MESERB
Minnesota Environmental Science and Economic Review Board
Using science and economics to improve environmental regulations

February 7, 2025

VIA SmartComment

Commissioner Katrina Kessler
Minnesota Pollution Control Agency
520 Lafayette Road
Saint Paul, MN 55155
katrina.kessler@state.mn.us

RE: 2025-2027 Triennial Standards Review – Comments from the Minnesota Environmental Science and Economic Review Board

Thank you for the opportunity to comment on MPCA's Triennial Standards Review. MESERB is a municipal joint powers organization representing over 60 cities, sanitary districts, and public utility commissions in Greater Minnesota that operate wastewater treatment plants and hold NPDES/SDS permits. Our mission is to ensure water quality regulations are science-based, cost-effective, and provide meaningful environmental benefits.

Wastewater operators face growing challenges in meeting water quality regulations while maintaining critical infrastructure, especially with limited funding. Given these constraints, we urge MPCA to focus on developing or revising water quality standards that directly impact human health and provide significant environmental benefits.

Below are MESERB's specific comments on the proposed water quality standards and revisions under the Triennial Standards Review. Please also see the attached letters for more detailed comments on specific standards that MESERB has previously submitted to MPCA.

Lower Mississippi River sulfate site-specific standard – wild rice:

MESERB supports efforts to implement site-specific standards (SSS) for sulfate in the Lower Mississippi River, specifically developing unique site-specific standards for pools 3 by itself and to cover pools 4 through 8 altogether, provided they are reasonable and based on sound scientific data. Existing vegetation data indicate that wild rice has been growing successfully in these waters for over 15 years, even with sulfate levels exceeding Minnesota's 10 mg/L standard. This suggests that a more tailored approach is both feasible and appropriate.

From an economic perspective, applying the 10 mg/L sulfate standard to these pools would place a significant financial burden on municipalities. Hundreds of wastewater treatment facilities across the state discharge upstream of these waters and could face costly compliance requirements that may not be necessary to protect wild rice. Adjusting the standard based on site-specific conditions would prevent unnecessary expenditure while maintaining environmental protections.

Scientific evidence supports the idea that these river pools can sustain wild rice at sulfate levels higher than the statewide standard. Developing a site-specific standard through proper analysis and consultation will ensure that wild rice resources remain protected while avoiding undue costs to local governments. MESERB encourages MPCA to take a balanced approach and strongly supports the development of an appropriate site-specific standard that protects the beneficial use while recognizing the unique environmental context of this area.

Nitrate – aquatic life

MPCA must balance environmental protection with the financial realities municipalities face in owning, operating, and upgrading wastewater treatment infrastructure. Rising costs, limited state and federal funding, and competing regulatory priorities make it essential to focus on scientifically justified efforts that address the most pressing human health and environmental concerns.

MESERB supports efforts to address nitrogen-related water quality issues when they are based on sound science and a clear demonstration of environmental benefits. However, the potential costs of implementing new nitrate standards could be significant for municipal wastewater treatment plants, particularly in effluent-dominated streams. Given the widespread presence of nitrate in Minnesota's waters due to both point and non-point sources, additional data collection and analysis should be conducted to ensure that any new standards are necessary, practical, and reflective of real-world conditions.

Additionally, the proposed 10 mg/L total nitrogen SDR is a broad target not directly tied to measurable human health or local environmental outcomes in Minnesota. While MESERB recognizes Minnesota's role in broader nutrient reduction goals for the Gulf of Mexico and Lake Winnipeg, municipal point sources contribute only a small fraction of nutrient pollution. Imposing costly nitrogen reduction mandates on municipalities without addressing non-point sources is unlikely to yield meaningful environmental benefits. Regulatory efforts should prioritize cost-effective, targeted strategies that address Minnesota's water quality needs while ensuring flexibility and feasibility for municipal dischargers. One area that MPCA should be prioritizing efforts more aggressively is farm-related nitrate pollution, which accounts for much significantly more nitrogen loading than municipal wastewater.

MESERB encourages MPCA to focus nitrogen regulation on clearly defined objectives, whether addressing aquatic life toxicity, drinking water concerns, or eutrophication. Scientific studies, including those cited by MPCA, indicate that phosphorus—not nitrogen—is the limiting factor for algal growth in Minnesota rivers. As such, efforts to regulate nitrogen for eutrophication management must be carefully evaluated to avoid unnecessary expenditures with limited environmental impact.

MPCA's existing wastewater nitrogen reduction strategy already allows the agency to impose nitrogen or nitrate limits on facilities contributing to aquatic life impairments. This targeted approach is more effective than developing broad new nitrate standards that would address only a small portion of the issue at high cost.

Ultimately, MESERB supports reasonable, scientifically grounded approaches to nitrogen management that balance environmental goals with the economic realities of municipal wastewater treatment. Investments should be directed where they will provide the greatest benefit to Minnesota's waters, and regulatory actions should be informed by sound science, real-world data, and practical implementation considerations.

