



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
March 18, 1999

The Honorable Jane T. Nishida
Secretary
Maryland Department of the Environment
2500 Broening Highway
Baltimore, Maryland 21224

Dear Secretary Nishida:

The Environmental Protection Agency (EPA), Region III has reviewed the report "Total Maximum Daily Loads (TMDLS) of Nitrogen and Phosphorus for Port Tobacco River" which were submitted by the Maryland Department of the Environment (MDE) on February 10, 1999. Pursuant to 40 CFR Section 130.7(d), EPA is approving the Port Tobacco River TMDLS.

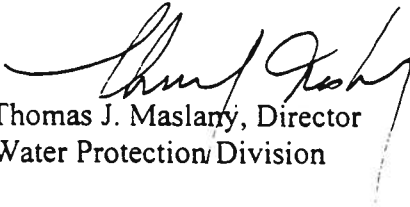
The definition of Load Allocation (LA) at 40 CFR Section 130.2(g) states, in part, that "Load Allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading." Further, a wasteload allocation (WLA), according to 40 CFR Section 130.2(h), is "The portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality-based effluent limitation." In addition, a TMDL is defined at 40 CFR Section 130.2(I) as "The sum of the individual WLAs for point sources and LAs for nonpoint sources and natural background."

The TMDL report submitted by Maryland did not include individual WLAs for individual point sources and land use-based LAs for nonpoint sources. However, the supporting documentation provided with the TMDL report, specifically the Technical Memoranda, did provide one allocation scenario with individual point and nonpoint source allocations. EPA relied upon this information in reviewing and approving the TMDL submittal and in preparing our approval rationale, which is enclosed. We expect for future TMDLS that the technical memoranda will be included in any public notice of the TMDLS.

EPA has determined that the TMDLS and the Technical Memoranda for Nitrogen and Phosphorus for Port Tobacco River are consistent with the regulations and requirements of 40 CFR Section 130. Pursuant to 40 CFR §§ 130.6 and 130.7(d)(2), these TMDLS and the supporting documentation, including the Technical Memoranda, should be incorporated into Maryland's current water quality management plan. EPA has authority to object to issuance of a National Pollutant Discharge Elimination System (NPDES) permit that is inconsistent with WLAs established for that point source. If an NPDES permit is issued with an effluent limitation that does not reflect the WLA contained in the approved TMDL and Technical Memoranda, it is expected that Maryland will document this change in the permit Fact Sheet, as discussed in our Approval Rationale. It is also expected that Maryland will provide this Fact Sheet to each point

source included in the TMDL analysis for review and comment. If you have any questions or concerns, please contact me at 215-814-2050 or Tom Henry at 215-814-5265.

Sincerely,



Thomas J. Maslany, Director
Water Protection Division

Enclosure

cc: Patricia Gleason
Elaine Harbold
Thomas Henry
Stefania Shamet

Rationale for Approval

Total Maximum Daily Loads of Nitrogen and Phosphorus for Port Tobacco River

I. Introduction

This document will set forth the Environmental Protection Agency's (EPA) rationale for approving the Total Maximum Daily Loads (TMDL) for Nitrogen and Phosphorus for Port Tobacco River submitted by the Maryland Department of the Environment (MDE) on February 10, 1999. Our rationale is based on information provided in the document which is used to determine if the TMDL meets the following 7 regulatory conditions as set forth in 40 CFR §130:

- 1) The TMDL is designed to meet water quality standards and identifies a total allowable load;
- 2) The TMDL includes Wasteload Allocations (WLA) and Load Allocations (LA);
- 3) The TMDL considers the impacts of background pollutant contributions;
- 4) The TMDL takes critical stream conditions into account;
- 5) The TMDL considers seasonal variations;
- 6) The TMDL includes a Margin of Safety (MOS);
- 7) The TMDL has been subject to public participation.

