



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

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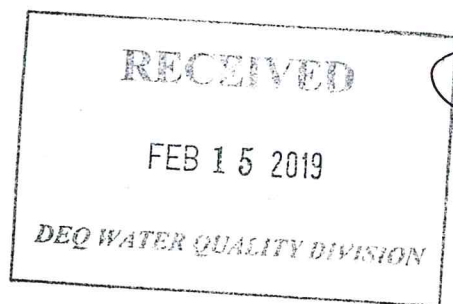
Mr. Tim Davis
Administrator
Water Quality Division
Montana Department of Environmental Quality
P.O. Box 200901
Helena, Montana 59620-0901

Re: Approval of Madison River TMDL Planning Area Nutrient, *E. coli*, and Metals TMDLs

Dear Mr. Davis,

The U.S. Environmental Protection Agency (EPA) has completed review of the total maximum daily loads (TMDLs) submitted by your office on December 19, 2018. In accordance with the Clean Water Act (33 U.S.C. §1251 *et. seq.*) and the EPA's implementing regulations at 40 C.F.R Part 130, the EPA hereby approves Montana's Madison Nutrient, *E. coli*, and Metals TMDLs. The EPA has determined that the separate elements of the TMDLs listed in the enclosure adequately address the pollutants of concern, are designed to attain and maintain applicable water quality standards, consider seasonal variation and include a margin of safety. The EPA's rationale for this action is contained in the enclosure.

Thank you for submitting these TMDLs for our review and approval. If you have any questions, please contact Peter Brumm on my staff at 406-457-5029.



Sincerely,

Darcy O'Connor
Assistant Regional Administrator
Office of Water Protection

Enclosure

EPA Region 8 TMDL Review Form and Decision Document

ENCLOSURE

EPA REGION 8 TMDL REVIEW FORM AND DECISION DOCUMENT

TMDL Document Info:

Document Name:	Madison Nutrient, <i>E. coli</i> , and Metals TMDL and Water Quality Improvement Plan
Submitted by:	Montana Department of Environmental Quality (DEQ)
Date Received:	12/19/2018
Review Date:	12/26/2018
Reviewer:	Peter Brumm
Rough Draft / Public Notice / Final Draft?	Final
Notes:	

Reviewers Final Recommendation(s) to EPA Administrator (used for final draft review only):

- ☒ Approve
☐ Partial Approval
☐ Disapprove
☐ Insufficient Information

Approval Notes to the Administrator: *Based on the review presented below, I recommend approval of the submitted TMDLs.*

<i>TMDL Summary</i>	
<i>Number of TMDLs:</i>	<i>15</i>
<i>Number of Causes Addressed by TMDL:</i>	<i>17</i>
<i>Number of Nutrient TMDLs:</i>	<i>9</i>
<i>Number of Pathogen TMDLs:</i>	<i>1</i>
<i>Number of Metals TMDLs:</i>	<i>5</i>

This document provides a standard format for EPA Region 8 to provide comments to state TMDL programs on TMDL documents submitted to EPA for either formal or informal review. All TMDL documents are evaluated against the TMDL review elements identified in the following 8 sections:

1. Problem Description
 - 1.1. TMDL Document Submittal
 - 1.2. Identification of the Waterbody, Impairments, and Study Boundaries
 - 1.3. Water Quality Standards
2. Water Quality Target
3. Pollutant Source Analysis
4. TMDL Technical Analysis
 - 4.1. Data Set Description
 - 4.2. Waste Load Allocations (WLA)
 - 4.3. Load Allocations (LA)

- 4.4. Margin of Safety (MOS)
- 4.5. Seasonality and variations in assimilative capacity
- 5. Public Participation
- 6. Monitoring Strategy
- 7. Restoration Strategy
- 8. Daily Loading Expression

Under Section 303(d) of the Clean Water Act, waterbodies that are not attaining one or more water quality standard (WQS) are considered “impaired.” When the cause of the impairment is determined to be a pollutant, a TMDL analysis is required to assess the appropriate maximum allowable pollutant loading rate. A TMDL document consists of a technical analysis conducted to: (1) assess the maximum pollutant loading rate that a waterbody can assimilate while maintaining water quality standards; and (2) allocate that assimilative capacity among the known sources of that pollutant. A well written TMDL document will describe a path forward that may be used by those who implement the TMDL recommendations to attain and maintain WQS.

Each of the following eight sections describes the factors that EPA Region 8 staff considers when reviewing TMDL documents. Also included in each section is a list of EPA’s review elements relative to that section, a brief summary of the EPA reviewer’s findings, and the reviewer’s comments and/or suggestions. Use of the verb “must” in this review form denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term “should” below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable.

This review form is intended to ensure compliance with the Clean Water Act and that the reviewed documents are technically sound and the conclusions are technically defensible.

1. Problem Description

A TMDL document needs to provide a clear explanation of the problem it is intended to address. Included in that description should be a definitive portrayal of the physical boundaries to which the TMDL applies, as well as a clear description of the impairments that the TMDL intends to address and the associated pollutant(s) causing those impairments. While the existence of one or more impairment and stressor may be known, it is important that a comprehensive evaluation of the water quality be conducted prior to development of the TMDL to ensure that all water quality problems and associated stressors are identified. Typically, this step is conducted prior to the 303(d) listing of a waterbody through the monitoring and assessment program. The designated uses and water quality criteria for the waterbody should be examined against available data to provide an evaluation of the water quality relative to all applicable water quality standards. If, as part of this exercise, additional WQS problems are discovered and additional stressor pollutants are identified, consideration should be given to concurrently evaluating TMDLs for those additional pollutants. If it is determined that insufficient data is available to make such an evaluation, this should be noted in the TMDL document.

1.1 Document Submittal

When a TMDL document is submitted to EPA requesting review or approval, the submittal package should include a notification identifying the document being submitted and the purpose of the submission.

