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Montana Department of
ENVIRONMENTAL QUALITY

DEPARTMENT CIRCULAR

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DEQ-12, PARTS A and B

Montana Base Numeric Nutrient Standards and Nutrient Standards Variances

GENERAL INTRODUCTION

This circular contains information pertaining to the base numeric nutrients standards (§75-5-103[2], MCA) and their implementation. It is divided into **Parts A** and **B**. **Part A** contains the water quality standards including concentration limits, where they apply, and their period of application. **Part A** is adopted by the Board of Environmental Review under its rulemaking authority in §75-5-301(2), MCA.

Part B contains information about variances from the base numeric nutrient standards. This includes effluent treatment requirements associated with general nutrient standards variances, as well as effluent treatment requirements for individual nutrient standards variances and to whom these apply. **Part B** also contains the Department's definition of the total nitrogen (TN) and total phosphorus (TP) concentrations achievable at the limits of technology. Unlike **Part A**, **Part B** is not adopted by the Board of Environmental Review; **Part B** is adopted by the Department following its formal rule making process, pursuant to §75-5-313, MCA.

The Department has reviewed a considerable amount of scientific literature and has carried out scientific research on its own in order to derive the base numeric nutrient standards (see **References** in **Part A**). Because many of the base numeric nutrient standards are stringent and may be difficult for MPDES permit holders to meet in the short term, Montana's legislature adopted laws (e.g., §75-5-313, MCA) allowing for the achievement of the standards over time via the variance procedures in **Part B**. This approach should allow time for nitrogen and phosphorus removal technologies to improve and become less costly, and to allow time for nonpoint sources of nitrogen and phosphorus pollution to be better addressed.

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Circular DEQ-12, PART A

FEBRUARY 2013 EDITION

1.0 Introduction

Elements comprising Circular DEQ-12, **Part A** are found below. These elements are adopted by the Montana Board of Environmental Review. The nitrogen and phosphorus concentrations provided here have been set at levels that will protect beneficial uses, and prevent exceedences of other surface water quality standards which are commonly linked to nitrogen and phosphorus concentrations (e.g., pH and dissolved oxygen; see Circular DEQ-7 for these standards). The nitrogen and phosphorus concentrations also reflect the intent of the narrative standard at ARM 17.30.637(1)(e), and will preclude the need for case-by-case interpretations of that standard.

1.1 Definitions

1. **Ecoregion** means mapped regions of relative homogeneity in ecological systems, derived from perceived patterns of a combination of causal and integrative factors including land use, land surface form, potential natural vegetation, soils, and geology. See also, endnote 1.

2. **Large river** means a perennial waterbody which has, during summer and fall baseflow (August 1 to October 31 each year), a wadeability index (product of river depth [in feet] and mean velocity [in ft/sec]) of 7.24 ft^2/sec or greater, a depth of 3.15 ft or greater, or a baseflow annual discharge of 1,500 ft^3/sec or greater. See also, endnote 5.

3. **Soluble reactive phosphorus** means dissolved orthophosphate, as P, determined by direct colorimetry from a filtered sample. The pore size of the filter used must be 0.45 µm. The RRV for soluble reactive phosphorus is 3 micrograms per liter.

4. **Total nitrogen** means the sum of all nitrate, nitrite, ammonia, and organic nitrogen, as N, in an unfiltered water sample. Total nitrogen in a sample may also be determined via persulfate digestion, or as the sum of total kjeldahl nitrogen plus nitrate plus nitrite.

5. **Total phosphorus** means the sum of orthophosphates, polyphosphates, and organically bound phosphates, as P, in an unfiltered water sample. Total phosphorus may also be determined directly by persulfate digestion.

6. **Wadeable stream** means a perennial or intermittent stream in which most of the wetted channel is safely wadeable by a person during baseflow conditions.

