Proposed Revisions to 314 CMR 4.00: Massachusetts Surface Water Quality Standards (SWQS)

MassDEP
Bureau of Water Resources
Division of Watershed Management
Watershed Planning Program

314 CMR 4.00: MASSACHUSETTS SWQS

DISCLAIMER: The descriptions of the current SWQS regulation and the proposed revisions to it included in this document are for informational purposes, only. The actual SWQS regulation shall control in the event of any discrepancy with the description provided. The proposed revisions may or may not be adopted into law, and are subject to change without notice. As a result, no person in any administrative or judicial proceeding shall rely upon the content of this document to create any rights, duties, obligations or defenses, implied or otherwise, enforceable at law or in equity.
Overview of Clean Water Act Framework and Water Quality Standards
Clean Water Act Framework

- **Water Quality Standards (Designated Uses and Criteria)**
  - Conduct Water Quality Monitoring and Assessment
    - Meeting Water Quality Standards?
      - Yes
      - No
      - 303(d) List
  - Develop Total Maximum Daily Load or Other Strategy
    - Implement Strategies (NPDES, 319, 404, etc.)
  - Apply Antidegradation for Discharge Permitting (NPDES, 404, etc.)
Surface Water Quality Standards

• Define the water quality goals of a water body by designating the use(s) of the water body and by setting criteria necessary to protect those uses.

• Core components of surface water quality standards:
  1. Designated uses
  2. Water quality criteria
  3. Antidegradation provisions
  4. General policies

• Do not apply to ground water.
Establishing Surface Water Quality Standards

• The Federal Clean Water Act requires state promulgation and periodic reviews of SWQS
  – First promulgated in Massachusetts in 1967 and periodically revised (314 CMR 4.00)
  – Updates to Massachusetts SWQS last made in 2006 and 2013

• EPA has oversight authority for review and approval
  – SWQS do not take effect until EPA approves them
  – EPA has 60 days to approve and 90 days to disapprove after receipt
Overview of Proposed Revisions to 314 CMR 4.00: Massachusetts SWQS
314 CMR 4.00: Massachusetts SWQS

• Divided into two parts
  1. Narrative section
  2. Tables and figures

• Revisions are proposed for both portions of the regulation
Overview of Proposed Revisions to Tables & Figures
Tables & Figures 1-27: Improve Clarity

- Modifications to overall format (including arranging basins alphabetically)
- Corrections (spelling, boundary descriptions, missing information)
- Added definitions as footnotes to the tables
- Two coastal figures updated to ensure consistency with major basin delineations in MassGIS
- Updated Combined Sewer Overflow and Public Water Supply qualifiers
- Where surface water names were listed with a qualifier (e.g., Cold Water) but without a class, the class was determined and listed
  - Note: only one substantive change was made to a surface water classification
Tables 1-27: Cold Water Designations

- Proposed regulations will add 153 Cold Water stream designations to Tables 1-27
- The Division of Fisheries and Wildlife (DFW) has already designated these 153 streams as Cold Water Fishery Resources (CFR)
- Adding these 153 stream designations will better align DEP’s SWQS with DFW’s CFR designations
Table 28: Site-Specific (SS) Criteria

• In 2013, 15 copper and 1 zinc SS criteria were added, derived using EPA’s Water Effect Ratio (WER) approach
  – EPA recently determined that the 15 copper SS criteria are not sufficiently protective
  – DEP proposes to remove these criteria from Table 28
  – DEP proposes to update the zinc SS criteria based on EPA’s technical review

• In 2006, 17 Cape Cod nitrogen SS criteria were added based on draft or preliminary TMDLs
  – The criteria have been revised to reflect the final TMDLs
Overview of Proposed Revisions to Narrative Sections
Key Revisions to SWQS Narrative Section

• Procedures for Sampling and Analyses (314 CMR 4.03(6))
  – Updates to procedures for collecting, preserving, and analyzing samples in connection with surface water quality standards

• Bacteria Criteria (314 CMR 4.05)
  – Update for consistency with EPA 2012

• Toxic Pollutants (314 CMR 4.05(5)(e))
  – Updates to model- and equation-based criteria
  – Addition of a new Table 29--Generally Applicable Criteria, consistent with EPA recommended ambient water quality criteria (AWQC)
Bacteria Criteria (314 CMR 4.05)