Review Elements:

- ☒ Each TMDL document submitted to EPA should include a notification of the document status (e.g., pre-public notice, public notice, final), and a request for EPA review.
- ☒ Each TMDL document submitted to EPA for final review and approval should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter should contain such identifying information as the name and location of the waterbody and the pollutant(s) of concern, which matches similar identifying information in the TMDL document for which a review is being requested.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information ☐ N/A

Summary: This TMDL document was submitted to EPA for final review and approval on December 19, 2018. An adequate submittal letter was included.

Comments: EPA was unable to review and take action on the final submittal within the 30-day review period due to the 2019 lapse in EPA funding.

1.2 Identification of the Waterbody, Impairments, and Study Boundaries

The TMDL document should provide an unambiguous description of the waterbody to which the TMDL is intended to apply and the impairments the TMDL is intended to address. The document should also clearly delineate the physical boundaries of the waterbody and the geographical extent of the watershed area studied. Any additional information needed to tie the TMDL document back to a current 303(d) listing should also be included.

Review Elements:

- ☒ The TMDL document should clearly identify the pollutant and waterbody segment(s) for which the TMDL is being established. If the TMDL document is submitted to fulfill a TMDL development requirement for a waterbody on the state's current EPA approved 303(d) list, the TMDL document submittal should clearly identify the waterbody and associated impairment(s) as they appear on the State's/Tribe's current EPA approved 303(d) list, including a full waterbody description, assessment unit/waterbody ID, and the priority ranking of the waterbody. This information is necessary to ensure that the administrative record and the national TMDL tracking database properly link the TMDL document to the 303(d) listed waterbody and impairment(s).
- ☒ One or more maps should be included in the TMDL document showing the general location of the waterbody and, to the maximum extent practical, any other features necessary and/or relevant to the understanding of the TMDL analysis, including but not limited to: watershed boundaries, locations of major pollutant sources, major tributaries included in the analysis, location of sampling points, location of discharge gauges, land use patterns, and the location of nearby waterbodies used to provide surrogate information or reference conditions. Clear and concise descriptions of all key features and their relationship to the waterbody and water quality data should be provided for all key and/or relevant features not represented on the map
- ☒ If information is available, the waterbody segment to which the TMDL applies should be identified/geo-referenced using the National Hydrography Dataset (NHD). If the boundaries of the TMDL do not correspond to the Waterbody ID(s) (WBID), Entity_ID information or reach code (RCH_Code) information should be provided. If NHD data is not available for the waterbody, an alternative geographical referencing system that unambiguously identifies the physical boundaries to which the TMDL applies may be substituted.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: This submittal package contains 15 TMDLs addressing 16 pollutant impairment causes and 17 total impairments causes (including the non-pollutant cause of Chlorophyll-a). The document clearly identifies the waterbody-pollutant combinations for which TMDLs have been established (see summary table below) including nine nutrient-related TMDLs on five streams, five metals TMDLs on three streams, and a single *E. coli* TMDL. Two of the total nitrogen TMDLs are expected to also address related nutrient impairments (i.e., Nitrate/Nitrate and Chlorophyll-a). Table 1-2 in the TMDL document identifies all remaining impairment causes on Montana's 2016 303(d) List, within the Madison TMDL Planning Area, that were not addressed by this TMDL effort.

TMDL Waterbody Impairment Summary Table

Waterbody Description	Waterbody ID	Cause of Impairment	Pollutant Addressed	Resolution
Elk Creek, headwaters to mouth (Madison River)	MT41F002_020	Iron	Iron	2019 TMDL*
		Selenium	Selenium	2019 TMDL*
		Total Nitrogen	Total Nitrogen	2019 TMDL*
		Total Phosphorus	Total Phosphorus	2019 TMDL*
		Nitrate/Nitrite	Total Nitrogen	Addressed by TN TMDL
		Alterations in Stream-Side or Littoral Vegetative Covers	Non-pollutant	Not yet addressed
		Arsenic	N/A	TMDL still needed
		Sedimentation/Siltation	N/A	TMDL still needed
		Turbidity	Non-pollutant	Not yet addressed
		Temperature	N/A	TMDL still needed
Hot Springs Creek, headwaters to mouth (Madison River)	MT41F002_030	Iron	Iron	2019 TMDL*
		Lead	Lead	2019 TMDL*
		Total Nitrogen	Total Nitrogen	2019 TMDL*
		Total Phosphorus	Total Phosphorus	2019 TMDL*
		Low Flow Alterations	Non-pollutant	Not yet addressed
		Sedimentation/Siltation	N/A	TMDL still needed
Moore Creek, springs to mouth (Fletcher Channel), TSS R1W S15	MT41F004_130	<i>E. coli</i>	<i>E. coli</i>	2019 TMDL*
		Total Nitrogen	Total Nitrogen	2019 TMDL*
		Total Phosphorus	Total Phosphorus	2019 TMDL*
		Alterations in Stream-Side or Littoral Vegetative Covers	Non-pollutant	Not yet addressed
		Arsenic	N/A	TMDL still needed
		Sedimentation/Siltation	N/A	TMDL still needed
		Temperature	N/A	TMDL still needed
O'Dell Spring Creek, headwaters to mouth (Madison River)	MT41F004_020	Total Nitrogen	Total Nitrogen	2019 TMDL*
		Alterations in Stream-Side or Littoral Vegetative Covers	Non-pollutant	Not yet addressed
		Arsenic	N/A	TMDL still needed
		Other anthropogenic substrate alterations	Non-pollutant	Not yet addressed
		Physical substrate habitat alterations	Non-pollutant	Not yet addressed
South Meadow Creek, headwaters to mouth (Ennis Lake)	MT41F004_070	Copper	Copper	2019 TMDL*
		Total Nitrogen	Total Nitrogen	2019 TMDL*
		Total Phosphorus	Total Phosphorus	2019 TMDL*
		Chlorophyll-a	Total Nitrogen	Addressed by TN TMDL
		Sedimentation/Siltation	N/A	TMDL still needed

*Indicates current TMDLs submitted by DEQ which is addressed by this 2019 EPA approval action.

Section 2.0 of the TMDL document thoroughly describes the physical, ecological and social characteristics of project area and provides 14 maps conveying various spatial information. All waterbody segments are geo-referenced to the NHD.

Comments: None.

