



CO L O R A D O
**Department of Public
Health & Environment**

Colorado Nutrient Management Plan and 10-Year Water Quality Roadmap

WQCD Prehearing Statement - Exhibit 3

Revisions to the Basic Standards and Methodologies for Surface Water
(Regulation #31) and Nutrients Management Control Regulation
(Regulation #85)

October 2017 Rulemaking Hearing

July 26, 2017

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I. Introduction

This exhibit details the Water Quality Control Division’s recommended Colorado Nutrient Management Plan and 10-Year Water Quality Roadmap. This plan and roadmap were developed as part of the nutrients work group effort in 2016-2017. The plan:

- Provides an overview of Colorado’s current nutrient management framework
- Discusses plans for further reducing nutrients from point source and nonpoint sources
- Outlines the major milestones the division, Water Quality Control Commission, and stakeholders will need to undertake over the next 10 years to implement the plan
- Provides an overview of how Colorado will continue to make progress on revising nutrient standards
- Summarizes other standards development efforts through 2027
- Details plans for developing feasibility information over the next 10 years
- Establishes how the division will monitor and measure progress related to nutrients controls

This plan was modeled after the 2011 memo from the Environmental Protection Agency’s (EPA) Nancy Stoner titled “Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions” and EPA’s 2016 memo from Joel Beauvais titled “Renewed Call to Action to Reduce Nutrient Pollution and Support for Incremental Actions to Protect Water Quality and Public Health. After the October 2017 rulemaking, the division intends to make this plan and 10-year water quality roadmap a division policy.

II. Overview of Colorado’s Current Nutrient Management Framework

Nitrogen and phosphorus are nutrients that are a part of all aquatic ecosystems and are necessary to support the growth of the algae and aquatic plants that provide food and habitat for fish and smaller aquatic organisms. However, excess nitrogen and phosphorus, or nutrient pollution, can cause water quality problems that result in serious risks to human and animal health and damage to the economy. Too much nitrogen and phosphorus in the water causes algae to grow faster than ecosystems can handle. Large growths of algae are called algal blooms. Some algal blooms are harmful to humans because they produce elevated toxins and bacterial growth that can make people sick if they come into contact with polluted water, consume tainted fish or shellfish, or drink contaminated water. Algal blooms can severely reduce or eliminate oxygen in the water, leading to illnesses in fish and other aquatic life and the death of large numbers of fish.

In June 2012, the commission adopted nutrients regulatory provisions composed of two major components:

1. A new nutrients management control regulation establishing technology-based treatment requirements for many domestic and some industrial wastewater dischargers, enhanced nutrients control requirements for storm water dischargers, provisions encouraging voluntary controls of nonpoint sources, and monitoring requirements to develop better information to

refine Colorado's nutrients management efforts over time. This control regulation is called Regulation #85.

2. Scientifically-based numerical values for nutrients at levels to protect classified uses of Colorado waters. Initially these standards are to be applied only to streams and lakes above dischargers and to protect municipal water supplies taken directly from lakes or reservoirs. Section 31.17 of Regulation #31 contains the numerical values.

The new rules became effective September 30, 2012.

A. Regulation #85

Regulation #85 contains a number of requirements. It includes provisions that:

- Establish technology-based treatment requirements for large domestic and some industrial wastewater dischargers
- Establish enhanced nutrients control requirements for storm water dischargers
- Encourage voluntary controls of nonpoint sources
- Establish monitoring requirements to develop better information to refine Colorado's nutrients management efforts over time

Regulation #85 requires certain large wastewater treatment facilities to meet effluent limits for phosphorus and nitrogen based on levels determined to be achievable with available technology. It focuses control requirements on the major sources of nutrient pollution in Colorado and includes provisions to fine-tune application of the new treatment requirements. For example, there are exceptions for small facilities, delays for medium facilities, and exclusions for facilities in disadvantaged communities and facilities that have minimal impacts. Regulation #85 contains a voluntary approach for agriculture and other nonpoint sources, with the potential for additional regulatory requirements after 2022. It also includes monitoring requirements that will develop better information for future nutrients management decision making.

Regulation #85 effluent limits (shown in the following table) only apply to Colorado's largest domestic wastewater dischargers and some industrial dischargers until 2027. This includes domestic facilities that have a design capacity of over two million gallons per day (MGD) and that are located in a high priority watershed. High priority watersheds are those areas with a high ratio of treated wastewater flow per square mile, which encompasses the highly urbanized areas in the Front Range and the most urbanized areas of the west slope. As of October 2017, approximately 47 domestic wastewater treatment facilities in Colorado meet both of those criteria. There are significant environmental benefits derived from this framework since the majority of the domestic wastewater flow comes from the larger facilities. The effluent limits in Regulation #85 do not apply to domestic wastewater facilities with a design flow of less than or equal to one MGD or facilities owned by a disadvantaged community.

Regulation #85 nutrient effluent limits (for facilities over 2.0 MGD in high priority watersheds)		
Parameter	Annual Median ⁽¹⁾	95 th Percentile ⁽²⁾
Total Phosphorus	1.0 mg/L	2.5 mg/L
Total Inorganic Nitrogen ⁽³⁾ as N	15 mg/L	20 mg/L
⁽¹⁾ Running annual median of all samples taken in the most recent 12 calendar months. ⁽²⁾ The 95 th percentile of all samples taken in the most recent 12 calendar months. ⁽³⁾ Determined as the sum of nitrate as N, nitrite as N, and ammonia as N.		

