UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Ref: 8WP-C

OCT 3 1 2017

Tom Livers, Director
Montana Department of Environmental Quality
P.O. Box 200901
Helena, Montana 59620-0901

Re: EPA Action on Montana's Variance Rules

Dear Mr. Livers:

The U.S. Environmental Protection Agency Region 8 (EPA) has completed its review of Montana's new water quality standard (WQS) variance rules for nutrients and is approving the variances as described in the Enclosure.[1] The Montana Department of Environmental Quality (Montana or MDEQ) adopted these revisions on June 12, 2017, and submitted the new nutrient variance rules to the EPA for review pursuant to 40 CFR § 131.20(c). The submission included: (1) a copy of the adopted nutrient variance rules and supporting materials; (2) notice of final adoption of the nutrient variance rules with the state's response to comments; and (3) a letter certifying that the nutrient variance rules were adopted in accordance with state law. Receipt of this submission on June 27, 2017, 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).

Montana's new nutrient variance rules include:

- A general variance for dischargers for up to 17 years for mechanical plants and up to 10 years for lagoons (ARM 17.30.660(1-2) and (8), Department Circular DEQ-12B Sections 1.0 and 2.0); and
- An individual variance authorizing provision applicable for future individual dischargers discharging to waters with numeric nutrient criteria (ARM 17.30.660(1, 4 and 8) and Department Circular DEQ-12B Section 3.0).

Today, the EPA is acting on the general variance for dischargers discharging to waters with numeric nutrient criteria (NNC). The EPA's action is supported by the record and consistent with CWA requirements and the EPA's implementing regulation. The EPA is taking no action on the individual variance authorizing provision at this time. The EPA looks forward to continuing to work with Montana to protect and improve surface water quality within the state.

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[1] On February 26, 2015, the EPA approved Montana's numeric nutrient criteria, general variance and individual variance authorizing provision. Montana's general variance interim effluent condition limits expired on July 1, 2017. Today's action applies to Montana's new general variance, revised to comply with 40 CFR § 131.14.

Clean Water Act Review Requirements

The CWA Section 303(c)(2) requires states and authorized Indian tribes[2] 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 WQS. Pursuant to CWA Section 303(c)(3), if the EPA determines that any WQS is not consistent with the applicable requirements of the Act, the Agency shall, not later than the ninetieth day after the date of submission, notify the state or authorized tribe and specify the changes needed to meet the requirements. If such changes are not adopted by the state or authorized tribe within ninety days after the date of notification, the EPA is to promptly propose and promulgate such standard pursuant to CWA Section 303(c)(4)(A). The Region's goal has been, and will continue to be, to work closely with states and authorized tribes throughout the water quality standards revision process to help ensure that submitted water quality standards adopted by states and authorized tribes are consistent with CWA requirements. Pursuant to 40 CFR § 131.21(c), new or revised state or authorized tribal standards submitted to the EPA after May 30, 2000, are not applicable for CWA purposes, including NPDES permitting, until approved by the EPA.

Today's Action

Today the EPA is approving, as consistent with the requirements of the CWA and the EPA's implementing regulation a general variance for nutrients for 36 dischargers. The EPA is taking no action at this time on the individual variance authorizing provision. The Enclosure contains a detailed rationale for today's action.

Endangered Species Act Requirements

The EPA's approval of Montana's nutrient variance rules submitted on June 27, 2017 is subject to the consultation requirement of Section 7(a)(2) of the Endangered Species Act (ESA). Under Section 7(a)(2) of the ESA, 16 U.S.C. § 1536, the EPA has the obligation to ensure that its approval of these modifications to Montana's WQS will not jeopardize the continued existence of threatened and endangered species and their critical habitat in Montana. The EPA initiated consultation with the US Fish and Wildlife Service (USFWS) regarding the effects of this action regarding Montana's general nutrient variance in August 2017 and sent a Biological Evaluation to the USFWS on October 30, 2017.

The EPA's approval of Montana's new 2017 general nutrient variance pending completion of consultation under ESA Section 7(a)(2) is fully consistent with Section 7(d) of the ESA because it does not foreclose either the formulation by Montana or the implementation by the EPA of any alternatives that might be determined in the consultation to be needed to comply with ESA Section 7(a)(2). Under CWA Section 303(c)(4)(B), the EPA has authority to take additional action regarding the revision of water quality standards for Montana if the consultation with the USFWS identifies deficiencies in the revised water quality standards requiring remedial action by the EPA, after the EPA has approved the revisions.

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

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 for their efforts to revise the nutrient variance rules and to ensure these variances comply with the EPA's regulation at 40 CFR Part 131, specifically the variance requirements at 40 CFR § 131.14. The EPA looks forward to working with MDEQ to make additional improvements to the State's water quality standards in the future and to determine any additional facilities that may need WQS variances. If you have any questions, please call me at 303-312-6392 or Tina Laidlaw of my staff at (406) 457-5016.

Sincerely,

Darcy O'Connor
Assistant Regional Administrator
Office of Water Protection

Enclosures

cc: George Mathieus, Division Administrator
Montana Department of Environmental Quality (via email)

Connie Howe, Crow Tribe (via email)

Charlene Alden, Northern Cheyenne Tribe (via email)

Gerald Wagner, Blackfeet Tribe (via email)

Joe LaFromboise and Dustin White, Chippewa Cree Tribe (via email)

Willie Keenan, Confederated Salish and Kootenai Tribe (via email)

Ina Nez Perce, Fort Belknap Indian Community (via email)

Deb Madison, Fort Peck Tribes (via email)

Enclosure

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

I. BACKGROUND

On February 26, 2015, the EPA Region 8 approved both Montana's Circular DEQ-12A, which sets forth the numeric nutrient criteria (NNC) for wadeable streams and certain segments of the Yellowstone River, and Circular DEQ-12B (DEQ-12B), which includes provisions relating to general and individual variances from the NNC. The EPA's approval of the previous version of DEQ-12B also included the approval of a July 1, 2017 date for expiration of the general variance treatment requirements specified in DEQ-12B.

After the EPA approved the previous DEQ-12B in February 2015, the EPA finalized 40 CFR § 131.14 in August 2015, which included new requirements for water quality standards (WQS) variances. The EPA regulation also made it explicit that WQS variances must be approved by the EPA before the variance can be the applicable standard for purposes of the Clean Water Act (CWA or "Act") for the limited purposes of developing CWA National Pollutant Discharge Elimination System (NPDES) permit limits and requirements and which may be used when issuing certifications under CWA Section 401 (See 40 CFR § 131.14(a)(3)). 40 CFR § 131.3(o) defines a "water quality standards variance" as "a time-limited designated use and criterion for a specific pollutant(s) or water quality parameter(s) that reflect the highest attainable condition during the term of the WQS variance." 40 CFR § 131.14 explicitly provides a federal regulatory framework and requirements for adoption of WQS variances. These requirements are described in additional detail below in the context of the EPA's review of the new version of DEQ-12B in accordance with 40 CFR § 131.14.

MDEQ adopted its variance provisions on June 12, 2017. The EPA received the rule submission on June 27, 2017 initiating the EPA's review period pursuant to Clean Water Act Section 303(c). Today the EPA is approving, as consistent with the requirements of the CWA and the EPA's implementing regulation, the general variance for nutrients for 36 dischargers that comprise the state's submission. The EPA is taking no action at this time on the individual variance authorizing provision.

II. MONTANA'S GENERAL NUTRIENT VARIANCE

A. 40 CFR §§ 131.14(a)(1-4)

- 40 CFR § 131.14(a)(1) provides that a water quality standards variance "only applies to the permittee(s) specified in the variance."
- 40 CFR § 131.14(a)(2) provides that "[w]here a State adopts a WQS variance, the State must retain, in its standards, the underlying designated use and criterion addressed by the WQS variance, unless the State adopts and EPA approves a revision to the underlying designated use and criterion consistent with § 131.10 and 131.11. All other applicable standards not specifically addressed by the WQS variance remain applicable."
- 40 CFR § 131.14(a)(3) provides that the "variance, once adopted by the State and approved by EPA, shall be the applicable standard for purposes of the Act under § 131.21(d) through (e), for the following limited purposes. An approved WQS variance applies for the purposes of

developing NPDES permit limits and requirements under 301(b)(1)(C), where appropriate, consistent with paragraph (a)(1) of this section. States and other certifying entities may also use an approved WQS variance when issuing certifications under section 401 of the [Clean Water] Act."

- 40 CFR § 131.14(a)(4) provides that "A State may not adopt WQS variances if the designated use and criterion addressed by the WQS variance can be achieved by implementing technology-based effluent limits required under sections 301(b) and 306 of the [Clean Water] Act."

EPA Basis for Approval

Montana's general variance is consistent with 40 CFR § 131.14(a)(1) as discussed below in Section B of this enclosure. In accordance with 40 CFR § 131.14(a)(2), the State retains its aquatic life uses that are consistent with CWA section 101(a)(2) of the Act and the NNC adopted to protect the aquatic life uses during the term of the variance. The Montana Board of Environmental Review adopted the NNC under its rulemaking authority in §75-5-301(2), MCA. The NNC are found in Montana's Circular DEQ-12A. With respect to 40 CFR § 131.14(a)(3), the State acknowledged that the general variance in the case of Montana are applicable for the limited purposes of developing NPDES permit limits.[3] Finally, as discussed below, the State has demonstrated that the underlying designated use and criteria addressed by the general variance cannot be achieved by implementing the National Secondary Treatment Standards (NSS) limits required by CWA sections 301(b) and 306. See page 11. Therefore, the EPA finds that Montana's general variance complies with the requirements of 40 CFR § 131.14(a).

B. Pollutant and the water bodies to which the variances apply and the permittees subject to the variance (40 CFR §§ 131.14(a)(1) and 131.14(b)(1)(i))

ARM 17.30.660(2) provides that "[a] n application for a general variance must provide information demonstrating that the wastewater treatment facility meets the requirements of Department Circular DEQ-12B (June 2017 edition)." DEQ-12B Section 2.0, page 1, identifies total phosphorus (TP) and total nitrogen (TN) as the pollutants to which the variances apply and also specifies:

> "The general variance treatment requirements in Table 12B-1 (below) apply to permittees where the Department has demonstrated that immediate compliance with the base numeric nutrient standards, where applicable, would result in substantial and widespread economic impacts."

DEQ-12B Section 2.0 notes that "a list of permittees likely to need a general variance is maintained on the Department's website on the Water Quality Standards webpage."[4]

Below is a summary of the types and numbers of facilities identified on the list located on MDEQ's website:

≥ 1 MGD[5] discharger category	8 facilities: 6 POTWs and 2 non-POTWs
< 1 MGD discharger category	13 facilities: 6 POTWs and 7 non-POTWs
Lagoons	39 lagoons: 28 POTWs and 11 non-POTWs

[3] ARM 17.30.660(2) establishes that "the decision to grant the general variance must be reflected in the permit that is made available for public comment."

[4] The State also included a caveat to its list indicating that "the Department's permitting unit makes final determinations regarding variances, and are not strictly bound to this list."

[5] MGD means Million Gallons per Day and POTW means publicly owned treatment works.

EPA Basis for Approval

40 CFR §§ 131.14(a)(1) and (b)(1)(i) require identification of the dischargers and waterbodies that are subject to the variance. The EPA has recognized that states have flexibility in how to meet this requirement. For example, states may identify "specific dischargers at the time of adoption of a variance" or adopt specific eligibility requirements that "make clear what characteristics a discharger must have in order to be subject to the WQS variance for multiple dischargers." 80 Fed. Reg, 51020, 51036 (Aug. 21, 2015).

In the case of Montana, the State included a statement in rule that describes specific binding conditions that identify the characteristics of dischargers that are within the scope of the state's submitted variance. The State also included on its website a list of dischargers that are likely to need the variance.[6]

ARM 17.30.660(2) provides that "[a]n application for a general variance must provide information demonstrating that the wastewater treatment facility meets the requirements of Department Circular DEQ-12B (June 2017 edition)." DEQ-12B Section 2.0, page 1, specifies: "The general variance treatment requirements in Table 12B-1 (below) apply to permittees where the Department has demonstrated that immediate compliance with the base numeric nutrient standards, where applicable, would result in substantial and widespread economic impacts."

In addition, MDEQ's submission documents that "immediate compliance" with NNC would require installation of reverse osmosis (RO) technology. Montana addressed this point in its Response to Comments document:

> "The department has consistently viewed reverse osmosis (RO) as the best available technology to get as close to the base numeric nutrient standards as possible, in the absence of dilution. The department's statewide economic impact analyses in 2012, 2014 and today are all based on the estimated cost of installing and operating RO treatment; the findings are all in the record (e.g., "Demonstration of Substantial and Widespread Economic Impacts to Montana That Would Result if Base Numeric Nutrient Standards had to be Met in 2011/2012" (Blend and Suplee, 2012). The department has consistently referenced RO throughout the variance process and does not believe it is necessary to also include the reference to it in the circular."[7]

As discussed below in Section C, pages 11-21, MDEQ's economic analysis demonstrated that communities would incur substantial and widespread economic and social impacts if dischargers were required to install RO to meet the base numeric nutrient standards approved by the EPA as the applicable water quality criteria in 2015.

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[6] This approach is consistent with the preamble to the EPA's WQS Regulation, which recommends "that states and authorized tribes provide a list of dischargers covered under the WQS variance on their Web sites or other publicly available sources of state or authorized tribal information, particularly when using multiple discharger WQS variances." 80 Fed. Reg at 51036.

[7] Response to Comment No. 13; Final MAR Notice Amended 6/23/17. Page 875.

The following binding conditions provided in DEQ-12B Section 2.0 identify the characteristics of dischargers that are within the scope of the submitted general variance for nutrients: (1) MDEQ must have already adopted NNC and the EPA has already approved NNC for the waterbody to which the permittee is discharging (i.e., "where applicable), (2) water quality-based effluent limitations for TN and TP would be required because the discharge has the reasonable potential to cause or contribute to a violation of the NNC, (3) "immediate compliance" with such water quality-based effluent limitations would require the installation and operation of RO treatment and dilution is not available, and (4) the state submitted an economic demonstration as part of the variance (i.e., "has demonstrated") showing that installing and operating RO treatment would result in substantial and widespread economic and social impacts.

DEQ-12B Section 2.0, also specifies that "a list of permittees likely to need a general variance is maintained on the Department's website on the Water Quality Standards page." In order to be clear about which dischargers are covered by the State's submission and today's action, the EPA developed the list of dischargers in Table 1 below. To develop this Table, the EPA compared the State's list from MDEQ's webpage that identifies the dischargers likely to be covered (including waterbodies where they discharge) and economic information included in Montana's submission against these binding conditions to identify the dischargers that fall within the scope of the State's general variance submission. The EPA's evaluation is discussed below. The EPA has determined that the State's narrowly defined binding conditions that articulate the scope of the variance and incorporation of the website list in DEQ-12B Section 2.0 coupled with the State's list of dischargers sufficiently satisfies 40 CFR § 131.14(b)(1)(i).

First, the EPA evaluated whether the base numeric nutrient standards (i.e., NNC) are "applicable" to the receiving waterbody where a permittee identified in the State's list of facilities would discharge. Next, the EPA considered whether a water quality-based effluent limitation would be required because the discharge has the reasonable potential (RP) to cause or contribute to a violation of the NNC that applies to the waterbody per 40 C.F.R. § 122.44(d). To do this, the EPA review examined materials associated with the Montana Pollutant Discharge Elimination System (MPDES) permits for facilities on the State's list.

As a result of this evaluation, the facilities discussed below are outside of the scope of this general variance and therefore are outside the scope of the EPA's action today. The EPA asks that MDEQ remove these facilities from the list on its website to avoid any confusion regarding whether these dischargers are covered by this general variance.

1. Facilities located on waterbodies where NNC have not yet been adopted:[8]

- **Billings**: MDEQ has not yet adopted numeric nutrient criteria for the segment of the Yellowstone River where Billings is located.[9]

[8] First Triennial Review. Page 8. MDEQ decided to include permittees located on the segment of the Yellowstone River from Yellowstone National Park to the confluence with the Big Horn River in the analysis because MDEQ anticipates adoption of numeric nutrient criteria for this segment prior to the next triennial review. MDEQ used the NNC adopted and approved for the lower Yellowstone to determine if the upstream dischargers had reasonable potential to cause or contribute to an exceedance of the TN or TP criteria.

[9] In the First Triennial Review document (Page 1), MDEQ notes that "no new numeric nutrient standards have been developed...Development of numeric nutrient standards for the upper and middle Yellowstone River (Yellowstone

- **Phillips 66**: In its Response to Comments, MDEQ documented that "Phillips 66 stopped discharging to the Yellowstone River on June 1, 2014, and since that time their treated process water has gone to the Billings WWTF."[10] Additionally, numeric nutrient criteria have not been adopted for this segment of the Yellowstone.

2. Facilities without RP for Nutrients:

- **Apple Rehab (Elkhorn Health)**: MDEQ's permit fact sheet for Apple Rehab documents that the effluent does not have RP to cause or contribute to a violation of the TN or TP WQ criterion; therefore, there is "no need for a TN [or TP] limit with this permit renewal."[11]
- **Rocker**: The town of Rocker will not require a general variance because they recently connected their sewer service to Butte's wastewater system and therefore would not need a separate NPDES permit.[12]
- **Circle**: MDEQ's permit fact sheet for the town of Circle documents that the facility "cannot discharge from July 1 through September 30, when the numeric limits for TN and TP apply;"[13] therefore, the facility does not have RP to cause or contribute to a violation of the TN or TP WQS criterion.