1.3 Water Quality Standards

TMDL documents should provide a complete description of the water quality standards for the waterbodies addressed, including a listing of the designated uses and an indication of whether the uses are being met, not being met, or not assessed. If a designated use was not assessed as part of the TMDL analysis (or not otherwise recently assessed), the documents should provide a reason for the lack of assessment (e.g., sufficient data was not available at this time to assess whether or not this designated use was being met).

Water quality criteria (WQC) are established as a component of water quality standard at levels considered necessary to protect the designated uses assigned to that waterbody. WQC identify quantifiable targets and/or qualitative water quality goals which, if attained and maintained, are intended to ensure that the designated uses for the waterbody are protected. TMDLs result in maintaining and attaining water quality standards by determining the appropriate maximum pollutant loading rate to meet water quality criteria, either directly, or through a surrogate measurable target. The TMDL document should include a description of all applicable water quality criteria for the impaired designated uses and address whether or not the criteria are being attained, not attained, or not evaluated as part of the analysis. If the criteria were not evaluated as part of the analysis, a reason should be cited (e.g. insufficient data were available to determine if this water quality criterion is being attained).

Review Elements:

- ☒ The TMDL must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the anti-degradation policy. (40 C.F.R. §130.7(c)(1)).
- ☒ The purpose of a TMDL analysis is to determine the assimilative capacity of the waterbody that corresponds to the existing water quality standards for that waterbody, and to allocate that assimilative capacity between the identified sources. Therefore, all TMDL documents must be written to meet the existing water quality standards for that waterbody (CWA §303(d)(1)(C)). *Note: In some circumstances, the load reductions determined to be necessary by the TMDL analysis may prove to be infeasible and may possibly indicate that the existing water quality standards and/or assessment methodologies may be erroneous. However, the TMDL must still be determined based on existing water quality standards. Adjustments to water quality standards and/or assessment methodologies may be evaluated separately, from the TMDL.*
- ☒ The TMDL document should describe the relationship between the pollutant of concern and the water quality standard the pollutant load is intended to meet. This information is necessary for EPA to evaluate whether or not attainment of the prescribed pollutant loadings will result in attainment of the water quality standard in question.

- ☒ If a standard includes multiple criteria for the pollutant of concern, the document should demonstrate that the TMDL value will result in attainment of all related criteria for the pollutant. For example, both acute and chronic values (if present in the WQS) should be addressed in the document, including consideration of magnitude, frequency and duration requirements.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: Section 3.0 of the TMDL document explains the general topic of water quality standards and provides relevant citations to state statute and administrative rules. The beneficial uses impaired by each pollutant cause are clearly associated in Table 3-1. Additional information is organized by pollutant group.

Nutrients: Table 5-3 of the TMDL document clearly identifies the numeric nutrient criteria for total nitrogen and total phosphorus, as well as response variable targets like chlorophyll-a and macroinvertebrate indices. These seasonal standards apply July through September. The effect of excess nutrients on beneficial uses is described in Section 5.1 of the TMDL document. Certain forms of excess nitrogen can be toxic to aquatic life and cause blue baby syndrome in infants. In addition, excess nutrients can lead to excess algal growth, which in turn depletes the supply of dissolved oxygen, kills fish, disrupts macroinvertebrate communities, hinders recreational opportunities and increases treatment costs for drinking water facilities. Relying upon a combination of both stressor and response variables provides assurance that beneficial use impairments are correctly identified and addressed. The pollutants of concern are the same pollutants as the applicable numeric nutrient criteria.

E. coli: Table 6-2 of the TMDL document clearly identifies all components (magnitude, duration, frequency) of the numeric *E. coli* water quality criteria for both the recreation season (April-October) and the non-recreation season (November-March). The effect of excess *E. coli* on beneficial uses is described in Section 6.1 of the TMDL document. Excessive amounts of fecal bacteria in surface waters used for recreation increases the risk of pathogen-induced illness to humans such as gastrointestinal, respiratory, and skin issues. *E. coli*, a subset of fecal bacteria, is a commonly used indicator of water quality and human health risk. Thus, a direct relationship exists between the pollutant of concern and the numeric criteria; both are *E. coli*.

Metals: Table 7-3 of the TMDL document clearly identifies the numeric metals criteria for each metal parameter of interest to this project. Most metal parameters have a human health criterion, intended to protect drinking water uses, and both acute and chronic aquatic life criteria designed to protect aquatic life uses across various exposure conditions. Aquatic life criteria for copper and lead vary based on water hardness. These in-stream concentration values are supported by streambed sediment targets to protect general "free from" statements in Montana's narrative criteria and ensure that water chemistry results don't overlook potential toxicity from sediments. These sediment targets were developed by the National Oceanic and Atmospheric Administration (NOAA) and summarized in Table 7-4. Metals standards apply year-round. The effect of excess metals on beneficial uses is described in Section 7.1 of the TMDL document. Elevated concentrations of metals can have a toxic, carcinogenic, or bio-concentrating effect on plants, wildlife and humans. The pollutants of concern are the same pollutants as the applicable numeric metals criteria.

Comments: None.

2. Water Quality Targets

TMDL analyses establish numeric targets that are used to determine whether water quality standards are being achieved. Quantified water quality targets or endpoints should be provided to evaluate each listed pollutant/water body combination addressed by the TMDL, and should represent achievement of applicable water quality standards and support of associated beneficial uses. For pollutants with numeric water quality standards, the numeric criteria are generally used as the water quality target. For pollutants with narrative standards, the narrative standard should be translated into a measurable value. At a minimum, one target is required for each pollutant/water body combination. It is generally desirable, however, to include several targets that represent achievement of the standard and support of beneficial uses (e.g., for a sediment impairment issue it may be appropriate to include a variety of targets representing water column sediment such as TSS, embeddedness, stream morphology, up-slope conditions and a measure of biota).

