



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

SEP 14 2018

Mr. Harold Ward, Deputy Cabinet Secretary and Acting Director
Division of Water and Waste Management
West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, West Virginia 25304-2345

Dear Mr. Ward:

The United States Environmental Protection Agency (EPA), Region III, is pleased to approve the fecal coliform Total Maximum Daily Load (TMDL) for the Monongahela River. The West Virginia Department of Environmental Protection submitted the report, *Total Maximum Daily Loads for the Monongahela River Watershed, West Virginia* (August 2018), to EPA for review and approval on August 22, 2018, which was received on August 27, 2018. The TMDL was established to address the recreation use impairment as identified on West Virginia's 2014 Section 303(d) List.

The TMDL was established and submitted in accordance with Section 303(d)(1)(c) and 303(d)(2) of the Clean Water Act. This approval includes all load and wasteload allocations established in the TMDL. Our review indicates that these allocations have been established at levels necessary that, when fully implemented, will lead to the attainment of the water quality standard addressed by this TMDL. A copy of EPA's rationale for approval is enclosed.

As you are aware, any new or revised National Pollutant Discharge Elimination System permits must be consistent with the assumptions and requirements of applicable TMDL wasteload allocations pursuant to 40 CFR §122.44(d)(1)(vii)(B). Please continue to submit all such permits to EPA for review per EPA's letters dated October 1, 1998, and July 7, 2009.

If you have any questions regarding the TMDL, please contact Ms. Jennifer Sincock, West Virginia TMDL Coordinator, at 215-814-5766.

Sincerely,

A handwritten signature in blue ink that reads "Catherine A. Libertz".

Catherine A. Libertz, Director
Water Protection Division



Enclosure

cc: Mr. John Wirts (WVDEP)
Ms. Mindy Neil (WVDEP)



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Decision Rationale
Total Maximum Daily Load for the
Monongahela River Mainstem, West Virginia

Catherine A. Libertz

Catherine A. Libertz, Director
Water Protection Division

Date: 9-14-18

Decision Rationale

Total Maximum Daily Load for the Monongahela River Mainstem, West Virginia

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a state where technology-based effluent limits and other pollution controls do not provide for the attainment of water quality standards. A TMDL establishes a target for the total load of a particular pollutant that a water body can assimilate and divides that load into wasteload allocations (WLA), given to point sources, load allocations (LAs), given to nonpoint sources and natural background, and a margin of safety (MOS), which takes into account any uncertainty. Mathematically, a TMDL is commonly expressed as an equation, shown below.

$$TMDL = \sum WLA_s + \sum LA_s + MOS$$

This document sets forth the U.S. Environmental Protection Agency, Region III's (EPA's) rationale for approving the TMDL for fecal coliform for the Monongahela River mainstem. The TMDL was developed to address impairments of water quality standards as identified on West Virginia's Section 303(d) list of water quality-limited segments. The West Virginia Department of Environmental Protection (WVDEP) submitted the report, *Total Maximum Daily Loads for the Monongahela River Watershed, West Virginia* (August 2018), (hereinafter referred to as the "TMDL Report"), to EPA for final review and action on August 22, 2018, and was received on August 27, 2018. EPA's decision is based upon its administrative record, which includes the TMDL Report and information in supporting files provided to EPA by WVDEP. EPA has reviewed and determined that the TMDL meets the requirements of Section 303(d) of the Clean Water Act and its implementing regulations at 40 CFR Part 130 including but not limited to:

1. TMDLs are designed to implement applicable water quality standards.
2. TMDLs include wasteload allocations and load allocations.
3. TMDLs consider natural background sources.
4. TMDLs consider critical conditions.
5. TMDLs consider seasonal variations.
6. TMDLs include a margin of safety.
7. TMDLs have been subject to public participation.

In addition, EPA has considered and finds acceptable the reasonable assurances set forth in the TMDL Report.

From this point forward, all references in this rationale can be found in West Virginia's TMDL Report, *Total Maximum Daily Loads for the Monongahela River Watershed, West Virginia* (August 2018), unless otherwise noted.

II. Section 303(d) Listing Information

WVDEP has established a fecal coliform TMDL for the Monongahela River mainstem (WV Code: WVM-up, NHD Code: WV-MU). West Virginia identified the entire length of the Monongahela River from the confluence of the Tygart Valley River and West Fork River to the West Virginia/Pennsylvania State Line as impaired due to exceedances of the numeric water quality criteria for fecal coliform bacteria. Attachment 1 of this Decision Rationale presents the impaired waterbody of the Monongahela River Watershed addressed by the TMDL.