The EPA next considered whether the state provided an economic demonstration consistent with ARM 17.30.660(2) and DEQ-12B Section 2.0 for the remaining facilities listed on the State's list of dischargers. The State's record indicates that RO is the "best available technology to get as close to the base numeric standards as possible, in the absence of dilution."[14,15] Therefore, a demonstration of "immediate compliance with the base numeric nutrient standards would…result in substantial and widespread economic impacts" involves a demonstration that installation and operation of RO treatment, where no dilution is available, would result in substantial and widespread economic and social impacts. Where the State did not submit an economic demonstration as required by ARM 17.30.660(2) and DEQ-12B Section 2.0 for dischargers included on the website list, the dischargers are considered to be outside the scope of this general nutrient variance in DEQ-12B submitted to the EPA. The EPA asks that MDEQ remove these facilities from the list on its website to avoid any confusion regarding whether these dischargers are covered by this general variance.

National Park Boundary to Big Horn River confluence) is the most advanced, and is likely to be completed between the completion of this report and the next triennial review in 2020." The City of Billings is located in this segment of the Yellowstone River.

[10] Response to Comment No. 21; Final MAR Notice Amended 6/23/17.

[11] MDEQ MPDES Fact Sheet for Apple Rehab West (MT0023566). Page 15.

[12] Memo to File Documenting Personal Communication from Jeff May, MDEQ, to Tina Laidlaw, EPA. August 14, 2017.

[13] MDEQ MPDES Fact Sheet for Circle (MT0020796). Page 14.

[14] MDEQ Response to Comment No. 13; Final MAR Notice Amended 6/23/17. First Triennial. Page 3. Montana DEQ. 2017. Economic Analysis of Meeting Base Numeric Nutrient Standards, Supplement to First Triennial review of Base Numeric Nutrient Standards and Variances. Prepared by the Energy Bureau and Water Quality Planning Bureau. Helena, MT. Pages 7-11. (Supplemental Economic Analysis). Page 3.

[15] Water Quality Planning Bureau. 2017. First Triennial Review of Base Numeric Nutrient Standards and Variances. Helena, MT: Montana Dept. of Environmental Quality. Pages 7-13. (First Triennial Review). MDEQ evaluated each mechanical plant to determine which facilities would be able to meet the NNC at the end of their mixing zone.

3. Facilities without an economic demonstration

- **Private Dischargers**: The State's record indicates that "[i]t should be noted that, due to a lack of data and clear methodology, the private-sector facilities in the discharger groups were not reviewed; they comprise a significant proportion of the <1MGD and lagoon groups."[16] (Executive Summary). Additionally, on page 14 of the same report, MDEQ notes that: "DEQ does not have a straight forward way of estimating cost threshold *in advance* for private facilities)."[17] While these statements pertain to the HAC cost analysis, they demonstrate the lack of data available for the economic demonstration. Therefore, the information provided by MDEQ in its Supplemental Economic Analysis[18] for the seven non-POTW mechanical plants (Stillwater Mining Company (2 permits); Barrett's Minerals; REC Silicon; Butte Highlands; Bonner Property Development; Montana Behavioral Health) and 11 non-POTW lagoons does not constitute an economic demonstration and thus does not meet the State's requirements for a demonstration as described in ARM 17.30.660(2) and DEQ-12B Section 2.0 As a result, the EPA considers these 18 private dischargers as outside of the scope of today's Agency's action.

4. Facilities where the economic demonstration is not based on RO

The EPA then evaluated whether there were any facilities that did not need RO to meet the NNC and identified one facility that did not require RO.

- **Town of Chinook:** Analyses completed by the EPA and provided to MDEQ in 2015 show that because of instream dilution, the town of Chinook would not be required to install RO to meet the base numeric nutrient standards.[19] Instead, the facility could install a less expensive treatment method that achieves 3000 μg/L TN and 100 μg/L TP to meet the NNC instream.[20] As the general variance is based on substantial and widespread economic and social impacts from installing RO, the EPA considers Chinook to be outside of the scope of today's Agency action on the general variance.

Based on this examination, the EPA considers the following 36 dischargers to be identified as within the scope of the State's general variance submission and subject to the EPA's CWA section 303(c) review because each of these facilities meets the four binding conditions articulated above:

$\geq$ 1 MGD discharger category	5 POTWs
< 1 MGD discharger category	4 POTWs
Lagoons	27 POTW lagoons

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16 First Triennial Review. Executive Summary.

17 *Id.* Page 14.

18 Supplemental Economic Analysis. Pages 7-11.

19 In 2015, EPA examined the list of Montana dischargers to determine whether the facility would be required to meet the NNC at the end-of-pipe. Results were provided to Montana and summarized in the report, "Draft Montana Nutrient WQBELs Analyses and Methods. 09/09/2015." Results of this analysis showed that 7 dischargers, including Chinook, had dilution and therefore, did not meet the condition of needing to meet the NNC at the end-of-pipe. Tetra Tech Analysis prepared for EPA including: Excel file: "MT Nutrient RP Analysis 2015-09-09 Final." and Report, "Draft Montana Nutrient WQBELs Analyses and Methods. 09/09/2015."

20 TetraTech Analysis prepared for EPA. December 2015. Economic Analysis of Water Quality Based Effluent Limits for the Chinook Wastewater Treatment Facility.

Table 1. EPA List of 36 Facilities For Which the General Variance is Approved.

MPDES PERMIT ID	Discharge Category	FLOW (MGD) (Design average)	Permit Name	Receiving Waterbody
MT0020184	≥1MGD	1.8	CITY OF WHITEFISH	Whitefish River
MT0021938	≥1MGD	5.4	CITY OF KALISPELL	Ashley Creek
MT0022641	≥1MGD	5.4	CITY OF HELENA	Prickly Pear Cr.
MT0022608	≥1MGD	8.5	CITY OF BOZEMAN	East Gallatin River
MT0022012	≥1MGD	5.5	BUTTE SILVER BOW CITY AND COUNTY	Silver Bow Creek
MT0022713	<1MGD	0.344	TOWN OF STEVENSVILLE	Side channel of Bitterroot River
MT0022560	<1MGD	0.434	CITY OF EAST HELENA	Prickly Pear Cr.
MT0021857	<1MGD	0.37	CITY OF MANHATTAN	Diva Ditch
MT0020079	<1MGD	0.54	CITY OF CONRAD	Unnamed tributary to Dry Fork of the Marias River
MT0022616	Lagoon	3.3	CITY OF DEER LODGE	Clark Fork River
MT0021628	Lagoon	1.9	CITY OF GLENDIVE	Yellowstone R./Glendive Cr.
MT0022454	Lagoon	0.09	TOWN OF BIG SANDY	Big Sandy Creek
MT0021458	Lagoon	2	CITY OF DILLON	Beaverhead River
MT0021211	Lagoon	0.7	CITY OF GLASGOW	Milk River
MT0020141	Lagoon	0.64	CITY OF CUT BANK	Old Maids Coulee
MT0020249	Lagoon	0.4	TOWN OF JOLIET	Rock Creek
MT0020753	Lagoon	0.39	CITY OF BIG TIMBER	Boulder River
MT0020389	Lagoon	0.277	CITY OF MALTA	Milk River
MT0021750	Lagoon	0.35	STILLWATER COUNTY COMMISSIONERS (Absarokee Sewer District)	Ditch draining to Rosebud Cr., or direct to Rosebud Cr.
MT0030295	Lagoon	0.32	CITY OF ROUNDUP	Mussellshell River
MT0020052	Lagoon	0.3	CITY OF CHOTEAU	Unnamed man-made ditch draining to Teton River
MT0020354	Lagoon	0.215	CITY OF HARLOWTON	Musselshell River
MT0020133	Lagoon	0.25	TOWN OF WHITEHALL	Big Pipestone Creek
MT0031500	Lagoon	0.16	TOWN OF PHILIPSBURG	Flint Creek
MT0020303	Lagoon	0.124	TOWN OF BRIDGER	Clarks Fork Yellowstone River
MT0020702	Lagoon	0.037	TOWN OF WINNETT	McDonald Creek
MT0021270	Lagoon	0.11	CITY OF HARLEM	Milk River
MT0030732	Lagoon	0.24	TOWN OF ENNIS	Madison River
MT0020516	Lagoon	0.04	TOWN OF WIBAUX	Beaver Creek

MT0028797	Lagoon	0.07	TOWN OF TWIN BRIDGES	Bayer's Ditch
MT0020451	Lagoon	0.05	TOWN OF RYEGATE	Musselshell River via unnamed Dry Slough
MT0022462	Lagoon	0.044	TOWN OF DENTON	Wolf Creek
MT0030091	Lagoon	0.034	STOCKETT WATER AND SEWER DIST.	Cottonwood Creek
MT0022080	Lagoon	0.0258	HIGHWOOD COUNTY WATER AND SEWER DISTRICT	Highwood Creek
MT0031453	Lagoon	0.02	TOWN OF WINIFRED	Unnamed tributary to Dog Creek
MT0024783	Lagoon	0.0195	RICHLAND COUNTY COMMISSIONERS (Savage)	Unnamed irrigation overflow ditch

Should MDEQ determine that a mechanical plant or lagoon not currently on the list is eligible for a variance (*e.g.*, because NNC are now applicable), the EPA is willing to work with MDEQ to identify the best approach for the relevant facility, including consideration of an individual variance request. MDEQ would need to submit the variance package and the appropriate supporting documentation (*e.g.*, economic demonstration) to the EPA for CWA section 303(c) review and action before it is effective for CWA purposes and thus before it can be incorporated into any NPDES permit.

C. Documentation submitted that demonstrates that attaining the designated uses and criteria is not feasible throughout the term of the variance because imposition of "controls more stringent than those required by sections 301(b) and 306 of the CWA would result in substantial and widespread economic and social impact" (40 CFR § 131.14(b)(2)(i)(A))

40 CFR § 131.14(b)(2)(i)(A)(1) requires that, for a variance to a use specified in Section 101(a)(2) of the CWA, states "must demonstrate that attaining the designated use and criterion is not feasible throughout the term of the variance because . . . [o]ne of the factors listed in [40 CFR §] 131.10(g) is met." One of those factors is that "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." 40 CFR § 131.10(g)(6). Montana relied on this factor to demonstrate the need for WQS variances from the underlying NNC that protects the aquatic life use in its 2017 adoption of the general nutrient variances.

CWA Sections 301(b) and 306 of the Act impose National Secondary Treatment Standards (NSS) which are technology-based requirements for BOD, TSS, and pH that apply to POTWs. NPDES permits must include technology-based effluent limitations and standards based on these requirements or more stringent water quality based requirements. 40 C.F.R. § 122.44(a)(1). Where a discharge will cause, have the reasonable potential to cause, or contribute to an excursion above any State WQS, the State must also impose a water quality-based effluent limitation (WQBEL) to control that pollutant to achieve applicable WQS. 40 C.F.R. § 122.44(d)(1). The NSS do not include standards for nutrients. Therefore, the State needs to impose WQBELs for nutrients where necessary to achieve WQS.

MDEQ used the EPA's "Interim Economic Guidance For Water Quality Standards Workbook"[21] ("EPA's Interim Economic Guidance") to determine if WQBELs necessary to comply with Montana's NNC would result in substantial and widespread economic and social impacts under 40 CFR § 131.10(g)(6). MDEQ built upon their 2012 economic analysis using updated economic and demographic information.[22]

The first step recommended by the EPA's Economic Guidance is to determine the cost of the pollution control project necessary to meet WQS. MDEQ evaluated wastewater treatment technologies that remove nitrogen and phosphorus to determine which of those technologies could reliably achieve the WQBELs necessary to achieve the NNC. In 2012, the State documented that costs for meeting the NNC should be based on the use of RO technology because RO was the treatment technology that could most reliably achieve both the TN and TP components of the NNC at end-of-pipe.[23] In 2017, MDEQ further evaluated whether it is reasonable to conclude that RO continues to be the pollutant control technology most likely to achieve the NNC. MDEQ reviewed recent advances in nutrient wastewater treatment, especially anaerobic ammonium oxidation methods, to evaluate if any new technologies may be likely to achieve the NNC.[24] Based on this review, MDEQ concluded that:

> "RO is still considered the technology needed to meet nutrient criteria for most towns in Montana…Schmidt (2010) shows that for TP, and TN, and other micro-pollutants, RO was indeed the most effective method for removing TN and TP (better than membrane bioreactor, MBR). Thus, this updated justification assumes the use of RO technology for this demonstration of economic hardship."[25,26]

Next, the EPA's Interim Economic Guidance suggests verifying project costs and calculating the annual cost of the pollution control project. MDEQ calculated the cost to install RO necessary to meet WQBELs that achieve the NNC using cost estimates published by the Water Environment Research Foundation (WERF).[27] MDEQ explained in its Supplemental Economic Analysis: "While it is uncertain whether RO will reduce total nitrogen (TN) to Montana's nutrient standards, the 2011 WERF study from which costs were derived (Falk et. al., 2011a) used RO as

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21 EPA Interim Economic Guidance for Water Quality Standards. Workbook. 1995. Available at: https://www.epa.gov/sites/production/files/2016-03/documents/econworkbook-complete.pdf. (EPA Interim Economic Guidance).

22 Updated economic information included 2015 MHI data that MDEQ obtained from the American Community Survey. First Triennial Review. Page 3.

23 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. (Public Sector Economic Demonstration). Helena, MT: Montana Dept. of Environmental Quality. Page 9.

24 First Triennial Review. Page 1.

25 Supplemental Economic Analysis. Page 1.

26 MDEQ also documented that RO continues to be the treatment technology required to achieve the NNC in its Response to Comments stating that "[t]here was no identification of any breakthrough treatment methodologies for nutrients that weren't already considered in 2014." MDEQ Response to Comments No. 11. Final MAR Notice Amended 6/23/17.

27 Falk 2011. Striking the Balance Between Nutrient Removal in Wastewater Treatment and Sustainability. ES-3.

its most strict nutrient control for cost purposes and is still the best cost study DEQ has on this."[28]

Upon completion of this step, the EPA's Interim Economic Guidance recommends calculating the Municipal Preliminary Screener (MPS).[29] The MPS "estimates the total annual pollution control cost per household (existing costs plus those attributable to the proposed project) as a percentage of median household income" and is calculated as the average total pollution control cost per household divided by the MHI.[30] The EPA's Interim Economic Guidance suggests that communities should expect to incur little economic impact if the MPS is less than 1%, large impacts if the MPS is greater than 2% and mid-range impacts if the MPS is between 1% and 2%.

MDEQ calculated the MPS for both a) the original list of the facilities included in MDEQ's 2012 economic analysis;[31] and b) 12 publicly owned mechanical plants including three facilities that are not within the scope of the general variance as discussed in Section B of this document (*i.e.*, Billings, Missoula, Colstrip).[32,33] Table 1 on pages 10-11 provide the list of facilities that the EPA has determined to be part of MT's 2017 general variance. Of those dischargers subject to this 2017 general variance, MDEQ's MPS analysis indicates that the cost of implementing RO will exceed 2% of median household income (MHI) for all communities except the City of Helena (the City of Helena had an MPS score of 1.59% of MHI).[34] MDEQ also calculated MPS scores for eight selected lagoon facilities subject to the NNC (Big Fork; Circle; Cut Bank; Deer Lodge; Glendive; Highwood; Philipsburg; and Red Lodge).[35] MDEQ's analysis resulted in MPS scores greater than 2% MHI for all eight lagoon facilities.[36]

If the MPS score indicates that the pollution control costs may result in a substantial economic impact, the EPA's Interim Economic Guidance recommends applying a secondary test. The secondary test is designed to assess the community's ability to obtain financing and describe the socioeconomic health of the community. The EPA's Interim Economic Guidance applies six secondary test indicators that utilize a community's bond rating, overall net debt as a percent of full market value of taxable property, unemployment rate, MHI, property tax revenue as a percent of full market value of taxable property, and property tax collection rate. MDEQ applied a secondary test using some of the secondary test indicators suggested in the EPA's Interim Economic Guidance, and other secondary test indicators MDEQ determined were better suited to the unique economic circumstances in Montana. MDEQ used the EPA's secondary test indicators of unemployment rate and MHI but used specialized secondary indicators MDEQ derived from measures of local tax and fee burden, poverty rate, and low and moderate income

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[28] Supplemental Economic Analysis. Page 1.
[29] EPA Interim 1995 Economic Guidance. Pages 2-6 to 2-7.
[30] *Ibid.*
[31] First Triennial Review, Page 5. Table 3-1.
[32] The EPA notes that Missoula and Colstrip were not on MDEQ's list of facilities likely to need a general variance. Therefore, EPA did not consider them in its analysis.
[33] Supplemental Economic Analysis, Page 3. Table 2-1.
[34] First Triennial Review. Page 5. Table 3-1. Supplemental Economic Analysis, Page 3. Table 2-1.
[35] Unlike the eight lagoon facilities used by MDEQ in their HAC cost analysis, MDEQ did not use a statistical random sample approach to select these eight lagoons.
[36] First Triennial Review. Page 5. Table 3-1.

rate for the remaining four indicators. MDEQ used the combination of the selected EPA secondary test indicators and MDEQ's specialized secondary test indicators to apply the secondary test as suggested in the EPA's Interim Economic Guidance.