Review Elements:

- ☒ The TMDL should identify a numeric water quality target(s) for each waterbody pollutant combination. The TMDL target is a quantitative value used to measure whether or not the applicable water quality standard is attained. *Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. Occasionally, the pollutant of concern is different from the parameter that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as a numerical dissolved oxygen criterion). In such cases, the TMDL should explain the linkage between the pollutant(s) of concern, and express the quantitative relationship between the TMDL target and pollutant of concern. In all cases, TMDL targets must represent the attainment of current water quality standards.*
- ☒ When a numeric TMDL target is established to ensure the attainment of a narrative water quality criterion, the numeric target, the methodology used to determine the numeric target, and the link between the pollutant of concern and the narrative water quality criterion should all be described in the TMDL document. Any additional information supporting the numeric target and linkage should also be included in the document.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: All nutrient, *E. coli*, and metal pollutants addressed by this TMDL submittal have corresponding numeric criteria established by Montana water quality standards regulations. These numeric criteria are directly applied as the primary TMDL targets. In addition, some TMDLs employ secondary targets (e.g., streambed sediments for some metals, macroinvertebrate indices for nutrients, etc.). DEQ selected the most stringent criterion as the TMDL target when multiple numeric criteria exist for a pollutant to be protective of all other numeric and narrative water quality standards. In these TMDLs, DEQ considers aquatic life and primary contact recreation to be the most sensitive (i.e.,

coequal) designated uses impacted by nutrient-related pollutants; primary contact recreation to be the most sensitive designated use impacted by *E. coli*; and aquatic life to be the most sensitive designated use impacted by metal pollutants. The full methodology used to determine when targets are met, and thus when beneficial uses are supported, is fully explained in Sections 5.4.1.2, 6.4.1.2, and 7.4.2.1 of the TMDL document.

Comments: None.

3. Pollutant Source Analysis

A TMDL analysis is conducted when a pollutant load is known or suspected to be exceeding the loading capacity of the waterbody. Logically then, a TMDL analysis should consider all sources of the pollutant of concern in some manner. The detail provided in the source assessment step drives the rigor of the pollutant load allocation. In other words, it is only possible to specifically allocate quantifiable loads or load reductions to each identified source (or source category) when the relative load contribution from each source has been estimated. Therefore, the pollutant load from each identified source (or source category) should be specified and quantified. This may be accomplished using site-specific monitoring data, modeling, or application of other assessment techniques. If insufficient time or resources are available to accomplish this step, a phased/adaptive management approach may be appropriate. The approach should be clearly defined in the document.

Review Elements:

- ☒ The TMDL should include an identification of the point and nonpoint sources of the pollutant of concern, including the geographical location of the source(s) and the quantity of the loading, e.g., lbs/per day. This information is necessary for EPA to evaluate the WLA, LA and MOS components of the TMDL.
- ☒ The level of detail provided in the source assessment should be commensurate with the nature of the watershed and the nature of the pollutant being studied. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of both the natural background loads and the nonpoint source loads.
- ☒ Natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g. measured in stream) unless it can be demonstrated that the anthropogenic sources of the pollutant of concern have been identified, characterized, and quantified.
- ☒ The sampling data relied upon to discover, characterize, and quantify the pollutant sources should be included in the document (e.g. a data appendix) along with a description of how the data were analyzed to characterize and quantify the pollutant sources. A discussion of the known deficiencies and/or gaps in the data set and their potential implications should also be included.

Recommendation:

- ☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The pollutant source analysis was performed separately for each pollutant group as described below.

Nutrients: The assessment work to determine the source of nutrient impairments in the Madison TMDL planning area was conducted using monitoring data from 2007-2016, aerial photos, Geographic Information System (GIS) analysis, field work, grazing lease management plans and literature reviews. There is one permitted point source with the potential to discharge nutrients in the TMDL planning area: the Ennis National Fish Hatchery. The U.S. Fish & Wildlife Service operates the hatchery under a general NPDES permit (MTG13008) to discharge pass-through raceway water to Blaine Spring Creek. Prior to 2016, facilities covered under this general permitted were not required to monitor for nutrients in their effluent; therefore, effluent nutrient data for the hatchery did not exist when the nutrient source assessment was conducted, and it is unlikely that available in-stream monitoring data captured potential nutrient pulses associated with periodic cleaning of the raceway and tanks. In 2016, the hatchery began operating a subsurface vertical-flow wetlands treatment system that discharges to an underground drain field. The system is designed to remove nutrients and capture solids during cleanings of the raceways and tanks. The data presented in the source assessment represents pre-treatment contributions from the hatchery. Ultimately, DEQ decided to delay nutrient TMDL development for Blaine Spring Creek due to elevated groundwater concentrations surfacing at the source of the springs and the potential need for site-specific nutrient standards as described on page 5-27 of the TMDL document. Consequently, the hatchery point source is not directly addressed through a current TMDL or specific allocation.

DEQ also reviewed nonpoint sources of nutrients such as silviculture, mining, wildfires, irrigated and dryland cropping, livestock grazing, residential development and subsurface wastewater treatment and disposal, and natural background. DEQ compared spatial and temporal patterns of the monitoring data against the locations and known characteristics of these nonpoint source categories and concluded that the most common and likely sources of nutrients were residential development, subsurface wastewater treatment and disposal, and agriculture. Mining was also identified as a likely source of nutrients unique to Hot Springs Creek due to the high density of abandoned mines in that watershed. The natural background contribution was estimated using median concentration values from DEQ's reference sites in the Middle Rockies Level III Ecoregion (TN = 0.095 mg/L, TP = 0.01 mg/L, NO₃+NO₂ = 0.02 mg/L).

E. coli: The assessment work to determine the source of Moore Creek's *E. coli* impairment was conducted using monitoring data from 2012-2013, aerial photos, GIS analysis, field work, grazing lease management plans and literature reviews. There are no permitted point sources in the Moore Creek watershed, however, DEQ identified the following nonpoint source categories possibly contributing *E. coli* to Moore Creek: agriculture (irrigated cropping and pasture/rangeland/forest grazing); residential development and subsurface wastewater disposal/treatment (individual and community septic systems); recreation and domestic animals; and natural background. DEQ compared spatial and temporal patterns of the monitoring data against the locations and known characteristics of these nonpoint source categories and concluded that cattle grazing in riparian areas is the most likely cause of elevated *E. coli* loading to Moore Creek. The natural background contribution was estimated using monitoring data collected from undeveloped tributaries located nearby in the West Fork Gallatin watershed. DEQ selected the 90th percentile *E. coli* concentration of this dataset (48 cfu/100 mL) to represent background levels in Moore Creek.

