UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
7/31/2009

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 sediment in the Catoctin Creek Watershed in Frederick County, Maryland*. The TMDL report was submitted via the Maryland Department of the Environment's (MDE) letter dated September 28, 2007, and was received by EPA for review and approval on October 4, 2007. Also, based on EPA's comments, MDE sent a final revised TMDL report via electronic mail on July 16, 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. The Catoctin Creek Watershed (MD02140305) was included on Maryland's Section 303(d) List as impaired by sediments (1996), nutrients (1996), bacteria (2004), and impacts to biological communities (2002 and 2006). This TMDL addresses the sediment 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 sediment TMDLs for the Catoctin Creek Watershed 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,

/S/

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
Sediment in the Catoctin Creek Watershed
Frederick County, Maryland

/S/

Jon M. Capacasa, Director
Water Protection Division

Date:7/31/2009

Decision Rationale
Total Maximum Daily Load of
Sediment in the Catoctin Creek Watershed
Frederick 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 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 sediment in the Catoctin Creek Watershed. The TMDL was established to address impairments of water quality, caused by sediment, 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 Load of Sediment in the Catoctin Creek Watershed, Frederick County, Maryland,* dated September 2007, to EPA for final review on September 28, 2007. The TMDL in this report addresses the sediment impairment in the Catoctin Creek Watershed as identified on Maryland's Section 303(d) List. The basin identification for the Catoctin Creek Watershed is MD02140305.

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 sediment loading to the Catoctin Creek watershed. There are 13 permitted point sources of sediment 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 or MDE 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 sediment TMDL is presented as an average annual load in tons per year because it was developed to meet TMDL endpoints under a range of conditions observed throughout the year. The long term daily sediment TMDL is presented in tons per day. The calculation of the long term daily TMDLs is explained in Appendix C of the TMDL report. The average annual and long term daily TMDLs are presented in Tables 1 and 2, respectively. Individual annual and daily WLAs for permitted point sources are provided in Table 3.

Table 1. Catoctin Creek Average Annual TMDL of Sediment/TSS (tons/yr)

TMDL (tons/year)	**=**	**LA**	**+**	**WLA**			**MOS**
14,370.3	**=**	12,920.1	**+**	**NPDES Stormwater WLA**		**Process Water WLA**	Implicit
				1,392.4	+	57.8	
				1,450.2			Implicit

Table 2. Catoctin Creek Maximum Daily Load of Sediment/TSS (ton/day)

TMDL (tons/day)	=	**LA**	+	**WLA**			**MOS**
515.7	=	465.1	+	**NPDES Stormwater WLA**		**Process Water WLA**	Implicit
				50.1	+	0.5	
				50.6			Implicit

Table 3. Wasteload Allocations for Process Water Permitted Point Sources in the Catoctin Creek Watershed

Facility	**NPDES ID Number**	**TMDL Long Term Average Daily Load (tons/year)**	**Daily Max Load (tons/day)**
I-70 Rest Stop WWTP	MD0023680	1.2768	0.011
Old South Mountain Inn	MD0055425	1.368	0.012
The Jefferson School	MD0067521	0.456	0.004
Middletown WWTP – East	MD0067628	6.84	0.058
Jefferson WWTP	MD0020737	13.68	0.117
Myersville WWTP	MD0020699	13.68	0.117
Fountaindale WWTP	MD0022721	9.12	0.078
Middletown WWTP	MD0024406	11.4	0.097
NPDES Stormwater Permits	N/A	1,392.4	50.6

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 Catoctin Creek is located within the Middle Potomac River Sub-basin in Frederick County, Maryland. It encompasses the southwestern portion of Frederick County, and is framed by Catoctin Mountain on the east and South Mountain on the west. The mainstem flows through the Middletown Valley and eventually empties into the Potomac River approximately three miles upstream from Point Rocks, Maryland. The watershed drains an area of 120 square miles, which includes areas of forested mountain slopes, agricultural valleys, and small towns. Approximately 5 percent of the total watershed is covered by water.

The Catoctin Creek Watershed (MD02140303) was included on Maryland's Section 303(d) List as impaired by sediments (1996), nutrients (1996), bacteria (2004), and impacts to biological communities (2002 and 2006). This TMDL addresses the sediment impairment only.

The Surface Water Use Designation for the Catoctin Creek and its tributaries is Use IV-P: *Recreational Trout Waters and Public Water Supply* (Code of Maryland Regulations, COMAR, 2007a,b). The water quality impairment of the Catoctin Creek Watershed consists of an elevated sediment load beyond a level to support aquatic health, where aquatic health is evaluated based on Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biologic Integrity (FIBI) scores. Applicable BIBI and FIBI scores indicate that the Catoctin Creek Watershed is exhibiting a negative deviation from reference conditions. There are no specific numeric criteria that quantify the impact of sediment on the aquatic health of non-tidal stream systems. To determine if aquatic health is impacted by elevated sediment loads, a weight-of-evidence stressor indicator identification approach was used. This approach applies a composite stressor indicator, defined as the Sediment Stream Disturbance Index (SSDI). Similar to the Index of Biotic Integrity (IBI), the SSDI is based on a comparison of specific watershed parameters with those from streams with a healthy aquatic community and is scored separately for the benthic and fish communities. Specific SSDI scores for the Catoctin Creek Watershed indicate that sediment is a stressor to the aquatic community. Therefore, it is concluded that a sediment TMDL is required.

