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

Decision Rationale
Total Maximum Daily Loads for the
Twelvepole Creek Watershed, West Virginia

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Date: _____

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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 effluent limits and other pollution controls do not provide for the attainment of water quality standards. A TMDL establishes a target for the total load of a particular pollutant that a water body can assimilate and divides that load into wasteload allocations (WLA), given to point sources, load allocations (LAs), given to nonpoint sources and natural background, and a margin of safety (MOS), which takes into account any uncertainty. Mathematically, a TMDL is commonly expressed as an equation, shown below.

$$TMDL = \sum WLAs + \sum LAs + MOS$$

This document sets forth the U.S. Environmental Protection Agency, Region III's (EPA's) rationale for approving TMDLs for iron, selenium, aluminum, pH, and fecal coliform bacteria in the Twelvepole Creek Watershed submitted by the West Virginia Department of Environmental Protection (WVDEP). The TMDLs were developed to address impairments of water quality standards as identified on West Virginia's section 303(d) list of water quality-limited segments. WVDEP submitted TMDLs for 194 impaired streams in its report entitled *Total Maximum Daily Loads for the Twelvepole Creek Watershed, West Virginia* (March 2021) (hereinafter referred to as the "TMDL Report"), to EPA for final review and action on March 4, 2021. EPA's decision is based upon its administrative record, which includes the TMDL Report and information in supporting files provided to EPA by WVDEP. EPA has reviewed and determined that the TMDL meets the requirements of section 303(d) of the Clean Water Act and its implementing regulations at 40 CFR Part 130 including but not limited to:

1. TMDLs are designed to implement applicable water quality standards.
2. TMDLs include wasteload allocations and load allocations.
3. TMDLs consider natural background sources.
4. TMDLs consider critical conditions.
5. TMDLs consider seasonal variations.
6. TMDLs include a margin of safety.
7. TMDLs have been subject to public participation.

In addition, EPA has considered and finds acceptable the reasonable assurances set forth in the TMDL Report.

From this point forward, all references in this rationale can be found in West Virginia's TMDL Report, *Total Maximum Daily Loads for the Twelvepole Creek Watershed, West Virginia* (March 2021), unless otherwise noted.

II. Section 303(d) Listing Information

Table 3-3 of the TMDL document presents the waterbodies and impairments for which TMDLs have been developed in the Twelvepole Creek Watershed. West Virginia identified 194 streams in the Twelvepole Creek Watershed as impaired due to exceedances of the numeric water quality criteria for total iron, total selenium, aluminum, pH, and/or fecal coliform bacteria. In addition, as set forth below, the iron and fecal coliform TMDLs address the causes of biological impairment in certain waters in the Twelvepole Creek Watershed that were listed as biologically impaired based on the narrative water quality criteria of 47 CSR §2-3.2.i. EPA notes the 2016 Section 303(d) list remains the operative list until West Virginia's 2018/2020/2022 Section 303(d) list is approved. Nevertheless, it is appropriate for TMDLs to be established for waters in which an impairment is first identified in the course of pre-TMDL monitoring. It is also appropriate for no TMDL to be developed where pre-TMDL monitoring demonstrates a lack of impairment. In the latter instance, the pre-TMDL monitoring may be used as a basis for removing a previously listed impairment from a future Section 303(d) list. Attachment 1 of this Decision Rationale presents the impaired waterbodies in the Twelvepole Creek Watershed for which TMDLs have been established.

Located within the Western Allegheny Plateau and Central Appalachian ecoregions, Twelvepole Creek is a tributary of the Ohio River, which joins the Mississippi and flows to the Gulf of Mexico. The Twelvepole Creek watershed consists of land draining to Twelvepole Creek and its east and west forks, which begin as headwater streams in northern Mingo County, and end at the confluence of Twelvepole Creek and the Ohio River in Ceredo, WV. Twelvepole Creek is approximately 32.5 miles (52.3 km) long from the confluence of the east and west forks to the Ohio River, and its watershed encompasses 442.1 square miles (1145.1 km^2). Two major tributaries of Twelvepole Creek have been dammed to create two large lakes. Beech Fork has been dammed to create Beech Fork Lake, and the East Fork of Twelvepole Creek has been dammed to create East Lynn Lake. For TMDL purposes, each lake is considered an independent water body. Neither lake is considered impaired for metals or fecal coliform bacteria and does not receive TMDL allocations. Flow and pollutant loads from Beech Fork and East Lynn Lakes were included in the modeling effort for TMDL development for receiving waters (Beech Fork and East Fork/Twelvepole Creek, respectively) immediately downstream of the lakes.

The Twelvepole Creek Watershed occupies more than half of Wayne County, as well as portions of Cabell, Lincoln, and Mingo Counties. Cities and towns in the study area are Huntington, Ceredo, Lavalette, Wayne, and East Lynn. The dominant landuse is forest, which constitutes 77.77 percent of the total landuse area. Other important modeled landuse types are grassland (9.31 percent), mining/quarry (4.5 percent) urban/residential (4.34 percent) and forestry (2.23 percent). Individually, all other land cover types compose less than one percent of the total watershed area each. The total population living in the subject watersheds of this report is estimated to be 30,000 people.

III. TMDL Overview

WVDEP developed TMDLs for iron, selenium, aluminum, pH, and fecal coliform bacteria in the Twelvepole Creek Watershed to address 194 streams in the Twelvepole Creek Watershed identified as impaired because they are not achieving West Virginia's numeric water quality criterion for those parameters. The TMDLs for all impairments are shown as daily loads in

Section 10 of the TMDL report. The TMDLs are also represented in Microsoft Excel allocation spreadsheets which provide detailed source allocations and successful TMDL scenarios. These allocation spreadsheets also present the TMDLs as annual loads because they were developed to meet TMDL endpoints under a range of conditions observed throughout the year. The annual loads are divided by 365 days per year to provide a daily load expression for each pollutant of concern. 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 ArcGIS Viewer Project and ESRI StoryMap that explore the spatial relationships among the pollutant sources in the watershed.

