UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Decision Rationale
Total Maximum Daily Loads
For Streams in the New River Watershed
West Virginia

/Signe/

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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 iron, aluminum, pH, fecal coliform bacteria and/or biological impairments on selected waterbodies in the New 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 Streams in the New 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 New River watershed by the West Virginia Department of Environmental Protection (WVDEP). The 88 waterbodies were identified on West Virginia's 2006 Section 303(d) List. TMDLs were developed for iron, aluminum, pH, fecal coliform bacteria and/or 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 resubmittal to EPA for approval.

Section 8.5 of the TMDL Report presents applicable TMDLs (sum of wasteload allocations + sum of load allocations + margin of safety) for iron, aluminum, and fecal coliform. Allocation spreadsheets also provide applicable TMDLs, wasteload allocations to individual point sources, and load allocations 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 New River watershed. The TMDLs are presented as average annual loads in pounds per year, or 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 pounds per day, or counts per day.

III. Background

The New River watershed is located in Southern West Virginia, and lies mostly within Fayette, Mercer, Monroe, Raleigh and Summers Counties (Figure 3-1). In West Virginia, the watershed drainage area encompasses nearly 1,600 square miles, exclusive of the Greenbrier River watershed. The New River mainstem runs Northwest through the watershed, and its major West Virginia tributaries include the Bluestone River, the Greenbrier River, Indian Creek, Glade Creek, and Piney Creek. Cities and towns in the watershed include Beckley, Bluefield, Fayetteville, Hinton, Princeton and Union. The New River watershed is dominated by forest land use (75.5%), with some grassland (12.4%), pasture (5.1%), urban/residential (4.4%) and water (1.2%) land uses. Individually, other identified land uses compose less than one percent of the total watershed area.

West Virginia conducted extensive water quality monitoring from July 2004 through June 2005 in the New River watershed. 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 the impaired waterbodies in 36 subwatersheds shown in Figure 3-2. Table 3-3 presents the 88 waters for which TMDLs are developed. The TMDLs were developed for iron, aluminum, pH, fecal coliform bacteria and/or biological impairments, including 113 TMDLs (waterbody/pollutant combinations). The 36 subwatersheds were further divided into 691 subwatersheds for modeling purposes (Figure 8-1). 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 and approved by EPA to fulfill requirements of a 1997 TMDL lawsuit settlement agreement. The 1997 consent decree requires either West Virginia or EPA to develop TMDLs for acid mine drainage (AMD) impaired waters

(including tributaries in the New River watershed) scheduled for completion by September 30, 2009. There is also an interim deadline of 350 mine drainage TMDLs by March 30, 2006, which has been met. The establishment of the New River watershed mine drainage TMDLs helps to meet the March 30, 2008, deadline for completion of all mine drainage TMDLs. These TMDLs also included several non-consent decree waters listed on the 2006 Section 303(d) List of impaired waters that 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 New River watershed is in hydrologic group D. Further information on West Virginia's TMDL development process is provided in Section 2.1 of the TMDL report.

Computational Procedures

Sections 5, 6, and 7 of the TMDL Report discuss metals, pH, fecal coliform bacteria and sediment source assessment while Section 4 describes biological impairments and stressor identification (SI) methods. Sources for metals and sediment in the New River watershed are: point sources, including mining, non-mining, and construction stormwater permits; and unpermitted sources of mine drainage from abandoned mine lands (AMLs) and bond forfeiture sites; as well as sediment sources including forestry, oil and gas, roads, agriculture, streambank erosion, and other land disturbance activities. The pH impairments in the New River watershed have been attributed to historic mining activities. There are 6 mining and 63 non-mining NPDES permitted facilities within the TMDL watersheds addressed in this report. There are also 20 active construction sites operating under West Virginia's Construction Stormwater General Permit. Fecal coliform bacteria sources are point sources, including individual sources covered under the NPDES program such as: wastewater treatment plants and general sewage permits; and unpermitted sources, including onsite treatment systems, stormwater runoff, agriculture, and natural background (wildlife). The New River watershed has 23 publicly owned treatment works (POTWs), five privately owned sewage treatment plants, 58 privately owned "package plants", 20 home aeration units (HAUs), and three municipal separate storm sewer systems (MS4s). Designated MS4 entities given WLAs for fecal coliform bacteria include: (1) The City of Beckley; (2) the West Virginia Department of Transportation, Division of Highways; and (3) the West Virginia Parkways, Economic Development and Tourism Authority. Ten combined sewer overflow (CSO) outlets are associated with the POTWs operated by Beckley, Fayetteville, Hinton and Princeton. No sanitary sewer overflows (SSOs) have been identified in the watershed. Stressor identification indicated that biological impairments were

caused by organic enrichment, metals and pH toxicity, and sedimentation. The Technical Report has expanded details of the pollutant source assessment discussed in Sections 5, 6, and 7.