The Monongahela River watershed is located in northern West Virginia (Figure 3-1) within the Western Allegheny Plateau ecoregion. The Monongahela River is a major tributary of the Ohio River that eventually joins the Mississippi River, which flows to the Gulf of Mexico. The TMDL project area extends from the City of Fairmont north to the Pennsylvania border, and lies in portions of Marion, Monongalia and Taylor Counties in West Virginia. West Virginia previously developed fecal coliform TMDLs for selected streams in the Monongahela River Watershed, which were approved by EPA in April 2014. Waterbodies covered under the 2014 TMDL included all the impaired streams contributing to the Monongahela River mainstem, but not the mainstem itself. For the Monongahela River mainstem TMDL, there were 19 direct tributaries modeled for fecal coliform which were not included in the previous 2014 TMDL Report. Not all direct tributaries of the Monongahela mainstem had TMDLs developed because not all direct tributaries were impaired streams. West Virginia previously developed fecal coliform TMDLs for selected streams in the West Fork River Watershed, which were approved by EPA in July 2014. West Virginia previously developed fecal coliform TMDLs for the Tygart Valley River Watershed, which were USEPA approved in June 2016. The previous EPA-approved TMDLs for the West Fork River watershed, Tygart Valley River watershed, and selected direct tributaries of the Monongahela River watershed were treated as model inputs to the Monongahela River mainstem at baseline and TMDL conditions. The TMDL established herein by West Virginia is for the Monongahela River mainstem from the confluence of the West Fork River and Tygart Valley River to the West Virginia/Pennsylvania state line.

Cities and towns in the vicinity of the area of study include Fairmont, Morgantown, and Westover. The dominant land use is forest, which constitutes 77.35 percent of the total land use area. Other important modeled land use types are urban areas under Municipal Separate Storm Sewer System (MS4) permit (5.32 percent), urban areas not under MS4 permit (6.17 percent), grassland (6.30 percent), and agricultural (cropland/pasture, 3.61 percent combined). Individually, all other land cover types compose less than one percent of the total watershed area each. The total population living in the subject watersheds of this report is estimated to be 10,000 people.

III. TMDL Overview

WVDEP has established a fecal coliform TMDL for the Monongahela River mainstem. Section 7.0 presents the TMDL developed for the Monongahela River mainstem on a daily load basis expressed in counts per day. The TMDL is also represented in Microsoft Excel allocation spreadsheets (submitted by West Virginia via compact disc) which provide detailed source allocations and successful TMDL scenarios. These allocation spreadsheets also present the

TMDL as an average annual load because it was developed to meet TMDL endpoints under a range of conditions observed throughout the year. The loads are expressed in counts per year, which may be divided by 365 days per year to express the TMDLs in counts per day. A technical report was included by West Virginia to describe the detailed technical approaches that were used during TMDL development and to display the data upon which the TMDL was based. West Virginia also provided an ArcView Geographic Information System (GIS) project (and shapefiles) that explores the spatial relationships among the pollutant sources in the watershed.

Section 4.0 discusses the fecal coliform bacteria source assessments in the Monongahela River Watershed. The technical report and appendices have expanded details of the source assessment in the Monongahela River Watershed. The fecal coliform bacteria sources in the watershed include: wastewater treatment plants (WWTP), general sewage permits, municipal separate storm sewer systems (MS4), and combined sewer overflows (CSOs). Non-regulated sources in the watershed include: on-site treatment systems, stormwater runoff, agricultural runoff, and natural background (wildlife).

Computational Procedures

The Mining Data Analysis System (MDAS) was used to represent fecal coliform bacteria coming from sources in watersheds and tributaries draining to the Monongahela River mainstem. MDAS was developed to facilitate large scale, data intensive watershed modeling applications. The model is used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and instream water quality. MDAS is capable of simulating different flow regimes and pollutant variations. A key advantage of the MDAS development framework is that it has no inherent limitations in terms of modeling size or upper limit model operations. In addition, the MDAS model allows for seamless integration with modern-day, widely available software such as Microsoft Access and Excel. The MDAS watershed model outputs were in turn used as inputs to the Monongahela River Environmental Fluid Dynamics Code (EFDC) receiving water model to simulate instream water quality dynamics for the Monongahela River mainstem. Configuration of the MDAS model is discussed in Sections 5.2 and 5.3 of the TMDL Report.

