



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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**Decision Rationale
Total Maximum Daily Loads
Selected Streams in the James River Watershed
West Virginia**

Signed

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Decision Rationale

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I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) to be developed for those waterbodies identified as impaired by a 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), which may be discharged to a water quality-limited waterbody.

This document will set forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the TMDLs for fecal coliform bacteria and biological impairments on waterbodies in the James River Watershed. The TMDLs were developed to address impairment of water quality as identified in West Virginia's 2006 Section 303(d) Lists of impaired waters. EPA's rationale is based on the determination that the TMDLs meet the following seven regulatory conditions pursuant to 40 CFR §130.

1. The TMDL is designed to implement applicable water quality standards.
2. The TMDL includes a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).
3. The TMDL considers the impacts of background pollutant contributions.
4. The TMDL considers critical environmental conditions.
5. The TMDL considers seasonal environmental variations.
6. The TMDL includes a MOS.
7. The TMDL has been subject to public participation.

In addition, these TMDLs considered reasonable assurance that the TMDL allocations assigned to nonpoint sources can be reasonably met.

From this point forward, all references in this approval rationale are found in West Virginia's TMDL Report *Total Maximum Daily Loads for Selected Streams in the James River Watershed, West Virginia* (TMDL Report), unless otherwise noted.

II. Summary

Table 3-3 of the TMDL Report presents the waterbodies and impairments for which TMDLs have been developed for the James River Watershed by the West Virginia Department of Environmental Protection (WVDEP). The three waterbodies were identified on West Virginia's 2006 Section 303(d) List. TMDLs were developed for fecal coliform bacteria and biological impairments.

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.

Section 7.0 of the TMDL Report presents applicable TMDLs (sum of wasteload allocations + sum of load allocations + margin of safety) for fecal coliform. Allocation spreadsheets also provide applicable TMDLs, WLAs to individual point sources, and LAs to categories of nonpoint sources. A Technical Report provides descriptions of the detailed technical approaches used throughout the TMDL development process. West Virginia developed an interactive ArcExplorer geographic information system (GIS) project that shows the spatial relationships between source assessment data for streams in the James River Watershed. The TMDLs are presented as average annual loads in counts per year, because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year. The TMDLs are also presented as equivalent average daily loads in counts per day.

III. Background

The West Virginia portion of the James River Watershed lies entirely within Monroe County in southeastern West Virginia (Figure 3-1). The remainder of the James River Watershed is located in the State of Virginia. The James River, a component of the Chesapeake Bay Drainage, encompasses nearly 71 square miles. Impaired streams in West Virginia are headwaters of the James River. Cities and towns in the watershed include Sweet Springs and Waiteville. The James River Watershed is dominated by forest land uses (87.47%), with some grassland (7.66%), pasture (3.97%), and urban/residential (0.52%) land uses (Table 3-1). All other land uses compose less than one percent of the total watershed area.

West Virginia conducted extensive water quality monitoring in the James River Watershed from July 2004 through June 2005. The results of this effort were used to confirm the listing of waterbodies not meeting applicable water quality criteria and to identify impaired waterbodies that were not previously listed. TMDLs were developed for three impaired streams as shown in Figure 3-1. Table 3-3 presents the three impaired waters for which TMDLs were developed. The TMDLs were developed for fecal coliform bacteria and biological impairment including three TMDLs (waterbody/pollutant combinations). The entire West Virginia portion of the James River watershed was subdivided into a total of 25 subwatersheds. However, only ten of these subwatersheds (those which contain or contribute to impaired waters) were included in this TMDL study for modeling purposes (Figure 6-1). The subwatershed delineation provided a basis for georeferencing pertinent source information and monitoring data, and for presenting TMDLs.

These TMDLs were developed by West Virginia for nonconsent decree waters listed on the 2006 Section 303(d) List of impaired waters. These TMDLs help West Virginia to meet TMDL development pace requirements.