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 that organic enrichment, metals and pH toxicity, and sedimentation were the causative stressors for biologically impaired streams addressed in this TMDL study.

Where the stressor identification process identified organic enrichment as the cause of biological impairment, data also indicated violations of the fecal coliform water quality criteria. The predominant sources of both organic enrichment and fecal coliform bacteria in the watershed are inadequately treated sewage and runoff from pasture land use. WVDEP determined that implementation of fecal coliform TMDLs would remove untreated sewage and reduce agricultural runoff thereby reducing the organic and nutrient loading causing the biological impairment in these streams. Therefore, fecal coliform TMDLs will serve as a surrogate where organic enrichment was identified as a stressor. Likewise, where metals and/or pH toxicity were identified as the cause of biological impairment, data also indicated violations of metals and/or pH water quality criteria, and the metals and pH TMDLs will thus serve as a surrogate for the biological impairment.

To address the sedimentation biological stressor, WVDEP initially pursued the development of sediment TMDLs for these streams using a reference watershed approach. However, all of the sediment impaired streams are also impaired pursuant to total iron water quality criteria and TMDL assessment of iron included representation and allocation of iron loadings associated with sediment. In each stream, the sediment loading reduction necessary for attainment of the water quality criteria for iron exceeds that which was determined necessary using the reference watershed approach for sediment. Therefore, the iron TMDLs are acceptable surrogates for biological impairments from sedimentation. Implementation of the iron TMDLs will address the biological impairment caused by sedimentation.

Section 8.0 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 New River watershed TMDL study area for iron, aluminum, sediment and 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 in-stream processes. MDAS is used to simulate watershed hydrology and pollution transport, as well as stream hydraulics and instream 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 include: propagation and maintenance of aquatic life in warmwater fisheries and trout-waters, water contact recreation, and public water supply. Most of the streams addressed by this TMDL Report are designated as warmwater fisheries; however, there are 18 impaired streams designated as trout-waters.

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 wasteload 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:

TMDL = Summation of WLAs + Summation of LAs + MOS

For purposes of these TMDLs only, wasteload allocations are given to NPDES permitted discharge points and load allocations 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 load allocations 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 load allocations, WVDEP and EPA are not determining that these discharges are exempt from NPDES permitting requirements.

Section 8.5 of the TMDL Report presents applicable TMDLs for iron, aluminum, and fecal coliform bacteria. Allocation spreadsheets also provide applicable TMDLs, wasteload allocations to individual point sources and load allocations to categories of unpermitted sources. The Metals Allocation Spreadsheet presents detailed iron and aluminum TMDLs, LAs, and

WLAs. The Fecal Coliform Bacteria Allocation Spreadsheet presents detailed fecal coliform TMDLs, LAs, and WLAs. The TMDLs are presented as average annual loads in pounds per year or 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 pounds per day or counts per day.

Sources for metals, sediment and pH in the New River watershed are: point sources, including mining, non-mining, and construction stormwater permits; and unpermitted sources of mine drainage from AMLs and bond forfeiture sites; as well as sediment sources including forestry, oil and gas, roads, agriculture, streambank erosion, and other land disturbance activities. There are six mining related NPDES permits with 36 associated outlets within the TMDL study area. The TMDLs required some mining permits to be reduced for iron. There are 63 non-mining NPDES permitted facilities with 63 associated outlets in the watershed that have effluent limits for metals and pH. There are also 17 construction stormwater permits. The TMDL does not prescribe pollutant reduction from the existing non-mining point sources or construction stormwater sources. A complete list of the permits and outlets is provided in the appendices of the Technical Report. Non-mining NPDES permitted outlets in the watershed may include the wastewater discharges from water treatment plants. In addition, the discharges from construction activities that disturb more than one acre of land are legally defined as point sources. The sediment introduced from such discharges can contribute metals. Based on the minimal flows of their discharges, these permitted non-mining sources are believed to be negligible. Under these TMDLs, these minor discharges are assumed to operate under their current permit limits and were given WLAs based on their current permit limits. LAs for metals were assigned to AMLs, bond forfeiture sites, and sediment sources including forestry, oil and gas, roads, agriculture, and other land disturbance areas.