Regulation #85 requires all domestic wastewater treatment facilities to monitor nutrient concentrations in their effluent. Facilities with a design flow greater than one MGD that are not located in an economically disadvantaged community are also required to conduct instream nutrient monitoring above and below their effluent discharge. The receiving water monitoring requirements apply to approximately 100 domestic facilities.

B. Section 31.17 of Regulation #31

In 2012, Regulation #31 (the Basic Standards and Methodologies for Surface Waters) was revised to include interim numerical values for phosphorus, nitrogen, and chlorophyll *a* for rivers, stream, lakes and reservoirs as summarized in the following table. The numerical values are based on the maximum amounts of each pollutant that can be present in water and still protect the classified use.

Interim numeric values for total phosphorus, total nitrogen, and chlorophyll <i>a</i>					
Parameter	Rivers and Streams		Lakes and Reservoirs		
	Cold	Warm	Cold	Warm	Direct Use Water Supply
Total Phosphorus	110 ug/L ⁽¹⁾	170 ug/L ⁽¹⁾	25 ug/L ⁽²⁾	83 ug/L ⁽²⁾	not applicable
Total Nitrogen	1,250 ug/L ⁽¹⁾	2,010 ug/L ⁽¹⁾	426 ug/L ⁽²⁾	910 ug/L ⁽²⁾	not applicable
Chlorophyll <i>a</i>	150 mg/m ² ⁽³⁾	150 mg/m ² ⁽³⁾	8 ug/L ⁽⁴⁾	20 ug/L ⁽⁴⁾	5 ug/L ⁽⁵⁾
⁽¹⁾ Annual median, allowable exceedance frequency 1-in-5 years ⁽²⁾ Summer (July 1 - September 30) average in the mixed layer of lakes (median of multiple depths), allowable exceedance frequency 1-in-5 years ⁽³⁾ Summer (July 1 - September 30) maximum attached algae, not to exceed. ⁽⁴⁾ Summer (July 1 - September 30) average chlorophyll <i>a</i> in the mixed layer of lakes (median of multiple depths), allowable frequency 1-in-5-years. ⁽⁵⁾ March 1-November 30 average chlorophyll <i>a</i> in the mixed layer of lakes (median of multiple depths), allowable frequency 1-in-5 years.					

These numerical values were intended to be adopted as standards for individual water bodies in phases. Adoption of standards during the first phase was intended to protect waters upstream of current dischargers and protect direct use water supply (DUWS) reservoirs. During the first phase, the commission considered adopting standards for phosphorus or chlorophyll *a* to protect aquatic life, recreation, and water supply uses only in the following specific circumstances:

- In headwaters upstream of existing dischargers
- In DUWS Lakes and Reservoirs where this type of protection is determined to be appropriate (chlorophyll *a* only)
- Under other circumstances where the commission determined Regulation #85 will not provide sufficient control of nutrients

During Phase 2 (2017-2027), in addition to considering the adoption of phosphorus or chlorophyll *a* standards as described above, the commission adopted a voluntary incentive program to encourage dischargers to reduce phosphorus and nitrogen concentrations in their effluent below the Regulation #85 effluent limits. Starting in 2027, the commission plans to consider adopting numerical water quality standards for phosphorus and nitrogen for all Colorado surface waters.

C. Summary of EPA's action on 2012 regulatory package

In July 2016, EPA provided an action letter on revisions to Regulation #31 regarding nutrients. As part of the action, EPA approved the following provisions in Regulation #31:

- Critical low flows - 31.9(1)(c)
- DUWS sub-classification - 31.13(1)(d)(i)
- Chlorophyll *a* interim values for streams/rivers, lakes/reservoirs, and DUWS sub-classification - 31.17(d)
- Site-specific flexibility - 31.17 (h)

EPA also approved with recommendations the total phosphorus and total nitrogen interim values for lakes/reservoirs - 31.17(b), (c). EPA took no action on the total phosphorus and total nitrogen interim values for rivers/streams - 31.17(b), (c).

III. Reducing Point Sources of Nutrient Pollution

As discussed previously, Colorado has implemented a phased approach to nutrient reduction. From 2017-2027, all domestic and industrial wastewater facilities in Colorado are eligible to participate in the incentive program that should result in further nutrient reductions. After 2027, the division will utilize the traditional approach of developing water quality-based effluent limits based on revised nutrient criteria in Regulation #31.

IV. Reducing Nonpoint Sources of Nutrient Pollution

Over the next 10 years, the division will continue to work with its partners to implement the voluntary nonpoint source provisions of Regulation #85. The division will collaborate with the agricultural community to implement best management practices, work with partners to implement public information and education programs focused on nonpoint source pollution prevention and restoration activities, collaborate on the development and implementation of nonpoint source management programs, evaluate trading proposals, and prepare for the 2020 Regulation #85 triennial review. These actions are summarized below.

