



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**REGION III**  
**1650 Arch Street**  
**Philadelphia, Pennsylvania 19103-2029**  
4/15/2009

Richard Eskin, Ph.D., Director  
Technical and Regulatory Service Administration  
Maryland Department of the Environment  
1800 Washington Blvd., Suite 540  
Baltimore, Maryland 21230-1718

Dear Dr. Eskin:

The U.S. Environmental Protection Agency (EPA), Region III, is pleased to approve Total Maximum Daily Loads (TMDLs) of Fecal Coliform for the Restricted Shellfish Harvesting/Growing Areas in the Lower Pocomoke River Basin and Pocomoke Sound Basin in Somerset and Worcester Counties, Maryland; and Accomack County, Virginia. The TMDL report was submitted jointly by the Maryland Department of the Environment (MDE) and the Virginia Department of Environmental Quality (DEQ) on February 13, 2009. The TMDL was established and submitted in accordance with Sections 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. Pocomoke Sound (MD-02130201) was included on Maryland's 1998 Section 303(d) List as impaired by fecal coliform. The Lower Pocomoke River (MD-02130202) was included on Maryland's 1996 Section 303(d) List as impaired by fecal coliform. Similarly, Pocomoke Sound and Pocomoke River (VAT-C09E) were listed as impaired for fecal coliform on Virginia's 1998 Section 303(d) List.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) be designed to attain and maintain the applicable water quality standards; (2) include a total allowable loading and as appropriate, wasteload allocations 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 instream water quality); and (7) be subject to public participation. In addition, these TMDLs considered reasonable assurance that the TMDL allocations assigned to the nonpoint sources can be reasonably met. The enclosure to this letter describes how the sediment TMDLs for the Lower Pocomoke River Basin and Pocomoke Sound Basin satisfy each of these requirements.

As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL wasteload allocation 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.

If you have any questions or comments concerning this letter, please do not hesitate to contact Greg Voigt at 215-814-5737.

Sincerely,

John Armstead for

Jon M. Capacasa, Director  
Water Protection Division

Enclosure

cc: Nauth Panday, MDE-TARSA  
Melissa Chatham, MDE-TARSA



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1650 Arch Street  
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**Decision Rationale**  
**Total Maximum Daily Load**  
**Fecal Coliform in the Lower Pocomoke River**  
**And Pocomoke Sound, Somerset and**  
**Worcester Counties Maryland, and**  
**Accomack County, Virginia**

**John Armstead for**

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**Jon M. Capacasa, Director**  
**Water Protection Division**

**Date: 4/15/2009**

**Decision Rationale**  
**Total Maximum Daily Load**  
**Fecal Coliform in the Lower Pocomoke River and Pocomoke Sound**  
**Somerset and Worcester Counties, Maryland and Accomack County, Virginia**

**I. Introduction**

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies 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 waterbody.

This document sets forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the TMDL for fecal coliform in the Lower Pocomoke River and Pocomoke Sound Watersheds. The TMDL was established to address impairments of water quality, caused by fecal coliform, as identified in Maryland and Virginia's Section 303(d) Lists for water quality limited segments. The Maryland Department of Environment (MDE) and the Virginia Department of Environmental Quality (VA-DEQ) jointly submitted the report, *Total Maximum Daily Loads of Fecal Coliform for the Restricted Shellfish Harvesting/Growing Areas of the Pocomoke River in the Lower Pocomoke River Basin and Pocomoke Sound Basin in Somerset and Worcester Counties, Maryland and Accomack County, Virginia*, to EPA on February 19, 2009. The Lower Pocomoke River (MD-02130202) was included on Maryland's 1996 Section 303(d) List and Pocomoke Sound (MD-02130201) was included on Maryland's 1998 Section 303(d) List for fecal coliform impairments. Similarly, Pocomoke Sound and Pocomoke River (VAT-C09E) were listed as impaired for fecal coliform on Virginia's 1998 Section 303(d) List.

EPA's rationale is based on the TMDL Report and information contained in the computer files provided to EPA by MDE and VA-DEQ. EPA's review determined that the TMDLs meet the following seven regulatory requirements pursuant to 40 CFR Part 130.

1. The TMDL is designed to implement applicable water quality standards.
2. The TMDL includes a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).
3. The TMDL considers the impacts of background pollutant contributions.
4. The TMDL considers critical environmental conditions.
5. The TMDL considers seasonal environmental variations.
6. The TMDL includes a MOS.
7. The TMDL has been subject to public participation.

In addition, these TMDLs considered reasonable assurance that the TMDL allocations assigned to nonpoint sources can be reasonably met.

