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Ref: 8EPR-EP

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Helena, Montana 59620-0901

Robin Shropshire, Chairman
Montana Board of Environmental Review
Montana Department of Environmental Quality
P.O. Box 200901
Helena, Montana 59620-0901

Re: EPA Action on Montana's Numeric Nutrient Criteria and Variance Rules

Dear Mr. Livers and Ms. Shropshire:

The U.S. Environmental Protection Agency Region 8 has completed its review of Montana's new and revised water quality standards for nutrients and is approving the water quality standards as described in the enclosure. The Montana Department of Environmental Quality (Montana or MDEQ) and the Montana Board of Environmental Review (BER or the Board) adopted these revisions on July 25, 2014, and submitted the revisions to the EPA for review pursuant to 40 CFR Section 131.20(c). The submission included: (1) a copy of the adopted amendments and supporting materials; (2) notice of final adoption of the amendments with the state's response to comments; and (3) a letter certifying that the amendments and water quality standards were adopted in accordance with state law. Receipt of this submission on August 15, 2014, initiated the EPA's review pursuant to Section 303(c) of the Clean Water Act (CWA or the Act) and the federal water quality standards implementing regulation (40 CFR Part 131).

We commend the MDEQ and the BER for adopting protective numeric nutrient criteria for total nitrogen and total phosphorus to address nutrient pollution in Montana's surface waters. Montana's nutrient rules include:

- Adoption of numeric nutrient criteria (referred to as "base numeric nutrient standards" in the state's documents) for wadeable streams (Department Circular DEQ-12A);
- Adoption of numeric nutrient criteria (NNC) for segments of the Yellowstone River (Department Circular DEQ-12A);
- A general variance authorizing provision and general variances for public and private dischargers applicable for up to 20 years to waters with numeric nutrient criteria (Department Circular DEQ-12B); and
- Individual variance procedures applicable to waters with numeric nutrient criteria (Department Circular DEQ-12B).

The adopted water quality criteria and variance provisions that are the subject of today's action are scientifically defensible, well supported by the record and consistent with CWA requirements. The EPA looks forward to continuing to work with Montana to protect and improve surface water quality within the state. As a result of the water quality standards, the EPA expects that concentrations of nutrients in Montana surface waters will decline over time.

Clean Water Act Review Requirements

The CWA Section 303(c)(2) requires states and authorized Indian tribes[1] to submit new or revised water quality standards (WQS) to the EPA for review. The EPA is required to review and approve or disapprove, the submitted standards. The Region's goal has been, and will continue to be, to work closely with states and authorized tribes throughout the standards revision process to help ensure that submitted water quality standards adopted by states are consistent with CWA requirements. Pursuant to 40 CFR Section 131.21(c), new or revised state standards submitted to the EPA after May 30, 2000, are not effective for CWA purposes until approved by the EPA. 65 Fed. Reg. 24653 (April 27, 2000).

Today's Action

Today the EPA is approving a number of water quality standards provisions discussed below, including numeric nutrient criteria and variance provisions. The EPA has concluded that the adopted provisions are consistent with the requirements of the Clean Water Act and the EPA's implementing regulations. The enclosure contains a more detailed rationale for today's action.

Endangered Species Act Requirements

The EPA's approval of Montana's water quality standards is considered a federal action which may be subject to the Section 7(a)(2) consultation requirements of the Endangered Species Act (ESA). Section 7(a)(2) of the ESA states that "each federal agency … shall …insure that any action authorized, funded or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined to be critical…"

The EPA's approval of new or revised water quality standards, therefore, may be subject to the results of consultation with the U.S. Fish and Wildlife Service (Service) pursuant to Section 7(a)(2) of the ESA. Nevertheless, the EPA also has a CWA obligation, as a separate matter, to complete its WQS action. Therefore, in acting on the state's WQS today, the EPA is completing its CWA Section 303(c) responsibilities.

The EPA's approval of the following water quality standards revisions is not subject to ESA consultation because either the actions will have "no effect" on listed aquatic and aquatic-dependent species or the EPA does not have discretion to act upon listed species as discussed in more detail below. All other provisions (i.e., low flow provisions, numeric nutrient criteria, the general variances, individual variance provisions) are approved by the EPA today subject to ESA consultation.

[1] CWA Section 518(e) specifically authorizes EPA to treat eligible Indian tribes in the same manner as states for purposes of CWA Section 303. See also 40 CFR Section 131.8.

No effect revisions

- New Definitions
  - The new definitions are consistent with the EPA's regulations and guidance and support the new Department Circular DEQ-12A. The EPA has determined that its approval of the new definitions will not change the existing environmental conditions. Therefore, ESA consultation is not required.
- Non-substantive edits
  - The EPA considers non-substantive edits to existing WQS to constitute new or revised WQS to ensure public transparency.[2] Montana adopted several revisions that would be included in this category. These revisions do not substantively change the meaning or intent of the existing WQS; therefore, the EPA has determined that these revisions will have no effect on listed species.
- Individual and general variance authorizing provisions
  - ARM 17.30.660(1) is merely an authorizing policy (40 CFR § 131.13) and thus has no effect on listed or proposed endangered or threatened species or critical habitat. As a result, no consultation is required.

No discretion revisions

- Antidegradation revisions
  - Montana revised their existing antidegradation rule ("nondegradation rule") to consider nutrients as a "harmful" parameter for nondegradation purposes instead of as "toxic". The basis for the EPA's conclusion that approval of antidegradation revisions is not subject to ESA consultation is discussed in "Antidegradation Policy Approvals and Endangered Species Act Consultations." Memorandum from Geoff Grubbs, Director, Office of Science and Technology, to Water Management Division Directors, Regions 1 - 10, January 27, 2005. Since the MT antidegradation revisions meet the EPA's regulatory requirements, the EPA has no relevant discretion for ESA purposes.

Indian Country

The WQS approvals in today's letter apply only to waterbodies in the state of Montana, and do not apply to waters that are within Indian country, as defined in 18 U.S.C. Section 1151. "Indian country" includes any land held in trust by the United States for an Indian tribe and any other areas defined as "Indian country" within the meaning of 18 U.S.C. Section 1151. Today's letter is not intended as an action to approve or disapprove water quality standards applying to waters within Indian country. The EPA, or authorized Indian tribes, as appropriate, will retain responsibilities for water quality standards for waters within Indian country.

Conclusion

The EPA Region 8 thanks MDEQ and the Board for their efforts to develop and adopt numeric nutrient criteria for Montana. The nutrient criteria and variance provisions represent significant progress towards addressing nutrient pollution issues in the state. The EPA looks forward to working with MDEQ to

[2] See EPA's October 2012 *What is a New or Revised Water Quality Standard Under CWA 303(c)(3)?-- Frequently Asked Questions* available at http://water.epa.gov/scitech/swguidance/standards/cwa303faq.cfm.

make additional improvements to the state's water quality standards in the future. If you have any questions, please call Tina Laidlaw on my staff at (406) 457-5016.

Sincerely,

Martin Hestmark
Assistant Regional Administrator
Office of Ecosystems Protection
and Remediation

Enclosures

cc: George Mathieus, Division Administrator
Montana Department of Environmental Quality

Connie Howe
Crow Tribe
(via email)

Charlene Alden
Northern Cheyenne Tribe
(via email)

Gerald Wagner
Blackfeet Tribe
(via email)

Joe LaFromboise and Jay Eagleman
Chippewa Cree Tribe
(via email)

Mike Durglo
Confederated Salish and Kootenai Tribe
(via email)

Ina Nez Perce
Fort Belknap Indian Community
(via email)

Deb Madison
Fort Peck Tribes
(via email)

Rationale for the EPA's Action on Montana's New and Revised Water Quality Standards

Today's EPA action letter addresses Montana's new and revised water quality standards for nutrient pollution adopted by the Board and MDEQ on July 25, 2014, including revisions made to Administrative Rules of Montana (ARM) Title 17, Chapter 30 (Water Quality), Sub-chapters 5 (Mixing Zones), 6 (Surface Water Quality Standards and Procedures), and 7 (Nondegradation) as well as adoption of new Department Circulars DEQ-12A and -12B.[3] This enclosure provides a rationale for the action taken by the EPA.

NONSUBSTANTIVE CHANGES TO EXISTING WATER QUALITY STANDARDS

The EPA considers non-substantive edits to existing water quality standards to constitute new or revised water quality standards that the EPA has the authority and duty to approve or disapprove under CWA Section 303(c)(3).[4] Montana adopted several revisions that would be included in this category such as: spelling corrections; adding or removing the word "and"; or numbering changes. The list below identifies those revisions that the EPA considers as non-substantive changes to water quality standards. While these revisions do not substantively change the meaning or intent of the existing water quality standards, the EPA believes it is reasonable to treat such non-substantive changes in this manner to ensure public transparency of which provisions are effective for CWA purposes. Accordingly, all non-substantive revisions to the ARM (Sections 17.30.201(6)(f); 17.30.507(1); 17.30.516(3); 17.30.619(1)(c) and (d); 17.30.619(3); 17.30.622(3)(h) and (i); 17.30.623(2)(h) and (i); 17.30.624(2)(h) and (i); 17.30.625(2)(h) and (i); 17.30.626(2)(h) and (i); 17.30.627(2)(h) and (i); 17.30.628(2)(j) and (k); 17.30.629(2)(h) and (i); 17.30.702; 17.30.702(17) through (20); 17.30.702(22); 17.30.702(27)(c) through (e); 17.30.702(25) and (26); and 17.30.702(27)(c) through (e); 17.30.715(h) are approved.

DEFINITIONS

Montana's nutrient pollution rules include the following definitions:

- Section 1.1 of Department Circular DEQ-12A includes definitions for the following terms: ecoregion, large river, total nitrogen, total phosphorus, and wadeable stream.
- ARM Sections 17.30.602(33) and 17.30.702(23) include revisions to the methods for calculating total nitrogen (TN) concentrations. The language cites the persulfate digestion method for determining total nitrogen and specifies the nutrient fractions (i.e., nitrate, nitrite, ammonia, and organic nitrogen, as N) that can be summed to calculate the total nitrogen concentration. ARM Sections 17.30.602(34) and 17.30.702(24) include similar revisions to the definitions for total phosphorus.
- ARM Sections 17.30.602(39), 17.30.619(1)(a), and 17.30.702(27)(a) modify the reference to nutrient standards previously contained in Circular DEQ-7. Water quality standards for nutrients (total nitrogen (TN) and total phosphorus (TP)) are now contained in Circular DEQ-12A. Human health-based water quality standards for nitrate, nitrate + nitrite, and nitrite, which have toxic effects, will remain in Circular DEQ-7.

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[3] Department Circular DEQ-12A and Department Circular DEQ-12B have been incorporated by reference into Montana's existing water quality standards at ARM 17.30.507(1)(a); 17.30.619(1)(e); 17.30.660(1); and 17.30.660(8) which provides additional assurances that these Circulars are legally binding.

[4] See EPA's October 2012 *What is a New or Revised Water Quality Standard Under CWA 303(c)(3)?*- Frequently Asked Questions available at http://water.epa.gov/scitech/swguidance/standards/cwa303faq.cfm.

- ARM Sections 17.30.602(40) and 17.30.702(27)(b) include a description of Circular DEQ-12A ("Montana Base Numeric Nutrient Standards"). Circular DEQ-12A contains Montana's adopted numeric nutrient criteria (NNC) for TN and TP.
- ARM Section 17.30.602(41) includes a reference to Department Circular DEQ-12B ("Montana Base Numeric Nutrient Standards Variances"). Circular DEQ-12B describes the requirements for the general variances for nutrients and the procedures for obtaining an individual nutrient variance. Any future approved individual variances will be contained in Circular DEQ-12B.
- ARM Section 17.30.702(17) was repealed because the definition of "nutrients" as inorganic nitrogen and inorganic phosphorus does not align with the numeric criteria adopted in Department Circular DEQ-12A for total nitrogen and total phosphorus.

The EPA has reviewed these definitions and considers them to be scientifically sound and consistent with the requirements of 40 CFR Part 131 as discussed below. Therefore, these provisions are approved.

CRITICAL LOW FLOW PROVISIONS

Section 2.2 in Department Circular DEQ-12A and revisions to Sections ARM 17.30.516 (3)(e) and (4) and ARM 17.30.635(2) identify critical low flows for purposes of calculating water quality-based effluent limitations (WQBELs) for nutrients to be included in CWA National Pollutant Discharge Elimination System (NPDES) permits.