PFAS Water Quality Standards:

Effective, affordable, scientifically grounded PFAS management remains a top priority for MESERB and its members. Given the ongoing regulatory developments at both the state and federal levels, MPCA must consider the following as it advances PFAS management efforts.

Municipal wastewater treatment facilities (POTWs) must be actively involved in the development of PFAS-related standards, monitoring requirements, and regulatory processes from the outset. Because PFAS are widespread and persistent, POTWs will be significantly impacted by any regulatory framework, despite not being sources of these chemicals. Early and meaningful stakeholder engagement is essential to ensuring that monitoring, sampling, and water quality standards are practical, effective, and scientifically sound.

MPCA must also recognize the significant technical and financial challenges associated with PFAS treatment. PFAS are notoriously difficult to remove from wastewater, and existing treatment technologies are neither widely available nor fully effective. By MPCA's own estimates, removing PFAS from wastewater streams in Minnesota could cost between $14 billion and $28 billion over 20 years, with small facilities facing per-pound removal costs over six times higher than larger facilities. Unlike drinking water treatment, achieving comparable PFAS removal in wastewater is virtually impossible with current technology.

As MPCA considers new standards, including fish-tissue-based human health standards and updates to Class 1 water quality standards, MESERB urges the agency to adopt a holistic approach that considers the realities of wastewater treatment. Collaboration with municipal stakeholders is critical to ensuring regulations are both protective of public health and financially sustainable for communities.

Conclusion:

MESERB is at the forefront of water protection in Minnesota with members operating and protecting water resources in all corners of the State. We remain invested in and committed to

maintaining the integrity of Minnesota's water resources. Thank you for the opportunity to submit these comments, and for taking the time to consider them.

Respectfully submitted,

MINNESOTA ENVIRONMENTAL SCIENCE AND ECONOMIC REVIEW BOARD

Joshua Gad
MESERB President
WRRF Superintendent, City of Mankato

MESERB
Minnesota Environmental Science and Economic Review Board

Using science and economics to improve environmental regulations

October 30, 2023

VIA ONLINE

Honorable James R. Mortenson
Administrative Law Judge
Office of Administrative Hearings
PO Box 64620
St. Paul, MN 55164-0620

Re: MESERB's comments on MPCA's second RFC for Water Quality Standards: Use Class 1

Dear Judge Mortenson,

As a representative of the Minnesota Environmental Science and Economic Review Board (MESERB), I am writing to provide comments on the Minnesota Pollution Control Agency's ("MPCA") second Request for Comments for Water Quality Standards: Use Class 1. MESERB is a municipal joint powers organization comprised of 60 publicly owned wastewater treatment plants ("POTWs") in Greater Minnesota. MESERB is a leader in working with the MPCA to identify and minimize sources of per- and poly-fluoroalkyl substances ("PFAS") to POTWs. Our goal in this rulemaking is to ensure the development and implementation of PFAS standards that protect human health without placing undue burdens on public utilities and the communities that the regulations are designed to protect.

MESERB supports MPCA's effort to develop Class 1 water quality standards for PFAS to protect drinking water sources. Developing these standards will establish important thresholds for the protection of drinking water sources. However, the fact remains that POTWS are not sources of PFAS and there are no presently available technological and economically feasible options to treat PFAS at POTWs.[1] As a result, this rulemaking must support the critical efforts already underway to identify, minimize, and eliminate the sources of PFAS to POTWS and the environment.

As MPCA develops class 1 standards for PFAS, MPCA must use the best available science, create a PFAS-specific Technical Support Document, and execute a comprehensive peer review process that is inclusive of public input, as stipulated under Minn. Stat. § 115.035.

It is our understanding that MPCA is also considering whether to apply future class 1 PFAS WQS to class 1 surface waters exclusively or to also apply the standards to surface waters that affect ground water. MESERB supports the goal of the effort to apply the class 1 PFAS WQS to surface

[1] *Evaluation of Current Alternatives and Estimated Cost Curves for PFAS Removal and Destruction from Municipal Wastewater, Biosolids, Landfill Leachate, and Compost Contact Water,* Prepared by: Barr Engineering Co., Hazen and Sawyer for MPCA, May 2023 https://www.pca.state.mn.us/news-and-stories/groundbreaking-study-shows-unaffordable-costs-of-pfas-cleanup-from-wastewater

waters that impact groundwater; however, such efforts must be conscientiously targeted to protecting those ground water resources that are presently or could reasonably be used for drinking water in the future. As such, if MPCA chooses to apply the class 1 PFAS WQS to surface waters that could potentially impact the quality of underlying groundwater, the criteria for such designations should be robust and consistent and MESERB prefers option 2 (over option 1) as outlined in section 2.c (p.5) of the Potential changes to Minn. R. chs. 7052 and 7053 Rule Concepts/Narrative document from the initial request for comment on this issue.[2]

Furthermore, the MPCA should contemplate broadening the scope of the rulemaking process to develop interim state pretreatment standards or other control rules or regulations. If such included and adopted, these additions could provide additional authority to minimize and eliminate the upstream sources of PFAS to POTWs, while simultaneously providing POTWs needed liability protections under the Minnesota Environmental Response and Liability Act (MERLA). *See* e.g., Minn. Stat. § 115B.05, subd. 8 (2), (4), and (5). By doing so, the MPCA can create a framework that safeguards public health and provides practical solutions and support to POTWs grappling with the complexities of PFAS management and mitigation in their respective communities.

