Proposed Revision of Cadmium Aquatic Life Water Quality Criteria

September 7, 2017
Associated Industries of Missouri
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Cadmium Criteria Revisions

• 2001 EPA Cadmium Criteria Revision
• U.S. Geological Survey 2010 revision - *Cadmium Risks to Freshwater Life: Derivation and Validation of Low-Effect Criteria Values using Laboratory and Field Studies*
• Idaho, Colorado, and New Mexico – revised criteria approved by EPA
• MN – drafted, proposed for rulemaking
Chronology of Proposed Revisions

• 2012 – AIM proposed revisions to MDNR
• AIM petitioned Clean Water Commission October 2014
  – MDNR response (December 2014): consider for triennial review
• AIM submitted revised proposal in May 2016 including draft RIR
## Importance of Revisions

<table>
<thead>
<tr>
<th></th>
<th>Example Limits – Existing Missouri Criteria (µg/l)</th>
<th>Example Limits – Proposed Revised Criteria (µg/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Monthly Avg</td>
<td>Daily Max</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.3</td>
<td>0.6</td>
</tr>
</tbody>
</table>

- Example calculation at hardness = 200 mg/l and upstream low flow = 0 cfs
- Chronic criteria in this example
History of Cadmium Criteria Updates

• EPA criteria previously updated in 2001
  – Basis for MO criteria

• New data – new EPA criteria April 2016
  – Additional species
  – More data for existing species

Table 2. Number of Aquatic Species Included in Cadmium AWQC.

<table>
<thead>
<tr>
<th>Year</th>
<th>Freshwater Acute</th>
<th>Freshwater Chronic</th>
<th>Estuarine/Marine Acute</th>
<th>Estuarine/Marine Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>29</td>
<td>13</td>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td>1985</td>
<td>52</td>
<td>16</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>1995</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>2001</td>
<td>65</td>
<td>21</td>
<td>61</td>
<td>2</td>
</tr>
<tr>
<td>2016</td>
<td>101</td>
<td>27</td>
<td>94</td>
<td>2</td>
</tr>
</tbody>
</table>

a NA = Not Available

Source: EPA Aquatic Life Ambient Water Quality Criteria Cadmium - 2016
Overview of Proposed Cadmium Criteria Revision

• **Acute criteria**
  – Adopt EPA 2016 criterion for cold-water protection
    • Dataset includes salmonids
    • Criterion is driven by rainbow trout
  – Apply EPA procedures to derive criterion for cool and warm-water protection
    • Remove salmonids from EPA dataset

• **Chronic criteria**
  – Apply EPA 2016 criteria for all waters
    • Chronic not driven by salmonids
Proposal includes Recalculating for Cool and Warm-water Acute Cadmium Criteria

Remove salmonids from dataset

Source: EPA Aquatic Life Ambient Water Quality Criteria Cadmium - 2016
Proposed Chronic Criteria Revision

• Adopt EPA 2016 revision as is
• Additional data
  – New species
  – More data for existing species
• Non-salmonid criteria not necessary
  – Most sensitive organisms not salmonids

Proposed chronic criteria for cold, cool and warm-water:

\[ e^{(0.7977 \times \ln(\text{Hardness}) - 3.909)} \times (1.101672 - (\ln(\text{Hardness}) \times 0.041838)) \]
Recommendation

• Adopt EPA criteria in Missouri for:
  – Cold-water acute
  – Cold, cool and warm-water chronic

• Adopt proposed cool and warm-water acute criteria