate the endpoint in order to be protective of fish. The TMDL must meet both the WQS and the site specific value calculated using the BAF (if it is lower).

Mark discussed two options for determining a PCB endpoint. 1) Default to the water quality standard 640 (lowered to 580) if site-specific value is higher, or 2) Calculate the site-specific value to protect fish. Factors also take into account multiple exposure pathways (sediment ingestion). We need to consider a number of factors in developing endpoints including the fact that fish accumulate PCBs, there are different forms of PCBs in a stream, and that PCB uptake occurs in the food chain. Given that dissolved PCBs are the basis for the water quality criteria, the average instream concentration of PCBs is often less than the WQC. Using site specific values allows us to account for all exposure pathways.

Mark provided a brief overview of calculation of a bioaccumulation factor. BAFs are calculated for each fish species in the watershed, and the endpoint is based on some average of selected fish species BAF values. The level of contamination we see typically goes up as you move downriver. Consequently, we would not develop one site specific endpoint for the whole watershed. Three scenarios were calculated for the Maury River, Upper James River and Lower James River watershed. Due to a relatively small fish tissue data set and the inability to calculate summary statistics, the scenarios did not apply to the Jackson River watershed and the BAF value for scenario 1 was above the WQS. The default value is the WQC. There was not a lot of difference between endpoints for all three scenarios in the Maury River, and we saw the greatest variation between scenarios for the Upper James watershed.

Mark shared information used to derive endpoints (e.g carp and rock bass in the Jackson River). DEQ has a larger dataset for the Maury River, which includes 4 advisory species and small mouth bass. Flathead catfish and carp are some of the most heavily contaminated species, and are really driving lower endpoints in some of the watersheds. TAC members can review these slides when the presentation is available on the DEQ website.

Q: Do we add other sources of PCB exposure to humans?

- No we are just using fish tissue exposure to drive the TMDL with the goal of restoring the waterway (i.e., . the fish consumption use).

Sources Considered in PCB TMDL Development

Permitted facilities considered in TMDL development included 26 municipal WWTPs, 2 CSOs, 73 industrial facilities and 11 MS4s.

Contaminated sites included 1 DEQ Voluntary Remediation Program site with PCBs (40 sites overall), and 2 Brownfields sites with PCBs (80 overall). Other contaminated site categories include spill sites, electric utility transformer pads, and rail yards/spurs. Additional TMDL source categories considered include an unregulated surface load (unregulated stormwater, loads from small tributaries, and unidentified contaminated sites/point sources), atmospheric deposition and streambed sediment.

Modeling PCBs- VA Tech, Biological Systems Engineering Department (BSE)

Karen Kline (BSE) described the modeling used for this project. The PCB model is comprised of the HSPF model for hydrology, sediment transport (main mechanism to transport PCBs from land cover and within water ways), and PCB fate and transport models.

Question: We discussed incorporating climate change calculations in this project last time. Was that done?

- We discussed this topic internally but need to take a deeper look for this project and others. More guidance needs to be created for this topic at an agency and programmatic level. We will incorporate to the best extent we can. This will take additional discussion in broader topics.

The model was developed for existing conditions. 139 samples from 63 monitoring stations were used.

Model inputs included meteorological, topography, stream network. Sources that were reduced are permitted sources, contaminated sites, surface sources (regulated and non-regulated).

Question: How much contribution to atmospheric sources?

- Nominal contribution—less than1%
- For New River, we tried to use atmospheric values from Chesapeake Bay study but they were too high. We calibrated it for this in the New River project and used those values for this project.