## II. Summary

The TMDL specifically allocates the allowable fecal coliform loading to the Lower Pocomoke River and Pocomoke Sound Watersheds. There are six permitted point sources of fecal coliform which are included in the WLA. The fact that the TMDL does not assign WLAs to any other sources in the watershed should not be construed as a determination by either EPA, MDE or VA-DEQ that there are no additional 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 fecal coliform TMDL is presented in counts per day and was developed to meet TMDL endpoints under a range of conditions observed throughout the year. A summary of the TMDL is provided in Table 1, and a more detailed breakdown is presented below in Table 2.

**Table 1. Summary of Fecal Coliform Loads for the Lower Pocomoke River and Pocomoke Sound (counts/day)**

Area	TMDL	=	LA	+	WLA	+	MOS
<b>Pocomoke River and Pocomoke Sound</b>	$7.54 \times 10^{13}$		$7.54 \times 10^{13}$	+	$4.43 \times 10^{10}$	+	Implicit

**Table 2. Detailed Breakdown of Fecal Coliform Loads for the Lower Pocomoke River and Pocomoke Sound (counts/day)**

Area	TMDL	=	LA	+	WLA	+	MOS										
<b>Pocomoke River and Pocomoke Sound, MD</b>	$6.50 \times 10^{13}$	=	$6.50 \times 10^{13}$	+	$4.42 \times 10^{10}$	+	Implicit										
<i>Where <math>\Sigma</math>WLA</i> <table style="margin-left: 100px;"> <tr> <td><i>MD0022551</i></td> <td><math>3.62 \times 10^9</math></td> </tr> <tr> <td><i>MD0051632</i></td> <td><math>4.92 \times 10^8</math></td> </tr> <tr> <td><i>MD0060348</i></td> <td><math>2.95 \times 10^8</math></td> </tr> <tr> <td><i>MD0022764</i></td> <td><math>2.95 \times 10^9</math></td> </tr> <tr> <td><i>Future Growth</i></td> <td><math>3.68 \times 10^{10}</math></td> </tr> </table>								<i>MD0022551</i>	$3.62 \times 10^9$	<i>MD0051632</i>	$4.92 \times 10^8$	<i>MD0060348</i>	$2.95 \times 10^8$	<i>MD0022764</i>	$2.95 \times 10^9$	<i>Future Growth</i>	$3.68 \times 10^{10}$
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<b>Pocomoke River and Pocomoke Sound, VA</b>	$1.04 \times 10^{13}$	=	$1.04 \times 10^{13}$	+	$1.37 \times 10^8$	+	Implicit										
<i>Where <math>\Sigma</math>WLA</i> <table style="margin-left: 100px;"> <tr> <td><i>VA0023078</i></td> <td><math>1.51 \times 10^7</math></td> </tr> <tr> <td><i>VA0090875</i></td> <td><math>7.57 \times 10^6</math></td> </tr> <tr> <td><i>Future Growth</i></td> <td><math>1.14 \times 10^8</math></td> </tr> </table>								<i>VA0023078</i>	$1.51 \times 10^7$	<i>VA0090875</i>	$7.57 \times 10^6$	<i>Future Growth</i>	$1.14 \times 10^8$				
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The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically based strategy that considers current and foreseeable conditions, the best available data, and accounts for

uncertainty with the inclusion of a MOS value. The option is always available to refine the TMDL for resubmittal to EPA for approval if environmental conditions, new data, or the understanding of the natural processes change more than what was anticipated by the MOS.

### **III. Background**

The Lower Pocomoke River and Pocomoke Sound Watersheds are interstate watersheds; the boundary between Maryland and Virginia follows along the Lower Pocomoke River and Pocomoke Sound on the eastern shores of these jurisdictions. The impaired portions of the watersheds addressed in this TMDL are located in Somerset and Worcester Counties in Maryland, and Accomack County in Virginia. The length of the impaired portion is roughly 8.3 km and has a drainage area of 1,344.5 km<sup>2</sup> (332,222.0 acres). The dominant land uses include forest (54.8%) and cropland (31.3%), with smaller amounts of wetlands (6.9%), residential urban (2.7%), and other (4.3%) land uses. Section 2.0 of MDE's TMDL Report provides additional information about the Lower Pocomoke River and Pocomoke Sound Watersheds, including land use information.

Pocomoke Sound (MD-02130201) was included on Maryland's 1998 Section 303(d) List as impaired by fecal coliform. The Lower Pocomoke River (MD-02130202) was included on Maryland's 1996 Section 303(d) List as impaired by fecal coliform. Similarly, Pocomoke Sound and Pocomoke River (VAT-C09E) were listed as impaired for fecal coliform on Virginia's 1998 Section 303(d) List.

