



**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) for fecal bacteria for the Non-Tidal Dividing Creek Basin in Somerset, Wicomico, and Worcester Counties, Maryland. The TMDL report was submitted by the Maryland Department of the Environment (MDE), letter dated May 9, 2008, and was received by EPA for review and approval on May 23, 2008. The TMDL was 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. The Non-Tidal Dividing Creek Watershed (MD-02130204) was included on Maryland's Section 303(d) List as impaired by fecal bacteria (1996), and impacts to biological communities (2004 and 2006). This TMDL addresses the fecal bacteria impairment only.

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 fecal bacteria TMDLs for the Non-Tidal Dividing Creek Watershed satisfy each of these requirements.

As you know, any new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL wasteload allocations 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 Maria Garcia at 215-814-3199.

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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**Decision Rationale**  
**Total Maximum Daily Loads**  
**Fecal Bacteria for Non-Tidal Dividing Creek Basin**  
**Somerset, Wicomico and**  
**Worcester Counties, Maryland**

**John Armstead for**

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

**Date: 4/15/2009**

**Decision Rationale**  
**Total Maximum Daily Load**  
**For Fecal Bacteria in the Non-Tidal Dividing Creek Basin**  
**Somerset, Wicomico, and Worcester Counties, Maryland**

**I. Introduction**

The Clean Water Act (CWA) requires that 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 bacteria in the Non-Tidal Dividing Creek Basin. The TMDL was established to address impairments of water quality, caused by fecal bacteria, as identified in Maryland's 1996 Section 303(d) List for water quality limited segments. The Maryland Department of the Environment (MDE) submitted the report, *Total Maximum Daily Loads of Fecal Bacteria for the Non-Tidal Dividing Creek Basin, Somerset, Wicomico, and Worcester Counties, Maryland*, dated April 2008, to EPA for final review on May 09, 2008. The TMDL in this report addresses the fecal bacteria impairment in the Non-Tidal Dividing Creek Basin as identified on Maryland's Section 303(d) List. The basin identification for the Non-Tidal Dividing Creek Basin is MD-02130204.

EPA's rationale is based on the TMDL Report and information contained in the computer files provided to EPA by MDE. 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 bacteria loading to the non-tidal Dividing Creek Basin. No National Pollutant Discharge Elimination System (NPDES) sources exist in the non-tidal Dividing Creek. Therefore, the entire TMDL was assigned to the LA. The fact that the 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 additional sources in the watershed that are subject to the NPDES program. MDE provided adequate land use and instream bacteria data in the TMDL report and allocated the TMDL loads to specific sources. The long-term annual average and maximum daily TMDLs are presented in Tables 1 and 2, respectively. The calculation of the long-term daily TMDL is explained in Appendix D of the TMDL report.

**Table 1: Annual Average TMDL for the Non-Tidal Dividing Basin**

Station/ Tributary	Total Allocation	LA	SW-WLA	WWTP WLA
	(Billion MPN <i>E. coli</i> /day)			
<b>DIV0113</b> Dividing Creek	12,609	12,609	N/A	N/A
<b>PUS0008</b> Pusey Branch	12,741	12,741	N/A	N/A
<b>Total</b>	<b>25,351</b>	<b>25,351</b>	<b>0</b>	<b>0</b>

**Table 2: Maximum Daily Loads**

Station/ Tributary	Total Allocation	LA	SW-WLA	WWTP- WLA
	(Billion MPN <i>E. coli</i> /day)			
<b>DIV0113</b> Dividing Creek	285	285	N/A	N/A
<b>PUS0008</b> Pusey Branch	220	220	N/A	N/A
<b>Total</b>	<b>505</b>	<b>505</b>	<b>0</b>	<b>0</b>

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. For this TMDL, the MOS was incorporated as a conservative assumption used in the TMDL analysis. The loading capacity of the stream was estimated based upon a reduced (more stringent) water quality criterion concentration. The *E. coli* water quality criterion concentration was reduced by 5 percent, from 126 *E. coli* MPN/100 ml to 119.7 MPN/100 ml. 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 Dividing Creek watershed is located in the Pocomoke River region of Maryland. The watershed encompasses 39,699 acres (62.03 square miles) in Somerset, Wicomico and Worcester counties. Of this, the non-tidal portion accounts for 23,150 acres (36.17 square miles) of the northern half of the overall watershed. The headwaters of Dividing Creek, which is one of the major tributaries of the Pocomoke River, begin just above the Wicomico County border. Flowing south it becomes the border for Somerset and Worcester Counties and is joined by Pollitt's Branch. Near the town of Whitesburg, Dividing Creek is joined by its major tributary Pusey Branch, which also begins in Wicomico County. The majority of this region is forested land (app. 80%), with occasional agricultural use (17.5%) and little urban (1.6%) and pasture (1.1%) uses. The total population in the non-tidal portion of the Dividing Creek watershed is estimated to be 690 people. The human population and the number of dwellings were estimated based on a weighted average from the 2000 Census GIS Block Groups (U.S. Department of Commerce 2000) and the 2002 MDP Land Use Land Cover. Section 2.1 of the TMDL report provides additional information about the non-tidal Dividing Creek watershed, including land use and population.

