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

APR 27 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 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 manganese), selenium, pH, chloride, and fecal coliform bacteria in the Upper Kanawha 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 Select Streams in the Upper Kanawha River Watershed, West Virginia*, 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 Kanawha 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)

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

Jon M. Capacasa, Director
Water Protection Division

Date: 4/27/2015

Decision Rationale
Total Maximum Daily Loads for Selected Streams in the
Upper Kanawha 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 manganese), selenium, pH, chloride, and fecal coliform bacteria in selected streams of the Upper Kanawha 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 Selected Streams in the Upper Kanawha River Watershed, West Virginia*, for final review 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 Selected Streams in the Upper Kanawha 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 Upper Kanawha River watershed. West Virginia

identified 64 streams in the Upper Kanawha River watershed as impaired due to exceedances of some combination of the numeric water quality criteria for metals (iron, dissolved aluminum, and manganese), selenium, pH, chloride, and fecal coliform bacteria,. In addition, certain waters in the Upper Kanawha 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 Upper Kanawha River watershed.

Section 9 presents the TMDLs developed for the Upper Kanawha 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 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 Kanawha River watershed is located in south-central West Virginia (Figure 3-1) and encompasses 519 square miles. Of the 519 total square miles in the watershed, only 105 square miles were modeled under this TMDL effort. The Upper Kanawha River watershed consists of land draining to a segment of the Kanawha River that starts at the confluence of the New and Gauley Rivers, and ends downstream at the confluence of the Elk River in the City of Charleston. Portions of Kanawha, Fayette, and Raleigh counties lie within the watershed. The dominant land use in the Upper Kanawha River watershed is forest, which constitutes 64.63 percent of the total land use area. Other important modeled land use types are mining/quarry (22.52%), urban/residential (5.66%) and grassland (5.13%) 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 6,750 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 (iron, dissolved aluminum, and manganese), selenium, chloride, fecal coliform bacteria, and pH. 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 17 streams listed as biologically impaired within the within Upper Kanawha River 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.

Metals, pH, and fecal coliform bacteria stressors were identified in nine waters that had violations of total iron, dissolved aluminum, pH, chloride, selenium, manganese, 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 Upper Kanawha River watershed. As such, iron TMDLs are acceptable surrogates for the sediment impairment in the watershed.

For the other eight 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 11.3). 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, 6, and 7 discuss the metals, selenium, pH, chloride, and fecal coliform bacteria source assessments in the Upper Kanawha River watershed. The sources of metals and sediment in the watershed include: mining permits, bond forfeiture sites, municipal separate storm sewers (MS4s), non-mining permits for construction stormwater 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. The pH impairments in the watershed have been attributed to legacy mining activities. The sources of chloride include: mining permits and nonpoint source urban/residential impervious land runoff. The fecal coliform bacteria sources in the watershed include: wastewater treatment plants, combined sewer overflows (CSOs), MS4s, general sewage permits, 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 Kanawha River watershed.

Computational Procedures

The Mining Data Analysis System (MDAS) was used to represent the source-response linkage in the Upper Kanawha River watershed TMDL for fecal coliform bacteria, iron, selenium, manganese, chloride, pH, and aluminum. 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 18 TMDL watersheds were broken into 226 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 the MDAS model to simulate loading conditions for the following 5 pollutant groups in the Upper Kanawha River watershed: iron/sediment, aluminum/pH/manganese, chloride, selenium, 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 in-stream 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 (iron, dissolved aluminum, selenium, and manganese), pH, chloride, and fecal coliform bacteria in the 64 impaired streams of the Upper Kanawha River watershed. The TMDLs are shown in Section 9 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, dissolved aluminum, selenium, manganese, chloride, pH 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 Upper Kanawha River watershed, warmwater fishery aquatic life use impairments have been determined pursuant to exceedances of total iron, dissolved aluminum, total selenium, chloride, 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, chloride, total manganese, total selenium, 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 9 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

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 36 mining related NPDES permits with 228 associated outlets in the metals impaired waters of the Upper Kanawha River watershed. 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.

