

Overview: Numeric Criteria Source Development and Peer Review

Table 1 titled *MPCA WQS Rulemaking Summary 2000 – 2017, Numeric Criteria Source Development and Peer Review*, is a summary of the water quality standards (WQS) rulemaking proceedings conducted by the Minnesota Pollution Control Agency from 2000 to the present. This table includes a listing of the amended water quality rules (Minn. R. chs. 7050, 7052, 7053), the major rule amendments that were made, the years the amendments were adopted (along with an rule adoption citation in the *State Register*), and three categories assigning the origins of the numeric criteria used in support of the proposed rule amendments. These three categories: 1) U.S. Environmental Protection Agency (EPA)/Federal Criteria; 2) EPA/Federal Criteria and MPCA/State Adjustments; and 3) State Developed Criteria are briefly described below.

These descriptions also reference the type of peer review associated with the development of these criteria and subsequent adoption as water quality standards. EPA, in the *Peer Review Handbook* (4th Ed.), defines peer review as “a documented process for enhancing a scientific or technical work product so that the decision or position taken by the Agency, based on that product, has a sound, credible basis...Peer review is an in-depth assessment of the assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria and conclusions pertaining to the scientific or technical work product, and of the documentation that supports them.”

For the purposes of this discussion, a distinction is made defining the terms “water quality criteria” and “water quality standards”.

- Water quality criteria are numeric or narrative limits on pollutants or conditions that are sufficient to support the protection of a particular water body’s designated uses, including the most sensitive use. Many criteria (called ambient water quality criteria or AWQC) are developed by the EPA. States can make state-specific adjustments to federal criteria, or may develop criteria on their own. Criteria are based solely on data and scientific judgement about what is needed to protect the stated beneficial use (aquatic life, drinking water, etc.). Under the Clean Water Act a criterion must be based on scientific evidence demonstrating that the criterion will be protective of the beneficial use; economic considerations or technological feasibility of treatment cannot be used as justification for adjusting a criterion. Standing on their own, criteria are not rules; they are not automatically included in states’ water quality rules, nor are they enforceable at the federal or state level. Under the federal Clean Water Act adopting enforceable standards are the responsibility of states and authorized Indian Tribes; the federal government retains oversight authority, and can act to adopt standards on behalf of a state only if the state fails to act.
- Minnesota’s water quality standards consist of three components - criteria, a designated use, and an antidegradation requirement. After a public participation process, conducted in accordance with the Minnesota Administrative Procedures Act (Minn. R. ch. 1400), WQS are incorporated into state rule and are subject to EPA approval or disapproval.
 - In Minnesota, economic considerations and technical feasibility are addressed as part of the rulemaking process when proposing to adopt water quality standards. Under the APA the MPCA must explain who will bear the costs of adopting (or not adopting) the proposed standard, the probable costs of complying with the standard, and the alternatives the agency considered that might be less costly. However, the APA does not mandate changes to a rule based on the cost analysis, and under the Clean Water Act a water quality criteria cannot be adjusted solely based on cost consideration. It must be set to protect the beneficial use.

- Economic and technical feasibility is also addressed when permit applicants seek water quality variances or schedules of compliance, and through antidegradation procedures when new or expanded activities are anticipated to lower high water quality.

EPA/Federal Criteria

EPA develops national recommended criteria based on the best available science, extensive scientific literature review, established procedures for risk assessment and management, EPA policy, external scientific peer review, and public input on potentially useful scientific information. EPA relies heavily on peer reviewed published studies, both their own and by others in the scientific community, when developing national guidelines and criteria.

Take, for example, the development of national water quality criteria for the protection of aquatic organisms and their uses. EPA guidelines establish procedures to examine four kinds of possible adverse affects: acute toxicity to animals, chronic toxicity to animals, toxicity to plants, and bioaccumulation. If a thorough review of the pertinent information indicates that enough acceptable data are available, then numeric national water quality criteria are derived to protect aquatic organisms and their uses from unacceptable effects. These criteria are then available to states for possible inclusion in their water quality rules. These criteria may also be revised by EPA as new scientific data or methodologies are developed.