In addition to the TMDLs above, the TMDL Report includes TMDLs addressing the causes of biological impairment in 70 streams (78 assessment units) within the watershed. As described in Section 4.0 of the TMDL Report, West Virginia utilized a stressor identification process to determine the primary causes of impairment in the streams listed as biologically impaired within the Twelvepole Creek Watershed based on the narrative water quality criterion of 47 CSR 2–3.2.i. 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 of the TMDL Report lists waters where the stressor identification process demonstrated that biological impairment caused by sedimentation and organic enrichment stressors will be resolved through the attainment of total iron 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 impairments 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 impairments 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 impairments caused by excess sedimentation in the Twelvepole Creek Watershed. As such, iron TMDLs are acceptable surrogates for the sediment impairment in the watershed.[1]

[1] For the 23 biologically impaired streams (26 assessment units) where the stressor identification process did not indicate that TMDLs designed to achieve the numeric water quality criterion for fecal coliform or iron would resolve

Sections 5.0 and 7.0 of the TMDL Report discuss the metals and fecal coliform bacteria source assessments in the Twelvepole Creek Watershed, respectively. The technical report has expanded details of the source assessment in the Twelvepole Creek Watershed.

The sources of metals and sediment in the watershed include mining permits, bond forfeiture sites, non-mining point sources for process wastewater discharges from wastewater treatment plants and industrial manufacturing operations and stormwater discharges associated with industrial and construction activity and unpermitted sources of mine drainage from abandoned mine lands (AMLs); as well as sediment sources including forestry, oil and gas operations, roads, agriculture, streambank erosion, and other land disturbance activities. As discussed above, iron TMDLs are appropriate surrogates for biological impairments caused by sediment.

The fecal coliform bacteria sources in the watershed include publicly owned treatment works (POTWs), combined sewer overflows (CSOs), municipal separate storm sewer systems (MS4s), general sewage permits, unpermitted sources, including on-site treatment systems, direct discharges of untreated sewage, stormwater runoff, agriculture, and natural background (wildlife). As discussed above, fecal coliform bacteria TMDLs are appropriate surrogates for biological impairments caused by organic enrichment.

There are two streams, Camp Creek (WV-OT-21) and Beech Creek (WV-OT-24) in the Twelvepole Creek Watershed that are impaired for both dissolved oxygen and fecal coliform bacteria, both commonly associated with organic enrichment. Excessive amounts of organic matter increase fecal coliform bacteria counts and reduce dissolved oxygen levels. Generally, point and non-point sources contributing to dissolved oxygen impairments are the same as those for fecal coliform. The sources of the fecal coliform appeared likely to be failing septic systems and runoff from residential areas. Implementation of the fecal coliform TMDL will reduce the organic loads from these sources and will resolve the dissolved oxygen impairment in the stream. Section 8.0 of the TMDL Report discusses the dissolved oxygen source assessment.

Additionally, in most cases, the acidic pH impairments in the Twelvepole Creek Watershed coincide with overlapping metals impairments and the TMDLs for pH impairments were developed using an approach where instream metal (iron and aluminum) concentrations were reduced for attainment of iron and aluminum water quality criteria coupled with direct pollutant reductions to offset acid load from acid precipitation and legacy mine sources. Pollutant reductions are measured and expressed in the amount of alkalinity needed to offset the acid load. The mitigation of acid loadings by alkalinity addition coupled with reductions of total aluminum loading from land-based sources are predicted to result in attainment of both dissolved aluminum and pH water quality criteria at all evaluated locations in the pH and dissolved aluminum impaired streams.

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the biological impacts (Appendix K), West Virginia is deferring TMDL development for biological impairments 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 these waters at this time (Section 4.0). Because WVDEP has indicated that it is retaining these waters on the Section 303(d) list for future TMDL development, EPA considers WVDEP's explanation to be informational and not part of WVDEP's submission of TMDLs for approval.

Finally, one stream, Left Fork/Camp Creek (WV-OT-45-Q-2) in the Twelvepole Creek watershed has been listed in the 2016 303(d) list pursuant to the water quality criteria for beryllium, based on pre-TMDL data collected by WVDEP from 2016- 2017. Left Fork/Camp Creek has TMDLs previously developed in 2009 for aluminum, pH, iron, fecal coliform, and biological impairment. Acidity abatement pursuant to the 2009 pH TMDL will create instream pH conditions that limit the solubility of beryllium resulting in precipitation and settling of particulate compounds (i.e., bound to metals hydroxides). Thus the 2009 pH TMDL developed for Left Fork/Camp Creek serves as a surrogate for beryllium water quality criterion nonattainment. Section 5.3 of the TMDL Report discusses the beryllium source assessment.

Computational Procedures

The Mining Data Analysis System (MDAS) was used to represent the source-response linkage in the Twelvepole Creek Watershed TMDL for iron/sediment; aluminum/pH, selenium, 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. Section 9.0 of the TMDL Report discusses the modeling process.

Configuration of the MDAS model involved subdividing the TMDL watershed into subwatershed modeling units connected by stream reaches. 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, 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. 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 total iron; aluminum/pH, total selenium, and fecal coliform bacteria for the 194 impaired streams of the Twelvepole Creek Watershed. The TMDLs are shown in Section 10.0 of the TMDL Report. 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.