II. Background

In response to the requirements of Section 303(d) of the Clean Water Act (CWA), MDE listed the Port Tobacco River on the 1996 and 1998 CWA 303(d) list of impaired waters. Nutrients (Nitrogen and Phosphorus) were listed as the cause of impairment in Port Tobacco River as demonstrated by signs of eutrophication and low dissolved oxygen in violation of the water quality standards. The high concentrations of algae combined with low dissolved oxygen content of the water caused violations of the designated uses of Port Tobacco River which are indicated as Use I (Water Contact Recreation and Protection of Aquatic Life) and Use II (Shellfish Harvesting Waters)¹. Section 303(d) of the CWA further states that a TMDL must be developed for those waterbodies identified as impaired by the State where technology-based and other required controls did not provide for attainment of water quality standards. The TMDL submitted by MDE is designed to address acceptable levels of nitrogen and phosphorus, as demonstrated by the WASP5 model, in order to ensure that the water quality standards are met. Furthermore, these levels of nitrogen and phosphorus will also provide for the control of eutrophication and seasonal algae blooms and allow the designated uses of Port Tobacco River to be met.

MDE has developed a low-flow TMDL as well as an average flow TMDL for both

¹ Code of Maryland Regulations 26.08.02

nitrogen and phosphorus. The low-flow TMDL applies from May 1 to October 31 while the average flow TMDL applies on an annual basis. Table 1 below summarizes the elements of the low-flow and average-flow TMDLs.

Table 1, Summary of TMDLs

Parameter	TMDL	LA	WLA	MOS	FA ^a	Type/Period
Nitrogen (lb/month)	8,710	5,776	1,597	173 and implicit	1,164	Low-flow May 1 - October 31
Phosphorus (lb/month)	871	696	88	21 and implicit	66	
Nitrogen (lb/year)	243,310	190,470	24,920	5,840 and implicit	22,080	Average-flow Annual
Phosphorus (lb/year)	15,570	12,500	1,060	400 and implicit	1,610	

^aFuture Allocation (FA) - See discussion at #2 below.

III. Discussion of Regulatory Conditions

EPA finds that the TMDLs of Nitrogen and Phosphorus for Port Tobacco River meet the regulatory requirements of the Clean Water Act. Our approval is outlined according to the regulatory requirements listed below.

1) *The TMDL is designed to meet water quality standards and identifies the total allowable load.*

MDE identified nitrogen and phosphorus as the causes of impairment of the water quality standards, specifically the designated uses of Port Tobacco River. While Maryland does not have numeric water quality criteria for nitrogen and phosphorus, they do utilize their narrative criteria listed at Section 26.08.02.03B of the Code of Maryland Regulations. In order to determine compliance with water quality standards, Maryland uses the dissolved oxygen water quality criterion and a numerical limitation for chlorophyll-*a*, which is a surrogate indicator for narrative criteria.

The elevated nitrogen and phosphorus levels contributed to excessive algae blooms and wide diurnal fluctuations in dissolved oxygen content with the potential to cause fish kills. In order to eliminate the excessive algae blooms and maintain the dissolved oxygen concentrations above the water quality criterion of 5 mg/l², the elevated levels of nitrogen and phosphorus must be reduced. MDE has demonstrated, through the use of a predictive model (WASP5), that the TMDLs will ensure compliance with the narrative criteria by restoring the designated uses of Port Tobacco River and meet the dissolved oxygen water quality criterion by maintaining nitrogen and phosphorus loads at the targeted levels. In addition, the water quality goal of

²Code of Maryland Regulations-Sections 26.08.02.03-3A(2) and 26.08.02.03C(2)

reducing high chlorophyll-*a* concentrations³, a surrogate indicator of algae blooms, will also be achieved. This will further ensure that the water quality standards of Port Tobacco River are met in relation to nutrients.

2) *The TMDL includes both Wasteload Allocations(WLA) and Load Allocations.*

While MDE did not specifically assign individual wasteload allocations to each of the four point sources identified in the document, a technical memorandum was submitted with the document which indicates this information for both the low-flow and average-flow TMDLs. Maryland has stated that these WLAs are viable individual allocations, however, they reserve the right to allocate among different sources by any means they deem reasonable as long as water quality standards are achieved.

1) *Wasteload Allocations*

Table 2 below is a listing of the individual WLAs for the low-flow TMDL and average-flow TMDLs.

Table 2, Summary of low-flow and average-flow TMDL WLAs.