EPA/Federal Criteria and MPCA/State Adjustments

As the name of this category implies, the criteria under consideration were originally developed by the EPA and made available to the states for their consideration. In some instances, states may propose modifications or adjustments to a national criterion, prior to it being proposed as a WQS, based on state-specific conditions and data. This approach allows states to tailor the criteria to reflect the aquatic community that is present within the state or the specific conditions needed to be protective of designated uses. These state-adjusted criteria must provide an equivalent level of protection as the federal criteria.

The peer review aspects associated with rule amendments falling under this category are more extensive on the state level since they are a departure from EPA's national recommended criteria. The state has to demonstrate to EPA that modifications to the national criteria are scientifically defensible and remain protective of the designated uses. Peer review input, in addition to that obtained during the national criteria development process, is typically sought from other EPA Region 5 states, other Minnesota state agencies and departments, as well as academic institutions.

State-Developed Criteria

Under the Clean Water Act section 304(a), the EPA is required to develop and publish national criteria that reflect the latest scientific knowledge and information. National criteria, however, do not exist for every pollutant nor do they exist for all designated uses. In situations where states need to address a pollution problem caused by a pollutant that lacks a federally derived criterion, a state may elect to develop its own criterion and proceed with rulemaking to adopt the criterion as a WQS.

Federal guidance documents are used by MPCA to assist in this state criterion development process. These guidance documents themselves undergo thorough peer review and periodic guidance updates occur in order to incorporate new methodologies and information.

In addition to criteria development guidance, peer reviewed, published journal articles are part of the state criteria development process. Additionally, it is worth noting that MPCA maintains a good working relationship with scientists at the EPA, other states, and academic experts. We rely on this collective expertise particularly when a new numeric criterion is proposed or when an existing standard is re-evaluated. MPCA has found that critical review comments offered during the Agency's criterion development and standards re-evaluation process adds to the scientific defensibility and credibility of the final end product.

Recent Criteria Development and Peer Review

Reviewed science with adequate support has always been used to develop water quality criteria. EPA noted in its 1986 Quality Criteria for Water compilation (called the "Gold Book") that "all data that are used should be available...with enough supporting information to indicate that acceptable test procedures were used and that the results are probably reliable." This is the goal of peer review – to ensure that the work reviewed meets good scientific standards.

Over the last 20 years, more and more data and information about the conditions of Minnesota's waters has become available. As our scientific knowledge has progressed, we have had more ability to make state adjustments to federal criteria or develop state-specific criteria. As MPCA's standards development work has progressed beyond simple incorporation of federal criteria, greater emphasis has been placed on conducting a more structured review of MPCA's development of water quality criteria and related water quality standards rulemaking proposals.

In recent years, this has come to include a more specific peer review of water quality criteria in development, especially where MPCA is proposing state-specific criteria. Examples of these independent reviews include:

- More use of advisory committees such as:
 - A technical advisory committee to review and provide consensus opinion on proposed rule amendments (e.g. 2000 rulemaking);
 - Legislatively mandated advisory committee on the proposed refinements to Minnesota's sulfate WQS to protect wild rice.
- Third-party independent review of the river eutrophication standards Technical Support Document (TSD) – two separate TSD reviews conducted by the EPA with anonymous peer reviewers with expertise in primary productivity (algal growth) in freshwater systems, biomonitoring and bioassessment, and standards development (e.g. 2014 rulemaking);
- Outside contractors to review the Agency's restructuring of the designated aquatic life use classification system (e.g. 2017 Tiered Aquatic Life Use rulemaking); and
- Publication of supporting information in peer-reviewed journals (river eutrophication standards, TALU, wild rice); and
- Formal peer review panel process in connection with the proposed refinements to Minnesota's sulfate WQS to protect wild rice (2017 rulemaking currently underway).

Regardless of what type of criteria (federal/state developed) are adopted into WQS, development follows extensive federal and state processes that rely on multiple types of peer reviews.