IV. Discussion of Regulatory Requirements

1) TMDLs are designed to meet the applicable water quality standards.

EPA regulations at 40 CFR 130.7(c)(1) states that TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS. Water quality standards are state regulations that define the water quality goals of a waterbody. Water quality standards are comprised of three components: (1) designated uses, (2) criteria (numeric or narrative) necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality.

The applicable numeric water quality criteria for iron, selenium and fecal coliform bacteria are discussed in Section 2.2 and shown in Table 2-1 of the TMDL Report, and Table 9-1 shows the TMDL endpoints used to attain water quality standards. Designated uses in the Twelvepole Creek Watershed include propagation and maintenance of aquatic life in warmwater fisheries, water contact recreation, and public water supply. There are no trout waters identified in the Twelvepole Creek Watershed. In various streams in the Twelvepole Creek Watershed, warmwater fishery aquatic life use impairments have been determined pursuant to exceedances of dissolved oxygen, aluminum, iron, selenium, 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, aluminum, selenium, beryllium, and iron.

All West Virginia waters are subject to the narrative criteria in Section 3 of the West Virginia Water Quality Standards. That section, titled *Conditions Not Allowed in State Waters*, contains various general provisions related to water quality. The TMDLs presented in Section 10.0 of the TMDL Report are based upon the EPA-approved water quality criteria that are currently specified in West Virginia's water quality standards regulation. Where there is an applicable numeric criterion for a particular pollutant and uses, it is reasonable to use that criterion as the quantitative implementation of the narrative standard and designated uses. If the West Virginia Legislature adopts water quality standard revisions that alter the basis upon which the TMDL is developed, then the TMDL and allocations may be modified as warranted. Any future water quality standard revision and/or TMDL modification must receive EPA approval prior to implementation. Based on the foregoing, EPA finds the TMDL is designed to meet the applicable water quality standards.

2) TMDLs include wasteload allocations and load allocations.

EPA regulations at 40 CFR §130.2(i) define total maximum daily load (TMDL) as the sum of the wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background. The development of the WLAs and LAs is further discussed below.

Wasteload Allocations

According to Federal regulations at 40 CFR §130.2(h), a WLA is the portion of a receiving water's loading capacity that is allocated to one of its existing or future point sources of pollution. WLAs were developed and assigned[2] for all facilities permitted to discharge iron, selenium or fecal coliform bacteria as described in Sections 5.0 and 7.0.

There are 94 permitted point sources (39 mining permits; 19 reclamation permits; 20 non-mining permits; 15 construction stormwater permits; 1 general permit for stormwater) that discharge metals and/or selenium into the watershed, and there are 8 permitted point sources (1 POTW; 2 mining bathhouse permits; 3 combined sewer overflow permits; 2 general sewage permits) that discharge fecal coliform bacteria into the watershed. Point sources are discussed in sections 5.1 and 7.1 of the TMDL Report. Tables 10-1 through 10-5 of the TMDL Report provide the WLAs for the Twelvepole Creek Watershed for iron, pH, aluminum, selenium, and fecal coliform bacteria, respectively, with detailed WLAs shown in the allocation spreadsheets. Daily loads are based on the annual load divided by 365 days/year. Based on the foregoing, EPA finds that both annual and daily WLAs included in the TMDL satisfy the regulations at 40 CFR Part 130.

WVDEP is authorized to administer the National Pollutant Discharge Elimination System (NPDES) Program, which, among other duties, includes issuing NPDES permits to existing or futures point sources subject to the NPDES program. The effluent limitations in any new or revised NPDES permits must be consistent with "the assumptions and requirements of any available [WLA]" in an approved TMDL pursuant to 40 CFR §122.44 (d)(1)(vii)(B). EPA has authority to object to the issuance of an NPDES permit that is inconsistent with the assumptions and requirements of WLAs established for that point source. It is expected that WVDEP will require periodic monitoring of the point source(s), through the NPDES permit process, in order to monitor and determine compliance with the TMDL's WLAs.

Load Allocations

According to Federal regulations at 40 CFR §130.2(g), a LA is the portion of a receiving water's loading capacity that is attributed either to one of its existing or future nonpoint sources of pollution or to natural background sources. Load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. This requirement is addressed in Sections 5.2, 5.3, and 5.4 of the TMDL Report for metals, beryllium, and selenium, respectively, and in Section 7.2 of the TMDL Report for fecal coliform bacteria[3].

[2] The fact that the TMDL does not assign WLAs to any other sources in the watershed should not be construed as a determination by either EPA or WVDEP that there are no additional sources in the watershed that are subject to the NPDES program.

[3] EPA's approval of this TMDL does not mean that EPA has determined there are no point sources within the land use categories that are assigned load allocations in the TMDL. EPA's review and approval of this TMDL does not represent a determination whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program.

Total iron LAs were provided for the dominant nonpoint sources of iron in the watershed, including: abandoned mine lands, loading associated with sediment contributions from barren land, forestry skid roads and landings, oil and gas well operations, agricultural landuses, and residential/urban/road landuses and streambank erosion in non-MS4 areas; and loading from undisturbed forest and grasslands. Total aluminum LAs included loading from abandoned mine lands, loading associated with acid precipitation influences from background sources, including barren land, harvested forest, oil and gas well operations, agriculture, undisturbed forest and grasslands, and residential/urban/road landuses. Total selenium LAs included undisturbed forest and grasslands and abandoned mine lands. Fecal coliform LAs were assigned to pasture/cropland, on-site sewage systems including failing septic systems, residential loadings associated with urban/residential runoff from non-MS4 areas, and background loadings associated with wildlife sources.