2.0 Base Numeric Nutrient Standards

Table 12A-1 below shows the base numeric nutrient standards for Montana's wadeable streams and large rivers. Details on how these standards were derived can be found mainly in Suplee et al. (2008), Suplee and Watson (2012), and Flynn and Suplee (2011). In **Table 12A-1** nutrient standards for wadeable streams are sub-grouped by ecoregion, either at level III (coarse scale) or level IV (fine scale). Following the ecoregional standards is a list of wadeable streams with reach-specific standards; these waterbodies have characteristics disimilar from those of the ecoregions in which they reside and have therefore been provided reach-specific values. **For wadeable streams, the standards should be applied in this order: reach specific (if applicable) then level IV ecoregion (if applicable) then level III ecoregion. Table 12A-1** also contains a list of large river segments for which base numeric nutrient standards have been developed.

Table 12A-2 contains base numeric nutrient standards for Montana's lakes and reservoirs. The Department has not yet developed regional lake criteria but it is expected that when they are developed they will be sub-grouped by ecoregion. As such, placeholders for future ecoregionally-based criteria are provided in the table. The table also provides lake-specific standards. The Department anticipates that reservoir standards will generally be developed case-by-case and, therefore, will be individually listed, as provided for in the table.

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Table 12A-1. Base Numeric Nutrient Standards for Wadeable Streams in Different Montana Ecoregions, and Base Numeric Nutrient Standards for Individual Wadeable-stream and Large-river Reaches. Related assessment information is also shown.

		Numeric Nutrient Standard[4]		
Ecoregion[1,2] (level III or IV) and Number, or Individual Reach Description	**Period When Criteria Apply[3]**	**Total Phosphorus (µg/L)**	**Total Nitrogen (µg/L)**	**Related Assessment Information[5]**
ECOREGION (level III or IV):				
Northern Rockies (15)	July 1 to September 30	30	300	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Canadian Rockies (41)	July 1 to September 30	25	350	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Idaho Batholith (16)	July 1 to September 30	30	300	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Middle Rockies (17)	July 1 to September 30	30	300	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Absaroka-Gallatin Volcanic Mountains (17i)	July 1 to September 30	105	250	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Northwestern Glaciated Plains (42)	June 16 to September 30	110	1400	
Sweetgrass Upland (42l), Milk River Pothole Upland (42n), Rocky Mountain Front Foothill Potholes (42q), and Foothill Grassland (42r)	July 1 to September 30	80	560	165 mg Chl*a* /m^2 and 70 g AFDM/m^2
Northwestern Great Plains (43) and Wyoming Basin (18)	July 1 to September 30	140	1400	
River Breaks (43c)	NONE RECOMMENDED	NONE RECOMMENDED	NONE RECOMMENDED	
*Non-calcareous Foothill Grassland (43s), Shields-Smith Valleys (43t), Limy Foothill Grassland (43u), Pryor-Bighorn Foothills (43v), and Unglaciated Montana High Plains (43o)**	July 1 to September 30	33	440	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
INDIVIDUAL REACHES (Wadeable Streams):				
Flint Creek, from Georgetown Lake outlet to the ecoregion 17ak boundary (46.4002, -113.3055)	July 1 to September 30	72	500	150 mg Chl*a* /m^2 and 45 g AFDM/m^2
Bozeman Creek, from headwaters to Forest Service Boundary (45.5833, -111.0184)	July 1 to September 30	105	250	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Bozeman Creek, from Forest Service Boundary (45.5833, -111.0184) to mouth at East Gallatin River	July 1 to September 30	76	270	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Hyalite Creek, from headwaters to Forest Service Boundary (45.5833,-111.0835)	July 1 to September 30	105	250	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Hyalalite Creek, from Forest Service Boundary (45.5833,-111.0835) to mouth at East Gallatin River	July 1 to September 30	90	260	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
East Gallatin River between Bozeman Creek and Bridger Creek confluences	July 1 to September 30	50	290	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
East Gallatin River between Bridger Creek and Hyalite Creek confluences	July 1 to September 30	30	300	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
East Gallatin River from Hyalite Creek confluence to the mouth (Gallatin River)	July 1 to September 30	60	290	125 mg Chl*a* /m^2 and 35 g AFDM/m^2
Clark Fork River[6] from below the Warm Springs Creek confluence (46.1881, -112.7680) to the Bitterroot River confluence	July 1 to September 30	20	300	See endnote 7
INDIVIDUAL REACHES (Large Rivers[6]):				
Clark Fork River[6] from the Bitterroot River confluence to the Flathead River confluence	July 1 to September 30	24	300	See endnote 7
Yellowstone River (Bighorn River confluence to Powder River confluence)	August 1 -October 31	100	750	
Yellowstone River (Powder River confluence to stateline)	August 1 -October 31	150	1150	150 mg Chl*a* /m^2

