



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
September/ 27/ 2005

Dr. Richard Eskin, Director
Technical and Regulatory Services Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 540
Baltimore, Maryland 21230-1718

Dear Dr. Eskin:

The U. S. Environmental Protection Agency (EPA) is pleased to approve Total Maximum Daily Loads (TMDLs) and Water Quality Analysis (WQA) for the Patuxent River Lower and Eastern Bay Basins submitted by the Maryland Department of the Environment (MDE) on July 8, 2005, to EPA for review and approval. These TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in Maryland's Section 303(d) list. These waters within these basins were identified on the State of Maryland's Section 303(d) lists as failing to attain criteria for shellfish harvesting. The TMDLs described in this document were developed to address localized water quality impairments identified within the watersheds, specifically excessive bacteria concentrations in four restricted shellfish areas of the Patuxent River Lower and Eastern Bay Basins. The remaining impairments in these watersheds will be addressed by MDE in separate TMDL document(s).

EPA's approval of the Patuxent River Lower and Eastern Bay Basin TMDLs is based on EPA's understanding that MDE will complete a Bacterial Source Tracking (BST) study in this watershed and MDE will evaluate the BST data when it becomes available, in order to verify the nonpoint source loading estimates contained in the TMDL Report.

The TMDL analysis identifies the current loading, relates the current loading to the applicable water quality standard, and identifies the necessary reductions for a total maximum daily load that will achieve the applicable water quality standard.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) designed to attain and maintain the applicable water quality standards, (2) include a total allowable loading and as appropriate, wasteload allocations (WLAs) for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and in-stream water quality), (7) consider reasonable assurance that the TMDL can be met,

and (8) be subject to public participation. The enclosure to this letter describes how the fecal coliform TMDLs for the Patuxent River Lower and Eastern Bay Basins satisfy each of these requirements.

As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL WLA pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated October 1, 1998.

In regards to the Shipping Creek WQA, EPA concurs with MDE's determination that the recent data for Shipping Creek show that a fecal coliform TMDL is not necessary for Shipping Creek. The monitoring data summarized in Table 2.3.1 of the TMDL / WQA Report, show that the median and 90th percentile criteria are being met for this area. If, in the future, evidence suggests that the bacteria from the Shipping Creek Watershed are contributing to water quality problems, then action will have to be taken.

If you have any questions or comments concerning this letter, please do not hesitate to contact Mr. Thomas Henry at (215) 814-5752.

Sincerely,

Signed

Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: Melissa Chatham, MDE-TARSA





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Decision Rationale
Total Maximum Daily Loads of Fecal Coliform for
Restricted Shellfish Harvesting Areas in the Patuxent
River Lower and Eastern Bay Basins in Calvert, St.
Mary's and Queen Anne's Counties, Maryland

Signed

Jon M. Capacasa, Director
Water Protection Division

Date: *September/ 27/ 2005*



Decision Rationale

Total Maximum Daily Loads of Fecal Coliform for Restricted Shellfish Harvesting Areas in the Patuxent River Lower and Eastern Bay Basins in Calvert, St. Mary's and Queen Anne's Counties, Maryland

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) to be developed for those water bodies identified as impaired by the state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited water body.

This document sets forth the United States Environmental Protection Agency's (EPA) rationale for approving the TMDLs for fecal coliform in the Patuxent River Lower and Eastern Bay Basins. The TMDLs were established to address impairments of water quality, caused by bacteria (i.e., evidenced by fecal coliform), as identified in Maryland's 1998 Section 303(d) list for water quality-limited segments. On July 05, 2005, the Maryland Department of the Environment (MDE) submitted the reports, "Total Maximum Daily Loads of Fecal Coliform for Restricted Shellfish Harvesting Areas in Solomons Island Harbor, Washington and Persimmon Creeks and Cockholds Creek of the Patuxent River Lower Basin in Calvert and St. Mary's Counties, Maryland" and Total Maximum Daily Loads of Fecal Coliform for the Restricted Shellfish Harvesting Area in Little Creek and Water Quality Analysis of Fecal Coliform for Shipping Creek of Eastern Bay Basin in Queen Anne's County Maryland" dated June 2005. The TMDLs in these reports address several individual sub-basins of the Patuxent River Lower and Eastern Bay Basins as identified on Maryland's Section 303(d) lists. The basin identification for the Patuxent River Lower Basin is 02-13-11-01 and the Eastern Bay Basin identification number is 02-13-05-01.