Thank you for considering these comments on the MPCA's proposal to include PFAS in the Use Class 1 rulemaking. If you have any questions, please reach out to me, at jgad@mankato.gov.

Sincerely,

MINNESOTA ENVIRONMENTAL SCIENCE AND ECONOMIC REVIEW BOARD

Joshua Gad
MESERB President
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cc: Katrina Kessler, Commissioner, MPCA
Nicole Blasing, Municipal Division Director, MPCA
Suzanne Baumann, Municipal Wastewater Manager, MPCA
Daniel Marx, Senior Attorney, Flaherty & Hood, P.A.

[2] *MPCA Amendments to Water Quality Rules for Class 1 waters (domestic consumption) Minn. R. chs. 7050 and 7060 Potential changes to Minn. R. chs. 7052 and 7053 Rule Concepts/Narrative* at 5, MPCA, December 2021 Standards for sources of drinking water | Minnesota Pollution Control Agency (state.mn.us)

MESERB
Minnesota Environmental Science and Economic Review Board
Using science and economics to improve environmental regulations

July 31, 2023

VIA ONLINE & EMAIL

Commissioner Katrina Kessler
Minnesota Pollution Control Agency
520 Lafayette Rd N, St. Paul, MN 55155
katrina.kessler@state.mn.us

Re: Comments on the framework for developing and evaluating site-specific sulfate standards for the protection of wild rice

Dear Commissioner:

Thank you for the opportunity to comment on the MPCA's framework for developing and evaluating site-specific sulfate standards for the protection of wild rice ("framework"). The Minnesota Environmental Science and Economic Review Board ("MESERB") is a municipal joint powers organization that represents the interests of municipally owned wastewater treatment plants ("WWTPs"). Based on the existing CWA section 303(d) impaired waters list, and the state's list of waters used for the production of wild rice ("WUFPOWR") the vast majority of our more than 50 members are potentially impacted by MPCA's implementation of the wild rice sulfate standard. Our members are interested in ensuring they do their part to protect wild rice in a manner consistent with the best available science.

Below are our comments related to the framework published by MPCA:

1. **The wild rice sulfate standard should be revised to reflect the best available science.**

MESERB continues to believe that the best approach to addressing the wild rice sulfate standard would be to update the 10 mg/L standard through the rulemaking process using the best available science. MESERB understands that MPCA already went to great lengths to do this in a previous rulemaking and the proposed rule was rejected by the courts. Nevertheless, MESERB supported key components of MPCA's previously proposed revisions, and we continue to prefer broad rule amendments compared to the administratively burdensome and expensive approach of using variances and site-specific standards. One approach that MESERB would support is to leave the existing narrative rule language in place and develop a narrative translator for determining and implementing a protective sulfate concentration on a case-by-case basis, like what MPCA has done in the recent revisions to the state's class 3 & 4 standards.

2. **In the alternative to state-wide rulemaking, MESERB continues to support the evaluation and development of site-specific standards for the Mississippi River Pools.**

Since the time that MPCA indicated that it would begin implementing the 10 mg/L wild rice sulfate standard, MESERB has expressed support for the development of a site-specific standard for the lower pools of the Mississippi River. As noted in the framework document, several pools in the Mississippi River in southeastern Minnesota are on the state's list of WUFPOWR and are designated as impaired. Because of the size of the watershed, there are hundreds of wastewater treatment facilities throughout the state that discharge upstream of these waters that could receive costly sulfate limits in their permits if MPCA applies the 10 mg/L sulfate standards to those pools.

It is our understanding that MPCA is actively working to collect data, evaluate, and develop site-specific standards for these river pools, we appreciate MPCA's effort to be proactive on this issue and MESERB strongly supports this effort. As indicated in the framework document, existing data indicate that a site-specific standard is appropriate, and that a less restrictive sulfate concentration is protective of wild rice in these river pools. *See* p. 8 – 11 (discussing the altered hydrology of the river impacting the potential for wild rice to grow in the river and its backwater pools and the fact that certain river pools have an abundance of wild rice despite elevated sulfate levels).