Tables 10-1 through 10-5 of the TMDL Report provide the iron, pH, aluminum, selenium, and fecal coliform bacteria LAs, respectively, for the Twelvepole Creek Watershed with detailed LAs shown in the allocation spreadsheets. Daily loads are based on the annual load divided by 365 days/year. Based on the foregoing, EPA finds that both annual and daily LAs included in the TMDL satisfy the regulations at 40 CFR Part 130.

3) TMDLs consider natural background sources.

According to Federal regulations at 40 CFR §130.2(g & i), natural background sources of pollutants are part of the LA and, wherever possible, natural and nonpoint source loads should be distinguished. The Twelvepole Creek Watershed TMDLs consider the impact of natural background pollutant contributions by evaluating loadings from background sources like undisturbed forest and grasslands and wildlife. MDAS also considers background pollutant contributions by modeling all land uses. Section 7.2.4 of the TMDL Report states that on the basis of the low fecal accumulation rates for forested areas, storm water sampling results, and model simulations, wildlife is not considered to be a significant nonpoint source of fecal coliform bacteria in the watershed. In addition, Sections 9.7.2 and 9.7.3 of the TMDL Report state that loading associated with undisturbed forest and grassland sources are included in the LA. Based on the foregoing, EPA finds the TMDL accounts for natural background sources consistent with the regulations at 40 CFR §130.2(g & i).

4) TMDLs consider critical conditions.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. West Virginia's TMDL Report explains that a critical condition represents a scenario where water quality criteria are most susceptible to violation. Analysis of water quality data for the impaired streams addressed in the Twelvepole Creek Watershed shows high pollutant concentrations during both high- and low-flow thereby precluding selection of a single critical condition. Both high-flow and low-flow periods were taken into account during TMDL development by using a long period of weather data that represented wet, dry, and average flow periods included in a representative six-year simulation period (January 1, 2012 through December 31, 2017). The TMDL Report

addresses this requirement in section 9.7.6. Based on the foregoing, EPA finds that the TMDL accounts for critical conditions consistent with the regulations at 40 CFR §130.7(c)(1).

5) TMDLs consider seasonal variations.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to consider seasonal variations. Seasonal variation was considered in the formulation of the modeling analysis. Continuous simulation (modeling over a period of several years that captured precipitation extremes) inherently considers seasonal hydrologic and source loading variability. The pollutant concentrations simulated on a daily time step by the model were compared with TMDL endpoints. Allocations that met these endpoints throughout the modeling period were developed. The TMDL Report addresses this requirement in section 9.7.5. Based on the foregoing, EPA finds the TMDL has been established at levels necessary to attain and maintain the applicable water quality standards with seasonal variations consistent with the regulations at 40 CFR §130.7(c)(1).

6) TMDLs include a margin of safety.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to include a margin of safety (MOS). The MOS is an accounting of uncertainty about the relationship between pollutant loads and receiving water quality. It can be provided implicitly through analytical assumptions or explicitly by reserving a portion of loading capacity. In the Twelvepole Creek Watershed TMDLs, an explicit five percent MOS was included to counter uncertainty in the modeling process. Long-term water quality monitoring data were used for model calibration. Although these data represented actual conditions, they were not of a continuous time series and might not have captured the full range of instream conditions that occurred during the simulation period. Section 9.6.1 discusses the explicit MOS used in these TMDLs. Based on the foregoing, EPA finds that WVDEP has incorporated a MOS into the TMDL consistent with the regulations at 40 CFR §130.7(c)(1).

7) TMDLs have been subject to public participation.

EPA regulations at 40 CFR §130.7(c)(1)(ii) requires TMDLs to be subject to public review and the State implements a process for involving the public in development of TMDLs. This requirement is addressed in section 12.0 of the TMDL Report. Based on the foregoing, EPA finds that the TMDL has been subject to WVDEP's public participation process.

V. Discussion of Reasonable Assurance

The CWA section 303(d) requires that a TMDL be "established at a level necessary to implement the applicable water quality standard." Documenting adequate reasonable assurance increases the probability that regulatory and voluntary mechanisms will be applied such that the

pollution reduction levels specified in the TMDL are achieved and, therefore, applicable water quality standards are attained.

Where a TMDL is developed for waters impaired by both point and nonpoint sources, in EPA's best professional judgment, determinations of reasonable assurance that the TMDL's LAs will be achieved could include whether practices capable of reducing the specified pollutant load: (1) exist; (2) are technically feasible at a level required to meet allocations; and (3) are likely to be implemented. Where there is a demonstration that nonpoint source load reductions can and will be achieved, a TMDL writer can determine that reasonable assurance exists and, on the basis of that reasonable assurance, allocate greater loadings to point sources.

Reasonable assurance is addressed in section 13.0 of the TMDL Report. Based on the foregoing, EPA finds acceptable the reasonable assurances set forth in the TMDL Report.

