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

JUN 17 2016

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 Mr. Mandirola:

The United States Environmental Protection Agency (EPA), Region III, is pleased to approve the Total Maximum Daily Loads (TMDLs) developed for metals (dissolved aluminum, total iron, and total beryllium), pH, and fecal coliform bacteria in the Tygart Valley River 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 the Tygart Valley River Watershed, West Virginia*, to EPA for review and approval on February 11, 2016. 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 Tygart Valley River 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)

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

Decision Rationale
Total Maximum Daily Loads for the Tygart Valley River Watershed, West Virginia

Jon M. Capacasa, Director
Water Protection Division

Date: 6/17/2016

Decision Rationale
Total Maximum Daily Loads for the
Tygart Valley River 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 metals (dissolved aluminum, total iron, and total beryllium), pH, dissolved oxygen, and fecal coliform bacteria in the Tygart Valley River 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 the Tygart Valley River Watershed, West Virginia*, to EPA on February 11, 2016, and was received on February 17, 2016. 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 the Tygart Valley River Watershed, West Virginia*, 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 Tygart Valley River Watershed. West Virginia identified 251 streams in the Tygart Valley River Watershed as impaired due to exceedances of the numeric water quality criteria for metals (dissolved aluminum, total iron, and total beryllium), pH, dissolved oxygen, and fecal coliform bacteria in the Tygart Valley River Watershed. In addition, certain waters in the Tygart Valley River 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 Tygart Valley River Watershed.

Section 10 presents the TMDLs developed for the Tygart Valley River 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 also 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 Tygart Valley River Watershed is located in the high Allegheny Mountains of north-central West Virginia (Figure 3-1) within the Central Appalachian ecoregion. The Tygart Valley River is a major tributary of the Monongahela River, which is a major tributary of the Ohio River that joins the Mississippi River and flows to the Gulf of Mexico. The Tygart Valley River is approximately 140 miles long and its watershed encompasses 1,375 square miles. The Tygart Valley River begins as a mountain stream in Pocahontas County, and ends where the Tygart and West Fork rivers converge to form the Monongahela River at Fairmont, West Virginia. The Tygart Valley River is dammed above the City of Grafton in Taylor County to make Tygart Lake Of the 1,375 total square miles in the watershed, only 1,350 square miles were modeled under this TMDL effort because the Tygart Lake and its unimpaired tributaries were not modeled. The dominant land use for the TMDL watersheds in the Tygart Valley River Watershed is forest, which constitutes 74.21% of the total land use area. Other important modeled land use types are urban/residential (6.64%), forestry (5.50%), agriculture (cropland/pasture, 5.47% combined), grassland (5.24%), and mining/quarry (1.15%), 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 85,000 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 metals (dissolved aluminum, total iron, and total beryllium), pH, dissolved oxygen, 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 51 streams listed as biologically impaired within the Tygart Valley River Watershed. Stressor identification entails reviewing available information, forming and analyzing possible stressor scenarios and implicating causative stressors associated with benthic macroinvertebrate community impact. 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 to address biological impairment. If that analysis demonstrated that impacts on the benthic macroinvertebrate community were caused by exceedance of numeric water quality criteria and could be resolved through attainment of numeric water quality criteria, then TMDLs were developed for those numeric water quality criteria (i.e. if the significant stressors were pH toxicity and aluminum toxicity, then pH and aluminum TMDLs were developed), eliminating any need for biological TMDL development in the future.

Table 4-1 lists 28 waters where the stressor identification process demonstrated that biological impairment caused by metals, pH, sedimentation and fecal coliform bacteria stressors will be resolved through the attainment of total iron, dissolved aluminum, pH, and/or the fecal coliform bacteria numeric 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 sediment impairment identified in the watershed, it was determined that the sediment reductions necessary to ensure the attainment of iron water-quality criteria exceed those that would be needed to address the biological impairment in the Tygart Valley River Watershed. As such, iron TMDLs are acceptable surrogates for the sediment impairment in the watershed.

For the other 23 biologically impaired streams, the stressor identification process did not indicate that TMDLs designed to achieve a numeric water quality criterion 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 pH, metals, 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 for future TMDL development. West Virginia has provided an explanation as to why it chose not to develop TMDLs for ionic stress at this time (Section 4.0).

Sections 5, 6, 7 and 8 discuss the metals (iron, aluminum, and beryllium), pH, dissolved oxygen and fecal coliform bacteria source assessments in the Tygart Valley River Watershed. The technical report has expanded details of the source assessment in the Tygart Valley River Watershed. The sources of metals and sediment in the watershed include: mining permits, bond forfeiture sites, non-mining permits for industrial wastewater discharges, construction stormwater, municipal separate storm sewers (MS4s), and unpermitted sources of mine drainage from abandoned mine lands (AMLs); as well as sediment sources including forestry, oil and gas, roads, agriculture, streambank erosion, and other land disturbance activities. As discussed above, iron TMDLs are appropriate surrogates for biological impairments caused by sediment.