As noted above, the MDAS watershed model outputs were used as inputs to the Monongahela River mainstem EFDC receiving water model to simulate instream water quality dynamics. EFDC is able to simulate three-dimensional hydrodynamics and water quality in large rivers. It is an integrated model which does not require external linkage between hydrodynamics and water quality. EFDC is unique among current surface water modeling systems in that it incorporates hydrodynamics, salinity, temperature, sediment, toxic contaminant, and eutrophication simulation capabilities in a single internally-linked framework. The EFDC model also includes a wide range of simulation capabilities for incorporating flow control and navigational structures including culverts, pressure conduits, spillways, weirs, dams and pumping operations as well as time-dependent barriers appropriate for representing lock operations. The operation of the various flow linkages and controls can be specified in a time varying manner or their operation can be controlled by simulation variables such as water surface elevation.

An EFDC model framework consisting of 1,524 grid cells was developed for the Monongahela River mainstem, from the confluence of the Tygart Valley River and West Fork River to the West Virginia/Pennsylvania State line. An additional segment was added to the grid to extend the domain to the USGS gage at the Point Marion Lock and Dam at RM 90.8 in Pennsylvania. The EFDC hydrodynamic model was calibrated for flow and temperature using graphical comparisons of model predicted flows and water temperature to available monitoring data for a three-year period from October 1, 2013 to September 30, 2016. Water temperature was calibrated by comparing model output to water temperature observations collected in the field by WVDEP during pre-TMDL water quality monitoring. After hydrodynamics and water temperature calibration was complete, the model was calibrated for fecal coliform bacterial concentration using recently collected pre-TMDL monitoring data for the time period July 2014 to June 2015. The Monongahela EFDC model simulated water quality in the Monongahela River mainstem for a three-year period from October 1, 2013 to September 30, 2016. This three-year period provides results for both calibration within the 2014 to 2015 time period when pre-TMDL monitoring data were collected, as well as with additional two years of run time to provide model validation over variable weather conditions. The EFDC receiving water model is described in Section 6.0 of the TMDL Report.

The EFDC model was used to determine TMDL allocations for fecal coliform bacteria for the Monongahela River mainstem. Specifically, EFDC was used to determine whether source reductions made under TMDL allocation conditions allowed the Monongahela River mainstem to meet applicable water quality standards. The TMDL is shown in Section 7.0 and is presented as average number of colonies in counts per day for fecal coliform bacteria. EPA has determined that the TMDL is consistent with statutory and regulatory requirements and EPA's policy and guidance. EPA's rationale for approving the TMDL is set forth according to the regulatory requirements listed below.

IV. Discussion of Regulatory Requirements

1) TMDLs are designed to meet the applicable water quality standards.

EPA regulations at 40 CFR 130.7(c)(1) state that TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS. Water quality standards are state regulations that define the water quality goals of a waterbody. Water quality standards are comprised of three components: (1) designated uses, (2) criteria (numeric or narrative) necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality.

The applicable numeric water quality criteria for fecal coliform bacteria are discussed in Section 2.2 and shown in Table 2-1 of the final TMDL Report, and Table 7-1 shows the TMDL endpoints used to attain water quality standards. In addition, WVDEP considered the downstream water quality standards of Pennsylvania.

All West Virginia waters are subject to the narrative criteria in Section 3 of the West Virginia Water Quality Standards. That section, titled *Conditions Not Allowed in State Waters*, contains various general provisions related to water quality. The TMDL presented in Section 7.0

is based upon the water quality criteria that are currently developed. Where there is an applicable numeric criterion for a particular pollutant and uses, it is reasonable to use that criterion as the quantitative implementation of the narrative standard and designated uses. If the West Virginia Legislature adopts water quality standard revisions that alter the basis upon which the TMDL is developed, then the TMDL and allocations may be modified as warranted. Any future water quality standard revision and/or TMDL modification must receive EPA approval prior to implementation. Based on the foregoing, EPA finds the TMDL is designed to meet the applicable water quality standards.

2) TMDLs include wasteload allocations and load allocations.

EPA regulations at 40 CFR §130.2(i) define TMDL as the sum of the WLAs for point sources and load allocations LAs for nonpoint sources and natural background. The development of the WLAs and LAs is further discussed below.