• In 2012, EPA released new recommended recreational bacteria criteria for the protection of human health
  – Minor change to the geometric mean criteria
  – Replaced a single-sample maximum value with a value not to be exceeded more than 10% of the time

• DEP coordinated with Department of Public Health (DPH) on the revisions
  – No changes to the criteria in DPH’s regulation used to make determinations for beach closures

• DEP’s criteria used to assess water quality for long-term recreational use
Bacteria Criteria (314 CMR 4.05) Geometric Mean

- **Geometric Mean**: DEP selected EPA’s recommended criteria at an illness rate of 36 illnesses per 1,000 persons.
- The 5-sample minimum requirement in the SWQS is proposed to be eliminated per EPA recommendation.

<table>
<thead>
<tr>
<th>Bacterial Indicator</th>
<th>Type of Water</th>
<th>Existing</th>
<th>Proposed New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterococci*</td>
<td>Marine and Fresh Water</td>
<td>35 cfu/mL (marine)</td>
<td>35 cfu/mL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33 cfu/mL (fresh)</td>
<td></td>
</tr>
<tr>
<td>Escherichia coli (E. coli)</td>
<td>Fresh Water</td>
<td>126 cfu/mL</td>
<td>126 cfu/mL</td>
</tr>
</tbody>
</table>

*The enterococci change from 33 to 35 cfu/mL is not considered significant and will ensure consistency with EPA’s 2012 guidance.*
### Bacteria Criteria (314 CMR 4.05) Averaging Period

- **Criteria calculation changes:** The time period over which the bacteria levels are averaged to compare to criteria will change in the proposed revisions to the SWQS.

<table>
<thead>
<tr>
<th>Type of Water</th>
<th>Applicable Season</th>
<th>Existing</th>
<th>Proposed New* (no minimum sample requirement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathing Waters</td>
<td>Bathing Season</td>
<td>5 most recent samples taken over the bathing season</td>
<td>30-day or smaller interval</td>
</tr>
<tr>
<td>Bathing Waters</td>
<td>Non-Bathing Season</td>
<td>6-month averaging period with a minimum of 5 samples</td>
<td>90-day or smaller interval</td>
</tr>
<tr>
<td>All Other Waters</td>
<td>Entire Year</td>
<td>6-month averaging period with a minimum of 5 samples</td>
<td>90-day or smaller interval</td>
</tr>
</tbody>
</table>

*For CSO- and POTW-impacted segments in the proposed revisions: 30-day-or-smaller interval.
DEP is proposing to adopt statistical threshold values (STVs) as recommended in the 2012 EPA guidance.

STVs would replace existing single-sample maximums (SSMs) in the proposed revisions to the SWQS.

<table>
<thead>
<tr>
<th>Bacterial Indicator</th>
<th>Type of Water</th>
<th>Existing SSM</th>
<th>Proposed New STV * (not to be exceeded by more than 10% of samples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterococci</td>
<td>Marine and Fresh Water</td>
<td>104 cfu/mL (marine) 61 cfu/mL (fresh)</td>
<td>130 cfu/mL</td>
</tr>
<tr>
<td>Escherichia coli (E. coli)</td>
<td>Fresh Water</td>
<td>235 cfu/mL</td>
<td>410 cfu/mL</td>
</tr>
</tbody>
</table>

*The proposed intervals for calculating the geomean (30-day or smaller interval and 90-day or smaller interval) also apply to STVs.
Toxic Pollutant Criteria (314 CMR 4.05(5)(e))
Generally Applicable Criteria

- Under CWA Section 303(c)(2)(B), states are required to adopt *Ambient Water Quality Criteria* (AWQC) for all toxic pollutants for which criteria have been published by EPA
  - If states do not adopt the criteria, they are required to provide an explanation to EPA
- In 2006, MassDEP incorporated EPA’s 2002 toxic pollutant criteria by reference
- EPA has requested that MassDEP incorporate the AWQC directly into 314 CMR 4.00
### Toxic Pollutant Criteria (314 CMR 4.05(5)(e))