The pH impairments in the watershed have been attributed to legacy mining activities and acid deposition. Beryllium exceedances were only detected in streams when the pH was less than 5 and in watersheds where legacy mining influences were prevalent and the most likely source of beryllium and acidity. Acidity abatement pursuant to the pH TMDLs will create instream pH conditions that limit the solubility of beryllium to the point where the beryllium water quality criterion will be attained. Therefore, the pH TMDLs developed by WVDEP are appropriate surrogates to address the beryllium impairments.

The fecal coliform bacteria sources in the watershed include: wastewater treatment plants (WWTP), combined sewer overflows (CSOs), MS4s, general sewage permits, unpermitted sources, including on-site treatment systems, stormwater runoff, agriculture, and natural background (wildlife). As discussed above, fecal coliform bacteria TMDLs are appropriate surrogates for biological impairments caused by organic enrichment. In general, sources contributing to dissolved oxygen impairments are the same as those for fecal coliform bacteria caused by organic enrichment. Because of the effect of reducing organic loadings, the fecal coliform TMDLs developed by WVDEP are appropriate surrogates for the dissolved oxygen impairments.

Computational Procedures

The Mining Data Analysis System (MDAS) was used to represent the source-response linkage in the Tygart Valley River Watershed TMDL metals (dissolved aluminum, total iron, and total beryllium), pH, dissolved oxygen 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 84 TMDL watersheds were broken into 520 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 three separate MDAS models: iron/sediment, pH/aluminum, 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 simulation period (January 1, 2008 through December 31, 2013). 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 metals (dissolved aluminum and total iron), pH and fecal coliform bacteria in the 251 impaired streams of the Tygart Valley River Watershed. As discussed above, beryllium and dissolved oxygen impairments were addressed with surrogate TMDLs for pH and fecal coliform bacteria, respectively. The TMDLs are shown in Section 10 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 metals (dissolved aluminum, total iron, and total beryllium), pH, dissolved oxygen, 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 various streams of the Tygart Valley River Watershed, warmwater fishery aquatic life use impairments have been determined pursuant to exceedances of dissolved aluminum, total iron, and total beryllium, dissolved oxygen, and/or pH numeric water quality criteria. There are 70 streams with troutwater fishery aquatic life use impairments pursuant to dissolved aluminum, total iron, total beryllium, and/or pH numeric water quality criteria. Water contact recreation and/or public water supply use impairments have also been determined in various waters pursuant to exceedances of numeric water quality criteria for fecal coliform bacteria, pH, dissolved oxygen, and total iron.

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 10 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.

<u>Total Iron TMDLs</u>

WLAs were developed for all point sources permitted to discharge iron under a NPDES permit. Because of the established relationship between iron and Total Suspended Solids (TSS) in the watershed, iron WLAs were provided for facilities with stormwater discharges that are regulated under NPDES permits that contain TSS and/or iron effluent or benchmark values, MS4 facilities, and facilities registered under the General NPDES permit for construction stormwater.

WLAs were also developed for all existing outlets of NPDES permits for mining activities, except for those where reclamation has progressed to the point where existing limitations are based upon the *Post-Mining Area provisions of Subpart E of 40 CFR §434.* There are 48 mining related NPDES permits with 187 associated outlets in the metals impaired waters of the Tygart Valley River Watershed (Figure 5-1). WVDEP and the Division of Water and Waste Management (DWWM) personnel used information contained in the Surface Mining Control and Reclamation Act (SMCRA), Article 3, and NPDES permits to characterize the mining point sources. Information gathered included type of discharge, pump capacities, and drainage areas (including total and disturbed areas). Using this information, the mining point sources were represented in MDAS and assigned individual WLAs.

WLAs were established for 19 bond forfeiture sites with 49 outlets located in the metals impaired TMDL watersheds. In addition to permitted outlets, there are 16 acid mine discharges (seeps) associated with bond forfeiture sites and represented as point sources. Baseline iron conditions were generally established under the same protocols used for active mining operations. In instances where effluent characteristics were not directly available, baseline conditions were established at the technology based effluent limits of 40 CFR 434 and reduced as necessary to attain the TMDL endpoints.

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.

There are two MS4 permits within the watershed including the City of Fairmont and the West Virginia Division of Highways (WVDOH) as presented in Figure 5-3. MS4 source representation was based upon precipitation and runoff from land uses determined from the modified National Land Cover Database 2011 landuse data, the jurisdictional boundary of the city, 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.

