REVISIONS TO THE BASIC STANDARDS AND METHODOLOGIES FOR SURFACE WATER (REGULATION #31) AND NUTRIENT MANAGEMENT CONTROL REGULATION (REGULATION #85)

WQCC Rulemaking Hearing
March, 2012
Commission’s Legal Authority to Adopt Control Regulations

C.R.S. § 25-8-205(1): The Commission may promulgate control regulations for the following purposes:

(a) To describe prohibitions, standards, concentrations, and effluent limitations on the extent of specifically identified pollutants, including, but not limited to, those mentioned in section 25-8-204, that any person may discharge into any specified class of state waters;

(c) To describe precautionary measures, both mandatory and prohibitory, that must be taken by any person owning, operating, conducting, or maintaining any facility, process, activity, or waste pile that does cause or could reasonably be expected to cause pollution of any state waters in violation of control regulations or that does cause the quality of any state waters to be in violation of any applicable water quality standard.
25-8-204(4) In promulgating water quality standards, the commission shall consider:

(a) The need for standards which regulate specified pollutants;

(b) Such information as may be available to the commission as to the degree to which any particular type of pollutant is subject to treatment; the availability, practicality, and technical and economic feasibility of treatment techniques; the impact of treatment requirements upon water quantity; and the extent to which the discharge to be controlled is significant;

(c) The continuous, intermittent, or seasonal nature of the pollutant to be controlled;

(d) The existing extent of pollution or the maximum extent of pollution to be tolerated as a goal;

(e) Whether the pollutant arises from natural sources;

(f) Beneficial uses of water; and

(g) Such information as may be available to the commission regarding the risk associated with the pollutants including its persistence, degradability, the usual or potential presence of the affected organisms in any waters, the importance of the affected organisms, and the nature and extent of the effect of the pollutant on such organisms.
Nature and Extent of the Problem?

Nationwide: EPA Priority

Colorado:
  Concentrations are elevated above background

Reservoirs with pH, DO impairments
Nature and Extent of Sources

SPARROW Modeling of Upper Missouri Basin (USGS, 2011)

TP and TN annual loading

Colorado’s South Platte Basin, below Colfax Ave, the most significant sources are Point Sources
Nature and Extent of Sources

- Domestic Effluent is high in N and P
- > 700 MGD authorized discharge of treated domestic effluent

Typical effluent concentrations and Tier 1 limits from C B Study. Background concentrations from WQCD PHS Table 2, p 12
Effects on Uses?

- Scientific literature
- Colorado Data
- Waters impaired by consequences of Nutrient Enrichment
Protection, avoid impairment

- CWQCA at 25-8-102 (1)

- …it is declared to be the policy of this state to prevent injury to beneficial uses made of state waters…
31.11 Basic Standards Applicable to Surface Waters of the State

(1) …state surface waters shall be free from substances attributable to human-caused point source or nonpoint source discharge in amounts, concentrations or combinations which:

(a) for all surface waters except wetlands;

   (i) can settle to form bottom deposits detrimental to the beneficial uses. Depositions are stream bottom buildup of materials which include but are not limited to anaerobic sludges, mine slurry or tailings, silt, or mud; or

   (ii) form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or

   (iii) produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species or to the water; or

   (iv) are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or

   (v) produce a predominance of undesirable aquatic life; or

   (vi) cause a film on the surface or produce a deposit on shorelines;

Regulation #31, 31.11 Emphasis added
Interpreting the Narrative Standards
303(d) List, Permits

• Weight of evidence approach to be developed for 303(d) Listing Methodology (not use the interim numeric values directly)

• In the event that a waterbody is identified as Impaired, rely on Reg 85 requirements for Permits.
Nutrient Technical Guidance Manual: Lakes and Reservoirs

- If only one factor, such as phosphorus, was always limiting, the task of developing nutrient criteria would be a simple matter of determining limits on that single factor. Unfortunately, the factor that limits plant biomass may (1) change seasonally or over longer periods of time, (2) vary depending on the land use, or (3) vary regionally. It would make little sense to construct a single nutrient criterion when that nutrient may not necessarily limit a target lake or lakes.