Table 1 - MPCA Water Quality Standards Rulemaking Summary 2000 - 2017		Basis of Criteria Adopted by MPCA into Rule			Notes
Year of Rule Adoption	Numeric Criteria Source Development and Peer Review Rule(s), [Rule Adoption State Register (SR) Cite], and Major Rule Amendments	EPA/Federal Criteria	MPCA/State Adjustments	State Developed Criteria	
2000	<p>Minn. R. ch. 7050 [249SR1105]</p> <p>1. Several changes based on recommendation from a Water Quality Standards Advisory Committee that met from 9/1996 to 12/1997.</p> <p>2. Allow an annual average limit for phosphorus in some cases</p> <p>3. Adopted aquatic life Tier 2 method for statewide use.</p> <p>Minn. R. ch. 7050 [279SR1217]</p> <p>Adoption of detailed narrative standards for assessing trophic status of lakes, biological community and contaminants in fish tissue.</p> <p>Minn. R. ch. 7050 [319SR1168]</p> <p>Fulfill requirements of 2003 Session Laws ch. 128, art. 1, § 156</p>	X	X	X*	*Additions/amendments to narrative standards
2003	<p>1. Define certain terms used in narrative standards dealing with water quality assessments.</p> <p>2. Include rule language requiring the Agency to consider the actual or potential loss of attainable or existing beneficial uses when assessing water quality standards exceedances.</p> <p>3. Include in the rule a petitioning process to request a review of assigned beneficial uses.</p>				
2006	<p>4. Include temperature as a factor in excess nutrient impairment assessments.</p> <p>Minn. R. ch. 7050 and Minn. R. ch. 7053 (new) [325SR1699]</p> <p>1. Moved effluent limit requirements into Minn. R. ch. 7053.</p> <p>2. Updated reference in Class 1 to EPA Safe Drinking Water Act Standards.</p> <p>3. Adopted eutrophication standards for lakes and reservoirs.</p> <p>4. Revised microbiological recreation standards to <i>E. coli</i>.</p> <p>5. Added new mercury fish-tissue standard for human health.</p> <p>6. Updated two toxic standards for human health.</p> <p>7. Added new aquatic life standards for aceochochlor and metolachlor</p> <p>8. Changed water designations from 3B to 3C</p> <p>9. Updated listing for Class 1 and 2A</p> <p>10. Completed review of Class 7</p> <p>11. Expanded 1 mg/L phosphorus effluent limit</p> <p>Minn. R. ch. 7050 [395SR154]</p>	X	X	X	*Additions/amendments to narrative standards
2008	<p>1. Adopted eutrophication standards for rivers</p> <p>2. Revised turbidity to total suspended solids (TSS)</p> <p>Minn. R. ch. 7050 and Minn. R. ch. 7052 [395SR1344]</p> <p>1. Revised methods for developing human health-based WQS (Class 2) for statewide and Lake Superior</p> <p>2. Adopted new methods for fish-tissue based HH-WQS</p> <p>3. Adopted National <i>E. coli</i> standards for Lake Superior Coastal Recreation Waters</p>		X	X	
2014	<p>Minn. R. ch. 7050 [415SR545]</p> <p>Antidegradation policies and requirements improved and updated.</p> <p>Minn. R. ch. 7050 and Minn. R. ch. 7052</p> <p>[final rule adoption notice awaiting publication in the State Register]</p> <p>Tiered Aquatic Life Uses (TALU) improve aquatic life designations (waiting EPA approval)</p>	X*		X**	*Antidegradation is not a criteria but note that the rulemaking conformed state rules with new federal requirements. **Modifications to the previous nondegradation narrative provisions
2015	<p>Minn. R. ch. 7050 and Minn. R. ch. 7053</p> <p>1. Revise the existing Class 4A sulfate standard for wild rice protection</p> <p>2. List specific lakes, rivers, streams, and wetlands in the rule as wild rice waters where the sulfate standard will apply.</p> <p>3. Establish the duration and frequency of applying the proposed wild rice based sulfate standard.</p> <p>4. Incorporate methods for implementing the sulfate standard in effluent limits.</p>			X	
2016					
2017					
2017 (currently in progress)					

