UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

APR 17 2015

Mr. Scott Mandirola, Director
Division of Water and Waste Management
West Virginia Department of Environmental Protection
601 57th Street SE
Charleston, West Virginia 25304-2345

Dear Scott Mr. Mandirola:

The United States Environmental Protection Agency (EPA), Region III, is pleased to approve the Total Maximum Daily Loads (TMDLs) developed for total iron and fecal coliform in the Upper Ohio North watershed. The TMDLs were established to address impairments of water quality, as identified on West Virginia's 2012 Section 303(d) List. The West Virginia Department of Environmental Protection submitted the report, *Total Maximum Daily Loads for Select Streams in the Upper Ohio North*, to EPA for review and approval on January 7, 2015. The TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) be designed to attain and maintain applicable water quality standards; (2) include a total allowable loading, and as appropriate, wasteload allocations for point sources and load allocations for nonpoint sources; (3) consider the impacts of background pollutant contributions; (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated); (5) consider seasonal variations; (6) include a margin of safety (which accounts for any uncertainties in the relationship between pollutant loads and instream water quality); and (7) be subject to public participation. The TMDLs for the selected streams of the Upper Ohio North watershed satisfy each of these requirements. In addition, the TMDLs considered reasonable assurance that the TMDL allocations assigned to the nonpoint sources can be reasonably met. A rationale of our approval is enclosed.

As you know, any new or revised National Pollutant Discharge Elimination System permits must be consistent with the assumptions and requirements of applicable TMDL wasteload allocations pursuant to 40 CFR §122.44(d)(1)(vii)(B). Please submit all such permits to EPA for review per EPA's letters dated October 1, 1998, and July 7, 2009.

If you have any questions regarding these TMDLs, please contact Ms. Jennifer Sincock, West Virginia TMDL Coordinator, at 215-814-5766.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

Enclosure

cc: Mr. John Wirts (WVDEP)
Mr. David Montali (WVDEP)

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Decision Rationale
Total Maximum Daily Loads for Select Streams in the Upper Ohio North Watershed, West Virginia

Jon M. Capacasa, Director
Water Protection Division

Date: 4/17/15

Decision Rationale
Total Maximum Daily Loads for Select Streams in the
Upper Ohio North Watershed, West Virginia

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by a state where technology-based and other controls do not provide for the 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's) rationale for approving the TMDLs for total iron and fecal coliform bacteria in selected streams of the Upper Ohio North watershed. The TMDLs were developed to address impairments of water quality as identified in West Virginia's 2012 Section 303(d) list of impaired waters. The West Virginia Department of Environmental Protection (WVDEP) submitted the report, *Total Maximum Daily Loads for Select Streams in the Upper Ohio North Watershed*, to EPA on January 7, 2015, and was received on January 15, 2015. EPA's rationale is based on the determination that the TMDLs meet the following seven regulatory conditions pursuant to 40 CFR§130.

1) The TMDLs are designed to implement applicable water quality standards.
2) The TMDLs include a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).
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) The TMDLs have 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 rationale can be found in West Virginia's TMDL Report, *Total Maximum Daily Loads for Select Streams in the Upper Ohio North Watershed*, unless otherwise noted.

II. Summary

Table 3-3 of the final TMDL document presents the waterbodies and impairments for which TMDLs have been developed in the Upper Ohio North watershed. West Virginia identified eight streams in the Upper Ohio North watershed as impaired due to exceedances of

the numeric water quality criteria for total iron or fecal coliform bacteria. In addition, certain waters in the Upper Ohio North watershed were listed as biologically impaired based on the narrative water quality criteria of 47 CSR §2-3.2.i, which 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. Attachment 1 of this Decision Rationale presents the impaired waterbodies of the Upper Ohio North watershed.