The final scores for each secondary test indicator for a community are then averaged into an overall secondary score. The EPA's Interim Economic Guidance interprets an average score of 1 as indicating weak economic conditions, an average score of 3 as indicating strong economic conditions, and an average score of 2 as indicating economic conditions mid-range between weak and strong.[37] The EPA's Interim Economic Guidance also provides a matrix to determine if the combination of the MPS and average secondary scores indicate if the impact is likely to be substantial, if the impact is not likely to be substantial, or if the impact is unclear.[38]

MDEQ's economic analysis showed average secondary scores for the nine communities with mechanical plants eligible for the general variance ranged from 1.6 to 2.2, with the town of Manhattan scoring 2.6.[39, 40] Additionally, MPS values for all communities except Helena exceed 2% MHI. On the basis of Table 2-2 in the EPA's Interim Economic Guidance, MDEQ concluded that all communities, except Helena and Manhattan, will incur substantial impacts if required to meet the underlying NNC. In its Response to Comments No. 19, MDEQ presented additional information for the City of Helena. MDEQ noted that Helena would "need to almost triple their wastewater rates to customers to get to reverse osmosis (RO) and this would lead to less disposable income for all residents, a concurrent decrease in local business, and would hit poverty level households the hardest."[41] MDEQ did not submit results of the secondary test for the eight communities it analyzed with lagoon facilities.

Based on this information, MDEQ determined in 2017 that "the conclusion reached in its 2012 report regarding substantial and widespread economic impacts on a statewide-scale also holds for this triennial review" for publicly owned wastewater treatment plants (WWTPs).[42]

EPA Basis for Approval

In its evaluation of MDEQ's 2017 economic demonstration, the EPA reviewed MDEQ's conclusion that RO would be necessary to reliably meet the NNC in streams without assimilative capacity by considering information provided by MDEQ and identifying and analyzing other available information on wastewater technologies discussed below. The EPA identified wastewater treatment systems that use Biological Nutrient Removal (BNR) and/or chemical precipitation technology as a potential alternative to RO. The EPA then evaluated whether or not dischargers in Montana could potentially meet WQBELs derived from the NNC using BNR and/or chemical precipitation technology rather than RO. BNR removes TN and TP through the use of microorganisms under different environmental conditions within the treatment process. In

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[37] EPA 1995 Economic Guidance. Page 2-11.
[38] EPA 1995 Economic Guidance, Table 2-2.
[39] MDEQ Response to Comments No. 18. Final MAR Notice Amended 6/23/17.
[40] Secondary score Table 2-1 also found at: http://deq.mt.gov/Portals/112/Water/WQPB/Standards/NutrientWorkGroup/PDFs/Comment18Table.pdf.
[41] MDEQ Response to Comment No. 19; Final MAR Notice Amended 6/23/17.
[42] First Triennial Review. Page 3.

BNR, nitrogen and phosphorus exist in dissolved and particulate forms, as well as in several chemical forms. Nutrient removal processes include physical treatment (e.g. sedimentation and filtration) for particulates, and chemical or biological treatment for dissolved nutrients. Biological treatment of nitrogen occurs through nitrification, by which certain bacteria oxidize ammonia to nitrate in an aerobic process, followed by denitrification, by which other bacteria reduce nitrate to nitrogen gas under anoxic conditions. TN is removed during volatilization of the nitrogen gas from the waste stream.[43]

Advanced biological treatment of phosphorus relies on use and subsequent separation and removal of phosphorus accumulating organisms that can store phosphate in excess of their biological growth needs. Chemical precipitation of phosphorus occurs with the addition of coagulants (lime, aluminum sulfate, ferric chloride) to react with soluble phosphates (orthophosphate) and form compounds that can be separated out with solids and removed from effluent. In general, advanced treatment of nitrogen and phosphorus are separate processes. However, they can be coordinated with each other. There are many different configurations of nutrient removal processes and each typically requires a good deal of operator skill.

On the basis of the available wastewater treatment systems that can remove nitrogen and phosphorus as described above, the EPA determined which nutrient removal process could reliably achieve WQBELs necessary to achieve the NNC. As described on page 12 above, MDEQ determined that many WWTPs in Montana would be required to meet the NNC at the "end-of-pipe" because they discharge into wadeable streams without assimilative capacity.[44] Therefore, MDEQ concluded that WQBELs necessary to achieve the NNC would need to be established as end-of-pipe limits, and such end-of-pipe limits would require the implementation of RO.

For TN, the EPA considered the following:

<u>BNR and TN</u>

- In 2011, the Water Environment Research Foundation (WERF, now the Water Environment & Reuse Foundation WE&RF) published a report by Bott and Parker on nutrient removal technology performance and reliability. One of the expressed objectives of the study was to "determine to what extent existing technologies can reliably achieve low effluent values with respect to total nitrogen or total phosphorus."[45]
- The study examined multiple well-performing plants in the U.S,[46] identifying four facilities (Fiesta Village, FL; River Oaks, FL; Truckee Meadows, NV; and Western Branch, MD) as the best performing in respect to nitrogen removal.[47] The 95th percentile (not the monthly average) for monthly nitrogen concentrations for these facilities ranged

[43] Metcalf and Eddy, Inc. (1991) Wastewater Engineering: Treatment, Disposal, and Reuse. 3rd Edition, McGraw-Hill, Inc., Singapore.
[44] Public Sector Economic Demonstration). Helena, MT: Montana Dept. of Environmental Quality. Page 2.
[45] Charles Bott and D.S. Parker. 2011. Nutrient Management Volume II: Removal Technology Performance and Reliability. Water Environmental Research Foundation. (Bott and Parker. 2011).
[46] The WERF report referred to the plants as "exemplary" plants because they had features that produce "exceptional" effluent quality.
[47] Bott and Parker. 2011. Page 4-3.

from 2,200 to 2,500 µg/L TN.[48] Improved performance of the two Florida facilities was attributed to warmer climate (which facilitates the nitrification process) and to removal of solid waste offsite for subsequent processing. For all four plants, the main characteristic impacting performance was that they have a separate denitrification stage or a polishing step with methanol which allows more precise process control.

- This same study also evaluated a plant operating under colder climatic conditions in Kalkaska, Michigan. This facility was able to achieve a monthly total *inorganic* nitrogen concentration below 3,000 µg/L TN which may translate into achieving approximately 2,700 to 3,200 µg/L TN on a 95th percentile basis.[49]
- The report concluded that "[t]he combined nitrogen removal technologies could not be demonstrated to meet a maximum month nitrogen removal capability of 3,000 µg/L consistently. Relatively few of the plants have been built in colder Northern climates and judgment about this class will have to be postponed until new plants come on-line."[50]
- Additionally, the study concluded that "...at low effluent TN levels, the composition of the TN becomes dominated by organic nitrogen (ON) that is resistant to further biological degradation."[51]

<u>RO and TN</u>

- Abt Associates compiled the available literature related to RO and summarized several studies that documented RO performance at municipal and industrial facilities.[52] The report highlighted that performance recorded at municipal WWTPs "achieved 74% to 91% removal efficiencies" and that "[a]ll of the TN results achieved in the various studies, however, are below 2000 µg/L regardless of plant size."[53]
- Information reviewed by the EPA continues to suggest that even installation of RO may not achieve the low TN criteria (300 µg/L TN) required for Western Montana because of challenges with removing organic nitrogen.[54,55]
- Falk (2011) documents that RO can achieve TN concentrations of less than 2,000 µg/L TN.[56]

For TP, EPA considered the following:

<u>BNR and TP</u>

- The Bott and Parker (2011) documented a range of TP removal, with performance varying based on whether the facility had a multiple stage chemical additional process,

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[48] *Id.* Table 4-4. Page 4-5.
[49] *Id.* Page 4-4.
[50] *Id.* Page 8-1.
[51] *Id.* Page 8-4.
[52] Abt Associates. 2014. Reverse Osmosis Treatment for Wastewater: Performance, Cost, and Other Considerations. Prepared for the EPA. 42 pages.
[53] *Id.* Page 5.
[54] Rion Merlo, J.Wong, et. al. 2012. Analysis of Organic Nitrogen Removal in Municipal Wastewater by Reverse Osmosis. Water Environment Research. Volume 84, Number 7.
[55] Bott and Parker. 2011. Page 8-4.
[56] Falk 2011. Striking the Balance Between Nutrient Removal in Wastewater Treatment and Sustainability. ES-3.

single stage chemical addition, or little to no chemical addition.[57] Plants with two-stage chemical addition, or single-stage chemical addition with enhanced biological phosphorus removal (EBPR), or single-stage tertiary chemical addition with high chemical doses producing the lowest effluent concentrations. The median of the 95th percentile monthly average across all processes was 130 µg/L TP with concentrations ranging from 30 µg/L TP (chemical addition) to 200 µg/L TP (EBPR, little or no chemical addition).[58] Only four of the several plants evaluated met TP concentrations of 100 µg/l for maximum month conditions on a reliable basis (95th percentile).

- The EPA 2015 report: "A Compilation of Cost Data associated with the Impacts and Control of Nutrient Pollution" documented that, "…most of the treatment schemes extracted from the available literature (which involved either technologies operated singly or in combination) can achieve an effluent quality at or below [1,000 µg/L], and a substantial fraction of the treatment schemes were capable of achieving effluent quality levels at or below 0.5 [500 µg/L] (Figure IV-16)." [59]
- The EPA's 2008 report summarized information on plant performance for TP removal. Membrane reactor (MBR) at the Lone Tree plant in CO showed maximum month TP concentrations at 38 µg/L TP.[60]
- Banerjee et. al. documented that "[e]xperts generally agree the limits of conventional wastewater treatment technology (LOCT) are somewhere around 3.0 mg/L TN and 0.3 mg/L TP, with influent characteristics, side stream treatment, equalization, and operator skill level being key factors in achieving these levels."[61]

RO and TP

- A pilot-study completed in Florida concluded that RO was more reliable than MBR at reliably achieving low TP concentrations (<10 µg/L TP).[62]
- Falk 2011 documents that RO can achieve TP concentrations less than 20 µg/L TP.[63]
- A pilot study conducted by the City of Plantation in Florida showed that RO achieved TP effluent (Permeate) concentrations of 30 µg/l TP but at a very high cost and carbon footprint.[64]
- A study to understand the benefits and trade-offs of advanced nutrient removal technologies listed a multi-stage tertiary process train that includes RO as capable of meeting a TP limit of 10 µg/l TP.[65]

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[57] Bott and Parker. 2011. Page 5-3.

[58] *Ibid.*

[59] EPA. 2015. A Compilation of Cost Data associated with the Impacts and Control of Nutrient Pollution. U.S. EPA 820-F-015-096. Page IV-14.

[60] EPA. 2008. Municipal Nutrient Removal Technologies Reference Document. Volume I- Technical Report and Volume 2- Appendices. Page 2-68.

[61] Joyetta Banjaree et. al. 2011. Technologies Available to Meet Numeric Nutrient Criteria and their Associated Economic and Environmental Impacts. Nutrient Recovery and Management. Water Environment Federation.

[62] Hal Schmidt. MWH Americas. Pilot Study for Low Level Phosphorus Removal (<10 ppb). Texas Association of Clean Water Agencies. May 28, 2010.

[63] Falk 2011. Striking the Balance Between Nutrient Removal in Wastewater Treatment and Sustainability. ES-3.

[64] Banerjee et al. 2011. Technologies Available to Meet Numeric Nutrient Criteria and their Associated Economic & Environmental Impacts. Nutrient Recovery and Management. Water Environment Federation.

[65] Gu et. al., Sustainability Evaluation of Nutrient Removal Technologies Using Comprehensive Life-Cycle Assessment, Water Environment & Reuse Foundation, 2016.

After the EPA's review of the relative effectiveness of wastewater treatment technologies for removing TN and TP found in the above information, the EPA determined the range of effluent concentrations that can be achieved using RO and among a broad range BNR/chemical precipitation wastewater treatment technologies. The EPA compared these ranges with the WQBELs necessary to achieve the NNC. Table 2 summarizes this comparison.

Table 2. Relative effectiveness of treatment technologies and comparison to WQBELs derived from the NNC.

Nutrient parameter	WQBELs needed to meet the NNC (µg/L)	Available treatment technologies	
		RO (µg/L)	BNR / Chemical Precipitation (µg/L)
TN	280 – 1,300	< 2,000	3,000 – 8,000
TP	30 – 150	< 20	100- 1,000

The EPA concludes from this independent review of available information that MDEQ's assumption that RO remains the technology most likely to reliably achieve the NNC is correct. In addition, the EPA also concludes that the best performing BNR/chemical precipitation wastewater treatment technologies can achieve effluent concentrations as low as 3,000 – 4,000 µg/L TN and as low as 100 - 300 µg/L TP.

On the basis of the EPA's conclusion that RO is the only feasible wastewater technology that can achieve WQBELs derived from the NNC, the EPA reviewed MDEQ's conclusion that the cost of installing RO would result in substantial and widespread economic and social impacts.

MECHANICAL PLANTS

The EPA evaluated MDEQ's economic analysis and conclusion that meeting the NNC would result in substantial and widespread economic and social impacts statewide. The EPA's Interim Economic Guidance states: "If the average annual cost per household exceeds 2.0 percent of MHI, then the project may place an unreasonable financial burden on many of the households within the community."[66] The EPA's Interim Economic Guidance further indicates that a community would likely face "substantial" impacts if the cost of the pollution control projects necessary to meet WQS is greater than 2% MHI and the community's secondary score is between 1.5 and 2.5.[67] MDEQ's analysis demonstrates that the cost of installing RO to meet WQBELs derived from the NNC exceeds 2% of MHI for all publicly owned mechanical plants in all communities except Helena. MDEQ's analysis also demonstrates that all facilities except Manhattan with costs greater than 2% of MHI are in communities with a secondary score between 1.5 and 2.5. Thus, the EPA concludes that MDEQ's analysis demonstrates that the communities with mechanical WWTPs except for Helena and Manhattan (which the EPA's Interim Economic Guidance classifies as "unclear") would incur substantial economic impacts if required to achieve the NNC.

According to the matrix in EPA's Interim Economic Guidance, MDEQ's economic analysis of

[66] EPA 1995 Interim Economic Guidance. Page 2-7.
[67] EPA 1995 Interim Economic Guidance. Table 2-2.

substantial impacts for the City of Helena and Manhattan is "?" or "unclear." In these situations, the EPA Interim Economic Guidance states:

> "For those communities rated "?", EPA's interpretation will rely on the additional information presented by the State/discharger. It should be noted that, in this case, there is no "correct" set of information."[68]

To evaluate whether or not it was appropriate for MDEQ to include the communities of Helena and Manhattan in their general variance, the EPA performed its own additional analysis of these communities. The EPA identified several areas of uncertainty in MDEQ's economic analysis. As discussed in MDEQ's 2012 economic demonstration:

> "[t]o meet the MT criteria, which are more stringent for TN than WERF level 5,[69] one could assume that the highest level of treatment was needed for 100 percent of the flow--not half as specified in the cost analysis in the WERF study. Thus, cost estimates could be based on providing RO treatment to 100 percent of flow rather than 50% of flow, in order for WWTPs to achieve Montana's NNC. While it may be possible that some facilities' waste streams and effluent levels would not require 100 percent RO treatment, simulating at 50 and 100 percent provides an upper bounds estimate of the potential economic impact of the Montana's NNC."[70]

The EPA also identified interest rates MDEQ used to annualize capital costs as potentially lower than what dischargers may expect when obtaining the financing necessary to fund the required pollution control projects and the absence of labor costs necessary to install the required treatment systems as additional sources of uncertainty.

To address these potential uncertainties, the EPA performed sensitivity analyses using discount rates of 5% and 7%, inclusion of labor costs consistent with labor costs in the affected communities, and the requirement that 100% of effluent treatment with RO may be required to meet WQBELs derived from the NNC.[71] Results of these sensitivity analyses suggest potential costs to the community of Helena could range between 1.59% and 2.54% of MHI[72] and potential costs to the community of Manhattan could range between 2.45% and 4.58% MHI.[73] This additional information, together with the average secondary scores of 2.2 for the community of Helena and 2.6 for the community of Manhattan demonstrates that these two communities will

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68 EPA 1995 Interim Economic Guidance. Page 2-13.

69 WERF Level 5 refers to treatment technologies describes in Falk 2011 (Striking the Balance Between Nutrient Removal in Wastewater Treatment and Sustainability; Falk 2011) that would achieve a TP concentration of 10 µg/L TP and 1,000 µg/L TN. This document was used by MDEQ in its 2012 economic demonstration.

70 Blend, Jeff; and 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: MDEQ. Page 12.

71 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. Pages 11-13.

72 Revised MHI (2015$) for Figure 2_DEQ S_W Demonstration (RO in all Flow NO CWNS)_9-6-17

73 *Ibid.*

also likely incur substantial economic impacts if required to meet WQBELs derived from the NNC.

LAGOONS

MDEQ analyzed the economic impacts of installing RO to achieve WQBELs derived from the NNC in eight communities with lagoon wastewater treatment systems. MDEQ considered the economic impacts in these eight communities as representative of the economic impacts expected in all the 27 communities with lagoon systems. MDEQ's analysis estimated that the costs to install RO in all eight of these communities would exceed 2% of MHI and concluded that all communities with lagoon systems would incur substantial economic impacts if required to meet WQBELs derived from the NNC.[74] However, MDEQ did not complete secondary tests for the eight representative communities as recommended in the EPA's Interim Economic Guidance. To confirm MDEQ's conclusion of substantial economic impacts for all communities with lagoon systems, the EPA analyzed the potential economic impact of implementing RO at all 27 lagoons specified in Table 1. Based on available information, the EPA estimated costs of implementing RO as a percent of MHI at 26 of 27 communities and calculated secondary test scores for all 27 communities. Applying the matrix in the EPA's Interim Economic Guidance, the EPA's analysis showed that all 26 communities would face substantial economic impacts. The results of the EPA's independent analysis on a larger representative sample of communities support MDEQ's conclusion that all communities with lagoon systems covered by this WQS variance will incur substantial economic impacts if required to install RO to achieve WQBELs derived from the NNC.