ARM 17.30.516(3):

(e) Facilities that discharge the parameters found in Department Circular DEQ-12A to surface water. Discharge limitations must be based on dilution with the entire seasonal 14-day, five-year (seasonal 14Q5) low flow of the receiving water without the discharge.

ARM 17.30.635: General Treatment Standards

(2) For total nitrogen and total phosphorus, the stream flow dilution requirements must be based on the seasonal 14Q5, which is the lowest average 14 consecutive day low flow, occurring from July through October, with an average recurrent frequency of once in five years.

ARM 17.30.516(4) specifies that, for nutrients only, mixing zone determinations are based on the seasonal 14Q5 low flow.

Montana typically uses a 7Q10 (seven-day, ten-year design flow) as the critical low flow for determining the allowable permitted discharge for toxics and other parameters. Since nutrients (i.e., TN, TP) are generally not toxic, Montana explored different options for selecting the critical low flow and determined that a seasonal 14-day, 5-year design flow was appropriate for discharges containing nutrients. The basis for the low flow provisions is described in a memo to the BER.[5] Montana used algal growth rates derived from laboratory studies to model the time (measured in days) it would take to reach peak algal biomass in a stream. Applying the model, the state estimated the number of days it would take before algal biomass concentrations reached nuisance bloom levels of 150 mg/m^2.[6] Results showed that peak algal biomass was achieved in 14-days, on average. However, depending on the initial biomass used in the model, this estimate could be over or under protective. Therefore, Montana compared the

[5] Memo from Mike Suplee and Kyle Flynn, MDEQ, to the Board of Environmental Review, 19 March 2014.

[6] Suplee, M.W;V. Watson, M.E. Teply, and H. McKee. 2009. How Green is Too Green? Public Opinion of what Constitutes Undesirable Algae Levels in Streams. Journal of the American Water Resources Association 45: 123-140.

proposed duration to results from the whole-stream nutrient enrichment study conducted in eastern Montana. Results from that study showed that peak biomass was reached approximately 20 days after the start of the nutrient additions. This comparison validated Montana's selection of a 14-day duration low flow period associated with the NNC.

Basis for Approval

The EPA's water quality standards regulation explains that "States may, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances. Such policies are subject to EPA review and approval (40 CFR § 131.13)." The revision to Montana's low flow provisions for nutrients identifies river and stream low flows, for use in calculating nutrient WQBELs, which are consistent with the adopted NNC. Montana's NNC are average growing season concentrations that cannot be exceeded more than once in every five years. The EPA reviews low flow provisions to ensure they are consistent with the duration and frequency provisions of the criterion. Montana selected a 14Q5 low flow provision that is shorter in duration (and therefore protective) than the NNC which are expressed as seasonal average criteria. Therefore, the EPA finds that Montana's low flow provision is appropriate and will support WQBELs that derive from and comply with the NNC.

The EPA concludes that Montana's low-flow provisions are appropriate because the duration and frequency of the flows support calculation of WQBELs that derive from and comply with the NNC.[7] (See 40 CFR § 131.11, 40 CFR § 131.13). Accordingly, the EPA approves these provisions.

ANTIDEGRADATION

Montana removed the term "nutrients" from ARM 17.30.715(c) and revised ARM 17.30.715(f) to include the parameters listed in DEQ-12-A (TN and TP). The practical effect of this revision is that it changes the nonsignificance threshold that applies to TN and TP from the 15% of the lowest applicable standard that applies to "toxic" parameters, to the one that applies to "harmful" parameters which is 10% of the applicable standard and existing water quality less than 40% of the standard. The state did not change the nonsignificance thresholds that apply to toxic or harmful parameters, it simply reclassified TN and TP from toxic to harmful.

Basis for Approval

The EPA's WQS regulation requires states to adopt an antidegradation policy and identify implementation procedures that at a minimum are consistent with 40 CFR § 131.12(a)(1-4). As described in the EPA Water Quality Standards Handbook (1994), "EPA's review of the implementation procedures is limited to ensuring that procedures are included that describe how the State will implement the required elements of the antidegradation review. The EPA may disapprove and federally promulgate all or part of an implementation process for antidegradation if, in the judgment of the Administrator, the State's process (or certain provisions thereof) can be implemented in such a way as to circumvent the intent and purpose of the antidegradation policy."

The EPA has reviewed the revisions to ARM 17.30.715(1)(c) and (f) and determined that they do not undermine the intent and purpose of Montana's nondegradation policy. Changing the significance test

[7] The EPA guidance on critical low flow provisions is available on the website at: http://water.epa.gov/scitech/swguidance/standards/handbook/chapter05.cfm#section52.

that applies to TN and TP from toxic to harmful continues to protect assimilative capacity for these parameters where it exists, which is clearly consistent with the intent and purpose of the nondegradation policy.

In addition, the environmental effects of TN and TP are not consistent with Montana's definition of the term "toxic". Montana defines a "toxic" parameter as: "A toxin is any chemical which has an immediate, deleterious effect on the metabolism of a living organism."[8] In contrast, the environmental effects of elevated levels of nitrogen and phosphorus may include excess algal growth; lower dissolved oxygen concentrations or increased fluctuations in dissolved oxygen and pH; decreased water clarity; and loss of sensitive species.

The EPA concludes these revisions are consistent with 40 CFR § 131.12 and are approved.

NONSEVERABILITY PROVISION

Montana included in its regulations (ARM 17.30.619(2) and 17.30.715(4)) a provision that calls for the voiding of *all* adopted NNC and all variances should one of three triggering events occur. The EPA is committed to continuing its collaboration with the state to implement this nutrient rule approach consistent with CWA requirements, including the adoption of variances established by and consistent with ARM 17.30.660 and Montana Circular DEQ-12B. Thus, the EPA believes it was inadvisable for the state to include such a provision. The EPA is not acting on this provision today.

NUMERIC NUTRIENT CRITERIA

Clean Water Act requirements relating to Numeric Nutrient Criteria

In reviewing water quality criteria, the EPA determines whether the criteria protect the designated use and are based on a sound scientific rationale. *See* 40 CFR § 131.5(a)(2), (5); 131.6(b)-(c) and 131.11(a). The regulations also require that for waters with multiple use designations, the criteria shall support the most sensitive use. 40 CFR § 131.11(a). As discussed below, the EPA has determined that Montana's NNC adopted in DEQ-12A are consistent with CWA requirements.

EPA Recommendations on Deriving Numeric Nutrient Criteria

For over a decade, the EPA has recognized the importance of developing numeric water quality criteria to protect the designated uses of waterbodies from nutrient pollution that is associated with increases in concentrations of nitrogen and phosphorus. In general, the EPA recommends three types of scientifically defensible approaches for setting numeric criteria to address nitrogen and phosphorus pollution: reference condition approach, stressor-response analysis, and mechanistic modeling.[9,10] The reference condition approach relies on data collected at minimally disturbed reference sites to characterize natural background conditions using percentiles of the frequency distribution from the reference dataset.

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[8] Montana DEQ, Planning Prevention and Assistance Division, Water Quality Planning Bureau, Water Quality Standards Section. 2012. DEQ-7 Montana Numeric Water Quality Standards. Helena, MT: Montana Dept. of Environmental Quality.

[9] U.S. EPA. 2000. Nutrient Criteria Technical Guidance Manual: Rivers and Streams. EPA-822-B-00002. http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/rivers/index.cfm. Washington, DC.

[10] U.S. EPA. 2010. Using Stressor-response Relationships to Derive Numeric Nutrient Criteria. EPA-820-S-10-001. Washington, DC.

Deriving nutrient criteria using stressor-response analysis provides an empirical representation of the known causal relationship between increased nutrients and ecological effects. In this approach, the known causal relationship has been established in the scientific literature by observational and manipulative studies. Mechanistic modeling refers to use of watershed models, hydrodynamic models or water quality models to determine NNC. A modeling approach to setting nutrient criteria allows the user to test the interactions between different nutrient loading scenarios, the response endpoint(s), and the candidate nutrient criteria. As discussed in detail below, Montana used a combination of reference and stressor-response approaches that is consistent with the EPA's recommendation to derive the NNC for nitrogen and phosphorus and therefore EPA has concluded that Montana's NNC are based on sound science.

Water Quality Standards: Department Circular DEQ-12A Sections 2.0 and 3.0:

Montana promulgated nutrient water quality standards including numeric criteria for total nitrogen and total phosphorus for all wadeable streams, segments of the Yellowstone River, and site-specific nitrogen and phosphorus criteria for several segments in the Gallatin watershed. Table 12A-1 of Circular DEQ-12A Section 2.0 (Table 1) summarizes the NNC approved by the BER and defines the index period when the criteria apply.

Table 1. Montana's Numeric Criteria for TN and TP for Wadeable Streams

Table 12A-1. Base Numeric Nutrient Standards for Wadeable Streams in Different Montana Ecoregions. If standards have been developed for level IV ecoregions (subcomponents of the level III ecoregions) they are shown in italics below the applicable level III ecoregion. Individual reaches are in the continuation of this table.

			Numeric Nutrient Standard[4]	
Ecoregion[1,2] (level III or IV) and Number	Ecoregion Level	Period When Criteria Apply[3]	Total Phosphorus (µg/L)	Total Nitrogen (µg/L)
Northern Rockies (15)	III	July 1 to September 30	25	275
Canadian Rockies (41)	III	July 1 to September 30	25	325
Idaho Batholith (16)	III	July 1 to September 30	25	275
Middle Rockies (17)	III	July 1 to September 30	30	300
Absaroka-Gallatin Volcanic Mountains (17i)	IV	July 1 to September 30	105	250
Northwestern Glaciated Plains (42)	III	June 16 to September 30	110	1300
Sweetgrass Upland (42l), Milk River Pothole Upland (42n), Rocky Mountain Front Foothill Potholes (42q), and Foothill Grassland (42r)	IV	July 1 to September 30	80	560
Northwestern Great Plains (43) and Wyoming Basin (18)	III	July 1 to September 30	150	1300
River Breaks (43c)	IV	See Endnote 5	See Endnote 5	See Endnote 5
*Non-calcareous Foothill Grassland (43s), Shields-Smith Valleys (43t), Limy Foothill Grassland (43u), Pryor-Bighorn Foothills (43v), and Unglaciated Montana High Plains (43o)**	IV	July 1 to September 30	33	440

*For the Unglaciated High Plains ecoregion (43o), criteria only apply to the polygon located just south of Great Falls, MT.

Derivation of the Wadeable Streams Nutrient Criteria Based on Omernik[11] Ecoregions

Montana evaluated several approaches (e.g., lithologic groupings, stream order) to characterize the natural variability in nutrient concentrations before selecting Omernik level III ecoregions as the preferred classification scheme. The state's analysis showed statistically significant differences in median nutrient concentrations between level III and level IV ecoregions. However, data limitations precluded establishment of NNC at a finer scale (Omernik level IV) on a statewide basis. The state's analysis and the EPA guidance[12] support Montana's decision to derive NNC at the ecoregion level III scale as being scientifically sound.

Montana followed a multi-step process to establish numeric criteria for TN and TP for wadeable streams. Aquatic life use support was identified as the most sensitive use. By establishing NNC that protect the most sensitive use, Montana's NNC also ensure protection of other designated uses such as recreational use support and drinking water.

1. Montana first characterized nutrient concentrations at reference sites where the aquatic life use was met located within the level III ecoregion.

2. Next, Montana reviewed dose-response studies that were conducted within similar ecoregions and documented in the scientific literature. For each study, Montana identified the nutrient threshold associated with the response endpoint (e.g., algal biomass, diatom or macroinvertebrate metric).

3. Montana used the information obtained from these two approaches (reference and dose-response) as multiple lines of evidence to establish numeric criteria for nitrogen and phosphorus for that ecoregion. Preliminary nutrient criteria were selected using a combination of nutrient percentiles observed at reference sites coupled with thresholds obtained from the relevant stressor-response studies.