The Lower Pocomoke River and Pocomoke Sound have shellfish harvesting designated uses in both Maryland and Virginia. In Maryland, the applicable fecal coliform water quality criteria for shellfish harvesting areas are: the median concentration does not exceed 14 Most Probable Number (MPN) per 100 milliliters (ml), and the 90<sup>th</sup> percentile concentration does not exceed 49 MPN per 100 ml for a three-tube decimal dilution test. See COMAR 26.08.02.03-3.C. In Virginia, the applicable State standard specifies that the number of fecal coliform bacteria shall not exceed a geometric mean of 14 MPN per 100 ml and a 90<sup>th</sup> percentile value of 49 MPN/100 ml (3-tube, 3-dilution); or 43 MPN/100 ml (5-tube, 3-dilution) (Virginia Water Quality Standard 9-VAC 25-260-160). The TMDL was developed based on the most stringent criterion (i.e., the 90<sup>th</sup> percentile criterion), requiring a total reduction of about 42.13 percent for both watersheds. The current total fecal coliform load from the Pocomoke Watershed is 1.30E+14 counts per day. The fecal coliform TMDL for the Pocomoke Watershed is 7.54E+13 counts per day.

The 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 fecal coliform TMDL submitted by MDE and VA-DEQ is designed to allow for the attainment of the Pocomoke's designated uses, and to ensure that there will be no fecal coliform impacts affecting the attainment of these uses. Refer to Tables 1 and 2 above for a summary of allowable loads.

For this TMDL analysis, the 3-dimensional hydrodynamic and eutrophication model

(HEM-3D) was used to estimate current fecal coliform loads and to establish allowable loads for the impaired shellfish harvesting area in the Pocomoke River watershed. The model incorporates influences of freshwater discharge, tidal and density-induced transport, and fecal coliform decay, thereby representing the fate and transport of fecal coliform in the Pocomoke Sound and Lower Pocomoke River and its corresponding restricted shellfish harvesting area. The potential sources (human, livestock, pets, and wildlife) are identified by analysis of the Bacteria Source Tracking (BST) data collected in the Pocomoke Sound and Lower Pocomoke River over a one-year period.

#### **IV. Discussion of Regulatory Conditions**

EPA finds that MDE and VA-DEQ have provided sufficient information to meet all seven of the basic requirements for establishing a fecal coliform TMDL for the Pocomoke River and Pocomoke Sound Watersheds. EPA, therefore, approves this TMDL. This approval is outlined below according to the seven 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. In Maryland and Virginia, the Lower Pocomoke River and Pocomoke Sound have a shellfish harvesting designated use. As previously mentioned, in Maryland, the applicable fecal coliform water quality criteria for shellfish harvesting area are that the median concentration does not exceed 14 MPN per 100 ml, and the 90<sup>th</sup> percentile concentration does not exceed 49 MPN per 100 ml for a three-tube decimal dilution test. See COMAR 26.08.02.03-3.C. In Virginia, the applicable state standard specifies that the number of fecal coliform bacteria shall not exceed a geometric mean of 14 MPN per 100 ml and a 90<sup>th</sup> percentile value of 49 MPN/100 ml (3-tube, 3-dilution); or 43 MPN/100 ml (5-tube, 3-dilution) (Virginia Water Quality Standard 9-VAC 25-260-160). The TMDL was developed based on the most stringent criterion (i.e., the 90<sup>th</sup> percentile criterion), and the overall objective is to reduce the fecal coliform loadings to ensure the attainment of the applicable shellfish harvesting designated uses. EPA believes this is a reasonable and appropriate water quality goal.

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

#### **Total Allowable Load**

EPA regulations at 40 CFR §130.2(i) state that *the total allowable load shall be the sum of individual WLAs for point sources, LAs for nonpoint sources, and natural background concentrations*. The TMDL for fecal coliform for the Lower Pocomoke River and Pocomoke Sound Watersheds is consistent with 40 CFR §130.2(i) because the total loads provided by MDE and VA-DEQ equal the sum of the individual WLAs for point sources and the land based LAs for nonpoint sources. Pursuant to 40 CFR §130.6 and §130.7(d)(2), this TMDL and the supporting documentation should be incorporated into Maryland's and Virginia's current water quality management plan.

## **Wasteload Allocations**

As indicated in the TMDL Report, there are six permitted point sources in the Lower Pocomoke River and Pocomoke Sound Watersheds, including four facilities in Maryland, and two facilities in Virginia. Based on the permit information shown in Table 2 of this document, the total permitted load is 7.29E+9 counts per day, and will be included as the WLA for the Lower Pocomoke River and Pocomoke Sound. Additional WLAs totaling 3.69E+10 counts per day were calculated to accommodate future growth in these watersheds. The fecal coliform loads from point source facilities constitute less than 0.01% of the total load. For these facilities, the allowable loads and baseline loads are the same, are estimated from the permit limits, and no reductions are needed.