Attachment 1

Waterbodies and Impairments Addressed in the Twelvepole Creek Watershed TMDL

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
Twelvepole Creek	WV-OT	Twelvepole Creek	WVO-2			x				x
Twelvepole Creek	WV-OT-1	Krout Creek	WVO-2-0.1A			м				x
Twelvepole Creek	WV-OT-4	Jordans Branch	WVO-2-0.5A			м				x
Twelvepole Creek	WV-OT-4-A	UNT/Jordans Branch RM 0.86				м				
Twelvepole Creek	WV-OT-5	UNT/Twelvepole Creek RM 2.97				м				
Twelvepole Creek	WV-OT-7	Walker Branch	WVO-2-A			м				x
Twelvepole Creek	WV-OT-8	UNT/Twelvepole Creek RM 5.72	WVO-2-A.1			м				x
Twelvepole Creek	WV-OT-10	Bobs Branch	WVO-2-B			м				x
Buffalo Creek	WV-OT-12	Buffalo Creek	WVO-2-C			м				x
Buffalo Creek	WV-OT-12-D	UNT/Buffalo Creek RM 2.21	WVO-2-C-4			м				x
Buffalo Creek	WV-OT-12-F	UNT/Buffalo Creek RM 3.50	WVO-2-C-6			м				x
Twelvepole Creek	WV-OT-14	Haneys Branch	WVO-2-D			м				
Twelvepole Creek	WV-OT-15	Plymale Branch	WVO-2-E			м				
Twelvepole Creek	WV-OT-15-C	UNT/Plymale Branch RM 0.61				м				
Twelvepole Creek	WV-OT-16	UNT/Twelvepole Creek RM 11.09				м				
Twelvepole Creek	WV-OT-17	UNT/Twelvepole Creek RM 11.90	WVO-2-E.6			м				x
Twelvepole Creek	WV-OT-18	UNT/Twelvepole Creek RM 13.38				м				
Twelvepole Creek	WV-OT-19	Newcomb Creek	WVO-2-F			м				

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
Camp Creek	WV-OT-21	Camp Creek	WVO-2-G		x	м				x
Camp Creek	WV-OT-21-A	UNT/Camp Creek RM 0.30				м				
Camp Creek	WV-OT-21-B	Right Fork/Camp Creek	WVO-2-G-1			M				X
Camp Creek	WV-OT-21-B-2	UNT/Right Fork RM 0.66/Camp Creek	WVO-2-G-1-B			M				X
Camp Creek	WV-OT-21-B-5	UNT/Right Fork RM 1.97/Camp Creek				M				
Camp Creek	WV-OT-21-D	UNT/Camp Creek RM 1.16	WVO-2-G-1.4			M				X
Beech Fork	WV-OT-24	Beech Fork	WVO-2-H		X	X				X
Beech Fork	WV-OT-24-C	UNT/Beech Fork RM 2.38	WVO-2-H-0.4			M				X
Beech Fork	WV-OT-24-D	Mays Branch	WVO-2-H-0.5			M				X
Beech Fork	WV-OT-24-H	Millers Fork	WVO-2-H-2			M				X
Beech Fork	WV-OT-24-H-12	Fisher Bowen Branch	WVO-2-H-2-C			M				X
Beech Fork	WV-OT-24-H-18	Left Fork/Millers Fork	WVO-2-H-2-D			M				X
Beech Fork	WV-OT-24-H-22	Fraley Fork	WVO-2-H-2-F			M				X
Beech Fork	WV-OT-24-U	Moxley Branch	WVO-2-H-6							X
Beech Fork	WV-OT-24-V	Long Branch	WVO-2-H-7			M				X
Beech Fork	WV-OT-24-V.2	Moxley Branch	WVO-2-H-7.2			M				
Beech Fork	WV-OT-24-V-3	Camp Branch	WVO-2-H-7-A			M				

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
Beech Fork	WV-OT-24-V-5	UNT/Long Branch RM 2.43				M				
Beech Fork	WV-OT-24-X	Butler Branch	WVO-2-H-8			M				
Beech Fork	WV-OT-24-AB	Grassy Lick	WVO-2-H-10			M				
Beech Fork	WV-OT-24-AD	Bowen Creek	WVO-2-H-11			M				X
Beech Fork	WV-OT-24-AI	Raccoon Creek	WVO-2-H-12			M				X
Beech Fork	WV-OT-24-AI-4	UNT/Raccoon Creek RM 2.20				M				
Beech Fork	WV-OT-24-AY	Wolfpen Branch	WVO-2-H-19			M				X
Beech Fork	WV-OT-24-AU	Right Fork/Beech Fork	WVO-2-H-18			M				X
Beech Fork	WV-OT-24-BC	Turkeycamp Branch	WVO-2-H-20			M				
Beech Fork	WV-OT-24-BG	Nestlow Branch	WVO-2-H-21			M				
Twelvepole Creek	WV-OT-26	Lynn Creek	WVO-2-I			M				X
Twelvepole Creek	WV-OT-35	Big Creek	WVO-2-K			M				X
Twelvepole Creek	WV-OT-37	Garrett Creek	WVO-2-L			M				X
Twelvepole Creek	WV-OT-38	Shoal Branch	WVO-2-M			M				X
Wilson Creek	WV-OT-39	Wilson Creek	WVO-2-N			M				X
Wilson Creek	WV-OT-39-A	Left Fork/Wilson Creek	WVO-2-N-1			M				X
Wilson Creek	WV-OT-39-A-1	Middle Fork/Left Fork/Wilson Creek	WVO-2-N-1-A			M				

