

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

U.S. Environmental Protection Agency  
Region III  
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Signed \_\_\_\_\_  
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Date

Decision Rationale  
Total Maximum Daily Loads  
West Fork 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 West Fork 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) list of impaired waters.

The following regulatory requirements were considered in establishing the West Fork 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 West Fork River Watershed, West Virginia*.

**II. Summary**

Table 1-8 presents the 1996 and 1998 Section 303(d) listing information for the water quality-limited segments of West Fork River watershed. The ninety-nine water quality limited segments shown were first identified on the 1996 Section 303(d) list and all are listed for some combination of pH and metals (aluminum, iron, and manganese). The West Fork River main stem is listed for aluminum, iron, and zinc. Appendix B compares recent water quality monitoring results with the zinc water quality standards and concludes that water quality standards are no longer violated. West Virginia will delist the West Fork River for zinc on the 2002 Section 303(d) list. These TMDLs represent the ninety-nine listed segments in the West Fork 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 TMDLs for re-submittal to EPA for approval.

The summary TMDL Tables 5-3, 5-4, and 5-5 present the allowable load allocations (LAs) for nonpoint sources and the allowable waste load allocations (WLAs) for point sources, and the TMDLs for aluminum, iron, and manganese, respectively. The loads are in pounds per year which may be divided by 365-days-per-year to express the TMDL in pounds-per-day.

### **III. Background**

The West Fork Watershed is located in northern West Virginia and forms part of the Monongahela River Watershed. It extends over 880 square miles (569,000 acres) of relatively small valleys and narrow winding ridges ranging from 1,200 to 1,500 feet in elevation, with higher elevations occurring in the southern region of the watershed. The watershed encompasses Harrison County, extends into portions of Marion, Taylor, Barbour, Upshur, and Lewis Counties, and borders Doddridge and Wetzel Counties (Figure 1-3). The West Fork River flows north approximately 103 miles from its headwaters in Upshur and Lewis Counties, through the City of Weston and the City of Clarksburg, to its confluence with the Tygart River near the City of Fairmont to form the Monongahela River (Figure 1-2). The West Fork River Watershed is dominated by forest and pasture land uses.

The West Fork Watershed is located in the north central coalfields of West Virginia. Historically, coal deposits represented the most economically valuable mineral resource in the West Fork Watershed. Coal mining played a significant role in the regional economy from the 1800's until a decline in coal production in the 1970's. As the production of coal mining declined, forestry, agriculture, oil and gas production, as well as sandstone, shale, and limestone extraction have become increasingly important economic factors.

Before the implementation of the West Virginia Surface Coal Mining and Reclamation Act (WVSCMRA) 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 West Fork River and its tributaries are being negatively impacted by acidic drainage from mines that were abandoned prior to these environmental regulations.

The West Fork Watershed was divided into 17 regions representing hydrologic units, shown in Figure 1-1. Each region was further divided into subwatersheds for modeling purposes. A total of 645 subwatersheds were created for the entire West Fork Watershed. The 17 regions and their respective subwatersheds provided a basis for georeferencing pertinent source information and monitoring data, and for presenting TMDLs. The Mining Data Analysis System (MDAS) was used to represent the source-response linkage in the West Fork Watershed for aluminum, manganese, and iron. The MDAS is a comprehensive data management and modeling system that is capable of representing loads from nonpoint and point sources found in

the watershed and simulating in-stream processes. The MINTEQ modeling system was used to represent the source-response linkage in the West Fork watershed for pH.

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, develops TMDLs for 44 priority waters included on West Virginia's 1996 Section 303(d) list by September 30, 2002. The West Fork 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 data sources, the formation of acid mine drainage and discusses point and non-point sources of acid mine drainage. Generally, point sources are permitted mining operations and non-point sources are pre-Surface Mining Control and Reclamation Act (SMCRA) sources such as abandoned mine lands (AMLs) and discharges from abandoned deep mines. Section 3.5.2 identifies a link between metals and AMLs in the West Fork River mainstem. Discharges from AML lands are primarily responsible for water quality impairments due to metals and pH in the West Fork Watershed. Analyses regarding the relationship between sediments and metals in the West Fork Watershed indicate that metals-laden sediment and sediment-producing sources are not necessarily the most significant contributors to impaired water quality. Reduction of metals and pH to the mainstem will require a reduction in the AML load. Tables 5a through 5c in Appendices A-1 through A-17 divide the LAs according to land use.

Section 4.0 discusses the technical approach, data sources, and application of the MDAS model. The parameter, pH, cannot be modeled as readily as can the metals. It is assumed that implementation of TMDLs in the West Fork 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's 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 West Fork River Watershed are not designated as trout streams. 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 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 WLAs point sources, LAs for non-point sources, and natural background levels. In addition, the TMDL must include an 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:

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

For purposes of these TMDLs only, point sources are identified as permitted discharge points including active mining sites and non-mining sites. 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 were 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 load allocations 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 and LAs. Tables 4a through 4c in Appendices A-1 through A-17 present WLAs for each subwatershed. Tables 5a through 5c in Appendices A-1 through A-17 present LAs for each subwatershed.

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

MDAS considers background pollutant contributions in that all land uses are modeled. Table 4-2 identified the land uses considered and Tables 4-4a and 4-4b present land uses by regions.

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 an MOS to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. EPA guidance suggest 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 6.2.1 discusses the duties of the Office of Abandoned Mine Lands and Reclamation and Section 6.2.2 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 will require that effluent limitations reflect the individual WLAs. The WLAs will be converted to effluent limitations 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 TMDL 101 meeting, a 35-day public comment period, and a public informational meeting. A responsiveness summary is included as part of this TMDL.