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. 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 no industrial wastewater discharges in the metal impaired streams of the Upper Kanawha River watershed. Sewage treatment facilities for which existing NPDES permits did not contain iron or aluminum effluent limitations were not considered to be substantive metals sources and were not explicitly represented in the model. Baseline iron conditions for bond forfeiture sites were established under the same protocols used for active mining operations. In instances where effluent characteristic were not directly available, baseline conditions were established at the technology based effluent limits of 40 CFR 434 and reduced as needed to attain the TMDL endpoints. A complete list of the permits and outlets in the Kanawha River watershed 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: sediment contributions from barren lands, harvested forest, oil and gas operations, agricultural land uses, residential/urban/road land uses and 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 8.2.2. The oil and gas data incorporated into the TMDL model were obtained from the WVDEP GIS coverage. There are 292 conventional active oil and gas wells (comprising 391.2 acres), one vertical Marcellus drilling site, and no 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 Upper Kanawha 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, chloride, and selenium impairments, a total of 18 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 Upper Kanawha 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 6 stream segments of the Upper Kanawha 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. WLAs were developed for mining and non-mining point source discharges regulated by NPDES permits, including: active mining operations, 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.

Total Manganese TMDL

Where present, WLAs were developed for bond forfeiture sites and LAs were developed for all other sources of manganese. In the watersheds of Horesemill Branch and Sugarcamp Branch, only AMD seeps contribute significant manganese loadings. Reductions of those sources allowed the manganese water quality endpoint to be met.

Fecal Coliform Bacteria TMDLs

WLAs were developed for all facilities permitted to discharge fecal coliform bacteria, including: sewage treatment plants, MS4s and CSOs. In the Upper Kanawha River watershed, there is one publicly owned treatment works (POTW) that discharges treated effluent at one outlet. Six mining bathhouse facilities discharge to TMDL streams in the Upper Kanawha River TMDL watersheds. 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.

The MS4s in the watershed are presented in Figure 5-3. The City of Charleston and WVDOH are MS4 entities 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 land use data, the jurisdictional boundary of the cities, 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 no CSOs or significant SSO discharges in the Upper Kanawha River TMDL watersheds.

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 Kanawha River watershed. There are approximately 1,133 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.

Chloride TMDLs

Source allocations were developed for all modeled subwatersheds contributing to the chloride impaired streams in the watershed. Permitted, high-volume, pumped discharges associated with mining activities dominate receiving stream flow and necessitate WLAs that are based on achievement of the chronic aquatic life protection criterion in the discharge. No other point sources of chloride were identified within the watersheds of chloride impaired streams. Road and impervious surface de-icing activities contribute non-negligible chloride loads to receiving waters and LAs are presented for the urban residential land uses. The modeled chloride loadings for all "background" sources are contained within the aggregated LA for Background and Other Nonpoint Sources.

Selenium TMDLs

Source allocations were developed for all modeled subwatersheds contributing to the 24 selenium impaired streams of the Upper Kanawha River watershed. In order to meet water quality criterion and allow for equitable allocations, reductions to existing sources were first assigned using the following general rules: (1) the loading from in-stream ponds was reduced to water quality criterion end of pipe (5 µg/L selenium); (2) the loading from continuous discharges (including AMD seeps) was reduced to water quality criterion end of pipe; (3) the loading from on bench structures was reduce to water quality criterion end of pipe using a top-down approach in subwatersheds where the model indicated non-attainment.

Using this method ensured that contribution from all sources were weighted equitably and that cumulative load endpoints were met at the most downstream subwatershed for each impaired stream. Reductions in sources affecting impaired headwaters ultimately led to improvements downstream and effectively decreased necessary loading reductions from downstream sources. Nonpoint source reductions did not result in allocated loadings less than natural conditions. Permitted source reductions did not result in allocated loadings to a permittee that would be more stringent than water quality criteria.

WLAs were developed for all mining related point source discharges. WLAs for active mining operations considered the functional characteristics of the permitted outlets (i.e.

precipitation-driven, pumped continuous flow, or commingled) and their respective impacts at high and low flow conditions.

LAs were developed for AMD seeps, background sources, and other nonpoint sources. LAs were divided into several land use categories: undisturbed forest and grasslands; areas disturbed by oil and gas development; and urban, residential, or otherwise developed areas. Loadings associated with AMD seeps were represented as continuous discharges in the model, and were reduced to the water quality criterion. Loadings associated with background and other nonpoint sources were represented but not reduced.