EPA's rationale is based on the information contained in the TMDL Reports, information contained in the Appendix to the reports, the Comment Response Documents, and MDE's responses to EPA's comments. EPA's review determined that the TMDL meets the following eight regulatory requirements pursuant to 40 CFR Part 130.

1. The TMDLs are designed to implement applicable water quality standards.
2. The TMDLs include a total allowable load as well as individual waste load allocations (WLAs) and load allocations (LAs).
3. The TMDLs consider the impacts of background pollutant contributions.
4. The TMDLs consider the critical environmental conditions.
5. The TMDLs consider seasonal environmental variations.
6. The TMDLs include a MOS.
7. There is reasonable assurance that the TMDLs can be met.
8. The TMDLs have been subject to public participation.

II. Summary

The TMDLs specifically allocate fecal coliform loadings to sources in each of the restricted shellfish harvesting areas within the basins. With the exception of Shipping Creek, as it was determined to be attaining, the applicable criteria and a TMDL was not warranted. There were no permitted point sources of bacteria in either of these watersheds and, consequently, no allocations were made to point sources. The fact that this TMDL does not assign WLAs to any sources in the watershed should not be construed as a determination by either EPA or MDE that there are no sources in the watershed that are subject to the National Pollutant Discharge Elimination System (NPDES) program. In addition, the fact that EPA is approving this TMDL does not mean that EPA has determined whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program. The TMDLs for each area were expressed as a median TMDL and a 90th Percentile TMDL, which is consistent with the format of Maryland's bacteriological criteria, which assign numeric threshold criteria for fecal coliforms based on the median and 10 percent of sample data.

Table 1 – Fecal Coliform Median TMDLs Summary

Area	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)
Pautuxent River Lower Basin Segments					
Solomons Island Harbor	Counts/day	3.51 x 10 ¹¹	0	3.51 x 10 ¹¹	Implicit
Washington and Persimmon Creeks	Counts / day	2.73 x 10 ¹⁰	0	2.73 x 10 ¹⁰	Implicit
Cuckold Creek	Counts / day	1.51 x 10 ¹¹	0	1.51 x 10 ¹¹	Implicit
Eastern Bay Basin Segments					
Little Creek	Counts / day	4.58 x 10 ⁹	0	4.58 x 10 ⁹	Implicit

Table 2 – Fecal Coliform 90th Percentile TMDLs Summary

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Area	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)
Pautuxent River Lower Basin Segments					
Solomons Island Harbor	Counts/day	3.51 x 10 ¹¹	0	3.51 x 10 ¹¹	Implicit
Washington and Persimmon Creeks	Counts / day	2.73 x 10 ¹⁰	0	2.73 x 10 ¹⁰	Implicit
Cuckold Creek	Counts / day	1.51 x 10 ¹¹	0	1.51 x 10 ¹¹	Implicit
Eastern Bay Basin Segments					
Little Creek	Counts / day	4.58 x 10 ⁹	0	4.58 x 10 ⁹	Implicit

The TMDLs are written plans and analyses established to ensure that a waterbody will attain and maintain water quality standards. The TMDLs are scientifically based strategies that consider current and foreseeable conditions, the best available data, and account for uncertainty with the inclusion of a MOS value. Conditions, available data, and the understanding of the natural processes can change more than what was anticipated by the MOS. The option is always available to refine the TMDLs for re-submittal to EPA for approval.