SUMMARY

For public-sector entities, the EPA's Interim Economic Guidance considers substantial impacts as those that refer to financial impacts on the community, whereas widespread impacts refer to changes in the community's socioeconomic conditions. The EPA's Interim Economic Guidance further explains:

> "Demonstration of substantial financial impacts is not sufficient reason to modify a use or grant a variance from water quality standards. Rather, the applicant must also demonstrate that compliance would create widespread socioeconomic impacts on the affected community."[75]
>
> "States and dischargers will need to consider the possibility that financial impacts could cause far reaching and serious impacts to the community. An important factor in determining the magnitude of these impacts is defining the geographical area affected. The affected area might be a town, city, region, county or some combination of these geographical units."[76]

The 36 facilities for which the EPA is approving MDEQ's general variance are located in

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[74] First Triennial Review. Table 3-1. Page 5.
[75] EPA 1995 Interim Economic Guidance. Page 1-5.
[76] *Ibid.*

communities throughout the state of Montana. The substantial economic impacts where these facilities are located will occur over a wide geographical area. Across the state, public treatment works (both mechanical plants and lagoons) serve a necessary function for the community, without which all residents of those communities would not be afforded basic sanitation. These public treatment works subject to the general variance serve the entire community, both in residential and commercial places. Therefore, the EPA concludes that the substantial impacts that MDEQ's analysis demonstrates will also be widespread.

The EPA recognizes that social impacts may include consequences of actions that alter the ways in which people live, work, play, relate to one another, and organize to meet their needs.[77] The financial impacts on a community scale may affect all these social interactions and thus, for the purposes of this action, the EPA considers the economic impacts that MDEQ demonstrates to also constitute social impacts.

MDEQ's economic analysis and the EPA's review and additional analysis of available information supports MDEQ's conclusion that communities with wastewater treatment facilities listed in Table 1 would incur substantial and widespread economic and social impacts if required to achieve WQBELs derived from the NNC. MDEQ's analysis and the EPA's review and additional analysis of available information also shows that those substantial economic impacts would be widespread. Furthermore, removing these facilities from service is not an option because they provide the necessary function of basic sanitation. For the reasons discussed in this section, the EPA concludes that Montana's general variance is justified for the mechanical plants and lagoons that the EPA has determined to be within the scope of this general variance (Table 1) because attaining the aquatic life use and NNC adopted to protect that use is not feasible throughout the term of the variance, and 2) that imposition of "controls more stringent than those required by sections 301(b) and 306 of the CWA would result in substantial and widespread economic and social impact" (40 CFR §§ 131.10(g)(6) and 131.14(b)(2)(i)(A)(1)).

D. Requirements that apply throughout the term of the variance that reflect the HAC (40 CFR § 131.14(b)(1)(ii))

40 CFR § 131.14(b)(1)(ii) provides that a variance must include: "the requirements that apply throughout the term of the WQS variance. The requirements shall represent the highest attainable condition of the water body or waterbody segment applicable throughout the term of the WQS variance based on the documentation required in (b)(2) of this section. The requirements shall not result in any lowering of the currently attained ambient water quality, unless a WQS variance is necessary for restoration activities, consistent with paragraph (b)(2)(i)(A)(2) of this section.[78]

[77] Guidelines and Principles for Social Impact Assessment. 1994. Prepared by the Interorganizational Committee on Guidelines and Principles for Social Impact Assessment. Available at: http://www.nmfs.noaa.gov/sfa/social_impact_guide.htm.

[78] Consistent with 40 CFR § 131.14(b)(1)(ii) Montana's general variance requirements do not result in a lowering of the currently attained ambient water quality. MDEQ noted in its Response to Comments that "the new Circular DEQ-12B represents a 40-60% decrease in group nutrient treatment levels for the ≥1 MGD and <1 MGD groups over the existing nutrient treatment levels in the circular." MDEQ Response to Comment No. 50, Final MAR Notice Amended 6/23/17.

The State must specify the highest attainable condition (HAC) of the water body or waterbody segment as a quantifiable expression that is one of the following:

(A) For discharger(s)-specific WQS variances:

(1) The highest attainable interim criterion; or
(2) The interim effluent condition[79] that reflects the greatest pollutant reduction achievable; or
(3) If no additional feasible pollutant control technology can be identified, the interim criterion or interim effluent condition that reflects the greatest pollutant reduction achievable with the pollutant control technologies installed at the time the State adopts the WQS variance, and the adoption and implementation of a Pollutant Minimization Program (PMP)."[80]

Montana adopted a general variance that applies to three categories of dischargers: (≥1 MGD; <1 MGD; and lagoons). A summary of how MDEQ identifies the HAC that applies to each individual discharger is described below.

Mechanical Plants

DEQ-12B Table 12B-1 identifies the HAC for all dischargers. A copy of Table 12B-1 is provided below.

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

Discharger Category[2]	Monthly Average Total P (µg/L)	Monthly Average Total N (µg/L)
≥1.0 million gallons per day[3, 4]	300	6,000
<1.0 million gallons per day[3, 4]	1,000	10,000
Lagoons not designed to actively remove nutrients	Maintain long-term average[5] and	Maintain long-term average[5] and

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[79] The EPA has explained that "rather than identifying the highest attainable interim use and interim numeric criterion, a state or tribe may choose to specify in its variance that the applicable interim water quality standard shall be defined by a numeric effluent condition that reflects the highest attainable condition for a specific permittee(s) during the term of the variance. Adopting a numeric effluent condition that reflects the highest attainable condition is reasonable because the resulting instream concentration reflects the highest attainable interim use and interim criterion and, therefore, the interim numeric effluent condition is acting as a surrogate for the interim use and interim criterion." 78 FR 54518, 54536 (September 4, 2013); 80 Fed Reg. 51020, 50137 (August 21, 2015).

[80] 40 CFR § 131.14(b)(1)(ii)(A)(3) specifies that the HAC is both the quantitative expression of the greatest pollutant reduction achievable with the pollutant control technologies installed at the time of adoption *and* adoption and implementation of a PMP. A PMP, in the context of 40 CFR § 131.14, is a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings. 40 CFR § 131.3(p). Achieving the quantitative interim effluent condition and implementing the PMP activities can happen concurrently, as both are components of the HAC under 40 CFR § 131.14(b)(1)(ii)(A)(3). As part of the applicable water quality standard, the permitting authority must use the PMP along with the quantifiable expression of the "greatest pollutant reduction achievable" to derive NPDES permit limits and requirements (see 40 CFR § 131.14(c)).

	implement the PMP	implement the PMP

[2] See Endnote 2
[3] See Endnote 3
[4] See Endnote 4
[5] See Endnote 5

Endnotes
(2) Based on facility design flow.

(3) Facilities that are already meeting the treatment requirements for one or both nutrients in Table 12B-1 must continue to meet these levels and are required to implement the pollutant minimization program in Section 2.2 of this Circular.

(4) If the Department believes that a non-POTW permittee can achieve a treatment level better than (i.e., at a lower concentration than) the general variance requirements in Table 12B-1, then the permittee and the Department shall discuss what treatment level can be achieved and the Department, in consultation with the permittee, will identify the highest attainable condition and level of treatment.

(5) For lagoons, the long term average is calculated as the arithmetic average of representative facility data from the past 3 years, or up to the past 5 years if those data are also representative.

DEQ-12B provides the following two options for identifying the HAC for mechanical plants:

1) Categorical interim effluent condition for mechanical plants ≥ 1 MGD, mechanical plants < 1 MGD, and lagoon facilities; or

2) On the basis of the facility's actual effluent concentration for one or both nutrients and implementation of the Pollutant Minimization Program (PMP) adopted pursuant to DEQ-12B Section 2.2.

DEQ-12B Table 12B-1 establishes specific interim effluent condition values[81] to serve as the HAC for each of three discharger categories (≥ 1 MGD, < 1 MGD, and lagoons). For all mechanical plants (≥ 1 MGD and < 1 MGD), the HAC is expressed as a numeric effluent condition (monthly average)[82] that reflects the greatest nitrogen and phosphorus reductions achievable during the variance term.

As part of the HAC, DEQ-12B also establishes more stringent requirements for all dischargers with current performance that is better than the Table 12B-1 values. DEQ-12B Section 2.0, page 2, provides that: "[f]or permittees whose effluent concentrations were, before July 1, 2017, lower than the concentrations in Table 12B-1, the general variance must be based on the actual total N

[81] MDEQ refers to the interim effluent condition values as the general variance end-of-pipe treatment requirements.
[82] DEQ-12B Section 1.1. defines the monthly average as "the sum of the daily discharge values during the period in which the base numeric nutrient standard applies divided by the number of days in the sample."

and/or total P concentrations of their effluent." MDEQ also notes in DEQ-12B Table 12B-1 Endnote 3: "facilities that are already meeting the treatment requirements for one or both nutrients in Table 12B-1 must continue to meet these levels and are required to implement the pollutant minimization program in Section 2.2 of this Circular." The EPA interprets "these levels" to mean each facility's current effluent concentration of TN and/or TP that are lower than the categorical limits specified in Table 12B-1, consistent with MDEQ's statement: "[f]or permittees whose effluent concentrations were, before July 1, 2017, lower than the concentrations in Table 12B-1, the general variance must be based on the actual total N and/or total P concentrations of their effluent."

DEQ-12B Section 2.2, page 5, further requires permittees to "evaluate facility operations and develop discharger-specific pollutant minimization activities and implement the pollutant minimization program." Section 2.2.1.1 of DEQ-12B, page 5, describes the PMP requirements for mechanical plants to include the evaluation of process control strategies identified and implemented through optimization; training on advanced operational strategies; and implementation of pollutant trading or reuse.[83] Permittees must report to MDEQ on the PMP activities they considered. MDEQ will review and approve the permittee specific PMP activities and incorporate the selected PMP activities into the permittee's MPDES permit.

MDEQ described its process for establishing a quantifiable interim effluent condition that reflects the HAC in its report, "First Triennial Review of Base Numeric Nutrient Standards." MDEQ summarized its four-step process applied to the mechanical plants as follows:

> "DEQ (1) identified those facilities likely to need a variance, (2) estimated the cost, with EPA assistance, via case-by-case facility cost projections for capital and O & M, and 10% extra for collection system replacement, to meet five dual[84]-nutrient treatment levels [7,000 and 500; 7,000 and 100; 7,000 and 50; 3,000 and 500; 3,000 and 100; and 3,000 and 50], total nitrogen [TN] and total phosphorus [TP], respectively, in [μ]g/L,[85] (3) determined, using DEQ methods, the cost threshold (as a % of community MHI) each community should maximally pay towards nutrient standards compliance, and (4) determined the percentage of group members that could affordably achieve each of the nutrient treatment levels."[86]

To derive the HAC values, MDEQ first determined which permittees are likely to need a

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[83] DEQ-12B Section 2.2.1.1, page 5.

[84] Error in original document. Duel should correctly be spelled dual.

[85] These levels as potentially feasible pollutant control technologies that are described in the following document, "Memorandum on the State of Montana wastewater system nutrient reduction cost estimates." From TetraTech to USEPA Region 8. October 21, 2016. 16 pages. The treatment levels described in MDEQ's First Triennial Review document are associated with the following pollutant control technologies: 7,000 μg/l TN: optimization of existing activated sludge process to promote nitrification/denitrification; 3,000 μg/l TN: biological nitrogen removal: nitrification/denitrification via anoxic/oxic zone or cycle retrofits, addition of a denitrification filter, or optimization for plants approaching limits of technology; 500 μg/l TP: enhanced biological phosphorus removal, EBPR: anaerobic selector technology with tertiary filtration; 100 μg/l TP: chemical precipitation with tertiary filtration; and 50 μg/l TP: high dose chemical precipitation with advanced solids removal process.

[86] First Triennial Review of Base Numeric Nutrient Standards and Variances. Executive Summary.

variance to the NNC. MDEQ performed this step by conducting a RP analysis of all mechanical plants and lagoons.[87] MDEQ also excluded those facilities that could meet the NNC at the end of the mixing zone and those permittees discharging to waters where NNC have not yet been adopted in this submission.[88,89] Through this process, MDEQ identified ten facilities ≥ 1 MGD, 14 facilities < 1 MGD, and 25 POTW lagoons systems that would likely need the general variance.[90, 91] These wastewater treatment facilities were the focus of MDEQ's HAC analysis.

In Step 2, five potential pollutant control technologies were identified for reducing TN and/or TP. Each facility's currently installed treatment technology and actual effluent concentrations were then compared to the potentially feasible effluent concentrations for TN and TP associated with the five potential pollutant control technologies. See pages 14-18 for more details on the estimated effluent condition for TN and TP that can be achieved by these pollutant treatment technologies. Based on this information, cost estimates were generated (in terms of %MHI) that reflected the facility upgrades or modifications that would need to be implemented to meet the potentially feasible effluent concentrations for TN and/or TP. In contrast to the cost estimates derived to justify the need for the variance that considered the long term goal of dual-nutrient removal to achieve the aquatic life use, cost estimates for determining the HAC independently analyzed the cost for each facility (based on their actual effluent concentration) to meet different combinations of the potentially feasible TN or TP effluent concentrations. These costs for each potentially feasible effluent concentration were then aggregated into a final cost for each of the five potential pollutant control technologies. For example, if a facility was already meeting a TN concentration of 7,000 µg/L TN but needed to install treatment technologies to meet a TP of 500 µg/L, the cost estimate for that facility to meet 7,000 µg/L TN and 500 µg/L TP was primarily based on the cost to meet the potential interim effluent condition for TP.[92] Cost estimates to meet each of the five potential pollutant control technologies were calculated for each discharger in the ≥ 1 MGD and < 1 MGD categories.[93]

MDEQ then estimated the cost of implementing each of the five potential pollutant control technologies as percent of MHI by calculating the average additional cost per household for each treatment option, adding those costs to current wastewater treatment costs, and then dividing by MHI. MDEQ summarized the cost estimate information in the Excel file

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[87] As described in Section B, page 9, two facilities that did not have RP were erroneously included in MDEQ's 2017 HAC analysis.

[88] First Triennial Review. Page 9.

[89] *Id.* Page 8. As noted in Footnote 12, MDEQ decided to include permittees located on the segment of the Yellowstone River from Yellowstone National Park to the confluence with the Big Horn River in the analysis because MDEQ anticipates adoption of numeric nutrient criteria for this segment prior to the next triennial review. MDEQ used the NNC adopted and approved for the lower Yellowstone to determine if the upstream dischargers had reasonable potential to cause or contribute to an exceedance of the TN or TP criteria.

[90] *Id.* Pages 9, 11 and 18.

[91] Note: MDEQ completed an "un-official RP analysis" for lagoons and only considered POTW lagoons. (First Triennial Review, page 18.) There were 39 lagoons (both POTWs and non-POTWs) included in MDEQ's list of facilities likely eligible for the general variance. See page 6 for more details.

[92] The Excel file, "2017DEQCalculations_VarianceBenchmarks_CHECK7.1," documents the facility-specific details for each discharger to meet the specific TN and TP concentrations. These details form the basis for the cost estimate to meet each TN and TP interim effluent condition.

[93] Memorandum on the State of Montana wastewater system nutrient reduction cost estimates. From TetraTech to USEPA Region 8. October 21, 2016. 16 pages.

"2017DEQCalculations_VarianceBenchmarks_CHECK7.1". An excerpt of these data is provided on page 32 of this document.

Step 3 compared the results of these analyses to the highest amount that is feasible for a community to pay towards pollution control costs – described by MDEQ as a "cost threshold." The regulatory test is to identify the "greatest pollutant reduction achievable" that will not result in "substantial and widespread social and economic impact." The EPA's Interim Economic Guidance offers an approach to use pollutant control costs as a percent of MHI that varies by a set of indicators of overall community financial health (the so-called "secondary score" or SS), but does not identify a specific "cost threshold" that establishes the amount a community is reasonably expected to pay towards pollution control costs. In 2010, MDEQ sent the EPA a letter asking for clarification on defining this threshold. The EPA responded by recommending use of a "sliding scale formula," based on the relationship between %MHI and SS described in EPA's guidance, to determine a customized cost cap for a public wastewater treatment entity serving a community:

> "This cost cap represents the total amount a community would be expected to pay to achieve WQS-based controls (i.e., not counting costs to achieve technology-based controls). The costs that are affordable under a WQS variance would be the incremental difference between the cost cap and the existing costs already born by the community to comply with WQS-based controls."[94]

The basis for EPA's recommendation is that a "cost threshold" for a community should be based on financial characteristics of the community, rather than a "one-sized fits all" approach. Therefore, the %MHI threshold should be set in the context of overall indicators of a community's financial health (like poverty rate, unemployment, and tax burden). The %MHI is a good basis for a cost threshold because it represents the proportion of household income dedicated to pollution control, and the 1-2% range represents the level where the EPA has long considered costs to be "substantial" based on examination of sewer fees conducted prior to the EPA's publication of its guidance in 1995. The formula the EPA recommended, and Montana chose to use, is based on an interpretation of the "Substantial Impacts Matrix" from the EPA's 1995 guidance (Table 2-2). The Substantial Impacts Matrix itself reflects a logical relationship between a reasonable %MHI ability to pay and a composite index of community financial health indicators (secondary score). The matrix delineates zones of substantial impact, zones of non-substantial impact, and zones of uncertainty. The formula splits the zones of uncertainty (denoted by a "?" in the matrix) in half, and thereby suggests a "cost threshold" that balances evidence of substantial impact with evidence of non-substantial impact to arrive at a value that represents the boundary condition.

