Comment Response Document for the Biochemical Oxygen Demand (BOD) TMDL for the Western Branch of the Patuxent River, Prince George's County, MD

Introduction

Beginning November 9, 1998, the Maryland Department of the Environment (MDE) conducted a public review of the Biochemical Oxygen Demand (BOD) TMDL for the Western Branch of the Patuxent River in Prince George's County, Maryland. The comment period was open through December 10, 1998. MDE received comments indicating that some commenters had additional information. In a mailing to commenters, dated December 22, 1998, MDE offered until January 22, 1999 for all commenters to supplement their original comments, specifically requesting additional data. MDE accepted supplemental information through February 11, 1999, and solicited clarifying information thereafter as needed.

MDE subsequently refined the computer simulation model and revised the TMDL estimate. Beginning August 23, 1999, MDE conducted a second public review of the referenced TMDL documentation. The comment period was open through September 22, 1999. Below is a list of commenters, their affiliation, and the date they submitted comments. In the pages that follow, both sets of comments are summarized and listed with MDE's response.

List of Commenters

Author	Affiliation	Date
Roger L. Gans (commenting on initial TMDL document)	Washington Suburban Sanitary Commission	12/10/98
Edward U. Graham (commenting on initial TMDL document)	Metropolitan Washington Council of Government	12/10/98
Earl Ludy (commenting on initial TMDL document)	Maryland Association of Municipal Wastewater Agencies	12/10/98
Wendy L. Meyers (commenting on initial TMDL document)	Eastern Environmental Law Center on behalf of the Sierra Club and the American Littoral Society; and by the Earthjustice Legal Defense Fund on behalf of the Chesapeake Bay Foundation	12/10/98
Samuel E. Wynkoop (commenting on initial	Prince George's County Department of	12/9/98

TMDL document)	Environmental Resources	
Larry S. Coffman (commenting on revision)	Prince George's County Department of Environmental Resources	9/22/99
Earl Ludy (commenting on revision)	Maryland Association of Municipal Wastewater Agencies	9/21/99
Edward Partington (commenting on revision)	private citizen	9/17/99
Dominic M. Tiburzi (commenting on revision)	Washington Suburban Sanitary Commission	9/22/99
Tanya S. Spano (commenting on revision)	Metropolitan Washington Council of Government	9/22/99
James Stuhltrager (commenting on revision)	Widener University Environmental and Natural Resources Law Clinic, on behalf of the Sierra Club and the American Littoral Society; Earthjustice Legal Foundation on behalf of the Chesapeake Bay Foundation.	9/22/99

1. Several comments were received that sought a reassessment of the status of the water quality in relation to meeting dissolved oxygen standards, accounting for natural conditions.

   Response: MDE has reviewed the dissolved oxygen data for the last five years and found that there were in fact fewer instances in which the dissolved oxygen was below 5 mg/l than was the case when Western Branch was initially included on Maryland's 1996 303(d) list. This was clearly pointed out to EPA prior to their review of the draft Western Branch TMDL. However, in their Decision Rationale document, EPA concludes that the Western Branch TMDL meets the regulatory conditions of 40 CFR ' 130. On page 2 they also state that: "*… while these impairments may currently be minor and infrequent, increased flows from significant point sources in this system will surely bring about more frequent and severe violations of the dissolved oxygen criterion*." MDE and EPA both agree that the water quality conditions in the Western Branch are on the border-line of being impaired. The establishment of a TMDL at this time is a prudent and appropriate environmental management measure, particularly in view of the continued increase in discharge from the Western Branch wastewater treatment plant.

2. Several commenters questioned the sufficiency of the public involvement process, and requested an extension of the comment period citing insufficient time for review of supporting information as it might bear on the technical adequacy of the TMDL.

