

**EPA’s Review of Revisions to Minnesota’s Water Quality Standards:  
Industrial Consumption (Class 3) and  
Agricultural and Wildlife (Class 4) Water Quality Standards  
Under Section 303(c) of the Clean Water Act  
WQSTS # MN2016-671**

**Date: October 8, 2021**

**I. Executive Summary**

On August 10, 2021, the U.S. Environmental Protection Agency received from the Minnesota Pollution Control Agency (MPCA) a rule revision package containing changes to the State’s water quality standards (WQS) rules that revise the State’s designated uses and water quality criteria at Minn. R. 7050.0223 to protect Minnesota’s industrial consumption use (Class 3) and the State’s criteria at Minn. R. 7050.0224 to protect Minnesota’s agriculture and wildlife use (Class 4). The rule revisions also move Minnesota’s WQS to protect wetlands within Minn. R. Ch. 7050 and make several non-substantive revisions to Minn. R. Ch. 7050.

As discussed in Section II of this document, EPA has determined that these rules are consistent with the relevant requirements of the Clean Water Act (CWA) and 40 CFR parts 131 and 132 and therefore approves the WQS revisions. Consistent with the requirements of the Endangered Species Act (ESA), EPA evaluated the potential impacts of its approval of the adopted rules on federally-protected species and designated critical habitat. As discussed in Section III of this document, EPA concluded that consultation is necessary for its approval of the Class 4B livestock and wildlife criteria but that it has no discretion to consult on its approval of Minnesota’s Class 3 (industrial consumption) and Class 4A (irrigation) WQS revisions because the action pertains to WQS revisions related to industrial and agricultural uses that are not designed to protect aquatic life or wildlife and, thus, consultation with the U.S. Fish and Wildlife Service (FWS) is not required. EPA developed a biological evaluation (BE) that evaluates the potential effects of its approval of the Class 4B criteria. Lastly, as discussed in Section IV of this document, EPA provided substantive opportunity for all tribes with tribal interests in Minnesota to provide input on EPA’s decision-making process and has therefore fulfilled its duty to consult on a government-to-government basis with federally-recognized tribes on actions that may affect tribal interests, consistent with the “EPA Policy on Consultation and Coordination with Indian Tribes.”

**II. EPA Review of MPCA’s Submittal**

WQS requirements of CWA sections 101(a)(2) and 303(c)(2) are implemented through federal regulations contained in 40 CFR Part 131 and 40 CFR Part 132 (see Section II.F.2). Consistent with 40 CFR § 131.21, new or revised WQS do not become effective for CWA purposes until they are approved by EPA. The factors governing EPA’s review of State-adopted WQS are identified in 40 CFR § 131.5(a)(1) through 40 CFR § 131.5(a)(8). Each of these factors that are relevant to EPA’s review of Minnesota’s new and revised WQS are discussed below. Because the revisions included in this rule package do not affect Minnesota’s existing antidegradation policy or its implementation, grant any WQS variances, or affect Minnesota’s compliance

schedule provisions, the WQS requirements in 40 CFR §§ 131.5(a)(3), (4) and (5) are not relevant in considering whether to approve Minnesota’s adopted WQS.

**A. Whether the State has adopted designated water uses that are consistent with the requirements of the Clean Water Act. (40 CFR § 131.5(a)(1))**

Section 101(a)(2) of the CWA states:

it is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983.

Section 303(c)(2)(A) of the CWA requires states to establish WQS for their waters, taking into consideration the use and value of waters for agricultural and industrial purposes among other uses. 40 CFR § 131.10 governs designation of uses for surface waters. With respect to the uses specified in Section 101(a)(2) of the CWA (hereafter collectively referred to as “101(a)(2) uses”), states or authorized tribes must adopt uses consistent with those specified in Section 101(a)(2) of the CWA or demonstrate why attaining these uses is not feasible through a use attainability analysis (UAA). With respect to uses not specified in Section 101(a)(2) of the CWA (hereafter collectively referred to as “non-101(a)(2) uses”), states are not required to designate waters with those uses but must submit documentation justifying how its consideration of the use and value of the water for those uses appropriately supports its decision. As specified at 40 CFR § 131.10(g) and (h)(1), states may not remove a designated use if it is an existing use.

**1. Re-designation of waters throughout Minnesota as general Class 3 industrial consumption use and deletion of Class 3 subclass categories from Minnesota’s WQS**

Minnesota’s WQS address industrial consumption through its Class 3 beneficial use classification, which is defined at Minn. R. 7050.0140, Subp. 4 as “all waters of the state that are or may be used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes, and for which quality control is or may be necessary to protect the public health, safety, or welfare.” Prior to this rulemaking, Minnesota’s WQS had assigned each water body one of four Class 3 use subclasses (Class 3A, Class 3B, Class 3C and Class 3D) that, as discussed in the State’s *Statement of Need and Reasonableness* (December 14, 2020) (hereafter referred to as the “SONAR”), were intended to reflect the water quality needs of the industries expected to use the water and the level of treatment necessary to support those industries’ uses. Prior to the revisions that are the subject of this action, Minnesota’s WQS included the following separate narrative criteria at Minn. R. 7050.0223 to protect the Class 3 subclasses:

- Class 3A waters – The quality of Class 3A waters of the state shall be such as to permit their use without chemical treatment, except softening for groundwater, for most industrial purposes, except food processing and related uses, for which a high quality of water is required. Minn. R. 7050.0223, Subp. 2.