PCB Allocations

DEQ presented allocation scenarios for the four watersheds, including the proposed standard scenarios for the Jackson River and Maury River. DEQ also presented the relative contribution to the PCB load for each source category in each watershed. In the Jackson River, the non regulated surface load, permitted sources and streambed sediment are the primary sources. The Existing instream PCB concentration is typically less than the criterion, this is the case in the Jackson River watershed. We develop allocations based on meeting ≤10% instream exceedance rate and 0% exceedance rate of current WQC. This approach was used in the New River watershed during PCB TMDL development. For the Jackson River, the WQC was the only endpoint used, so there could be no exceedance of the criteria. BSE also developed a scenario for the Jackson River using the new proposed WQC and applied a long term average based on the footnote include in the new criteria. Mark shared these results, explaining that the highlighted allocated conditions shown in the table are based on the daily simulated PCB concentration closest to the upper 95% confidence limit that is greater than the endpoint but no greater than the 90th percentile of the model output dataset. Mark noted that the application of the new criterion (i.e., footnote) uses a more complicated statistically based approach with the modeled output to set the necessary reductions based on the endpoint. For the Jackson, the reduction for permitted loads went up a little since the standard is lower. However, reductions for non-regulated surface source loads went down (from 86% to 19%).

Q: how do you remove 86% of load from nonregulated sources?

- Back track and try to understand where the loads are coming from. Could be grossly underestimating point sources and we will understand this more once the TMDL is complete and facilities are required to monitor as a part of their permit. This is a challenging process with a lot of unknowns as this category includes PCB sources that we aren't aware of, or there may have been previous spills that we didn't know about.

Q: What about the load from bio solids?

- If there are PCBs in biosolids DEQ would consider that as categorized loads from the nonregulated surface source (i.e., stormwater via overland runoff from non-point sources).

Mark shared annual relative PCB contributions for the Maury River. Permitted sources comprise 8% of the load, while non regulated surfaces account of 92% of the load. All the other categories have very small loads (less than 1%). Known contaminated sites include rail yards, rail spurs, and electric utility transformer pads. There are no known contaminated sites in the Maury River watershed.

Comment: There is a lot of bio solid application in the Maury River watershed that could be considered in the nonregulated surface load. Landfill leachate (6000 gpd) is put into POTW, suspect this is a source.

The Maury River watershed has a scenario for each of three TMDL endpoints. Significant load reductions from permitted sources and non-regulated surface sources are considerable for all scenarios (over 99% for point sources, 94% for unregulated). BSE developed a scenario for the Maury using the new proposed standard as well, and just one scenario was selected using 400 pg/L (scenario 3) as the endpoint to simplify things. The data was not log normal or normally distributed, so the median PCB concentration was used in the 95% upper confidence level calculations. Allocated conditions do not include a reduction from non regulated surface loads (just loads from permitted sources). BSE has not developed similar scenarios for Upper and Lower James watersheds yet due to time constraints.

Q: Do you (Mark and Karen) have thoughts on the radical change when using the new standard for the Maury River?

- Karen and Brian Behham (BSE VT) explained that it's likely due to the idea of applying a long term average. For existing, we have to meet a 0% exceedance of the criterion, sometimes this means we keep reducing these sources to get below one or two peaks, when we are looking at the central tendency, we aren't looking at spikes during rainfall events, we are looking at what happens during rain events. The surface loads are driven during rainfall events. The revised standard doesn't require that you reduce every peak below 580, those large spikes are what drive the reductions under the existing standard.

Q: How long is the long term average?

- We develop a harmonic mean flow based on an extensive record of flow data (may go all the way back to the 1940s). Then we select one year of flow data that best represents the harmonic mean flow. During the years that you are calibrating, you find the year most representative of this flow and use that for calibration.

Q: Do you take into consideration the half life of contaminants? Impacts can be quite cumulative over time, really depends on the time frame that you are looking at as to human health impacts.

- No. The PCB half life is not factored into TMDL development. While it is unclear if this is considered in one or more assumptions used in the human health life time exposures to PCBs (i.e. possibly limited to the dioxin-like PCBs), half lives are not incorporated into WQC derivation for water or fish tissue. Also, relative to the PCB fate and transport model, the adsorption/desorption rates for the different PCB homolog groups are incorporated into the model but there is no component that considers contaminant half lives.