4. As a final step in the process, Montana evaluated the nitrogen to phosphorus ratio (N:P ratio / Redfield ratio) associated with the adopted criteria to ensure it was similar to N:P ratios observed at reference sites. N:P ratios can indicate whether nitrogen, phosphorus, or both, are the are the "limiting nutrient" (nutrient in short supply) that constrains algal growth. This final "check" on the proposed criteria ensures that the NNC do not inadvertently alter the limiting nutrient, causing a naturally N-limited stream to become P-limited (or vice versa).

For sites where data were readily available to support the use of level IV ecoregions, Montana established numeric criteria for TN and TP. Examples of level IV ecoregional criteria for TN and TP include (1) the Absaroka-Gallatin Volcanic Mountains where natural background nutrient concentrations are higher than the ecoregion level III nutrient criteria and (2) several level IV ecoregions that reflect transition zones from the mountains to the plains (e.g., Sweetgrass Upland, Pryor-Bighorn Foothills). If dose-response studies were not available for these smaller areas, Montana examined the nutrient concentrations observed in the reference distribution and used the nutrient to benthic chlorophyll-a relationship to calculate the final criteria.

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[11] Omernik, J.M. Ecoregions of the Conterminous United States. *Ann Assoc Am Geogr* 77, 118-125 (1987).
[12] U.S. EPA. 2000. Nutrient Criteria Technical Guidance Manual: Rivers and Streams. EPA-822-B-00002. http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/rivers/index.cfm. Washington, DC.

Scientific justification for Montana's approach can be found in the May 2013 *Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers,*[13] along with an earlier version of the document published in 2008.[14] Section 3 of Montana's 2013 technical rationale synthesizes the information used to derive the numeric criteria in a concise and easy-to-follow format. For each ecoregion, the document presents: (1) an ecoregional map; (2) recommended numeric criteria; (3) regional reference population descriptive statistics; (4) comparison of the recommended criteria to the ecoregional reference distribution; (5) summary of any relevant dose-response studies; and (6) a conclusion section containing a brief rationale justifying the recommended ecoregional criteria and an evaluation of N:P ratios.

In its scientific justification, Montana recognizes that the ecoregionally-derived nutrient criteria may need to be refined to reflect site-specific considerations, especially in situations where it can be demonstrated that natural background nutrient concentrations exceed the state's ecoregional nutrient criteria and designated uses are supported. To facilitate development of site-specific criteria, Montana described several approaches for deriving site-specific criteria in Section 6.0 of their implementation guidance.[15] Methods include empirically-derived site-specific criteria based on a robust suite of causal and response variable data, or use of a mechanistic model to set protective criteria. The EPA looks forward to working with the state when the state develops such new or revised criteria in the future.

For all NNC adopted by Montana for wadeable streams and rivers, Department Circular DEQ-12A defines the duration and frequency associated with the standard as: "The average concentration during a period when the standards apply may not exceed the standards more than once in any five-year period, on average." (Section 3.0, Endnote 4)

Basis for Approval

Based on review of the Montana's 2008 and 2013 scientific rationales and the comments and technical information submitted to the BER during the state's rulemaking process, the EPA has concluded that the NNC are consistent with CWA requirements discussed above.

In deriving NNC for wadeable streams, Montana independently applied two of the EPA-recommended approaches for deriving NNC (i.e., reference, stressor-response) to build a sound scientific justification for the adopted criteria. In reviewing Montana's scientific rationale, the EPA examined the multiple lines of evidence considered by Montana in establishing the NNC for wadeable streams. Nutrient information gathered from a comprehensive statewide network of reference sites provided useful information on natural background nutrient concentrations observed across Montana. Additionally, the EPA worked closely with Montana to assist the state with developing a rigorous approach to identifying a network of reference sites that represent minimally disturbed reference conditions of aquatic life designated uses. Montana documented their reference screening approach and reference site selection criteria in the 2005 document, "*Identification and Assessment of Montana Reference Streams: A Follow-up and Expansion of the 1992 Benchmark Biology Study*".

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[13] Suplee, M. W., and V. Watson, 2013. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers—Update 1. Helena, MT: Montana Dept. of Environmental Quality.
[14] Suplee, Michael W., V. Watson, A. Varghese, and Joshua Cleland. 2008. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers. Helena, MT: MDEQ Water Quality Planning Bureau.
[15] Montana Department of Environmental Quality, 2014. Base Numeric Nutrient Standards Implementation Guidance. Version 1.0. Helena, MT. Montana Dept. of Environmental Quality.

Incorporation of nutrient thresholds identified in regionally relevant dose-response studies further strengthened the state's technical basis for establishing criteria. The state's presentation of the scientific literature provided a sound scientific justification of thresholds associated with impacts to aquatic life and recreational uses observed in studies conducted by academicians, state agencies and other governmental entities (e.g., U.S. Geological Survey). In the 2008 technical basis for the NNC, several peer reviewers (including the EPA) noted the lack of nutrient enrichment studies associated with plains streams. To address these concerns, Montana designed and implemented a whole-stream nutrient addition study on a reference stream in eastern Montana.[16] The purpose of the study was to evaluate the impacts to aquatic life associated with excess algal growth from elevated nutrient levels. Montana used the results from this study to identify stressor-response thresholds for plains streams. The study provided a tremendous amount of useful information that Montana considered in deriving the adopted NNC for plains streams. In addition, the information gathered from Montana's dose-response study strengthened the scientific basis for establishing NNC in plains streams based on stressor-response analysis.

Throughout Montana's NNC development process, the EPA reviewed the state's draft technical documents and provided written comments as well as informal feedback. The EPA also conducted an external independent peer review of the state's preliminary technical rationales for wadeable streams produced in 2008 and 2012. Overall, the peer reviews demonstrated support for Montana's approach as a scientifically sound and defensible basis for developing NNC in wadeable streams. Peer review comments and Montana's response to the comments can be found in the state's technical rationale.[17,18]

The EPA examined Montana's synthesis of the technical basis for the adopted NNC for each ecoregion. For each ecoregion, Montana presented the reference information in addition to the relevant stressor-response studies and offered a detailed and transparent discussion of the basis for the adopted criteria. Montana's integration of multiple approaches -- results from stressor-response studies; understanding of reference conditions; nutrient limitations -- minimizes the uncertainty associated with a single approach and further strengthens the technical basis for the final NNC values.

Therefore, the EPA has determined that the NNC provisions are consistent with the federal requirements because, as discussed above, the state has demonstrated that the NNC for wadeable streams will protect aquatic life and recreational designated uses and are based on a sound scientific rationale that is consistent with the EPA guidance on deriving NNC using scientifically defensible methods. Accordingly, the EPA approves Montana's NNC.

Derivation of Nutrient Criteria for the Yellowstone River

In order to derive NNC for the lower Yellowstone River, Montana chose to utilize an enhanced mechanistic model (QUAL2K). Given the complexity and unique characteristics of large river systems like the Yellowstone, as well as the challenges with determining reference condition for large rivers, Montana determined that utilization of the QUAL2K model to simulate benthic algal growth in the river would be a scientifically defensible approach.

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[16] Suplee, M.W., and R. Sada de Suplee. 2011 Assessment Methodology for Determining Wadeable Stream Impairment Due to Excess Nitrogen and Phosphorus Levels. Helena, MT: Montana Dept. of Environmental Quality. See Appendix B.1.2.
[17] Suplee, M. W., and V. Watson, 2013. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers—Update 1. Helena, MT: Montana Dept. of Environmental Quality.
[18] See Peer Review Memorandum of 2008 document available at: http://www.deq.mt.gov/wqinfo/standards/NumericNutrientCriteria.mcpx.

Mechanistic modeling is an additional approach recommended by the EPA for establishing defensible NNC. Mechanistic models integrate nutrient-sensitive assessment endpoints and water quality targets to derive protective NNC. Montana spent considerable time and resources to collect the necessary suite of data needed to calibrate and validate the model. Model development is described in more detail below.

After calibrating the model, Montana ran a series of modeling scenarios to simulate the effect of increasing nutrient concentrations on different eutrophication response endpoints associated with impacts to aquatic life, drinking water, and recreational use support (e.g., pH, dissolved oxygen (DO), benthic chlorophyll, total organic carbon, total dissolved oxygen gas). Model simulations of nutrient additions showed that the most sensitive response endpoints (associated with different designated uses) varied between the upper and lower river reaches. Montana then derived the TN and TP criteria necessary to protect the most sensitive use for each segment. For the upper segment of the Yellowstone River (Big Horn River confluence to Powder River confluence), pH was the most sensitive endpoint, indicating that aquatic life use is the most sensitive use. In contrast, for the lower river (Powder River confluence to the state line), the benthic chlorophyll-a threshold (150 mg/m^2) associated with recreational use impacts was the most sensitive response endpoint. As a final step, Montana compared the final numeric criteria to nutrient concentrations in the scientific literature where observed impacts to similar response endpoints have been documented.[19]

Table 2. Numeric Nutrient Criteria for the Yellowstone River

		Numeric Nutrient Standard*	
Individual Stream or Reach Description	**Period When Criteria Apply**	**Total Phosphorus (µg/L)**	**Total Nitrogen (µg/L)**
Yellowstone River (Bighorn River confluence to Powder River confluence)	August 1-October 31	55	655
Yellowstone River(Powder River confluence to stateline)	August 1-October 31	95	815

*The average concentration during a period when the standards apply may not exceed the standards more than once in any five-year period, on average.

Basis for Approval

In reviewing the TN and TP criteria for the segments of the Yellowstone River, the EPA examined the modeling details including: calibration and validation results; simulated response endpoints used to set the criteria; modeled nutrient addition scenarios; design flow; and model uncertainty. Montana tested different simulated response endpoints to confirm that the adopted criteria were protective of the most sensitive use, which for the Yellowstone River included both aquatic life use (upper segment) and recreational use support (lower segment). The EPA reviewed the response indicators applied in the model; model assumptions; and uncertainty factors considered in establishing thresholds. From the review, EPA confirmed the model was developed from a robust dataset; is well calibrated; and accurately simulates nutrient effects on response endpoints. The EPA therefore concludes that the

[19] Montana's detailed scientific basis for TN and TP criteria for segments of the mainstem Yellowstone River can be found in the May 2013 document "*Using a computer water quality model to derive numeric nutrient criteria: Lower Yellowstone River.*"

application of Montana's model for the Yellowstone River produced NNC that are scientifically defensible and protective of designated uses.

In addition to the EPA's internal review, the Agency conducted an external independent peer review of the state's preliminary modeling report describing the scientific basis for the adopted numeric criteria for the mainstem Yellowstone River.[20] Montana responded to reviewer comments in the final report and addressed many of technical issues noted in the comments.

Based on the EPA's review of the technical rationale developed by Montana, the EPA has concluded that the adopted NNC provisions are consistent with 40 CFR § 131.11(a)(1) of EPA's water quality standards regulation. The EPA approves Montana's NNC for the Yellowstone River.

Reach-Specific Criteria: Gallatin Watershed

In addition to the ecoregionally-derived nitrogen and phosphorus criteria for wadeable streams, Department Circular DEQ-12A includes site-specific nutrient criteria for one waterbody in the Clark Fork River basin and eight stream segments in the Gallatin watershed. See Table 1.
For the eight stream segments in the Gallatin watershed, Montana refined the numeric criteria for TN and TP to reflect the contributions of known geologic sources of phosphorus associated with Phosphoria deposits.[21] Portions of the two main tributaries to the Gallatin River, Bozeman and Hyalite Creek, are located within the level IV Absaroka-Gallatin-Volcanic Mountains ecoregion. Montana established level IV nutrient criteria for this area to reflect the naturally elevated total phosphorus concentrations found in these watersheds.[22]

Reach-specific criteria for the tributaries to the Gallatin watershed were calculated using a simple mixing equation to apply in specific locations situations (see below). Natural background (NB) represents the 75th percentile nutrient concentration observed in the reference population from the different contributing ecoregions.[23] This concentration (NB) is multiplied by the average summer flows (Q) for each ecoregional zone to reflect the relative contribution from each area.

$$NB_{NEW} = \frac{(NB_1 * Q_1) + (NB_2 * Q_2)}{Q_1 + Q_2}$$

Following this process, Montana derived reach-specific criteria for Bozeman and Hyalite Creek (See Table 1).[24]

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[20] Peer review comments and Montana's response to the comments can be found in the state's technical rationale: Flynn, Kyle and Michael W. Suplee. 2013. Using a computer water quality model to derive numeric nutrient criteria: Lower Yellowstone River. WQPBDMSTECH-22. Helena, MT: Montana Dept. of Environmental Quality.
[21] Scientific justification for MDEQ's approach can be found on pages 4-4 to 4-8 of the May 2013 document: Suplee, Michael W., V. Watson, A. Varghese, and Joshua Cleland. 2008. *Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers*. Helena, MT: MDEQ Water Quality Planning Bureau.
[22] Id.
[23] The 75th percentile is consistent with EPA's guidance on establishing nutrient criteria for rivers and streams. http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/rivers/index.cfm.
[24] Id.