The non-tidal portion of Dividing Creek and its tributaries have been identified in the State of Maryland's Section 303(d) List as impaired by fecal bacteria (listed in 1996) and by impacts to biological communities (listed in 2004 and 2006). This TMDL addresses the fecal bacteria impairment only.

The waterbodies of the Dividing Creek watershed have been designated as Use I - *Water Contact Recreation, and Protection of Non-tidal Warmwater Aquatic Life* (Code of Maryland Regulations (COMAR) 26.08.02.07F(5)). Maryland's water quality criteria for bacteria are based on water column limits for either *E. coli* or *enterococci*. The indicator organism used in the Non-Tidal Dividing Creek TMDL analysis was *E. coli* and the state water quality standard used in this study was 126 Most Probable Number (MPN)/100 ml (COMAR 26.08.02.03-3 Water Quality Criteria Specific to Designated Uses; Table 1). MDE conducted bacteria monitoring at two stations in the Dividing Creek watershed from November 2003 through October 2004. The *E. coli* counts for the two stations ranging between 10 and 2,005 MPN/100 ml.

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 bacteria TMDL submitted by MDE is designed to allow for the attainment of the designated uses in the non-tidal Dividing Creek watershed.

For this TMDL analysis, the non-tidal Dividing Creek watershed has been divided into two subwatersheds, which include Dividing Creek and Pusey Branch. Refer to Tables 1 and 2 above for a summary of allowable loads. To establish baseline and allowable pollutant loads for this TMDL, a flow duration curve approach was employed, using bacteria data from MDE and flow strata estimated from United States Geological Survey (USGS) daily flow monitoring. The sources of fecal bacteria were estimated at two representative stations in the Non-Tidal Dividing

Creek Basin where samples were collected for one year. Multiple Antibiotic Resistance Analysis (ARA) source tracking was used to determine the relative proportion of domestic (pets and human associated animals), human (human waste), livestock (agriculture-related animals), and wildlife (mammals and waterfowl) source categories. Appendix C of the TMDL report includes the Bacteria Source Tracking Report titled *Identifying Sources of Fecal Pollution in Shellfish and Nontidal Waters in Maryland Watersheds* prepared by the Salisbury University, Department of Biological Sciences and Environmental Health Services.

The allowable load was determined by estimating a baseline load from current monitoring data. The baseline load was estimated using a long-term geometric mean and weighting factors from the flow duration curve. The TMDL for fecal bacteria was established after considering three different hydrological conditions: high flow and low flow annual conditions; and an average seasonal condition (the period between May 1 and September 30, when water contact recreation is more prevalent). The allowable load was reported in units of Most Probable Number (MPN)/year and represents a long-term load estimated over a variety of hydrological conditions.

Two scenarios were developed, with the first assessing if attainment of current water quality standards could be achieved by applying maximum practicable reductions (MPRs), and the second applying higher reductions than MPRs. Scenario solutions were based on an optimization method where the objective was to minimize the overall risk to human health, assuming that the risk varies over the four bacteria source categories. In both subwatersheds, it was estimated that water quality standards could not be attained with MPRs, thus higher maximum reductions were applied.

The fecal bacteria long-term annual average TMDL for the Non-Tidal Dividing Creek Basin is 25,351 billion MPN *E. coli*/year, with a maximum daily load of 505 billion MPN/day. These total loads represent the sum of individual TMDLs for the two subwatersheds. The long-term annual average TMDL represents a reduction of approximately 65.6 percent from the baseline load of 73,630 billion MPN/year. No point sources exist in the Non-Tidal Dividing Creek Basin; thus, the entire TMDL is assigned to the LA. The maximum daily load, estimated using predicted long-term annual average TMDL concentrations, was also assigned entirely to the LA.

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

EPA finds that MDE has provided sufficient information to meet all seven of the basic requirements for establishing a fecal bacteria TMDL for the Non-Tidal Dividing Creek Watershed. EPA therefore approves this fecal bacteria TMDL for the Non-Tidal Dividing Creek Watershed. 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.