Following the sliding scale formula, MDEQ used a community's secondary score to determine the funds available to implement pollutant control costs for TN and TP, as a percentage of the MHI. Montana's secondary score is calculated based on measures of poverty rate, low and moderate income rate, unemployment rate, MHI, and current local tax and fee burden, applying a score of 1.0 (weak) to 3.0 (strong) for each category. MDEQ aggregated the score and compared

[94] The "sliding scale approach" was first recommended by EPA in 2010. See letter from Carol Campbell, EPA, to Richard Opper, MDEQ, dated September 10, 2010.

it to the percentage of the community's MHI that will result from incurring the pollution control costs. In its 2010 memo to MDEQ on the sliding scale, the EPA stated: "The impacts are considered substantial when the secondary score of community health is less than the municipal preliminary screen value plus half a percentage point."[95] An example of MDEQ's application of the sliding scale to derive the sliding scale-derived cost threshold is provided below:

> "For example, a community has demonstrated that substantial and widespread economic impacts would occur from trying to comply with the base numeric nutrient standards, and there were no reasonable alternatives to discharging. If the permittee's average secondary score from the secondary tests was 1.5, then the annual cost cap for the pollution control project (including current wastewater fees) would be the dollar value equal to 1.0% of the community's MHI at the time that the analysis was undertaken (see diagonal line, Figure 3-2). This 1.0% would include existing wastewater costs plus the new, hypothetical upgrades."[96]

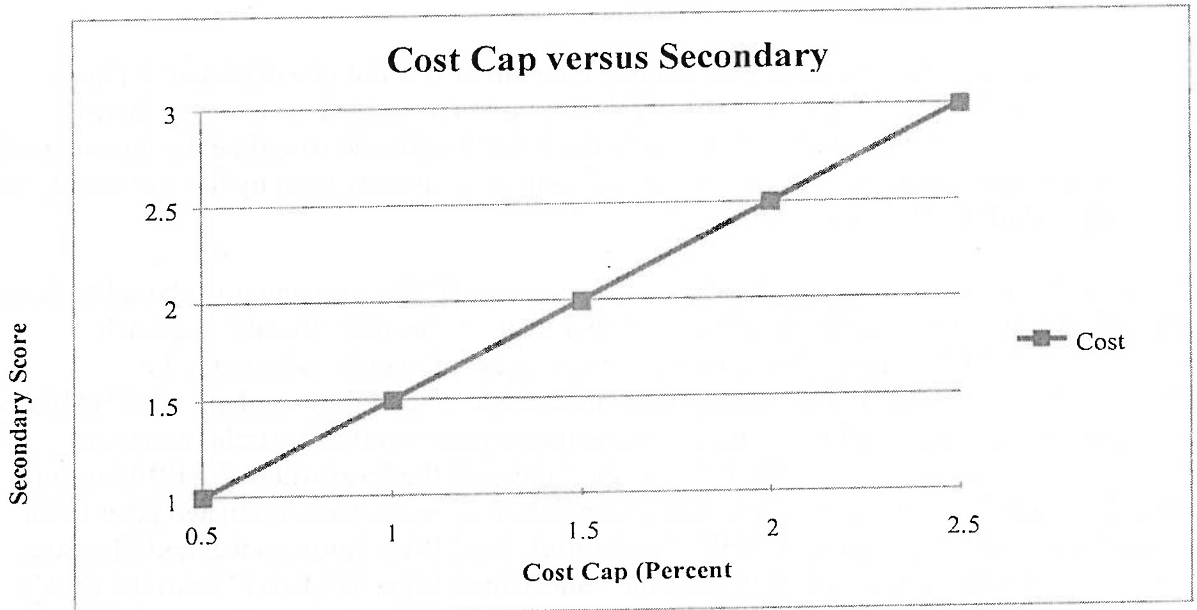

Figure 3-2. Sliding scale for determining cost cap based on a community's secondary score. The horizontal axis represents percentages of a community's median household income (MHI) that the community would be expected to expend towards the pollution control project as a function of the secondary score shown on the vertical axis.[97]

In Step 4, MDEQ aggregated the facility-level data by each discharger category and examined the percentage of facilities within each group that could afford various potential treatment target combinations of TN and TP.[98] MDEQ used the aggregated information to identify a range of possible HAC values for the ≥1 MGD and <1 MGD discharger categories that represented

[95] Letter from Carol Campbell, EPA, to Richard Opper, MDEQ, on September 10, 2010. Page 4.
[96] Montana Department of Environmental Quality, 2017. Base Numeric Nutrient Standards Implementation Guidance. Version 2.0. Helena, MT: Montana Dept. of Environmental Quality. Page 9.
[97] *Id.* Page 10. First Triennial Review. Page 14.
[98] First Triennial Review. Pages 14-16.

feasible treatment levels that are achievable. MDEQ also weighed the technological considerations related to the effect of the colder temperatures in Montana on nutrient removal; the challenges of dual nutrient control; and reductions that can be achieved through optimization to identify a final interim effluent condition for TN and TP for mechanical plants. As an additional consideration in selecting the proposed HAC value for the ≥1 MGD category, MDEQ reviewed the effluent data from ten facilities from across the U.S. that were included in the EPA's 2007 report[99] on biological nutrient removal processes and two plants from Montana that are achieving relatively low TN and TP concentrations.[100]

MDEQ used the results of this four-part process to select the final Table 12B-1 interim effluent condition values that represent the greatest pollutant reduction achievable of 6,000 µg/L TN and 300 µg/L TP for dischargers ≥1 MGD and 10,000 µg/L TN and 1,000 µg /L TP for facilities <1MGD during the term of the variance.

<u>EPA Basis for Approval for Mechanical Plants</u>

Variances may be justified under 40 CFR § 131.14(b)(2)(i)(A)(1) where implementing controls more stringent than those required by CWA sections 301(b) and 306 to meet water quality-based effluent limitations derived from the underlying designated use and water quality criteria would cause substantial and widespread economic and social impact (40 CFR § 131.10(g)(6)). In these circumstances, there may be pollutant controls that are feasible (*i.e.*, would not result in substantial and widespread economic and social impact) for the discharger to install or implement to reduce the discharger's loadings of the pollutant into the water body, albeit not down to the level necessary to meet permit limits based on attaining the underlying designated use and water quality criteria. Where this is the case, a discharger-specific variance must identify the HAC as a quantitative expression that could, as one option, include an interim effluent condition reflecting the greatest pollutant reduction achievable during the variance term that results from the installation of feasible (*i.e.*, would not result in substantial and widespread economic and social impact) pollutant control technologies. 40 CFR § 131.14(b)(1)(ii)(A)(2). In situations where no additional feasible pollutant control technologies can be identified, the discharger-specific variance would identify the highest attainable condition as the greatest pollutant reduction achievable with optimization[101] of the currently installed pollutant control technology and adoption and implementation of a PMP, as defined in 40 CFR § 131.3(p). 40 CFR § 131.14(b)(1)(ii)(A)(3). This reflects the highest attainable condition because there is no feasible pollutant control technology to achieve the WQS and thus the effluent condition can only be improved to the greatest extent by implementation of a PMP. Specifically, ensuring that the technology is optimized and requiring implementation of "...a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings" is the best that can be achieved to make incremental progress towards the underlying designated use and criteria.

In Montana's circumstance, the State utilized two options as stated in 40 CFR § 131.14(b)(1)(ii)

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[99] U.S. EPA. 2007. Biological Nutrient Removal Processes and Costs. Office of Water, Washington, D.C. EPA-823-R-07.001.
[100] First Triennial Review. Pages 16-17.
[101] The EPA interprets optimized to mean "well maintained and operated."

for deriving the HAC on a discharger-by-discharger basis. The two options were:

1) establish the HAC based on the categorical interim effluent condition; or
2) derive the interim effluent condition value based on the facility's actual effluent concentration for one or both nutrients plus implementation of a PMP adopted at DEQ-12B Section 2.2.

The EPA conducted an independent analysis to confirm whether MDEQ accurately established the applicable HAC for each individual discharger that represents the greatest pollutant reduction achievable in accordance with 40 CFR § 131.14(b)(1)(ii)(A)(2) or (3). The EPA considered:

1) the technological aspects of what can be reliably achieved with current wastewater technologies (e.g., technological considerations; climate; data from best performing wastewater treatment plants);
2) the potential pollutant control technologies that were used in MDEQ's cost analysis; and
3) the HAC cost analysis information provided by MDEQ for all the mechanical plants eligible to receive the general variance and whether installation of such technologies are "feasible."

Materials considered in the EPA's review included technical reports[102] and detailed cost estimates MDEQ completed for each of the publicly owned mechanical plants.[103]

The State's economic analysis for purposes of demonstrating the necessity for the variance in accordance with 40 CFR § 131.14(b)(2)(i)(A) determined that facilities must install reverse osmosis to achieve both the TN and TP components of the NNC. See discussion on pages 11-21. The State's HAC cost analysis also considered costs of potentially feasible pollutant control technologies other than RO that are associated with achieving varying TN and TP effluent concentrations independently. The list of potential pollutant control technologies and associated effluent concentrations are described below. Cost estimates for Montana's HAC analysis were based on different combinations of these pollutant control technologies to achieve varying TN and TP effluent concentrations:[104]

- 7,000 µg/L TN: optimization of existing activated sludge process to promote nitrification/denitrification;
- 3,000 µg/L TN: biological nitrogen removal: nitrification/denitrification via anoxic/oxic zone or cycle retrofits, addition of a denitrification filter, or optimization for plants approaching limits of technology;
- 500 µg/L TP: enhanced biological phosphorus removal, EBPR: anaerobic selector technology with tertiary filtration;

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[102] *E.g.,* Memo from TetraTech to EPA re. the State of Montana wastewater system nutrient reduction costs estimates. October 21, 2016.
[103] 2017DEQCalculations_VarianceBenchmarks_Check7.1.
[104] Memo from TetraTech to EPA re. the State of Montana wastewater system nutrient reduction costs estimates. October 21, 2016. Page 1.

- 100 µg/L TP: chemical precipitation with tertiary filtration; and
- 50 µg/L TP: high dose chemical precipitation with advanced solids removal process.[105]

For TP, the EPA review of the various methods for TP removal demonstrated that only a few technologies can reliably achieve a TP limit of 100 µg/L as a 95th percentile concentration (not as a monthly average) because consistently achieving a TP concentration of 100 µg/L requires significant amounts of process control, chemical addition, and results in increased sludge production. Therefore, as noted on page 18, the EPA concluded that the best performing phosphorus removal wastewater treatment technologies can achieve effluent concentrations in the range of 100 - 300 µg/L TP. For TN, because of the effects of colder climates on nitrifying bacteria, the EPA also concludes that the best performing BNR/chemical precipitation wastewater treatment technologies can achieve effluent concentrations as low as 3,000 – 4,000 µg/L TN.

Next, the EPA analyzed the available economic information to determine whether MDEQ's approach adequately established the HAC for each mechanical plant based on an analysis of the feasible treatment technology for each discharger. The EPA first assessed the actual effluent concentrations for both TN and TP for the five POTW plants included in the ≥ 1 MGD category and four POTWs in the < 1 MGD category that the EPA identified as within the scope of MDEQ's general variance submission. See the detailed list of facilities for which the general variance is approved on pages 10-11. This assessment was based on the past three years or less of median effluent concentration data that MDEQ downloaded from ECHO (Enforcement and Compliance History Online).[106] The EPA used this information to identify the HAC option that applied to the individual discharger: a) the categorical interim effluent condition established in Table 12B-1; or b) derive the interim effluent condition value based on the facility's actual effluent concentration for one or both nutrients plus implementation of the PMP adopted at DEQ-12B Section 2.2 as required by Endnote 3 of Table 12B-1.

Subsequently, the EPA reviewed cost estimate information for each individual discharger ("2017DEQCalculations_VarianceBenchmarks_CHECK7.1"). Specifically, the EPA compared the community's current sewer rate (expressed as a % MHI) to the sliding scale-derived cost threshold identified in MDEQ's cost analysis.[107] As discussed in Section D and illustrated in Figure 3-2 on page 27, the EPA's sliding scale formula calculates a sliding scale-derived cost threshold based on a community's secondary score minus half a percentage point. For example, a community with a secondary score of 2 would have a sliding scale-derived cost threshold of 1.5% MHI. This cost threshold represents the amount the EPA expects a community could pay towards pollution control costs and reflects the greatest pollutant reduction achievable.

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[105] Advanced solids removal process can include certain membrane filters, reactive media filters, continuous backwash media filters, microfilters, cloth filters, ballasted and other enhanced settling processes and combinations of these technologies. For the purposes of this evaluation, costs were assumed to be comparable.

[106] Email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15, 2017. Powerpoint presentation on "recent effluent quality of facilities likely to need a variance." Mike Suplee, MDEQ, presentation to Montana nutrient workgroup on March 20, 2017. Slide 13.

[107] In the "Cost_High" tab, Column R contains the current sewer rate in the Excel spreadsheet, "2017DEQCalculations_VarianceBenchmarks_CHECK7.1" and Column AJ identifies the sliding scale MHI ceiling.

The EPA examined whether it was reasonable for Montana to include an additional 10% increase to cover collection system costs for mechanical plants. The EPA's 1995 Interim Economic Guidance (Worksheet B, Calculation of Total Annualized Project Costs) includes the annual cost of repair, administration and replacement as examples of operating and maintenance costs that can be considered when estimating the total annualized project costs.[108] Including costs to repair and maintain the wastewater collection system aligns with the examples provided in the EPA's Interim Economic guidance. However, Montana's nutrient variance submission did not describe whether collection system costs were already included in a community's current sewer rates. Absent this information, the EPA completed its own analysis to evaluate the HAC implications of including the 10% to account for collection system costs. The EPA deducted 10% from the total cost estimate and compared the final % MHI to the % MHI that included the 10%. Results showed minor changes to the final % MHI, none that had implications for the final HAC values.[109] Therefore, the EPA concludes that MDEQ's approach to including a general 10% increase had no effect on the selection of the final HAC values based on MDEQ's cost analysis.

Table 3 below summarizes MDEQ's HAC cost analysis data for each individual discharger. The EPA evaluated MDEQ's HAC approach for each individual mechanical plant included in the ≥ 1 MGD and < 1 MGD categories. For each discharger, the EPA examined the following:

1) the HAC option that applies to that facility (i.e., Table 12B-1 or actual effluent concentrations and implementation of the PMP);
2) the facility's current effluent concentrations for TN and TP and currently installed treatment technology;
3) all the potentially feasible effluent concentrations for TN and TP that could result from installing different combinations of the identified pollutant control technologies;
4) the estimated cost (in terms of %MHI) to achieve the potentially feasible effluent concentrations using the identified pollutant control technologies;
5) which of the potentially feasible effluent concentrations are feasible by comparing their estimated costs with the sliding scale-derived cost threshold that would trigger substantial and widespread economic and social impacts; and
6) technological considerations associated with meeting lower TN effluent concentrations in colder climates and the technological challenges with treating to lower TP effluent concentrations.

The EPA completed this level of detailed review for all nine mechanical plants that were determined by the EPA to be eligible to receive the general variance. Appendix A documents the detailed analysis for the nine mechanical plants. The EPA summarizes the results of this review below.

[108] EPA 1995 Economic Guidance. Worksheet B available at: https://www.epa.gov/sites/production/files/2016-03/documents/econworksheets-complete.pdf.
[109] EPA Memo to the File on collection system costs.

Table 3. Summary of Current Sewer Rates, Costs of Potentially Feasible Effluent Concentrations, and Sliding Scale-Derived Cost Thresholds[110,111]

Facility	Current Sewer Rate %MHI	7000 µg/L TN and 500 µg/L TP (%MHI)	7000 µg/L TN and 100 - 300 µg/L TP (%MHI)	7000 µg/L TN and 50 µg/L TP (%MHI)	3000 - 4,000 µg/L TN and 500 µg/L TP (%MHI)	3000 - 4,000 µg/L TN and 100 -300 µg/L TP (%MHI)	3000- 4,000 µg/L TN and 50 µg/L TP (%MHI)	Sliding scale Threshold (% MHI)
Dischargers ≥ 1 MGD								
Bozeman	0.80	0.83	1.18	2.07	1.22	1.57	2.46	1.7
Butte	0.91	0.99	0.99	2.40	0.99	0.99	2.40	1.1
Helena	0.66	1.07	1.20	2.02	1.18	1.32	2.14	1.7
Kalispell	1.08	1.58	1.60	3.20	2.12	2.14	3.74	1.3
Whitefish	1.79	3.38	3.38	3.45	3.85	3.85	3.92	1.3
Dischargers <1 MGD								
Conrad	1.25	1.25	1.26	6.34	2.09	2.09	7.18	1.3
East Helena	1.78	1.78	4.02	5.97	2.79	5.03	6.98	1.3
Manhattan	1.81	4.62	4.62	7.14	5.94	5.94	8.45	2.1
Stevensville	1.30	2.54	2.76	NA	2.70	2.82	NA	1.1

110 Sewer rate and %MHI costs found in: 2017DEQCalculations_VarianceBenchmarks_CHECK7.1.

111 The EPA's record shows analyses using the units of mg/L. However, for ease of reading, the EPA has reflected that same analysis using the units of micrograms/L consistent with the units that Montana used in its WQS variance submission.

