

Decision Rationale
Total Maximum Daily Loads
Elk 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, that may be discharged to a water quality-limited water body.

This document sets forth the United States Environmental Protection Agency's (USEPA) rationale for establishing the TMDLs for metals and pH in the Elk 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 Elk 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 Elk River Watershed, West Virginia*.

II. Summary

Table 1-1 presents the 1996 and 1998 Section 303(d) listing information for the water quality-limited segments of Elk River watershed. Of the five water quality limited segments shown, two were first identified on the 1996 Section 303(d) list, all are listed for some combination of pH and metals. The Elk River main stem is also listed for lead and zinc. Appendix F 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 Elk River for zinc on the 2002 Section 303(d) list. These TMDLs represent the five listed segments in the Elk 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 margin of safety value. Conditions, available data, and the understanding of the natural processes can change more than anticipated by the margin of safety. The option is always available to refine the TMDL for re-submittal to USEPA for approval.

The following tables present the allowable load allocation for nonpoint sources, the allowable waste load allocation for points sources, and for lead, the TMDL. The loads are in pounds per year which may be divided by 365 days per year to express the TMDL in pounds per day.

Load and waste load allocations for aluminum

Stream Name	List ID	LAs (lbs/yr)	WLAs (lbs/yr)
Morris Creek	KE-26	5,006	0
Left Fork, Morris Creek	KE-26A	782	0
Buffalo Creek	KE-50	64,475	48,003
Pheasant Run	KE-50T	550	0
Elk River	KE-43	2,227,530	48,003

Load and waste load allocations for iron

Stream Name	List ID	LAs (lbs/yr)	WLAs (lbs/yr)
Morris Creek	KE-26	8,114	0
Left Fork, Morris Creek	KE-26A	2,172	0
Buffalo Creek	KE-50	130,556	49,245
Pheasant Run	KE-50T	1,428	0
Elk River	KE-43	1,194,977	49,245

Load and waste load allocations for manganese

Stream Name	List ID	LAs (lbs/yr)	WLAs (lbs/yr)
Morris Creek	KE-26	3,676	0
Left Fork, Morris Creek	KE-26A	1,092	0
Buffalo Creek	KE-50	82,391	28,109
Pheasant Run	KE-50T	721	0
Elk River	KE-43	Not listed for Mn	Not listed for Mn

Total maximum daily load for lead

Stream Name	List ID	Lead criteria (ug/L)	TMDL (lbs/yr)
Elk River	KE-43	0.81	3975.10

III. Background

The Elk River watershed is located in parts of nine counties with a 1,530-square mile watershed and flowing approximately 190 miles before discharging to the Kanawha River near Charleston, West Virginia. Although dominated by forest and agricultural lands, coal mining, oil and natural gas production, and recreational activities take place in the watershed. 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 Elk 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 three regions for modeling purposes. There are no water quality limited segments in region 1, waste load allocations are made to mining point

sources in region 2, and while there are no permitted discharges in water quality limited segment in region 3, allocations are made to nonmining, nonpoint sources. Figure 1-2 shows a map of the regions.

These TMDLs were established by USEPA to fulfill requirements of the 1997 TMDL lawsuit settlement agreement. The 1997 consent decree requires that West Virginia, or the USEPA if West Virginia fails to, develop, by September 30, 2001, seven TMDLs priority water quality-limited segments included on the 1996 Section 303(d) list. The Elk River main stem is not a priority water quality limited segment. In addition, the consent decree included an additional 250 TMDLs for mine drainage impacted WQLS from the section 303(d) list sublist whose required dates were extended to between March 31, 2001 and March 31, 2006.

Computational Procedure

Section 3.0 of the TMDL Report discusses the formation of acid mine drainage and discusses point source and non-point source of acid mine drainage. Generally, point sources are permitted mining operations and non-point 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 Elk River mainstem. Reduction of iron and aluminum to the mainstem will require a reduction in the sediment load. Tables 5a through 5c, Appendix A-2, 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. The parameter, pH, cannot be modeled as readily as can the metals. It is assumed that implementation of TMDLs in the Elk 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.

The source(s) of the lead impairment to the Elk River mainstem could not be identified. Therefore, the lead TMDL is based on the water quality standard. Further monitoring is needed to identify the source of lead.

IV. Discussions of Regulatory Requirements

USEPA has determined that these TMDLs are consistent with statutory and regulatory requirements and USEPA 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 Elk 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 wasteload allocations (WLA) point sources, load allocations (LA) for non-point sources, and natural background levels. In addition, the TMDL must include a margin of safety (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.

$$\text{TMDL} = \sum \text{WLA} + \sum \text{LA} + \text{MOS}$$

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 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 USEPA 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, USEPA is not determining that these discharges are exempt from NPDES permitting requirements.

Tables 5-2 through 5-5 present, for each water quality limited segment, the WLA and LA. Tables 4a through 4c in Appendix A-2 present each permittee's WLA.

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 4-4 and 4-5 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 1990 to 1999.

5. *The TMDLs consider seasonal environmental variations.*

See requirement 4 above.

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

The Clean Water Act and federal regulations require TMDLs to include a margin of safety (MOS) to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. USEPA 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 permit limits 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* (USEPA, 1991).

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

Section 8.0 describes the public participation which included an informational meeting, a 45-day public comment period, and a public hearing.