Collaborate with the agricultural community to implement best management practices

- Pursue Colorado Water Resources and Power Development Authority funds to support implementation of nutrient best management practices
- Develop a strategy for use of Clean Water Act Section 319 nonpoint source funding to support implementation of best management practices in the absence of nutrient impairment listings
- Explore additional incentives such as certification programs that will encourage nutrient reduction activities by offering certainty that over a specified timeframe, such activities will continue to be voluntary rather than mandated
- Promote implementation of watershed-based or Total Maximum Daily Load (TMDL) alternative approach plans through use of funding and other incentives
- Prioritize projects that address the connection between nitrate and the mobilization of selenium
- Increase partnerships in the Lower Arkansas River Basin to maximize reduction of nonpoint sources of nutrients and selenium through best management practices
- Transfer lessons learned and utilize partnerships developed in the Lower Arkansas River Basin to solicit partnerships and nutrient best management practices in other areas of the state

Work with partners to implement public information and education programs focused on nonpoint source pollution prevention and restoration activities

- Utilize peer-to-peer information-sharing for dissemination of lessons learned from producer-implemented best management practices
- Promote effective messaging about nutrients and water quality from community leaders and early reducers
- Incorporate public information and education activities in all best management practices implementation projects
- Maximize partnership with the Colorado Department of Agriculture and Colorado State University to produce and effectively share information about nutrients and water quality
- Expand coordination and collaboration at all organizational and landscape scales (from federal partners to conservation districts and local growers, and from basin scale to watershed and field scales)

- Continue dialogue with the agricultural community in order to tell their stories of success and progress in preparation for the 2020 Regulation #85 triennial review
- Investigate opportunities to partner with municipalities outside of urbanized area boundaries to develop and implement nonpoint source nutrient reduction information and education programs
- Identify effective approaches for nutrient information and education programs through follow-up to the water quality public perception survey and focus groups projects

Collaborate on the development and implementation of nonpoint source monitoring programs

- Finalize nutrient and selenium data collection and best management practices effectiveness evaluation for an over 2,000 acre demonstration project in the Lower Arkansas River Basin
- Continue to require effectiveness monitoring for projects implementing nutrient best management practices
- Pursue Natural Resource Conservation Service and other funding for edge-of-field monitoring to evaluate effectiveness of best management practices at a field or project scale
- Continue to compile effectiveness information about nutrient best management practices such as reduced nitrogen application, improved irrigation systems, development of buffer strips and use of cover crops
- Incorporate best management practices effectiveness discussions into information and education activities
- Collaborate with partners to identify through monitoring or modeling priority nonpoint sources of nutrients for control
- Utilize and expand planning, prioritization, analysis and tracking tools such as the Nutrient Dashboard and Environmental Risk Assessment and Management System (eRAMS) Watershed Rapid Assessment Program
- Investigate opportunities to capitalize on selenium modeling in support of TMDL alternative approach planning and implementation to identify reasonable progress goals for nutrients reduction in the Lower Arkansas River Basin

Nonpoint source to point source trading

- Evaluate nonpoint source to point source nutrient trading proposals

2020 Triennial Review Hearing

- The next triennial review for Regulation #85 will occur in 2020. At that time, the division in collaboration with its partners will make recommendations regarding the effectiveness of the nonpoint source controls as identified in the regulation

V. Overview of 10-Year Water Quality Roadmap

Phase I of nutrients implementation (2012-2017) has been completed. Phosphorus and chlorophyll *a* standards have been applied throughout all basins as appropriate, and DUWS waters have been classified. The division is committed to continuing to make progress to develop and refine appropriate and protective nutrient criteria for Colorado and achieve additional nutrient reductions. In 2022, the division intends to propose adoption of the chlorophyll *a* standards for all state waters, revise standards for phosphorus and nitrogen for lakes and reservoirs (but to limit application to prioritized water bodies), and to consider nonpoint source controls. The division plans to propose revised standards for phosphorus and nitrogen for rivers and streams in 2027, along with standards for ammonia and selenium. At the same time, the division will develop tools to evaluate feasibility of treatment for all three parameters. Because this will require significant resources from the division as well as stakeholders leading up to 2027, the regular basic standards rulemaking hearings in 2021 and 2026 will be limited in scope. For nutrients, between 2017-2027, there will be a voluntary incentive program designed to encourage point source dischargers to voluntarily reduce their nutrient contributions.

The division has developed this 10-year water quality roadmap to continue to make progress on criteria development and memorialize Colorado's plan for continuing to make incremental progress on reducing nutrients. The success of this roadmap relies on a robust stakeholder process.

In the past, criteria development was prioritized by the division to occur within five years after EPA adopted new 304(a) criteria or disapproved standards. Past practice would have dictated that the division would plan to propose revisions to Colorado's selenium and ammonia standards in 2021, due to new 304(a) criteria. This roadmap is a deviation from past practice. This longer planning horizon recognizes the need to address complex criteria development with adequate time. Through this 10-year water quality roadmap, rather than holding a major rulemaking hearing for Regulation #31 to consider new 304(a) criteria or disapproved standards every five years, Colorado will instead follow a new approach where rulemakings for new or revised water quality criteria will be scheduled separate from the basic standards (Regulation #31) triennial reviews. Regulation #31 triennial reviews will instead be focused on housekeeping items.