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 sediment TMDL submitted by MDE is designed to allow for the attainment of the designated uses and to ensure that there will be no sediment impacts affecting aquatic health in the Maryland 8-digit Catoctin Creek watershed. Refer to Tables 1 and 2 above for a summary of allowable loads.

For this TMDL analysis, Maryland used data collected in 2003 by the Maryland Biological Stream Survey (MBSS) program at 14 stations in the Catoctin Creek watershed. The MBSS parameters recommended for determining a sediment stressor included percent

embeddedness, epifaunal substrate score, instream habitat score, bank stability, and number of benthic tolerant species. For the benthic SSDI, the parameters used were tolerant species, percent embeddedness, epifaunal substrate condition, and bank stability index. For the fish SSDI, the parameters used included embeddedness, epifaunal substrate, and instream habitat condition.

The computational framework utilized for the Catoctin Creek watershed TMDL was the CBP P5 long-term average annual watershed model edge-of-stream (EOS) loading rates. The spatial domain of the CBP P5 watershed model segmentation aggregates to the Maryland 8-digit watershed, which is consistent with the impairment listing. The baseline sediment loads generated within the Maryland 8-digit Catoctin Creek watershed are calculated as the sum of corresponding land use EOS loads within the watershed and represents a long-term average loading rate. Individual land use EOS loads are calculated as a product of the land use area, land use target loading rate, and loss from the edge-of-field (EOF) to the main channel. The loss from the EOF to the main channel is the sediment delivery ratio, and is defined as the ratio of the sediment load reaching a basin outlet to the total erosion within the basin. A sediment delivery ratio is estimated for each land use type based on the proximity of the land use to the main channel. The Maryland 8-digit Catoctin Creek watershed was evaluated using two TMDL segments. Based on the analysis, both segments are impaired and will require a reduction in sediment loads.

Maryland conducted a source assessment by reviewing land use data to estimate the contributions of sediment from crop, extractive, forest, pasture, and urban land uses. The largest portion of the sediment load in the Catoctin Creek watershed is from forest (47.5%). The next largest sediment sources are crop (25.9%), urban (16.6%), and pasture (9.9%). Detailed explanations of the source assessment and estimated sediment budget for each land use are described in Section 2.2 of the TMDL Report.

There are no specific numeric criteria that quantify the impact of sediment on the aquatic health on the non-tidal stream systems. Therefore, in order to quantify the impact of sediment on the aquatic health of non-tidal stream systems, a reference watershed TMDL approach was used which resulted in the establishment of a sediment-loading threshold. To reduce the variability when comparing watersheds within and across regions, the watershed sediment loads are normalized by a constant background condition, the all-forested watershed condition. The new normalized load, defined as the forest normalized sediment load is calculated as the current watershed sediment load divided by the all forest sediment load. A comparison of the Catoctin Creek watershed's forest-normalized sediment load to the sediment loading threshold shows that the Catoctin Creek load exceeds the sediment loading threshold. For the TMDL, the allowable load is calculated as the product of the sediment loading threshold and the Catoctin Creek all-forested sediment load. The current total sediment load from the Catoctin Creek watershed is 28,829.2 tons per year. An overall reduction of 50.2 percent from current estimated loads was required to meet the TMDL allocation and Maryland's water quality standards. The sediment TMDL for the Catoctin Creek watershed was calculated to be 14,370.3 tons per year. Section 4.0 of the TMDL Report provides a thorough description of the CBP P5 model and calculations.

IV. Discussion of Regulatory Conditions

EPA finds that MDE has provided sufficient information to meet all seven of the basic requirements for establishing a sediment TMDL for the Catoctin Creek watershed. EPA therefore approves this sediment TMDL for the Catoctin 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 Catoctin Creek is Use IV-P: *Recreational Trout Waters and Public Water Supply* (COMAR, 2007a,b). Maryland does not currently have numeric criteria for sediments. However, the Maryland 2004 Section 303(d) report states that degraded stream water quality resulting in a sediment impairment is characterized by erosional impacts, depositional impacts, and decreased water clarity (MDE 2004). Therefore, the evaluation of suspended sediment loads are based on how the sediment related impacts are influencing the designated use of supporting aquatic health, as defined by Maryland's biocriteria. The overall objective of the TMDL is to reduce the sediment loadings in the Maryland 8-digit Catoctin Creek watershed in order to meet the narrative water quality criteria to support the Use IV-P designation. 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

As described above, the allowable load for the impaired watershed is calculated as the product of the normalized reference load (determined from watersheds with a healthy benthic community) and the Catoctin Creek Watershed sediment load expected from an all-forested condition. This load is considered the maximum allowable load the watershed can assimilate and still attain water quality standards. The sediment TMDL was developed for the Catoctin Creek Watershed based on this endpoint. The sediment TMDL and allocations are presented as mass loading rates of tons per year for the average annual load and tons per day for the long term daily load. Expressing TMDLs as annual and daily mass loading rates 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 average annual and long term daily sediment 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 sediment for the Catoctin Creek Watershed 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. 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.