There are 230 modeled non-mining NPDES permitted outlets (seven water treatment plant discharges, 19 industrial stormwater discharges regulated by an individual permit, 162 storm water industrial general permit discharges, one solid waste landfill discharge, 38 WV DOH stormwater discharges, and three POTW stormwater discharges) in the watersheds of metals impaired streams (Figure 5-1). The assigned WLAs for all non-mining NPDES outlets allow for continued discharge under existing permit requirements. A complete list of the permits and outlets is provided in Appendix F of the Technical Report.

Total iron LAs were provided for the dominant nonpoint sources of iron in the watershed, including: abandoned mine lands, loadings associated with undisturbed forests and grasslands, and sediment contributions from barren lands, harvested forest, oil and gas well operations, agricultural land uses, residential/urban/road land uses, streambank erosion. 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 9.2.2.

The oil and gas data incorporated into the TMDL model were obtained from the WVDEP GIS coverage. There are 4,577 conventional active oil and gas wells, 60 vertical Marcellus drilling sites, and 165 horizontal Marcellus drilling sites represented in the metals impaired TMDL watersheds addressed in this report. Runoff from unpaved access roads to these wells and disturbed areas around the wells contribute sediment to adjacent streams (Figure 5-5).

The Office of Abandoned Mine Lands and Reclamation (AML&R) identified locations of AML in the Tygart Valley River Watershed. In addition, source tracking efforts were conducted by WVDEP's Division of Water and Waste Management (DWWM) and AML&R to identify AML sources in the watershed (discharges, seeps, portals, and refuse piles). Field data, such as GPS locations, water samples, and flow measurements were collected to represent AML sources and characterize their impact on water quality. In TMDL watersheds with metals and pH impairments, a total of 164.45 miles of AML highwall and 197 seeps associated with legacy mine practices at AML sites were incorporated into the TMDL model (Figure 5-4).

Dissolved Aluminum and pH TMDLs

Source allocations were developed for all modeled subwatersheds contributing to the dissolved aluminum and/or pH impaired streams of the Tygart Valley River Watershed. Substantive sources (e.g., seeps) of total iron were reduced prior to total aluminum reduction because existing in-stream dissolved iron concentrations can significantly reduce pH and consequentially increase dissolved aluminum concentrations. In several stream segments of the Tygart Valley River Watershed, the dissolved aluminum and/or pH TMDL endpoints were not attained after source reductions to iron. Therefore, the total aluminum loading from source water discharges was reduced in combination with acidity reduction (via alkalinity addition) to the extent necessary to attain water quality criteria for both pH and dissolved aluminum. All sources were represented and provided allocations in terms of the total aluminum and net acidity loadings. WLAs were developed for mining and non-mining point source discharges regulated by NPDES permits, including: active mining operations, bond forfeiture sites, multi-sector stormwater, MS4, and Construction Stormwater General Permits. LAs were assigned to: AMLs, barren land, harvested forest, oil and gas well operations, agriculture, undisturbed forest and grasslands, and residential/urban/road land uses.

As discussed above, the pH TMDLs developed by WVDEP are appropriate surrogates to address beryllium impairments.

Fecal Coliform Bacteria TMDLs

WLAs were developed for all facilities permitted to discharge fecal coliform bacteria including MS4s, sewage treatment plants, and CSOs. In the Tygart Valley River Watershed, there are 10 publicly owned treatment works (POTW) that discharge treated effluent at 10 outlets. There are also three permitted stormwater discharges from WWTPs, one individually permitted non-POTW WWTP and nine mining bathhouse facilities discharge to TMDL streams in the Tygart Valley River Watershed. These sources are regulated by NPDES permits that require effluent disinfection and compliance with strict fecal coliform effluent limitations (200 counts/100 ml). Compliant facilities do not cause fecal coliform bacteria impairments because effluent limitations are more stringent than water quality criteria. There are no sanitary sewer overflows (SSOs) within the Tygart Valley River Watershed.

There are two MS4 permits within the watershed including the City of Fairmont and the West Virginia Division of Highways (WVDOH) as presented in Figure 5-3. MS4 source representation was based upon precipitation and runoff from land uses determined from the modified National Land Cover Database 2011 landuse data, the jurisdictional boundary of the city, 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, 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 Tygart Valley River Watershed. There are approximately 10,179 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.

As discussed above, fecal coliform bacteria TMDLs developed by WVDEP are appropriate surrogates to address dissolved oxygen impairments.

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

The Tygart Valley River 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 Tygart Valley River Watershed by using a long period of weather data, (January 1, 2008 -- December 31, 2013) that represented wet, dry, and average flow periods. Figure 9-3 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 Tygart Valley River 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.