#### Generally Applicable Criteria

**Aquatic Life Criteria**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Fresh or Marine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrolein (2009)</td>
<td>Fresh</td>
</tr>
<tr>
<td><strong>Aluminum (2018, update to 1988 guidance)</strong></td>
<td>Fresh</td>
</tr>
<tr>
<td>Ammonia (2013, update to 1999 guidance)</td>
<td>Fresh</td>
</tr>
<tr>
<td>Cadmium (2016, update to 2001 guidance)</td>
<td>Fresh and Marine</td>
</tr>
<tr>
<td>Carbaryl (2012)</td>
<td>Fresh and Marine</td>
</tr>
<tr>
<td><strong>Copper (2007, update to 1996 guidance)</strong></td>
<td>Fresh</td>
</tr>
<tr>
<td>Diazinon (2005)</td>
<td>Fresh and Marine</td>
</tr>
<tr>
<td>Nonylphenol (2005)</td>
<td>Fresh and Marine</td>
</tr>
<tr>
<td>Selenium (2016, update to 1999 guidance)</td>
<td>Fresh</td>
</tr>
<tr>
<td>Tributyltin (2004)</td>
<td>Fresh and Marine</td>
</tr>
</tbody>
</table>

**Human Health Criteria**

- 100 updated criteria
- 11 new criteria
Toxic Pollutant Criteria (314 CMR 4.05(5)(e))

Generally Applicable Criteria

- DEP proposes to adopt all new or updated EPA recommended criteria since 2002, except for the 2016 selenium criteria update, which requires further evaluation before adoption.

- All pollutant criteria will be incorporated into a new Table 29:
  - Table 29a: Aquatic Life Criteria
  - Table 29b: Human Health Criteria

- Most criteria are presented as absolute values.

- Some criteria use model- or equation-based formulas:
  - 7 metals (models and equations)
  - Ammonia (temperature- and pH-based equation)
  - Pentachlorophenol (pH dependent)
Toxic Pollutant Criteria (314 CMR 4.05(5)(e))

Generally Applicable Criteria

• The proposed revisions will allow for use of EPA’s recommended *Water Effect Ratio* (WER) method to adjust aquatic life criteria

• For certain metals, the WER may be used where adjustments to local conditions are desired
  – Will require data collection, toxicity testing, and analysis

• WER-adjusted criteria need approval by DEP and EPA for use in establishing effluent limits in NPDES permits
Toxic Pollutant Criteria (314 CMR 4.05(5)(e))
Freshwater Aluminum Criteria

• Existing SWQS include aluminum criteria based on 1988 EPA guidance
  – Fixed values: 87 µg/L chronic & 750 µg/L acute
• In 2018, EPA published updated aluminum criteria guidance that recommends use of Multiple Linear Regression (MLR) models
  – Criteria are derived based on local water chemistry: pH, hardness, and dissolved organic carbon (DOC)
• The variable 2018 MLR-based aluminum criteria supersede the fixed 1988 aluminum criteria (87 µg/L chronic and 750 µg/L acute)
• DEP proposes to include the 2018 aluminum MLR criteria in the new Table 29a
# Toxic Pollutant Criteria (314 CMR 4.05(5)(e))

## Freshwater Aluminum Criteria

<table>
<thead>
<tr>
<th>River Basin or Coastal Drainage Area</th>
<th>CMC† (Acute) μg/L</th>
<th>CCC† (Chronic) μg/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackstone</td>
<td>542</td>
<td>270</td>
</tr>
<tr>
<td>Boston Harbor/Charles</td>
<td>970</td>
<td>390</td>
</tr>
<tr>
<td>Buzzards Bay/Mt. Hope Bay/Narragansett Bay/Taunton/Ten-Mile</td>
<td>490</td>
<td>260</td>
</tr>
<tr>
<td>Cape Cod Coastal</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Chicopee (5th percentile)</td>
<td>291</td>
<td>171</td>
</tr>
<tr>
<td>Connecticut (5th percentile)</td>
<td>630</td>
<td>300</td>
</tr>
<tr>
<td>Deerfield</td>
<td>450</td>
<td>220</td>
</tr>
<tr>
<td>Farmington/Westfield (5th percentile)</td>
<td>309</td>
<td>180</td>
</tr>
<tr>
<td>French/Quinebaug</td>
<td>580</td>
<td>280</td>
</tr>
<tr>
<td>Housatonic/Hudson</td>
<td>1400</td>
<td>520</td>
</tr>
<tr>
<td>Ipswich/North Coastal/Parker</td>
<td>954</td>
<td>406</td>
</tr>
<tr>
<td>Islands Coastal</td>
<td>**</td>
<td>**</td>
</tr>
<tr>
<td>Merrimack/Shawsheen (5th percentile)</td>
<td>470</td>
<td>259</td>
</tr>
<tr>
<td>Millers</td>
<td>340</td>
<td>210</td>
</tr>
<tr>
<td>Nashua (5th percentile)</td>
<td>350</td>
<td>200</td>
</tr>
<tr>
<td>South Coastal</td>
<td>1200</td>
<td>460</td>
</tr>
<tr>
<td>Sudbury, Assabet, and Concord (SuAsCo)</td>
<td>954</td>
<td>394</td>
</tr>
</tbody>
</table>