Metals: The assessment work to determine the source of metals impairments in the Madison TMDL planning area was conducted using monitoring data from 2011-2013, aerial photos, GIS analysis, field reconnaissance, abandoned mine inventories and literature reviews. There are approximately 60 abandoned mines located within the planning area's metals impaired watersheds and DEQ determined that historical mining is the principal human-caused source of excess metals loading. Hot Springs Creek is the only watershed with active mining which includes a number of small miner exclusion operations and a single open-cut gravel operation run by the county road department. Existing state-issued permits require these operations to protect surface water quality and their metals loading contribution is likely minimal. A semi-active gold mine also exists in the Hot Springs Creek watershed. The Majesty Mine has an effective operating permit issued through DEQ's Hard Rock Mining Bureau (operating permit #00162) but does not have a NPDES permit to discharge to surface waters and has not processed ore in the last 15 years.

DEQ also reviewed non-mining sources of metals. For instance, elevated iron samples were positively correlated with suspended solid concentrations indicating a potential link between iron impairments and activities that contribute to the erosion of iron-laden sediment into waterways, such as cattle grazing and other forms of riparian disturbance. The natural background contribution was estimated using monitoring data collected from Moore Creek which has a similar geologic makeup but experienced significantly less mining than the watersheds containing metals impaired streams addressed by TMDLs. DEQ selected the 75th percentile concentration of this dataset to represent background metals levels.

Comments: None.

4. TMDL Technical Analysis

TMDL determinations should be supported by an analysis of the available data, discussion of the known deficiencies and/or gaps in the data set, and an appropriate level of technical analysis. This applies to all of the components of a TMDL document. It is vitally important that the technical basis for all conclusions be articulated in a manner that is easily understandable and readily apparent to the reader.

A TMDL analysis determines the maximum pollutant loading rate that may be allowed to a waterbody without violating water quality standards. The TMDL analysis should demonstrate an understanding of the relationship between the rate of pollutant loading into the waterbody and the resultant water quality impacts. This stressor → response relationship between the pollutant and impairment and between the selected targets, sources, TMDLs, and load allocations needs to be clearly articulated and supported by an appropriate level of technical analysis. Every effort should be made to be as detailed as possible, and to base all conclusions on the best available scientific principles.

The pollutant loading allocation is at the heart of the TMDL analysis. TMDLs apportion responsibility for taking actions by allocating the available assimilative capacity among the various point, nonpoint, and natural pollutant sources. Allocations may be expressed in a variety of ways, such as by individual discharger, by tributary watershed, by source or land use category, by land parcel, or other appropriate scale or division of responsibility.

The pollutant loading allocation that will result in achievement of the water quality target is expressed in the form of the standard TMDL equation:

$$TMDL = \sum WLA_s + \sum LA_s + MOS$$

Where:

TMDL = Total Maximum Daily Load (also called the Loading Capacity)
LA_s = Load Allocations
WLA_s = Wasteload Allocations
MOS = Margin Of Safety

Review Elements:

- ☒ A TMDL must identify the loading capacity of a waterbody for the applicable pollutant, taking into consideration temporal variations in that capacity. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).
- ☒ The total loading capacity of the waterbody should be clearly demonstrated to equate back to the pollutant load allocations through a balanced TMDL equation. In instances where numerous LA, WLA and seasonal TMDL capacities make expression in the form of an equation cumbersome, a table may be substituted as long as it is clear that the total TMDL capacity equates to the sum of the allocations.
- ☒ The TMDL document should describe the methodology and technical analysis used to establish and quantify the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.
- ☒ It is necessary for EPA staff to be aware of any assumptions used in the technical analysis to understand and evaluate the methodology used to derive the TMDL value and associated loading allocations. Therefore, the TMDL document should contain a description of any important assumptions (including the basis for those assumptions) made in developing the TMDL, including but not limited to:

- the spatial extent of the watershed in which the impaired waterbody is located and the spatial extent of the TMDL technical analysis;
- the distribution of land use in the watershed (e.g., urban, forested, agriculture);
- a presentation of relevant information affecting the characterization of the pollutant of concern and its allocation to sources such as population characteristics, wildlife resources, industrial activities etc...;
- present and future growth trends, if taken into consideration in determining the TMDL and preparing the TMDL document (e.g., the TMDL could include the design capacity of an existing or planned wastewater treatment facility);
- an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for

sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

- ☒ The TMDL document should contain documentation supporting the TMDL analysis, including an inventory of the data set used, a description of the methodology used to analyze the data, a discussion of strengths and weaknesses in the analytical process, and the results from any water quality modeling used. This information is necessary for EPA to review the loading capacity determination, and the associated load, wasteload, and margin of safety allocations.
- ☒ TMDLs must take critical conditions (e.g., stream flow, loading, and water quality parameters, seasonality, etc...) into account as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable critical conditions and describe the approach used to determine both point and nonpoint source loadings under such critical conditions. In particular, the document should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.
- ☒ Where both nonpoint sources and NPDES permitted point sources are included in the TMDL loading allocation, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document must include a demonstration that nonpoint source loading reductions needed to implement the load allocations are actually practicable [40 CFR 130.2(i) and 122.44(d)].

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The TMDL submittal contains all the necessary documentation supporting the TMDL analysis, such as clear descriptions of the inputs and equations used to derive all TMDLs and allocations. Furthermore, these calculations are presented in the document as step-by-step instructions that are easily reproducible and understood. The primarily technical method followed is best described as a weight of evidence approach with mass balance investigations. DEQ compared spatial and temporal patterns of the monitoring data against the locations and known characteristics of point and nonpoint source and interpreted reasonable conclusions from the results. Point sources were characterized by their discharge and NPDES permit information, if applicable. Nonpoint sources were quantified by category (e.g., septic systems or mines) and/or by land use (e.g., crop production, grazing or forestry). Additionally, for nutrient TMDLs DEQ used a computer model to estimate loading from septic systems. A full explanation of the MEANSS model is included in Appendix B. Overall, this technical approach allowed DEQ to identify the most likely source(s) causing each impairment which is needed to guide future restoration efforts as described in Section 8.0 of the TMDL document.