Informational public meetings were held in Elkins, WV on May 9, 2012 and in Grafton, WV on May 10, 2012. These meetings 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. Two project update meetings were held in Elkins, WV on May 18, 2015 and in Grafton, WV on May 19, 2015 to provide the public with the projected timeframe for a public release and preliminary findings. Two public meetings were held in Elkins, WV on October 13, 2015 and in Grafton, WV on October 14, 2015 to provide information to stakeholders intended to facilitate comments on the draft TMDLs. Beginning on October 2, 2015, the availability of draft TMDLs was advertised in various local newspapers. Interested parties were invited to submit comments during the public comment period, which began on October 2, 2015 and ended on November 2, 2015. West Virginia did not receive any written comments on the Draft TMDLs.

IV. Discussion of Reasonable Assurance

Reasonable assurance for maintenance and improvement of water quality in the Tygart Valley River 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 11.

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.

There are several active citizen-based watershed associations representing the Tygart mainstem and several of its tributaries in the Tygart Valley River Watershed. These groups include the Save the Tygart Watershed Association, Buckhannon River Watershed Association, Laurel Run Watershed Association, and the Laurel Mountain/Fellowsville Area Watershed Association. Information concerning these associations can be found at: http://www.dep.wv.gov/WWE/getinvolved/WSA_Support/Documents/WVWatershedAssoc.PDF

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.

Within WVDEP, the AML&R manages the reclamation of lands and waters affected by mining prior to the passage of the SMCRA in 1977. Funding for reclamation activities is derived from fees placed on coal mines, which are placed in a fund to distribute to state and federal agencies. In AML impacted areas, project prioritization will consider treatment practicability and sustainability and will be accomplished under a methodology that provides for the efficient application of funds to maximize restoration of fisheries across AML impacted areas of the State.

Attachment 1

Waterbodies and Impairments Addressed in in the Tygart Valley River Watershed TMDL

Stream Name	NHD Code	WVCODE	pH	Al	DO	Fe	Be	FC
Tygart Valley River	WV-MT	WVMT				X		X
Island Run	WV-MT-108	WVMT-36				M		
Beaver Creek	WV-MT-109	WVMT-37	X	X		M		
UNT/Beaver Creek RM 2.02	WV-MT-109-D	WVMT-37-0.6A	M	M		M		
Goose Creek	WV-MT-11	WVMT-4	X	X		X		X
Zebs Creek	WV-MT-112	WVMT-38				M		X
Laurel Run	WV-MT-114	WVMT-39				M		
Big Laurel Run	WV-MT-115	WVMT-40				M		
Little Laurel Run	WV-MT-115-B	WVMT-40-A	X	X		M		
UNT/Tygart Valley River RM 71.66	WV-MT-116	WVMT-40.4				M		
UNT/Tygart Valley River RM 72.55	WV-MT-117	WVMT-40.5	X	X		X		
Grassy Run	WV-MT-119	WVMT-41	X	X		X		
UNT/Grassy Run RM 0.45	WV-MT-119-A	WVMT-41-A	M	M				
Lost Run	WV-MT-12	WVMT-5				M		X
Roaring Creek	WV-MT-120	WVMT-42	X	X		M		
UNT/Roaring Creek RM 4.09	WV-MT-120-I	WVMT-42-0.8A	X	X		X		
Laurel Run	WV-MT-120-L	WVMT-42-A				M		
Flatbush Fork	WV-MT-120-U	WVMT-42-B	X	X		M		
UNT/Flatbush Fork RM 0.78	WV-MT-120-U-3	WVMT-42-B-0.5	X	X		M		
UNT/Flatbush Fork RM 1.80	WV-MT-120-U-4	WVMT-42-B-1	X	X		M		
UNT/Roaring Creek RM 10.51	WV-MT-120-X	WVMT-42-D	M	M		M		
UNT/Roaring Creek RM 11.0	WV-MT-120-Y	WVMT-42-E	X					
UNT/Tygart Valley River RM 76.87	WV-MT-122	WVMT-42.5				X		X
Leading Creek	WV-MT-125	WVMT-43				X		X
UNT/Leading Creek RM 0.47	WV-MT-125-A	WVMT-43-0.5A				M		
Cherry Fork	WV-MT-125-AC	WVMT-43-L				M		
Laurel Run	WV-MT-125-AN	WVMT-43-O				M		X
Craven Run	WV-MT-125-B	WVMT-43-A				M		X
Claylick Run	WV-MT-125-D	WVMT-43-B				M		
Pearcy Run	WV-MT-125-L	WVMT-43-E				M		
Stalnaker Run	WV-MT-125-M	WVMT-43-F				M		
Davis Lick	WV-MT-125-S	WVMT-43-H				X		X

