

Metals and pH Total Maximum Daily Loads (TMDLs) for the Monongahela River Watershed, West Virginia

U.S. Environmental Protection Agency
Region III
1650 Arch Street
Philadelphia, PA 19103-2029

September 2002



Signed

Jon M. Capacasa, Acting Director
Water Protection Division

9/30/2002

Date

Decision Rationale
Total Maximum Daily Loads
Monongahela River Watershed
For Acid Mine Drainage Affected Segments

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water bodies identified as impaired by the state where technology-based and other controls did 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 water body.

This document sets forth the U. S. Environmental Protection Agency's (EPA) rationale for establishing the TMDLs for metals and pH in the Monongahela River Watershed. The TMDL was established to address impairment of water quality, caused by mine drainage, as identified in West Virginia's 1996 and 1998 Section 303(d) lists of impaired waters.

The following regulatory requirements were considered in establishing the Monongahela River TMDLs:

1. The TMDLs are designed to implement the applicable water quality standards.
2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.
3. The TMDLs consider the impacts of background pollutant contributions.
4. The TMDLs consider critical environmental conditions.
5. The TMDLs consider seasonal environmental variations.
6. The TMDLs include a margin of safety.
7. There is reasonable assurance that the proposed TMDLs can be met.
8. The TMDLs have been subject to public participation.

From this point forward, all references in this approval rationale are found in the TMDL Report, *Metals and pH TMDLs for the Monongahela River Watershed, West Virginia, September 2002*.

II. Summary

Table 1-5 presents the 1996 and 1998 Section 303(d) listing information for the water quality-limited segments of Monongahela River Watershed. Of the 39 water quality limited segments shown, most were first identified on the 1996 Section 303(d) list, and all are listed for some combination of pH and metals. These TMDLs represent the 39 listed segments in the Monongahela River watershed.

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 which considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a MOS value. Conditions, available data, and the understanding of the natural processes can change more than anticipated by the MOS. The option is always available to refine the TMDL for re-submittal to EPA for approval.

The summary TMDL Tables 5-3 through 5-5 are found beginning on page 5-6 of the TMDL Report and present the allowable load allocations (LAs) for nonpoint sources, the allowable waste load allocations (WLAs) for points sources, and the TMDLs for aluminum, iron, and manganese. The loads are in pounds per year which may be divided by 365 days per year to express the TMDL in pounds per day. The WLAs for point sources are presented in Appendix A, Table 4. In addition to the WLA as an average annual load, the WLA in mg/L is also presented which should be used to develop permit effluent limitations using the procedures in EPA's *Technical Support Document for Water Quality-based Toxics Control*, March 1991.

III. Background

The Monongahela River, formed by the confluence of the West Fork and Tygart River near Fairmont, West Virginia, flows north to Pennsylvania where it eventually joins the Allegheny River at Pittsburgh, Pennsylvania. The river and its major tributaries are shown on Figure 1-2.

Historically, coal mining has been a significant industry in the watershed. Before the implementation of the West Virginia Surface Coal Mining and Reclamation Act and the Surface Mining Control and Reclamation Act (SMCRA), little consideration was given to the environmental degradation that resulted from these activities. Currently, the quality of the Monongahela River and its tributaries are being negatively impacted by acidic drainage from mines that were abandoned prior to these environmental regulations.

The entire watershed is divided into 12 regions for modeling purposes. Only Region 1 has no waters on the Section 303(d) list of impaired waters. Figure 1-3 shows a map of the regions.

These TMDLs were established by EPA to fulfill requirements of the 1997 TMDL lawsuit settlement agreement. The 1997 consent decree requires that West Virginia or EPA, if West Virginia fails to, develop TMDLs for 44 priority waters included on West Virginia's 1996 Section 303(d) list by September 30, 2002. The Monongahela River main stem is a priority water quality limited segment. In addition, the consent decree required a total of 350 waters impacted by mine drainage to have TMDLs completed by March 31, 2006.

Computational Procedure

Section 3.0 of the TMDL Report discusses the formation of acid mine drainage and discusses point sources and nonpoint sources of acid mine drainage. Generally, point sources are permitted mining operations and nonpoint sources are pre-SMCRA sources such as abandoned mine lands and discharges from abandoned deep mines. Section 3.4.2 identifies the link between metals and sediment in the Monongahela River mainstem. Reduction of iron and aluminum to the mainstem will require a reduction in the sediment load. Tables 5a through 5c, Appendices A-1 through A-12, divides the load allocation according to land use.