Comments: None.

4.1 Data Set Description

TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis. An inventory of the data used for the TMDL analysis should be provided to document, for the record, the data used in decision making. This also provides the reader with the opportunity to independently review the data. The TMDL analysis should make use of all readily available data for the waterbody under analysis unless the TMDL writer determines that the data are not relevant or appropriate. For relevant data that were known but rejected, an explanation of why the data were not utilized should be provided (e.g., samples exceeded holding times, data collected prior to a specific date were not considered timely, etc...).

Review Elements:

- ☒ TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis such that the water quality impairments are clearly defined and linked to the impaired beneficial uses and appropriate water quality criteria.
- ☒ The TMDL document submitted should be accompanied by the data set utilized during the TMDL analysis. If possible, it is preferred that the data set be provided in an electronic format and referenced in the document. If electronic submission of the data is not possible, the data set may be included as an appendix to the document.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The water quality datasets utilized during the TMDL analyzes are summarized throughout the TMDL document and provided in their entirety in Appendix A. This primarily includes water samples for each pollutant cause collected by DEQ at multiple sites along impaired waterbodies from 2011-2014. In addition to water samples, DEQ collected algal and macroinvertebrate samples for nutrient assessment and TMDL purposes and analyzed metals concentrations in stream sediments for metals assessment TMDL purposes. Water monitoring conducted by the USGS and the Madison Stream Team were also utilized.

A significant amount of supplemental data and other information was used for impairment determinations, source assessments, and TMDL development such as BLM and USFS grazing allotment management plans, discharge monitoring reports, abandoned mine land inventories, USDA cropland information, and USGS geologic maps. These resources are fully cited in Section 11.0 of the TMDL document.

Comments: None.

4.2 Waste Load Allocations (WLA)

Waste Load Allocations represent point source pollutant loads to the waterbody. Point source loads are typically better understood and more easily monitored and quantified than nonpoint source loads. Whenever practical, each point source should be given a separate waste load allocation. All NPDES permitted dischargers that discharge the pollutant under analysis directly to the waterbody should be identified and given separate waste load allocations. The finalized WLAs are required to be incorporated into future NPDES permit renewals.

Review Elements:

- ☒ EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit. If no allocations are to be made to point sources, then the TMDL should include a value of zero for the WLA.
- ☒ All NPDES permitted dischargers given WLA as part of the TMDL should be identified in the TMDL, including the specific NPDES permit numbers, their geographical locations, and their associated waste load allocations.

Recommendation:

- ☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: The TMDL document clearly identifies and reviews the potential impact of all NPDES dischargers to applicable TMDL waterbodies. There are no point sources discharging to streams assigned nutrient or *E. coli* TMDLs in this document; no WLAs were established and the allowable WLA is considered zero in these watersheds.

Each metals TMDL was assigned a composite WLA to abandoned mines and other human-caused sources. These WLAs were determined by calculating the difference between the TMDL and the natural background load allocation in the absence of active mines or other allocations. This lumped WLA strategy follows longstanding practice in EPA Region 8 and was pursued here because the available data is not refined enough to identify loading from individual sources and out of recognition that many abandoned mine sites contain features regulatorily defined as point sources (e.g., discharging adits).

Active mining operations in the Hot Springs Creek watershed were assigned a LA, not a WLA, because they have no identified pollutant loading to surface water that would be considered a point source and thus do not require coverage under a NPDES permit.

Comments: None.

4.3 Load Allocations (LA)

Load allocations include the nonpoint source, natural, and background loads. These types of loads are typically more difficult to quantify than point source loads, and may include a significant degree of uncertainty. Often it is necessary to group these loads into larger categories and estimate the loading rates based on limited monitoring data and/or modeling results. The background load represents a composite of all upstream pollutant loads into the waterbody. In addition to the upstream nonpoint and upstream natural load, the background load often includes upstream point source loads that are not given specific waste load allocations in this particular TMDL analysis. In instances where nonpoint source loading rates are particularly difficult to quantify, a performance-based allocation approach, in which a detailed monitoring plan and adaptive management strategy are employed for the application of BMPs, may be appropriate.

Review Elements:

- ☒ EPA regulations require that TMDL expressions include LAs which identify the portion of the loading capacity attributed to nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Load allocations may be included for both existing and future nonpoint source loads. Where possible, load allocations should be described separately for natural background and nonpoint sources.
- ☒ Load allocations assigned to natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g., measured in stream) unless it can be demonstrated that the anthropogenic sources of the pollutant of concern have been identified and given proper load or waste load allocations.

Recommendation:

- ☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: A LA for natural background sources was assigned to each Madison TMDL and was derived using a conservative statistical representation of a reference, or less disturbed, dataset for each pollutant group (i.e., nutrients = median of reference dataset; *E. coli* = 75th percentile of less disturbed dataset; metals = 90th percentile of less disturbed dataset). No reductions were assigned to natural background LAs since none are expected.

Human-caused nonpoint sources were quantified by category (e.g., septic systems or mines) or land use (e.g., crop production, grazing or forestry). These nonpoint source groups were examined individually during the source analysis, then were often combined into one composite, human-caused LA for allocation purposes due to the increasing uncertainty associated with further refining the allocation and given the expectation that the more descriptive source analysis results will provide the necessary guidance for future restoration activities. Each human-caused LA was calculated as the difference between the TMDL and all other allocations. All loading reductions called for in the nutrient and *E. coli* TMDLs come from this LA category and will be achieved through voluntary BMP implementation.

