



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

9/9/2010

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 Extended Restricted Shellfish Harvesting Area in Miles River Mainstem of the Miles River Basin in Talbot County, Maryland*. The TMDL report was submitted via the Maryland Department of the Environment's (MDE) letter dated June 24, 2009. 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. This TMDL addresses the fecal coliform impairments of the extended restricted shellfish harvesting area in the Miles River (MD-EASMH-Miles-River 2).

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, the TMDL considers reasonable assurance that the TMDL allocations assigned to the nonpoint sources can be reasonably met. The enclosure to this letter describes how the fecal coliform TMDL for the extended restricted shellfish harvesting area in the Miles River satisfies 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 María García, at 215-814-3199.

Sincerely,

Jon M. Capacasa, Director  
Water Protection Division

cc: Lee Curry, MDE-TARSA  
Melissa Chatham, MDE-TARSA

## Decision Rationale

### **Total Maximum Daily Loads of Fecal Coliform for the Extended Restricted Shellfish Harvesting Area in the Miles River Mainstem of the Miles River Basin Talbot County, Maryland**

#### **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 the 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 extended portion of the restricted shellfish harvesting area in the Miles River. The assessment unit listing code for the extended restricted shellfish harvesting area in the Miles River is MD-EASMH-Miles-River 2. The Maryland Department of the Environment (MDE) submitted the report, *Total Maximum Daily Loads of Fecal Coliform for the Extended Restricted Shellfish Harvesting Area in Miles River Mainstem of the Miles River Basin in Talbot County, Maryland*, on June 24, 2009. The TMDL in this report addresses the fecal coliform impairments in the extended restricted portion of the Miles River as identified on Maryland's 2006 Section 303(d) List. The basin identification for the Miles River is basin number 02130502.

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 TMDL meets 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 (WLA) and load allocations (LA).
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, the TMDL considers reasonable assurance that the TMDL allocations assigned to nonpoint sources can be reasonably met.

## II. Summary

The TMDL allocates the allowable fecal coliform loadings to specific sources in the extended restricted shellfish harvesting area in the Miles River. Since there are no permitted point sources of fecal coliform impacting the extended restricted portion of the Miles River, the entire TMDL has been assigned to the LA. The fact that the TMDL does not assign a WLA to any sources in the Miles River should not be construed as a determination either by EPA or MDE that there are not sources in the extended restricted portion of the Miles River that are subject to the NPDES program. Table 1 below shows the fecal coliform TMDL for the extended restricted shellfish harvesting area in the Miles River. The TMDL was expressed as a median TMDL and a 90<sup>th</sup> percentile TMDL, which is consistent with the format of Maryland's bacteriological criteria, which assigns numeric threshold criteria for fecal coliform based on the median and 90<sup>th</sup> percentile. However, since the 90<sup>th</sup> percentile criterion is more stringent in this case, the allocation for the TMDL is based on the fecal coliform 90<sup>th</sup> percentile criterion.

**Table 1. Fecal Coliform TMDL Based on 90<sup>th</sup> Percentile Criterion**

TMDL	Area	=	Wasteload Allocation (WLA)	+	Load Allocation (LA) (counts per day)	+	Future Allocation	+	Margin of Safety (MOS)
Extended Restricted Shellfish Harvesting Area in the Miles River	1.10x10 <sup>12</sup>	=	N/A	+	1.10x10 <sup>12</sup>	+	N/A	+	Implicit

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 account 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 Miles River is located on Maryland's Eastern Shore in Talbot County, Maryland. The River flows southwest into the Eastern Bay, which in turn flows into the Chesapeake Bay. The extended restricted shellfish harvesting area in the Miles River is located upstream, approximately 12.2 km from the mouth of the Miles River. The extended restricted portion of the Miles River has a length of 1.4 km and a watershed area of 15,957 acres (6,457.4 km<sup>2</sup>). The watershed can be characterized as primarily rural with 53 percent of the area being cropland and more than 27 percent being forested land.

The Miles River was first identified on the 1996 §303(d) List as impaired by fecal coliform. On the 2004 §303(d) List, the fecal coliform impairment was clarified with the identification of a specific restricted shellfish harvesting area within the Miles River watershed. In 2006, the restricted shellfish harvesting area in the Miles River was extended. The assessment unit listing code for the extended restricted area on MD's 2006 303(d) List is MD-EASMH-

Miles-River 2. This TMDL addresses the fecal coliform impairments in the extended restricted shellfish harvesting area in the Miles River. The fecal coliform TMDLs for the restricted shellfish harvesting area in the Miles River were completed in 2005, and submitted to the EPA (MDE 2005).