Table 1. Reach Specific Nutrient Criteria for the Gallatin River Basin

		Numeric Nutrient Standard*	
Individual Stream or Reach Description	**Period When Criteria Apply**	**Total Phosphorus (µg/L)**	**Total Nitrogen (µg/L)**
Wadeable Streams: Gallatin River Basin			
Bozeman Creek, from headwaters to Forest Service Boundary (45.5833, -111.0184)	July 1 to September 30	105	250
Bozeman Creek, from Forest Service Boundary (45.5833, -111.0184) to mouth at East Gallatin River	July 1 to September 30	76	270
Hyalite Creek, from headwaters to Forest Service Boundary (45.5833, -111.0835)	July 1 to September 30	105	250
Hyalite Creek, from Forest Service Boundary (45.5833, -111.0835) to mouth at East Gallatin River	July 1 to September 30	90	260
East Gallatin River, between Bozeman Creek and Bridger Creek confluences	July 1 to September 30	50	290
East Gallatin River, between Bridger Creek and Hyalite Creek confluences	July 1 to September 30	40	300
East Gallatin River, between Hyalite Creek and Smith Creek confluences	July 1 to September 30	60	290
East Gallatin River, between Smith Creek confluence to mouth (Gallatin River)	July 1 to September 30	40	300

*The average concentration during a period when the standards apply may not exceed the standards more than once in any five-year period, on average.

Basis for Approval

The EPA's water quality standard regulation gives states the discretion and flexibility to establish site-specific criteria that reflect site-specific conditions (40 CFR § 131.11(b)(1)) so long as the criteria protect the designated use and are based on a sound scientific justification. In addition, the Agency produced a memo indicating that states may establish site-specific numeric aquatic life criteria by setting the criteria value equal to natural background.[25]

The EPA has reviewed Montana's reach-specific criteria derived for stream segments in the Gallatin watershed and determined that the criteria reflect natural background conditions associated with phosphorus-rich geologic formations based on nutrient concentrations observed at reference sites from the contributing ecoregions.[26] The Agency also conducted an external independent peer review of the state's preliminary technical rationales for wadeable streams produced in 2012, specifically asking reviewers to comment on the state's proposed approach to deriving reach-specific criteria. Peer review comments considered Montana's approach sound and defensible.

[25] See Memorandum from Tudor T. Davies, Director Office of Science and Technology, Subject: Establishing Site-Specific Aquatic Life Criteria Equal to Natural Background, November 5, 1997.

[26] Scientific justification for MDEQ's approach can be found on pages 4-4 to 4-8 of the May 2013 document: Suplee, Michael W., V. Watson, A. Varghese, and Joshua Cleland. 2008. *Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers.* Helena, MT: MDEQ Water Quality Planning Bureau.

The EPA examined Montana's process for deriving reach-specific criteria and finds the criteria, reflecting natural background conditions, are scientifically defensible and protective of the aquatic life designated use. These provisions are approved.

DURATION AND FREQUENCY

For all NNC adopted by Montana for wadeable streams and segments of the Yellowstone River, Department Circular DEQ-12A defines the duration and frequency associated with the standard as: "The average concentration during a period when the standards apply may not exceed the standards more than once in any five-year period, on average." (Section 3.0, Endnote 4). This duration and frequency means that, for a given waterbody, the TN and TP concentrations must not exceed the applicable criterion concentration more than once in a 5-year period.

Montana's determined the once in 5-year recurrence frequency based on an analysis of a long-term dataset (1998-2009) from the Clark Fork River where NNC have been approved by the EPA since 2003. The state's analysis examined TN and TP data from sites along the Clark Fork River[27] that were meeting and exceeding the numeric chlorophyll criterion. Results of that analysis showed that: *"Sites that experience greater than about 25-30% exceedance of the nutrient standards will develop nuisance benthic algal growth, i.e., growth equal to or greater than 150 mg Chl a/m².* " The state used this information to inform their selection of the one in 5-year recurrence frequency since that frequency is similar to a 20% exceedance rate. Montana also noted that a once in 5-year recurrence frequency is more protective than the EPA's long-standing recommendation (i.e., once in three years).

Basis for Approval

The EPA determined that such a frequency of exceedances would still protect the designated use because it would allow water bodies enough time to recover from occasionally elevated levels of nitrogen and phosphorus concentrations. The EPA has concluded that the adopted duration and frequency provisions are consistent with 40 CFR § 131.11(a)(1) of EPA's water quality standards regulation. Accordingly, the EPA is approving these provisions.

ASSESSMENT METHODOLOGY

Montana's current assessment methodology for nutrients is based on the existing narrative standard. The EPA recognizes and supports the state's decision to apply the draft NNC as part of a weight-of-evidence approach to interpret the narrative when developing its 303(d) list. Now that the state has adopted NNC applicable to certain waters and waterbody types and the EPA has approved such standards as discussed above, the EPA fully expects Montana to revise and update its nutrient assessment methodology to be consistent with the newly adopted and EPA-approved NNC. These revisions should be completed prior to the 2016 Integrated Reporting cycle to ensure that nutrient-related attainment decisions reflect compliance with the newly adopted and EPA-approved numeric criteria values.[28]

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[27] See pages A8-A14. Suplee, M.W., and R. Sada de Suplee, 2011 Assessment Methodology for Determining Wadeable Stream Impairment Due to Excess Nitrogen and Phosphorus Levels. Helena, MT: Montana Dept. of Environmental Quality.

[28] For impairment decisions and total maximum daily loads (TMDLs), CWA § 303(d)(1)(A) requires that each State shall identify "those waters within its boundaries for which the effluent limitations required by section 301(b)(1)(A) and section 301(b)(1)(b) are not stringent enough to implement any water quality standard applicable to such waters" (emphasis added). Accordingly, listing decisions must consider the underlying designated use and criteria.

DOWNSTREAM USE PROTECTION

Protection of downstream waters is required by language included in Endnotes 2 in Department Circular DEQ-12A Section 3.0:

> (2) Within and among the geographic regions or watersheds listed, base numeric nutrient standards of the downstream reaches or other downstream waterbodies must continue to be maintained. Where possible, modeling methods will be utilized to determine the limitations required which provide for the attainment and maintenance of water quality standards of downstream waterbodies.

Basis for Approval

Montana's downstream provision provides a process that will serve to ensure that water quality standards are maintained both near and far-field. Montana's provision is consistent with both EPA's regulation at 40 CFR § 131.10(b) and the following EPA recommended language for developing a narrative downstream protection criterion:[29]

> "All waters shall maintain a level of water quality that is demonstrated by water quality modeling to provide for the attainment and maintenance of the water quality standards of downstream waters, including the waters of another state."

Since Montana is not adopting NNC for any downstream waterbodies such as lakes or reservoirs at this time, the EPA concludes the state's decision to adopt a narrative downstream provision is appropriate. In cases where a downstream water quality standard is not attained, the EPA's expectation is that Montana would evaluate the upstream waterbody(ies), based on the narrative downstream criterion, to determine impairment under CWA Section 303(d).

This provision is approved.

PERMITTING COMPONENTS (DEQ-12A SECTION 2.1)

Section 2.1 of DEQ-12A identifies the required reporting limits for calculating total nutrient concentrations for TN and TP. The EPA is not acting on the reporting requirements today because the EPA determined they are not water quality standards requiring Agency review and approval under CWA § 303(c).

VARIANCE AUTHORIZATION PROVISIONS

Section ARM 17.30.660(1) authorizes the general and individual variances for nutrients once the BER adopts the NNC.

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[29] Templates for Narrative Downstream Protection Criteria in State Water Quality Standards: http://water.epa.gov/scitech/swguidance/standards/narrative.cfm

Basis for Approval

The EPA has reviewed this provision and determined that it is consistent with the EPA's requirements. The EPA's water quality standards regulation (40 CFR § 131.13) provides that variance policies may be adopted at state discretion, and that such general policies are subject to review and approval by the EPA.[30,31] The EPA approves ARM 17.30.660(1).

GENERAL VARIANCES FOR PUBLIC AND PRIVATE DISCHARGERS

A variance is a "time-limited designated use and criterion that is targeted to a specific pollutant(s), source(s), and/or water body or waterbody segment(s) that reflects the highest attainable condition during the specified time period."[32] The EPA encourages states and authorized tribes to utilize WQS variances, where appropriate, as an important WQS tool that provides time to make progress towards attaining the underlying designated use and criteria. The EPA has offered its position and guidance relating to variances through Office of General Counsel legal decisions,[33] guidance, memoranda, and approval actions for many years.[34]

The EPA's position is that it could approve a variance for a specific discharger or group of dischargers where the state satisfies the requirements in 40 CFR Part 131 for removing a designated use.[35] As such, the state must demonstrate that it is not feasible for the discharger or group of dischargers to attain the WQBEL(s) derived from the applicable designated use and criteria during the term of the variance due

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[30] On September 4, 2013 the Agency proposed revisions to its WQS regulation that include new requirements addressing WQS variances. The comment period on the proposed rule closed on January 2, 2014.

[31] Guidance regarding State options is provided in Section 5.3 of the EPA Water Quality Standards Handbook (EPA-823-B-94-005, August 1994). http://water.epa.gov/scitech/swguidance/standards/handbook/index.cfm.

[32] Water Quality Standards Regulatory Clarifications, 78 Fed. Reg. 54517, 54531 (September 4, 2013).

[33] It has been EPA's position since 1977 that, where a state satisfies all of the requirements in 40 CFR Part 131 for removing designated uses (or subcategories of uses), EPA could also approve a state decision to limit the applicability of the use removal to only a single discharger and/or a single criterion via a variance for a limited time period, while continuing to apply the underlying use designation and criteria to the waterbody as a whole (i.e., the underlying use designation and criteria would apply to all other dischargers other than the one for which a variance has been granted). This position was set forth in a Decision of the EPA General Counsel (In Re Bethlehem Steel Corporation, No. 58, March 29, 1977). The General Counsel's decision reasoned that such a state decision can be approved by EPA as being consistent with the CWA and 40 CFR Part 131 because the state's action in limiting the applicability of an otherwise approvable use removal to a single discharger and a single criterion for a limited time period would be more stringent than if the state made the use removal applicable to the water body as a whole; and Section 510 of the CWA allows states to adopt standards more stringent than necessary to meet the CWA's requirements. See 58 Fed. Reg. 20802, 20921-22 (April 16, 1993).

[34] The EPA's memoranda discussing variances are available on the EPA's website at http://water.epa.gov/scitech/swguidance/standards/handbook/chapter05.cfm or http://water.epa.gov/scitech/swguidance/standards/library/index.cfm.
http://water.epa.gov/scitech/swguidance/standards/upload/2008_08_04_standards_wqsvariance.pdf.

[35] EPA has explained a state or authorized tribe may streamline its variance process by granting one variance that applies to all these dischargers (i.e., a multiple discharger variance) where the state or authorized tribe can demonstrate that that the designated use and criterion is unattainable as it applies to multiple permittees because they are all experiencing challenges in meeting their WQBELs for the same pollutant for the same reason, regardless of whether or not they are located on the same water body, so long as the variance is consistent with the CWA and EPA's implementing regulations. *See* Water Quality Standards Regulatory Clarifications, 78 Fed. Reg. 54517, 54531-32 (September 4, 2013) and EPA's FAQs on multiple discharger variances available at: ahttp://water.epa.gov/scitech/swguidance/standards/upload/Discharger-specific-Variances-on-a-Broader-Scale-Developing-Credible-Rationales-for-Variances-that-Apply-to-Multiple-Dischargers-Frequently-Asked-Questions.pdf.

to at least one of the factors listed in 131.10(g).[36] Section 131.10(g) includes the following factors: (1) naturally occurring pollutant concentrations prevent the attainment of the use; (2) natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating state water conservation requirements to enable uses to be met; (3) human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; (4) dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to resort the water body to its original condition or to operate such modification in a way that would result in the attainment of the use; (5) physical conditions related to natural features of the water body such as lack of a proper substrate, cover, flow, depth, pools riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or (6) controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

The EPA reviewed Montana's basis[37,38] for determining that it is reasonable to grant multiple public and multiple private dischargers throughout the state with general variances of up to 20 years based on a demonstration that it is infeasible to meet water quality-based effluent limits based on the NNC (and by extension infeasible to attain the designated use for that limited time) "end-of-pipe" because meeting such limits would cause substantial and widespread economic and social impacts (see 40 CFR § 131.10(g)(6)) on a statewide basis. This analysis is the focus of the EPA review discussed below.