WVDEP recently assumed responsibility for the TMDL Program and utilized the Watershed Management Framework cycle approach for TMDL development. The framework divides the state into 32 major watersheds and operates on a five-year, five-step process. The watersheds are divided into five hydrologic groups (A - E). Each group is assessed once every five years and waters are placed on the Section 303(d) List of impaired waters, as necessary. The TMDL process begins in the first year of the cycle with pre-TMDL sampling and public meetings in the affected watersheds. The data is compiled and TMDL development begins in year two of the cycle. In the third year, TMDL development continues and the TMDL is drafted. The TMDL is finalized in the fourth year. In the fifth year of the cycle, TMDL implementation is initiated through the National Pollutant Discharge Elimination System (NPDES) permitting process and efforts toward limiting nonpoint source loading. Throughout the TMDL development process, there are numerous opportunities for public participation and input. The James River Watershed is in hydrologic group D and is one of the first TMDLs developed by WVDEP. West Virginia's TMDL process is described in Section 2.1 of the TMDL report.

Computational Procedures

Section 4.0 of the TMDL Report discusses biological impairments and stressor identification methods. Biological integrity/impairment is based on a rating of the stream's benthic macroinvertebrate community using the multimetric West Virginia Stream Condition Index (WVSCI). Biological impairments were addressed by developing TMDLs for specific stressors. West Virginia utilized a stressor identification process to determine the primary causes of biologically impaired streams including sedimentation or organic enrichment. Stressor identification was followed by stream-specific determinations of the pollutants for which TMDLs must be developed. It is expected that implementation of those pollutant-specific TMDLs would address the biological impairment. Where organic enrichment was identified as a biological stressor, the waters also demonstrated violations of the numeric criteria for fecal coliform bacteria. It was determined that implementation of fecal coliform TMDLs would require the elimination of the majority of the existing fecal coliform sources including untreated sewage and runoff from pasture land use and thereby reduce the organic and nutrient loading causing the biological impairment.

Section 5.0 discusses fecal coliform bacteria source assessment. West Virginia determined that there are no permitted point sources including publicly owned or privately owned wastewater treatment plants, combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), municipal separate storm sewer systems (MS4s), or general sewage permits. Unpermitted sources include on-site treatment systems, stormwater runoff, agriculture, and natural background (wildlife). The Technical Report has expanded details of the fecal coliform bacteria source assessment discussed in Section 4, and 5 of the TMDL Report.

Section 6.0 describes the modeling processes employed during TMDL development with further details provided in the Technical Report. The Mining Data Analysis System (MDAS) was used to represent the source-response linkage in the James River watershed for fecal coliform. MDAS is a comprehensive data management and modeling system that is capable of representing loads from nonpoint and point sources in the watershed and simulating instream

processes. MDAS is used to simulate watershed hydrology and pollution transport, as well as stream hydraulics and in-stream water quality. It is capable of simulating different flow regimes and pollutant loading variations. A customized Microsoft Excel spreadsheet tool was used to determine the fecal loading from failing septic systems identified during source tracking efforts by WVDEP. West Virginia's numeric and water quality criteria and an explicit MOS were used to identify the TMDL endpoints.

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.

The applicable numeric water quality criteria are shown in Table 2-1. The applicable designated uses for all the waters subject to this report are aquatic life protection, water contact recreation, and public water supply. Although the designated use of aquatic life protection is applicable to the streams in the James River Watershed, violations of the numeric aquatic life criteria were not observed through pre-TMDL monitoring. In various waters, the water contact recreation and public water supply uses have been determined to be violated, pursuant to exceedances of the numeric water quality criteria for fecal coliform bacteria.

All West Virginia waters are subject to the narrative criteria in Section 3 of the Standards. That section, titled *Conditions Not Allowed in State Waters*, contains various provisions relative to water quality. The narrative water quality criterion at 46 CSR 1 - 3.2.i prohibits the presence of wastes in State waters that cause or contribute to significant adverse impacts on the chemical, physical, hydrologic, and biological components of aquatic ecosystems. This provision is the basis for the "biological impairment" determinations. Biological impairment signifies a stressed aquatic community. WVDEP determines the biological integrity of each stream based on a rating of the stream's benthic macroinvertebrate community using the multimetric WVSCI.

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 for point sources, LAs for nonpoint 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, WLAs are given to NPDES permitted discharge points and LAs are given to discharges from activities that do not have an associated NPDES permit, such as failing septic systems and straight pipes. The decision to assign LAs to these

sources does not reflect any determination by WVDEP or EPA as to whether there are, in fact, unpermitted point source discharges. In addition, by establishing these TMDLs with failing septic systems and straight pipes treated as LAs, WVDEP and EPA are not determining that these discharges are exempt from NPDES permitting requirements.