Section 8 presents the TMDLs developed for the Upper Ohio North watershed on a daily load basis. The TMDLs are also represented in Microsoft Excel spreadsheets (submitted by West Virginia via compact disc) which provide detailed source allocations and successful TMDL scenarios. These spreadsheets present TMDLs as average annual loads because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year. The loads are expressed in pounds per year, or counts per year, which may be divided by 365 days per year to express the TMDLs in pounds per day or counts per day. A technical report was included by West Virginia to describe the detailed technical approaches that were used during TMDL development and to display the data upon which the TMDLs were based. West Virginia also provided an ArcView Geographic Information System (GIS) project (and shapefiles) that explores the spatial relationships among the pollutant sources in the watershed.

III. Background

The Upper Ohio North watershed is located in West Virginia's northern panhandle (Figure 3-1) within the Western Allegheny Plateau ecoregion and encompasses 125 square miles. The Ohio River is a major tributary of the Mississippi River, which flows to the Gulf of Mexico. The West Virginia portion of the Upper Ohio North Watershed begins where the Ohio River enters West Virginia from Pennsylvania. The segment of the Ohio River that falls within the Upper Ohio North hydrologic unit in West Virginia is 31 miles long. Additional area in Pennsylvania and Ohio also drains to this segment of the Ohio River, but this area was beyond the scope of this study. Of the 125 total square miles in the watershed, only 11 square miles were modeled under this TMDL effort. The Ohio River in West Virginia begins near the town of Chester in northern Hancock County. The river flows west and south to form the border between West Virginia and Ohio. The modeled portions of the watershed fall within Hancock and Brooke counties. Cities and towns in the vicinity of the area of study are Chester, New Cumberland, Weirton, Follansbee, and Wellsburg. The dominant land use for the TMDL watersheds in the Upper Ohio North watershed is forest, which constitutes 82.13 percent of the total land use area. Other important modeled land use types are urban/residential (13.04%) and grassland (3.19%), as shown in Table 3-1. Individually, all other land cover types compose less than one percent of the total watershed area. The total population living in the subject watersheds of this report is estimated to be 2,500 people.

The impaired streams that are the subject of this TMDL are included on West Virginia's 2012 Section 303(d) List. Documented impairments are related to numeric water quality criteria for total iron and fecal coliform bacteria. Certain waters are also biologically impaired based on the narrative water quality criterion of 47 CSR 2–3.2.i. West Virginia utilized a stressor identification process to determine the primary causes of impairment in the six streams listed as

biologically impaired within the Upper Ohio North watershed. Stressor identification entails reviewing available information, forming and analyzing possible stressor scenarios and implicating causative stressors. The primary data set used for the stressor identification was generated through pre-TMDL monitoring (Technical Report, Appendix K). Stressor identification was followed by stream-specific determinations of the pollutants for which TMDLs must be developed. When the stressor identification process identified that a specific pollutant with numeric criteria was a causative stressor, TMDLs were developed for that pollutant.

The stressor identification process identified organic enrichment as the only significant biological stressor in Laurel Hollow (Muchmores Run) (WV-OUN-17), where water quality monitoring data indicated violations of the fecal coliform water quality criteria. The predominant sources of both organic enrichment and fecal coliform bacteria in this watershed are inadequately treated sewage and runoff from agricultural land uses. For the organic enrichment impairment identified in the watershed, it was determined that the implementation of fecal coliform TMDLs would require the elimination of the majority of existing fecal coliform sources and thereby resolve organic enrichment stress. Therefore, fecal coliform TMDLs will serve as a surrogate where organic enrichment was identified as a stressor.

For the other five biologically impaired streams, the stressor identification process did not indicate that TMDLs for numeric criteria would resolve the biological impacts (Appendix K). In these waters, the stressor identification process determined ionic stress to be a significant stressor as well as sedimentation and/or organic enrichment. West Virginia is deferring TMDL development for biological impairments caused by ionic stress and will retain those waters on the Section 303(d) list. While it is often more efficient to develop TMDLs to address all impairments to a waterbody at the same time, there is no requirement that TMDLs for all stressors be developed simultaneously. West Virginia has provided an explanation as to why it chose not to develop TMDLs for ionic stress at this time (Section 10.3). Because WVDEP has explained that it has "paused" rather than cancelled TMDL development, EPA does not believe that WVDEP is refusing to ever establish these TMDLs, but is merely postponing TMDL development temporarily while additional information is obtained.