Response: MDE recognizes the importance of public participation in the Development of TMDLs and has made considerable efforts to involve the public at each stage of the development of the Western Branch TMDL. Several briefings were provided to the Patuxent River Commission well before the first written draft TMDL document. This body, which also serves as the Governor-appointed Tributary Strategy Implementation Team, has wide stakeholder representation, including staff from Prince George's County, and the Washington Suburban Sanitation Commission (WSSC). This body, and its individual members, were given an open invitation to be involved in the TMDL development.

Outside of these briefings, direct contact was made with knowledgeable staff from Prince George's County and WSSC including verbal solicitation of any potentially relevant data. As noted in the introduction above, during the initial public review process, comments from WSSC and Prince George's County recommended consideration of data that was potentially germane to the TMDL analysis. MDE extended an opportunity for commenters to supplement their initial comments and provide data. The data was incorporated into the TMDL analysis, and a revised TMDL was produced for a second public review period.

On the matter of public access to supplemental information, prior to commencing the formal public review of the proposed TMDL, MDE conducted several public briefings. Several of these briefings involved knowledgeable staff from those interested parties who requested extension of the comment period. Subsequent to these briefings, the proposed TMDL underwent two formal public comment periods, the first in November 1998, and the second in August 1999. In each case, MDE provided the public notice that supplemental information was available for review.

In addition to the informational briefing process started prior to November 1998, interested parities have had nearly one year to review the body of supplemental information. Furthermore, the body of supplemental information has not changed substantially since the initial comment period in November 1998. Given the extensive involvement process, and the long period of time for interested parties to review the available supplemental information and interject their views, MDE has concluded that further extension of the public comment period is not warranted.

3. Commenters questioned whether data from Prince George's County, Washington Suburban Sanitary Commission (WSSC), and the Maryland Department of Natural Resources (DNR) was considered in the analysis.

Response: Monitoring data and modeling tools managed by DNR were considered and used where applicable. Data from WSSC in the form of discharge monitoring reports from the Western Branch treatment plant were used in the initial analysis. Upon review of the initial set of public comments, which suggested additional data might be available, MDE reiterated an earlier data request in writing. Supplemental Data received from Prince George's County and WSSC has been considered in refining the TMDL (see response to comment # 9, and the response to comment # 10).

4. An associated phosphorus restriction (1.0 mg/l) proposed for the Western Branch Wastewater Treatment Plant (WWTP) is three-times greater than the phosphorus loadings from this WWTP during periods of documented summer dissolved oxygen violations. In addition, the TMDL proposed for BOD for the Western Branch, is nearly 10-times greater than BOD loadings that have resulted in summer violations of the dissolved oxygen standard.

   Response: Based on the analysis documented in the draft TMDL, the existing permit limits at the Western Branch WWTP, including the modeled increase in the dissolved oxygen concentration in the effluent, are expected to be protective of water quality. After implementation of the TMDL, MDE will monitor the waters to evaluate its effectiveness, and may revise the TMDL in the future if it is determined that the water quality problem persists.

5. The conclusion that the Western Branch water quality is not impaired by excessive nutrient concentrations is misplaced.

   Response: As part of the TMDL assessment, sensitivity analyses for different potentially impairing substances were conducted and documented. Simulated reductions of nutrients showed little affect on dissolved oxygen concentrations, whereas, reductions in BOD did show an effect. This analysis indicates that reducing nutrients is not a fruitful management option for affecting water quality *within Western Branch*. The sensitivity analyses provided the logical basis for establishing a TMDL for BOD in relation to dissolved oxygen. It has been noted in the TMDL document that the establishment of a TMDL for BOD in Western Branch does not preclude the future establishment nutrient limits on the Western Branch watershed as they might pertain to down-stream impacts.

6. Why were only two water quality stations used when it appears that five stations exist?

   Response: All five stations were used; however, some were used in different ways than others. Two of the stations (WXT0001 and WXT0045) in the Western Branch are long term monitoring stations used to define boundaries of the model. The other three stations were short term sampling stations used to collect data for the calibration of the model. The location of these stations was based upon a plan which allowed for an even distribution of water quality monitoring points along the length of the river between the two boundary stations.