Wasteload Allocations

According to Federal regulations at 40 CFR §130.2(h), a WLA 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 were developed and assigned¹ for all facilities permitted to discharge fecal coliform bacteria as described in Section 4.1 of the TMDL Report. In the Monongahela River Watershed, there are two permitted publicly owned treatment works (POTW) that discharges treated effluent via one outlet each. There are also three permitted stormwater discharges associated with the Fairmont POTW. Five additional individually permitted non-POTW wastewater treatment plants discharge from one outlet each. These compliant facilities do not cause fecal coliform bacteria impairments because effluent limitations are more stringent than water quality criteria. There are 15 facilities under the package plant general permit WV0103110 that regulates small, privately owned sewage treatment plants. There are 157 home aeration units (HAUs) under the general permit WV0107000 that regulates small sewage treatment plants primarily used by individual residences where site considerations preclude typical septic tank and leach field installation. There are several MS4 entities regulated under the MS4 general permit WV0116025 in the Monongahela River watershed including City of Fairmont, Town of Star City, City of Westover, Morgantown Utility Board, West Virginia University, and the West Virginia Division of Highways (WVDOH).

There are 34 CSO outlets associated with POTW collection systems operated by the City of Fairmont (13), Morgantown Utility Board (16), Westover Combined Sewer Collection System (4), and the Greater Paw Paw Sanitary District (1). All fecal coliform bacteria WLAs for CSO discharges have been established at 200 counts/100 ml. The WLAs prescribed for CSOs are set at levels necessary to achieve current fecal coliform water quality criteria. However, it is an assumption of this TMDL that the wasteload allocations in the TMDL do not supersede the prioritization and scheduling of CSO controls and actions pursuant to their NPDES permits an

¹ 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 WVDEP that there are no additional sources in the watershed that are subject to the NPDES program.

consistent with the national CSO program. No significant sanitary sewer overflow (SSO) discharges were represented in the model.

Table 7-2 of the TMDL Report provides the WLA for the Monongahela River mainstem with detailed WLAs shown in the allocation spreadsheet. Daily loads are calculated by dividing the average annual loads by 365 days per year. Based on the foregoing, EPA finds that both annual and daily WLAs included in the TMDL satisfy the regulations at 40 CFR Part 130.

WVDEP is authorized to administer the National Pollutant Discharge Elimination System (NPDES) Program, which, among other duties, includes issuing NPDES permits to existing or future point sources subject to the NPDES program. The effluent limitations in any new or revised NPDES permits must be consistent with “the assumptions and requirements of any available [WLA]” in an approved TMDL pursuant to 40 CFR §122.44 (d)(1)(vii)(B). EPA has authority to object to the issuance of an NPDES permit that is inconsistent with the assumptions and requirements of WLAs established for that point source. It is expected that WVDEP will require periodic monitoring of the point source(s), through the NPDES permit process, in order to monitor and determine compliance with the TMDL’s WLAs.

Load Allocations

According to Federal regulations at 40 CFR §130.2(g), a LA is the portion of a receiving water’s loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. 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. As described in Section 4.2 of the TMDL Report, fecal coliform LAs were assigned to: pasture/cropland, on-site sewage systems including failing septic systems, residential loadings associated with urban/residential runoff from non-MS4 areas, and natural background loadings associated with wildlife sources.² Discharges of sewage from the approximately 200 homes in the watershed that are not served by a centralized collection and treatment system and are within 100 meters of a stream are a significant source of fecal coliform bacteria..

Table 7-2 of the TMDL Report provides the LA for the Monongahela River mainstem with detailed LAs shown in the allocation spreadsheet. Daily loads are calculated by dividing the average annual loads by 365 days per year. Based on the foregoing, EPA finds that both annual and daily LAs included in the TMDL satisfy the regulations at 40 CFR Part 130.

3) TMDLs consider natural background sources.

According to Federal regulations at 40 CFR §130.2(g & i), natural background sources of pollutants are part of the LA and, wherever possible natural and nonpoint source loads should be distinguished. The Monongahela River mainstem TMDL considers the impact of natural

² EPA’s approval of this TMDL does not mean that EPA has determined there are no point sources within the land use categories that are assigned load allocations in the TMDL. EPA’s review and approval of this TMDL does not represent a determination whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program.

background pollutant contributions by evaluating loadings from background sources like forest and wildlife. MDAS also considers background pollutant contributions by modeling all land uses. Section 4.2.4 of the TMDL Report states that on the basis of the low fecal accumulation rates for forested areas, storm water sampling results, and model simulations, wildlife is not considered to be a significant nonpoint source of fecal coliform bacteria in the watershed. In addition, Section 7.2 of the TMDL Report states that loading associated with wildlife sources are included in the LA. Based on the foregoing, EPA finds the TMDL accounts for natural background sources consistent with the regulations at 40 CFR §130.2(g & i).