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
Twelvepole Creek	WV-OT-44	Toms Creek	WVO-2-O			M				X
East Fork/Twelvepole Creek	WV-OT-45	East Fork/Twelvepole Creek	WVO-2-Q			X				X
East Fork/Twelvepole Creek	WV-OT-45-E	Onemile Creek	WVO-2-Q-2			M				
East Fork/Twelvepole Creek	WV-OT-45-G	Twomile Creek	WVO-2-Q-3			M				
East Fork/Twelvepole Creek	WV-OT-45-G-3	UNT/Twomile Creek RM 1.00				M				
East Fork/Twelvepole Creek	WV-OT-45-L	Newcomb Creek	WVO-2-Q-5			M				X
East Fork/Twelvepole Creek	WV-OT-45-M	Petercave Branch	WVO-2-Q-6			M				X
East Fork/Twelvepole Creek	WV-OT-45-P	Little Lynn Creek	WVO-2-Q-7			M				
East Fork/Twelvepole Creek	WV-OT-45-P-2	Right Fork/Little Lynn Creek	WVO-2-Q-7-A			M				
Camp Creek	WV-OT-45-Q	Camp Creek	WVO-2-Q-8			BC			X	X
Camp Creek	WV-OT-45-Q-2	Left Fork/Camp Creek	WVO-2-Q-8-A					X		XRe
Camp Creek	WV-OT-45-Q-2-A	Tiger Fork	WVO-2-Q-8-A-1							XRe
Camp Creek	WV-OT-45-Q-3	Right Fork/Camp Creek	WVO-2-Q-8-B						X	X
Lynn Creek	WV-OT-45-R	Lynn Creek	WVO-2-Q-9			M				X
Lynn Creek	WV-OT-45-R-1	Battern Fork	WVO-2-Q-9-A			M				X
Lynn Creek	WV-OT-45-R-4	Right Fork/Lynn Creek	WVO-2-Q-9-D			M				X
Lynn Creek	WV-OT-45-R-5	Left Fork/Lynn Creek	WVO-2-Q-9-C			M				X

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
East Fork/Twelvepole Creek	WV-OT-45-W	Laurel Creek/East Fork	WVO-2-Q-10			M				X
East Fork/Twelvepole Creek	WV-OT-45-W-8	Stephens Fork	WVO-2-Q-10-A			M				
East Fork/Twelvepole Creek	WV-OT-45-Z	Brush Creek	WVO-2-Q-11			M				
East Fork/Twelvepole Creek	WV-OT-45-AD	Lick Creek	WVO-2-Q-12			M				
East Fork/Twelvepole Creek	WV-OT-45-AD-4	Right Fork/Lick Creek	WVO-2-Q-12-A			M				
Rich Creek	WV-OT-45-AG	Rich Creek	WVO-2-Q-14			X				
Rich Creek	WV-OT-45-AG-6	Geiger Branch	WVO-2-Q-14- 0.8A			M				
Rich Creek	WV-OT-45-AG-7	Right Fork/Rich Creek	WVO-2-Q-14-A							X
Rich Creek	WV-OT-45-AG-8	Left Fork/Rich Creek	WVO-2-Q-14-B			M				
East Fork/Twelvepole Creek	WV-OT-45-AH	Beechy Branch	WVO-2-Q-15			M				X
East Fork/Twelvepole Creek	WV-OT-45-AJ	Bluelick Branch	WVO-2-Q-16			M				
Cove Creek	WV-OT-45-AK	Cove Creek	WVO-2-Q-17			M				X
Cove Creek	WV-OT-45-AK-9	Trace Fork	WVO-2-Q-17-E							X
East Fork/Twelvepole Creek	WV-OT-45-AM	Alum Fork	WVO-2-Q-17.8			M				X
Kiah Creek	WV-OT-45-AN	Kiah Creek	WVO-2-Q-18			M				X
Kiah Creek	WV-OT-45-AN-3	Little Laurel Creek	WVO-2-Q-18-A			M				
Kiah Creek	WV-OT-45-AN-4	Hurricane Branch	WVO-2-Q-18-A.5			M				

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
Kiah Creek	WV-OT-45-AN-6	Big Laurel Creek	WVO-2-Q-18-B			M				X
Kiah Creek	WV-OT-45-AN-6-C	Dalton Fork	WVO-2-Q-18-B-1			M				
Kiah Creek	WV-OT-45-AN-11	Trough Fork	WVO-2-Q-18-C			M				X
Kiah Creek	WV-OT-45-AN- 11-D	Vance Branch	WVO-2-Q-18-C-1			M				
Kiah Creek	WV-OT-45-AN- 11-F	Tomblin Branch	WVO-2-Q-18-C-2			M				X
Kiah Creek	WV-OT-45-AN-16	Parker Branch	WVO-2-Q-18-D			M				
Kiah Creek	WV-OT-45-AN- 16-A	Left Fork/Parker Branch	WVO-2-Q-18-D-1			M				
Kiah Creek	WV-OT-45-AN- 16-B	Sumate Fork	WVO-2-Q-18-D-2			M				
Kiah Creek	WV-OT-45-AN-20	Rollem Fork	WVO-2-Q-18-E			M				
Kiah Creek	WV-OT-45-AN- 20-C	UNT/Rollem Fork RM 0.92	WVO-2-Q-18-E-3			M				
Kiah Creek	WV-OT-45-AN-21	Frances Creek	WVO-2-Q-18-F			M				X
Kiah Creek	WV-OT-45-AN- 21-D	Pretty Branch	WVO-2-Q-18-F-1			M				X
Kiah Creek	WV-OT-45-AN- 21-E	Sandlick Branch	WVO-2-Q-18-F-2			M				
Kiah Creek	WV-OT-45-AN-22	Witcher Fork	WVO-2-Q-18-F.2			M				X
Kiah Creek	WV-OT-45-AN-24	Copley Trace Branch	WVO-2-Q-18-G			M			X	X
Kiah Creek	WV-OT-45-AN-25	Jims Branch	WVO-2-Q-18-H			M				X
Kiah Creek	WV-OT-45-AN-26	UNT/Kiah Creek RM 11.84	WVO-2-Q-18-I			M				