The monitoring and analysis for the fecal coliform TMDL was performed using fecal coliform data. Fecal coliform is a bacterium which 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. High 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 the extended restricted shellfish harvesting area in the Miles River is Use II Waters: *Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting* (Code of Maryland Regulations, COMAR, 26.08.02.03-3.C(2)). Water quality criteria for shellfish waters are established under the National Shellfish Sanitation Program (NSSP). MDE adheres to the requirements of the NSSP, with oversight by the U.S. Food and Drug Administration. 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, or if the 90<sup>th</sup> percentile concentration exceeds 49 per 100 milliliters (for a three tube decimal dilution test). The Miles River was placed on Maryland's Section 303(d) List because the shellfish area within this system violates Maryland's protective bacteriological criteria for Use II waters.

CWA Section 303(d), and its implementing regulations, requires that TMDLs be developed for waterbodies identified as impaired by the State where technology based and other required controls do not provide for the attainment of water quality standards. The fecal coliform TMDL submitted by MDE is designed to attain acceptable loadings of fecal coliform in order to attain the bacteriological water quality criteria and support the Use II designation. Refer to Table 1 above for a summary of the allowable loads.

To establish baseline and allowable pollutant loads for this TMDL, a steady state multiple segment tidal prism model approach was employed, using monitoring data from MDE. A steady state multiple segment tidal prism model can estimate baseline fecal coliform loads based on volume, tidal prism, and bacteria concentration. When calculating the baseline loads, the model incorporates both influences of freshwater discharge and tidal flushing for the river, which thereby represents the hydrodynamics of the restricted shellfish harvesting area. The methodology used also assumes that freshwater input, tidal range, and the first-order decay of fecal coliform are all constant. Allowable loads can then be calculated from the baseline loads based on the TMDL water quality target of a median concentration of 14 MPN/100ml and a 90<sup>th</sup> percentile concentration of 49 MPN/100ml.

In order to assess the potential fecal coliform sources in the Miles River, one station (08-01-034) in the Miles River was selected for Bacteria Source Tracking (BST) analysis. BST is used to provide evidence regarding contributions from anthropogenic sources (*i.e.*, human or livestock) as well as background sources, such as wildlife. Sampling was conducted over a twelve month period from November 2006 through October 2007. Antibiotic Resistance Analysis (ARA) was the chosen BST method used to determine the potential sources of fecal coliform in the Miles River. The premise of ARA 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 its hosts (domestic, humans, livestock, and wildlife). Detailed results of the BST and ARA analysis are presented in Appendix B of the TMDL.

According to the water quality standards for fecal coliform in shellfish waters, computation of a TMDL requires analyses of both the median and the 90<sup>th</sup> percentile scenarios. The median concentration water quality criterion for shellfish harvesting is 14 MPN/100 ml, and the 90<sup>th</sup> percentile criterion concentration is 49 MPN/100 ml for a three-tube decimal dilution. When allocating loads among sources, the scenario that requires the greatest overall reductions is applied. In this TMDL, the Median Analysis Scenario is less than the 90<sup>th</sup> Percentile Analysis Scenario; therefore, the 90<sup>th</sup> percentile criterion for shellfish criterion was applied for the TMDL. In the 90<sup>th</sup> percentile load, the current load for the extended restricted shellfish harvesting area in the Miles River is  $2.592 \times 10^{12}$  counts per day and the TMDL is  $1.10 \times 10^{12}$  counts per day. This TMDL represents a 57.7 percent reduction from the current load.

#### **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 coliform TMDL for the extended restricted shellfish harvesting area in the Miles River. EPA therefore approves the fecal coliform TMDL for the extended portion of the Miles River. 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 extended restricted shellfish harvesting area in Miles River mainstem is Use II Waters: *Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting* (Code of Maryland Regulations, COMAR, 26.08.02.03-3.C(2)). 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. Approved classifications means that the median fecal coliform MNP of at least 30 water sample results taken over a three year period to incorporate inter-annual variability does not exceed 14 per 100 milliliters; and (1) in areas affected by point source discharges, no more than 10 percent of the samples exceed an MPN of 43 per 100 milliliters for a five tube decimal dilution test or 49 MPN per 100 milliliter for a three tube

decimal dilution test, or (2) in other areas, the 90<sup>th</sup> percentile of water sample results does not exceed an MPN of 43 per 100 milliliters for a five tube decimal dilution test or 49 MPN per 100 milliliters for a three tube decimal dilution test (COMAR 2006)<sup>1</sup>.

Maryland developed the fecal coliform TMDL for the extended restricted shellfish harvesting area in Miles River, 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 TMDL, therefore, uses these applicable numerical criteria as an endpoint. The TMDL was calculated and expressed as a median TMDL and a 90<sup>th</sup> percentile TMDL 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 wasteload allocations and load allocations.***

**Total Allowable Load**

As described above, MDE used as endpoints a median concentration of 14 MPN per 100 milliliters and a 90<sup>th</sup> percentile concentration of 49 MPN per 100 milliliters. Load calculations were conducted for the extended restricted shellfish harvesting area of the Miles River based on these two endpoints. The TMDL allocations were developed based on the criterion requiring the largest percent reduction, in this case based on the 90<sup>th</sup> percentile. The TMDL 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 measures.*

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 in the extended restricted shellfish harvesting area in the Miles River is consistent with 40 CFR §130.2(i) because the total loads provided by MDE equal the sum of the individual WLAs for point sources and the land based LAs for nonpoint sources.