7. Since runoff from the Composting Facility could be a significant source of BOD, its potential contributions during storm events should be evaluated. Although reference is made to the loads from the facility, it is not clear how these loads were input into the model and how they were projected into the future. Discussion is warranted on how loadings are determined and impacted in dissolved oxygen levels within the Western Branch.

   Response: It is reasonable to expect that there is no contributing load from the

composting facility during critical low-flow conditions, because there is no rainfall to produce a load. However, the model was also used to assess the water body system under higher-flow nonpoint source loads, maximum permitted discharges from the WWTPs, and the estimated maximum possible loads from the composting facility. It was found that there were no dissolved oxygen standard violations under such conditions.

8. The TMDL does not establish a *daily* load.

   Response: The term "Total Maximum Daily Load" is intended to convey a concept rather than to be interpreted literally. This is supported by the Code of federal Regulations (40 CFR 130.2(i)), which states that "TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure." No explicit time period is required. However, to assist the reader, the TMDL is expressed as both a total monthly load and as an average daily load in the TMDL documentation.

9. Several comments addressed the application of the EURTO5.1 Model. Specifically, comments questioned the data used in the model for calibration and the post-audit; whether the model was being used outside of its predictive range; the choice of the carbonaceous biological oxygen demand (CBOD) decay rate; the choice of water temperatures; the relevance of land use estimations and the Hydrologic Simulation Program in Fortran (HSPF) to the estimation of nonpoint source loads used in the TMDL analysis; accounting for the potential effects of storm events on sediment oxygen demand; and potential BOD from tidal flushing of wetlands in the downstream Patuxent River.

   Response: Federal guidance stipulates that TMDLs are to be developed using the best readily available data, provided data is sufficient. As elaborated upon below, the data used to develop the proposed TMDL meets both the criteria of being sufficient, and of being the best data readily available. MDE has solicited all readily available data, as demonstrated by the public comment process described in the preamble of this comment response document.

   The data was sufficient to develop an analytical tool calibrated for the specific water body of concern. Although the calibration data was collected in the winter, the model kinetic coefficients, which are fixed during the calibration process, are independent of season or loads. That is, these model coefficients, once fixed, are not expected to change with reasonable changes in flow, loadings, or seasonal conditions such as temperature and solar radiation. This is borne out by the post-audit, model verification procedure, which demonstrated that the model is able to predict summer conditions reflected in supplemental data provided to MDE by WSSC.

   MDE disagrees with the argument that the model is being used "outside of its applicable range." The commenter claims the model is being over-extended because it is being used to evaluate the following scenario: Low stream-flow conditions, under the supposition that the Western Branch treatment plant is operating at full design capacity, at the current permit limits. Although the current treatment plant discharge and effluent concentrations are below

those described above, it is the express intent of a water quality simulation model to explore the full range of possible scenarios given existing permits and environmental conditions, including possible scenarios that are not currently observed. The suppositions of the scenario described above are reasonably foreseeable in light of current permit limits and conditions in the Western Branch, and are well within the sensitivity of the model.

Acceptable values for the CBOD deoxygenation rate, at 20 ^{o}C, range from 0.023/day to 0.4/day, based on experience in the Potomac Estuary of Maryland, the North Branch of the Potomac in West Virginia, and in the Lower Sacramento River in California respectively. Given the best readily available information, the CBOD decay rate of 0.2/day selected for this analysis is a well-reasoned estimate.

Comments about the accuracy of land use estimates provided in the TMDL document, and whether or not the HSPF watershed simulation model should have been used, appear directed at the issue of how nonpoint sources are addressed in the analysis. The proposed BOD TMDL applies only during low flow conditions. Thus, for the purpose of the TMDL analysis it was necessary to determine nonpoint source associated loads with base-flow contributions. This was accomplished by starting the simulation process with observed data, which approximates dry-weather BOD concentrations at the upstream boundary of the modeling domain. The analysis demonstrates that it is possible to increase the BOD concentration at the upstream boundary of the modeling domain somewhat above observed values and meet water quality standards. This provides an estimate of the total upstream load, which is referred to as a nonpoint source load in the TMDL documentation (See the response to Comment #6 regarding the allocation of BOD to upstream sources). Note that simulations were also conducted, which indicate that the river's assimilative capacity for BOD during higher flow conditions is well above any reasonable potential future load.