Economic Analysis for POTWs

For the economic analysis of publicly-owned wastewater treatment plants (POTWs) within the state, Montana referred to the EPA's 1995 economic guidance to evaluate substantial and widespread economic impacts.[39] Montana identified the 107 actively discharging POTWs within the state, and completed the analysis of economic impacts for 24 of the 107 dischargers across Montana. The state considered this subset to be a representative subsample of the economic and technological conditions for the entire population of dischargers. The state's analysis examined effluent data and financial information for all 12 POTWs that discharge more than 1 million gallons per day (MGD); four of the 12 facilities that discharge less than 1 MGD; and eight of the 83 lagoon systems.[40] Appendix A of the state's economic demonstration[41] includes the detailed cost analyses for each plant.

Using EPA's guidance as a starting point for its analysis, the state applied three "tests" to determine if the cost to meet the NNC would cause substantial economic and social impacts for the community: 1)

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[36] Id.

[37] Blend, Jeff; Suplee, Michael. 2011. Demonstration of Substantial and Widespread Economic Impacts to Montana That Would Result if Base Numeric Nutrient Standards had to be Met in 2011/2012. Helena, MT: Montana Dept. of Environmental Quality.

[38] Blend, Jeff; Suplee, Michael. 2012. Demonstration of Substantial and Widespread Economic Impacts to Montana That Would Result if Base Numeric Nutrient Standards had to be Met by Entities in the Private Sector in 2011/2012. Helena, MT: Montana Dept. of Environmental Quality.

[39] U.S. Environmental Protection. 1995. Interim Economic Guidance Workbook. Washington, DC: U.S. Environmental Protection. Report EPA-823-B-95-002.

[40] Lagoons refer as "facultative waste stabilization ponds" (USEPA 2002. Wastewater Technology Fact Sheet) http://water.epa.gov/scitech/wastetech/upload/2002_10_15_mtb_faclagon.pdf. In Montana, this includes aerated and non-aerated facultative waste stabilization ponds.

[41] Blend, Jeff; Suplee, Michael. 2011. Demonstration of Substantial and Widespread Economic Impacts to Montana That Would Result if Base Numeric Nutrient Standards had to be Met in 2011/2012. Helena, MT: Montana Dept. of Environmental Quality.

Municipal Preliminary Screener (MPS) test; 2) secondary score; and 3) the widespread test. The MPS and secondary score constitute an evaluation of whether the population that is expected to bear the cost will incur "substantial" economic impacts due to the implementation of the pollution control costs. The MPS "screener" test establishes whether a community can clearly pay for the project without incurring any substantial impacts. If a community did not pass the "screener" test, the state used the secondary test to incorporate a characterization of the community's current financial and economic well-being. Together these two tests can demonstrate whether or not a community has "substantial" economic impacts. In order to derive the MPS, the state needed to estimate the compliance costs to meet the NNC. The state first described the current treatment technology and nutrient effluent concentrations for each of the 24 facilities. Next, the state identified additional treatment technology needed to achieve the NNC after examining a variety of different treatment processes. Effluent concentrations associated with enhanced biological nutrient removal technology are the best currently being achieved anywhere in the U.S. at full-scale wastewater treatment facilities. According to Montana's analysis, effluent concentrations using enhanced biological nutrient removal (EBNR) technology ranged from 3000 - 4000 µg/L TN and 50 – 70 µ/L TP.[42,43] If those concentrations were end-of-pipe (no mixing zone) limits, they would not meet the nitrogen criteria (see Table 12A-1 on page 5) and would not necessarily meet the phosphorus criteria (see Table 12A-1 on page 5). Therefore, Montana did not use EBNR as the basis for determining compliance costs.

Instead, the state considered reverse osmosis (RO) to be the most advanced treatment method with the greatest likelihood of achieving Montana's NNC, which includes nitrogen and phosphorus criteria. Wastewater engineering reports document that RO can achieve concentrations of less than 2000 µg/L TN and may meet concentrations of 1000 µg/L TN (depending on a number of factors) and less than 0.010 µg/L TP.[44] Based on this information, Montana determined that RO was the only available technology for facilities to implement in order to meet WQBELs derived to meet the state's dual NNC.

Montana calculated the cost of compliance based on RO using data available from the Interim Water Environment Research Foundation (WERF) study.[45] The WERF study identifies different treatment levels and their associated capital and operations costs. To calculate the total annual pollution control costs for each facility, current effluent concentrations were compared to the costs of treating 50% and 100%, of the plant's effluent using RO. Both scenarios were run because meeting the NNC may require reducing influent TN concentrations by using a two-pass RO system (i.e., treating 100%),[46] Montana next calculated the total annual pollution control cost per household, including the cost of the project and existing pollution control costs.

Montana also completed an overall sensitivity analysis to derive the MPS value. In the sensitivity analysis, the state examined the effect of different discount rates (i.e., using 7% instead of 5%); labor costs (labor was excluded from the WERF cost estimates); and treating 100% of the effluent using RO.

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[42] Hartman, Pamela, and J. Cleland. 2007. Wastewater Treatment Performance and Cost Data to Support and Affordability Analysis for Water Quality Standards.

[43] Presentation by Dave Clark, HDR Consulting to MDEQ Nutrient Workgroup. Achievable Technology for Municipal Wastewater Systems. 09/17/2009.

[44] Falk, M. W., J. B. Neethling, and D. J. Reardon. 2012. Striking the Balance Between Nutrient Removal in Wastewater Treatment and Sustainability. IWA Publishing. U.S. Environmental Protection. 1995. Interim Economic Guidance Workbook. Washington, DC: U.S. Environmental Protection. Report EPA-823-B-95-002.

[45] Id.

[46] See page 18 of MDEQ's economic demonstration for more detail. Blend, Jeff; Suplee, Michael. 2011. Demonstration of Substantial and Widespread Economic Impacts to Montana That Would Result if Base Numeric Nutrient Standards had to be Met in 2011/2012. Helena, MT: Montana Dept. of Environmental Quality.

The EPA found the sensitivity analysis to represent the range of circumstances that could be encountered.

The MPS value represents the cost of annualized proposed pollution controls per household. The EPA's economic guidance states that MPS values greater than 2% indicate that the project may place an unreasonable financial burden on many of the households within the community. If the MPS suggests substantial impacts may be possible (i.e., >1%) or more likely (i.e., >2 %), the EPA guidance recommends performing the secondary test to confirm substantial economic and social impact. Secondary scores describe the socioeconomic health of the community in more detail and demonstrate the community's ability to obtain financing for wastewater improvements. In its approach, Montana chose to use its own updated list of indicators to determine the secondary score.[47, 48] Using the data for its updated list of indicators, Montana calculated the secondary scores for the 24 communities. Montana then used secondary scores in combination with the MPS results and the sensitivity analysis to determine whether implementing the pollution control costs would cause "substantial" economic impacts to the community. The state asserted that based on the results of the secondary scores and the MPS values, all 107 communities showed substantial economic impacts.

Lastly, the state evaluated statewide economic impacts of meeting the NNC through application of the "widespread" test. The "widespread" test examines the impacts to the larger affected community, recognizing that the financial impacts associated with the discharger treating to the NNC could cause "far reaching and serious impacts to the community".[49] Montana described the potential cumulative adverse economic impacts that could occur including: a) the expense associated with replacing lagoons with mechanical treatment plants for the majority of communities; b) the state's current ranking as 41st in the nation in per capita income; c) impacts to struggling small towns lacking diversified economies; d) challenges with finding qualified wastewater treatment plant operators; and e) impacts to other community infrastructure needs. In addition, the state described the environmental consequences associated with building RO treatment systems (e.g., brine disposal, increased greenhouse gas emissions). The state concluded that Montana would experience widespread economic impacts if communities were required to implement the necessary pollution control costs without the added flexibility of staging attainment by dischargers over up to 20 years.

Economic Analysis for Private Facilities

Montana's showing of economic impacts to private-sector dischargers was modeled on the EPA's economic guidance and is similar to the public sector analysis.[50] First, the state identified 51 private dischargers from a variety of sectors (e.g., metal mining; coal mining; oil and gas development; oil and gas refineries; etc.) that may be affected by adoption of NNC. NPDES water discharge permits, monitoring data, and the statement of basis for these dischargers were examined to evaluate current treatment levels for each facility. The state's analysis assumed that the costs of compliance would be incurred by the businesses and not transferred to Montana households. Similar to the public sector analysis, Montana projected the costs of achieving the NNC based on the following assumptions: a) treatment of 50% and 100% of the facility's effluent using RO would be required; b) discount rates

[47] See Appendix C of Blend and Suplee (2011). Demonstration of Substantial and Widespread Economic Impacts to Montana That Would Result if Base Numeric Nutrient Standards had to be Met in 2011/2012.
[48] Memo submitted to the EPA from Jeff Blend, MDEQ, on 12/09/2014. Changes to the Individual Variance Made by the NCAAG (Nutrient Criteria Affordability Advisory Group).
[49] U.S. Environmental Protection. 1995. Interim Economic Guidance Workbook. Washington, DC: U.S. Environmental Protection. Report EPA-823-B-95-002.
[50] Id.

would be 5% or 7%; and c) labor costs may vary from 15% to 48%. The state's private sector economic analysis also included a sensitivity analysis. Where possible, plant level information was used to determine current and projected costs of meeting the NNC.

The EPA guidance does not identify a specific economic hardship threshold (i.e., 2% MPS for the public sector) that can be applied to determine whether private-sector economic impacts are substantial. Therefore, the state examined economic impacts to individual facilities and also at a statewide scale. Montana presented financial analyses completed for several of the larger businesses as a signal of the economic impacts that could also occur to smaller businesses if facilities were required to treat to the NNC.[51] This review suggested larger plants may experience impacts such as a loss in revenues; layoffs; or scaling back production. In some cases, plants may have to shut down, affecting the financial status of the broader community.

Montana also evaluated sector-level estimates associated with meeting NNC. Montana's analysis estimated the amount of total annual revenue that businesses would spend to meet the NNC. Additionally, Montana's private-sector economic demonstration includes several case studies of individual businesses working to implement rigorous nutrient controls. These case studies offer insights into the implications of meeting the adopted NNC for private businesses-- documenting the technological and financial barriers that may be encountered.

The state's economic analysis concludes with the "widespread" test which discusses the projected statewide implications to private businesses including: a) recent impacts from the recession; b) companies deciding not to locate in Montana to avoid costs associated with meeting the NNC without the possibility of staging attainment by dischargers over up to 20 years; and c) impacts of business closures including loss of higher wage paying jobs on the local and statewide economy. As noted above, based on the EPA's review of the available treatment technologies for total nitrogen, there is not an existing technology currently available that would reliably meet Montana's dual NNC, especially stringent nitrogen criteria (1300 µg/L TN (warm water); 300 µg/L TN (cold water)). This presents similar difficulties for some industrial dischargers who, without available treatment, could be in the position of halting operations entirely in the state. Closure of these facilities could result in significant job losses in the Montana.

Basis for Approval

In the EPA's review of Montana's economic demonstration, the EPA first reviewed the list of dischargers included in the state's analysis. The EPA notes that an estimated thirty dischargers included in the state's economic analysis discharge into non-wadeable rivers for which numeric nutrient criteria have not yet been derived or adopted. Based on ARM 17.30.660(1), the EPA understands that these facilities will continue to be subject to Montana's existing narrative criterion instead of the NNC and therefore the EPA's approval of general variances today does not include these dischargers. Additionally, the state's economic analysis included dischargers currently covered by a general permit for domestic sewage lagoons. The EPA's approval of general variances today does not apply to these lagoons because they are not yet subject to the NNC.