As MPCA develops the site-specific standard for the Mississippi River pools, there should also be an interim permit strategy developed to avoid imposing effluent limits based on the 10 mg/L standard in permits while the site-specific standard is under development. One option would be to use the "standalone approach" referenced in the framework document and establish a sulfate concentration that does not cause impairment of the wild rice use in the Mississippi River (i.e., between 30 and 50 mg/L) and tie it to a multi-discharger variance. That way facilities upstream of these river pools would be eligible for a variance from the 10 mg/L standard, pending the completion of a more targeted site-specific standard using MPCA's proposed "weight of evidence" approach.

3. **Specific Comment on MPCA's proposed framework.**

MESERB supports the proposed framework for evaluating and developing site-specific standards as necessary and reasonable, but has the following specific comments and questions:

- The framework document provides a reasonable definition of what constitutes meeting the wild rice beneficial use. This definition – the continued annual long-term growth of wild rice with or without boom-bust cycles – should be the primary basis for determining the attainment of wild rice use. Still, it is unclear how long-term trends will be evaluated year-to-year and account for fluctuations in growth:

  - Can MPCA provide additional information about how use attainment is determined and how long-term trends will be evaluated so that year-to-year fluctuations will not lead to a determination of impairment?
  - How will indigenous knowledge be used in assessing use attainment?

- Wild rice use could be lost due to natural or anthropogenic causes, exclusive of sulfate concentration. Where wild rice was historically present but is now no longer present, it should not be presumed that sulfate is the cause and there should be an assessment to determine whether other known causative factors are responsible for the absence of wild rice (i.e., altered hydrology).
  - Under Minn. R. 7050.0224, certain waterbodies are to be recognized as WUFPOWR. These designations are primarily based on documented wild rice presence, including wild rice inventories, biological monitoring, reports, agency databases, and data supplied by the public. However, due to the cyclical pattern of growth and a high degree of natural variability in population sizes, the MPCA does not require a specific population-size threshold to be met for the purpose of assigning a WUFPOWR designation. Therefore, the wild rice use designation is applied to waters with documented wild rice presence, current or historical, because it shows the use has occurred.

- MESERB generally supports the use of the "standalone approach" where WUFPOWR are presently supporting healthy wild rice beds with sulfate concentrations that exceed 10 mg/L. However, outside the scope of such wild rice beds, this approach will not yield a specific science-based impairment threshold and will likely result in a very conservative and potentially overly restrictive site-specific standard.
  - The standalone approach is, by far, the easiest of the two for supporting alternative sulfate criteria but depends upon having long-term data (at least 10 years of data) on wild rice abundance and sulfate concentration. Given the definition of healthy wild rice population discussed above, it is not clear what is meant by multiple metrics. If the long-term growth of wild rice is documented, this should be sufficient to meet the demonstration of healthy wild rice in the specific water body.
  - As for surface water sulfate concentration, increases in concentration over time should not be a basis for excluding this approach, provided that sufficient data are available to show that deleterious effects have not occurred to the wild rice population in response to these increases.
  - This approach appears to require having long-term data (at least 10 years of data) on wild rice abundance and sulfate concentration. If long-term ambient sulfate data are not available, the petitioner should be allowed to substitute modeling results if alternative data on point and nonpoint source loads are available.
  - One option would be to use this approach in conjunction with multi-discharger variances (see comment above regarding the Mississippi River pools) by setting the highest attainable condition based on the existing sulfate concentration that is

not causing impairment, to provide time to use the "weight-of-evidence" approach to develop a more scientifically rigorous numeric criterion that functions as a traditional impairment threshold.

- MESERB would be supportive of modifications to the weight-of-evidence approach discussed by MPCA, which references the four key lines of evidence. The specific requirements set forth for this approach are onerous, and MPCA should amend this approach so that a petitioner need not pursue each line of evidence. In some cases, one line of evidence could be sufficient to support a site-specific standard.
    - The first line of evidence – the use of the proposed equation from the 2017 rulemaking – could be helpful for facilities that do not require a high amount of relief. This approach, if appropriately supported, could be treated as a standalone approach for site-specific standard development rather than simply one potential line of evidence. Further, the suggestion that this approach be paired with "information demonstrating that wild rice has not declined over time" is not necessary. If such data were available, the site-specific criterion could be developed using the MPCA's proposed Standalone Approach.
    - The second literature-based line of evidence is akin to a separate criterion development analysis and could be a stand-alone approach for establishing a sulfate standard for the protection of wild rice as well.
    - The third approach could be useful in determining a concentration of sulfate that does not impair wild rice, but this is not the same as a criterion – the threshold level of sulfate below which harm does not occur. The suggestion that the median sulfate concentration could be used to justify a site-specific standard would only result in a very conservative outcome.
    - The fourth line of evidence approach would be useful in assessing the threshold for sulfide toxicity to wild rice in specific waters and could be used to assess whether other factors are contributing to wild rice impairment if sulfide levels are below the reported threshold for impairment. However, it is not apparent how this approach will help in identifying a criterion for sulfate in the overlying water.