III. Background

The Patuxent River Lower Basin is located on Maryland's western shore and drains directly to the Chesapeake Bay. The Patuxent River Lower Basin TMDL Report addresses three separate sub-basins of the Patuxent River Lower Basin; Solomons Island Harbor, Washington and Persimmon Creeks and Cuckold Creek. Section 2.0 of Maryland's TMDL report provides additional information about the Lower Patuxent River and these sub-basins, including landuse information. The Eastern Bay Basin is located on Maryland's eastern shore and drains directly to the Chesapeake Bay. The TMDL for the Eastern Bay Basin addresses two impaired segments; Little and Shipping Creeks. Based on the water quality data collected from Shipping Creek it was determined that a TMDL was not warranted on this segment since it is currently attaining the applicable criteria. Section 2.0 of Maryland's TMDL Report provides additional information about the Eastern Bay and the two sub-basins, including landuse information.

The Patuxent River Lower Basin was identified on the 1996 § 303(d) list submitted to EPA by the MDE as impaired by nutrients and sediments with, listings of bacteria for several specified tidal shellfish waters added in 1998, and listings of toxics, metals and evidence of biological impairments added in 2002. The Eastern Bay Basin was first listed on Maryland's 1996 § 303(d) as impaired by nutrients, sediments and bacteria. In 2004, the bacteria impairment was refined to pertain to Little and Shipping Creeks. The Creeks listed above are classified as restricted shellfish

harvesting areas because these areas are impaired by bacteria levels exceeding Maryland's water quality standards for fecal coliform. As a result of this restricted classification, these areas are closed to shellfish harvesting. Maryland's TMDL Reports address the fecal coliform impairment specific to these sub-basins; the other impairments will be addressed at a future date (Maryland completed a WQA for Shipping Creek because a TMDL is not necessary to achieve water quality standards in this sub-basin).

The monitoring and analysis for these bacteria TMDLs were performed using fecal coliform data. Fecal coliform is a bacterium that can be found within the intestinal tract of all warm-blooded animals. Fecal coliform in itself is generally not a pathogenic organism. However, fecal coliform indicates the presence of fecal wastes and the potential for the existence of other pathogenic bacteria. The higher concentrations of fecal coliform indicate the elevated likelihood of the presence of pathogenic organisms in shellfish that are harvested from polluted waters and subsequently consumed. Maryland's current water quality standards provide bacteriological criteria for Shellfish Harvesting (i.e., Use II) waters based on numeric criteria for fecal coliform.

The Surface Water Use Designation for these sub-basins of the Patuxent River Lower and Eastern Bay Basins is Use II: *Shellfish Harvesting Waters* (Code of Maryland Regulations, COMAR, 26.08.02.08L). Maryland's water quality standards provide bacteriological criteria for Use II waters, stating that a public health hazard will be presumed if the most probable number (MPN) of fecal coliform organisms exceeds a median concentration of 14 MPN per 100 milliliters (ml) or if more than 10 percent of samples taken exceed 49 MPN per 100 ml (for a 3-tube decimal dilution test).

Maryland's current standards provide a classification system for Use II shellfish waters. Use II waters may be classified as approved, conditionally approved, restricted, or prohibited. Maryland's listing methodology for shellfish waters provides that approved and conditionally approved shellfish waters are not placed on the Section 303(d) list of water quality limited segments. Shellfish waters may be classified as "Approved" if the median fecal coliform MPN of at least 30 water samples taken over a three-year period to incorporate inter-annual variability does not exceed 14 MPN per 100 ml, and, in areas not affected by point source discharges, the 90th percentile of water samples does not exceed an MPN of 49 per 100 ml (for a three-tube decimal dilution test). The restricted shellfish areas of the Patuxent River Lower and Eastern Bay Basins were classified as such because they do not meet shellfish water quality standards for an approved classification. The Patuxent River Lower and Eastern Bay Basins were placed on Maryland's Section 303(d) list because the shellfish areas within this system, which are currently classified as restricted, violate Maryland's protective bacteriological criteria for Use II Waters. The most recent five-year dataset for these areas is shown in Table 2.3.1 of Maryland's TMDL Report. The data set for Shipping Creek, analyzed in Table 2.3.1, documents that the water quality criteria is being attained in this sub-basin and a TMDL no longer warranted.

CWA Section 303(d) and its implementing regulations require that TMDLs be developed for waterbodies identified as impaired by the state where technology-based and other required controls do not provide for attainment of water quality standards. The TMDLs submitted by MDE are

designed to attain the bacteriological water quality criteria and support the Use II designation. Refer to Tables 1 and 2 above for a summary of allowable loads.