4) TMDLs consider critical 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. Both high-flow and low-flow periods were taken into account during TMDL development for the Monongahela River mainstem by using a representative three-year model simulation period (January 1, 2014 through December 31, 2016). Figure 7-1 presents the range of precipitation conditions and the years that were used for TMDL development. Critical conditions are discussed in Section 7.4 of the TMDL Report. Based on the foregoing, EPA finds that the TMDL accounts for critical conditions consistent with the regulations at 40 CFR §130.7(c)(1).

5) TMDLs consider seasonal variations.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to consider seasonal variations. Seasonal variation was considered in the formulation of the modeling analysis. Continuous simulation (modeling over a period of several years that captured precipitation extremes) inherently considers seasonal hydrologic and source loading variability. The pollutant concentrations simulated on a daily time step by the model were compared with TMDL endpoints. Allocations that met these endpoints throughout the modeling period were developed. Seasonal variation is discussed in Section 7.3 of the TMDL Report. Based on the foregoing, EPA finds the TMDL has been established at levels necessary to attain and maintain the applicable water quality standards with seasonal variations consistent with the regulations at 40 CFR §130.7(c)(1).

6) TMDLs include a margin of safety.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to include a margin of safety (MOS). The MOS is an accounting of uncertainty about the relationship between pollutant loads and receiving water quality. It can be provided implicitly through analytical assumptions or explicitly by reserving a portion of loading capacity. In the Monongahela River mainstem TMDL, an explicit MOS of five percent was included to counter uncertainty in the modeling process. Long-term water quality monitoring data were used for model calibration. Although these data represented actual conditions, they were not of a continuous time series and might not have captured the full range of instream conditions that occurred during the simulation period. Section 7.1.1 discusses the explicit MOS used in this TMDL. Based on the foregoing, EPA finds that WVDEP has incorporated a MOS into the TMDL consistent with the regulations at 40 CFR §130.7(c)(1).

7) TMDLs have been subject to public participation.

EPA regulations at 40 CFR §130.7(c)(1)(ii) requires TMDLs to be subject to public review and the State implements a process for involving the public in development of TMDLs. An informational public meeting for the Monongahela River mainstem TMDL was held in Fairmont, WV at Fairmont State University on May 14, 2013. The meeting occurred prior to pre-TMDL stream monitoring and pollutant source tracking and included a general TMDL overview and a presentation of planned monitoring and data gathering activities. A public meeting was held to present the draft TMDLs on June 7, 2018 at Fairmont State College. The public meeting provided information to stakeholders intended to facilitate comments on the draft TMDL. Beginning on May 24, 2018, the availability of the draft TMDL was advertised in various local newspapers. Interested parties were invited to submit comments during the public comment period, which began on May 24, 2018 and ended on June 25, 2018. West Virginia received one set of written comments on the Draft TMDL, which are addressed in Section 9.3. Based on the foregoing, EPA finds that the TMDL has been subject to WVDEP's public participation process.

V. Discussion of Reasonable Assurance

The CWA section 303(d) requires that a TMDL be "established at a level necessary to implement the applicable water quality standard." Documenting adequate reasonable assurance increases the probability that regulatory and voluntary mechanisms will be applied such that the pollution reduction levels specified in the TMDL are achieved and, therefore, applicable water quality standards are attained.

Where a TMDL is developed for waters impaired by both point and nonpoint sources, in EPA's best professional judgment, determinations of reasonable assurance that the TMDL's LAs will be achieved could include whether practices capable of reducing the specified pollutant load: (1) exist; (2) are technically feasible at a level required to meet allocations; and (3) are likely to be implemented. Where there is a demonstration that nonpoint source load reductions can and will be achieved, a TMDL writer can determine that reasonable assurance exists and, on the basis of that reasonable assurance, allocate greater loadings to point sources.

Reasonable assurance is in Section 10 of the TMDL Report. Based on the foregoing, EPA finds acceptable the reasonable assurances set forth in the TMDL Report.

Attachment 1

**Waterbodies and Impairments Addressed in the
Monongahela River Mainstem TMDL**

Waterbody Name	NHD Code	WV Code	FC
Monongahela River	WV-MU	WVM-up	X

Note:

FC fecal coliform bacteria impairment