

**Comment Response Document
Regarding the Water Quality Analysis of Eutrophication for the
Tidal Lower Susquehanna River in Harford and Cecil Counties, Maryland**

Introduction

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed Water Quality Analysis (WQA) of eutrophication for the tidal Lower Susquehanna River. The public comment period was open from March 4, 2005 through April 2, 2005. MDE received six sets of comments, four of which were received during the comment period.

Below is a list of commentors, their affiliation, the date comments were submitted, and the numbered references to the comments submitted. In the pages that follow, comments are summarized and listed with MDE's response.

List of Commentors

Author	Affiliation	Date	Comment Number
Elizabeth A. Weisengoff	Harford County Department of Public Works, Division of Engineering and Construction	March 4, 2005	1 and 2
Jennifer Murphy (Staff Attorney) and Robert Albanese (Intern)	Mid-Atlantic Environmental Law Center	April 1, 2005	3 through 9
Sherry Krest	U.S. Fish & Wildlife Service	April 1, 2005	10 through 13
Beth L. McGee	Chesapeake Bay Foundation	April 1, 2005	14 through 19
Gary Browning ¹	Harford County Health Department	April 4, 2005	20 through 23
Fred Faulkner ²	Harford County Health Department	March 14, 2005 (postmarked April 7, 2005)	---

¹ MDE has accepted these comments, despite receiving them after the deadline of April 2, 2005, because the commentor indicated in his e-mail that he attempted to send them on April 1 and had notified the Department on April 1 that he intended to comment.

² These comments were not postmarked prior to the close of the comment period. Although, they were considered, they do not alter the decision and formal responses have not been included. However, a copy of these comments has been provided to EPA.

1. The commentor requested that the date format for Station RXK001 be corrected in Appendix A.

Response: The date format for Station RXK001 has been corrected in Appendix A.

2. The commentor requested an explanation why data from a U.S. Geological Survey (USGS) water quality monitoring station located at Conowingo Dam that appears to be within the watershed was not included in the WQA.

Response: The USGS water quality monitoring site at the dam shows water quality condition above the dam (upstream of its location). The water quality analyses focuses on the water quality condition below the dam (from the outlet of the Conowingo Dam south into the headwater of the Chesapeake Bay). The water quality data from USGS monitoring site at the dam will be used in a future date to address the impairment listings in the Conowingo Dam - Susquehanna River watershed region (MD basin code 02-12-02-04).

3. The commentors noted that Appendix A references monitoring station XKH3152, which is not mentioned in the text or in Table 1 of the WQA. The commentors requested an explanation of the significance of the data from monitoring station XKH3152 as it relates to this WQA.

Response: The commentors are correct in the identification of station references in the report. Table 1 has been changed to reflect location of the station XKH3152.

4. The commentors stated that MDE's use of data that was collected no later than September 14, 1999 from seven MDE monitoring stations (XKH3051, 3644, 4450, 5039, 5824, 5934, and 6811) does not address the current dissolved oxygen levels in the Tidal Lower Susquehanna River, and questioned why MDE believes that water quality pertaining to dissolved oxygen in the Tidal Lower Susquehanna River from MDE monitoring stations XKH3051, 3644, 4450, 5039, 5824, 5934, and 6811 has remained the same since September 14, 1999.

Response: MDE develops Total Maximum Daily Loads (TMDLs) and WQAs based on the available data. MDE conducted field monitoring during the 1998-1999 period to address the tidal Lower Susquehanna River watershed. Additionally, MDE solicited data from stakeholders in December 2004. The analysis was then aided by data from Susquehanna River Basin Commission (SRBC) for 1998-2003 and the Chesapeake Bay Program (CBP) for 1998-2002 (Please refer to the Section 3.0 of the report to see the use of various resources). Barring any contradictory future data, this WQA provides sufficient justification to revise Maryland's 303(d) list to remove nutrients as an impairing substance in relation to Lower Susquehanna River.

5. The commentors noted that the dissolved oxygen data collected between March 16th and September 14th from seven MDE monitoring stations (XKH3051, 3644, 4450, 5039, 5824, 5934, and 6811) was used to establish that the dissolved oxygen water quality standard (WQS) is being met "at any time". The commentors stated that the phrase "at any time" can arguably be interpreted to mean that the WQS must be met at all times during the year. The commentors concluded that MDE's lack of data between September 14th and March 16th does not support the assumption that the dissolved oxygen WQS is being attained for MDE monitoring stations XKH3051, 3644, 4450, 5039, 5824, 5934, and 6811.

Response: As provided in the tabular water quality data in Appendix A of the WQA document, MDE used data from January 1998 - June 2003 to establish this WQA, which covers both the high-flow and the low-flow conditions/seasonal variations.