Active mining operations in the Hot Springs Creek watershed were assigned a LA, not a WLA, for the metals TMDLs because they have no identified pollutant loading to surface water that would be

considered a point source and do not require coverage under a NPDES permit. DEQ established these allocations to cover all active mining activities within the watershed (i.e., Majesty Mine, small miner exclusion operations, and open-cut gravel operations) and draw distinctions between the contributions from abandoned mines. The LAs for active mines were set to zero because there shouldn't be any loading to surface waters if the conditions of their current operating (non-NPDES) permits are met.

Comments: None.

4.4 Margin of Safety (MOS)

Natural systems are inherently complex. Any mathematical relationship used to quantify the stressor → response relationship between pollutant loading rates and the resultant water quality impacts, no matter how rigorous, will include some level of uncertainty and error. To compensate for this uncertainty and ensure water quality standards will be attained, a margin of safety is required as a component of each TMDL. The MOS may take the form of an explicit load allocation (e.g., 10 lbs/day), or may be implicitly built into the TMDL analysis through the use of conservative assumptions and values for the various factors that determine the TMDL pollutant load → water quality effect relationship. Whether explicit or implicit, the MOS should be supported by an appropriate level of discussion that addresses the level of uncertainty in the various components of the TMDL technical analysis, the assumptions used in that analysis, and the relative effect of those assumptions on the final TMDL. The discussion should demonstrate that the MOS used is sufficient to ensure that the water quality standards would be attained if the TMDL pollutant loading rates are met. In cases where there is substantial uncertainty regarding the linkage between the proposed allocations and achievement of water quality standards, it may be necessary to employ a phased or adaptive management approach (e.g., establish a monitoring plan to determine if the proposed allocations are, in fact, leading to the desired water quality improvements).

Review Elements:

- ☒ TMDLs must include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d) (1) (C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit (i.e., incorporated into the TMDL through conservative assumptions in the analysis) or explicit (i.e., expressed in the TMDL as loadings set aside for the MOS).
- ☒ If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS should be identified and described. The document should discuss why the assumptions are considered conservative and the effect of the assumption on the final TMDL value determined.
- ☐ If the MOS is explicit, the loading set aside for the MOS should be identified. The document should discuss how the explicit MOS chosen is related to the uncertainty and/or potential error in the linkage analysis between the WQS, the TMDL target, and the TMDL loading rate.
- ☐ If, rather than an explicit or implicit MOS, the TMDL relies upon a phased approach to deal with large and/or unquantifiable uncertainties in the linkage analysis, the document should include a description of the planned phases for the TMDL as well as a monitoring plan and adaptive management strategy.

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: MOS considerations are described separately for each pollutant group in Sections 5.9.2, 6.9.2, and 7.8.2 of the TMDL document. Each TMDL addressed uncertainty with an implicit MOS which used conservative assumptions throughout the TMDL development process. For example, allowable exceedances of criteria were not incorporated into the calculation of allowable loads. Additionally, true reductions needed from anthropogenic sources may be less than what is called for in the TMDL document because the natural background contribution was conservatively calculated. Other assumptions are detailed in the specific pollutant group sections referenced above.

Comments: None.

4.5 Seasonality and Variations in Assimilative Capacity

The TMDL relationship is a factor of both the loading rate of the pollutant to the waterbody and the amount of pollutant the waterbody can assimilate and still attain water quality standards. Water quality standards often vary based on seasonal considerations. Therefore, it is appropriate that the TMDL analysis consider seasonal variations, such as critical flow periods (high flow, low flow), when establishing TMDLs, targets, and allocations.

Review Elements:

☒ The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variability as a factor. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Recommendation:

☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: Seasonality considerations are described separately for each pollutant group in Sections 5.9.1, 6.9.1, and 7.8.1 of the TMDL document. Nutrient and *E. coli* water quality criteria were seasonally defined to coincide with impacts to designated uses. Nutrient standards were established to be more stringent during the summer season (July 1-September 30) when algal growth is high and impacts to aquatic life and recreation are most severe. *E. coli* standards are also more stringent during an expanded summer season (April 1-October 31) when bacterial growth is high and water-based recreation is common. DEQ focused monitoring and source analysis work during these timeframes and ultimately chose the more stringent summer criteria for nutrient and *E. coli* TMDL targets as a protective measure.

Metals water quality criteria do not vary according to specific dates, however, aquatic life criteria for copper and lead depend on water hardness which may vary seasonally. DEQ further considered seasonality by reviewing sources and including metals TMDLs for both high and low flow conditions when impairments occurred. This was done because metals loading pathways change from high to low flow conditions. During high flows, overland flow and erosion of metals-contaminated soils and mine wastes tend to be the major cause of elevated metals concentrations. During low flow, groundwater and/or adit discharges may be more significant contributors of elevated metals concentrations.

Additionally, all TMDLs were established as a function of flow using an equation that incorporates seasonal variability into the loading capacity.

Comments: None.

5. Public Participation

EPA regulations require that the establishment of TMDLs be conducted in a process open to the public, and that the public be afforded an opportunity to participate. To meaningfully participate in the TMDL process it is necessary that stakeholders, including members of the general public, be able to understand the problem and the proposed solution. TMDL documents should include language that explains the issues to the general public in understandable terms, as well as provides additional detailed technical information for the scientific community. Notifications or solicitations for comments regarding the TMDL should be made available to the general public, widely circulated, and clearly identify the product as a TMDL and the fact that it will be submitted to EPA for review. When the final TMDL is submitted to EPA for approval, a copy of the comments received by the state and the state responses to those comments should be included with the document.

Review Elements:

- ☒ The TMDL must include a description of the public participation process used during the development of the TMDL (40 C.F.R. §130.7(c)(1)(ii)).
- ☒ TMDLs submitted to EPA for review and approval should include a summary of significant comments and the State's/Tribe's responses to those comments.

Recommendation:

- ☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: This TMDL document was available for public comment from September 19th to October 19th, 2018. On September 26th a public meeting was held at the Madison Valley Public Library to summarize the TMDLs, answer questions and solicit public input on the document. The public comment period and meeting were advertised in two area newspapers, the Bozeman Daily Chronicle and the Madisonian, notices were posted on DEQ's website, and were also announced through stakeholder email distributions. Electronic copies of the draft TMDL document were made available on DEQ's website and at the Madison Valley Public Library. No public comments were received.