The model used in the TMDL analysis does not explicitly simulate the effects of storm events on sediment oxygen demand and BOD from tidal flushing of wetlands in the downstream Patuxent River; however, the model does account for these phenomena in the following ways. Sediment oxygen demand is estimated through the calibration process and all final values are within the range of values reported in the technical literature.

Potential BOD from tidal flushing is addressed by accounting for diffusion from the Patuxent River, which constitutes the downstream boundary of the simulation model.
The BOD from the tidal flushing of wetlands is generally not controllable. If the proposed TMDL has underestimated this phenomenon, and the margin of safety is insufficient to protect water quality, MDE recognizes that it has the obligation to revise the TMDL in the future.

10. A decrease in BOD concentration from nonpoint sources reported in the November 1998 draft TMDL and the August 1999 draft TMDL is not explained in the August 1999 TMDL documentation, and thus appears to be arbitrary and capricious.

Response: The final estimate of 2.0 mg/l, based on measured data provided by Prince George's County* during the initial comment period, was deemed to be a more reliable estimate than the initial estimate, which was based on typical values for free-flowing streams in Maryland. *(BOD derived from dry-weather analysis performed by Prince George's County).

11. Several comments were received regarding the appropriateness of the supposition that the Western Branch waste water treatment plant (WWTP) would need to assure that dissolved oxygen concentrations in its effluent meet or exceed 7 mg/l. The initial TMDL documentation noted that a lower allowable BOD load (lower BOD TMDL) would be a viable alternative if lower effluent DO concentrations were assumed. Please justify why the second draft TMDL removes this alternative.

    Response: The suppositions underlying any TMDL analysis include many factors in addition to the maximum allowable amount of the impairing substance. Expectations regarding the operation of waste water treatment plants are appropriate underlying factors to be quantified and documented in a TMDL analysis. Recall that the TMDL analysis is projecting future conditions. The particular value of 7.0 mg/l as an effluent DO concentration is well within operational parameters of waste water treatment plants, and thus is a reasonable choice for this analysis. It was chosen after consultations with the Western Branch WWTP operators.

    The reference to an alternative TMDL in which both the allowable load and effluent concentrations would be decreased was removed from the final draft TMDL to make the presentation more concise. However, it should be clear from this discussion that the maximum allowable BOD load ultimately depends on WWTP operating procedures, which will be addressed through the NPDES permitting process. If at such time the Western Branch WWTP oxygenates the effluent to a concentration below 7.0 mg/l, the maximum allowable BOD load will be decreased accordingly to assure the maintenance of water quality standards.

12. There is an apparent discrepancy between the BOD load in Scenario 1 in Table 1 on page 14 and Table A7 on page A-23. The BOD load in Table A7 is about 67% higher.

    Response: As mentioned in the section entitled "Sources of the Impairing Substance," BOD reflects the amount of oxygen consumed through two processes: carbonaceous biochemical oxygen demand (CBOD) and nitrogenous biochemical oxygen demand (NBOD). The BOD values cited throughout the main document (e.g. Table 1, p.14) represent the amount of oxygen consumed by the oxidation of carbonaceous and nitrogenous waste materials over a 5-day period, at 20 ^{o}C (BOD_5). The values cited in Appendix A, Table A7 (p. A23) reflect the ultimate *carbonaceous* oxygen demand only. This is because the WASP5.1 model accounts for the NBOD and CBOD in separate modules, and thus requires separate data inputs, as documented in Appendix A.