Sections 5 and 6 discuss the iron and fecal coliform bacteria source assessments in the Upper Ohio North watershed. The sources of iron in the watershed include sediment sources such as forestry, oil and gas, roads, agriculture, streambank erosion, and other land disturbance activities. Fecal coliform bacteria sources in the watershed include: municipal separate storm sewer systems (MS4s), unpermitted sources, including on-site treatment systems, stormwater runoff, agriculture, and natural background (wildlife). The technical report has expanded details of the source assessment in the Upper Ohio North watershed.

Computational Procedures

The Mining Data Analysis System (MDAS) was used to represent the source-response linkage in the Upper Ohio North watershed TMDL for iron and fecal coliform bacteria. MDAS was developed to facilitate large scale, data intensive watershed modeling applications. The model is used to simulate watershed hydrology and pollutant transport as well as stream hydraulics and instream water quality. MDAS is capable of simulating different flow regimes

and pollutant variations. A key advantage of the MDAS development framework is that it has no inherent limitations in terms of modeling size or upper limit model operations. In addition, the MDAS model allows for seamless integration with modern-day, widely available software such as Microsoft Access and Excel.

Configuration of the MDAS model involved subdividing the TMDL watershed into subwatershed modeling units connected by stream reaches. The five TMDL watersheds were broken into 17 separate subwatershed units, based on the groupings of impaired streams shown in Figure 3-2. The TMDL watershed was divided to allow for the evaluation of water quality and flow at pre-TMDL monitoring stations. The subdivision process also ensures a proper stream network configuration within the basin. The physical characteristics of the subwatersheds, weather data, land use information, continuous discharges, and stream data were used as input for the MDAS model. Flow and water quality were continuously simulated into the model on an hourly time-step. Model setup consisted of configuring two separate MDAS models: iron/sediment and fecal coliform bacteria.

The calibrated model provides the basis for performing the allocation analysis. The first step is to simulate baseline conditions, which represent existing nonpoint source loadings and point source loadings at permit limits. Baseline conditions allow for an evaluation of instream water quality under the highest expected loading conditions. The MDAS model was run for baseline conditions using hourly precipitation data for a representative six year simulation period (January 1, 2004 through December 31, 2009). The precipitation experienced over this period was applied to the land uses and pollutant sources as they existed at the time of TMDL development. Predicted instream concentrations were compared directly with the TMDL endpoints. This comparison allowed for the evaluation of the magnitude and frequency of exceedances under a range of hydrologic and environmental conditions.

The MDAS model provided allocations for iron and fecal coliform bacteria in the eight impaired streams of the Upper Ohio North watershed. The TMDLs are shown in Section 8 and are presented as average daily loads, in pounds per day, or counts per day. 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 for iron and fecal coliform bacteria are shown in Table 2-1 of the final TMDL document. The applicable designated uses in the watershed include: propagation and maintenance of aquatic life in warmwater fisheries and troutwaters, water contact recreation, and public water supply. In Holbert Run, warmwater fishery aquatic life use impairments have been determined pursuant to exceedances of total iron numeric water quality criteria. Water contact recreation and/or public water supply use impairments have also been determined in various waters in the Upper Ohio North watershed pursuant to exceedances of 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 general provisions related to water quality. The TMDLs presented in Section 8 are based upon the water quality criteria that are currently effective. If the West Virginia Legislature adopts Water Quality Standard revisions that alter the basis upon which the TMDLs are developed, then the TMDLs and allocations may be modified as warranted. Any future Water Quality Standard revision and/or TMDL modification must receive EPA approval prior to implementation.