Source	Permit #	Low-flow TMDL WLAs		Average-flow TMDL WLAs	
		TN Load (lb/month)	TP Load (lb/month)	TN Load (lb/month)	TP Load (lb/month)
La Plata	MD0020524	1,355	68	21,970	820
Charles Community College	MD0052311	124	7	1,510	80
Mt. Carmel	MD0053228	77	9	930	100
Thunderbird Apts.	MD0050334	42	5	510	60
Existing WLA		1,597	88	24,920	1,060
Maximum Allowable Point Source Load ^a		2,761	154	42,720	1,870
Future Allocation		1,164	66	17,800 ^b	810 ^b

^a As determined by the model

^b This represents the FAs for point sources only. Under average-flow conditions there is nonpoint source component of FAs which account for the difference between the FAs in Table 2 and those in Table 1.

The individual WLA for La Plata assumes that Biological Nutrient Removal (BNR), which will be implemented through the NPDES permit, will achieve a total nitrogen (TN)

³Refer to discussion under Section 6 of this document

concentration of 6 mg/l at maximum discharge flow during low-flow conditions and 8 mg/l, the anticipated average annual concentration, during average-flow conditions. The use of 6 mg/l as the concentration is a conservative assumption based on studies of similar facilities with similar BNR processes. Chemical Phosphorus Removal (CPR), already implemented at La Plata, accounts for the relatively small contribution of phosphorus from this facility. The other 3 point source discharges were considered too small to impose nutrient limitations. The loading from these facilities assumed the maximum allowable nitrogen and phosphorus discharge concentrations without BNR and CPR at maximum flow for both flow conditions.

Future Allocations (FA) under low-flow conditions are not individually assigned to specific dischargers and represent only the difference between the existing overall WLA for all point sources and the maximum allowable load from point sources which the stream can assimilate without exhibiting impairment of the water quality standards. Under average-flow conditions, this is also true, however, the FA also includes a nonpoint source component which will be discussed below. In both cases, nonpoint sources are considered when determining FAs.

Any revisions to the WLAs or FAs would require verification that water quality standards are maintained. Revisions may include new or expanding discharges or changes in the location of existing discharges.

II) Load Allocations

Despite adequate land use data indicated in the document, MDE does not assign specific load allocations to each particular land use. Maryland simply includes a gross load allocation for the low-flow and average-flow TMDLs. Table 3 below is a summary of the LAs for each flow condition.

Table 3, Summary of low-flow and average-flow TMDL LAs

	Low-flow TMDL LAs		Average-flow TMDL LAs	
	Nitrogen (lb/month)	Phosphorus (lb/month)	Nitrogen (lb/month)	Phosphorus (lb/month)
Load Allocation	5,776	696	190,470	12,500

The Load Allocations for the low-flow TMDL represent actual instream values determined from two instream data stations in Port Tobacco River during August 1984. Under low-flow conditions, nonpoint source loads are mainly due to groundwater and not attributable to any particular land use. The load allocations are inclusive of both natural and nonpoint source contributions and are conservative estimates given that 1984 loads predate any nonpoint source controls which may have been implemented following the Lower Potomac Basin Strategy which began in 1985.

Nonpoint sources for the average-flow TMDL were calculated using a simple land use area/loading coefficient approach based on three land use types (urban, agriculture, and forest) and the year 2000 loading rates from the Chesapeake Bay Model which accounts for atmospheric deposition and septic tanks. Background contributions as calculated from the low-flow TMDL are included.

MDE states that FAs for nonpoint sources represent the difference between the estimated 1996 nonpoint source loads and the estimated 2000 loads from the model. MDE has

demonstrated that nonpoint source loads based on year 2000 estimates will assure that water quality standards are met during average-flow conditions, however, the technical memorandum does not clearly state the future allocation load for nonpoint sources. The State needs to include a Table which clearly identifies the specific land use load allocations and future allocations.

3) *The TMDL considers the impacts of background contributions.*

The State indicates that the load allocations for the low-flow TMDL represent nonpoint source loads from 1984 and account for both natural and human-induced load contributions. Furthermore, the average-flow TMDL load allocations include the background contribution from the low-flow TMDL as well as the nonpoint source loads estimated from land use/loading coefficients as used in the Chesapeake Bay Model (CBM).

4) *The TMDL takes critical stream conditions into account.*

The requirements at 40 CFR 130.7(c)(1) require TMDLs to take into account critical conditions for streamflow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of Port Tobacco River is protected during times when it is most vulnerable.