13. The Western Branch waste water treatment plant (WWTP) outfall is about 2.6 km from the mouth; however, Figure A9 shows the discharge into segment 5, which is 1.7 to 2.4 km from the mouth. In addition, Table A-2 shows a suspiciously high volume for segment 5.

    Response: Segment 5 of the WASP model, into which the simulated Western Branch WWTP effluent is discharged, extends from 1.96 km to 2.64 km from the mouth of the Patuxent River. This is consistent with the actual discharge location of Western Branch WWTP.

    On the matter of the volume of model segment 5 cited in Table A2, this typographical error has been corrected to be 18,152 m^3. The correct volume for segment 5 was used in the TMDL analysis.

14. The model inputs (e.g., BOD = 10 mg/l, NH_3 = 2 mg/l) reflect the permit limits, but not reality. The 2 mg/l NH_3 is equivalent to 9 mg/l potential oxygen demand, if full nitrification occurs in the stream. Plant Effluent NH_3 is typically 0.1 mg/l, and BOD is typically 2-3 mg/l. Thus the model is used outside its applicable range.

    Response: The point source loads used in the model are possible loads presuming the Western Branch WWTP will discharge at its maximum flow and concentrations stated in the current NPDES permit. (Also see the response to comment # 9 as it pertains to the applicable range of the model).

15. Several commenters addressed the margin of safety (MOS). One commenter noted a decrease in the margin of safety reported in the August 1999 draft TMDL as compared to the November 1998 draft TMDL. It was the opinion of another commenter that the MOS is overly conservative, going beyond EPA guidance by using both an implicit MOS and explicit MOS.

    Response: A 5% MOS was applied consistently in both versions of the proposed TMDL. The difference in the numeric value of the margins of safety between the two versions arises due to the fact that 5% was applied to different numeric values of allowable loads.

    In response to the assertion that the MOS is overly conservative with regard to environmental protection, EPA guidance does not preclude the combined use of an implicit and explicit MOS. The record of EPA-approved TMDLs, which apply a combination of implicit and explicit margins of safety, suggests that this approach is reasonable.

16. A variety of recommendations were provided regarding formatting, graphical presentation, and language clarifications.

    Response: MDE considered these recommendations and incorporated them where appropriate.

17. Four additional point sources may need to be considered: Patuxent Mobile Estates, Buck Distributing Co., Inc., Marlboro Meadows Subdivision-F, and Utilities Inc. of Maryland. If any of these facilities contribute BOD to the Western Branch of the Patuxent, they must have an associated waste load allocation.

    Response: Three of the point sources; Patuxent Mobile Estates, Marlboro Meadows Subdivision-F, and Utilities Inc. of Maryland, discharge outside the Western Branch basin. The last point source, Buck Distributing Co., ceased discharging in 1995.

18. The commenters raised several questions regarding implementation matters.

    Response: Neither the Clean Water Act nor EPA's existing regulations direct states to develop a detailed implementation plan as part of the TMDL development and approval process. Implementation measures, therefore, are beyond the scope of this process. Maryland's rationale for not including a detailed implementation plan within the TMDL documentation is to allow for a separate, thorough process, involving the appropriate stakeholders. Suffice to say, the NPDES permit for the Western Branch WWTP will be reviewed in accordance with the NPDES five-year permit cycle. The upstream loads of BOD will be tracked using monthly data from the water quality monitoring station WXT0045 in Upper Marlboro. (See the response to comment #17 for further discussion of the future management of upstream loads).

19. How will the nonpoint source load be monitored, measured, or allocated? What will be the criteria? Specifically, what has to be done in order to ensure that the proposed allocation for the nonpoint source load will be within the limit?

    Response: Recall that the Western Branch TMDL is established for low-flow conditions. The nonpoint source load of BOD during low-flow conditions is not anticipated to vary much in the future. Nevertheless, it will be tracked using monthly data from the water quality monitoring station WXT0045 in Upper Marlboro. This is the station used to assess nonpoint source loads from the upper portion of the watershed (See the response to comment # 9 as it pertains to higher flow conditions).