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

The Upper Kanawha 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 Upper Kanawha River watershed by using a long period of weather data, (January 1, 2004 -- December 31, 2009) that represented wet, dry, and average flow periods. Figure 8-3 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 Kanawha River watershed, an explicit MOS of five percent was included to counter uncertainty in the modeling process. An implicit MOS was included in selenium TMDLs because little modeling uncertainty exists. Similarly, an implicit MOS was applied for total iron and chloride TMDLs in certain subwatersheds where mining point sources create an effluent dominated scenario and/or the regulated mining activity encompasses a large percentage of the watershed area.

7. *The TMDLs have been subject to public participation.*

An informational public meeting was held on August 18, 2011 at WVDEP Headquarters in Charleston, 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 project status update meeting was held at WVDEP Headquarters on August 12, 2014 to provide the public with the projected timeframe for a public release and preliminary findings. A public meeting was held on October 22, 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 9, 2014. Interested parties were invited to submit comments during the public comment period, which began on October 9, 2014 and ended on November 10, 2014. West Virginia received comments from Appalachian Mountain Associates and West Virginia Coal Association which were addressed in Section 11.3 of the final TMDL report.

IV. Discussion of Reasonable Assurance

Reasonable assurance for maintenance and improvement of water quality in the Upper Kanawha 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 10.

The MS4 permitting program is being implemented to address stormwater impacts from urbanized areas. West Virginia has developed a General NPDES Permit for MS4 discharges (WV0110625). All of the cities with MS4 permits in subject waters of this report, plus the West Virginia Department of Transportation, WVDOH are registered under the permit. The permit is based upon national guidance and is non-traditional in that it does not contain numeric effluent limitations, but instead proposes Best Management Practices that must be implemented. At permit reissuance, registrants will be expected to specifically describe management practices intended for implementation that will achieve the WLAs prescribed in applicable TMDLs. A mechanism to assess the effectiveness of the BMPs in achieving the WLAs must also be provided. Through consideration of anticipated removal efficiencies of selected BMPs and their areas of application, it is anticipated that this information will allow MS4 permittees to make meaningful predictions of performance under the permit.

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.

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

Impaired Waterbodies and Impairments Addressed in the Upper Kanawha River Watershed TMDL

TMDL Watershed	Stream Name	NHD Code	pH	Fe	Al	Cl	Se	Mn	FC
Mission Hollow (Venable Branch)	Mission Hollow (Venable Branch)	WV-KU-3							X
Mission Hollow (Venable Branch)	Chappel Hollow (Chappel Branch)	WV-KU-3-A							X
Lower Donnally Branch	Lower Donnally Branch	WV-KU-5		X					X
Pointlick Fork	Pointlick Fork	WV-KU-6-F					X		
Pointlick Fork	UNT/Pointlick Fork RM 2.26	WV-KU-6-F-4					X		
Rattlesnake Hollow	Rattlesnake Hollow	WV-KU-6-N					X		
Georges Creek	Georges Creek	WV-KU-8							X
New West Hollow	New West Hollow	WV-KU-19-R-1				X	X		
Toms Fork	Toms Fork	WV-KU-26-AC					X		
Tenmile Fork	Tenmile Fork	WV-KU-26-AD					X		
Tenmile Fork	UNT/Tenmile Fork RM 1.22	WV-KU-26-AD-1					X		
Tenmile Fork	UNT/Tenmile Fork RM 4.17	WV-KU-26-AD-10					X		
Tenmile Fork	UNT/Tenmile Fork RM 3.98	WV-KU-26-AD-9					X		
Wet Branch	Wet Branch	WV-KU-26-E					X		
Longbottom Creek	Longbottom Creek	WV-KU-26-N				X			
Longbottom Creek	Laurel Fork	WV-KU-26-N-5				X			
Coal Fork	Coal Fork	WV-KU-26-U				X	X		
Coal Fork	UNT/Coal Fork RM 4.63	WV-KU-26-U-18				X	X		
Coal Fork	Laurel Fork	WV-KU-26-U-7					X		
Coal Fork	Left Fork/Laurel Fork	WV-KU-26-U-7-E					X		
Coal Fork	UNT/Left Fork RM 1.99/Laurel Fork	WV-KU-26-U-7-E-4					X		
Kellys Creek	Kellys Creek	WV-KU-33		X					X
Kellys Creek	Horsemill Branch	WV-KU-33-B	X	M	M			X	X
Kellys Creek	UNT/Horsemill Branch RM 0.50	WV-KU-33-B-1	X		X				
Kellys Creek	UNT/Horsemill Branch RM 0.83	WV-KU-33-B-2	X	M	X				
Kellys Creek	UNT/Horsemill Branch RM 1.21	WV-KU-33-B-3		M					
Kellys Creek	UNT/Horsemill Branch RM 1.58	WV-KU-33-B-4	X	X	X				
Kellys Creek	Frozen Branch	WV-KU-33-C					X		X
Kellys Creek	Sugarcamp Branch	WV-KU-33-D	X					X	
Kellys Creek	UNT/Sugarcamp Branch RM 0.58	WV-KU-33-D-1		M					
Kellys Creek	Fourmile Fork	WV-KU-33-L		M					
Kellys Creek	Fivemile Fork	WV-KU-33-M		M					
Kellys Creek	UNT/Fivemile Fork RM 1.29	WV-KU-33-M-1		M					
Kellys Creek	Left Fork/Kellys Creek	WV-KU-33-N		M					