For this TMDL analysis, Maryland used fecal coliform data from seven shellfish monitoring stations in the Patuxent River Lower Basin and one monitoring station in the Eastern Bay Basin. Observations and data from the period of 1999-2004 were used. Maryland selected a five-year

period for TMDL development because it covers a longer time span than the 30-sample minimum requirement and is consistent with MDE's shellfish program sanitary survey schedule. The TMDL analysis utilizes a tidal prism model in order to account for the tidal influences in the Basins. The transport of fecal coliform is most influenced by the tide and the amount of freshwater discharge into the shellfish harvesting areas. The steady state tidal prism method assumes that freshwater input, tidal range, and the first-order decay rate of fecal coliform are all constant. The steady state mass inputs include: upstream loading of fecal coliform, loading from the local area within the tidal cycle, and fecal coliform associated with ocean water that does not exit the embayment on the previous ebb tide. Mass outputs include: fecal coliform associated with embayment water that does not enter the system on the previous flood tide, and fecal coliform lost through decay or removal. The given or known parameters are: tidal period, fecal coliform decay rate, tidal range, freshwater discharge flow rate, ocean tidal exchange ratio (estimated from salinity data), volume of embayment, fecal coliform concentration and water quality criterion. These values are used to derive the TMDL (i.e., using the water quality criterion) and the current load (i.e., using the current median concentration). The differences between these loads are used to compute the percentage load reductions that are required to meet the TMDL. Section 4.2 and Appendix A of the TMDL Report provide a thorough description of the tidal prism model and calculations.

Maryland conducted a nonpoint source assessment by reviewing several sources of population and landuse data to estimate the contributions of fecal coliforms by the following categories: wildlife, human, pets, and livestock. Any contributions from boat discharges, resuspension from sediments, and regrowth of fecal coliform were neglected due to insufficient data. The contributions from each of these four sources were derived by multiplying the population densities by fecal coliform production rates. For the wildlife contribution, the population density estimates for each major wildlife animal type was multiplied by the associated acreage or stream mile for that animal, and multiplied again by the estimated fecal coliform production rate for each animal type. For human contributions, Maryland used census coverage and estimated daily discharges of wastewater per person, fecal coliform concentration of the wastewater, and septic system failure rate to calculate the human loading for areas having no or partial public sewer system. Pet contributions were calculated using survey-based estimates of dogs walked per household, percentage cleaned up, and estimated fecal coliform production rate per dog. Livestock contributions were derived from livestock census data and estimated fecal coliform production rates and manure washoff rates. Detailed explanations of the nonpoint source assessment and estimated parameters for each category are described in Appendix B of the TMDL Report.

The results of the nonpoint assessment allowed Maryland to calculate the percent contribution for each of the four major types of nonpoint sources. This method is described further

below in Section IV. Maryland is conducting a one-year bacteria source tracking (BST) study for each shellfish harvesting area in order to verify the categorized nonpoint source estimates and LAs in the TMDL.

IV. Discussion of Regulatory Conditions

EPA finds that MDE has provided sufficient information to meet all of the eight basic requirements for establishing fecal coliform TMDLs for the four restricted shellfish areas; Washington and Persimmon, Cuckold, Solomon Harbor Island and Little Creeks. EPA therefore approves these TMDLs for fecal coliform in the Patuxent River Lower and Eastern Bay Basins. This approval is outlined below according to the eight regulatory requirements.

1) *The TMDLs are designed to implement applicable water quality standards*

Water quality standards consist of three components: designated and existing uses; narrative and/or numerical water quality criteria necessary to support those uses; and an anti-degradation statement.