The TMDL Report submitted on July 9 2008, contained iron TMDLs for seven trout-waters in which the pollutant reductions associated with the prescribed LAs and WLAs do not assure complete attainment of the trout-water, chronic aquatic life protection criterion. The affected trout-waters are Wolf Creek (WVKN-10); Arbuckle Creek (WVKN-21); Piney Creek (WVKN-26); Batoff Creek (WVKN-26-A); Cranberry Creek (WVKN-26-E); Beaver Creek (WVKN-26-F); and Crane Creek (WVKNB-30). Non-attainment is predicted when large precipitation events elevate instream total suspended sediments (TSS) concentrations and has been attributed to the relatively high iron content of the soils in these watersheds. The magnitudes of the predicted exceedances under TMDL conditions are not extreme, but exceedances are predicted more often than the once per three years average frequency prescribed by the criterion.

A letter submitted to EPA on January 15, 2008, provided further clarification of WVDEP's plans to address predicted nonattainment in the seven trout-waters and calculations of TMDLs necessary for attainment of the currently effective criteria. The allocations associated with all of the trout water iron TMDLs reflect pollutant reductions for existing sources to the maximum practical extent. WLAs for permitted point sources and LAs for continuous discharge AML sources and bond forfeiture sites are set at the value of the trout water criterion. LAs for precipitation-induced upland nonpoint sources are commensurate with background loadings from undisturbed forest and LAs for bank erosion are set equal to loadings associated with the best

available bank conditions measured in the watershed. Even with these stringent reductions, the model indicates that the iron TMDLs for the seven trout-waters do not result in complete attainment of the currently effective trout water iron criteria. Predicted criterion exceedances at the TMDL condition appear to be attributable to natural conditions (high iron content in soils) and, given the presence and apparent viability of trout, may indicate that the existing trout-water iron criterion may be overly conservative in relation to the protection of the trout-water designated uses in these waters. WVDEP plans an adaptive implementation approach under which the prescribed trout-water iron TMDLs contained in the TMDL Report submitted on July 9, 2008, will be implemented as an interim goal concurrently with reassessment of the trout-water iron criterion for these streams. In order to determine possible alternative criterion, development of a monitoring plan has been initiated which will include a special monitoring effort for minimally impacted and documented viable trout-waters in the watershed. Field work will be completed in calendar year 2008. Based upon the new data, WVDEP will determine whether an alternative criterion or other modifications of the water quality standards or TMDLs appear warranted. The January 15, 2008, letter included additional tables displaying calculations of the trout-water iron TMDLs that will result in attainment of the currently effective trout-water iron criterion.

Fecal coliform bacteria sources are point sources, including individual sources covered under the NPDES program such as wastewater treatment plants and general sewage permits; and unpermitted sources, including onsite treatment systems, stormwater runoff, agriculture, and natural background (wildlife). Fecal coliform bacteria TMDLs were developed in 83 streams and will affect 109 permits including 23 POTWs, five privately owned sewage treatment plants, 58 privately owned "package plants", 20 HAUs, and three MS4s. Designated MS4 entities given WLAs for fecal coliform bacteria include: (1) The City of Beckley, (2) the West Virginia Department of Transportation, Division of Highways, and (3) the West Virginia Parkways, Economic Development and Tourism Authority. Ten CSO outlets are associated with the POTWs operated by Beckley, Fayetteville, Hinton and Princeton. No (SSOs) have been identified in the watershed. The TMDLs allowed fecal coliform NPDES permits to remain at 200 counts/100 ml (monthly average) and 400 counts/100 ml (daily maximum). Load allocations were assigned to pasture, onsite 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 in non-MS4 areas. Fecal coliform reductions will require elimination of illicit discharges, straight pipes, and leaking septic systems, which would substantially reduce organic and nutrient loadings. 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 8.4.1). 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 10.0 describes the public participation process which included two meetings to present information on fundamental TMDL concepts and 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 May 2 to June 2, 2008, with an additional public meeting held on May 16, 2008, in Hinton, West Virginia. West Virginia received written comments from EPA and the West Virginia American Water Company. West Virginia appropriately addressed all of these comments, as described in Section 10.3.

IV. Discussion of Reasonable Assurance

EPA requires that there be a reasonable assurance that a TMDL can be implemented. Section 11.0 addresses reasonable assurance. There are three primary programs in effect which provide reasonable assurance that the TMDLs will be implemented. Section 11.1 discusses permit reissuance by WVDEP's Division of Water and Waste Management. Section 11.2 discusses the Watershed Management Framework Process. Sections 11.3 and 11.4 discuss ongoing public sewer and AML projects, respectively.

Section 12.0 discusses monitoring activities including NPDES compliance, nonpoint source project monitoring, and TMDL effectiveness monitoring.

Section 9.0 discusses the future growth in the New River watershed TMDL. With the exception of allowances provided for construction stormwater general permit registrations discussed in Section 9.1, this TMDL does not include specific future growth allocations for iron or aluminum. Section 9.2 discusses future growth for fecal coliform bacteria. 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.

Friends of the New River and the West Virginia Rivers Coalition are active watershed associations for the New River watershed.