Prior to the official public release of the draft TMDL document, DEQ convened a watershed advisory group comprised of volunteers from diverse interest groups, as required by State law. Advisory group participants provided feedback throughout the TMDL development process. That engagement process culminated with a four-week stakeholder review period during the summer of 2018. Stakeholder comments provided during that time period were incorporated into the final TMDL.

Comments: None.

6. Monitoring Strategy

TMDLs may have significant uncertainty associated with the selection of appropriate numeric targets and estimates of source loadings and assimilative capacity. In these cases, a phased TMDL approach may be necessary. For Phased TMDLs, it is EPA's expectation that a monitoring plan will be included as a component of the TMDL document to articulate the means by which the TMDL will be evaluated in the field, and to provide for future supplemental data that will address any uncertainties that may exist when the document is prepared.

Review Elements:

- ☐ When a TMDL involves both NPDES permitted point source(s) and nonpoint source(s) allocations, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring.
- ☐ Under certain circumstances, a phased TMDL approach may be utilized when limited existing data are relied upon to develop a TMDL, and the State believes that the use of additional data or data based on better analytical techniques would likely increase the accuracy of the TMDL load calculation and merit development of a second phase TMDL. EPA recommends that a phased TMDL document or its implementation plan include a monitoring plan and a scheduled timeframe for revision of the TMDL. These elements would not be an intrinsic part of the TMDL and would not be approved by EPA, but may be necessary to support a rationale for approving the TMDL.

Recommendation:

☐ Approve ☐ Partial Approval ☐ Disapprove ☒ N/A

Summary: The TMDL document outlines a monitoring strategy with recommendations that were provided to help strengthen the source assessment, increase the available data, ensure consistency with future data collection methods, and track restoration effectiveness. The strategy is predicated on adaptive management but the TMDLs are not considered phased. Once restoration measures have been implemented and given time to take effect, DEQ is compelled by state law (MCA 75-5-703(7) & (9)) to monitor and re-evaluate the impairment status to determine whether water quality standards (i.e., TMDL targets) are being met.

No action has been taken on this review element because EPA does not approve the monitoring strategy aspect of TMDLs, however, EPA supports the future monitoring recommendations outlined in the TMDL document.

Comments: None.

7. Restoration Strategy

The overall purpose of the TMDL analysis is to determine what actions are necessary to ensure that the pollutant load in a waterbody does not result in water quality impairment. Adding additional detail regarding the proposed approach for the restoration of water quality is not currently a regulatory requirement, but is considered a value added component of a TMDL document. During the TMDL analytical process, information is often gained that may serve to point restoration efforts in the right direction and help ensure that resources are spent in the most efficient manner possible. For example, watershed models used to analyze the linkage between the pollutant loading rates and resultant water quality impacts might also be used to conduct “what if” scenarios to help direct BMP installations to locations that provide the greatest pollutant reductions. Once a TMDL has been written and approved, it is often the responsibility of other water quality programs to see that it is implemented. The level of quality and detail provided in the restoration strategy will greatly influence the future success in achieving the needed pollutant load reductions.

Review Elements:

- ☐ EPA is not required to and does not approve TMDL implementation plans. However, in cases where a WLA is dependent upon the achievement of a LA, “reasonable assurance” is required to demonstrate the necessary LA called for in the document is practicable). A discussion of the BMPs (or other load reduction measures) that are to be relied upon to achieve the LA(s), and programs and funding sources that will be relied upon to implement the load reductions called for in the document, may be included in the implementation/restoration section of the TMDL document to support a demonstration of “reasonable assurance”.

Recommendation:

☐ Approve ☐ Partial Approval ☐ Disapprove ☒ N/A

Summary: The TMDL document outlines a restoration strategy to help guide stakeholders in developing an effective Watershed Restoration Plan (WRP) which could prescribe a more specific restoration approach. Section 8.0 of the TMDL document describes general restoration approaches for each pollutant group and source category. The document also explains DEQ’s role in the implementation strategy, the potential roles for other agencies and stakeholders, and summarizes the numerous sources of potential funding and technical assistance.

No action has been taken on this review element because EPA does not approve the restoration strategy or implementation plan aspects of TMDLs, however, EPA encourages follow through on the recommended planning and restoration efforts as outlined in the TMDL document.

Comments: None.

8. Daily Loading Expression

The goal of a TMDL analysis is to determine what actions are necessary to attain and maintain WQS. The appropriate averaging period that corresponds to this goal will vary depending on the pollutant and the nature of the waterbody under analysis. When selecting an appropriate averaging period for a TMDL analysis, primary concern should be given to the nature of the pollutant in question and the achievement of the underlying WQS. However, recent federal appeals court decisions have pointed out that the title TMDL implies a “daily” loading rate. While the most appropriate averaging period to be used for developing a TMDL analysis may vary according to the pollutant, a daily loading rate can provide a more practical indication of whether or not the overall needed load reductions are being achieved. When limited monitoring resources are available, a daily loading target that takes into account the natural variability of the system can serve as a useful indicator for whether or not the overall load reductions are likely to be met. Therefore, a daily expression of the required pollutant loading rate is a required element in all TMDLs, in addition to any other load averaging periods that may have been used to conduct the TMDL analysis. The level of effort spent to develop the daily load indicator should be based on the overall utility it can provide as an indicator for the total load reductions needed.

Review Elements:

- ☒ The document should include an expression of the TMDL in terms of a daily load. However, the TMDL may also be expressed in temporal terms other than daily (e.g., an annual or monthly load). If the document expresses the TMDL in additional “non-daily” terms the document should explain why it is appropriate or advantageous to express the TMDL in the additional unit of measurement chosen.

Recommendation:

- ☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary: All TMDLs and allocations contained in this document are expressed as daily loads. Nutrient and metals TMDLs (i.e., total nitrogen, total phosphorus, copper, iron, lead, and selenium) are presented in units of pounds per day. The single pathogen TMDL is presented in units of million colony-forming units (MCFU) of *E. coli* per day. All individual allocations follow those same daily units.

Comments: None.