6. The commentors stated that it is unclear how the data from monitoring stations RXK00001 and SUS0109, CBP CB1.0, and SRBC SUS10.0 relate to the data collected from monitoring stations XKH3051, 3644, 4450, 5039, 5824, 5934, and 6811, since monitoring stations RXK00001 and SUS0109, CBP CB1.0, and SRBC SUS10.0 are neither non-tidal monitoring stations nor are tidal-fresh monitoring stations.

Response: Monitoring station RXK00001 was referenced in the tabular data for informational purposes only; it does not enter into actual analysis. However, stations SUS0109, CB 1.0 and SUS10.0 are tidal fresh stations and were considered in the analysis since the WQA is for the tidal region of the Lower Susquehanna River.

7. The commentors recommended that MDE delay the removal of the Tidal Lower Susquehanna River from Category 5 Integrated 303(d) list until such a time that adequate data (i.e., 24 months of consecutive data collection) has been collected from monitoring stations XKH3051, 3644, 4450, 5039, 5824, 5934, and 6811 to establish that current dissolved oxygen levels in Tidal Lower Susquehanna River are being attained at any time.

Response: MDE develops TMDLs or WQAs for listed waterbodies based on available data collected by MDE for analysis purposes (covering high flow and low flow conditions), as well as any supplemental data from other agencies or any other sources. Based on available data, the analysis shows no evidence of dissolved oxygen violation or elevated chlorophyll levels. Barring any contradictory future data, this information provides sufficient justification to revise Maryland's 303(d) list to remove nutrients as an impairing substance for the Lower Susquehanna River. However, if any contradictory data exist in the future indicating violation of water quality standards, the 303(d) listings can be revised.

8. The commentors stated that MDE's use of data that was collected no later than September 14, 1999 does not address the current chlorophyll *a* levels in the Tidal Lower Susquehanna River, and questioned why MDE believes that water quality pertaining to Chlorophyll *a* in the Tidal Lower Susquehanna River has remained below the water quality threshold of 50 µg/l at monitoring stations XKH3051, 3644, 4450, 5039, 5824, 5934, and 6811.

Response: Please refer to the response to Comment 4.

9. The commentors recommended that the MDE delay the removal of the Tidal Lower Susquehanna River from Category 5 Integrated 303(d) list until such a time that adequate data (i.e., 24 months of consecutive data collection) has been collected to establish that current Chlorophyll *a* levels in Tidal Lower Susquehanna River for monitoring stations XKH3051, 3644, 4450, 5039, 5824, 5934, and 6811 are being attained below the water quality threshold 50 µg/l.

Response: Please refer to the response to Comment 7.

10. The commentor noted that the tidal Lower Susquehanna River is listed as impaired by cadmium, PCBs, sediment and biological impacts, as well as nutrients (which is the listing addressed by the draft document). The commentor suggested that all water, sediment and biological impairments be addressed together because they are likely related.

Response: MDE addresses listed waterbodies for different types of contaminants based on data availability (i.e., MDE's monitoring data supplemented with other available sources). The data from MDE, SRBC and CBP in January 1998 – June 2003 show very low frequency of dissolved oxygen violation and no occurrence of elevated chlorophyll levels. This data provides sufficient justification to remove nutrients as an impairing substance for the Lower Susquehanna River. Other listings will be addressed at a later date as pertinent information becomes available.

11. The commentor recommended that the author describe the rationale for samples used in this report and the methods in which they were collected, noting that it is difficult to independently evaluate the data and the conclusions of this report without a sampling design and method.

Response: MDE has standard procedures for collecting data. MDE's Field Operations Program staff collected physical and chemical samples in the Lower Susquehanna River watershed. The physical parameters, dissolved oxygen, salinity, conductivity, and water temperature were measured *in situ* at each water quality monitoring station. Grab samples were also collected for laboratory analysis. The samples were collected at a depth of 0.5 m from the surface. Samples were placed in plastic bottles and preserved on ice until they were delivered to the University of Maryland Laboratory in Solomons, MD, or the Department of Health & Mental Hygiene in Baltimore, MD for analysis. The field and laboratory protocols used to collect and process the samples are summarized in Table A1 below (MDE, April 2001). The CBP and SRBC also use the similar protocol for collecting and analyzing the data. In addition, the stations where monitoring was conducted the water depth is shallow and sampling at the 0.5 m depth would cover the entire water column. If the station were sampled during a floodgate opening, it would be hazardous for the person to take a sample either by boat or by "dipping" due to the rocky bottom at the sampling stations.