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
East Fork/Twelvepole Creek	WV-OT-45-AS	Milam Creek	WVO-2-Q-20			M				
East Fork/Twelvepole Creek	WV-OT-45-AS-3	Queenscamp Branch	WVO-2-Q-20-A			M				
East Fork/Twelvepole Creek	WV-OT-45-AS-4	Little Milam Creek	WVO-2-Q-20-B			M				
East Fork/Twelvepole Creek	WV-OT-45-AS-5	Honeytrace Fork	WVO-2-Q-20-C			M				
East Fork/Twelvepole Creek	WV-OT-45-AY	Spry Branch	WVO-2-Q-21.8			M				
East Fork/Twelvepole Creek	WV-OT-45-BA	Devilstrace Branch	WVO-2-Q-21.9			X				
East Fork/Twelvepole Creek	WV-OT-45-BD	Maynard Branch	WVO-2-Q-23			M				X
East Fork/Twelvepole Creek	WV-OT-45-BG	McComas Branch	WVO-2-Q-24			M				X
East Fork/Twelvepole Creek	WV-OT-45-BH	Frank Branch	WVO-2-Q-24.2			M				X
East Fork/Twelvepole Creek	WV-OT-45-BJ	Cranes Nest Branch	WVO-2-Q-25			M				
East Fork/Twelvepole Creek	WV-OT-45-BK	Bluewater Branch	WVO-2-Q-26			XDMR				
East Fork/Twelvepole Creek	WV-OT-45-BP	Wiley Branch	WVO-2-Q-28			M				
East Fork/Twelvepole Creek	WV-OT-45-BP-1	UNT/Wiley Branch RM 0.72	WVO-2-Q-28-A			M				
East Fork/Twelvepole Creek	WV-OT-45-BQ	Honey Branch	WVO-2-Q-29			M				
Laurel Branch	WV-OT-45-BS	Laurel Branch	WVO-2-Q-30			M				
Laurel Branch	WV-OT-45-BS-1	UNT/Laurel Branch RM 0.34	WVO-2-Q-30-A			M			X DMR	
Cub Branch	WV-OT-45-BT	Cub Branch	WVO-2-Q-31			M				X

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
Cub Branch	WV-OT-45-BT-1	Right Fork/Cub Branch	WVO-2-Q-31-A			M				X
East Fork/Twelvepole Creek	WV-OT-45-BU	UNT/East Fork RM 38.31/Twelvepole Creek	WVO-2-Q-31.8			M				X
East Fork/Twelvepole Creek	WV-OT-45-BV	Andy Branch	WVO-2-Q-32			M				
East Fork/Twelvepole Creek	WV-OT-45-BX	Old House Branch	WVO-2-Q-32.8			X				X
East Fork/Twelvepole Creek	WV-OT-45-BY	Caney Fork	WVO-2-Q-33			M				X
East Fork/Twelvepole Creek	WV-OT-45-BY-3	UNT/Caney Fork RM 2.29				M				
East Fork/Twelvepole Creek	WV-OT-45-CA	Pretty Branch	WVO-2-Q-35							X
East Fork/Twelvepole Creek	WV-OT-45-CB	Mare Branch	WVO-2-Q-36			M				X
East Fork/Twelvepole Creek	WV-OT-45-CB-2	UNT/Mare Branch RM 0.97	WVO-2-Q-36-B			M				
East Fork/Twelvepole Creek	WV-OT-45-CC	McCloud Branch	WVO-2-Q-37			M				
East Fork/Twelvepole Creek	WV-OT-45-CG	Big Branch	WVO-2-Q-39			M				
East Fork/Twelvepole Creek	WV-OT-45-CH	Hurricane Branch	WVO-2-Q-40			M				X
East Fork/Twelvepole Creek	WV-OT-45-CI	Hogger Branch	WVO-2-Q-41			M				X
East Fork/Twelvepole Creek	WV-OT-45-CK	Marcum Branch	WVO-2-Q-42.5			M				X
East Fork/Twelvepole Creek	WV-OT-45-CM	Lick Branch	WVO-2-Q-43.5			M				
East Fork/Twelvepole Creek	WV-OT-45-CP	UNT/East Fork RM 48.19/Twelvepole Creek	WVO-2-Q-44.6			M				X
West Fork/Twelvepole Creek	WV-OT-46	West Fork/Twelvepole Creek	WVO-2-P			X				X

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
West Fork/Twelvepole Creek	WV-OT-46-F	Big Branch	WVO-2-P-1			M				X
West Fork/Twelvepole Creek	WV-OT-46-J	Patrick Creek	WVO-2-P-2			M				X
Trace Fork	WV-OT-46-O	Trace Fork	WVO-2-P-4			M				X
Trace Fork	WV-OT-46-O-1	Booth Branch	WVO-2-P-4-0.1A			M				
Trace Fork	WV-OT-46-O-3	Wolf Creek	WVO-2-P-4-A			M				X
Trace Fork	WV-OT-46-O-4	Greenbrier Creek	WVO-2-P-4-B			M				X
Trace Fork	WV-OT-46-O-7	Orchard Branch	WVO-2-P-4-C			M				
West Fork/Twelvepole Creek	WV-OT-46-T	Joels Branch	WVO-2-P-5			M				
West Fork/Twelvepole Creek	WV-OT-46-X	Deephole Branch	WVO-2-P-7			M				X
West Fork/Twelvepole Creek	WV-OT-46-Y	Sycamore Branch	WVO-2-P-8			M				X
West Fork/Twelvepole Creek	WV-OT-46-Z	Flat Branch	WVO-2-P-9			M				X
West Fork/Twelvepole Creek	WV-OT-46-AB	Drift Branch	WVO-2-P-10			M				X
West Fork/Twelvepole Creek	WV-OT-46-AD	Jackson Branch	WVO-2-P-11			M				X
West Fork/Twelvepole Creek	WV-OT-46-AE	Billy Branch	WVO-2-P-12			M				X
West Fork/Twelvepole Creek	WV-OT-46-AL	Martha Noe Branch	WVO-2-P-13							X
West Fork/Twelvepole Creek	WV-OT-46-AN	Big Branch	WVO-2-P-14			M				
West Fork/Twelvepole Creek	WV-OT-46-AR	Ferguson Branch	WVO-2-P-15							X