Stream Name	NHD Code	WVCODE	pH	Al	DO	Fe	Be	FC
UNT/Tygart Valley River RM 81.92	WV-MT-136	WVMT-43.8				X		
UNT/Tygart Valley River RM 82.27	WV-MT-137	WVMT-43.9				X		X
Chenoweth Creek	WV-MT-146	WVMT-45				M		X
Isner Creek	WV-MT-146-F	WVMT-45-A						X
Left Fork/Chenoweth Creek	WV-MT-146-Q	WVMT-45-D				M		
Whitman Run	WV-MT-148	WVMT-46				M		
Beaver Creek	WV-MT-151	WVMT-47				M		
Kings Run	WV-MT-152	WVMT-48				M		X
Dodson Run	WV-MT-153	WVMT-49						X
Files Creek	WV-MT-157	WVMT-50				M		
Right Fork/Files Creek	WV-MT-157-D	WVMT-50-A				M		
Left Fork/Files Creek	WV-MT-157-E	WVMT-50-B				M		
UNT/Tygart Valley River RM 92.85	WV-MT-159	WVMT-51.8				X		X
Glady Creek	WV-MT-16	WVMT-6				M		
Plum Run	WV-MT-17	WVMT-7				M		
Sea Run	WV-MT-171	WVMT-56						X
Jones Run	WV-MT-177	WVMT-58				M		X
Wickwire Run	WV-MT-18	WVMT-8				M		X
Dog Run	WV-MT-18-C	WVMT-8-A				M		
UNT/Wickwire Run RM 4.39	WV-MT-18-D	WVMT-8-B				M		
UNT/Wickwire Run RM 5.22	WV-MT-18-E	WVMT-8-C				M		
Otter Creek	WV-MT-20	WVMT-9				M		X
McCall Run	WV-MT-205	WVMT-64-0.5A						X
Dry Run	WV-MT-206	WVMT-63				M		X
Mill Creek	WV-MT-207	WVMT-64				M		X
Right Fork/Mill Creek	WV-MT-207-A	WVMT-64-A				M		X
Meatbox Run	WV-MT-207-N	WVMT-64-E	X	X				
Potatohole Fork	WV-MT-207-P	WVMT-64-F	X	X		M		
UNT/Tygart Valley River RM 105.69	WV-MT-208	WVMT-64.2				X		X
Berkeley Run	WV-MT-24	WVMT-11				X		X
Stewart Run	WV-MT-243	WVMT-75				M		
Shelby Run	WV-MT-24-A	WVMT-11-A				M		X
Long Run	WV-MT-24-B	WVMT-11-B				X		X
Berry Run	WV-MT-24-B-2	WVMT-11-B-1				X		X
Three Fork Creek	WV-MT-25	WVMT-12	X	M		M		X
Conley Run	WV-MT-254	WVMT-77				M		
Ralston Run	WV-MT-258	WVMT-78				M		
Windy Run	WV-MT-259	WVMT-79				M		
Martins Run	WV-MT-25-AA	WVMT-12-E						X
Lick Run	WV-MT-25-AD	WVMT-12-F	X	X		M		