Table A1: Field and Laboratory Protocols

Parameter	Units	Detection Limits	Method Reference
IN SITU:			
Flow	cfs	0.01 cfs	Meter (Marsh-McBirney Model 2000 Flo-Mate)
Temperature	degrees Celsius	-5 deg. C to 50 deg. C	Linear thermistor network; Hydrolab Multiparameter Water Quality Monitoring Instruments Operating Manual (1995) Surveyor 3 or 4 (HMWQMIOM)
Dissolved Oxygen	mg/L	0 to 20 mg/l	Au/Ag polarographic cell (Clark); HMWQMIOM
Conductivity	micro Siemens/cm (μ S/cm)	0 to 100,000 μ S/cm	Temperature-compensated, five electrode cell Surveyor 4; or six electrode Surveyor 3 (HMWQMIOM)
pH	pH units	0 to 14 units	Glass electrode and Ag/AgCl reference electrode pair; HMWQMIOM
Secchi Depth	meters	0.1 m	20.3 cm disk
GRAB SAMPLES:			
Ammonium	mg N / L	0.003	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Nitrate + Nitrite	mg N / L	0.0007	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Nitrite	mg N / L	0.0003	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Total Dissolved Nitrogen	mg N / L	0.03	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Particulate Nitrogen	mg N / L	0.0123	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Ortho-phosphate	mg P / L	0.0007	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Total Dissolved Phosphorus	mg P / L	0.0015	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Total Phosphorus	mg P / L		Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Particulate Phosphorus	mg P / L	0.0024	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Dissolved Organic Carbon	mg C / L	0.15	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Particulate Carbon	mg C / L	0.0759	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Silicate	mg Si / L	0.01	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Total Suspended Solids	mg / L	2.4	Chesapeake Biological Laboratory. Standard Operating Procedures. TR No. 158-97
Chlorophyll <i>a</i>	μ g/L	1 mg/cu.M	Standard methods for the Examination of Water and Wastewater (15 th ed.) #1002G. Chlorophyll. Pp 950-954
BOD ₅	mg/l	0.01 mg/l	Oxidation ** EPA No. 405

12. The commentor expressed concern that, by applying the “10 percent rule of thumb”, Maryland may be masking a dissolved oxygen problem in this stretch of the river. The commentor provided an alternate analysis of the data:

“If we do not apply the 10 percent rule of thumb and evaluate each sample location as well as the whole data set, we note that 100 percent of the samples that fell below dissolved oxygen criteria were from the segment represented by sample susq10. In this segment approximately 26 percent of the samples were below 5.0 mg/l dissolved oxygen and several others were barely above 5.0 mg/l. Figure 1 of this report shows approximately 2 miles between susq10 and the next downstream location (XKH6841) at the mouth of an unlabeled tributary. The first downstream sample from susq10, on the main stem of the Susquehanna, is sample XKH5039. This sample is approximately 6 miles from susq10. From the spatial distribution of samples in figure 1, it is logical to suggest that susq10 represents 3 miles of river (half the distance to XKH5039) or approximately 37 percent of the Lower Susquehanna River segment. It is also logical to assume that the data provided in appendix A represents the temporal pattern of dissolved oxygen at susq10. Using this same data set, we conclude that 37 percent of the main stem of the Lower Susquehanna River segment fell below the 5.0 mg/l dissolved oxygen 26 percent of the time between 1998 and 2003.”

Response: The water quality standards attainment process requires that the designated use be met over a given unit area as defined by the agency. In this case, the assessment unit is the Lower Susquehanna River, an 8-digit basin. The Department currently uses the 10 percent rule of thumb as a surrogate for levels of criteria exceedance that do not deleteriously impact the aquatic resource per general guidance from EPA as to what is relevant. Given different results for proximate status from susq10 may be abnormous as they contradict a significant amount of data colleted by other agencies. The new Bay criteria will apply a biological reference curve that was developed based on actual living resource requirements for dissolved oxygen on a temporal-spatial basis. The maximum allowable exceedances for dissolved oxygen are around 10 percent based on frequency, magnitude and duration of exceedance. (see EPA 309-R-03-002, “Ambient Water Quality Criteria for Dissolved Oxygen,, Water Clarity, and Chlorophyll a for the Chesapeake Bay and its Tidal Tributaries”, April 2003). Also, a close inspection of the data reveals that this low dissolved oxygen phenomenon, if real, is very localized. For example, a dissolved oxygen sample taken at susq10 on 08/05/99 was 4.7 mg/L, a minor exceedence of the standard, yet samples taken from SUS0109 (a station located adjacent to susq10) on 07/20/99, 08/17/99, and 09/14/99 were 6.4, 6.1, and 6.7 mg/L respectively. Therefore, the Department concludes that due to the proximity of SUS0109, and the similarity in hydrologic conditions, that the commentors’ analysis is flawed because they failed to account for results from a station located adjacent to the sample in question from the same year at under similar seasonal conditions. Also, the commentor makes the assumption that susq10 represents 3 miles of river when the adjacent sample SUS0109 presents data that conflict with the results from susq10. The Department contends that while this station may indicate a very localized dissolved oxygen impairment, the overall aquatic life use is met because the overall dataset indicates that dissolved oxygen

criteria are achieved on a spatial and temporal basis sufficient to support the current aquatic life use.