*Defaults are based on 10th percentile criteria calculated from concurrent pH, DOC, and hardness data, except watersheds marked as 5th percentile to protect state and federal endangered species.

** Insufficient data are available to calculate watershed-based default criteria.

†The CMC = Criterion Maximum Concentration and the CCC = Criterion Continuous Concentration
Default Aluminum Multiple Linear Regression (MLR) Chronic Criteria vs. Existing Aluminum Chronic Criterion

5th Percentiles: Chicopee, Connecticut, Farmington–Westfield, Merrimack–Shawsheen, and Nashua

10th Percentiles: All Other Watersheds

Existing Criterion
CCC (87 μg/L)

Al MLR Criteria:

- Blackstone
- Boston Harbor–Charles
- Chicopee
- Connecticut
- Deerfield
- Farmington–Westfield
- French–Qlinebaug
- Housatonic–Hudson
- Ipswich–NorthCoastal–Parker
- Merrimack–Shawsheen
- Milers
- Nashua
- South Coastal
- SuAsCo (Concord)

Proposed Aluminum Chronic Criteria

AI MLR Criteria (μg/L)

Watersheds
Toxic Pollutant Criteria (314 CMR 4.05(5)(e))

Freshwater Aluminum Criteria

• The proposed SWQS also allow for the use of local ambient water quality data to derive site-specific criteria.

• If site-specific criteria are derived, those criteria will supersede the watershed default criteria.

• Site-specific criteria derived for use in establishing effluent limits in NPDES permits require approval by DEP and EPA, and will be subject to public notice in connection with the NPDES permitting process.
Toxic Pollutant Criteria (314 CMR 4.05(5)(e))

Freshwater Copper Criteria

• EPA Guidance
  – In 2007, EPA recommended a bioavailability model (Biotic Ligand Model; BLM) to calculate freshwater criteria for copper

• DEP Proposed Regulation
  – Continue use of the hardness-based equation for copper criteria in Table 29a
  – Allow for the use of the 2007 copper BLM in Table 29a
Freshwater Copper Criteria

- Copper Biotic Ligand Model (BLM)
  - The BLM allows the criteria to be derived based on local water chemistry.
  - This approach requires 10 water chemistry parameters as inputs (pH, dissolved organic carbon (DOC), major cations (Ca, Mg, Na, & K), major anions (SO$_4$ & Cl), temperature, and alkalinity).
  - Use of the BLM requires sample collection to develop the criteria.
Toxic Pollutant Criteria (314 CMR 4.05(5)(e))
Freshwater Copper Criteria

Hardness-Based Equations

• Copper criteria are derived using local water chemistry and equations

• Local water chemistry:
  – Hardness (Ca and Mg)

Biotic Ligand Model (BLM)

• Copper criteria are derived using local water chemistry and equations (model)

• Local water chemistry:
  – 10 parameters
  – pH, DOC, major cations (Ca, Mg, Na, & K), major anions (SO₄ & Cl), temperature, and alkalinity
For More Information on Proposed Revisions to 314 CMR 4.00: Massachusetts SWQS

MassDEP Website

www.mass.gov/regulations/314-CMR-4-the-massachusetts-surface-water-quality-standards

• Available documents
  – Summary of proposed revisions and notice to reviewers
  – 314 CMR 4.00 with proposed revisions
  – Fact sheets (8) with supplemental information
To Submit Comments on Proposed Revisions to 314 CMR 4.00: Massachusetts SWQS

- Comments, submitted orally or in writing, will be accepted at public hearings in Boston (October 25th) and Worcester (October 28th).
- Written comments will be accepted until 5:00 p.m. on Friday, November 8, 2019.
- Written comments must be submitted to

Richard.Carey@mass.gov

or

Richard Carey
MassDEP, Watershed Planning Program
8 New Bond Street
Worcester, MA 01606