Stream Name	NHD Code	WVCODE	pH	Al	DO	Fe	Be	FC
Birds Creek	WV-MT-25-AE	WVMT-12-H	X	X		M	X	
Squires Creek	WV-MT-25-AE-1	WVMT-12-H-1	X	X		X	X	
UNT/Squires Creek RM 2.40	WV-MT-25-AE-1-B	WVMT-12-H-1-B	X	X		X		
UNT/Birds Creek RM 0.64	WV-MT-25-AE-2	WVMT-12-H-2	X	X		X		
UNT/Birds Creek RM 2.57	WV-MT-25-AE-4	WVMT-12-H-4	M	X				
Fields Creek	WV-MT-25-AF	WVMT-12-G	X	X		X		X
Stony Run	WV-MT-25-AF-1	WVMT-12-G-1				M		
Brains Creek	WV-MT-25-AF-3	WVMT-12-G-2				M		X
UNT/Three Fork Creek RM 2.02	WV-MT-25-C	WVMT-12-0.5A				M		X
Rocky Branch	WV-MT-25-E	WVMT-12-A						X
Little Laurel Run	WV-MT-25-N	WVMT-12-B				M		
Raccoon Creek	WV-MT-25-R	WVMT-12-C	X	X		X		
Cooks Run	WV-MT-25-R-2	WVMT-12-C-1	M	M		M		
Little Raccoon Creek	WV-MT-25-R-5	WVMT-12-C-2				M		X
Laurel Run	WV-MT-25-V	WVMT-12-D				M		X
Scab Run	WV-MT-26	WVMT-13				M		X
Logan Run	WV-MT-264	WVMT-80				M		
Big Run	WV-MT-268	WVMT-81				M		
Pleasant Creek	WV-MT-30	WVMT-15				M		X
Sandy Creek	WV-MT-34	WVMT-18				M		X
Swamp Run	WV-MT-34-D	WVMT-18-B				M		
Glade Run	WV-MT-34-G	WVMT-18-C				M		
Little Cove Run	WV-MT-34-H	WVMT-18-D				M		X
Little Sandy Creek	WV-MT-34-J	WVMT-18-E	X	X		X		
York Run	WV-MT-34-J-13	WVMT-18-E-2				M		X
Right Fork/Little Sandy Creek	WV-MT-34-J-18	WVMT-18-E-4				M		
Tibbs Run	WV-MT-34-J-18-B	WVMT-18-E-4-A				M		
Left Fork/Little Sandy Creek	WV-MT-34-J-19	WVMT-18-E-3	X	X		X	X	
Maple Run	WV-MT-34-J-8	WVMT-18-E-1	X	X		X		
Oldroad Run	WV-MT-34-K	WVMT-18-F				M		
Left Fork/Sandy Creek	WV-MT-34-L	WVMT-18-G				M		X
UNT/Left Fork RM 4.58/Sandy Creek	WV-MT-34-L-10	WVMT-18-G-2				M		X
UNT/Sandy Creek RM 10.47	WV-MT-34-N	WVMT-18-H				M		X
UNT/UNT RM 0.56/Sandy Creek RM 10.47	WV-MT-34-N-1	WVMT-18-H-1	X			M		
Stony Run	WV-MT-38	WVMT-19.5						X
Big Cove Run	WV-MT-39	WVMT-20				M		X
Teter Creek	WV-MT-43	WVMT-23				M		X
Glade Run	WV-MT-43-B	WVMT-23-A				M		X

Stream Name	NHD Code	WVCODE	pH	Al	DO	Fe	Be	FC
Raccoon Creek	WV-MT-43-C	WVMT-23-B				M		X
Stony Run	WV-MT-43-C-5	WVMT-23-B-1				M		X
Brushy Fork	WV-MT-43-H	WVMT-23-C				M		X
Mill Run	WV-MT-43-L	WVMT-23-F				M		X
Jimmy Run	WV-MT-43-M	WVMT-23-G	X			M		
Mill Run	WV-MT-43-S	WVMT-23-H				M		
Laurel Creek	WV-MT-46	WVMT-24				M		
Moats Hollow	WV-MT-46-B	WVMT-24-0.5A				M		
Frost Run	WV-MT-46-C	WVMT-24-A				M		X
Sugar Creek	WV-MT-46-J	WVMT-24-C			X	M		X
Bills Creek	WV-MT-46-J-10	WVMT-24-C-2				M		
Hunter Fork	WV-MT-46-J-24	WVMT-24-C-3.5						X
Long Run	WV-MT-46-J-25	WVMT-24-C-4						X
Glady Creek	WV-MT-46-J-3	WVMT-24-C-0.5				X		X
UNT/Glady Creek RM 3.68	WV-MT-46-J-3-F	WVMT-24-C-0.5-F				M		
Whitman Run	WV-MT-46-J-7	WVMT-24-C-1.5				M		X
Bonica Run	WV-MT-46-K	WVMT-24-B				M		X
Mitchell Run	WV-MT-48	WVMT-25				M		X
Hackers Creek	WV-MT-50	WVMT-26				X		X
Taylor Drain	WV-MT-50-A	WVMT-26-A				X		X
Foxgrape Run	WV-MT-50-B	WVMT-26-B				X		X
Little Hackers Creek	WV-MT-50-C	WVMT-26-C				X		X
Fords Run	WV-MT-51	WVMT-27	X	X		X		X
Shooks Run	WV-MT-53	WVMT-28				M		X
Anglins Run	WV-MT-54	WVMT-29						X
Little Laurel Run	WV-MT-56	WVMT-30				M		
Buckhannon River	WV-MT-62	WVMTB				M		X
Big Run	WV-MT-62-AA	WVMTB-8				X		X
Childers Run	WV-MT-62-AB	WVMTB-9				M		X
Turkey Run	WV-MT-62-AE	WVMTB-10				M		X
Sugar Run	WV-MT-62-AE-3	WVMTB-10-A				M		X
Fink Run	WV-MT-62-AH	WVMTB-11				X		X
Bridge Run	WV-MT-62-AH-10	WVMTB-11-B.7			X	X		X
Sauls Run	WV-MT-62-AH-12	WVMTB-11-C				M		
Brushy Fork	WV-MT-62-AH-4	WVMTB-11-A				X		X
Mud Lick	WV-MT-62-AH-5	WVMTB-11-B				X		X
Wash Run	WV-MT-62-AH-8	WVMTB-11-B.5				M		X
Little Sand Run	WV-MT-62-AN	WVMTB-13			X	M		X
Left Fork/Little Sand Run	WV-MT-62-AN-2	WVMTB-13-A						X
Ratcliff Run	WV-MT-62-AO	WVMTB-14				M		X
Stony Run	WV-MT-62-AP	WVMTB-15				M		X
Hickory Flat Run	WV-MT-62-AR	WVMTB-16				M		X
Cutright Run	WV-MT-62-AS	WVMTB-17				X		X
Lick Run	WV-MT-62-AS-5	WVMTB-17-A				X		X
French Creek	WV-MT-62-AV	WVMTB-18				X		X