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 receiving waters 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 non-point sources, and natural background levels. In addition, TMDLs 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.

Total Iron TMDLs

There are no mining or non-mining NPDES permitted outlets in the iron impaired stream (Holbert Run) of the Upper Ohio North watershed.

The discharges from construction activities that disturb more than one acre of land are legally defined as point sources and the sediment introduced from such sources can contribute iron loadings. WVDEP issues a General NPDES Permit (WV0115924) to regulate stormwater discharges associated with construction activities with a land disturbance greater than one acre. Subwatershed-specific future growth allowances have been provided for site registrations under the Construction Stormwater General Permit. Because of the established relationship between iron and Total Suspended Solids (TSS, iron WLAs were provided for future registrations under the Construction Stormwater General Permit. The TMDL allocation provides 2.5 percent of the modeled subwatershed area to be registered under the general permit at any point in time.

Total iron LAs were provided for the dominant nonpoint sources of iron in the watershed, including: sediment contributions from agricultural land uses, residential/urban/road land uses, streambank erosion and loadings associated with undisturbed forests and grasslands. Streambank erosion has been determined to be a significant sediment source in the watershed. The sediment loading from bank erosion is considered a nonpoint source and LAs are assigned for stream segments outside of MS4 areas. The sediment loading from bank erosion loadings are most strongly influenced by upland impervious area and bank stability. The streambank erosion modeling process is discussed in Section 7.2.2.

Fecal Coliform Bacteria TMDLs

WLAs were developed for all facilities permitted to discharge fecal coliform bacteria

including MS4s. There are no sewage treatment plants, combined sewer overflows (CSOs) or sanitary sewer overflows (SSOs) within the Upper Ohio North TMDL watersheds.

The MS4s in the watershed are presented in Figure 5-2. The West Virginia Division of Highways (WVDOH) is the only MS4 entity in the subject watersheds. MS4 source representation was based upon precipitation and runoff from land uses determined from the modified National Land Cover Database 2006 landuse data, 2011 TIGER Roads data, and the transportation-related drainage area for which WVDOH has MS4 responsibility. The MS4s in the watershed will be registered under, and subject to the requirements of general permit, WV0110625, which is based upon national guidance and proposes best management practices to be implemented.

Fecal coliform LAs were assigned to: pasture/cropland and on-site sewage systems; including, failing septic systems and straight pipes, residential loadings associated with urban/residential runoff from non-MS4 areas, and loadings associated with wildlife sources. Failing on-site septic systems and straight pipes are a significant nonpoint sources of fecal coliform bacteria in the Upper Ohio North watershed. There are approximately 110 homes in the watershed that are not served by a centralized collection and treatment system and are within 100 meters of a stream. To calculate failing septic wastewater flows, the TMDL watershed was divided into four septic failure zones, and septic failure zones were delineated by soil characteristics.

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

The Upper Ohio North watershed TMDLs consider the impact of background pollutant contributions by looking at loadings from background sources like forest and 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 sources generally occur during periods of wet weather and high surface runoff. In contrast, critical conditions for non-land-based point source dominated systems generally occur during low flow and low dilution conditions.

Both high-flow and low-flow periods were taken into account during TMDL development for the Upper Ohio North watershed by using a long period of weather data,

(January 1, 2004 -- December 31, 2009) that represented wet, dry, and average flow periods. Figure 7-3 presents the range of precipitation conditions that were used for TMDL development.

5. The TMDLs consider seasonal environmental variations.

Seasonal variations were considered in the formulation of the MDAS modeling analysis. Continuous simulation (modeling over a period of several years that captured precipitation extremes) inherently considers seasonal hydrological and source loading variability. The pollutant concentrations simulated on a daily time-step by MDAS and were compared with TMDL endpoints. Allocations that met these endpoints throughout the modeling period were developed.