The Surface Water Use Designation for these areas of the Patuxent River Lower and Eastern Bay Basins is Use II: *Shellfish Harvesting Waters* (Code of Maryland Regulations, COMAR, 26.08.02.08M). Use II waters may be classified as approved, conditionally approved, restricted, or prohibited. Maryland's listing methodology for shellfish waters provides that approved and conditionally approved shellfish waters are not placed on the Section 303(d) list of water quality limited segments. For Use II waters, Maryland's water quality standards provide bacteriological criteria of (1) fecal coliform organisms not to exceed a median concentration of 14 MPN per 100 ml; and (2) no more than 10 percent of samples taken may exceed 49 MPN per 100 ml (for a three-tube decimal dilution test). Shellfish waters may be classified as "approved" if the median fecal coliform MPN of at least 30 water samples taken over a three-year period to incorporate inter-annual variability does not exceed 14 per 100 ml, and, in areas not affected by point source discharges, the 90th percentile of water samples does not exceed an MPN of 49 per 100 ml (for a three-tube decimal dilution test).

Maryland developed the bacteria TMDLs for the Patuxent River Lower and Eastern Bay Basins in terms of fecal coliform because Maryland's current water quality standards contain specific numerical criteria for bacteria in Use II waters that are based on the concentration of fecal coliform, as described above. The TMDLs therefore use these applicable numerical criteria as an endpoint. The TMDLs were calculated and expressed as median TMDLs and 90th percentile TMDLs in order to meet the associated numerical criteria. EPA believes that this is a reasonable and appropriate water quality goal.

2) *The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.*

Total Allowable Load

As described above, MDE used as endpoints a median concentration of 14 MPN per 100 ml and a 90th percentile concentration of 49 MPN per 100 milliliters. Separate TMDLs were developed for each restricted shellfish area of the Patuxent River Lower and Eastern Bay Basins based on these two endpoints. The TMDLs and allocations are presented as mass loading rates of counts per day. Expressing TMDLs as daily mass loading rates is consistent with Federal regulations at 40 CFR § 130.2(i), which state that TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.

EPA regulations at 40 CFR § 130.2(i) state that the total allowable load shall be the sum of individual WLAs for point sources, and LAs for nonpoint sources, and natural background concentrations. The TMDLs for fecal coliform for the Patuxent River Lower and Eastern Bay Basins are consistent with 40 CFR § 130.2(i) because the total loads provided by MDE equal the sum of the individual WLAs for point sources (which are zero in six of the seven areas, where no permitted point sources exist) and the land-based LAs for nonpoint sources. Pursuant to 40 CFR § 130.6 and § 130.7(d)(2), these TMDLs and the supporting documentation should be incorporated into Maryland's current water quality management plan. See Tables 1 and 2 for a summary of allowable loads.

Waste Load Allocations

According to the TMDL Report, of the sub-basins that drain to the Patuxent River Lower and Eastern Bay Basins contain no permitted point sources, and therefore these sub-basins are assigned a WLA of zero. In Maryland's TMDL Report, Maryland assigned a WLA of "N/A" (i.e., not applicable) for these four areas. EPA clarifies that these WLAs are actually zero, because a measurable value must be assigned to the WLA even if no point sources exist.

Load Allocations

The TMDL summary in Tables 1 and 2 contain the LAs for each restricted shellfish area. As described above in Section III, Maryland conducted a nonpoint source assessment in order to estimate the contributions of wildlife, humans, pets, and livestock to the overall nonpoint source loadings.

As stated above, Maryland developed two types of fecal coliform TMDLs for each restricted shellfish area consistent with the two numeric criteria for Use II waters that are based on median and 90th percentile data. For each shellfish area, the TMDL for the median case is more restrictive than the 90th percentile TMDL in terms of mass loading rate. However, larger percentage and overall mass reductions are required in the 90th percentile TMDL case based on the difference between the TMDL and the current load to each shellfish area (see Tables 4.4.1 and 4.4.2 of the TMDL Report). For example, in order to meet the median TMDL for Little Creek, a reduction by 67% or 9.48×10^9 counts/day would be required. In order to meet the 90th percentile TMDL, a reduction by 84% or 8.16×10^{11} counts/day would be required. Note that the percentage reductions are not strictly

comparable between the two TMDLs because the baseline, or current, loads are different: the loads were calculated using the corresponding median concentration or 90th percentile concentration of the current condition.