- Although the framework identified numerous potential metrics and evaluations for assessing the health of wild rice, the need for these other measurements is dubious. Spatial extent and stalk density should be sufficient to assess health over time. The framework notes that an application for a site-specific sulfate standard would include long-term data on wild rice stand spatial extent and stalk density paired with sulfate concentrations and water depth, as well as measurements on other variables related to wild rice conditions or productivity.
    - The framework requires population data spanning ten years or two boom-bust cycles, whichever is shorter. If the data exhibit a downward trend in spatial extent, stalk density, biomass, or other indicator of health, a site-specific sulfate standard will not be approved. Such an approach is only appropriate if other factors that would impair wild rice health are not present (see the example of Kettle Lake

where the data on stalk density shows greater variability than the corresponding data on biomass). Again, MPCA should provide additional clarity about how it will assess long-term trends in the data.

- The framework references the fact that many wild rice waters in the southern and western regions of the state have sulfate concentrations that are naturally above 10 mg/L. In situations where baseline levels of sulfate are high, the MPCA should proactively develop a site-specific standard given that water quality standards should not be set lower than natural background concentrations. See 40 CFR § 131.10(g).

Thank you for the opportunity to submit the above comments. If you have any further inquiries or wish to respond to these comments, please don't hesitate to contact Daniel Marx at dmmarx@Flaherty-hood.com.

Sincerely,

MINNESOTA ENVIRONMENTAL SCIENCE AND ECONOMIC REVIEW BOARD

Josh Gad
MESERB President
WRRF Superintendent, City of Mankato

CC: Dana Vanderbosch, Assistant Commissioner, MPCA
Nicole Blasing, Municipal Division Director, MPCA
Suzanne Baumann, Municipal Wastewater Manager, MPCA

MESERB
Minnesota Environmental Science and Economic Review Board
Using science and economics to improve environmental regulations

November 8, 2024

VIA EMAIL

Nicole Blasing
Municipal Division Director
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Ms. Blasing:

I am writing on behalf of the Minnesota Environmental Science and Economic Review Board (MESERB) to share our position on the Minnesota Pollution Control Agency's (MPCA) nitrogen reduction efforts.

Nitrogen management is a top priority for MESERB, and we support making strategic investments to protect human health and aquatic life in Minnesota from its potential toxic impacts. We appreciate MPCA's focus on reducing nitrogen through monitoring, optimization, and other voluntary measures as outlined in the Wastewater Nitrogen Reduction and Implementation Strategy ("Wastewater Strategy"). This approach allows for immediate action while ensuring resources are used effectively.

However, MESERB has several comments and questions regarding the Wastewater Strategy and the draft nitrate-nitrogen criteria that need further consideration.

How many municipal wastewater facilities will be impacted?

MESERB expects the MPCA's Wastewater Strategy—which includes applying existing narrative standards, adopting new nitrate-nitrogen toxicity standards, and implementing a 10 mg/L total nitrogen state discharge restriction (SDR)—to significantly affect municipal wastewater treatment facilities statewide. However, it remains unclear how many facilities will face new or stricter effluent limits and how many will need major capital improvements to comply with these changes.

To clarify, MESERB plans to submit a formal data request to obtain any existing MPCA data on the facilities affected and estimates of those likely requiring substantial upgrades. This information will help assess the impact of the Wastewater Strategy on municipal wastewater facilities.

What are the economic impacts of the proposed Wastewater Strategy?

MPCA should evaluate the additional costs of implementing the proposed 10 mg/L total nitrogen State Discharge Restriction (SDR), which differs from traditional water quality-based regulations in the Wastewater Strategy. Unlike state nitrate-nitrogen standards, the SDR is not required by federal law and is tied to broader nitrogen reduction goals aimed at protecting the Gulf of Mexico and Lake Winnipeg. While MESERB supports Minnesota's nutrient reduction goals, we believe state efforts should prioritize local health and aquatic life first.

To fully understand the economic impacts, MESERB requests that MPCA conduct a thorough analysis of the capital and operational costs needed for municipal wastewater facilities to: (1) comply with existing Class 1 water quality standards for nitrate-nitrogen; (2) meet existing narrative standards addressing IBI impairments linked to nitrate; (3) adhere to the proposed nitrate-nitrogen toxicity standards for aquatic life; and (4) comply with the proposed 10 mg/L total nitrogen SDR. This analysis should also assess the cost of implementing the SDR compared to its projected pollution reduction benefits for the Gulf of Mexico and Lake Winnipeg, while exploring alternative, cost-effective approaches to achieving Minnesota's non-binding nitrogen reduction goals.

Such an analysis will provide critical insights to inform MPCA's decisions during the rulemaking process and will serve as a vital tool to educate the legislature on the need for continued investment in wastewater infrastructure.

MPCA should prioritize developing and implementing nitrate-nitrogen standards to protect health and aquatic life.

As MPCA is aware, the costs to own, operate, and upgrade municipal wastewater infrastructure are rising due to new regulations, labor shortages, treatment chemicals, and construction delays. Competition for limited state and federal funding only intensifies these challenges, especially when such programs are inconsistently funded by the legislature. Given these constraints, MPCA should focus its regulatory efforts on addressing the most critical human health and environmental issues.