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 be allocating a portion of the allowable load to the MOS. In the TMDLs developed for the Upper Ohio North watershed, an explicit MOS of five percent was included to counter uncertainty in the modeling process.

7. The TMDLs have been subject to public participation.

An informational public meeting was held on June 6, 2011 at Cabela's store in Wheeling, WV. The meeting occurred prior to pre-TMDL stream monitoring and pollutant source tracking and included a general TMDL overview and a presentation of planned monitoring and data gathering activities. A TMDL status update meeting was held at the same Cabela's store on August 7, 2014 to provide the public with the projected timeframe for a public release and preliminary findings. A public meeting was held at the same Cabela's store on November 6, 2014 to provide information to stakeholders intended to facilitate comments on the draft TMDLs. The availability of draft TMDLs was advertised in various local newspapers beginning on October 23, 2014. Interested parties were invited to submit comments during the public comment period, which began on October 23, 2014 and ended on November 21, 2014. West Virginia received comments from Appalachian Mountain Associates which were addressed in Section 10.3 of the final TMDL report.

IV. Discussion of Reasonable Assurance

Reasonable assurance for maintenance and improvement of water quality in the Upper Ohio North watershed rests primarily with two programs: the NPDES permitting program and the West Virginia Watershed Network. The NPDES permitting program is implemented by WVDEP to control point source discharges. The West Virginia Watershed Network is a cooperative nonpoint source control effort involving many state and federal agencies, whose task is the protection and/or restoration of water quality.

WVDEP's DWWM is responsible for issuing non-mining permits within the State. WVDEP's Division of Mining and Reclamation developed NPDES permits for mining activities. As part of the permit review process, permit writers have the responsibility to incorporate the required TMDL WLAs into new or reissued permits. The permits will contain self-monitoring and reporting requirements that are periodically reviewed by WVDEP. WVDEP also inspects treatment facilities and independently monitors NPDES discharges. The combination of these efforts will ensure implementation of the TMDL WLAs. New facilities will be permitted in accordance with future growth provisions described in Section 9.

The Watershed Management Framework is a tool used to identify priority watersheds and coordinate efforts of state and federal agencies with the goal of developing and implementing watershed management strategies through a cooperative, long-range planning effort. The principal area of focus of watershed management through the Framework process is correcting problems related to nonpoint source pollution. Network partners have placed a greater emphasis on identification and correction of nonpoint source pollution. The combined resources of the partners are used to address all different types of nonpoint source pollution through both public education and on-the-ground projects. All nonpoint source restoration projects should include a monitoring component specifically designed to document resultant local improvements in water quality. These data may also be used to predict expected pollutant reductions from similar future projects.

Within WVDEP DWWM, the Engineering and Permitting Branch's Engineering Section will be charged with the responsibility of evaluating sewer projects and providing funding. For information on upcoming projects, a list of funded and pending water and wastewater projects in West Virginia can be found at http://www.wvinfrastructure.com/projects/index.php.

Attachment 1

Waterbodies and Impairments Addressed in in the Upper Ohio North Watershed TMDL

TMDL Watershed	Stream Name	NHD Code	Fe	FC
Mahan Run	Mahan Run	WV-OUN-3		X
Mahan Run	UNT/Mahan Run RM 2.04	WV-OUN-3-A		X
Holbert Run	Holbert Run	WV-OUN-6	M	
Holbert Run	UNT/Holbert Run RM 1.26	WV-OUN-6-B		X
Laurel Hollow (Muchmores Run)	Laurel Hollow (Muchmores Run)	WV-OUN-17		X
Middle Run	Middle Run	WV-OUN-19		X
Marks Run	Marks Run	WV-OUN-20		X
Marks Run	UNT/Marks Run RM 0.89	WV-OUN-20-A		X

Note:
RM river mile
UNT unnamed tributary

Fe iron impairment
FC fecal coliform bacteria impairment
M Impairment determined via modeling