40 CFR 131.10 (b)

- the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.
DUWS Proposal

• Policy Concept
  – Control algal contribution to DBP precursors

• Scope
  – Interim value: chlorophyll
  – Discretionary application to lakes classified DUWS

• Assessment
  – Mar-Nov average
  – 1/5-y exceedance
Stream Recreation Proposal

• Policy Concept
  – Visual perception; “desirability” for recreational experience

• Scope
  – Interim value: benthic algal chlorophyll

• Assessment
  – Summer maximum
  – Representative sample by WQCD protocol
  – Not to exceed
Lakes Proposal

• Policy Concept
  – Target trophic condition (or less productive)
    • Maintain ecosystem health
    • Balance competing interests
    • Minimize WQ impacts

• Scope
  – Interim values: chlorophyll, TP, and TN
  – Cold and Warm lakes

• Assessment
  – Summer average
  – 1/5-y exceedance
Exhibit 20, Photo 3

Roaring Fork River at Fothergill Park

Escalante Cr at Escalante SWA

Bear Creek above Bear Cr Res
Figure 1. Schematic of the Colorado hybrid approach used to develop the proposed interim nutrient values for rivers and streams. The proposed values are anchored in the nutrient and biological reference condition and an allowable 5 percent decline in biological condition is calculated. The nutrient concentration that corresponds to end of this decline is proposed as the interim nutrient values.
Figure 2. Mechanisms through which nutrients impact aquatic life in rivers and stream
Figure 3. Wedge plots showing the response of the biological metrics to nutrients.
Beaver Creek at Avon, Exh 20, #4
WQS Rulemaking Schedule

2013 - Consider TP, Chl, upstream & DUWS: Ark/Rio Grande Basins
2014 - Consider TP, Chl, upstream & DUWS: Up/Low Colo Basins
2015 - Consider TP, Chl, upstream & DUWS: So Platte Basin
2016 - (Basic Standards Review)
2017 - Consider TP, Chl, upstream & DUWS: San Juan/ Gunn Basins
2018 - Consider TN, TP, Chl, upstream & DUWS: Ark/Rio Grande Basins
2019 - Consider TN, TP, Chl, upstream & DUWS: Up/Low Colo Basins
2020 - Consider TN, TP, Chl, upstream & DUWS: So Platte Basin
2021 - (Basic Standards Review)
2022 - Consider TN, TP, Chl, upstream & DUWS: San Juan/ Gunn Basins
2023 - Consider TN, TP, Chl, all waters & DUWS: Ark/Rio Grande Basins
…and so forth
31.17(h) Site-Specific Flexibility to Consider Alternatives to the Interim Values

Both before and after May 31, 2022, in considering adoption of numeric standards for specific water bodies in Colorado, the Commission may review relevant site-specific factors and conditions in determining what numeric standards is most appropriate, and may adopt standards, either more or less stringent that the 31.17(b)(c) and (d) interim values

(i) Where evidence based on expected conditions demonstrate that an alternative numeric standard would be more appropriate for the protection of use classifications the Commission may consider assigning ambient quality-based standards or site-specific criteria based standards as outlined in 31.17(b)(ii-iii),

(ii) Where is has been demonstrated that interim values are not feasible to achieve the Commission may consider modifying the use classification as outlined in Section 31.6(2)

(iii) Where the conditions established in Section 31.7(3) a) are met, the Commission may consider granting a temporary modification.
Developing Technology-based Numeric Nutrient Limits and Associated Compliance Monitoring
Guiding Principles

– Promote immediate nutrient treatment improvement for Nitrogen and Phosphorus

– Establish reliably achievable limits for well engineered, operated, and maintained treatment facilities

– Establish compliance monitoring periods appropriate for chronic contaminants

– Encourage facilities to select processes that provide flexibility for future improvements
## Technology Performance by Treatment Bin

<table>
<thead>
<tr>
<th>Bin</th>
<th>Treatment Process</th>
<th>Total Nitrogen</th>
<th>Total Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Annual Average Performance (TPS 50%)</td>
<td>Reliable Process Performance (TPS 95%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Annual Average Performance (TPS 50%)</td>
<td>Reliable Process Performance (TPS 95%)</td>
</tr>
<tr>
<td>1</td>
<td>Lagoon</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Activated Sludge</td>
<td>-</td>
<td>30 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 mg/L</td>
<td>6 mg/L</td>
</tr>
<tr>
<td>3</td>
<td>Biological Nutrient Removal (BNR)</td>
<td>6.7 mg/L</td>
<td>10 mg/L</td>
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<tr>
<td></td>
<td></td>
<td>0.7 mg/L</td>
<td>1 mg/L</td>
</tr>
<tr>
<td>4</td>
<td>Enhanced Biological Nutrient Removal (EBNR)</td>
<td>4 mg/L</td>
<td>6 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.43 mg/L</td>
<td>0.65 mg/L</td>
</tr>
<tr>
<td>5</td>
<td>BNR or EBNR with Chemical Addition</td>
<td>~</td>
<td>~</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.43 mg/L</td>
<td>0.65 mg/L</td>
</tr>
<tr>
<td>6</td>
<td>BNR or EBNR with Chemical Additional and Tertiary Filtration</td>
<td>2.7 mg/L</td>
<td>4 mg/L</td>
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<tr>
<td></td>
<td></td>
<td>0.24 mg/L</td>
<td>0.36 mg/L</td>
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<tr>
<td>7</td>
<td>BNR or EBNR with Chemical Addition and Reverse Osmosis or Ultra Filtration</td>
<td>0.7 mg/L</td>
<td>1 mg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.05 mg/L</td>
<td>0.07 mg/L</td>
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# Technology Performance by Treatment Bin