MPCA's Wastewater Strategy appropriately prioritizes the most urgent nitrogen-related threats in Minnesota, such as Class 1 drinking water impairments, IBI impairments linked to nitrate-nitrogen, and toxicity-based aquatic life standards. While addressing these concerns will be costly, they are backed by scientific evidence and necessary to protect both human health and aquatic life in Minnesota.

However, the proposed 10 mg/L total nitrogen SDR is different. It is not directly tied to tangible human health or environmental outcomes in Minnesota but rather linked to voluntary nutrient reduction goals based on national and international targets for the Gulf of Mexico and Lake Winnipeg. While MESERB supports Minnesota's role in achieving these broader goals, we believe that MPCA should prioritize state efforts and funding toward standards that directly protect local human health and ecosystems.

A categorical 10 mg/L SDR may impose significant costs on municipalities without meaningful local or regional benefits. Some Class A facilities, for example, could meet a 15 mg/L limit without major capital investments, while reducing to 10 mg/L would require costly upgrades. These reductions, not mandated by the Clean Water Act or necessary to protect local waters, may not significantly benefit the Gulf of Mexico or Lake Winnipeg.

Furthermore, nutrient pollution in the Gulf of Mexico and Lake Winnipeg is primarily caused by non-point sources, with municipal point sources in Minnesota contributing a small fraction of the overall nutrient load. Investing heavily to reduce nitrogen from Minnesota's municipal point sources will have limited environmental impact unless significant reductions are achieved from

non-point sources. Any MPCA strategy that includes municipal point sources in its nutrient reduction goals must be flexible and ensure that investments first address the nitrate-nitrogen standards critical to protecting Minnesota's waters.

MESERB supports creating incentives for voluntary efforts to meet goals for the Gulf of Mexico and Lake Winnipeg. We also believe there may be promise in point-to-point trading with some of the large metro facilities to address the state's TN reduction goals. Still, we oppose any mandate requiring significant state or local resources until substantial non-point source reductions are made.

Total nitrogen limits vs nitrate limits?

The wastewater strategy suggests that facilities will receive total nitrogen effluent limits based on the MPCA's application of the narrative standards (with demonstrated IBI impacts), the proposed nitrate-nitrogen criteria, and the 10 mg/L SDR rule. As previously raised with MPCA, we would prefer nitrate limits rather than total nitrogen limits because the priority from both a human and aquatic life standpoint is on reducing nitrate rather than total nitrogen. As MPCA is aware, total nitrogen also includes soluble unbiodegradable total kjeldahl nitrogen (SON), sometimes also referred to as dissolved organic nitrogen (DON), which is virtually impossible to breakdown in the wastewater treatment process with biological treatment or advanced filtration. For many of our members this equates to 2-4 mg/L of nitrogen that simply cannot be removed from their waste stream.[1] This means that a total nitrogen limit will require many of our members to reduce more of the biodegradable nitrogen in their waste streams potentially pushing them into more expensive treatment technologies than would otherwise be required if the effluent limits were expressed as nitrate limits.

Additional studies and evaluation may be needed before adopting nitrate-nitrogen water quality standards.

Finally, MESERB has conducted a high-level review of MPCA's Aquatic Life Water Quality Standards Draft Technical Support Document for Nitrate (October 2022) ("TSD"), which is attached to the letter. Our high-level technical review indicated that some additional study and data analysis may be needed to ensure that the proposed nitrate-nitrogen criteria are tied to actual impairment thresholds and will ensure that limited state and local resources are being used to protect aquatic life.

We request MPCA to review these comments and consider conducting some additional research and analysis related to the draft criteria.

Thank you for your attention to this matter. MESERB appreciates MPCA's efforts to engage municipal stakeholders in this process, and we look forward to working together on these critical issues. Should you have any questions, please contact me at jgad@mankatomn.gov, and please copy our consultant, Daniel Marx, at dmmarx@flaherty-hood.com.

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[1] WRF (The Water Research Foundation), 2019, "Soluble Organic Nitrogen in Biological Nutrient Removal" from the Nutrient Removal Challenge; *See also* WRF, 2013, "Final Report: Uptake by Algae of Dissolved Organic Nitrogen from BNR Treatment Plant Effluents."