Stream Name	NHD Code	WVCODE	pH	Al	DO	Fe	Be	FC
Laurel Fork	WV-MT-62-AV-12	WVMTB-18-D				M		X
Queens Fork	WV-MT-62-AV-12-H	WVMTB-18-D-2				M		
Grassy Creek	WV-MT-62-AV-12-J	WVMTB-18-D-2.5				M		
Kittle Run	WV-MT-62-AV-14	WVMTB-18-E				M		
Morgan Run	WV-MT-62-AV-15	WVMTB-18-F				X		X
Grub Hollow	WV-MT-62-AV-16	WVMTB-18-G				X		X
Brush Run	WV-MT-62-AV-17	WVMTB-18-H				M		X
Little Brush Run	WV-MT-62-AV-17-A	WVMTB-18-H-1				M		
Slab Camp Fork	WV-MT-62-AV-19	WVMTB-18-I				X		X
Left Fork/French Creek	WV-MT-62-AV-24	WVMTB-18-K				M		X
Bull Run	WV-MT-62-AV-7	WVMTB-18-B			X	X		X
Blacklick Run	WV-MT-62-AV-7-B	WVMTB-18-B-2	X	X		X		
Mudlick Run	WV-MT-62-AV-7-C	WVMTB-18-B-3			X	X		X
Grand Camp Run	WV-MT-62-AV-9	WVMTB-18-C	M	X		M		X
Trubie Run	WV-MT-62-AW	WVMTB-19				M		X
Sawmill Run	WV-MT-62-BA	WVMTB-20				X		X
Grassy Run	WV-MT-62-BD	WVMTB-21				M		
Little Laurel Run	WV-MT-62-BF	WVMTB-23				M		
Laurel Run	WV-MT-62-BG	WVMTB-24				M		X
Tenmile Creek	WV-MT-62-BH	WVMTB-25				M		
Right Fork/Tenmile Creek	WV-MT-62-BH-1	WVMTB-25-A				M		X
Panther Creek	WV-MT-62-BN	WVMTB-27	X			M		
Big Run	WV-MT-62-BR	WVMTB-28				M		
Swamp Run	WV-MT-62-CB	WVMTB-29	X	M		M		
Herods Run	WV-MT-62-CC	WVMTB-30	X	M		M		
Right Fork/Buckhannon River	WV-MT-62-CE	WVMTB-31				M		
Marsh Fork	WV-MT-62-CE-21	WVMTB-31-J				M		
UNT/Right Fork RM 12.18/Buckhannon River	WV-MT-62-CE-22	WVMTB-31-K	X					
Millsite Run	WV-MT-62-CE-6	WVMTB-31-D				M		
Left Fork/Right Fork/Buckhannon River	WV-MT-62-CE-8	WVMTB-31-F				M		
Middle Fork/Right Fork/Buckhannon River	WV-MT-62-CE-9	WVMTB-31-G				M		
Left Fork/Buckhannon River	WV-MT-62-CF	WVMTB-32				M		
Beech Run	WV-MT-62-CF-16	WVMTB-32-H				M		
Smooth Rock Lick Run	WV-MT-62-CF-3	WVMTB-32-A	X			M		
Bearcamp Run	WV-MT-62-CF-7	WVMTB-32-D	X			M		
First Big Run	WV-MT-62-E	WVMTB-1				M		X
Cottrill Run	WV-MT-62-J	WVMTB-2				X		X
Big Run	WV-MT-62-L	WVMTB-3				X		X
Lick Shoals Run	WV-MT-62-N	WVMTB-4				M		X
Pecks Run	WV-MT-62-P	WVMTB-5				X		X

