

# Metals and pH Total Maximum Daily Loads (TMDLs) for the Fourpole Creek 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**  
**Fourpole Creek Watershed**  
**For Total Aluminum and Fecal Coliform Bacteria**

**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 total aluminum and fecal coliform bacteria in the Fourpole Creek watershed. The TMDLs were established to address impairment of water quality 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 Fourpole Creek 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, *Total Aluminum and Fecal Coliform Bacteria TMDLs, 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 Fourpole Creek watershed. Although Fourpole Creek is not listed for fecal coliform bacteria, recent monitoring disclosed a fecal coliform bacteria impairment to Fourpole Creek. West Virginia Department of Environmental Protection (WVDEP) took advantage of the ongoing modeling and analysis efforts being used for the aluminum TMDL and the fecal coliform bacteria TMDL was also developed.

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 Table 5-1 is found beginning on page 5-7 of the TMDL Report and presents the allowable load allocations (LAs) for nonpoint sources, the allowable waste load allocations (WLAs) for point sources, and the TMDLs for aluminum and fecal coliform bacteria. The aluminum loads are in pounds per year and the fecal coliform bacteria is in counts per year which may be divided by 365 days per year to express the TMDL in pounds/counts per day. The WLAs for point sources are presented in Appendices G and H for fecal coliform bacteria and aluminum, respectively. 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 limits using the procedures in EPA's *Technical Support Document for Water Quality-based Toxics Control*, March 1991.

### III. Background

The Fourpole Creek is in southwestern West Virginia near the State's borders with Ohio and Kentucky, Figure 1-1. The upper part of the 23.4-square mile watershed is forested lands and the lower portion is mostly urban land. Based on analysis of total aluminum and total suspended solids (TSS) measurements, the soils within the watershed are naturally high in aluminum and determined to be the source of aluminum violations, see Appendix B. Potential fecal coliform bacteria sources are discussed in Sections 3.6.2 and 3.7.

The entire watershed is divided into eight regions for modeling purposes. Only the 11.74-mile long mainstem is on West Virginia's Section 303(d) list. Figure 4-11 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 the 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. 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

Because of the lack of recent flow measurements within the Fourpole Creek watershed reflecting the current urbanization of the watershed, a reference watershed, Hurricane Creek located approximately 17 miles east of Fourpole Creek with 1998-2000 flow data was used to calibrate the hydrologic model.

Section 3.0 of the TMDL Report discusses the sources of the pollutant loads. Based on the total aluminum vs. TSS analysis in Appendix B, sediment is the cause of the total aluminum water quality exceedences. The watershed model, mining data analysis system (MDAS) computer model, a re-coded version of Hydrologic Simulation Program-Fortran, was used to determine aluminum loads based on land use, see Section 4.0. Reduction of aluminum to the mainstem will require a reduction in the sediment load.

Section 3.0 identifies the potential sources of fecal coliform bacteria, including broken sanitary sewers, failing septic systems, improperly maintained home aeration units, storm water

sewers, and combined sewers. Section 4.0 identifies MDAS input parameters and the assumptions made regarding fecal coliform bacteria sources.

#### **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 Fourpole Creek 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 sum of the WLAs and LAs, 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 WLA point sources, LA 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.

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

The combined sewer outfall (CSO) systems and small Municipal Separate Storm Sewer Systems (MS4) have not been permitted yet. This TMDL allocates part of the TMDL load to those systems. Other permitted facilities also have allocations, including stormwater construction sites, home aeration units, and general sewage permits.

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

MDAS considers background pollutant contributions in that all land uses are modeled. Table 3-3 identifies the land uses considered and Table 4-2 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 1996 to 2000.

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 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 three approaches which provide reasonable assurance that the TMDLs will be implemented. Section 6.1 discusses how the implementation of Best Management Practices aimed at sediment reductions will in turn assist in the reduction of total aluminum. Section 6.2 discusses the general MS4 permit which West Virginia is currently drafting. The six minimum controls within the MS4 permit will help reduce both the fecal coliform bacteria and aluminum/sediment loading to the Fourpole Creek watershed. Section 6.3 discusses West Virginia's proposed plans regarding CSOs within the Fourpole Creek watershed.

In addition, the next round of National Pollutant Discharge Elimination System permitting will require that 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.