Pollutant Minimization Program (PMP)

Expression of the HAC consistent with 40 CFR § 131.14(b)(1)(ii)(A)(3) requires the State to adopt specific quantitative requirements and adopt and implement a PMP. The EPA's regulation defines a PMP as "a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings." 40 CFR § 131.3(p). Pollutant control activities represent a broad set of pollutant reduction options, such as process or raw material changes and pollution prevention technologies, practices that reduce pollutants prior to entering the wastewater treatment system, or best management practices for restoration and mitigation of the waterbody.[112] The EPA regulation also establishes that "the permitting authority must use the PMP (along with the quantifiable expression of the ''greatest pollutant reduction achievable'') to derive NPDES permit limits and requirements. DEQ-12B Section 2.2.1.1 specifies that mechanical plants must "examine all possible pollutant minimization activities including, but not limited to: documentation, in the Operations and Maintenance Manual, of process control strategies identified and implemented through optimization; ongoing training of operations staff in advanced operational strategies; minor changes to infrastructure to complement and further advance operational strategies; and implementation of pollutant trading and the reuse of effluent if feasible." DEQ-12B Section 2.2.1.1 further elaborates that "the Department will, as provided in subchapter 13, incorporate the PMP and associated schedule into the permittee's MPDES permit. These PMP activities demonstrate that MDEQ requires permittees to evaluate a "broad set of pollutant reduction options" and include the PMP activities in the permit as required by 40 CFR § 131.14(b)(1)(ii)(A)(3).

Summary

The EPA is approving the HAC established in DEQ-12B Section 2 and Table 12B-1 as applied to the nine mechanical plants listed below. Table 4 below summarizes the HAC for each individual discharger that result from the implementation of DEQ-12BTable 12B-1 and the EPA's approval. The EPA developed Table 4 below as part of its consideration of whether DEQ-12B Table 12B-1 reflects the HAC. The EPA's analysis of the HAC for each facility is shown in Appendix A. Based on this information, Montana's general variance satisfies the requirements of 40 CFR § 131.14(b)(1)(ii).

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[112] The EPA's regulation at 40 CFR Part 131 and the preamble to the final Water Quality Standards Regulatory Revisions distinguish between "pollutant control technologies" and "pollutant control activities". Specifically, the EPA's provision at 40 CFR §§ 131.14(b)(1)(A)(3) and (B)(2) discuss an option for articulating the highest attainable condition where "no feasible pollutant control technologies can be identified." In this case, the highest attainable condition may be expressed as the "greatest pollutant reduction achievable with the pollutant control technologies installed at the time the State adopts the WQS variance, and the adoption and implementation of a Pollutant Minimization Program." The EPA defines a Pollutant Minimization Program at 40 CFR § 131.3(p) as "...a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings...". However, the EPA notes that there is a typographical error in the preamble to the final rule that could cause confusion. When intending to describe the kinds of pollutant control activities it would be important to consider for the pollutant minimization plan, the EPA mistakenly said "Pollutant control *technologies* represent a broad set of pollutant reduction options..." 80 Fed. Reg. at 51037. The EPA intended for this language to read as follows: "Pollutant control *activities* represent a broad set of pollutant reduction options..." Therefore, an activity such as land application is an example of a pollutant control activity that can be evaluated and implemented if feasible as part of the pollutant minimization program, but is not something that the EPA would be required to consider in determining whether a pollutant control technology is feasible for purposes of 40 CFR § 131.14(b)(1)(A)(3).

Table 4. Summary of MDEQ's Approach for Establishing the HAC for Each Facility covered by the General Variance for Mechanical Plant.[113]

Facility	Median Observed TN Effluent[114] (µg/L TN)	Median Observed TP Effluent (µg/L TN)[115]	HAC Approach	TN HAC for Permit	TP HAC for Permit
Dischargers ≥ 1 MGD					
Bozeman	4,400	170	Interim effluent condition value based on actual effluent concentration for TN and TP +PMP for both nutrients.	monthly average of actual effluent TN at the time of permitting + PMP	monthly average of actual effluent TP at the time of permitting + PMP
Butte	2,400	2,100	Categorical interim condition value for TP. Interim effluent condition value based on actual effluent concentration for TN + PMP for TN.	monthly average of actual effluent TN at the time of permitting + PMP	monthly average of 300 µg/L TP
Helena	5,600	2,360	Categorical interim condition value for TP. Interim effluent condition value based on actual effluent concentration for TN + PMP for TN.	monthly average of actual effluent TN at the time of permitting + PMP	monthly average of 300 µg/L TP
Kalispell	8,400	150	Categorical interim effluent condition value for TN. Interim effluent condition value based on actual effluent concentration for TP +PMP for TP.	monthly average of 6,000 µg/L TN	monthly average of actual effluent TP at the time of permitting + PMP

[113] The EPA expects that if, at the time of permitting, the actual effluent concentration is better than the categorical limits, the State will include limits based on that actual effluent concentration + PMP rather than the categorical limits consistent with DEQ-12B and the EPA's approval.

[114] Median TN and TP effluent concentrations were obtained from MDEQ's PowerPoint presentation on "recent effluent quality of facilities likely to need a variance," provided in an email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15,2017. This information was also included in Mike Suplee's, MDEQ, presentation to the Montana nutrient workgroup on March 20, 2017. Slide 13. This assessment was based on the past three years or less of median effluent concentration data that MDEQ downloaded from ECHO (Enforcement and Compliance History Online). These data were used by the EPA to inform the identification of the HAC limits that apply to each discharger as established in Table 12B-1. The actual effluent concentration that will serve as the interim effluent condition will be determined at the time of permitting.

[115] *Ibid.*

Whitefish	24, 200	470	Categorical interim effluent condition values for both TN and TP.	monthly average of 6,000 µg /L TN	monthly average of 300 µg/L TP
Dischargers <1 MGD					
Conrad	7,000	150	Interim effluent condition values based on actual effluent for TN and TP +PMP for both nutrients.	monthly average of actual effluent TN at the time of permitting + PMP	monthly average of actual effluent TP at the time of permitting + PMP
East Helena	10,600	530	Categorical interim effluent condition values for TN. Interim effluent condition values based on actual effluent concentrations for TP +PMP for TP.	monthly average of 10,000 µg/L TN	monthly average of actual effluent TP at the time of permitting + PMP
Manhattan	8,700	600	Interim effluent condition values based on actual effluent for TN and TP +PMP for both nutrients.	monthly average of actual effluent TN at the time of permitting + PMP	monthly average of actual effluent TP at the time of permitting + PMP
Stevensville	14,800	2,840	Categorical interim effluent condition values for TN and TP.	monthly average of 10,000 µg/L TN	monthly average of 1,000 µg/L TP

LAGOONS

Establishing the HAC for Lagoons

MDEQ "took a representative random sample of POTW lagoons and estimated the cost and economic impact for them to achieve different nutrient treatment levels."[116] The State randomly selected eight lagoons to represent all lagoons eligible to receive the general variance. For those randomly selected lagoons, the State calculated the costs to install several different potentially feasible pollutant control technologies (i.e., nutrient add-on/ retrofit; installation of a package plant; and replacement with a mechanical plant) as a % of MHI in the communities where the lagoons are located. Cost estimates were calculated to achieve the following TN and TP effluent concentrations:

Table 5. Potentially Feasible Effluent Concentrations and Associated Potential Pollutant Control Technologies for Lagoons

TN or TP (µg/L)	Options for Facultative Lagoons	Options for Aerated Lagoons
7,000 µg/L TN	Aeration + denitrification filters (*retrofit:* existing lagoon system retained/modified)	Denitrification filters (*retrofit:* existing lagoon system retained/modified)

[116] First Triennial Review. Page 18.

7,000 µg/L TN	MLE Process (*replacement:* new mechanical treatment plant)	N/A
3,000 µg/L TN + 100 µg/L TP	ENR + chemical precipitation + tertiary filtration (*replacement:* new mechanical treatment plant)	ENR + chemical precipitation + tertiary filtration (*replacement:* new mechanical treatment plant)
3,000 µg/L TN + 50 µg/L TP	Spray irrigation system (*retrofit:* existing lagoon system retained/modified)	Spray irrigation system (*retrofit:* existing lagoon system retained/modified)
100 µg/L TP	Chemical precipitation + tertiary filtration (*retrofit:* existing lagoon system retained/modified)	Chemical precipitation + tertiary filtration (*retrofit:* existing lagoon system retained/modified)

MLE = Modified Ludzack-Ettinger process. ENR = enhanced nutrient removal, which includes some type of improved MLE-based biological nitrogen removal process and enhanced biological phosphorus removal (EBPR).

MDEQ then reviewed the secondary scores for each of the eight communities where those representative lagoons are located and applied the sliding scale formula to determine the amount each community could afford to pay for costs associated with installing the potential pollution control technologies. See Section D, pages 26-27, for a detailed discussion of the sliding scale. For all lagoons, all potential pollutant control technologies were determined to exceed the sliding scale MHIs that the State identified as an indicator of substantial and widespread economic and social impacts. Based on this HAC analysis, MDEQ concluded that, for the eight randomly sampled lagoons MDEQ evaluated, there is no feasible pollutant control technology that can be identified. Therefore, consistent with 40 CFR § 131.14(b)(1)(A)(3), Montana concluded that the HAC for lagoons is to "maintain [the] long-term average and implement the PMP." [117]

MDEQ also looked at the costs of land application as a pollutant control activity and results showed this option may be affordable for 38% of the eight lagoons based on a comparison to the sliding scale-derived cost threshold. However, MDEQ's analysis noted the challenges with land application beyond the cost considerations (e.g., lack of suitable soils; land availability) that may preclude a discharger's ability to land apply. [118]

DEQ-12B Section 2.2.1.2, page 6, describes the PMP requirements for lagoons. The PMP commits MDEQ to the following steps and to incorporate any feasible activities identified as a result of these commitments into the lagoons' MDPES permits:

- "Implementing pilot studies before the 2020 triennial review to examine the use of novel, low-maintenance technologies to reduce nutrient concentrations in lagoon system effluent. Based on final results from these studies, the Department shall publish results demonstrating the efficiency of the tested technologies in reducing nutrients in lagoon systems.
- Conducting and completing a statewide review of lagoon performance by 2022 to evaluate effective operational methods and identify those lagoons that require additional improvements. For each facility, within 1 year of completing the review of operational methods, the Department shall begin requiring implementation of the improvements at those facilities that do not require substantial investment or additional study.

[117] Department Circular DEQ-12B. Page 2.
[118] First Triennial Review. Page 18.

- Evaluating the facility-specific recommendations and documentation submitted by each lagoon permittee as part of its optimization activities. The Department and the permittee shall also evaluate the capability of each discharger to implement feasible nutrient reduction strategies." (DEQ12-B Section 2.2.1.2, Page 6)[119]

The PMP requires all permittees including lagoons, to "provide sufficient information to allow the Department to evaluate the performance of all PMP activities. Feasible activities will, as provided in subchapter 13, be incorporated into each discharger's PMP through the renewal process for each facility's MPDES permit." [120]

EPA Basis for Approval of Lagoon Wastewater Treatment Systems

In addition to MDEQ's analysis of eight randomly sampled communities with lagoon systems, the EPA completed its own independent HAC cost analysis for all lagoons in the EPA's Table 1.0 as likely eligible to receive a variance.[121] The EPA's independent analysis confirmed MDEQ's conclusion that the additional installation of any of the potentially feasible pollution control technologies, including replacement of the lagoon systems with a mechanical wastewater treatment system, would result in substantial and widespread social and economic impacts at all communities with lagoon systems listed in Table 1.[122] The EPA agrees with MDEQ that land application is a feasible pollutant control activity for some lagoon facilities if land is available and soil conditions will ensure protection of ground water quality. DEQ-12B Section 2.2 requires permittees to consider land application as a possible PMP activity: "Permittees shall consider a full array of reasonable options including, but not limited to, facility advanced operational strategies, reuse, recharge, and land application." [underline added]. This requirement ensures that land application will be incorporated into a facility's permit requirements if determined to be a feasible option for that individual facility.

The regulation at 40 CFR § 131.3(p) defines a pollutant minimization program as "a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings." Pollutant control activities represent a broad set of pollutant reduction options, such as process or raw material changes and pollution prevention technologies, practices that reduce pollutants prior to entering the wastewater treatment system, or best management practices for restoration and mitigation of the waterbody. 80 Fed. Reg. at 51037. The EPA preamble to the final rule further clarifies that "the permitting authority must use the PMP (along with the quantifiable expression of the ''greatest pollutant reduction achievable'') to derive NPDES permit limits and requirements. *Id.* DEQ-12B Section 2.2.1.2, page 6, demonstrates that the State-led PMP activities are designed to evaluate innovative methods for reducing TN and TP in lagoon systems and that any feasible operational strategies identified through the State's review of lagoon performance will be incorporated into permits. DEQ-12B Section 2.1.1.2 states "[f]easible activities will, as provided in subchapter 13, be incorporated into each discharger's PMP through the renewal process of each facilities MPDS permit." These PMP activities demonstrate that MDEQ's lagoon PMP requires permittees to evaluate a "broad set of pollutant reduction options" and include the identified PMP activities in the permit as required by 131.14(b)(1)(ii)(A)(3).

Summary

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[119] Department Circular DEQ-12B. Page 6.
[120] Department Circular DEQ-12B. Page 6.
[121] MHI summary analysis_Lagoons 2-27-17 v.1- GR(03-10-17).
[122] *Id.*

The EPA's analysis confirms MDEQ's conclusion that no additional feasible pollutant control technologies can be identified for all lagoons listed in Table 1 because installation of any of the identified options or replacement of the lagoons with a mechanical wastewater treatment plant would trigger the % MHI threshold the State identified as an indicator of substantial and widespread economic and social impacts for each community. Thus, the State was reasonable to conclude that maintaining the current long-term average[123] concentration of TN and TP reflects the greatest TN and TP reductions achievable. Furthermore, the EPA confirms that communities with lagoon systems are required to implement a structured set of activities to improve processes and pollutant controls that will prevent and reduce pollutant loadings. Therefore, it is reasonable to conclude that maintaining the existing long-term average concentration of TN and TP and implementing the specified PMP at each lagoon system meets the requirements of 40 CFR § 131.14(b)(1)(ii)(A)(3).

E. A term is specified that is as long as necessary to achieve the HAC (40 CFR § 131.14(b)(1)(iv))

40 CFR § 131.14(b)(1)(iv) requires that the variance define "the term of the WQS variance, expressed as an interval of time from the date of EPA approval or a specific date. The term of the variance must only be as long as necessary to achieve the HAC and consistent with the demonstration provided in [40 CFR § 131.14(b)(2)." [underline added]. *See* 80 Fed. Reg. at 51036.

The EPA's regulation further specifies at 40 CFR § 131.14(b)(2)(ii) that the supporting documentation must include "[d]ocumentation demonstrating that the term of the WQS variance is only as long as necessary to achieve the highest attainable condition. Such documentation must justify the term of the WQS variance by describing the pollutant control activities to achieve the highest attainable condition, including those activities identified through a Pollutant Minimization Program, which serve as milestones for the WQS variance."

i. Specified term

DEQ-12B Section 2.1, page 3, specifies:

> "The time for the general variance must only be as long as necessary to meet the treatment requirements in Table 12B-1 but could take up to 17 years from the date of approval of the general variances in this circular." [underline added]
>
> "For the lagoon discharge category, the Department and permittee shall complete the pollutant minimization program requirements described in section 2.2 and section 2.2.1.2 no later than July 1, 2027."

EPA Basis for Approval

Because the State explicitly lays out an expiration date for the variance for lagoons, it is reasonable to assume that the first provision applies only to mechanical plants within the scope of the general variance submission. Therefore, the State has satisfied the first part of 40 CFR § 131.14(b)(1)(iv) and specified that the variance term for mechanical plants is up to 17 years "from the date of approval of the general variances in this circular" and the variance term for lagoons is until July 1, 2027. While DEQ-12B does

[123] DEQ-12B Endnote 5 (page 10) defines "the long term average is calculated as the arithmetic average of representative facility data from the past 3 years, or up to the past 5 years if those data are also representative."

not explicitly specify that "date of approval" means the EPA approval, in its Response to Comments, MDEQ clarifies that the "department recognizes that under the federal regulations, the variances described in Circular DEQ-12B are not effective for Federal Clean Water Act purposes until such time as EPA issues a water quality standards approval pursuant to 40 CFR 131.21." (Response to Comment No. 52, Final MAR Notice 6/23/17 Amendment); (underline added).

The general variance, therefore, will no longer be effective for mechanical plants 17 years (October 31, 2034) following the date of the EPA approval and after July 1, 2027 for lagoons. Montana can seek the EPA approval of a new or revised general variance in accordance with Section 303(c) of the CWA, to the extent that Montana wishes to continue to have the general variance in place when the general variance that the EPA is approving today is no longer effective. Any future general variance must meet the requirements of 40 CFR § 131.14. MDEQ's rule language satisfies the EPA requirements in 40 CFR § 131.14(b)(1)(iv).

ii. Term is only as long as necessary based on appropriate documentation

Mechanical Plants

DEQ-12B Section 2.1, page 3, specifies that: "Through the MPDES permitting process for each facility, the Department shall establish the time necessary to meet the treatment requirements in Table 12B-1. The time for the general variance must only be as long as necessary to meet the treatment requirements in Table 12B-1, but could take up to 17 years from the date of approval of the general variance in this circular."