<table>
<thead>
<tr>
<th>Bin</th>
<th>Treatment Process</th>
<th>Process Schematic</th>
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<tr>
<td>1</td>
<td>Lagoon</td>
<td><img src="image1.png" alt="Image" /></td>
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<tr>
<td>2</td>
<td>Activated Sludge</td>
<td><img src="image2.png" alt="Image" /></td>
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<tr>
<td>3</td>
<td>Biological Nutrient Removal (BNR)</td>
<td><img src="image3.png" alt="Image" /></td>
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<tr>
<td>4</td>
<td>Enhanced Biological Nutrient Removal (EBNR)</td>
<td><img src="image4.png" alt="Image" /></td>
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<tr>
<td>5</td>
<td>BNR or EBNR with Chemical Addition</td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td>6</td>
<td>BNR or EBNR with Chemical Additional and Tertiary Filtration</td>
<td><img src="image6.png" alt="Image" /></td>
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<tr>
<td>7</td>
<td>BNR or EBNR with Chemical Addition and Reverse Osmosis or Ultra Filtration</td>
<td><img src="image7.png" alt="Image" /></td>
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Monitoring
85.6 MONITORING REQUIREMENTS

(1) Monitoring requirements are established by this Control Regulation to evaluate the effectiveness of this control regulation and to determine the sources and load of nutrients at selected locations, and eventual implementation of appropriate and necessary source controls.
Table 7 Summary of How Proposed Effluent Limits
In Regulation #85 Determine Domestic Facilities Monitoring Requirements

<table>
<thead>
<tr>
<th></th>
<th>&lt; 0.5 MGD</th>
<th>0.5 – 1.0 MGD</th>
<th>1.0-2.0 MGD</th>
<th>&gt;2.0 MGD</th>
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</thead>
<tbody>
<tr>
<td><strong>De minimus</strong></td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent Only (monthly)</td>
<td>Effluent Only (monthly)</td>
</tr>
<tr>
<td><strong>Disadvantaged</strong></td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent Only (monthly)</td>
<td>Effluent Only (monthly)</td>
</tr>
<tr>
<td><strong>Lagoon</strong></td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent and Instream (monthly)</td>
<td>Effluent and Instream (monthly)</td>
</tr>
<tr>
<td><strong>In Current Control Reg. Basin</strong></td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent and Instream (bimonthly)</td>
<td>Effluent and Instream (monthly)</td>
<td>Effluent and Instream (monthly)</td>
</tr>
<tr>
<td><strong>In low priority basins</strong></td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent and Instream (bimonthly)</td>
<td>Effluent and Instream (monthly)</td>
<td>Effluent and Instream (monthly)</td>
</tr>
<tr>
<td><strong>In high priority basins</strong></td>
<td>Effluent Only (bimonthly)</td>
<td>Effluent and Instream (bimonthly)</td>
<td>Effluent and Instream (monthly)</td>
<td>Effluent and Instream (monthly)</td>
</tr>
</tbody>
</table>
Cost/Benefit Study of the Impacts of Potential Nutrient Controls for Colorado Point Source Discharges

December 2011

On behalf of

Colorado Department of Public Health and Environment

CDM

HE

RISK Sciences
Cost Benefit Study Facilities
Discharge Flow per Square Mile (No Federal Land)

Legend
NonExempt Facilities
Flow Million Gallons per Day (MGD)
- 2 to 3
- 3 to 5
- 5 to 10
- Above 10
Delayed NonExempt Facilities
Exempt Facilities

Hydrologic Unit Code (8)
Flow per Square Mile (mgd)
- No Discharge or Regulated Plant
- 0.000002 - 0.009053
- 0.009054 - 0.174808

Use constraints: There are no restrictions or legal prerequisites for using this data set. The State of Colorado assumes no liability for the completeness, correctness, or fitness for use of this data set.
Blue Mesa Reservoir