The EPA evaluated whether including these facilities in the state's economic analysis affected the final

[51] See Table 5; Pages 8-10. Blend, Jeff; Suplee, Michael. 2012. Demonstration of Substantial and Widespread Economic Impacts to Montana That Would Result if Base Numeric Nutrient Standards had to be Met by Entities in the Private Sector in 2011/2012. Helena, MT: Montana Dept. of Environmental Quality.

outcome. From the EPA review, it appears that facilities discharging into non-wadeable rivers without established NNC are similar in composition to the subset of facilities with established NNC that were used in the state's economic analysis. For example, for the public sector, facilities on non-wadeable rivers ranged from larger more affluent communities with mechanical plants (i.e., Billings, Livingston) to small towns with lagoon systems. For the private sector, facilities discharging into non-wadeable rivers includes a mix of larger, multi-national private dischargers with greater financial capabilities to make capital improvements (i.e., Exxon, Conoco) to facilities that may not be currently discharging. By including both highly profitable and potentially nondischarging facilities in their economic analysis, it is possible the state's economic analysis may have underestimated the economic impacts associated with meeting the NNC. The EPA concludes that including these facilities from the economic analysis does not undermine the final conclusion in the state's economic analysis that meeting the NNC would result in substantial and widespread economic and social impacts for all dischargers subject to the NNC.

For the public sector economic demonstration, the EPA reviewed the list of public dischargers included in the state's analysis. The state's economic analysis focused on those communities with the highest likelihood of being able to afford to meet the NNC. By demonstrating that the largest, and generally most affluent, communities with already-sophisticated systems in place (e.g., biological nutrient removal) and/or that large populations where additional costs could be dispersed (i.e., economies of scale) would face economic hardship, Montana demonstrated that the remaining dischargers (primarily lagoons) would also face economic hardship if required to meet the NNC. These dischargers would have to absorb much higher costs of additional technology (e.g., RO plant) with less population to absorb the costs. Assuming these remaining dischargers have at most the same median household income as the other communities, the net effect is a higher MPS value. Since the subset of communities examined in Montana's analysis exceeded the 2% threshold, Montana concluded the remaining dischargers would also have MPS values above the 2% threshold. The EPA finds this assumption reasonable.

The EPA also evaluated the state's assumption that facilities would need to meet the NNC at the end-of-pipe. There were several factors relevant to determining whether a facility would need to meet the NNC at the end of end-of-pipe including: whether the facility discharges into a waterbody on the state's 303(d) list as impaired for nutrients; whether any mixing zone is available; and whether the facility discharges into an intermittent waterbody or waterbody where the 14Q5 would likely be zero. The EPA concludes that the state's assumption that criteria would need to be met at the end-of-pipe is reasonable.

Next, the EPA examined Montana's assumption that RO would be required to meet the NNC by reviewing the available literature on treatment technologies; identifying the effluent concentrations that can reliably be achieved; and consulting with wastewater experts both within the EPA as well as outside of the Agency. The EPA recognizes that treatment technologies other than RO may meet some of Montana's numeric TP criteria if it was the only criteria that Montana had adopted and dischargers were treating only for total phosphorus.[52, 53,54] For example, case studies from Colorado (Cherry Creek Reservoir Control Regulation), Utah (Snyderville Water Reclamation Facility)[55] and Montana

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[52] Water Environment Research Federation. 2010. Nutrient Management: Regulatory Approaches to Protect Water Quality. Volume 1 – Review of Existing Practices.
[53] EPA. 2009. Nutrient Control Design Manual. State of Technology Review Report. EPA/600/R-09/012.
[54] EPA. 2010. Nutrient Control Design Manual. EPA/600/R-10/100.
[55] Pers. Com. February 9, 2015.

(Kalispell)[56] demonstrate that, while expensive, dischargers can use chemical addition and/or microfiltration to consistently achieve total phosphorus concentrations of 0.050 µg/L. However, chemical addition or microfiltration cannot achieve the nitrogen criteria component of Montana's NNC. Montana's approach to addressing nutrient pollution is based on the need for managing both total nitrogen and total phosphorus in order to manage the full nutrient pollution problem, which the EPA supports.[57] In the scientific justification for adopting an NNC that necessarily includes both TN and TP criteria, Montana states:

> The Department is recommending both TN and TP criteria for stream protection. Phosphorus (P) control is sometimes promoted as the only approach needed to limit eutrophication, this being based largely on the more economical removal of P from wastewater and the assumption that P can be made to become limiting in the waterbody. But data pertaining to streams and rivers indicate that it would be unwise to adopt only P criteria. Mixed assemblages of benthic algae are very often limited by nitrogen or nitrogen and phosphorus (co-limitation) in the region's flowing waters. A P-only approach, in order to work, would require that P standards be set to the very low background levels observed in our western region's reference sites (e.g., 10 µg TP/L). If the P standard were not set to natural background, and no controls on N were undertaken, then the commonly occurring N limitation or N and P co-limitation would lead to algal growth stimulation nonetheless. Worse yet, in the long term, a P-only strategy would result in highly skewed (elevated) N:P ratios accompanying the low P levels. These management-induced conditions might control green algae biomass but may lead to nuisance blooms of the diatom algae *Didymosphenia geminata,* which has in recent years formed nuisance blooms in rivers and streams in Montana and world-wide. (Executive Summary). [58]

Determining the cost of compliance with Montana's NNC requires identification of treatment technologies that will meet both the TN and TP criteria. Treatment options that meet one criteria but not the other would not ensure protection of the aquatic life designated use.

Based on the EPA's review of the available treatment technologies for total nitrogen, there is not an existing technology currently available that would reliably meet Montana's stringent NNC which includes both nitrogen and phosphorus criteria. RO is the only treatment option that has the potential to remove the total nitrogen component of the NNC to concentrations of approximately 1000 µg/L TN. Case studies examining RO performance indicate that the reliability and consistency of meeting a TN concentration of 1000 µg/L TN are highly variable and depend on the TN concentrations of the influent, total dissolved solids concentrations, temperature and pH. Removal of refractory dissolved organic nitrogen has also been shown to be a challenge when striving to meet such a low concentration.[59] Therefore, using a single-pass RO system to meet a 1300 µg/L TN monthly summer average criterion for warm water streams is considered unreliable. Because there are no existing treatment technologies that can reliably achieve the nitrogen criteria of the NNC for wadeable streams, the EPA supports Montana's view that achieving WQBELs based on the NNC and thus attaining the NNC (and the designated use) is infeasible until treatment methods improve or ambient levels of nutrients in the streams decrease to the point that effluent discharge concentrations do not need to be equal to the NNC,

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[56] EPA. 2008. Municipal Nutrient Removal Technologies Reference Document. Volume II – Appendices. EPA-832-R-08-006. http://water.epa.gov/scitech/wastetech/upload/2008_10_06_mtb_mnrt-volume2.pdf

[57] EPA. 2012. http://www2.epa.gov/sites/production/files/documents/nandpfactsheet.pdf

[58] Suplee, M.W1., and V. Watson2, 2013. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers—Update 1. Helena, MT: Montana Dept. of Environmental Quality.

[59] Falk, M. W., J. B. Neethling, and D. J. Reardon. 2012. Striking the Balance Between Nutrient Removal in Wastewater Treatment and Sustainability. IWA Publishing.

otherwise substantial and widespread economic and social impacts will occur. Optimization studies, including efficiencies that could be obtained through trading with nonpoint sources, may illuminate such opportunities.

For the public sector dischargers, the EPA concludes that based on the above, requiring public sector dischargers to meet WQBELs based on Montana's adopted NNC would result in substantial and widespread economic and social impacts for all POTWs covered by a general variance. The state's analysis meets the requirements of 40 CFR § 131.10(g) and justifies a variance of up to 20 years for POTWs.

For the private sector economic demonstration, the EPA concludes that the state's submission meets the requirements of 40 CFR § 131.10(g) and justifies a variance of up to 20 years by demonstrating that requiring private sector facilities to meet WQBELs during the period of the variance based on Montana's adopted NNC would result in substantial and widespread economic and social impact. Given that there is no feasible technology to reliably meet the TN criteria, a broad spectrum of facilities and industries would be forced to substantially alter or halt operations. The resulting cascade of impacts would be felt throughout all communities statewide. Montana's variance provisions provide needed time to determine how to achieve compliance with necessary effluent limits based on the NNC, and ensure that progress toward that goal will proceed in a timely manner.

If at the time of permitting, Montana determines that, based on site-specific facts and details (e.g., dilution, alternatives to discharge, installing less expensive treatment technology), an individual discharger can meet the NNC-based limits, then the discharge permit would include such limits. Where necessary and appropriate, a compliance schedule may be included in the permit. This approach is consistent with Montana's regulatory language that variances may be provided for up to 20 years, or for a shorter duration, should the state determine that is appropriate. Another option would be for the discharger to apply for an individual variance based on a site-specific demonstration that the discharger cannot afford to meet such NNC-based limits.

General Variance Considerations and Water Quality Protections that Apply While the Variance is in Effect

ARM 17.30.660(2) establishes that any discharger covered by a general variance must meet the requirements described in DEQ-12B. This provision documents that "the decision to grant the general variance must be reflected in the permit that is made available for public comment." Section 2.0 of DEQ-12B provides additional detail regarding implementation, stating that general variance coverage will be implemented through the permitting process and that permits will include the period of the variance and the interim requirements for each discharger covered under a general variance.

Section 2.0 of DEQ-12B provides additional detail regarding general variances including: a) interim end-of-pipe treatment requirements which expire on July 1, 2017 ; b) the maximum 20 year duration of a variance; c) permitting details associated with the variance; and d) review requirements of the justification for the variance and future end-of-pipe treatment requirements to make progress towards the NNC.

This section goes on further to define the end-of-pipe interim treatment requirements at Table 12B-1 (see figure) for three categories of dischargers: 1) facilities with discharge volumes greater than 1 MGD; 2) dischargers with volumes less than 1 MGD; and 3) lagoons. The interim treatment requirements shall

be applied as a monthly average as defined in Sections 1.1 and 2.1 of DEQ-12B.

Section 2.0 of DEQ-12B requires that, after June 1st, 2016, and triennially thereafter, Montana review the economic justification for the general variances as well as the cost and effluent concentrations associated with available treatment technologies. Findings from this review will determine the next set of interim limits that apply under the general variances after 2017. The state will solicit public comment on its draft findings and will initiate rulemaking if there is a need to revise the interim limits and/or continue the general variance without modifications. Results of the rulemaking will be submitted to the EPA for review and approval.

Table 12B-1. General variance end-of-pipe treatment requirements.

	Monthly Average	
Discharger Category	**Total P (µg/L)**	**Total N (µg/L)**
> 1.0 million gallons per day	1,000	10,000
< 1.0 million gallons per day	2,000	15,000
Lagoons not designed to actively remove nutrients	Maintain current performance	Maintain current performance

Section 2.0 clarifies that permit limits implementing the end-of-pipe treatment requirements and NNC will be expressed in loads. The rule language also indicates that compliance schedules can be incorporated into the permit to allow time to meet the interim treatment requirements.

Section 2.1 of DEQ-12B requires permittees covered by a general variance to complete an optimization study within two years of receiving the variance. The optimization study must explore alternatives to reduce nutrient loading such as nutrient trading, facility optimization without substantial investment in new infrastructure, reuse, recharge, and land application.