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

[1] See endnote 1
[2] See endnote 2
[3] See endnote 3
[4] See endnote 4
[5] See endnote 5
[6] See endnote 6
[7] See endnote 7

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Table 12A-2. Base Numeric Nutrient Standards, Other Standards, and Related Assessment Information for Lakes and Reservoirs.

		Numeric Nutrient Standard[8]			
Ecoregion[1] (level III or IV) and Number, or Individual Lake or Reservoir Description	**Period of Application**	**Total P (µg/L)**	**Total N (µg/L)**	**Other Standards[9]**	**Related Assessment Information[5]**
LAKES/RESERVOIRS by ecoregion:					
Middle Rockies (17)	Year-round	[]	[]		
Northern Rockies (15)	Year-round	[]	[]		
Canadian Rockies (41)	Year-round	[]	[]		
Idaho Batholith (16)	Year-round	[]	[]		
LAKE SPECIFIC CRITERIA:					
Flathead Lake[10]	Year-round	5.0	95	Secchi depth ≥ 10.4 m during non turbidity-plume conditions. Phytoplankton chlorophyll *a* 1.0 µg/L, expressed as an annual average.	The following parameters expressed as annual averages: soluble reactive phosphorus (SRP), 0.5 µg/L; nitrate + nitrite (NO_{2+3}), 30 µg/L.
RESERVOIR SPECIFIC CRITERIA:					
	Year-round	[]	[]		

[1] See endnote 1 [10] See endnote 10
[5] See endnote 5
[8] See endnote 8
[9] See endnote 9

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2.1 Required Reporting Values for Base Numeric Nutrient Standards

Table 12A-3 presents the required reporting values for total phosphorus and total nitrogen, as well as the RRVs for nitrogen fractions that can be used to compute total nitrogen.

Table 12A-3. Required reporting values[a,b] for total nitrogen and phosphorus measurements.

Nutrient		Method of Measurement	Required Reporting Value
Total phosphorus		Persulfate digestion	3 µg/L
Total nitrogen		Persulfate digestion	70 µg/L
Total nitrogen	Sum of:	(a) total kjeldahl nitrogen	150 µg/L
		(b) nitrate + nitrite	See RRVs below
Nitrate- as N			20 µg/L
Nitrite- as N			10 µg/L
Nitrate + Nitrite-as N			20 µg/L

[a] See definition for required reporting values found in footnote 19 of Department Circular DEQ-7.
[b] Concentrations in Table 12A-3 must be achieved unless otherwise specified in a permit, approval, or authorization issued by the Department (DEQ-7; ARM 17.30.702).

2.2 Developing Permit Limits for Base Numeric Nutrient Standards

For total nitrogen and total phosphorus, the critical low-flow for the design of disposal systems shall be based on the seasonal 14Q5 of the receiving water (ARM 17.30.635[4]). When developing permit limits for base numeric nutrient standards, the Department will use an average monthly limit (AML) only, using methods appropriate for criterion continuous concentrations (i.e., chronic concentrations). Permit limits will be established using a value corresponding to the 95th percentile probability distribution of the effluent. Nitrogen and phosphorus concentrations of the receiving waterbody upstream of the discharge may be characterized using other frequency distribution percentiles. The Department shall use methods that are appropriate for criterion continuous concentrations which are found in the document "*Technical Support Document for Water Quality-based Toxics Control*", Document No. EPA/505/2-90-001, United States Environmental Protection Agency, 1991.