## **Load Allocations**

Tables 1 and 2 contain the LAs for the Lower Pocomoke River and Pocomoke Sound Watersheds. 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 and VA-DEQ conducted sampling over a one-year period in the Pocomoke Sound and Lower Pocomoke River to evaluate the source characterization through a process called BST in 2005-2006 and 2002-2003, respectively, by MDE and VA-DEQ. BST analysis is used to provide evidence regarding contributions from anthropogenic sources (*i.e.*, human or livestock) as well as background sources, such as wildlife. The Antibiotic Resistance Analysis (ARA) BST method was used to determine the potential sources of fecal coliform in the Pocomoke Sound and Pocomoke River. ARA uses enterococci or *Escherichia coli* (*E. coli*) and patterns of antibiotic resistance in these bacteria to identify sources. The premise is that the antibiotic resistance of bacteria isolated from different hosts can be discerned based upon differences in the selective pressure of microbial populations found in the gastrointestinal tract of those hosts (humans, livestock, pets, wildlife).

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 this TMDL, if an NPDES permit is issued for a point source that discharges one or more of the pollutants of concern in the Lower Pocomoke River or Pocomoke Sound Watersheds, any deviation from the WLAs set forth in the TMDL Report, 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 the TMDL; 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 land uses for which LA changes may be impacted. It is also expected that MDE will require periodic monitoring of the point source(s) for total suspended solids, through the NPDES permit process, in order to monitor and determine compliance with the TMDL's 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 (BMP) 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.

Based on the foregoing, EPA has determined that the TMDLs are consistent with the regulations and requirements of 40 CFR Part 130.

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

The TMDLs consider the impact of background pollutants by considering the fecal coliform load from natural sources such as forested land.

**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 standards<sup>1</sup>. 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

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<sup>1</sup> EPA 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.

reasonable worst case scenario condition. The 90<sup>th</sup> percentile concentration is the concentration that exceeded the water quality criterion only 10% of the time. Since the data used to develop the Lower Pocomoke River and Pocomoke Sound TMDLs were collected over a three-year period, the critical condition is implicitly included in the value of the 90<sup>th</sup> percentile. Given the length of the monitoring record used and the limited applicability of BMPs to extreme conditions, the 90<sup>th</sup> percentile is utilized instead of the absolute maximum.

**5) *The TMDLs consider seasonal environmental variations.***

Similar to the critical condition, seasonality is also implicitly included in this TMDL analysis due to the averaging required in the water quality standards. The MDE and VA-DEQ shellfish-monitoring programs use a systematic random sampling design that was developed to cover inter-annual variability. The monitoring design and the statistical analysis used to evaluate water quality attainment, therefore, implicitly include the effect of seasonality. By examining the seasonal variability of fecal coliform, it is apparent that the highest fecal coliform values often occur during the few months of the year that correspond to the critical condition.

**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 and VA-DEQ have adopted an implicit MOS for this TMDL by using conservative estimates in model parameter selection. The decay rate of fecal coliform is one of the most sensitive parameters in the HEM-3D model. For a given system, the higher the decay rate, the higher the assimilative capacity. The value of the decay rate varies from 0.7 to 3.0 per day in salt water, and a decay rate of 0.7 per day was used as a conservative estimate in the TMDL calculation. Further literature review supports this assumption as a conservative estimate of the decay rate. Therefore the MOS is implicitly included in the calculation.

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

MDE and VA-DEQ provided an opportunity for public review and comment on the fecal coliform TMDL for the Lower Pocomoke River and Pocomoke Sound Watersheds. A public meeting was held on July 23, 2008, to discuss these TMDLs. In addition, a public comment period was open from October 23, 2008 until November 25, 2008. During this period, MDE and VA-DEQ received one set of written comments from the Mid-Atlantic Environmental Law Center at the Widener University School of Law. MDE and VA-DEQ appropriately addressed these comments.

Copies of the TMDL report were sent to the U.S. Fish and Wildlife Service pursuant to Section 7(c) of the Endangered Species Act, requesting the Service's concurrence with EPA's findings that approval of this TMDL does not adversely affect any listed endangered and threatened species, and their critical habitats.

**V. Discussion of Reasonable Assurance**

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: Water Quality Improvement Act of 1998 (WQIA), Federal Nonpoint Source Management Program (Section 319 of the Clean Water Act), Buffer Incentive Program (BIP), State Water Quality Revolving Loan Fund, and Stormwater Pollution Cost Share Program.