Basis for Approval

The EPA finds Montana's general variances for public and private dischargers to be reasonable and consistent with CWA requirements. As discussed above, the state's economic analyses demonstrate that the facilities subject to WQBELs based on the NNC need a variance because meeting WQBELs based on the NNC during the term of the variance would cause substantial and widespread economic and social impact, consistent with 40 CFR § 131.10(g)(6). In addition, the maximum 20-year time frame of the general variances combined with the requirement for the state to review every three years both the justification for the general variances and to review, obtain public input and adopt new interim treatment requirements provides assurance that these dischargers will be expected to achieve specific numeric interim treatment requirements throughout the variances in order to make progress towards achieving

the target effluent limitations based on the underlying NNC. Montana documented the rationale for the maximum 20-year variance limit in DEQ-12B (General Introduction) stating:

> Because many of the base numeric nutrient standards are stringent and may be difficult for MPDES permit holders to meet in the short term, Montana's Legislature adopted laws (e.g. §75-5-313, MCA) allowing for the achievement of the standards over time via the variance procedures found here in Circular DEQ-12B. This approach should allow time for nitrogen and phosphorus removal technologies to improve and become less costly, and to allow time for nonpoint sources of nitrogen and phosphorus pollution to be better addressed." (underline added)

Montana's approach facilitates long-term facility planning by defining the NNC as the highest attainable condition (HAC) for its waters and establishing a maximum of 20 years to achieve that HAC. Given the current lack of existing treatment technologies that can reliably achieve effluent limits based on the NNC, specifically the stringent nitrogen criteria, discussed above, the variance process provides time for dischargers to identify and implement the most cost effective method for making progress towards meeting the NNC while also ensuring that the NNC remains the goal. Montana's nutrient rules establish the NNC as the long-term HAC with interim milestones (i.e., interim treatment requirements) required for dischargers to meet in the near term:

> "Variances from the standards may be granted for up to 20 years. Thus, 75-5-313,MCA, allows for the base numeric nutrient standards to be met in a staged manner over time, as alternative effluent management methods are considered, nutrient removal technologies becomes more cost-effective and efficient, and nonpoint sources of nutrients are addressed." (Statement of Reasonable Necessity ARM 17.30.660)

To ensure that dischargers are making meaningful progress toward the HAC throughout the duration of the variance, Montana's approach incorporates short-term interim milestones, adopted on a triennial basis. The first set of milestones are the end-of-pipe treatment requirements established by the MT statute and re-iterated in Table 12B-1 that expire on July 1, 2017, after which Montana will go through a public rulemaking process to establish the next set of interim treatment requirements. The procedure established in Montana's regulations provides accountability that dischargers will make progress towards meeting the NNC by the end of the general variance provided that the triennial review process is implemented appropriately and effectively. This process should ensure that the water quality protection requirements imposed by the variances keep pace with what is feasible to achieve. This approach also affords the public an opportunity to review and comment on the proposed milestones. Montana will submit a new WQS rule package including the interim milestones applicable for the next three-year period to the EPA for review and approval.

Based on prior conversations with the state, the EPA understands that Montana will include limits based on the NNC in the permit fact sheet. The EPA supports and encourages this practice so that dischargers are fully aware of what will be expected of them at the end of the variance period.

Montana's approach is comprehensive and provides time for dischargers to incrementally work to achieve stringent WQBELs based on the protective NNC. The EPA supports Montana's decision to establish interim treatment requirements and to require a review of the interim treatment requirements and underlying variance justifications on a triennial basis. Not only will Montana's rules as a whole ensure that dischargers are making progress towards achieving the HAC in a process that includes public

input and oversight by the EPA, but this approach also provides incentives to maximize optimization, develop innovative treatment technologies, and look toward nonpoint source reductions, especially for nitrogen, to facilitate that the NNC will be achieved in 20 years.

The initial set of end-of-pipe treatment requirements included in the rulemaking expire on June 1, 2017. This expiration is appropriate given that the state statute authorizing the general variances, MCA 75-5-313, sets forth that particular set of treatment requirements for only that time frame. As the expiration date approaches for the initial set of treatment requirements, the EPA fully expects Montana to adopt the next set of general variance milestones that will ensure dischargers continue to reduce nutrient loads and will ensure Montana is on a pathway to protect aquatic life designated use and attain the NNC. Such interim requirements should, themselves, reflect the best that dischargers can achieve in that time period and be based on 1) information collected during the optimization studies completed during the first phase of the general variances; and 2) additional analyses about what is affordable for facilities under the substantial and widespread economic and social test.

Montana's nutrient rules (specifically section 2.1 of DEQ-12B) define the expectations for the optimization studies.[60] Optimization is a tool that, when effectively implemented and sustained, can achieve remarkable nutrient reductions at much lower costs and within much shorter timeframes (~3 years).[61] Optimization case studies demonstrate that plant performance can be improved to achieve TN and TP concentrations below 10,000 µg/L and 1000 µg/L respectively.[62] Optimization work recently completed at several Montana wastewater treatment plants (e.g., Manhattan, Chinook, Conrad) demonstrate improved plant performance with effluent total nitrogen concentrations reduced by as much as 50%.[63,64] By coupling the interim treatment requirements with an optimization requirement, Montana's approach facilitates shorter-term nutrient reductions from dischargers that will inform future interim treatment requirements.

Section 2.0 includes rule language that a compliance schedule may be incorporated into a permit to allow time to meet the interim treatment requirements. Such schedules are appropriate where compliance with the WQBEL is feasible but time is needed. For example, facilities may need time to secure funding[65], install treatment technology and implement the steps necessary to meet the WQBEL. The duration of a compliance schedule is determined based on discharger-specific information and must ensure compliance as soon as possible and be consistent with EPA's federal regulations at 40 CFR § 122.47. The state's decision to authorize permit compliance schedules for purposes of implementing such limits is fully consistent with the state's more general authority[66] to establish permit compliance schedules for <u>any</u> water quality-based effluent limit.

Based on our review, the EPA concludes that ARM Section 17.30.660(2),Sections 2.0 and Section 2.1 of DEQ-12B implementing general variances for both public and private dischargers are consistent with the EPA's regulations and are approved.

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[60] Section 2.1 of Circular DEQ-12B requires permittees covered under a general variance to complete an optimization study.
[61] Wastewater Nitrogen & Phosphorus Removal without Plant Upgrades: Optimizing the Operation of Existing Facilities. The Water Planet Company. 10 December 2013 Presentation to EPA Region 8.
[62] <u>Id.</u>
[63] Paul LaVigne, Montana Department of Environmental Quality, personal communication, March 24, 2014.
[64] Grant Weaver. The Water Planet Company. http://www.cleanwaterops.com/case~studies.
[65] Financing through bonds may be necessary to fund and construct expensive capital improvements and qualified plant operators may need to be trained or hired.
[66] ARM 17.30.1350 contains Montana's compliance schedule authorizing provision.

Existing Use Protection and NonPoint Source Controls for the General Variances

The EPA's water quality standards regulation (40 CFR § 131.10(h)) states that:

> "States may not remove designated uses if:
> (1) They are existing uses, as defined in § 131.3, unless a use requiring more stringent criteria is added; or
> (2) Such uses will be attained by implementing effluent limits required under sections 301(b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

Existing uses are those uses actually attained in the waterbody on or after November 28, 1975, whether or not they are included in the water quality standards. Federal regulations preclude removing designated uses if they are existing uses. A variance is a time-limited designated use and criterion for a specified pollutant(s), permittee(s), and/or water body or waterbody segment(s) that reflects the highest attainable condition during the specified time period. A variance provides a mechanism to make incremental progress toward the ultimate water quality objectives for the water body.

When adopting a variance, states and authorized tribes retain the underlying designated use and criterion in their standards to apply to all other permittees not addressed in the WQS variance, to identify threatened and impaired waters under CWA Section 303(d), and to establish a Total Maximum Daily Load (TMDL). The underlying designated use and associated criteria reflect the ultimate water quality objectives for a water body. In contrast, a variance is time-limited, and reflects the highest attainable condition during a specified time period. Designated uses and existing uses represent ultimate goals independent of time, whereas the highest attainable condition during a variance represents a time-limited proximate goal with the purpose of providing a mechanism toward achieving the ultimate designated use and thus protecting the existing use. Because the underlying designated use and associated criteria remain in place for the long-term, existing uses that are protected by the underlying designated use and associated criteria are not removed when a state adopts a time-limited variance.

For the nutrient rules that the EPA is acting on today, it is clear that Montana's implementation of nutrient variances (whether general or individual) will *improve* water quality, and place many impaired Montana waters on a pathway toward full attainment. Such variances recognize the reality that nutrient loadings from existing point sources need to be reduced, and that time is needed to accomplish such reductions. Rather than removing designated uses, the EPA believes such variances are essential to achieving protection of designated uses (and attainment of base numeric criteria) by a date certain.

Unlike an action to permanently remove a designated use, Montana's general variances retain the designated use as a long-term goal. The variances are authorized for no more than 20 years, and EPA understands the state will include limits based on the NNC in the permit fact sheet. Doing so ensures that permittees remain aware of their long-term compliance goals, and demonstrates a commitment to pursue achieving the WQBELs, the underlying designated use and the NNC within a period not to exceed 20 years.

It is clear from Montana's response to public comments that the state recognizes its obligation to protect existing uses, and that variances are not authorized for new or increased dischargers if existing use(s) would be impacted. For example, consider a water body where water quality conditions for all pollutants (including nutrients) support designated uses (i.e., the designated use is an existing use). In this scenario, a new/expanded discharge that would cause or contribute to a water quality standards exceedance would

not protect an existing use and fail to comply with MCA 75-5-303(1). Thus, the EPA interprets MCA 75-5-303(1), and Montana's response to comment, as acknowledging that variances are not authorized in the circumstances described therein, and that permits for such new/expanded discharges would need to include effluent quality limitations that protect designated and existing uses *on the date such discharges are initiated.* Any such permits would also have to comply with Montana nondegradation requirements.

Regarding 40 CFR § 131.10(h)(2), Montana evaluated cost-effective and reasonable best management practices for nonpoint sources under the control of a discharger. This is consistent with §131.10(h) because Montana's general variances and individual variances provision clearly only allow variances that are discharger(s) specific versus waterbody wide. Given the scope of Montana's provisions, the EPA believes it is reasonable for the state to evaluate only those best management practices for nonpoint source control that are within the control of a discharger.[67,68,69] In the scenario where there are no nonpoint sources under the control of the discharger (which the EPA believes is often the case) then the justification for the variance need not consider what can be achieved with implementation of cost-effective and reasonable best management practices for nonpoint source control.

In developing its general variance approach, Montana considered whether land application would be a viable nonpoint source control by various dischargers. Montana also discussed water rights issues related to land application opportunities with its rulemaking workgroup in March 2010. Workgroup discussion notes document the challenges noted with land application, specifically that land application requires access to available land with reliable landowner permission; piping to transport waste to the land application area; retention zones for periods when waste cannot be land applied; and funding. Because of this host of issues, Montana determined that land application was not be a viable option for many communities as a cost-effective BMP. Land application is one of the alternatives that, per DEQ-12B, dischargers should consider as part of the facility optimization study required for all facilities. Therefore, Montana considered cost effective and reasonable BMPS for non-point sources within the control of the discharger.

It is clear from Montana's evaluation of land application options that in the typical case where waters are now impaired, implementing cost effective and reasonable BMPs for nonpoint source control alone will not attain designated uses. It is most likely that a reduction in TP and TN load from a combination of point sources and nonpoint sources will ultimately be necessary to achieve the NNC and attain designated uses in wadeable streams. Rather than removing the underlying designated use, Montana's adoption of a variance provides time, up to 20 years in this case, to attain the underlying designated use. During this interim period, Montana is committed to a process of evaluating both point source control technology and nonpoint source reductions to identify the highest attainable condition at regular intervals. The EPA fully anticipates that this process will include further examination of cost effective and reasonable BMPs for nonpoint source control. As an example, Montana has encouraged dischargers

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[67] EPA. 2011. EPA Technical Support Document for EPA's Action on the State of Oregon's New and Revised Human Health Water Quality Criteria for Toxics and Associated Implementation Provisions Submitted July 12 and 21, 2011. October 17,2011.

[68] By contrast, for variances that temporarily relax requirements for all sources in the watershed (waterbody variances), the EPA interprets the provision as requiring an assessment of all contributing nonpoint sources.

[69] 40 CFR 132, Appendix F, Procedure 2 A.3. "A WQS variance shall not be granted if standards will be attained by implementing effluent limits required under sections 301(b) and 306 of the Clean Water Act (CWA) and by the permittee implementing cost-effective and reasonable best management practices for nonpoint source control."

to evaluate nutrient trading opportunities with nonpoint source partners. Montana recently released a comprehensive report that examined the viability of nutrient trading within the state.[70]

Based on this information, the EPA is approving Montana's nutrient rules as consistent with 131.10(h).