3.0 Endnotes

(1) Ecoregions are based on the 2009 version (version 2) of the U.S. Environmental Protection Agency maps. These can be found at: http://www.epa.gov/wed/pages/ecoregions/mt_eco.htm . For Geographic Information System (GIS) use within the Department, the GIS layers may be found at: L:\DEQ\Layers\Ecoregions.lyr

(2) Within and among the geographic regions or watersheds listed, base numeric nutrient standards of the downstream reaches or other downstream waterbodies must continue to be maintained.

(3) For the purposes of ambient surface water monitoring and assessment only, a ten day window (plus/minus) on the beginning and ending date of the period when the criteria apply is allowed in order to accommodate year-specific conditions (an early-ending spring runoff, for example).

(4) The 30 day average concentration of these parameters may not be exceeded more than once in any five year period, on average.

(5) Related assessment information comprises water quality variables besides total nutrients that are important for assessing eutrophication in waterbodies. In **Table 12A-1**, the values shown refer to bottom-attached (benthic) algae density quantified as chlorophyll *a* (Chl*a*) or ash free dry mass (AFDM) per square meter of stream bottom. The values are the arithmetic mean of ≥10 replicate measures of benthic algae collected in the wadeable zone (water depths ≤ 1m) from a site during a sampling event. A site is a reach of a stream ≥100 m long but <500 m long or, for some larger streams reaches and for large rivers, may be a transect perpendicular to flow. Algae replicates must be collected in the wadeable zone of streams and rivers using a randomized approach or other, unbiased systematic approaches. Chl*a* and AFDM are used to assess the biomass of algae accumulated on the stream bottom; algae is stimulated by excess nitrogen and phosphorus levels and is associated with (for example) impacts to recreational uses and impacts to stream dissolved oxygen levels.

(6) **Table E-1** below shows the beginning and ending locations for large rivers in Montana.

Table E-1. Large river segments within the state of Montana.

River Name	Segment Description
Big Horn River	Yellowtail Dam to mouth
Clark Fork River	Bitterroot River to state-line
Flathead River	Origin to mouth
Kootenai River	Libby Dam to state-line
Madison River	Ennis Lake to mouth
Missouri River	Origin to state-line
South Fork Flathead River	Hungry Horse Dam to mouth
Yellowstone River	State-line to state-line

(7) Benthic algal chlorophyll *a* levels were first adopted as water quality standards for these reaches of the Clark Fork River in 2002 (see MAR p. 2196, Eff. 8/16/2002). The standards are: 100 mg Chl*a*/m^2 (summer mean), and 150 mg Chl*a*/m^2 (maximum), and their period of application shall be July 1st to September 30th each year. The summer mean is the arithmetic mean of the set of all benthic algae replicates collected at a site during a given summer. The maximum summer algae value is the single greatest of any of the monthly mean Chl*a* values from a given site. There is only one month each summer representing the maximum.

(8) No lake or reservoir in **Table12A-2** shall have a total nutrient concentration that exceeds the values shown based upon an annual average. The Department will determine on a case-by-case basis whether or not a permitted discharge to a stream or river is likely to be affecting any downstream lake or reservoir. If yes, the permittee would be required to meet its average monthly limit year round.

(9) Parameters listed under this column are standards specific to lakes and reservoirs.

(10) Standards and related assessment information (excluding secchi depth) are to be determined from 0-30 m depth-integrated samples. Samples and secchi depth measurements are to be collected at the Midlake Deep site which is located approximately 1 mile west of Yellow Bay Point in a pelagic area of the lake (approximately at latitude 47.861, longitude -114.067).

4.0 References

The following are citations for key scientific and technical literature used to derive the base numeric nutrient standards. This is not a complete list; rather, it contains the most pertinent citations. Many other articles and reports were reviewed during the development of the standards.