Section 7.0 of the TMDL Report presents applicable TMDLs for fecal coliform. Allocation spreadsheets also provide applicable TMDLs, WLAs to individual point sources and LAs to categories of unpermitted sources. The Fecal Coliform Bacteria Allocation Spreadsheet presents detailed fecal coliform TMDLs, LAs, and WLAs. The TMDLs are presented as average annual loads in counts per year because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year. The TMDLs are also presented as equivalent average daily loads in counts per day.

There are no permitted point sources for fecal coliform bacteria within the James River Watershed. Therefore, no WLAs were assigned. Nonpoint sources of fecal coliform included unpermitted sources such as on-site treatment systems, stormwater runoff, agriculture, and natural background (wildlife). Fecal coliform bacteria TMDLs were developed in three streams and load allocations were assigned to pasture, on-site sewer systems including failing septic systems and straight pipes, residential land uses including urban/residential runoff, and background and other nonpoint sources including wildlife sources from forested land and grasslands. Fecal coliform reductions will require elimination of illicit discharges, straight pipes, and leaking septic systems. The loadings from wildlife sources were not reduced.

The TMDL development methodologies prescribe allocations that achieve water quality criteria throughout the watershed. Various provisions attempt equity between categories of sources and the targeting of pollutant reductions from the most problematic sources. Nonpoint source reductions did not result in loading contributions less than the natural conditions, and point source allocations were not more stringent than numeric water quality criteria.

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

The TMDL considers the impact of background pollutant contributions by considering loadings from background sources like wildlife. MDAS also considers background pollutant contributions by modeling all land uses.

4. The TMDLs consider critical environmental conditions.

According to EPA's regulation 40 CFR §130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of the impaired waterbody is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards. Critical conditions for waters impacted by land based nonpoint sources generally occur during periods of wet weather and high surface runoff.

In contrast, critical conditions for point source-dominated systems generally occur during low flow and low dilution conditions. Point sources, in this context, also include nonpoint sources that are not precipitation driven (i.e., fecal deposition to stream). High and low flow stream conditions and all point and nonpoint source loads were included in the development of these TMDLs, which should address the critical conditions of each water.

5. The TMDLs consider seasonal environmental variations.

Seasonal variations were considered while considering critical conditions, by running the daily simulation model for several years, from 1998 to 2003 for MDAS. Continuous simulation (modeling over a period of several years that capture precipitation extremes) inherently considers seasonal hydrologic and source loading variability.

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 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 explicit MOS of five percent was included to counter uncertainty in the modeling process (Section 6.2.1). West Virginia also set the modeling endpoints to 95 percent of the water quality standards as an additional MOS. West Virginia did not include a discussion regarding an implicit MOS but did use conservative model assumptions (such as assuming all point sources continually discharge at permit limits) to develop the allocations.

7. The TMDL has been subject to public participation.

Section 9.0 describes the public participation which included two meetings to present information on fundamental TMDL concepts and to present West Virginia's proposed TMDL allocation strategies, a 30-day public comment period, and a final public informational meeting. The 30-day public comment period was held from February 1, 2008 to March 3, 2008, with a public meeting held on February 11, 2008, in Lewisburg, West Virginia. EPA was the only entity from which West Virginia received written comments. West Virginia appropriately addressed these comments.

IV. Discussion of Reasonable Assurance

EPA requires that there be a reasonable assurance that a TMDL can be implemented. Section 10.0 addresses reasonable assurance. There are two primary programs in effect which provide reasonable assurance that the TMDLs will be implemented. Section 10.1 discusses the Watershed Management Framework Process while Section 10.2 discusses ongoing public sewer projects.

Section 11.0 discusses monitoring activities including nonpoint source project monitoring

and TMDL effectiveness monitoring.

Section 8.0 discusses the future growth and water quality trading in the James River Watershed TMDL. In many cases, the implementation of the fecal coliform bacteria TMDLs will consist of providing public sewer service to unsewered areas. A new facility could be permitted in the watershed, provided that the permit includes average monthly and maximum daily fecal coliform limitations of 200 counts/100 ml and 400 counts/100 ml, respectively, which are the technology based fecal coliform effluent limitations that are more stringent than applicable water quality criteria.

The James River Association is a watershed association for the James River Watershed.