Stream Name	NHD Code	WVCODE	pH	Al	DO	Fe	Be	FC
Mud Run	WV-MT-62-P-11	WVMTB-5-C						X
UNT/Pecks Run RM 2.24	WV-MT-62-P-2	WVMTB-5-0.8A				M		X
Little Pecks Run	WV-MT-62-P-6	WVMTB-5-B				M		X
Handy Camp Run	WV-MT-62-U	WVMTB-6				M		
Sand Run	WV-MT-62-V	WVMTB-7				M		X
Laurel Fork	WV-MT-62-V-2	WVMTB-7-A				M		X
Little Laurel Fork	WV-MT-62-V-2-A	WVMTB-7-A-1				M		
Left Fork/Sand Run	WV-MT-62-V-9	WVMTB-7-B				M		X
Laurel Run	WV-MT-68	WVMT-32				M		X
Guyses Run	WV-MT-7	WVMT-2				M		
Middle Fork River	WV-MT-72	WVMTM				X		
White Oak Run	WV-MT-72-AA	WVMTM-8	X			M		
UNT/White Oak Run RM 0.44	WV-MT-72-AA-1	WVMTM-8-A	X	X		M		
Gum Run	WV-MT-72-AB	WVMTM-9						X
UNT/Gum Run RM 1.18	WV-MT-72-AB-2	WVMTM-9-B				M		X
Laurel Creek	WV-MT-72-AE	WVMTM-10				M		X
Brook Run	WV-MT-72-AE-1	WVMTM-10-A	X	X		M		X
Right Fork/Middle Fork River	WV-MT-72-AH	WVMTM-11				X		X
Osborne Run	WV-MT-72-AH-1	WVMTM-11-A				M		
Jackson Fork	WV-MT-72-AH-12	WVMTM-11-D				M		
Jenks Fork	WV-MT-72-AH-13	WVMTM-11-E	X			M		
Laurel Run	WV-MT-72-AH-5	WVMTM-11-B				M		
Laurel Run	WV-MT-72-AH-7	WVMTM-11-C				M		
Kettle Run	WV-MT-72-AK	WVMTM-12	X	X				
Long Run	WV-MT-72-AL	WVMTM-13				M		
Lick Run	WV-MT-72-AT	WVMTM-15	X			M		
Cassity Fork	WV-MT-72-AU	WVMTM-16	X	X		X	X	
Panther Run	WV-MT-72-AU-3	WVMTM-16-A	M	X		X		
UNT/Panther Run RM 0.62	WV-MT-72-AU-3-A	WVMTM-16-A-1	X	X		M		
Mulberry Fork	WV-MT-72-AU-5	WVMTM-16-B	X			M		
Three Forks Run	WV-MT-72-AV	WVMTM-17				M		
Stonecoal Run	WV-MT-72-BA	WVMTM-20	X	X		M		
Pleasant Run	WV-MT-72-BC	WVMTM-21	X			M		
Laurel Run	WV-MT-72-BD	WVMTM-22				M		
Laurel Branch	WV-MT-72-BE	WVMTM-23				M		
Spice Run	WV-MT-72-BG	WVMTM-24				M		
Schoolcraft Run	WV-MT-72-BH	WVMTM-25				M		
Birch Fork	WV-MT-72-BH-2	WVMTM-25-A	X	X		M		
Birch Fork	WV-MT-72-BI	WVMTM-26				M		
Rocky Run	WV-MT-72-BI-2	WVMTM-26-B	X	X		M		
Kittle Creek	WV-MT-72-BJ	WVMTM-27				M		
Mitchell Lick Fork	WV-MT-72-BJ-1	WVMTM-27-A				M		
Hanging Run	WV-MT-72-O	WVMTM-1				M		

Stream Name	NHD Code	WVCODE	pH	Al	DO	Fe	Be	FC
Laurel Run	WV-MT-72-Q	WVMTM-2				M		
Hooppole Run	WV-MT-72-T	WVMTM-3				X		
Devil Run	WV-MT-72-V	WVMTM-4	X	M		M		
Service Run	WV-MT-72-W	WVMTM-5	X					
Hell Run	WV-MT-72-X	WVMTM-6	X	X		M		
Short Run	WV-MT-72-Z	WVMTM-7	X	X		M		
UNT/Tygart Valley River RM 55.89	WV-MT-77	WVMT-33.4				M		
Gower Run	WV-MT-78	WVMT-33.5				M		
UNT/Tygart Valley River RM 58.40	WV-MT-83	WVMT-33.6				X		
Big Run	WV-MT-94	WVMT-34				M		
Mill Creek	WV-MT-96	WVMT-35			X	X		X
UNT/Mill Creek RM 2.11	WV-MT-96-E	WVMT-35-E				M		
Shooks Run	WV-MT-97	WVMT-35.5				M		X

Note:

RM	river mile
UNT	unnamed tributary
pH	acidity impairment
Al	aluminum impairment
DO	dissolved oxygen impairment
Fe	iron impairment
Be	beryllium impairment
FC	fecal coliform bacteria impairment
M	Impairment determined via modeling