A key consideration in this draft roadmap is the division's understanding from stakeholders about the complexity of treatment if the commission adopts revised ammonia criteria, revised selenium criteria, and revised nutrient criteria. Thus, the division is proposing to hold a rulemaking for ammonia, selenium and nutrients in 2027, allowing time for in-depth discussions to occur amongst stakeholders and the regulatory agencies concerning the criteria and its eventual implementation.

The division is committed to an extensive stakeholder processes leading up to these rulemakings. Overall this will involve quarterly workgroup meetings for 10 years to serve as a guide for the criteria development efforts. These quarterly meetings will ensure that planning and communication is a key part to the path forward. It is anticipated that many efforts will require smaller, focused groups to

draft criteria proposals, policy documents and the implementation framework. These smaller group efforts are included below in the 2017-2027 roadmap plan.

In addition to meetings, the division will provide communications through the water quality roadmap email distribution list and the division's website. Below is an overview of the major steps in the process. Sections VI and VII provide a more robust explanation of the steps outlined below.

2017-2027 outreach efforts

- Quarterly workgroup meetings from spring 2018-2027 to keep stakeholders informed
- Regular updates to the commission
- Information distributed through the water quality roadmap email distribution list

2020 nutrients triennial review

- Division will request that a rulemaking hearing be scheduled for 2022 to consider:
 - the adoption of revised nitrogen and phosphorus standards for lakes and reservoirs in Regulation #31 and in lakes and reservoirs in Regulations #32 through #38 that are above dischargers, DUWS reservoirs, and lakes and reservoirs with public swim beaches
 - the adoption of chlorophyll *a* standards in Regulations #32 through #38 in all waters (rivers and streams, and lakes and reservoirs) downstream of dischargers as appropriate
- Commission to decide if nutrient controls are needed for nonpoint sources, specifically agricultural sources of nutrient pollution, or whether additional time is needed to measure reductions from existing projects. If it is determined that changes to the nonpoint source provisions in Regulation #85 are needed, these could be considered in the 2022 hearing. Leading up to the 2020 triennial review, the division will continue to work with interested parties to examine data and nonpoint source contributions to nutrients.
- Commission will determine the success of the voluntary incentive program and whether any modification to the nutrient reductions strategy is needed prior to 2027

2021 Regulation #31 Rulemaking

- Cleanup and corrections
- Arsenic: The division is waiting for EPA to release new 304(a) criteria for arsenic. Assuming that occurs by 2020, the division will convene a small technical advisory committee from April 2020 through December 2020. It is anticipated that this effort will require two to three meetings. Proposed changes to Regulation #31 will be due in January 2021. The rulemaking hearing is scheduled for June 2021. This could occur earlier if the 304(a) criteria are released sooner.
- Cadmium: EPA released new 304(a) criteria for cadmium in March 2016. The new 304(a) cadmium criteria are less stringent than the current cadmium criteria adopted statewide in

Colorado. The commission adopted the new 304(a) criteria on a limited number of cold water segments in the San Juan and Gunnison river basins in the June 2017 rulemaking hearing. The division plans on making similar proposals in the basin rulemaking hearings in 2018, 2019 and 2020. As part of this effort, the division will work with parties interested in these segments leading up to the basin rulemaking hearings. In addition, the division will convene a small technical advisory committee in mid to late 2020 to consider statewide revisions to the cadmium criteria. The number of meetings are yet to be defined but is anticipated to be minimal. Proposed changes to Regulation #31 will be due in January 2021. The rulemaking hearing is scheduled for June 2021.

- Ammonia and Selenium: Delay consideration of revised ammonia and selenium criteria to 2027
- Temperature: Small possibility of changes to temperature criteria in Regulation #31 based on work done in the temperature technical advisory committee and the basin site-specific hearings. The temperature technical advisory committee will meet three times in 2017 and 2018 and the Water Quality Forum will determine in July 2018 whether the temperature technical advisory committee should continue to meet after that time.

2022 rulemaking hearing to (1) revise lakes and reservoirs nitrogen and phosphorus standards, (2) adopt chlorophyll *a* standards statewide, and (3) potentially adopt nonpoint source controls

- A small lakes nutrient criteria group will meet monthly from January 2021 through June 2021. Draft criteria will be available in summer 2021
- Hold rulemaking to revise or update Regulation #31 Interim Nitrogen and Phosphorus Values for lakes and reservoirs
- Adopt revised nitrogen and phosphorus criteria for lakes and reservoirs in Regulations #32 through #38 that are upstream of permitted dischargers, for DUWS reservoirs, and where there is a public swimming beach
- Adopt chlorophyll *a* criteria in Regulations #32 through #38 in all waters (rivers and streams, and lakes and reservoirs) downstream of dischargers as appropriate

2025 nutrients triennial review

- Division will request that a rulemaking hearing be scheduled for 2027 to consider adoption of revised ammonia, selenium, and stream nitrogen and phosphorus criteria

2026 Regulation #31 Rulemaking

- Cleanup and corrections only

2027 Ammonia, Selenium and Stream Nutrient Criteria Rulemaking(s)

- Intent is to address the competing or confounding treatment challenges of ammonia, selenium, and nutrients