Situations where stream flows are reduced to levels approaching 7Q10⁴, there are higher levels of nutrient concentrations, and water temperatures are warmer creating favorable environmental conditions for algal growth represent critical conditions for Port Tobacco River⁵. The low-flow TMDL for nitrogen and phosphorus developed by MDE demonstrates that water quality standards and designated uses for Fairlee Creek are met, including maintaining the dissolved oxygen concentration above 5 mg/l, during critical conditions. This is also significant due to the documented water quality criteria violations during these times.

The State also recognizes a second critical condition represented by increased nonpoint source loads of nutrients during precipitation events which could adversely affect water quality. In that regard, MDE developed an annual TMDL based on average flow conditions which takes into account the increased loads from nonpoint sources and still meets the water quality standards.

5) *The TMDL considers seasonal variations.*

The annual TMDL based on average flow considerations developed by the State appropriately considers seasonal variations. The water quality and hydrology of streams are impacted by seasonality. Typically, seasonal variations are described by low-flow conditions in

⁴7Q10 represents the 7-day average low-flow occurring once in 10 years.

⁵Critical conditions and seasonality are discussed in detail in Section 2.3.3 of EPA's *Technical Guidance Manual for Developing Total Maximum Daily Loads, Book 2, Part 1* (EPA 823-B-97-002)

the summer and early fall while high flows usually occur during the winter and early spring⁶. Development of a low-flow TMDL as well as an annual, average flow TMDL effectively considers impacts which may be due to seasonal variations and demonstrates compliance with the water quality standards, including maintaining the dissolved oxygen concentration during these seasonal variations.

6) *The TMDL includes a Margin of Safety.*

This requirement is intended to add a level of conservatism to the modeling process. MDE has indicated that the TMDL uses combined implicit and explicit margins of safety (MOS) to provide conservatism to the model and comply with regulations. Separate explicit margins of safety are applied to both the low-flow and average -flow TMDLs.

The low-flow TMDL MOS is calculated as 3% of the nonpoint source load for nitrogen and phosphorus, which actually represents 2% and 2.4%, respectively, of the TMDL. The average-flow TMDL MOS is also calculated as 3% of the nonpoint source load for nitrogen and phosphorus, which represents 2.4% and 2.6% respectively, of the TMDL.

The State also applies an implicit MOS by setting an upper model target on chlorophyll-*a* concentrations of 52 µg/l, which is conservative given that a generally acceptable range is 50 µg/l to 100µg/l. Chlorophyll-*a* is a measure of algal biomass in waters and is a significant link between the dissolved oxygen concentration and nutrient levels. Placing a conservative upper limit on algal biomass, which is predicated on reduced levels of nutrients, adds a level of conservatism to the TMDL. Other implicit MOS features include assuming that the point sources in the watershed are discharging at their permitted limits during low-flow conditions, assuming high temperatures.

EPA agrees that the combined approach used by MDE is appropriate.

7) *The TMDL has been subject to public participation.*

MDE conducted a public review of the TMDL by holding a public comment period which extended from April 24, 1998 to June 19, 1998. Three sets of written comments were received by MDE and a comment response document was generated. A public hearing was not held due to the lack of widespread interest. EPA generally agrees with the comments provided by MDE.

8) *There is reasonable assurance that the TMDL can be met.*

EPA guidance recommends that TMDLs be developed with a reasonable assurance that the TMDL can be met. MDE has indicated that the ability to control point source discharges through the National Pollutant Discharge Elimination System (NPDES) plays a significant role in assuring that the low-flow TMDL will be met. Reasonable assurance for the average-flow TMDL, in which nonpoint source loads have an increasing impact, relies on the Tributary

⁶Critical conditions and seasonality are discussed in detail in Section 2.3.3 of EPA's *Technical Guidance Manual for Developing Total Maximum Daily Loads, Book 2, Part 1* (EPA 823-B-97-002)

Strategy for Nutrient Reduction⁷ and the State Nonpoint Source Management Plan⁸ as well as the traditional NPDES program. Furthermore, the watershed cycling strategy adopted by MDE will ensure that an evaluation of TMDLs will occur on a five-year basis. EPA believes that these programs implemented by MDE provide reasonable assurance.

⁷Developed as a result of the Chesapeake Bay Agreement (1987)

⁸As required by Section 319 of the Clean Water Act