Q: The difference between the long term average and 0 % exceedance is due to runoff events and we are likely to have more runoff events due to climate change- does that mean we will need to reduce sources more?

- The goal of the new standard is to reduce the human health risk of exposure of a longer period of time.

Mark shared a chart showing the Upper James River PCB load, which is comprised of mostly surface loads (regulated and non- regulated) and loads from permitted sources. Three scenarios were presented. We defaulted to the criterion in the first scenario since site specific value was greater than the WQC. All scenarios include an 85% reduction in inputs from the Jackson and Maury Rivers. The 68% reduction for CSOs takes into account long term control plan. There are 85-95% reductions for MS4 permits across the three scenarios, and 84-95% reductions for non-regulated surface sources. A scenario to meet the new proposed WQC has not yet been developed for the Upper James watershed .

Mark shared a chart of annual relative contributions to PCB concentrations at the Lower James River outlet. He noted that the legend was incorrect in the chart and offered to post a corrected presentation on the DEQ website after the meeting. The largest sources in the Lower James watershed are regulated surface load (64%), Upper James River (26%) and non regulated surface load (8%). Mark shared three reduction scenarios for the Lower James watershed. All three included significant reductions from

permitted sources (95.3% - 98.2%), regulated MS4 permitted areas (94%-98%) and non regulated surface loads (44%-98%).

Q: Is the goal of the reduction scenarios to tweak the numbers to find the best scenario for a watershed?

- Based on comments received back in January 2021, DEQ was asked to provide different scenarios for the various endpoints in each TMDL study area. The different scenarios that were used to compare the existing WQC with the revised WQC represent different methods in setting reductions. WLAs, which are relevant and the end of the pipe for permitted point sources, are calculated based on the endpoint and their design flow (i.e., for facililties that have a waste water treatment system).

Q: Percent reduction is a little deceiving. But what do we do about the non-permitted sources?

- Moving forward DEQ will continue to grapple with how to best deal with this issue. An example that included Lewis Creek PCB TMDL was discussed earlier in the meeting (i.e., post TMDL, DEQ is sampling subwatersheds in the TMDL study area that appeared to be the origin of an increased modeled PCB loading. The purpose of the monitoring is to locate prospective unidentified sources).

TMDL Implementation

Mark discussed next steps in the TMDL process and how the transition to implementation could occur. DEQ will complete the TMDL consistent with the existing WQC. We can modify the TMDL when the standard changes (though this will be dependent on the revised WQC being approval which could be several years). The standard change will not affect the permitted sources, but it will affect allocations for MS4s. Completion of the TMDL coincides with the MS4 General Permit renewal in fall of 2023, and Phase I plus the Richmond City Integrated permit. Mark noted that WLAs are implemented as non numeric water quality based effluent limits, predicated on use of BMPs. The TMDL implementation process is based on adaptive management. Upon completion of the TMDL, permitted point sources that have not yet screened their effluents need to perform this task as a first step. Thus far about 30% of WWTPs in the TMDL project area provided screening data to DEQ to support TMDL development.

Q: After the TMDL does DEQ require facilities to provide data?

- Yes after the TMDL it will be added as a special condition in permits; however, some permits already have this requirement depending on region, or have been collected voluntarily.

Q: There are lots of things that interact with PCBs and produce synergistic effects. Are we looking at dioxins and other contaminants? This effort cannot be connected to public health without considering these interactions between these compounds. Water quality is one thing, but really protecting the public is a different conversation.

- No, other contaminants are not considered within the PCB TMDL but relative to PCB contamination, DEQ's standard is based on total PCBs.

Next Steps

DEQ will post the presentation online and will share an internal memo on proposed standard and allocation scenarios at a later date. DEQ plans to host an additional TAC meeting this fall as well as share a draft PCB TMDL Report in the fall.