TMDL Watershed	Stream Name	NHD Code	pH	Fe	Al	Cl	Se	Mn	FC
Kellys Creek	Slabcamp Hollow	WV-KU-33-N-2		M					
Kellys Creek	UNT/Left Fork RM 2.23/Kellys Creek	WV-KU-33-N-5		M					
Kellys Creek	UNT/UNT RM 0.51/Left Fork RM 2.23/Kellys Creek	WV-KU-33-N-5-A		M					
Kellys Creek	Hurricane Fork	WV-KU-33-O		M			X		X
Kellys Creek	UNT/Hurricane Fork RM 2.11	WV-KU-33-O-1		M					
Kellys Creek	Rich Hollow	WV-KU-33-O-2		M					
Kellys Creek	Goose Hollow	WV-KU-33-P							X
Cedar Creek	Cedar Creek	WV-KU-39-AK	X		X				
Mossy Creek	Mossy Creek	WV-KU-39-BM		M					X
Mossy Creek	Toney Creek	WV-KU-39-BM-10		M					
Mossy Creek	Painter Creek	WV-KU-39-BM-11		M					
Mossy Creek	Long Branch	WV-KU-39-BM-7		M					X
Mossy Creek	Lick Fork	WV-KU-39-BM-8		M					
North Sand Branch	North Sand Branch	WV-KU-39-DG-2		M					X
North Sand Branch	Maple Fork	WV-KU-39-DG-2-A		X					X
North Sand Branch	UNT/Maple Fork RM 1.17	WV-KU-39-DG-2-A-2		M					
North Sand Branch	UNT/Maple Fork RM 1.91	WV-KU-39-DG-2-A-3		M					
North Sand Branch	UNT/North Sand Branch RM 2.56	WV-KU-39-DG-2-E		M					
Hughes Creek	Hughes Creek	WV-KU-42		X			X		
Hughes Creek	Martin Hollow	WV-KU-42-J		M					
Hughes Creek	Barn Hollow	WV-KU-42-K		M			X		
Hughes Creek	Graveyard Hollow	WV-KU-42-L		M			X		
Hughes Creek	Shadrick Fork	WV-KU-42-N		M					
Hughes Creek	Dry Lick Hollow	WV-KU-42-N-3		M					
Hughes Creek	UNT/Dry Lick Hollow RM 0.24	WV-KU-42-N-3-A		M					
Hughes Creek	Sixmile Hollow	WV-KU-42-Q		M			X		
Bullpush Fork	Bullpush Fork	WV-KU-55-F		M			X		
Bullpush Fork	Burnett Hollow	WV-KU-55-F-3		M					X
Bullpush Fork	Riffle Hollow	WV-KU-55-F-5					X		
Fourmile Fork	Fourmile Fork	WV-KU-55-P					X		

Note:

RM	river mile
UNT	unnamed tributary
pH	acidity impairment
Fe	iron impairment
Al	aluminum impairment
Cl	chloride impairment
Se	selenium impairment
Mn	manganese impairment
FC	fecal coliform bacteria impairment
M	Impairment determined via modeling