MDEQ justifies establishing 17-years as the maximum term of the variance for mechanical plants that are receiving the categorical limit for TN, TP or both as described in Table 12B-1 based on the time needed to implement the nine steps described in Table 12B-2. MDEQ's nine-step process focuses the first two years on facilities implementing "...advanced operational strategies to reduce nutrients using existing infrastructure. Evaluate effects of operational changes and fine tune, as necessary. Operations staff identify potential minor capital improvements, if any, that could be made to further advanced operational strategies. Preliminarily assess the feasibility of trading, reuse, etc."[124]

If, after these preliminary steps are taken and the Table 12-1 treatment requirements are not achieved, the next 9 years include steps to:[125]

> (1) "...hire an engineer to prepare a preliminary engineering report (PER) that evaluates options for minor and/or major facility improvements, trading or reuse that lead to further nutrient reductions that build upon developed operational strategies, if appropriate. Continue to fine-tune operational strategies. Begin discussion with funding agencies and submit PERs to those agencies, if necessary (for major upgrades)." [1 year]
>
> (2) "Go through funding agency timelines and requirements for planning, if necessary. This may involve legislative approval, depending upon the funding sought. Implement minor facility improvements, if appropriate, and fine tune operations for further TN and TP reductions." [2 years]

[124] DEQ-12B. Table 12B-2. Page 4.

[125] *Ibid.*

(3) "Design major capital improvements. Go through Department (DEQ) and other funding agency review and approval processes for the design/bidding phase, including MEPA analysis, adjustments of rates and charges, legal opinions, etc. Bid major capital project." [2 years]. And, finally

(4) "Construct major capital project, including trading and/or reuse, if appropriate. Begin operating new infrastructure and fine tuning operations. Continue with advanced operational training with new infrastructure. Evaluate nutrient reductions achieved with major capital project and operator optimization." [4 years].

If Table 12B-1 requirements are still not achieved, the next 6 years are dedicated to:[126]

(1) "...hire engineer to evaluate alternatives in a PER for next steps to meet Table 12B-1 treatment requirements for TN and TP." [1 year].

(2) "Submit PER to funding agencies for review, approval, MEPA, etc. Legislative approval required? Obtain funding." [2 years]

(3) "Design and bid capital project to meet Table 12B-1 treatment requirements for TN and TP." [1 year]

(4) "Construct capital upgrades, including trading, reuse, etc., if appropriate. Continue with operational optimization to meet Table 12B-1 treatment requirements." [2 years].

DEQ-12B Section 2.1, page 3, also states: "If a facility were to achieve the Table 12B-1 treatment requirements using a subset of the steps in Table 12B-2, the Department would expect the discharger to need less time to complete that subset of steps. The purpose of Table 12B-2 is to provide an outline of potential steps needed to achieve the Table 12B-1 treatment requirements. The actual time period for individual steps may vary between each facility; however the total time necessary to meet the treatment requirements in Table 12B-1 may not exceed the remaining variance period." MDEQ's further elaborates on considerations for defining "as long as necessary" in its First Triennial Review guidance:[127]

"Generally, if fewer than all the steps in Table 7-1[128] are required, less time is necessary to achieve the general variance treatment requirements. For example, if a community has already constructed some version of a BNR facility, but is still above the HAC, perhaps only two years are needed to see what improvements in effluent quality can be made with advanced operations. If that proves unsuccessful in meeting the HAC, another 3 to 5 years might be necessary for planning, funding, design and construction of a polishing facility to meet the HAC."

Lagoons

Lagoons are required to maintain their long-term average and implement the PMP specified at DEQ-12B

[126] *Ibid.*
[127] First Triennial Review. Page 21.
[128] Table 7-1 is identical to Table 12B-2 in DEQ-12B and is included in MDEQ's First Triennial Review document to remind dischargers of the potential steps described in DEQ-12B.

Sections 2.2.1 and 2.2.1.2 by July 1, 2027. During that timeframe, MDEQ and the permittees are committed to the following timeframes:

- "Implementing pilot studies before the 2020 triennial review to examine the use of novel, low-maintenance technologies to reduce nutrient concentrations in lagoon system effluent. Based on final results from these studies, the Department shall publish results demonstrating the efficiency of the tested technologies in reducing nutrients in lagoon systems." (2020)
- "Conducting and completing a statewide review of lagoon performance by 2022 to evaluate effective operational methods and identify those lagoons that require additional improvements. For each facility, within 1 year of completing the review of operational methods, the Department shall begin requiring implementation of the improvements at those facilities that do not require substantial investment or additional study." (2022+)
- "Evaluating the facility-specific recommendations and documentation submitted by each lagoon permittee as part of its optimization activities. The Department and the permittee shall also evaluate the capability of each discharger to implement feasible nutrient reduction strategies." (Ongoing)

<u>EPA Basis for Approval</u>

As discussed in the EPA's preamble to the final rule, 40 CFR § 131.14 "...establishes an explicit regulatory framework for the adoption of WQS variances that states and authorized tribes can use to implement adaptive management approaches to improve water quality." 80 Fed. Reg. at 51035. MDEQ's nine-step process provides an adaptive management approach for mechanical plants that are receiving the categorical limit for TN, TP or both as discussed in Table 4 of this document. The EPA has reviewed the proposed nine steps and determined that it is reasonable to believe that 17 years is needed to implement all nine steps consistent with 40 CFR § 131.14(b)(2)(ii). Finally, the EPA recognizes that MDEQ has established an adaptive management approach and that it is clear that additional steps and time are not needed if the earlier steps result in achieving the Table 12B-1 treatment requirements. Where this is the case, NPDES permits implementing the WQS variance will only reflect the time necessary to meet the HAC (*i.e.*, the interim effluent condition values) and will not be longer than 17 years from the date of the EPA approval of this general variance.

For facilities that do not need to implement the nine-step process outlined in Table 12B-2 (*i.e.*, where the HAC is based on Option 2, actual effluent condition value for one or both pollutants and implementation of the PMP at DEQ-12B Sections 2.2.1 and 2.2.1.1, as described in Table 4), MDEQ's rule language requires that the term of the variance be "only as long as necessary" to implement those steps related to meeting the HAC. The EPA expects that these facilities will not need to implement the nine-step process described in Table 12B-2. Instead, as specified in DEQ-12B, the EPA anticipates that the term of the variance will reflect the timeframe necessary to implement the PMP activities identified for these facilities with a maximum term of up to 17 years from the date of EPA approval of this general variance. The EPA finds this approach reasonable and consistent with 40 CFR § 131.14(b)(2)(ii)).

For lagoons, the EPA considered MDEQ's rationale that ten years would be needed to implement the State-led PMP activities as well as PMP requirements for the permittee. Because there are no feasible pollutant control technologies that can be identified for lagoons, the EPA recognizes that it will take time for MDEQ to implement the pilot projects designed to evaluate innovative methods for reducing nutrient loads at lagoons and to analyze and summarize the results. Concurrently, MDEQ plans to review lagoon performance on a statewide scale and implement operational changes, as feasible at specific lagoons, to improve lagoon performance. MDEQ estimates a total of ten years is required to complete the various steps in the lagoon PMP -- three years to implement the pilot studies; another two years to complete the statewide review of lagoon performance; and an additional five years to implement those performance measures at individual lagoons. DEQ-12B Section 2.2.1.2, page 6, specifies that, as a result of these studies and evaluations, "Feasible activities will, as provided in subchapter 13, be incorporated into each discharger's PMP through the renewal process for each facility's MPDES permit." These activities and associated milestones in combination with PMP requirements for the individual lagoon permittees demonstrate that a ten-year term for the lagoon variance is reasonable and consistent with 40 CFR § 131.14(b)(2)(ii).

F. The EPA's reevaluation requirements at 40 CFR §§ 131.14(b)(1)(iii), (v), and (vi).

For variances where the term is longer than five years, the EPA regulations describe the specific reevaluation requirements that must be met.

- 40 CFR § 131.14(b)(1)(v) requires that variances "with a term greater than five years, [must include] a specified frequency to reevaluate the highest attainable condition using all existing and readily available information and a provision specifying how the State intends to obtain public input on the reevaluation. Such reevaluations must occur no less frequently than every five years after EPA approval of the WQS variance and the results of such reevaluation must be submitted to EPA within 30 days of completion of the reevaluation."
- 40 CFR § 131.14(b)(1)(iii) requires that variances must include: "A statement providing that the requirements of the WQS variance are either the highest attainable condition identified at the time of the adoption of the WQS variance, or the highest attainable condition later identified during any reevaluation consistent with paragraph (b)(1)(v) of this section, whichever is more stringent." And,
- 40 CFR § 131.14(b)(1)(vi) requires that a variance must include a provision that the WQS variance will no longer be the applicable WQS for purposes of the CWA if the State does not conduct a reevaluation consistent with the frequency specified in the variance or the results are not submitted to the EPA as required by 40 CFR § 131.14(b)(1)(v).

DEQ-12B Section 2.0, pages 2-3, specifies MDEQ's reevaluation requirements, consistent with the above regulatory provisions:

> "For permittees who are doing better than Table 12B-1 after July 1, 2017, Table 12B-1 will be used unless and until the Department revises Table 12B-1 to reflect a HAC requirement that results from the triennial review.
>
> Sections 75-5-313(7) and (8), MCA, require the Department to review the general variance treatment requirements every three years to assure that the justification for their adoption remains valid. The purpose of the review is to determine whether there is new information that supports modifying (e.g., revising the interim effluent treatment requirements) or terminating the variance. The review must occur triennially and must be carried out at a state-wide scale, i.e., the Department will consider the aggregate economic impact to dischargers within a category (the ≥1 MGD category, for example). The Department, in consultation with the Nutrient Work Group, must consider whether a pollutant control technology for treating nitrogen and phosphorus is (1) now feasible to attain (i.e., the cost of such pollutant control technology shall not cause substantial and widespread social and economic impacts) using all existing and readily

available information, and (2) would result in a more stringent treatment requirements than the requirements in Table 12B-1. The Department shall initiate rulemaking to adopt general variance treatment requirements that reflect any proposed changes to the HAC treatment requirements consistent with this review, and revised effluent limits must be included with the permit during the next permit cycle, unless the demonstrations discussed in Section 3.0 below are made. A compliance schedule may also be granted to provide time to achieve compliance with revised effluent limits.

Based on the triennial review, the Department shall issue a solicitation for public comment on the nutrient concentrations and conditions associated with the general variance. This solicitation must be conducted through: (1) a rulemaking if changes to the general variance are proposed; or (2) a request for public comment if no changes to the general variance are proposed. (If the Department fails to conduct the triennial review as specified at Section 75-5-313(8), MCA, or if the results of the triennial review are not submitted to EPA within 30 days of the completion of the review, the variance will not be applicable for purposes of the Federal Clean Water Act until such time as the review is completed and submitted to EPA.)"

MDEQ clarified the distinction between the triennial review and the reevaluation requirement in its Response to Comments, noting that "triennial review" refers to "the requirement in State statute (at 75-5-313(7)(a), MCA) to carry out a review of the variance treatment requirements every three years." (Response to Comment No. 15; Final MAR Notice Amended 6/23/17). This three-year review is part of Montana's reevaluation process that is required to comply with 40 CFR § 131.14(b)(1)(v). In addition, MDEQ further clarified the timeframe by which the State will complete the reevaluation and "adopt general variance treatment requirements that reflect any proposed changes to the HAC treatment requirements consistent with this reviews" as specified in Section 2.0 of DEQ-12B:

> "the department clarifies here that the triennial review, in the context of nutrient variances, refers to and is consistent with 40 CFR 131.14(b)(1)(v). <u>Regarding the specific steps in the time interval, the department will review the nutrient variance circular (DEQ-12B) within three years of EPA approval of the previous version, and complete any necessary rulemaking within one year of finishing its review</u>." (underline added; Response to Comment No. 15; Final MAR Notice 6/23/17 Amendment)

<u>EPA Basis for Approval</u>

MDEQ's requirement to examine the general variance treatment requirements every three years, request public comment on the general variance regardless of whether changes are proposed, initiate rulemaking if a revised HAC is identified, and the State's commitment to complete rulemaking one year after the triennial review is complete and submit the results of the reevaluation to the EPA, will occur every 4-5 years and thus "no less frequently than every five years after EPA approval of the WQS variance…" as required by 40 CFR § 131.14(b)(1)(v). In addition, DEQ-12B Section 2.0, page 3, commits the State to initiate rulemaking to "adopt general variance treatment requirements that reflect any proposed changes to the HAC treatment requirements consistent with this review" within 1 year of the triennial review. Therefore, any new HAC identified through the reevaluation will be available to be reflected during the next permit cycle. Thus, the State's reevaluation and subsequent rulemaking process is functionally equivalent to the EPA's requirement to include a self-implementing provision that the requirements of the WQS variance are either the highest attainable condition identified at the time of the adoption of the WQS variance or the highest attainable condition later identified during any reevaluation consistent with

40 CFR § 131.14 (b)(1)(v), whichever is more stringent. 80 Fed. Reg at 51037. The EPA included this requirement of a self-implementing provision in its final WQS regulation to provide flexibility for states and authorized tribes so that the states and authorized tribes would not have to initiate rulemaking each time to ensure that a new HAC becomes part of a variance. However, the State has chosen to commit itself to completing a rulemaking with the required public participation within 1 year to make any necessary changes to the HAC and still be within the federally required 5-year timeframe for conducting reevaluations.

MDEQ's rule language satisfies the requirements of 40 CFR § 131.14(b)(1)(vi) by explicitly stating, "If the Department fails to conduct the triennial review as specified at Section 75-5-313(8), MCA, or if the results of the triennial review are not submitted to EPA within 30 days of the completion of the review, the variance will not be applicable for purposes of the Federal Clean Water Act until such time as the review is completed and submitted to EPA."[129] Only variances that are applicable for CWA purposes can legally be incorporated into an NPDES permit. The EPA would have a basis to object to any permit that includes a variance not effective for CWA purposes.

Montana's general variance provides that the State will evaluate whether the general variance treatment requirements reflect the HAC not more than 5 years from the EPA approval, specifies how it intends to obtain public input on the reevaluation, includes a provision that the general variance will not be in effect for CWA purposes if the State does not submit to the EPA the results of the reevaluation within 30 days of review, and includes a process to implement more stringent HAC limits before the next permit cycle if the State finds through its reevaluation that more stringent HACs are attainable. For these reasons, Montana has met the requirements at 40 CFR § 131.14(b)(1)(iii) and 40 CFR § 131.14(b)(1)(v), and 40 CFR § 131.14(b)(1)(vi).

III. OTHER PROVISIONS

- DEQ-12B Section 1.1. includes a definition of "monthly average" that explains how monthly average nutrient concentrations are calculated to establish permit limits for nutrients. This section also defines pollutant minimization program.
- DEQ-12B Section 2.0 Table 12B-1 Endnote 5 defines the long-term average as "the arithmetic average of representative facility data from the past 3 years, or up to the past 5 years if those data are also representative."
- ARM 17.30.660(1-2), (8) updates the reference to Department Circular DEQ-12B from the July 2014 version to the June 2017 edition.

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

IV. PROVISIONS PERTAINING TO NPDES PERMITTING

DEQ-12B Section 2.0, page 1,establishes that the final permit limit for the general variance will be expressed as a load and that a default coefficient of variation (CV) of 0.6 may be used to determine the multiplier used when deriving the applicable permit limit. The selection of a CV of 0.6 is a CWA National Permit Discharge Elimination System (NPDES) program implementation detail and not a new

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[129] DEQ12-B Section 2.0.

or revised water quality standard that is subject to the EPA's review and action pursuant to CWA Section 303(c).[130]

[130] See EPA's October 2012 *What is a New or Revised Water Quality Standard Under CWA 303(c)(3)? – Frequently Asked Questions* available at: https://www.epa.gov/sites/production/files/2014-11/documents/cwa303faq.pdf.

APPENDIX A:
EPA's detailed HAC Analysis for the nine mechanical plants

As described on Section D, page 31, the EPA examined the following information for each discharger:

1) the HAC option that applies to that facility (i.e., Table 12B-1 or actual effluent concentrations and implementation of the PMP);
2) the facility's current effluent concentrations for TN and TP and currently installed treatment technology;
3) all the potentially feasible effluent concentrations for TN and TP that could result from installing different combinations of the identified pollutant control technologies;
4) the estimated cost (in terms of %MHI) to achieve the potentially feasible effluent concentrations using the identified pollutant control technologies;
5) which of the potentially feasible effluent concentrations are feasible by comparing their estimated costs with the sliding scale-derived cost threshold that would trigger substantial and widespread economic and social impacts; and
6) technological considerations associated with meeting lower TN effluent concentrations in colder climates and the technological challenges with treating to lower TP effluent concentrations.