The Surface Water Use Designation for the Non-Tidal Dividing Creek is Use I - *Water Contact Recreation, and Protection of Non-tidal Warmwater Aquatic Life* (Code of Maryland Regulations (COMAR) 26.08.02.07F(5)). Maryland's water quality criteria for bacteria are based on water column limits for either *E. coli* or *enterococci*. The indicator organism used in the Non-Tidal Dividing Creek TMDL analysis was *E. coli* and the State water quality standard used in this study was 126 MPN/100 ml (COMAR 26.08.02.03-3 Water Quality Criteria Specific to Designated Uses; Table 1). 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**

The allowable load was determined by estimating a baseline load from monitoring data. The baseline load was estimated using a long-term geometric mean and weighting factors from a flow duration curve. The TMDL for fecal bacteria was established after considering three different hydrological conditions: high flow and low flow annual conditions; and an average seasonal condition (the period between May 1 and September 30, when water contact recreation is more prevalent). The allowable load was reported in units of MPN/year, for both the average annual and daily loads. Expressing TMDLs as MPN/year is consistent with Federal regulations at 40 CFR §130.2(i), which states that *TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure*. The annual average and long-term daily fecal bacteria TMDLs are presented in Tables 1 and 2, respectively.

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 bacteria for the Non-Tidal Dividing Creek Basin is consistent with 40 CFR §130.2(i) because the total loads provided by MDE equal the sum of the 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 current water quality management plan.

### **Load Allocations**

The TMDL summary in Table 1 contains the LA for the non-tidal Dividing Creek Watershed. 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. Many types of nonpoint sources introduce fecal bacteria to the land surface, including the manure spreading process, direct deposition from livestock during the grazing season, and excretions from pets and wildlife. The deposition of non-human fecal bacteria directly to the stream occurs when livestock or wildlife have direct access to the waterbody. Nonpoint source contributions from human sources generally arise from failing septic systems and their associated drain fields or from leaking infrastructure (i.e., sewer systems). No sewer systems occur in the Non-Tidal



Dividing Creek Basin and all households rely on onsite disposal (septic systems). Section 2.4 of the TMDL report describes a source assessment conducted to estimate the bacteria contributions of domestic (pets and human associated animals), human (human waste), livestock (agricultural animals), and wildlife (mammals and waterfowl) to the overall nonpoint source loadings. Table 2.4.2 of the TMDL report shows the distribution of fecal bacterial source loads in the Non-Tidal Dividing Creek Basin. Based on this assessment, there are no potential human bacteria sources in the watershed and the greatest percentage is due to wildlife. A similar breakdown was developed for the allocations, which are shown in Table 4.6.2 of the TMDL report.

### **Wasteload Allocations**

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.

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

The TMDLs consider the impact of background pollutants by considering the bacterial loads 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 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 reasonable “worst case” scenario condition. For this TMDL, the critical condition was determined by assessing annual and seasonal hydrological conditions for high flow and low flow periods. The critical condition requirement is met by determining the maximum reduction per bacteria source that satisfies all hydrological conditions and meets the water quality standard; thereby, minimizing the risk to water contact recreation.

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

Seasonality was determined using various hydrological conditions and it was assessed as

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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.

the time period when water contact recreation was expected, specifically May 1 through September 30.

**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 this TMDL. The MOS was determined by estimating the loading capacity of the stream based on a reduced (more stringent) water quality criterion concentration. The *E. coli* water quality criterion concentration was reduced by 5 percent, from 126 *E. coli* MPN/100 ml to 119.7 *E. coli* MPN/100 ml.

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

MDE provided an opportunity for public review and comment on the fecal bacteria TMDL for the non-tidal Dividing Creek Watershed. A public notice of intent to establish the Dividing Creek fecal bacteria TMDL, announcing the opening and closing dates of the formal 30-day comment period, was published in the Somerset County Herald, the Wicomico Daily Times, and the Worcester County Times. The public review and comment period was open from March 27, 2008 through April 25, 2008. No written comments were received.

**V. Discussion of Reasonable Assurance**

EPA requires that there be a reasonable assurance that the TMDLs can be implemented. The TMDL analysis for the non-tidal Dividing Creek watershed showed that for the two subwatersheds, the reduction of fecal bacteria loads from wildlife are beyond the maximum practicable reduction (MPR ) targets, and for one of the subwatersheds is beyond the MPR target for domestic animals. The MPR targets were defined based on a literature review of best management practices (BMPs) effectiveness and assuming a zero reduction for wildlife sources. MDE proposed a staged approach to implementation beginning with the MPR scenario, with regularly scheduled follow-up monitoring to assess the effectiveness of the implementation plan. MDE intends for the required reductions to be implemented in an iterative process that first addresses those sources with the largest impact on water quality and human health risk, with consideration given to ease of implementation and cost.