Sincerely,

MINNESOTA ENVIRONMENTAL SCIENCE AND ECONOMIC REVIEW BOARD

Joshua Gad
MESERB president
WRRF Superintendent, City of Mankato

cc: Commissioner Katrina Kessler, MPCA
Asst. Commissioner Dana Vanderbosch, MPCA
Catherine Neuschler, MPCA
Steve Weiss, MPCA
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Suzanne Baumann, MPCA
Joel Peck, MPCA

MESERB
Minnesota Environmental Science and Economic Review Board
Using science and economics to improve environmental regulations

MESERB Review of Aquatic Life Water Quality Standards,
Draft Technical Support Document for Nitrate (MPCA, October 2022)

This memorandum provides a high-level technical review of MPCA's updated Aquatic Life Water Quality Standards Draft Technical Support Document for Nitrate (October 2022). The TSD includes proposed aquatic life acute and chronic water quality standards for nitrate-nitrogen, summarized below:

Water Quality Standard	Applicable Water Body	Criterion	Duration
Acute	All Class 2 Waters	60 mg/L	1 day
Chronic	Class 2A	5 mg/L	4 days
Chronic	Class 2B and Class 2Bd	8 mg/L	4 days

Technical Review

The draft nitrate-nitrogen water quality standards presented in the TSD were derived using the USEPA "Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses" (1985). This method is based on a statistical distribution of genus mean acute values (GMAVs) and genus mean chronic values (GMCVs) to determine the criteria concentration protective of 95% of the genera in the data base. The GMAVs and GMCVs are obtained from literature studies (in peer-reviewed scientific studies) of toxicity. This method is the EPA standard for deriving water quality criteria.

Because it is a statistical method, it is sensitive to the number of genera (N) contained in the database. The acute database included 28 genera and consisted of LC50/EC50 determinations for tests durations of 2 or 4 days. The most sensitive genus in the data base has a percentile equal

to 3.45% (i.e., P = 1/(N+1)) and the derivation will obtain a final acute value (FAV) somewhat greater than the most sensitive genus, estimated to represent the genus of the 5th percentile most sensitive organisms. The most sensitive organism, with an LC50 = 103 mg/L is an aquatic insect (Hydropsyche). The 5th percentile acute concentration was estimated at 119.2 mg/L and the acute water quality standard is one half of that value, 59.6 mg/L (rounded to 60 mg/L), with an averaging period of one day.

The chronic data base for Class 2A (cold) Waters included 14 genera and consisted of chronic effects (reproduction, biomass, weight, length, growth rate, delayed development, or metamorphosis) endpoints (IC25, EC20, LOEC, NOEC, or MATC)[1] for test durations ranging from 7 days to 120 days. The most sensitive genus in the data base has a percentile equal to 6.7% and the chronic criteria derivation will be extrapolated to a concentration less than the endpoint for the most sensitive organism to determine the Final Chronic Value (FCV). Lake trout (Salvelinus) were identified as the most sensitive genera based on the effects of nitrate-nitrogen on fry weight following a 146-day exposure. (Note: Table 6 in the TSD indicates the exposure period was 120 days.) The GMCV was estimated as 3.16 mg/L based on a geometric mean of the NOEC and LOEC. A review of the lake trout study (McGurk et al., 2006) shows that the LOEC was determined as a significant difference from the control based on an analysis of variance and differed from the control by 12%. Chronic impacts are generally evaluated at 20 – 25%, consequently the GMCV should have been increased to reflect the appropriate endpoint.

The chronic data base for Class 2B and Class 2Bd (warm) Waters included 13 genera (with the removal of Lake Trout) and consisted of chronic effect endpoints for test durations

[1] IC25 – inhibition concentration at which the organism exhibits a 25% reduction in a biological measurement in comparison with the control response. EC20 – effect concentration showing a 20% reduction in biological measurement. LOEC- lowest observed effect concentration in a given study. NOEC – no observed effect concentration in a given study. MATC – maximum acceptable toxicant concentration, the geometric mean of the NOEC and LOEC.

ranging from 7 days to 52 days. The most sensitive genus in the data base has a percentile equal to 7.1% and the chronic criteria derivation will be extrapolated to a concentration less than the endpoint for the most sensitive organism to determine the FCV. The Midge (Chironomus) was identified as the most sensitive genera based on the effects of nitrate-nitrogen on biomass following a 10-day exposure. The GMCV was estimated as 9.56 mg/L based on the estimated EC20. A review of the midge study (Wang et al., 2020) shows that there was no significant difference in individual weight or biomass based on an analysis of variance for nitrate-nitrogen exposures ranging from 5.7 mg/L (the lowest test concentration) to 21 mg/L. **This result is unusual and may indicate that the control response was unusually high and the actual EC20 corresponds with a nitrate-nitrogen concentration greater than 9.56 mg/L**.