According to Federal regulations at 40 CFR § 130.2(g), LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loadings should be distinguished. MDE has used several sources of census, population, and land use coverage data in order to estimate and account for the major types of nonpoint, natural and background sources. Tables in Section 2.4 of the TMDL Reports provide a breakdown of the existing bacteria load from the four nonpoint source categories (livestock, pets, wildlife and humans). A similar breakdown was not developed for the TMDL allocation, which instead was developed with a gross LA. This was done because the implementation will target anthropogenic sources and monitor the basins to determine if the TMDLs can be achieved through controls on pets, livestock and humans. Also, bacterial source tracking has not yet been completed within the basins to confirm the percent contribution from each of the four nonpoint source categories.

Federal regulations at 40 CFR § 122.44(d)(1)(vii)(B) require that, for an NPDES permit for an individual point source, the effluent limitations must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. EPA has authority to object to the issuance of an NPDES permit that is inconsistent with WLAs established for that point source. To ensure consistency with these TMDLs, if an NPDES permit is issued for a point source that discharges one or more of the pollutants of concern in the Patuxent River Lower or Eastern Bay Basins Watershed, any deviation from the WLAs set forth in the TMDL Reports and described herein for a point source must be documented in the permit Fact Sheet and made available for public review along with the proposed draft permit and the Notice of Tentative Decision. The documentation should: 1) demonstrate that the loading change is consistent with the goals of the TMDL and will implement the applicable water quality standards, 2) demonstrate that the changes embrace the assumptions and methodology of these TMDLs, and, 3) describe that portion of the total allowable loading determined in the state's approved TMDL Report that remains for any other point sources (and future growth where included in the original TMDL) not yet issued a permit under the TMDL. It is also expected that Maryland will provide this Fact Sheet for review and comment to each point source included in the TMDL analysis as well as any local and state agency with jurisdiction over landuses for which LA changes may be impacted. It is also expected that MDE will require periodic monitoring of the point source(s) for fecal coliform and total suspended solids, through the NPDES permit process, in order to monitor and determine compliance with the TMDL WLAs.

In addition, EPA regulations and program guidance provides for effluent trading. Federal regulations at 40 CFR § 130.2(i) state: "if Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent LAs practicable, then WLAs may be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs." The state may trade between point sources and nonpoint sources identified in the TMDL as long as three general

conditions are met: 1) the total allowable load to the waterbody is not exceeded; 2) the trading of loads from one source to another continues to properly implement the applicable water quality standards and embraces the assumptions and methodology of the TMDL; and, 3) the trading results in enforceable controls for each source. Final control plans and loads should be identified in a publicly available planning document, such as the state's water quality management plan (see 40 CFR § 130.6 and § 130.7(d)(2)). These final plans must be consistent with the goals of the approved TMDLs.

Based on the foregoing, EPA has determined that the TMDLs are consistent with the regulations and requirements of 40 CFR Section 130. Pursuant to 40 CFR § 130.6 and § 130.7(d)(2), these TMDLs and the supporting documentation, including MDE's responses to comments, should be incorporated into Maryland's current water quality management plan.

3) *The TMDLs consider the impacts of background pollutant contributions.*

The TMDLs consider the impact of background pollutants by considering the bacterial load from natural sources such as wildlife.

4) *The TMDLs consider critical environmental conditions.*

EPA regulations at 40 CFR § 130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. The intent of the regulations is to ensure that 1) the TMDLs are protective of human health, and 2) the water quality of the waterbodies is protected during the times when they are most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards¹. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable worst-case scenario condition. MDE modeled the 90th percentile current load and allowable load. The 90th percentile concentration is that which one would expect to see exceeded no more than 10% of the time. For each shellfish area, the actual 90th percentile concentration from the most recent data set (i.e., five years) was used in these calculations, thereby incorporating the critical condition. Further, Maryland compared the 90th percentile and median TMDLs to determine which value represented the critical condition and to determine the basis for the critical condition. Greater reductions in the median TMDL suggest that, on average, water column concentrations are very high with limited variation. Greater reductions in the 90th percentile TMDL suggest a less frequent occurrence of high fecal coliform concentrations due to the variation of hydrological conditions.