**Wasteload Allocations**

There is one municipal point source located in the Miles River basin: Talbot County Region II WWTP. This facility is located near the mouth of the Miles River and is far downstream from the extended restricted shellfish harvesting area of the Miles River mainstem. The fecal coliform discharge limit for this facility is also set through the Use II (shellfish harvesting water) standard. Therefore, the discharge from this facility has no effect on the fecal coliform impairment of the restricted harvesting area. Since there are no permitted point sources of fecal coliform impacting the extended restricted portion of the Miles River, the entire TMDL is assigned to the LA.

---

<sup>1</sup> Note that Maryland uses the three-tube decimal dilution test for fecal coliform bacteria monitoring purposes.

## **Load Allocations**

The TMDL summary in Table 1 contains the LA for the extended restricted shellfish harvesting area in the Miles River. 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.

As described above in Section III, Maryland conducted a BST analysis in the Miles River to determine fecal coliform sources. In order to assess the potential fecal bacteria sources, one station (08-01-034) in the Miles River was selected for BST analysis. ARA was the BST method used to determine the potential sources of fecal coliform. In the Miles River basin, wildlife contributions, both mammalian and avian, are considered natural conditions and may represent a background level of bacterial loading. Livestock contributions, such as those from mammalian and avian livestock, mainly result from surface runoff. Pet contributions usually occur through runoff from streets and land. Human sources mainly result from failure of septic systems. Based on the analysis, livestock is the predominant bacteria source (46.4%), followed by human (19.6%), wildlife (10.5%), and pets (8.5%). Additionally, 15 percent of the water samples in the analysis were classified as unknown. The unknown water samples were compared to the BST source library to estimate the contributing sources in the water sample and were apportioned to the known samples.

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

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

The TMDL considers the impact of background pollutants by considering the fecal coliform 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>2</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.

---

<sup>2</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.



In the extended restricted shellfish harvesting area of the Miles River, the critical condition requirement is implicitly included in the 90<sup>th</sup> percentile value. A comparison of the median values and the 90<sup>th</sup> percentile values against the water quality criteria determines which represents the more critical condition or higher percent reduction. If the median values dictate the higher reduction, this suggests that, on average, water sample counts are high with limited variation around the mean. If the 90<sup>th</sup> percentile criterion requires a higher reduction, this suggests an occurrence of high fecal coliform due to the variation of hydrological conditions.

**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 dataset of thirty 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 90<sup>th</sup> percentile criterion (i.e., to account for fluctuations around the median). The results show the seasonal variability of fecal coliform concentrations. The seasonal fecal coliform distribution in Miles River can be found in Appendix C.

**6) *The TMDLs include a Margin of Safety.***

The requirement for an 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.

The MOS in this TMDL is implicitly expressed through the steady state multiple segment tidal prism model's decay rate. The decay rate is one of the most sensitive parameters in the 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. A decay rate of 0.7 per day was used as a conservative estimate in the TMDL calculation; therefore, the MOS is implicitly included in this calculation.

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

MDE provided an opportunity for public review and comment on the fecal coliform TMDL for the extended restricted shellfish harvesting area in the Miles River. The public comment period was open from April 27, 2009 through May 26, 2009. MDE received one set of

written comments. These comments were appropriately addressed in the TMDL report.

A letter was 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**

In general, MDE intends for the required reductions to be implemented in an iterative process that first addresses those sources with the greatest impact on water quality, with consideration given to ease and cost. An iterative approach towards implementation throughout the watershed will help to ensure that the most cost-effective practices are implemented first. The appropriate measures to reduce pollutant levels in the extended restricted shellfish harvesting area of the Miles River will include, where appropriate, the use of better treatment technology or the installation of best management practices (BMPs).

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 are available through MDE to address failing septic systems. It is anticipated that the Bay Restoration Fund will provide funding to upgrade onsite sewage disposal systems, with priority given to failing systems and holding tanks in the Chesapeake and Atlantic Coastal Bays Critical Areas. Also, funds are available through the Maryland Department of Natural Resources to install a pump out station.

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.

Regulatory enforcement of potential bacteria sources will be covered by MDE's routine sanitary surveys of shellfish growing areas and NPDES permitting activities. Also, although not directly linked, it is assumed that the nutrient management plans from the Water Quality Improvement Act of 1998 (WQIA) will result in some reduction of bacteria from manure application practices.