Biggs, B.J.F., 2000. New Zealand Periphyton Guideline: Detecting, Monitoring and Managing Enrichment in Streams. Prepared for the New Zealand Ministry of the Environment, Christchurch, 122 p.

Dodds, W.K., V.H. Smith, and B. Zander, 1997. Developing Nutrient Targets to Control Benthic Chlorophyll Levels in Streams: A Case Study of the Clark Fork River. Water Research 31: 1738-1750.

Dodds, W.K., V.H. Smith, and K. Lohman, 2002. Nitrogen and Phosphorus Relationships to Benthic Algal Biomass in Temperate Streams. Canadian Journal of Fisheries and Aquatic Sciences 59: 865-874.

Dodds, W.K, V.H. Smith, and K. Lohman, 2006. Erratum: Nitrogen and Phosphorus Relationships to Benthic Algal Biomass in Temperate Streams. Canadian Journal of Fisheries and Aquatic Sciences 63: 1190-1191.

Elser, J.J., M.E.S. Bracken, E.E. Cleland, D.S. Gruner, W.S. Harpole, H. Hillebrand, J.T. Ngai, E.W. Seabloom, J.B. Shurin, and J.E. Smith, 2007. Global Analysis of Nitrogen and Phosphorus Limitation of Primary Producers in Freshwater, Marine and Terrestrial Ecosystems. Ecology Letters 10: 1135-1142.

Flynn, K., and M.W. Suplee, 2010. Defining Large Rivers in Montana using a Wadeability Index. Helena, MT: Montana Department of Environmental Quality, 14 p.

Flynn, K., and M.W. Suplee, 2011. Using a Computer Water Quality Model to Derive Numeric Nutrient Criteria. Lower Yellowstone River, MT. WQPBMSTECH-22. Helena, MT: Montana Department of Environmental Quality, 274 p plus appendices.

McCarthy, P.M., 2005. Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water years 1900 through 2002. U.S. Geological Survey Scientific Investigations Report 2004-5266, 317 p.

Omernik, J.M., 1987. Ecoregions of the Conterminous United States. Annals of the Association of American Geographers 77: 118-125.

Smith, R.A., R.B. Alexander, and G.E. Schwarz, 2003. Natural Background Concentrations of Nutrients in Streams and Rivers of the Conterminous United States. Environmental Science and Technology 37: 3039-3047.

Sosiak, A., 2002. Long-term Response of Periphyton and Macrophytes to Reduced Municipal Nutrient Loading to the Bow River (Alberta, Canada). Canadian Journal of Fisheries and Aquatic Sciences 59: 987-1001.

Stevenson, R.J, S.T. Rier, C.M. Riseng, R.E. Schultz, and M.J. Wiley, 2006. Comparing Effects of Nutrients on Algal Biomass in Streams in Two Regions with Different Disturbance Regimes and with Applications for Developing Nutrient Criteria. Hydrobiologia 561: 149-165.

Suplee, M., R. Sada de Suplee, D. Feldman, and T. Laidlaw, 2005. Identification and Assessment of Montana Reference Streams: A Follow-up and Expansion of the 1992 Benchmark Biology Study. Helena, MT: Montana Department of Environmental Quality, 41 p.

Suplee, M.W., A. Varghese, and J. Cleland, 2007. Developing Nutrient Criteria for Streams: An Evaluation of the Frequency Distribution Method. Journal of the American Water Resources Association 43: 453-472.

Suplee, M.W., V. Watson, A. Varghese, and J. Cleland, 2008. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers. Helena, MT: Montana Department of Environmental Quality, 86 p.

Suplee, M.W. and V. Watson, 2012. Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers: Addendum 1 (Final Draft). Helena, MT: Montana Department of Environmental Quality, 76 p.

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

Suplee, M.W., and R. Sada de Suplee, 2011. Assessment Methodology for Determining Wadeable Stream Impairment Due to Excess Nitrogen and Phosphorus Levels. Helena, MT: Montana Department of Environmental Quality

Suplee, M.W., V. Watson, W.K. Dodds, and C. Shirley, 2012. Response of Algal Biomass to Large Scale Nutrient Controls on the Clark Fork River, Montana, United States. Journal of the American Water Resources Association 48: 1008-1021.