- Adopt criteria for nutrients, selenium, and ammonia into Regulation #31 as well as Regulations #32 through #38
- Intent would be for rulemaking package to include sector based variances, consideration of existing and new site-specific standards, or other standards tools such as resegmentation or changes in use classification
- Selenium: A small group on selenium will meet in 2018 and 2019. The number of meetings is yet to be defined, but it is anticipated the effort will require monthly meetings for six months to a year. Draft criteria will be available in 2019 or 2020. Dischargers that anticipate challenges meeting the draft selenium criteria can explore discharger specific variance, site-specific standards, and other tools between 2020 through 2027.
- Ammonia: A small focus group on ammonia will meet in 2022. The number of meetings is yet to be defined, but it is anticipated the effort will require monthly meetings for six months to a year. Draft criteria will be available in 2022 or 2023. Dischargers that anticipate challenges meeting the draft ammonia criteria can explore discharger specific variance, site-specific standards, and other tools between 2023 through 2027.
- Nitrogen and phosphorus revised standards for streams and rivers: A work group on stream nutrient standards will meet in 2023 and 2024. The number of meetings is yet to be defined, but it is anticipated the effort will require monthly meetings for at least a year. Draft criteria will be available in 2025. Dischargers that anticipate challenges meeting the draft nitrogen and/or phosphorus criteria can explore discharger specific variance, site specific standards, and other tools between 2025-2027 (or sooner).

VI. Continued Progress on Developing and Implementing Nutrient Standards

There are three components to continued progress on nutrient standards: (1) total nitrogen and total phosphorus for lakes, which were approved with recommendations by EPA; (2) continued adoption of the chlorophyll *a* standard which was approved by EPA; and (3) modification of the interim numeric values for total phosphorus and total nitrogen for rivers and streams, on which EPA took no action. These three components will proceed on separate tracks, as each requires a different approach. In general, the division's process to develop or update nutrient criteria will include:

- Summarizing existing datasets and their utility for use in nutrient standards development
- Collecting data to bolster existing database and fill data gaps
- Reviewing new information and literature regarding nutrients
- Evaluating treatment alternatives and feasibility
- Developing nutrient standards that are scientifically defensible, appropriate, and protective
- Developing an implementation strategy for nutrients standards
- Conducting outreach and engaging interested stakeholders

A. Total nitrogen and total phosphorus for lakes

i. Approach for proposing refined standards

While the EPA has approved Colorado’s nutrient criteria for lakes, it has also provided recommendations for application of these criteria and what potential revisions may be necessary for the standards to be adequately protective. In response to the recommendations, the division is developing a summary of available lake nutrients data (i.e., nitrogen, phosphorus, and chlorophyll *a*) to evaluate potential data gaps and the utility of existing data to support refinement of criteria to protect Colorado’s lentic waterbodies. As necessary, additional sampling or studies will be conducted to bolster the database used in standards development. This effort will include a focus on warm lakes where environmental conditions may be more favorable to a strong algal response to nutrient pollution.

A review of recent literature will be conducted to better understand the relationships between nutrients and relevant endpoints in lakes (e.g., harmful algal blooms, algal response, recreation, aquatic life and disinfection byproducts) and what approaches in developing standards have been taken by other regulatory agencies. The division will engage stakeholders in the standards development process and timely communicate related progress.

The division will continue to work with EPA to understand its concerns and recommendations regarding nutrient standards for lakes, including variable algal response to nutrient pollution. At the 2020 triennial review for nutrient regulations, the division plans to recommend that the commission schedule a rulemaking hearing for 2022 to consider revisions to Regulation #31 to revise the lakes and reservoir nutrient standards. By mid-2021, the division plans to have developed draft revisions to the lake and reservoir phosphorus and nitrogen criteria for consideration as part of a statewide rulemaking hearing in 2022. Also as part of the rulemaking hearing in 2022, the division plans to propose application of the revised criteria for lakes and reservoirs above dischargers, DUWS reservoirs and lakes, and lakes and reservoirs with public swimming beaches that meet the definition of natural swimming areas in C.R.S. § 25-5-801. The division plans to propose application of nitrogen and phosphorus criteria for the remaining lakes in 2027.

ii. Standards implementation through 2027

During the first phase, the commission proceeded with a strategy to adopt standards for total phosphorus for lakes and reservoirs that are greater than 25 acres, and that are above a qualified discharger as noted in the basin regulations. This phase has been completed and total phosphorus standards have been adopted statewide in Regulations ##32 through 38. Nitrogen standards have not yet been adopted. As noted above, the plan is that in 2022, phosphorus and nitrogen standards for lakes will be revised in Regulation #31 and also adopted in the basins above dischargers, in DUWS reservoirs, and in lakes and reservoirs with public swimming beaches.