13. The commentor recommended that Maryland provide a discussion of the methods and results at susq10. Without this discussion, the commentor stated that “we can not support removing the Lower Susquehanna River from the 303(d) list for nutrients.”

Response: Please refer to the response to Comment 12.

14. The commentor indicated that MDE relieved itself from the legal obligation to develop a Total Maximum Daily Load of nutrients for the Lower Susquehanna River by instead developing a WQA to remove nutrients from the list of substances impairing the system.

Response: Section 303(d) of the federal Clean Water Act (CWA) and the U.S. Environmental Protection Agency (EPA)’s implementing regulations direct each State to either establish a TMDL of the specified substance that a listed waterbody can receive without violating water quality standards or demonstrate that water quality standards are being met; therefore, MDE has fully complied with its legal obligation.

15. The commentor expressed concern with MDE’s use of the “10 percent rule of thumb”, stating that MDE did not comply with U.S. Environmental Protection Agency (EPA) guidance that States should explain why the “rule of thumb” is a reasonable approach to evaluate the attainment of water quality standards.

Response: Please refer to the response to Comment 12 discussing the 10 percent rule and the newly proposed biological reference curves for dissolved oxygen and appropriate citations.

16. The commentor noted that all of the samples that fell below the dissolved oxygen criterion were from the same station, “susq10.0”, with 5 out of 19 of the samples from this station having dissolved oxygen below 5.0 mg/l. The commentor stated that without an adequate explanation for the frequent low dissolved oxygen concentrations at this station, the decision to remove nutrients as impairing substances in this waterbody segment is not supported by the data.

Response: Please refer to the response to Comment 12.

17. The commentor stated that the reported dissolved oxygen concentrations can not be evaluated in the appropriate context nor can an evaluation regarding the State’s decision be made because the water quality information presented in Appendix A does not contain water depth data.

Response: Please refer to the response to Comment 11.

18. The commentor questioned why MDE would proceed with a decision to delist this waterbody based on the current criteria, rather than the proposed revised criteria which includes new

designated uses for the Lower Susquehanna River and new criteria for dissolved oxygen and water clarity.

Response: Because at this time they are only proposed, are not in effect and have not been approved by EPA. There is no justification for using the proposed criteria.

19. The commentor recommended that MDE not proceed with the decision to remove nutrients as impairing substances in the Lower Susquehanna River.

Response: Please refer to the response to Comment 7.

20. The commentor expressed concern that MDE has not imposed a limit on nitrogen or phosphorus in the Lower Susquehanna River, given that the Susquehanna River is the largest source of fresh water that enters the Chesapeake Bay and the know effects of nutrients on the Bay. The commentor stated that MDE has reached an illogical conclusion because nutrients upstream of the Bay must be reduced.

Response: Please refer to the response to Comment 14. The commentor appears to be confusing loads with ambient concentrations. The impact of excess nutrient loads are seen further down the bay in deeper water and drive load reduction upstream. Impacts in this segment have not caused an exceedence of water quality standards.

21. The commentor questioned how a river or watershed can be segregated into separate Water Quality Limited Segments (WQLSs) that may have different dynamics from one another.

Response: The State's 303(d) listing process is currently based on an 8-digit scale established by Maryland Department of Natural Resources. MDE believes that TMDLs and WQAs for any size watershed can be established by using information on that scale. Different 8-digit scale watersheds may have similar dynamics, but again they can be individually addressed if the information is available on that level.

22. The commentor questioned why the State can't develop limits or standards that each WQLS can work within.

Response: Water quality standards are developed to protect the uses (either existing or designated), within a waterbody or stream segment. Once the uses are known and designated, the State is required to develop criteria to protect those uses. Currently, the criteria to protect aquatic life uses is 5.0 mg/L year-round within the Lower Susquehanna River segment. The state is also required to monitor to assess whether the segment is meeting the use(s) present in the segment. If a certain number of samples exceeds a certain criteria threshold, then the segment is deemed impaired. Further intensive monitoring will reveal if the water is truly impaired, thus requiring a TMDL, or that the existing sampling only represented a very localized or transient condition (ie. broken sewer line, or extreme weather), in which case the State develops a "water quality analysis" to present its findings of why the segment is not impaired.

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23. The commentor requested that landmarks (e.g., roads) be added to Figure 1 and Figure 2.

Response: Figure 1 and Figure 2 have been revised to include roads.