U.S. Environmental Protection Agency, 2000a. Nutrient Criteria Technical Guidance Manual, Rivers and Streams. United States Environmental Protection Agency, EPA-822-B00-002. Washington, D.C.

U.S. Environmental Protection Agency, 2000b. Nutrient Criteria Technical Guidance Manual, Lakes and Reservoirs. United States Environmental Protection Agency, EPA-822-B00-001. Washington, D.C.

Varghese, A., and J. Cleland, 2005. Seasonally Stratified Water Quality Analysis for Montana Rivers and Streams-Final Report. Prepared by ICF International for the Montana Department of Environmental Quality, 44 p plus appendices.

Varghese, A., J. Cleland, and B. Dederick, 2008. Updated Statistical Analyses of Water Quality Data, Compliance Tools, and Changepoint Assessment for Montana Rivers and Streams. Prepared by ICF International for the Montana Department of Environmental Quality under agreement No. 205031, task order 5.

Woods, A.J., J.M. Omernik, J.A. Nesser, J. Shelden, J.A. Comstock, and S. J. Azevedo, 2002. Ecoregions of Montana, 2nd edition. (Color Poster with Map, Descriptive Text, Summary Tables, and Photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,500,000).

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Circular DEQ-12, PART B

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1.0 Introduction

Elements comprising Circular DEQ-12, **Part B** are found below. These elements are adopted by the Department following the Department's formal rule making process. Montana state law (§75-5-103 [22], MCA and 75-5-313, MCA) allows for variances from the base numeric nutrient standards (found in **Part A** of this circular) based on a determination that base numeric nutrient standards cannot be achieved because of economic impacts, the limits of technology, or both.

1.1 Definitions

1. **Limits of technology** means wastewater treatment processes for the removal of nitrogen and phosphorus compounds from wastewater that can consistently achieve a concentration of 70 µg TP/L and 4,000 µg TN/L.

2. **Long-term average** means a description of effluent data from a treatment system using standard descriptive statistics and an assumption that the data follow a lognormal distribution. See also, "*Technical Support Document for Water Quality-based Toxics Control*", Document No. EPA/505/2-90-001, United States Environmental Protection Agency, 1991.

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2.0 General Nutrient Standards Variances

Because the treatment of wastewater to base numeric nutrient standards in 2011 would have resulted in substantial and widespread economic impacts on a statewide basis (§75-5 -313 [5][a], MCA), a permittee who meets the end-of-pipe treatment requirements provided below in **Table 12B-1** may apply for and DEQ shall approve a general nutrient standards variance ("general variance")(§75-5 -313 [5][b], MCA). The Department will process the general variance request through the discharge permit, and include information on the period of the variance and the interim requirements. A person may apply for a general variance for either total phosphorus or total nitrogen, or both. The general variance may be established for a period not to exceed 20 years. A compliance schedule to meet the treatment requirements shown in **Table 12B-1** may be granted on a case-by-case basis.

Cases will arise in which a permittee is or will be discharging effluent with N and/or P concentrations lower than (i.e., better than) the minimum requirements of a general variance. And yet, the resulting concentrations outside of the mixing zone still exceed the base numeric nutrient standards. Such discharges are still within the scope of the general variance, because the statute contemplates that a general variance is allowable if the permittee treats the discharge to, **at a minimum**, the concentrations indicated by §75-5-313(5)(b)(i)and (ii), MCA. Thus, permitted discharges better than those at §75-5-313(5)(b)(i)and (ii), MCA are not precluded from falling under a general variance.

Table 12B-1. General variance end-of-pipe treatment requirements per §MCA 75-5 -313(5)(b), through May 2016.