≥1 MGD FACILITIES

- *Bozeman (Permit No. MT0022608):* Bozeman's current median effluent concentrations are 4400 µg/L TN and 170 µg/L TP.[131] Because the effluent concentrations for TN and TP are lower (i.e., better) than the Table 12B-1 values, DEQ-12B Table 12B-1 Endnote 3 establishes the quantitative portion of the HAC for both TN and TP parameters based on the monthly average of actual effluent concentrations. As shown in Table 3, page 32, Bozeman's current sewer rate is 0.8% MHI compared to the sliding scale-derived cost threshold of 1.7% MHI. MDEQ's HAC cost analysis demonstrates that the lowest concentrations of TN and TP that Bozeman can achieve without triggering the 1.7% MHI threshold that the State identified as an indicator of substantial and widespread economic and social impacts are 3,000 µg/L of TN and 100 µg/L of TP, respectively. Treating to 3000 µg/L TN and 50 µg/L TP would cost 2.46 % MHI, exceeding the sliding scale-derived cost threshold of 1.7% MHI. The EPA recognizes that Bozeman's actual effluent concentration for TN is 4,400 µg/L and therefore greater than 3,000 µg/L TN. The EPA has determined that Montana's decision to keep the City at 4,400 µg/L TN is reasonable because (1) the City is achieving 4400 µg/L TN by implementing its already installed biological nitrogen removal (BNR) technology (this is the technology generally associated with meeting 3000 µg/L levels)[132] and (2) Bozeman's actual TN effluent concentration reflects concentrations that the EPA considers as the lowest effluent concentration that can reliably be achieved for TN using BNR in the colder climates

[131] Email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15,2017. Powerpoint presentation on "recent effluent quality of facilities likely to need a variance." Mike Suplee, MDEQ, presentation to Montana nutrient workgroup on March 20, 2017. Slide 13.

[132] Bozeman 5-stage Bardenpho process plant went on-line in 2011. See details on the new facility at: http://www.pncwa.org/assets/2012Conf/Presentations/Session_1_Nutrient_Removal/revis_cold_weather_advanced_nutrient_removal.pdf.

of MT. See discussion on pages 16-19. The interim effluent condition value for TN will be based on the City's actual effluent concentrations and require implementation of a PMP for TN to further reduce TN levels below 4,400 μg/L via pollutant control activities. MDEQ's PMP requires permittees to continue to evaluate facility operations and implement process control strategies.[133]

As discussed above, Bozeman's current median effluent concentration of 170 μg/L TP reflects the lowest concentrations of TP that Bozeman can achieve without triggering the 1.7% sliding scale MHI threshold that the State identified as an indicator of substantial and widespread economic and social impacts. The City is using biological phosphorus removal to achieve their current TP effluent concentrations and achieving the lowest effluent concentration that can reliably be achieved for TP using biological phosphorus removal. See discussion on pages 16-19. The EPA recognizes that Bozeman's actual effluent concentration for TP is 170 μg/L TP and therefore greater than 100 μg/L TP. The EPA has determined that the facility's actual effluent concentration of 170 μg/L TP is reasonable because 1) as described on pages 16-19, there are only a few technologies that were able to reliably achieve a TP limit of 100 μg/L as a 95th percentile concentration; and 2) while it is possible to achieve a TP concentration of 100 μg/L, it requires significant amounts of process control, chemical addition, and results in increased sludge production. Bozeman's actual TP effluent concentration reflects concentrations that the EPA considers as the lowest effluent concentration that can reliably be achieved for TP. Thus, the facility's actual effluent concentrations for TN and TP reflect the greatest phosphorus and nitrogen reductions achievable with the currently installed technology. This along with implementation of the PMP represents an HAC for TN and TP at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(3).

- *Butte (Permit No. MT0022012)*: Butte's current median effluent concentrations are 2,400 μg/L TN and 2,100 μg/L TP.[134] Because the effluent concentrations for TN are lower (i.e., better) than the Table 12B-1 values, DEQ-12B Table 12B-1 Endnote 3 establishes the quantitative portion of the HAC for TN based on the monthly average of actual effluent concentrations. As shown in Table 3, page 32, Butte's current sewer rate is 0.91% MHI compared to the sliding scale-derived cost threshold of 1.1% MHI. MDEQ's HAC cost analysis indicates that achieving 3,000 μg/L TN and 100 μg/L TP will cost Butte an estimated 0.99% MHI, which represents the lowest concentrations of TN and TP that Butte can achieve without triggering the 1.1% MHI threshold that the State identified as an indicator of substantial and widespread economic and social impacts. Butte installed a new BNR facility plant in 2017 that is being implemented to achieve the 2,400 μg/L TN concentrations.[135] Therefore, for TN, Butte's actual effluent concentration for TN is the greatest pollutant reduction achievable because there is no additional feasible pollutant control technology to lower TN further. MDEQ's PMP requires permittees to continue to evaluate facility operations and implement process control strategies.[136] This, in combination

[133] Department Circular DEQ-12B. Nutrient Standards Variances. June 2017 Edition. Sections 2.2, 2.2.1, and 2.2.1.1.
[134] Email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15,2017. Powerpoint presentation on "recent effluent quality of facilities likely to need a variance." Mike Suplee, MDEQ, presentation to Montana nutrient workgroup on March 20, 2017. Slide 13.
[135] Butte installed a Membrane Batch Reactor (MBR) plant in 2017.
[136] Department Circular DEQ-12B. Nutrient Standards Variances. June 2017 Edition. Sections 2.2, 2.2.1, and 2.2.1.1.

with the requirement to implement the PMP to control TN, reflects an HAC for TN at this facility that meets of 40 CFR § 131.14(b)(1)(ii)(A)(3).

For TP, the facility's effluent quality is above the categorical interim effluent limit of 300 µg/L and there are additional feasible pollutant control technologies for TP. While the EPA's analysis indicates that Butte could treat to 100 µg/l TP without triggering the 1.1% MHI threshold that indicates substantial and widespread economic and social impacts, Butte is just starting to use chemical precipitation to treat for TP,[137] which is generally understood to be able to achieve 100 µg/L- 300 µg/L TP. The EPA's examination of current pollutant control technologies suggests that TP levels of 100 µg/L – 300 µg/L reflect the range associated with the lowest effluent concentrations that can be reliably achieved. See discussion on pages 16-19. Thus, the categorical interim effluent condition of 300 µg/L TP established in Table 12B-1 represents the HAC for TP for Butte. Therefore, it is reasonable to conclude that the categorical interim effluent condition of 300 µg/L TP established in Table 12B-1 represents an HAC for TP at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(2).

- *Helena (Permit No. MT0022641):* Helena is a BNR plant whose current median effluent concentrations are 5,600 µg/L TN and 2,360 µg/L TP.[138] Because the effluent concentrations for TN are lower (i.e., better) than the Table 12B-1 values, DEQ-12B Table 12B-1 Endnote 3 establishes the quantitative portion of the HAC for TN based on the monthly average of actual effluent TN concentration. As shown in Table 3, page 32, Helena's current sewer rate is 0.66% MHI compared to the sliding scale-derived cost threshold of 1.7% MHI. MDEQ's HAC cost analysis indicates that achieving 3,000 µg/L TN and 100 µg/L TP will cost the City of Helena an estimated 1.32% MHI. In comparison, treating to 3,000 µg/L TN and 50 µg/L TP would cost 2.14 % MHI, exceeding the sliding scale-derived cost threshold of 1.7% MHI. The interim effluent condition value for TN will be based on Helena's actual effluent concentrations and require implementation of a PMP for TN to further reduce TN levels based on pollutant control activities. MDEQ's PMP requires permittees to continue to evaluate facility operations and implement process control strategies.[139] Preliminary optimization efforts initiated at the Helena plant have demonstrated TN reductions from current TN concentrations[140] and additional optimization efforts are likely to achieve lower TN limits.

  The effluent concentration for TP is above the categorical interim effluent limit of 300 µg/L and there are additional feasible pollutant control technologies for TP. Helena is currently relying on biological phosphorus removal methods to reduce their TP concentrations. As discussed on page 19, the EPA considers 100 to 300 µg/L TP to represent the range of TP concentrations that can reliably be achieved by the best performing BNR/chemical precipitation wastewater treatment technologies. Thus, the categorical interim effluent condition of 300 µg/L TP established in Table 12B-1 represents the HAC for TP. Therefore,

[137] Personal Communication between Tina Laidlaw, EPA Region 8, and Paul LaVigne, MDEQ on October 16, 2017.
[138] Email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15,2017. Powerpoint presentation on "recent effluent quality of facilities likely to need a variance." Mike Suplee, MDEQ, presentation to Montana nutrient workgroup on March 20, 2017. Slide 13.
[139] Department Circular DEQ-12B. Nutrient Standards Variances. June 2017 Edition. Sections 2.2, 2.2.1, and 2.2.1.1.
[140] Personal Communication between Tina Laidlaw and Paul LaVigne on 10/26/2017.

it is reasonable to conclude that the categorical interim effluent condition of 300 µg/L TP represent an HAC for TP at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(2).

- *Kalispell (Permit No. MT0021938):* Kalispell's current median effluent concentrations are 8,400 µg/L TN and 150 µg/L TP.[141] Kalispell currently operates a Johannesburg BNR process with enhanced biological phosphorus removal with tertiary filtration. For TN, effluent quality is above the categorical interim effluent limit of 6,000 ug/L TN established in Table 12B-1. As shown in Table 3, page 32, Kalispell's current sewer rate is 1.08% MHI compared to the sliding scale-derived cost threshold of 1.3% MHI. MDEQ's HAC cost analysis indicates that all of the potentially feasible effluent concentrations for TN and TP would trigger the 1.3% MHI threshold that that the State identified as an indicator of substantial and widespread economic and social impacts. Therefore, it is reasonable to conclude that the categorical interim effluent condition of 6,000 µg/L TN represent an HAC for TN at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(2).

  Because the effluent concentrations for TP are lower (i.e., better) than the Table 12B-1 values, DEQ-12B Table 12B-1 Endnote 3 establishes the quantitative portion of the HAC for TP based on the actual effluent TP concentration. For biological phosphorus removal, Kalispell has been used as a national demonstration of using biological treatment methods to achieve low TP concentrations using enhanced biological phosphorus removal along with tertiary filtration.[142] As discussed above, the State was reasonable to identify Kalispell's actual TP effluent concentration as the HAC that reflects the greatest phosphorus reductions achievable with the currently installed technology because MDEQ's HAC cost analysis indicates that all of the potentially feasible effluent concentrations for TN and TP would trigger the 1.3% MHI threshold that that the State identified as an indicator of substantial and widespread economic and social impacts. Thus, this in combination with the requirement to implement the PMP to control TP reflect an HAC for TP at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(3).

- *Whitefish (Permit No. MT0020184):*[143] Whitefish currently operates an aerated lagoon[144] with additional chemical TP removal that achieves median effluent concentrations of 24,200 ug/L TN and 470 µg/L TP. For TN and TP, effluent quality is above the categorical interim effluent limits established in Table 12B-1. As shown in Table 3, page 32, Whitefish's current sewer rate is 1.79% MHI compared to the sliding scale-derived cost threshold of 1.3% MHI. For TN and TP, there are no additional feasible pollutant control technologies that can be identified because the community of Whitefish is already well above the 1.3% MHI threshold that that the State identified as an indicator of substantial and widespread economic and social impacts. Therefore, it is reasonable to conclude that the categorical interim effluent

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[141] Email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15,2017. Powerpoint presentation on "recent effluent quality of facilities likely to need a variance." Mike Suplee, MDEQ, presentation to Montana nutrient workgroup on March 20, 2017. Slide 13.

[142] EPA. 2008. Municipal Nutrient Removal Technologies Reference Document. Volume I- Technical Report and Volume 2- Appendices. Pages 303-320.

[143] It is the EPA's understanding at the time of this action that the City of Whitefish has requested an individual variance. Once approved, the individual variance and not the general variance would apply for Whitefish.

[144] MCA 75-5-313(5)(b)(iii) establishes that facilities that qualify for the lagoon category are only those "lagoons that were not designed to actively remove nutrients". Because Whitefish is a lagoon with the ability to remove nutrients, MDEQ considers Whitefish as part of the ≥1 MGD category.

conditions of 6,000 µg/L TN and 300 µg/L TP represent an HAC for TN and TP at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(2).

<1 MGD FACILITIES

- *Conrad (Permit No. MT0020079):* Conrad is an activated sludge plant with ultraviolet disinfection that achieves median effluent concentrations of 7,000 µg/L TN and 150 µg/L TP.[145] Because the effluent concentrations for TN and TP are lower (i.e., better) than the Table 12B-1 values, the quantitative portion of the HAC for both TN and TP parameters would be established based on the monthly average of actual effluent concentrations. As shown in Table 3, page 32, Conrad's current sewer rate is 1.25% MHI compared to the sliding scale-derived cost threshold of 1.3% MHI. All treatment options that would result in effluent concentrations below current concentrations are above the sliding scale-derived cost threshold of 1.3% MHI. Thus, the facility's actual effluent concentrations for TN and TP with the currently installed technology reflect the greatest TN and TP reductions achievable. This along with implementation of the PMP represents an HAC for TN and TP at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(3).

- *East Helena (Permit No. MT0022560)*: East Helena is an activated sludge plant with current median effluent concentrations of 10,600 µg/L TN and 530 µg/L TP.[146] For TN, effluent quality is above the categorical interim effluent limits established in Table 12B-1. As shown in Table 3, page 32, East Helena's current sewer rate is 1.78% MHI compared to the sliding scale-derived cost threshold of 1.3% MHI. Because East Helena's current sewer rate of 1.78% MHI is already above the sliding scale-derived cost threshold of 1.3% MHI, there are no additional feasible pollutant control technologies available to control TN. Thus, it is reasonable for the State to determine that the categorical interim effluent condition of 10,000 µg/L TN represents an HAC for TN at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(2).

  The effluent concentration for TP is lower (i.e., better) than the Table 12B-1 values; therefore, DEQ-12B Table 12B-1 Endnote 3 establishes the quantitative portion of the HAC for TP based on the monthly average of the actual effluent concentration. As shown in Table 3, page 32, East Helena's current sewer rate is 1.78% MHI compared to the sliding scale-derived cost threshold of 1.3% MHI. Because East Helena's current sewer rate of 1.78% MHI is already above the sliding scale-derived cost threshold of 1.3% MHI, there are no additional feasible pollutant control technologies available to control TP. Thus the State was reasonable to identify East Helena's actual TP effluent concentration as the HAC that reflects the greatest phosphorus reductions achievable with the currently installed technology. This along with implementation of the PMP represents an HAC at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(3).

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[145] Email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15,2017. Powerpoint presentation on "recent effluent quality of facilities likely to need a variance." Mike Suplee, MDEQ, presentation to Montana nutrient workgroup on March 20, 2017. Slide 13.
[146] *Ibid.*

- *Manhattan (Permit No. MT0021857):* Manhattan's current median effluent concentrations are 12,150 µg/L TN and 600 µg/L TP.[147] Manhattan currently operates a fixed film system with nitrification/ denitrification, aerobic sludge digestion and ultraviolet disinfection. Effluent concentrations for both TN and TP are lower (*i.e.*, better) than the Table 12B-1 values; therefore, DEQ-12B Table 12B-1 Endnote 3 establishes the quantitative portion of the HAC for TN and TP based on the monthly average of the actual effluent concentrations. As shown in Table 3, page 32, Manhattan's current sewer rate is 1.81% MHI compared to the sliding scale-derived cost threshold of 2.1% MHI. MDEQ's HAC cost analysis indicates that the least expensive treatment option would cost 4.62 % MHI, exceeding the sliding scale-derived cost threshold of 2.1% MHI. For TN and TP, there is no additional pollutant control technology because there are no technologies that can be identified without triggering the 2.1% MHI threshold that that the State identified as an indicator of substantial and widespread economic and social impacts. Thus, the State was reasonable to identify Manhattan's actual TN and TP effluent concentrations as the HAC that reflects the greatest phosphorus reductions achievable with the currently installed technology. This along with implementation of the PMP represents an HAC at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(3).

- *Stevensville (Permit No. MT0022713)*: Stevensville operates an oxidation ditch activated sludge mechanical plant with ultraviolet disinfection. The town's current median effluent concentrations are 14,800 µg/L TN and 2,840 µg/L TP.[148] For TN and TP, effluent quality is above the categorical interim effluent limits established in Table 12B-1. As shown in Table 3, page 32, Stevensville's current sewer rate is 1.30% MHI compared to the sliding scale-derived cost threshold of 1.1% MHI. For TN and TP, there is no additional pollutant control technology because there are no technologies that can be identified without triggering the 1.1% MHI threshold that that the State identified as an indicator of substantial and widespread economic and social impacts. Therefore, it is reasonable to conclude that the categorical interim effluent condition of 10,000 µg/L TN and 1,000 µg/L TP represent an HAC for TN and TP at this facility that meets 40 CFR § 131.14(b)(1)(ii)(A)(2).

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[147] Email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15,2017. Powerpoint presentation on "recent effluent quality of facilities likely to need a variance." Mike Suplee, MDEQ, presentation to Montana nutrient workgroup on March 20, 2017. Slide 13. To verify Manhattan's TP effluent concentrations, the EPA downloaded data from ICIS and calculated the median TP concentrations. The EPA compared the results of its analysis to median effluent concentration data that Mike Suplee, MDEQ, provided to Tina Laidlaw, EPA, on 10/16/17 based on data the State downloaded from ECHO.

[148] Email from Mike Suplee, MDEQ, to Tina Laidlaw, EPA. March 15,2017. Powerpoint presentation on "recent effluent quality of facilities likely to need a variance." Mike Suplee, MDEQ, presentation to Montana nutrient workgroup on March 20, 2017. Slide 13.