Currently the 2018 303(d) Listing Methodology defines assessment methods for lakes and reservoirs. For reservoirs where either total nitrogen or total phosphorus standards are adopted, the division

will assess the average of available summer data (July 1-September 30) in the mixed layer. A lake or reservoir is determined to be impaired if the summer average exceeds the standards using three or more representative samples from that summer. If the summer average of the data exceeds the standard more than once in five years, the commission may add that lake or reservoir to the 303(d) List of Impaired Waters. The 303(d) Listing Methodology is updated every two years. It is anticipated that these methods will be reevaluated through discussions during the 303(d) Listing Methodology workgroup meetings.

Once a segment is listed on the 303(d) List of Impaired Waters, a TMDL may be developed for that waterbody. TMDL development priorities are reexamined periodically. If a listed segment for total nitrogen or total phosphorus is prioritized, a TMDL will be developed to identify the point source and nonpoint source loading to the impaired waterbody. Once the TMDL is approved by EPA, point source allocations in the TMDL must be translated into permit effluent limitations as applicable permits are renewed.

B. Chlorophyll *a*

i. Approach for proposing standards

While it is not expected that the existing interim chlorophyll *a* values to protect DUWS or recreation in streams will be revised prior to 2022, the division will review the information upon which these values were based, and may propose revisions to the standards if new or updated information makes it necessary. The division will propose chlorophyll *a* standards for all waters (streams and rivers as well as lakes and reservoirs), as appropriate, as part of a statewide rulemaking hearing in 2022.

For lakes and reservoirs, the division plans to propose chlorophyll *a* standards for all previously classified DUWS waters. For DUWS waters downstream of qualified dischargers, the division will propose the DUWS use sub-classification and chlorophyll *a* standards to protect that use. The division will continue to be consistent with past implementation for the remaining lakes and propose chlorophyll *a* standards below dischargers in lakes that are larger than 25 acres in size and have a residence time of at least fourteen days, and for stream segments with a classified recreation use.

ii. Standards implementation through 2027

During the first phase, the commission has proceeded with a strategy to adopt standards for chlorophyll *a* for lakes and reservoirs that are greater than 25 acres as well as for streams located upstream of all qualified dischargers as noted in the basin regulations. In addition, the DUWS use subcategory has been adopted where lakes meet the class description; however, the sub-category numeric values have not been applied. This phase has been completed and standards have been adopted statewide in Regulations #32 through #38. As described above, in 2022, the division plans to propose the adoption of chlorophyll *a* standards statewide as appropriate for all remaining segments in Regulations #32 through #38. The chlorophyll *a* standard would not be implemented directly into permit limits. If a waterbody is assessed and determined to be impaired using the chlorophyll *a*

standard, a TMDL must be written first to determine if reductions in nutrient loading from point sources are required to bring the segment back in attainment of the chlorophyll *a* standard.

For streams where chlorophyll *a* standards are adopted, the division will assess the summer time maximum (July 1-September 30). Only one sample is required for assessment, and the allowable exceedance frequency is once in five years. For the reservoirs where chlorophyll *a* standards are adopted, the division will assess the average of the available summer data (July 1-September 30). A lake or reservoir is determined to be impaired if the summer average exceeds the standards using three or more representative samples from that summer. For lakes and reservoirs designated as DUWS, a minimum of five representative samples in a season is required for the assessments of chlorophyll *a* for that year. For lakes and reservoirs designated as DUWS, chlorophyll *a* must be collected from March 1 through November 20.

If the average of the data exceeds the standard more than once in five years, the commission may add that waterbody to the 303(d) List of Impaired Waters. The 303(d) Listing Methodology is updated every two years. It is anticipated that these methods will be reevaluated through discussions during the 303(d) Listing Methodology work group meetings. Sandy bottom streams have been identified as one area for which to further explore the assessment methods.

Once a segment is listed on the 303(d) List of Impaired Waters, a TMDL may be developed for that waterbody. TMDL development priorities are reexamined periodically. If a listed segment for chlorophyll *a* is prioritized, a TMDL will be developed to identify the point source and nonpoint source loading to the impaired waterbody. Once the TMDL is approved by EPA, point source allocations in TMDLs must be translated into permit effluent limitations as applicable permits are renewed.

C. Total nitrogen and total phosphorus for streams

i. Approach for proposing refined standards

The interim numeric nutrient values in Regulation #31 for rivers and streams were developed for protection of the aquatic life use. These values were based on a stressor response relationship derived from the response of the macroinvertebrate community to nutrient concentrations. However, the development of nutrient criteria for streams using algal community endpoints has become increasingly common, and a multi-assemblage approach has been encouraged by EPA (e.g., algae, benthic macroinvertebrates, and fish). This algal assemblage approach would include developing a relationship between nitrogen and phosphorus concentrations and the response of the algal community using quantifiable and relevant ecological endpoints such as diversity, abundance and biomass.

To begin evaluating suitable methods for refinement of its nutrient values, a summary of the division's algal community data for streams (i.e., algal ID, chlorophyll *a*, ash-free dry mass) has been developed to evaluate potential data gaps and the utility of existing data to support refinement of criteria to protect Colorado's lotic waterbodies. Work is also ongoing to identify studies that may

need to be conducted or additional sampling that may be necessary to supplement the division's routine sampling efforts and bolster the database used for standards development. Future efforts may include: additional characterization of nutrient conditions across stream types and disturbance intensities, analysis of detailed algal community characteristics and responses, development of a conceptual model of nutrient-periphyton-classified use interactions, evaluation of additional parameters (e.g., pH and dissolved oxygen) that affect the aquatic life community, and development of biological indices that are responsive to nutrients and may help identify protective use-based thresholds.