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

[1] See endnote 1

The Department must review the general variance treatment requirements every 3 years to assure that the justification for their adoption remains valid. The review will not take place before June 1, 2016, and will occur triennially thereafter. 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 deleting the variance. If a low-cost technological innovation for lowering nitrogen and phosphorus concentrations in effluent were to become widely available in the near future, for example, the Department could (after May 2016) make more stringent the concentrations shown in **Table 12B-1**. If, after May 2016, the Department were to adopt general variance treatment requirements more stringent than those provided in **Table 12B-1**, revised effluent limits will be included with the permit during the next permit cycle, unless the demonstration discussed in **Section 2.2** below is made. A compliance schedule may also be granted to provide time to achieve compliance with revised effluent limits.

The Department and the Nutrient Work Group will consider specific factors, listed below in this paragraph, when determining whether the general variance treatment requirements must be updated in accordance with §75-5-313(7)(a) and (b), MCA. The review will occur triennially and will 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).

1. Whether more cost-effective, efficient, and innovative nutrient removal technologies are available.

2. Whether Montana's economic status had changed sufficiently to make nutrient removal more affordable. If new technologies (per 1 above) have not become widely available, the Department will estimate on a statewide basis the cost for facilities within a category (per §75-5-313(5)(b)(i) and (ii), MCA) to move to the next more stringent nutrient treatment level . Nutrient treatment

levels are defined in Falk et al. (2011)[1].

3. Whether development of permit limits for base numeric nutrient standards should be revised to reflect N- or P-compound speciation and bioavailability.

Based on the triennial review findings and conclusions, the Department will issue a rulemaking proposal for public comment on the general variances. The proposal will solicit comments from the public on whether the variance should be: (1) re-adopted without changes, (2) re-adopted with changes, or (3) deleted. Based on the review conclusions and public comment, the Department will revise Montana's water quality standards to reflect either (1) new interim limits to apply during the variance or (2) the continuation of the previous interim limits.

2.1 Wastewater Facility Optimization Study

Permitees receiving a general variance are required to evaluate current facility operations in order to optimize nutrient reduction with existing infrastructure and shall analyze cost-effective methods of reducing nutrient loading, including but not limited to nutrient trading without substantial investment in new infrastructure (§75-5-313[9][a], MCA). The Department encourages permittees to examine a full array of reasonable options including (but not limited to) reuse, recharge, and land application. The Department may request the results of the optimization/nutrient reduction analysis within two years of granting a general variance to a permittee.

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Changes to facility operations resulting from the analysis carried out as above are only intended to be refinements to the wastewater treatment system already in place. Therefore, optimizations:

1. Should only address changes to facility operation and maintenance and should not be structural changes
2. Should not result in rate increases
3. Must include exploration of the feasibility of nutrient trading within the watershed

How the analysis is to be conducted and by whom is left to the discretion of the permittee. The Department encourages the use of a third-party firm with expertise in this subject.

2.2 Option for Remaining at a Previous General Variance Long-term Average Based on Water Quality Modeling

In some cases a permittee may be able to demonstrate, using water quality modeling and reach-specific data, that greater emphasis on reducing one nutrient (target nutrient) will achieve the same desired

[1] See Endnote 2.

water-quality conditions as can be achieved by emphasizing reduction of both nutrients. Requiring a point source discharger to immediately install sophisticated nutrient-removal technologies to reduce the non-target nutrient to levels more stringent than what is in statute at §75-5-313(5)(b), MCA may not be the most prudent nutrient control expenditure, and would cause the discharger to incur unnecessary economic expense. Since this relates to economic impacts, as described at §75-5-313(1), MCA, these situations are appropriately addressed by individual variances. If such a case can be demonstrated to the satisfaction of the Department, then a permittee can apply for an individual variance which will include discharger specific limits reflecting the highest attainable condition for the receiving water rather than limits based on any new general variance concentration. The permittee will be required to submit the demonstration with the proposed effluent limits to the Department for review. The demonstration must consider effects on the downstream waterbody including effects from the non-target nutrient; if the downstream waterbody will be impacted, some level of reduction on the target and/or non-target nutrient will likely be required or the individual variance may not be granted. In addition, the permittee will be required to provide monitoring water-quality data that can be used to determine if the justifications for less stringent effluent limits continue to hold true (i.e., status monitoring). Because status can change, for example due to substantive nonpoint source cleanups upstream of the discharger, status monitoring by the discharger is required. Details on the requirements for making the demonstration and for collecting the status monitoring data are provided in the Department guidance document "*Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances* AND *Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration*".