¹EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

5) *The TMDLs consider seasonal environmental variations.*

Seasonal variations involve changes in flow as a result of hydrologic and climatological patterns. Generally, water column data for fecal coliform may sometimes exhibit seasonal trends. For example, bacteria levels tend to be lower during the colder months in some areas, but this is not always the case. In order to account for seasonal variation and inter-annual variability, Maryland's shellfish monitoring program collects samples on a monthly basis and a minimum data set of 30 samples over three years (in this case, five years) is used. The monitoring design and the statistical analysis used to evaluate water quality attainment therefore implicitly includes the effect of seasonality. Further, Maryland's water quality standard itself reflects the need to account for seasonal variation in assigning both a median (i.e., average condition) criterion and 90th percentile criterion (i.e., to account for fluctuations around the median)

The BST study to be conducted by Maryland in conjunction with these TMDLs may generate additional information as to the seasonality of loadings by the types of nonpoint sources investigated in the study.

6) *The TMDLs include a margin of safety*

The requirement for a MOS is intended to add a level of conservatism to the modeling process in order to account for uncertainty. Based on EPA guidance, the MOS can be achieved through two approaches. One approach is to reserve a portion of the loading capacity as a separate term, and the other approach is to incorporate the MOS as part of the design conditions. MDE has adopted an implicit MOS for these TMDLs. In the tidal prism model, an implicit MOS was incorporated to account for the uncertainty of certain model parameters. For example, the decay rate was determined to be the most sensitive parameter and was therefore set at the conservative end of its known range (i.e., 0.7 per day) for the TMDL calculation. Also, monitoring data from the stations closest to the headwaters, which typically exhibit higher concentrations, were used to represent the concentration within the corresponding shellfish area in the TMDL calculation.

7) *There is reasonable assurance that the TMDLs can be met.*

EPA requires that there be a reasonable assurance that the TMDLs can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR § 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Furthermore, EPA has the authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

Nonpoint source controls to achieve LAs will be implemented in an iterative process that places priority on those sources having the largest impact on water quality, with consideration given to ease of implementation and cost. BMPs can be implemented through a number of existing programs and funding sources, including: Maryland's Agricultural Cost Share Program,

Environmental Quality and Incentives Program, State Water Quality Revolving Loan Fund, and Stormwater Pollution Cost Share Program. Also, low interest loans available through MDE to address failing septic systems. Also, sources of fecal coliform stemming from boats and marinas can be addressed through the Clean Marina Program, no discharge zone program, and grant funds available through Maryland Department of Natural Resources to install a pumpout station. Under existing Maryland law, certain new and existing marinas are required to have a pumpout station.

Pursuant to the National Shellfish Sanitation Program, Maryland will continue to monitor shellfish waters and classify harvesting areas. In addition to water quality monitoring and shoreline surveys, MDE will be conducting a BST study that will be used to confirm the source estimates presented in the TMDL Report.

As mentioned above, Maryland and EPA acknowledge that while the TMDL does not promote changing natural background conditions due to wildlife, it is possible that implementation measures taken to reduce nonpoint controllable sources will also reduce wildlife loadings. In areas where wildlife is the dominant source of fecal coliform inputs to the shellfish waters and where water quality standards cannot be attained following TMDL implementation for controllable sources, then MDE would consider conducting either a risk-based water quality assessment or a Use Attainability Analysis to recognize these natural conditions.

8) *The TMDLs have been subject to public participation.*

MDE provided an opportunity for public review of and comment on the fecal coliform TMDLs for the four restricted shellfish harvesting areas (plus the WQA for Shipping Creek) of the Patuxent River Lower and Eastern Bay Basins. The public review and comment period was open from May 13, 2005 to June 13, 2005 for the Patuxent River Lower Basin and May 20, 2005 to June 20, 2005 for the Eastern Bay Basin. No written comments were submitted for either of the TMDL Reports. EPA sent comments to MDE on these TMDLs on May 3, 2005 (Patuxent River Lower Basin) and May 31, 2005 (Eastern Bay Basin). MDE responded to the comments on May 26, 2005 and June 7, 2005 respectively.