A review of recent literature will be conducted to better understand the relationships between nutrients and relevant endpoints in streams (e.g., algal community response, impacts on aquatic life) and what standards approaches have been taken by other regulatory agencies. The division will engage stakeholders in the standards development process and timely communicate related progress.

The division will continue to work with EPA to understand its concerns regarding nutrient thresholds for streams, and to evaluate appropriate and relevant endpoints to protect the classified uses. The division plans to have draft revised rivers and streams phosphorus and nitrogen criteria for rivers and streams developed by fall 2025 for consideration as part of a statewide rulemaking hearing in 2027.

ii. Standards implementation through 2027

During the first phase, the commission has proceeded with a strategy to adopt standards for total phosphorus in streams in waters located upstream of all qualified dischargers as identified in the basin regulations. Nitrogen standards have not yet been adopted. In 2027, total nitrogen and total phosphorus standards will be considered by the commission for individual segments where total phosphorus and total nitrogen standards have not yet been adopted. Once numeric standards are in place, the division will develop water quality based effluent limits based on the standards.

VII. Other Water Quality Standards Development through 2027

A. Temperature

The division continues to work with stakeholders regarding the adoption of revised temperature standards in the basin rulemaking hearings. The division will continue to participate in a statewide temperature technical advisory committee to discuss data collection, future studies and refinements to statewide standards. The division will also continue to reexamine past temperature standards decisions to determine if new and relevant information is now available to either refine the uses or standards for segments in basin rulemaking hearings. These refinements may also include changes to the timing and duration of the shoulder season to protect sensitive life stages, but also to recognize where current standards may be overly protective. Additional work regarding the realized thermal niche will also be pursued to examine where refinements can be made in segments in the transition zone. There is a small possibility that the division will propose changes to temperature criteria in Regulation #31 in the 2022 hearing based on work done in the temperature technical advisory committee and the basin site-specific hearings.

B. Cadmium

EPA released updated recommended 304(a) criteria for cadmium in March 2016. In 2017, the commission adopted the division's proposal to apply the updated 304(a) criteria for cadmium to a select number of cold water segments in Regulations #34 and #35. The division supports continued adoption of the updated hardness-based criteria on a targeted, site-specific basis in cold waters because they reflect the most up-to-date science and are protective of sensitive cold water aquatic life (i.e., trout). The division plans to further evaluate the criteria and consider statewide adoption of these updated criteria and Colorado-specific adjustments of these criteria during the 2021 Regulation #31 rulemaking hearing. It is anticipated that the rulemaking hearing in 2021 will be limited in scope to cadmium and other minor issues. This change to past practice recognizes the need to focus resources on the work necessary to lead up to the 2027 rulemaking hearing.

C. Ammonia

EPA released updated recommended 304(a) criteria for ammonia in 2013. The new ammonia criteria reflect more recent information regarding the toxicity of ammonia for new and more sensitive species, including unionid mussels and non-pulmonate snails. The division has not recommended adopting EPA's updated ammonia criteria in past hearings, as studies are currently underway to evaluate the applicability of these new criteria for Colorado's aquatic life communities. Specifically, these studies are focusing on the historical distributions of sensitive species in Colorado. Pending the results of these studies, additional toxicity data may need to be developed for sensitive species to support protective and appropriate ammonia criteria for Colorado.

The division plans to further evaluate the updated 304(a) criteria and review the results of ongoing and future studies. In addition, in light of the challenges for wastewater treatment facilities to treat for nutrients as well as ammonia and selenium at the same time, the division plans to propose ammonia criteria as part of the rulemaking hearing in 2027.

D. Selenium

EPA released updated recommended 304(a) criteria for selenium in June 2016. The new selenium criterion uses a multi-parameter, tissue-based approach that is much more complex and more stringent than Colorado's current water column-based standards. The division is currently working on studies with Colorado Parks and Wildlife and Colorado State University to evaluate whether the updated criterion is appropriate for Colorado and if there are approaches to facilitate future implementation of this complex criterion in Colorado. The division has not recommended adopting EPA's updated selenium criterion in past hearings. The division plans to further evaluate the criteria and the results of ongoing and future studies. In addition, in light of the challenges for wastewater treatment facilities to treat for nutrients as well as ammonia and selenium at the same time, the division plans to propose selenium criteria as part of the rulemaking hearing in 2027.