Section 4.0 discusses the technical approach, data sources, and application of the Mining Data Analysis System (MDAS) model use for the Monongahela River watershed. The Monongahela mainstem was modeled using the Environmental Fluid Dynamic Computer Code. The parameter, pH, cannot be modeled as readily as can the metals. It is assumed that implementation of TMDLs in the Monongahela River watershed for metals will result in instream metals concentrations meeting water quality standards. Compliance with the pH water

quality standards is demonstrated by the use of MINTEQA2 model. MINTEQA2 is a geochemical equilibrium speciation model. By inputting into the MINTEQA2 model the dissolved concentrations of metals, a pH value can be predicted.

IV. Discussions of Regulatory Requirements

EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA policy and guidance. EPA's rationale for establishing these TMDLs is set forth according to the regulatory requirements listed below.

1. The TMDLs are designed to implement the applicable water quality standards.

Streams within the Monongahela River watershed are not designated as trout streams and, therefore, the applicable iron criterion is the four-day average of 1.5 mg/l. The applicable water quality criteria are shown in Table 2-1.

2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.

A TMDL is the total amount of a pollutant, including a MOS, that can be assimilated by the receiving water while still achieving water quality standards. TMDLs can be expressed in terms of mass per time or by other appropriate measures. TMDLs are comprised of the sum of individual wasteload allocations (WLAs) point sources, LAs for non-point sources, and natural background levels. In addition, the TMDL must include a MOS, either implicitly or explicitly, that accounts for the uncertainty in the relationship between pollutant loads and the quality of the receiving stream. Conceptually, this definition is denoted by the following equation.

$$\text{TMDL} = \text{Sum of WLAs} + \text{Sum of LAs} + \text{MOS}$$

For purposes of these TMDLs only, point sources are identified as permitted discharge points from active mining sites and nonpoint sources are discharges from abandoned and reclaimed mine lands which includes such things as tunnel discharges, seeps, and surface runoff. Abandoned and reclaimed mine lands are treated in the allocations as nonpoint sources because there are no National Pollutant Discharge Elimination System (NPDES) permits associated with these areas. As such, the discharges associated with these land uses were assigned load allocations (as opposed to wasteload allocations). The decision to assign LAs to abandoned and reclaimed mine lands does not reflect any determination by EPA as to whether there are unpermitted point source discharges within these land uses. In addition, by approving these TMDLs with mine drainage discharges treated as load allocations, EPA is not determining that these discharges are exempt from NPDES permitting requirements.

Tables 5-3 through 5-5 present, for each water quality limited segment, the WLAs, LAs, TMDLs, and MOS. Tables 4a through 4c in Appendix A-2 present each permittee's WLAs.

3. The TMDLs consider the impacts of background pollutant contributions.

MDAS considers background pollutant contributions in that all land uses are modeled. Tables 4-2 and 4-3 identify the land uses considered and Table 4-4 and present land uses by subwatershed.

4. *The TMDLs consider critical environmental conditions.*

Critical conditions were considered while considering seasonal variations, by running the daily simulation model for several years, from 1987 to 1992.

5. *The TMDLs consider seasonal environmental variations.*

See Requirement 4 above.

6. *The TMDLs include a margin of safety.*

The CWA and Federal regulations require TMDLs to include a MOS to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. EPA guidance suggests two approaches to satisfy the MOS requirement. First, it can be met implicitly by using conservative model assumptions to develop the allocations. Alternately, it can be met explicitly by allocating a portion of the allowable load to the MOS.

An implicit MOS was included by setting the modeling endpoints to 95 percent of the water quality standards, Section 5.1.3.

7. *There is reasonable assurance that the proposed TMDLs can be met.*

Section 6.0 addresses reasonable assurance. There are two primary programs in effect which provide reasonable assurance that the TMDLs will be implemented. Section 6.1.1 discusses the duties of the office of Abandoned Mine Lands and Reclamation and Section 6.1.2 discusses the duties of the Special Reclamation Group. Adequate funding for reclaiming abandoned mine lands is an issue to be addressed.

In addition, the next round of NPDES permitting is scheduled for 2004 and will require that permit effluent limitations reflect the individual WLAs. The WLAs will be converted to permit limits using the procedures of EPA's *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991).

8. *The TMDLs have been subject to public participation.*

Section 8.0 describes the public participation which included an informational meeting, a 35-day public comment period, and a public meeting. A responsiveness summary is included as part of this TMDL.