Copies of the reports were sent to the U.S. Fish and Wildlife Service and National Marine Fisheries Service (NMFS) pursuant to Section 7(c) of the Endangered Species Act, requesting the Services' concurrence with EPA's findings that approval of these TMDLs does not adversely affect any listed endangered and threatened species and their critical habitats. The NMFS response dated July 26, 2005 states "... no further consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended, is required.

Enclosure #2

II. Summary

The TMDLs specifically allocate fecal coliform loadings to sources in each of the restricted shellfish harvesting areas within the basins. With the exception of Shipping Creek, as it was determined to be attaining, the applicable criteria and a TMDL was not warranted. There were no permitted point sources of bacteria in either of these watersheds and, consequently, no allocations were made to point sources. The fact that this TMDL does not assign WLAs to any sources in the watershed should not be construed as a determination by either EPA or MDE that there are no sources in the watershed that are subject to the National Pollutant Discharge Elimination System (NPDES) program. In addition, the fact that EPA is approving this TMDL does not mean that EPA has determined whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program. The TMDLs for each area were expressed as a median TMDL and a 90th Percentile TMDL, which is consistent with the format of Maryland's bacteriological criteria, which assign numeric threshold criteria for fecal coliforms based on the median and 10 percent of sample data.

Table 1 – Fecal Coliform Median TMDLs Summary

Area	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)
Patuxent River Lower Basin Segments					
Solomons Island Harbor	Counts/day	3.51×10^{11}	0	3.51×10^{11}	Implicit
Washington and Persimmon Creeks	Counts / day	2.73×10^{10}	0	2.73×10^{10}	Implicit
Cuckold Creek	Counts / day	1.51×10^{11}	0	1.51×10^{11}	Implicit
Eastern Bay Basin Segments					
Little Creek	Counts / day	4.58×10^9	0	4.58×10^9	Implicit

Table 2 – Fecal Coliform 90th Percentile TMDLs Summary

Area	Rate	TMDL	Wasteload Allocation (WLA)	Load Allocation (LA)	Margin of Safety (MOS)
Patuxent River Lower Basin Segments					
Solomons Island Harbor	Counts/day	1.23 x 10 ¹²	0	1.23 x 10 ¹²	Implicit
Washington and Persimmon Creeks	Counts/day	9.54 x 10 ¹⁰	0	9.54 x 10 ¹⁰	Implicit
Cuckold Creek	Counts/day	5.28 x 10 ¹¹	0	5.28 x 10 ¹¹	Implicit
Eastern Bay Basin Segments					
Little Creek	Counts/day	1.60 x 10 ¹⁰	0	1.60 x 10 ¹⁰	Implicit

The TMDLs are written plans and analyses established to ensure that a waterbody will attain and maintain water quality standards. The TMDLs are scientifically based strategies that consider current and foreseeable conditions, the best available data, and account for uncertainty with the inclusion of a MOS value. Conditions, available data, and the understanding of the natural processes can change more than what was anticipated by the MOS. The option is always available to refine the TMDLs for re-submittal to EPA for approval.

III. Background

The Patuxent River Lower Basin is located on Maryland’s western shore and drains directly to the Chesapeake Bay. The Patuxent River Lower Basin TMDL Report addresses three separate sub-basins of the Patuxent River Lower Basin; Solomons Island Harbor, Washington and Persimmon Creeks and Cuckold Creek. Section 2.0 of Maryland’s TMDL report provides additional information about the Lower Patuxent River and these sub-basins, including landuse information. The Eastern Bay Basin is located on Maryland’s eastern shore and drains directly to the Chesapeake Bay. The TMDL for the Eastern Bay Basin addresses two impaired segments; Little and Shipping Creeks. Based on the water quality data collected from Shipping Creek it was determined that a TMDL was not warranted on this segment since it is currently attaining the applicable criteria. Section 2.0 of Maryland’s TMDL Report provides additional information about the Eastern Bay and the two sub-basins, including landuse information.

The Patuxent River Lower Basin was identified on the 1996 § 303(d) list submitted to EPA by the MDE as impaired by nutrients and sediments with, listings of bacteria for several specified