E. Unscheduled water quality standards development work

Along with the issues identified in this roadmap, the division anticipates additional pressures on standards development work in the next 10 years. These pressures will have to be evaluated based on the work required to implement this roadmap and, if needed, the roadmap may have to be revised to address a significant need. The division foresees the following issues that may be considered over the next 10 years:

- Review and potential adoption of EPA’s Cyanobacteria Criteria for Recreation Use
- EPA aquatic life use criteria refinement for chloride and development for sulfate
- Development and review of discharger specific variances not associated with the roadmap

VIII. Feasibility information

Stakeholders have expressed difficulty with planning for and meeting uncertain implementation timeframes and standards including but not limited to ammonia, total phosphorus, total nitrogen, temperature, and selenium. Since treatment processes for all of these pollutants are interrelated, planning for only one parameter at a time may result in more inefficiencies (i.e. capital, treatment, infrastructure, and personnel resources) than planning for all aspects at once. Alternately, addressing all parameters at once may require capital expenditures that exceed available budget capacities. The division acknowledges these challenges and is working on various plans and projects to help address as many of the issues as possible related to implementing the various standards. As part of the approach, the division intends to undertake the following:

- Update the 2010 Technologies, Performance, and Costs for Wastewater Nutrient Removal and Implementation Recommendations between now and 2027
- Consider the need for sector-based discharger specific variances (DSV) for one or multiple parameters
- Evaluate Regulation #85 data to inform future decisions
- Develop a guidance and accompanying fact sheets designed to assist systems with the evaluation of alternatives related to DSVs

This 10-year water quality roadmap allows the division and the regulated community to plan for implementation of new standards over the next 10 years. These standards include selenium, ammonia, and temperature in addition to nutrients. If a stakeholder anticipates difficulty meeting the water quality standards that are expected to be adopted in 2027, the stakeholder should work with the division to develop a site-specific standard or pursue a DSV.

The division is in the process of developing additional guidance that will assist the regulated community and the commission with making decisions regarding DSVs. This guidance will provide additional tools to the guidance already provided in the commission’s Policy 13-1, Interim Guidance for Implementation of Discharger Specific Variances Provisions. Newly developed materials will include information on lessons learned, helpful approaches and fact sheets meant to assist applicants

with the alternatives analysis. The division is working with four different contractors on developing technology fact sheets to support the alternatives analysis for temperature, ammonia, nitrate, and selenium. These fact sheets will provide technical and cost information on various technologies critical to the decision making process related to DSVs. It is anticipated that most of the fact sheets will be completed in 2018. Once completed the division will work on whether to include these fact sheets with the current Policy 13-1 or develop a separate guidance or tool box to complement the existing policy document. The goal is to have these documents and guidance materials available in time to be used prior to the 2027 rulemaking hearing.

The division issued *Technologies, Performance, and Costs for Wastewater Nutrient Removal and Implementation Recommendations* in November 2010 to outline the technologically reliable and feasible treatment limits for nutrients using biological nutrient removal and enhanced biological nutrient removal technologies specifically for domestic wastewater treatment works. This document was created to inform the commission during the initial adoption of Regulation #85. While the document is still relevant, technologies, instrumentation, and operational practices continue to evolve. Between 2017 and 2027, the division intends to update the technology paper to better represent the most recent science and practices and to assist with feasibility efforts.

With a more defined and earlier roll-out of standards over the next ten years, the division expects that stakeholders will use this time to plan and implement strategies that can be implemented without delay once the standard becomes effective. Strategies may include planning for additional treatment, the development of DSVs or other standards actions including resegmentation or changes in use classifications. If action needs to be taken early, such as for a site-specific standard development, the Phase 2 delay and roadmap allow time for advanced planning.

Coordination with stakeholders on these efforts will be ongoing. The division is already developing this information. The division will seek input and report on this information on a routine basis through the quarterly work group meetings, the email distribution list for the roadmap workgroup, and the division's website.

IX. Monitoring and Measuring Progress of Colorado's Nutrient Management Plan

A. Establish a baseline for instream nutrient concentrations

An important part of Colorado's nutrient management approach is to show continued water quality improvements as Regulation #85 and eventual changes to Regulation #31 are implemented over the next 10 years. The division will establish a baseline for nutrient concentrations across the State. Since 2014, in order to supplement the existing body of data on nutrient levels in Colorado, the division has added total phosphorus and total nitrogen to its routine panel assessed at all monitoring sites. In addition, facilities with design capacities greater than one MGD have been collecting both instream and effluent data. All of this data can be used to establish a baseline.

The division plans to develop this information in 2018-2019. The division will work with stakeholders and report on this information on an annual basis through the roadmap work group effort, at commission meetings and through the division's website.

The division has partnered with Colorado State University's Center for Comprehensive, Optimal and Effective Abatement of Nutrients to develop online tools to assess and analyze nutrients statewide. Currently, the nutrient monitoring data collected by facilities to fulfill Regulation #85 requirements are publically available for visualization, download, or analysis through the center's Environmental Risk Assessment and Management System (eRAMS). The division may employ analysis tools within eRAMS to better understand or refine baseline conditions.

B. Tracking progress on nutrient reductions

The division will track the following information:

- Instream nutrient concentrations compared to the baseline
- Instream nutrient trend analysis
- Impacts of nutrients on designated uses such as percent of impaired waters, number of public water systems with nitrate maximum contaminant level (MCL) violations, hazardous algal blooms, and number of facilities treating or blending in order to meet the nitrate MCL
- Nonpoint source reduction efforts
- Progress on incorporating nutrient effluent limitations in permits
- Results of the voluntary incentive program

As the division develops the methodologies for how it will track the information, the division will seek input from stakeholders. It is anticipated that the division will report on this information on an annual basis through the roadmap work group effort, at commission meetings and through the division's website.