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3.0 Individual Nutrient Standards Variances

Montana law allows for the granting of nutrient standards variances based on the particular economic and financial situation of a permittee (§75-5-313 [1], MCA). Individual nutrient standards variances ("individual variances") may be granted on a case-by-case basis because the attainment of the base numeric nutrient standards is precluded due to economic impacts, limits of technology, or both. In general, individual variances are intended for permittees who would have financial difficulties meeting even the general variance concentrations, and are seeking individual N and P permit limits tailored to their specific economic situation, or to meet the requirements of **Section 2.2** above.

Like the general variance in **Section 2.0**, individual variances may be established for a period not to exceed 20 years and must be reviewed by the Department every three years to ensure that their justification remains valid. Unlike the general variances presented in **Section 2.0**, the Department will only grant an individual variance to a permittee <u>after</u> the permittee has made a demonstration to the Department regarding the economic impacts that would be incurred from meeting the standards. The Department, in conjunction with the Nutrient Work Group, has developed an assessment process that must be completed by applicants seeking an individual variance. The assessment process is found in the Department guidance document "*Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances* AND *Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration*".

A permittee, using the assessment process referred to above, must also demonstrate to the Department that there are no reasonable alternatives (including but not limited to trading, compliance schedules, reuse, recharge, and land application) that would allow compliance with the base numeric nutrient standards. If no reasonable alternatives exist, then an individual variance is justifiable and becomes effective and may be incorporated into a permit following the Department's formal rule making process. Like any variance, such variances must be adopted as revisions to Montana's standards and submitted to EPA for approval. Individual variances the Department may adopt in the future will be documented in **Table 12B-2** below.

For many individual variances, the basis will be the economic status of the community, i.e., the demonstration of substantial and widespread economic impacts. At each triennial review the Department will consider if the basic economic status of a community granted an individual variance has changed. The same parameters used to justify the original individual variance will be considered; these are detailed in the guidance document "*Carrying out a Substantial and Widespread Economic Analysis for Individual Nutrient Standards Variances* AND *Guidelines for Determining if a Waste Water Treatment Facility Can Remain at a Previous General Variance Concentration*". If new, low-cost nutrient removal technologies have become widely available, or if the economic status of the community has sharply improved, the basis of the variance may no longer be justified. In such cases the department will discuss with the permittee the options going forward, including but not limited to a permit compliance schedule, trading, reuse, recharge, land application, or a general variance.

Based on the triennial review findings and conclusions, the Department will issue a rulemaking proposal for public comment on the individual variances. The proposal will solicit comments from the public on whether each variance should be: (1) re-adopted without changes, (2) re-adopted with changes, or (3) deleted. Based on the review conclusions and public comment, the Department will revise Montana's water quality standards to reflect either (1) new interim limits to apply during the variance or (2) the continuation of the previous interim limits.

Table 12B-2. Table for individual variances that may be adopted.

MPDES Number	Facility Name	Discharge Latitude	Discharge Longitude	Receiving Waterbody	Receiving Waterbody Classification	Long-term Average Total P (µg/L)	Long-term Average Total N (µg/L)	Start Date	Sunset Date (maximum)	Review Schedule (year)	Review Outcome

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4.0 Endnotes

(1) Based on facility design flow.

(2) Falk, M.W., J.B. Neethling, and D.J. Reardon, 2011. Striking a Balance between Wastewater Treatment Nutrient Removal and Sustainability. Water Environment Research Foundation, document NUTR1R06n, IWA Publishing, London, UK.

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