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
West Fork/Twelvepole Creek	WV-OT-46-AQ	Matty Ferguson Branch	WVO-2-P-14.5	X			X			
West Fork/Twelvepole Creek	WV-OT-46-AS	Donathan Branch	WVO-2-P-15.3			M				
West Fork/Twelvepole Creek	WV-OT-46-AV	UNT/West Fork RM 20.26/Twelvepole Creek	WVO-2-P-15.8			M				X
West Fork/Twelvepole Creek	WV-OT-46-AW	Licklog Branch	WVO-2-P-16			M				
West Fork/Twelvepole Creek	WV-OT-46-AX	Sycamore Branch	WVO-2-P-17			M				X
West Fork/Twelvepole Creek	WV-OT-46-AZ	Big Branch	WVO-2-P-18			M				X
West Fork/Twelvepole Creek	WV-OT-46-BK	Wells Branch	WVO-2-P-19			M				X
West Fork/Twelvepole Creek	WV-OT-46-BM	Missouri Branch	WVO-2-P-20			M				
Moses Fork	WV-OT-46-BN	Moses Fork	WVO-2-P-21			M				X
Moses Fork	WV-OT-46-BN-5	Johnnies Branch	WVO-2-P-21-B.5			M				
Moses Fork	WV-OT-46-BN-8	Right Fork/Moses Fork	WVO-2-P-21-C			M				X
Moses Fork	WV-OT-46-BN-9	Bark Camp Branch	WVO-2-P-21-C.5			M				
West Fork/Twelvepole Creek	WV-OT-46-BP	Arkansas Branch	WVO-2-P-23			M				
West Fork/Twelvepole Creek	WV-OT-46-BQ	Wiley Branch	WVO-2-P-24			M				X
West Fork/Twelvepole Creek	WV-OT-46-BS	Sweetwater Branch	WVO-2-P-25			M				X
West Fork/Twelvepole Creek	WV-OT-46-BS-2	Right Fork/Sweetwater Branch	WVO-2-P-25-B			M				
West Fork/Twelvepole Creek	WV-OT-46-BT	Long Branch	WVO-2-P-26			M				

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
West Fork/Twelvepole Creek	WV-OT-46-BW	Spruce Fork	WVO-2-P-27			M				
West Fork/Twelvepole Creek	WV-OT-46-BX	Gourd Branch	WVO-2-P-28			M				
Turkey Creek	WV-OT-46-BY	Turkey Creek	WVO-2-P-29			XDMR				X
Turkey Creek	WV-OT-46-BY-4	Jacks Fork	WVO-2-P-29-B			XDMR				X
West Fork/Twelvepole Creek	WV-OT-46-CE	Poor Branch	WVO-2-P-33							X
West Fork/Twelvepole Creek	WV-OT-46-CF	Bull Branch	WVO-2-P-34			M				
West Fork/Twelvepole Creek	WV-OT-46-CI	UNT/West Fork RM 39.30/Twelvepole Creek	WVO-2-P-35.3			M				X
West Fork/Twelvepole Creek	WV-OT-46-CJ	Pumpkin Field Branch	WVO-2-P-35.5			M				X
West Fork/Twelvepole Creek	WV-OT-46-CK	Breeden Creek	WVO-2-P-36			X				X
West Fork/Twelvepole Creek	WV-OT-46-CK-4	UNT/Breeden Creek RM 2.17				M				
West Fork/Twelvepole Creek	WV-OT-46-CM	UNT/West Fork RM 41.41/Twelvepole Creek	WVO-2-P-36.5			M				X
West Fork/Twelvepole Creek	WV-OT-46-CN	UNT/West Fork RM 42.13/Twelvepole Creek	WVO-2-P-36.8			M				X
West Fork/Twelvepole Creek	WV-OT-46-CO	Openmouth Branch	WVO-2-P-37			XDMR				
West Fork/Twelvepole Creek	WV-OT-46-CO-1	Left Fork/Openmouth Branch	WVO-2-P-37-A			M				
West Fork/Twelvepole Creek	WV-OT-46-CP	UNT/West Fork RM 43.91/Twelvepole Creek	WVO-2-P-37.1			M				X
West Fork/Twelvepole Creek	WV-OT-46-CS	Trace Branch	WVO-2-P-38			M				X

TMDL Watershed	NHD Code	Stream Name	WV Code	pH	DO	Fe	Al	Be	Se	FC
West Fork/Twelvepole Creek	WV-OT-46-CT	Big Sang Kill	WVO-2-P-39			M				X
West Fork/Twelvepole Creek	WV-OT-46-CT-2	UNT/Big Sang Kill RM 1.42				M				
West Fork/Twelvepole Creek	WV-OT-46-CW	Hogger Run	WVO-2-P-40.5			X				X
West Fork/Twelvepole Creek	WV-OT-46-CZ	Dingess Trace Branch	WVO-2-P-41			M				X
West Fork/Twelvepole Creek	WV-OT-46-DB	Camp Branch	WVO-2-P-42			M				X
West Fork/Twelvepole Creek	WV-OT-46-DF	Moses Fork	WVO-2-P-43			M				X
West Fork/Twelvepole Creek	WV-OT-46-DG	Messenger Branch	WVO-2-P-44	X		X				X

Note:
RM river mile
UNT unnamed tributary
Trout trout stream cold-water fishery
Fe iron impairment
Se selenium impairment
FC fecal coliform bacteria impairment
M impairment determined via modeling
X impairment determined via sampling
X DMR impairment determined via discharge monitoring reports provided by the Division of Mining and Reclamation