The FCV is based on a statistical evaluation of the four genera that most closely surround the 5th percentile response. For databases with counts less than 59, the four lowest GMCVs will be used for this evaluation. Thus, the four genera used in the evaluation for Class 2A and Class 2B/2Bd Waters included the following:

Class 2A Waters		Class 2B/2Bd Waters	
Genus	GMCV	Genus	GMCV
Hyalella	18.92	*Rana*	29.10
Lampsilis	17.45	*Hyalella*	18.92
Chironomus	9.560	*Lampsilis*	17.45
Salvelinus	6.25	*Chironomus*	9.560
Draft FCV	5.0	Draft FCV	8.0

Each of the scientific studies cited in the TSD as the source of the GMCV in the table

above was reviewed. A review of the studies for *Salvelinus* and *Chironomus* was presented above. The GMCV for the fatmucket (*Lampsilis*), a freshwater mussel, was based on the study by Wang et al., 2020. **The supplemental data for this study show that there was no significant difference in individual weight or biomass for the controls to a nitrate-nitrogen concentration of 17 mg/L. The EC20 should be a value greater than 17.45 mg/L if there was no effect on growth with a nitrate-nitrogen concentration of 17 mg/L.**

The GMCV for the amphipod, *Hyalella*, was based on the study by Soucek and Dickinson, 2016. The GMCV used in the analysis, 18.92 mg/L was the geometric mean of three tests at varying chloride concentrations, and the authors reported a significant effect of chloride on the toxicity of nitrate-nitrogen to *Hyalella*. At higher chloride concentration, the EC20 increases with a maximum EC20 = 28 mg/L when the chloride concentration was 100 mg/L. Higher chloride concentrations are expected to occur in Minnesota streams under low flow conditions when the percent effluent flow in the receiving stream is greatest and nitrate-nitrogen concentrations are at a maximum. **Under these conditions, it would be appropriate to derive nitrate-nitrogen criteria using the GMCV associated with the higher chloride concentrations.**

The GMCV for the pacific tree frog (*Rana*) was based on the study by Schuytema and Nebeker (1999c). The GMCV used in the analysis, 29.10 mg/L, was the geometric mean of the NOEC and LOEC. The LOEC was based on an analysis of variance comparing length of larvae to the performance of the control. The length of the controls was 13.9 mm while the length of the larvae tested with 29.1 mg/L nitrate-nitrogen was 13.5 mm. **This represents a 3% change in growth and should not be considered a chronic value as other tests use a 20% change as the threshold for chronic effects**.

Additional evaluation should be conducted related to the chronic criteria that examines the sensitivity around the 5th percentile of the chronic database. If the lake trout GMCV is revised to a much higher number, the resulting chronic criterion will be 8 mg/L (identical for Class 2A and Class 2B waters). Further, the GMCV for the genus *Chironomus* should be re-evaluated by testing other members of the genus to determine if a GMCV higher than 9.56 mg/Lis protective. MPCA should consider adding less-sensitive genera to the chronic data base for evaluation. For example, if the number of genera was increased from 13 to 20, with the *Chironomus* GMCV at 9.56 mg/L, the resulting chronic criterion would be 10 mg/L.

General Comments

Nitrate is a common constituent in receiving waters that drain agricultural fields and that are downstream of wastewater treatment facilities. For municipal wastewater treatment plants that nitrify, nitrate-nitrogen concentration in the effluent is likely to be elevated (e.g., > 25 mg/L), thus dischargers to effluent dominated streams will likely be required to implement nitrogen removal if the draft chronic criteria in the TSD are adopted. Given the ubiquitous nature of nitrate-nitrogen in the environment and the significant cost to remove nitrate-nitrogen from wastewater treatment facilities, additional information should be collected to ensure that the draft aquatic life nitrate-nitrogen criteria are necessary. Some suggestions are provided below:

- ***The FCVs must be based on actual impairment thresholds.***

As discussed above, GMCVs should be based on EC20s and/or IC25 concentrations, not the NOEC, LOEC, or MATC. Many of the GMCVs used to derive the proposed criteria need to be revised to reflect actual chronic impacts, not statistical differences in response from the control.

- ***Evaluation of Sensitive Genera***

The information presented in the TSD show that Salvelinus and Chironomus are the most chronically sensitive species in Class 2A and Class 2B/2Bd Waters, respectively. This conclusion is based on an evaluation of one species of salmonid (Salvelinus namaycush – lake trout) and one species of midge (Chironomus dilutus). Given the potential cost of compliance with these criteria, additional species within these genera should be tested to develop appropriate GMCVs for these genera.

- ***Databases should be expanded to include more Genera.***

The data used to derive the draft acute and chronic criteria are based on relatively small numbers of genera. The FAV is based on 28 genera. The FCVs for Class 2A and Class 2B/2Bd Waters are based on 14 and 13 genera, respectively. Given the expected cost to comply with the proposed criteria, these databases should be expanded to be more representative of the organisms living in Minnesota waters.

- ***Chronic Averaging Period***

As presented in the TSD, the lowest GMCV for Class 2A waters was for lake trout. The studies used to characterize the GMCV for lake trout were based on studies that were 146 days in duration and more than double the length of the next closest GMCV. If this species drives the FCV, the criteria duration should be increased to at least 30 days.

- ***Real world stream impairment should be evaluated.***

Given the ubiquitous nature of nitrate-nitrogen in the environment, any proposed criteria should be evaluated against actual streams to confirm that the proposed protection is necessary and that acclimation to elevated levels of nitrate does not occur.