Wasteload Allocations

As indicated in the TMDL Report, there are 13 permitted point sources in this watershed. The permits are grouped in two categories, process water and stormwater. There are eight process water sources and five stormwater sources. Based on the permit information shown in Section 4.6 and Appendix B of MDE's TMDL Report, the total permitted load is 57.8 tons per year. No reductions were applied to this source because at 0.2 percent of the total load, such controls would produce no discernable water quality benefit. See Table 3 above for these facilities. There are five NPDES Phase I or Phase II stormwater permits identified throughout the Maryland 8-digit Catoctin Creek watershed which are regulated based on Best Management Practices (BMPs) and do not include Total Suspended Solids (TSS) limits. Therefore, the NPDES regulated stormwater loads within the Maryland 8-digit Catoctin Creek watershed will be expressed as a single NPDES stormwater WLA. The total NPDES stormwater WLA is 1,392.4 ton/yr, which constitutes a 49.1 percent reduction from its baseline load.

Load Allocations

The TMDL summary in Table 1 contains the LA for the Catoctin 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. Wherever possible, natural and nonpoint source loadings should be distinguished. As described above in Section III, Maryland conducted a source assessment in order to estimate the contributions of cropland, extractive land, forest, and pasture, to the overall nonpoint source loadings. Table 4 of the TMDL Report provides a breakdown of the existing annual sediment load from the five source categories (cropland, pasture, urban, extractive land, and forest). A similar breakdown was developed for the allocations, which are shown in Table 11 of the TMDL Report. As indicated in Section III, the Maryland 8-digit Catoctin watershed was evaluated using two segments. Both segments were determined to be impaired. The total TMDL for both segments (14,370.3 tons/year) represent a total reduction of 50.2 percent. For the purpose of TMDL development, reductions are estimated for predominant controllable sediment sources.

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. There is no express or implied statutory requirement that effluent limitations in NPDES permits necessarily be expressed in daily terms. The CWA definition of "effluent limitation" is quite broad (effluent limitation is "any restriction…on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources…)." See CWA 502(11). Unlike the CWA's definition of TMDL, the CWA definition of "effluent limitation" does not contain a "daily" temporal restriction. NPDES permit regulations do not require that effluent limits in permits be expressed as maximum daily limits or even as numeric limitations in all circumstances, and such discretion exists regardless of the time increment chosen to express the TMDL. For further guidance, refer to Benjamin H. Grumbles

memo (November 15, 2006) titled *Establishing TMDL Daily Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015 (April 25, 2006) and implications for NPDES Permits*. 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 Catoctin Creek watershed, 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 TSS, 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 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 sediment load from natural sources such as forested land. The CBP P5 model also considers background pollutant contributions by incorporating all land uses.

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[1]. 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. The biological monitoring data used to determine the reference watersheds integrates the stress effects over the course of time and thus inherently addresses critical conditions.

5) The TMDLs consider seasonal environmental variations.

Seasonality is considered in two components. First, it is implicitly included in the biological monitoring data, since results integrate the stress effects over the course of time as discussed in Requirement 4 above. Second, the MBSS sampling included benthic sampling in the spring, and fish sampling in the summer, to incorporate both spring and summer flow conditions.

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 estimated variability around the reference watershed group used in the analysis accounts for such uncertainty. Analysis of the reference group forest normalized sediment loads indicates that approximately 75 percent of the reference watersheds have a value of less than 3.6, and that 50 percent of the reference watersheds have a value of less than 3.3. Based on this analysis, the forest normalized reference sediment load was set at the median value of 3.3. This is considered an environmentally conservative estimate, since 50 percent of the reference watersheds have a load above this value, which when compared to the 75 percent value, results in an implicit MOS of approximately eight percent.

[1] 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.

7) The TMDLs have been subject to public participation.

MDE provided an opportunity for public review and comment on the sediment TMDL for the Catoctin Creek watershed. The public review and comment period was open from August17, 2007 through September 17, 2007. MDE received comments from the Maryland Department of Agriculture. All of these comments were considered and addressed appropriately.

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

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) and the Federal Nonpoint Source Management Program (Section 319 of the Clean Water Act). Potential funding sources include the Buffer Incentive Program (BIP), Maryland Agriculture water quality cost share program (MACS), State Water Quality Revolving Loan Fund, and Stormwater Pollution Cost Share Program.