INDIVIDUAL VARIANCES

Section 3.0

Section 3.0 of DEQ Circular 12B contains introductory information and discusses how Section 3.0 is organized. This section establishes that the final permit limit for individual variances implementing the end-of-pipe-treatment requirements and NNC will be expressed as a load. Section 3.0 is approved.

Eligibility Criteria for Individual Variances

Sections 3, 5 and 6 of ARM 17.30.660 and Section 3.1 of DEQ-12B describe the considerations for individual variances and application process. The ARM language reads as follows:

> (3) An application for an individual variance must adequately demonstrate that there are no reasonable alternatives that eliminate the need for a variance and that attainment of the base numeric nutrient standards is precluded due to economic impacts or limits of technology, or both. If the demonstration relies upon economic impacts, the department shall consider any guidance developed by the department and the nutrient work group, as provided in 75-5-313(2), MCA.
>
> (5) The department shall review each application for an individual variance to determine whether a reasonable alternative, such as trading, a permit compliance schedule, a general variance, reuse, recharge, or land application would eliminate the need for an individual variance. If the department makes a preliminary finding that a reasonable alternative to approving an individual variance is available, the department shall consult with the applicant prior to making a final decision to approve or deny the individual variance.
>
> (6) If, after consultation with the applicant, the department determines that no reasonable alternative to an individual variance exists, the department shall determine whether the information provided by the applicant pursuant to (3) adequately demonstrates that attaining the base numeric nutrient standards is not feasible. If the department finds that attaining the base numeric nutrient standards is not feasible, the department shall approve an individual variance, which will become effective and incorporated into the applicant's permit only after adoption by the department in a formal rulemaking proceeding.

Section 3.1 of DEQ-12B emphasizes many of the conditions described in ARM 17.30.660 Sections 3, 5 and 6 regarding the analysis of alternatives to a variance; basis for the individual variance; and the process for review and approval by the state. In addition, Section 3.1 provides additional details on the considerations for individual variances. For example, Section 3.1 authorizes Montana to grant individual variance limits for up to 20 years and establishes that Montana must review the economic basis for the individual variance every three years. Section 3.1 also establishes that the variance will identify the "lowest effluent concentration that is feasible based on achieving the highest attainable condition."

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[70] Morrison-Maierle, Kieser and Associates; and M.J Walsh and Associates. Water Quality Trading Business Case for Montana. 2014. Report prepared for MDEQ.

Basis for Approval

The EPA's water quality standards regulation at 40 CFR § 131.13 provides that variance policies may be adopted at state discretion, and that such general policies are subject to review and approval by the EPA.[71,72] As noted in the general variance section of this letter, under the EPA's water quality standards regulation, adoption of variances may be granted if it can be demonstrated that the otherwise applicable designated use and criterion or criteria are not feasible to attain during a certain time frame. 40 CFR § 131.10(g) sets forth the limited factors that may be used to justify variances.

ARM 17.30.660(3) specifies that variances are authorized only when no reasonable alternatives to the individual variance exist. ARM 17.30.660(5) and Section 3.1 of DEQ-12B specify that the analysis should evaluate non-discharge options (e.g., pollutant reduction or elimination, seasonal retention, land application, reuse, recharge) as well as nutrient trading and the use of compliance schedules. Such a requirement to conduct a thorough evaluation of alternatives, including non-discharge options, is an important component of deciding whether the WQS is attainable or whether it is unattainable for a period of time.

In addition to requiring an analysis of alternatives to the individual variance, ARM 17.660(3) identifies three situations (eligibility criteria) where adoption of individual variances is authorized. This is in contrast to the federal rule (40 CFR 131.10(g)), which authorizes removal of designated uses in six situations. The three eligibility criteria included in Montana's nutrient rules are as follows: (1) attainment of the base numeric nutrient standards is precluded due to economic impacts; (2) attainment of the base numeric nutrient standards is precluded due to limits of technology; or (3) attainment of the base numeric nutrient standards is precluded due to both economic impacts and limits of technology.

While none of the EPA's 131.10(g) factors allows for "limits of technology" to be the sole basis for a designated use removal, such technology limits may be relevant to a demonstration provided under 40 CFR § 131.10(g) where water quality-based controls would "result in substantial and widespread economic and social impact." Section 3.1 of DEQ-12B (page 3-4) supports this approach, stating that:

> "Unlike the general variances discussed in Section 2.0, the Department will only grant an individual variance to a permittee after the permittee has made a demonstration to the Department that meeting the underlying standards would require water quality-based controls that results in substantial and widespread economic impacts."

The EPA agrees that there may be site-specific circumstances where it would be reasonable for Montana to consider adoption of discharger-specific individual variances provided the demonstration also shows that a 40 CFR § 131.10(g) factor has been met. The EPA is approving Montana's individual variance provisions explained above as a general policy under 40 CFR § 131.13. The decision to issue such an individual variance can only be made by completing a rulemaking to revise the WQS for an individual discharger applicable to a specific water body segment based on review of site-specific information. Each individual variance will be a Montana WQS rule change that must be submitted to the EPA for review and approval or disapproval pursuant to 40 CFR § 131.20(c). Accordingly, each individual

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[71] On September 4, 2013 the Agency proposed revisions to its WQS regulation that include new requirements addressing WQS variances. The comment period on the proposed rule closed on January 2, 2014.

[72] Guidance regarding State options is provided in Section 5.3 of the EPA Water Quality Standards Handbook (EPA-823-B-94-005, August 1994). http://water.epa.gov/scitech/swguidance/standards/handbook/index.cfm.

variance submitted for the EPA's review must include the Attorney General's certification and be consistent with the CWA and the EPA's implementing regulations, including all applicable public participation requirements. Thus, the EPA's review of Montana's individual variance authorizing provision need not evaluate each hypothetical variance the state may issue under ARM 17.30.660(3), (5) and (6) and consider whether such a variance would be consistent with the CWA and the EPA's implementing regulation. The EPA's approval of Montana's variance provision is not an automatic approval of any future variance the state wishes to grant pursuant to these provisions.

The EPA concludes that individual variance provisions in ARM 17.30.660(3), (5) and (6) are consistent with the EPA's requirements for individual variances. These provisions are approved.

Water Quality Protections that Apply While an Individual Variance is in Effect

Section 3.1 of DEQ-12B specifies that "the variance application will identify the lowest effluent concentration that is feasible based on achieving the highest attainable condition." In addition, ARM 17.30.660(4) and Section 3.2 of DEQ-12B address situations where reductions may be needed for one nutrient component of the NNC (e.g., TP) but not both (e.g., TP and TN). This section authorizes Montana to consider an individual variance request if the applicant can demonstrate, using water quality modeling, that designated uses are protected by focusing on a single nutrient. If the applicant can show that installing technology to address dual nutrient control would not improve water quality beyond what is projected with technology designed to reduce a single nutrient, the state will consider an individual variance for that nutrient parameter. In situations where individual variances are authorized based on this modeled demonstration, ambient monitoring is required to document designated use protection.

ARM 17.30.660(4) reads:

> "(4) The department may approve the adoption of an individual variance that specifies interim effluent limits different from those contained in general variance limits contained in Department Circular DEQ-12B (July 2014 edition), if water quality modeling demonstrates that greater emphasis on the reduction of one nutrient may achieve similar water quality and biological improvements as would the equal reduction of both nitrogen and phosphorus. The variance must provide effluent limits that reflect the lowest effluent concentration that is feasible based on achieving the highest attainable condition for the receiving water. A person shall submit the proposed effluent limits and supporting data in an application for an individual nutrient variance under (3). A person who has an individual variance with effluent limits that are based on this section shall, in each subsequent triennial review of those limits conducted pursuant to 75-5-313(7), MCA, collect and submit water quality data to demonstrate whether the biological status of the receiving water continues to justify those effluent limits."

In these situations, ARM 17.30.660(4) and Section 3.2 of DEQ-12B authorize Montana to set interim variance limits that reflect the highest attainable condition and require collection of water quality data to demonstrate that designated uses are supported. In addition to Montana's rule language, Sections 4.0 and 4.1 of Montana's implementation guidance[73] describe Montana's recommended approaches for dischargers interested in pursuing an individual variance based on water quality modeling: mechanistic modeling outputs or empirical data showing that the designated uses are being met.

[73] Page 12-13. Montana Department of Environmental Quality, 2014. Base Numeric Nutrient Standards Implementation Guidance. Version 1.0. Helena, MT: Montana Dept. of Environmental Quality.

In all scenarios, the expectation is that the interim effluent limit will reflect the lowest effluent concentration that is feasible based on the highest attainable condition.

Basis for Approval

The EPA's position is that variances must reflect the highest attainable condition for the duration of the variance.[74]

The procedures Montana has adopted for individual variances are consistent with the EPA's regulations in 40 CFR Part 131 and provides requirements that will facilitate progress towards the underlying designated use and applicable NNC. In situations where attainment of the water quality standard is not feasible for a period of time, the policy will require the highest degree of protection that *is* feasible, and that such requirements are re-examined not less than once every three years. As discussed earlier, any individual variance must be adopted through a state rulemaking and submitted to the EPA for review and approval. The EPA will base its review upon the applicable regulatory provisions at 40 CFR Part 131.

The EPA finds that ARM 17.30.660(4) and sections 3.1 and 3.2 are consistent with the CWA requirements and EPA's regulations. Any subsequent individual variance must include a demonstration consistent with the requirements in 40 CFR § 130.10, including the requirement that the state demonstrate that a 131.10(g) factor has been met. These provisions are approved.

NPDES Permits, and CWA Section 303(d) where there is an applicable variance

Generally, when a discharger is subject to a WQS variance, for the period of time when a variance is in effect, CWA National Pollutant Discharge Elimination System (NPDES) permits for discharges included in the variance will include limits (e.g., the "interim variance limits") derived from or specified by the variance. This approach is consistent with 40 CFR § 122.44(d)(1)(vii)(A) which requires WQBELs that "derive from and comply with" water quality standards. In situations where a TMDL establishes a wasteload allocation and a variance is granted, the permit should include effluent limits derived from the variance including any interim effluent limits approved in the variance. In situations where the discharger is meeting the waste load allocation defined in an approved TMDL, a variance is not needed. ARM 17.30.660(7) addresses this point.

However, regarding impairment decisions and TMDLs, CWA Section 303(d)(1)(A) requires that each State shall identify "those waters within its boundaries for which the effluent limitations required by section 301(b)(1)(A) and section 301(b)(1)(b) are not stringent enough to implement any water quality standard applicable to such waters" (emphasis added). Accordingly, listing decisions must consider the underlying designated use and criteria.

ALTERNATIVE VARIANCE

MCA 75-5-313(10)(a) and (b) authorize Montana to issue an "alternative" variance in situations where the discharger is an "insignificant" source of the nutrient load. Section 5.0 (page 15) of

[74] 1998 ANPRM, 78 Federal Register 54531.

Montana's Implementation Guidance explains that Montana may authorize an alternative variance if the permittee can demonstrate that meeting the general variance would not result in an environmentally significant water quality improvement. The guidance specifies that Montana will review requests for an alternative variance on a case-by-case basis.

However, Montana did not adopt any regulatory provisions related to "alternative" variances and is not part of the submission EPA received. Because EPA's approval does not include approval of such "alternative" variances, such variances are not effective for CWA purposes. As noted in the EPA's 2011 letter to Montana[75], none of the 40 CFR § 131.10(g) factors authorize variances based on *de minimus* (aka "insignificant") considerations; therefore, a variance based on a *de minimus* demonstration would not comply with the EPA's regulations. Instead, *de minimus* situations may be addressed through the development of total maximum daily load (TMDL) allocations pursuant to CWA Section 303(d). This approach is described in ARM 17.30.660(7) and addresses situations where a TMDL has been approved and the discharger meets the waste load allocation. As discussed earlier, the decision to issue such an individual variance can only be made by completing a rulemaking to revise the WQS for an individual segment based on review of site-specific information. The EPA will review any WQS variance based on the applicable requirements at 40 CFR Part 131. Absent an EPA-approved variance, the permit writer must use the NNC the EPA approved today, if applicable, to evaluate reasonable potential and, if necessary, develop limits as stringent as necessary to meet the applicable water quality standards (i.e., NNC). *See* CWA Section 301(b)(1)(C), 40 CFR § 122.44(d)

[75] Letter from Jim Martin, EPA Region 8 Regional Administrator to Richard Opper, MDEQ Director, 16 March 2011.