- Class 3B waters. The quality of class 3B waters of the state shall be such as to permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment. Minn. R. 7050.0223, Subp. 3.
- Class 3C waters. The quality of class 3C waters of the state shall be such as to permit their use for industrial cooling and materials transport without a high degree of treatment being necessary to avoid severe fouling, corrosion, scaling, or other unsatisfactory conditions. Minn. R. 7050.0223, Subp. 4.
- Class 3D waters; wetlands. The quality of class 3D wetlands shall be such as to permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment. Minn. R. 7050.0223, Subp. 5.

As described above, Minnesota’s Class 3 subclasses reflected a previous determination by the State that the water quality needs for industrial purposes vary based on the expected level of water treatment required by the industries’ processes and that different subclasses of the Class 3 use and different criteria were necessary to protect those varying needs. However, as discussed in the State’s *Class 3 & 4 Water Quality Standards Revision Technical Support Document* (December 2020) (hereafter referred to as the “TSD”), Minnesota evaluated the current technical guidance regarding industrial water quality needs and determined that, while industrial water quality needs vary widely between types of industry, industries typically account for their varying water quality needs through the selection of treatment. For example, “[g]ravel washing operations do not need high water quality and do not need to treat their appropriated water before they use it, whereas computer chip manufacturers require impurity-free water and extensively treat their water, prior to use, to remove all possible impurities.” SONAR at 29. Furthermore, Minnesota determined that industries’ decisions about water treatment are based on complex evaluations “that involve evaluating intricate trade-offs that are industry- and location-specific.” *Id.* Because industries treat water to achieve their specific water quality needs, Minnesota determined based on the current technical literature and surveys conducted by the State that the greatest water quality need for industry is consistency, which is needed to allow for the design of water treatment systems based on predictable water quality and to subsequently stay within the design parameters for that system. TSD at 17-18. Therefore, MPCA concluded that the water quality needs for industrial purposes are the same for all waterbodies (i.e., consistent water quality that will not cause severe fouling, corrosion, scaling or other unsatisfactory conditions for industrial water treatment systems) and, thus, that all Minnesota waters have the same use and value for industrial use.

Consistent with this conclusion, Minnesota re-designated all waters with a general Class 3 use classification by replacing the A, B, C or D Class 3 subclass designation with a general Class 3 designation for all waters listed in Minn. R. 7050.0470 and revising Minn. R. 7050.0415, Subp. 4(A) and (B)<sup>1</sup> to specify that all surface waters and wetlands not listed in part 7050.0470 are classified as Class 3 instead of Class 3C (surface waters) and 3D (wetlands), as previously specified. Additionally, Minnesota eliminated the Class 3 use subclass categories from Minn. R. 7050.0223 because waters in the state were no longer designated with those subclasses and the State determined that those subclass categories are not needed for designating waters in

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<sup>1</sup> Prior to Minnesota’s revisions, these rules were located at Minn. R. 7050.0430. In moving these rules, Minnesota did not make any substantive changes other than the removal of the Class 3 use subclasses and re-designation of wetlands as Class 4A and 4B instead of Class 4C (discussed in Section II.A.2).

the future because the water quality needs for industrial purposes are the same for all waterbodies.

40 CFR § 131.10(a) requires states to “specify appropriate water uses to be achieved and protected. The classification of the waters of the State must take into consideration the use and value of water for ... industrial, and other purposes ....” For revisions to non-101(a)(2) uses, such as industrial uses, 40 CFR § 131.10(k)(3) specifies that states are not required to conduct a use attainability analysis, but must “submit documentation justifying how its consideration of the use and value of water for those uses ... appropriately supports the State’s action ... .”

As discussed above, Minnesota considered the technical literature and surveys of industrial water appropriators and determined that all waters of the state have the same use and value for industrial purposes and revised the Class 3 use for waters throughout Minnesota, accordingly. Additionally, Minnesota determined based on the technical literature and industrial surveys that the previously applicable Class 3 use subclasses do not reflect the use and value of waters for industrial purposes. The previous Class 3 use subclasses had not reflected different goals for the different types of waters and the goal for each was the same: use “as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes,” consistent with the definition of the Class 3 use at Minn. R. 7050.0140, Subp. 4. Instead, the subclasses reflected potentially different water quality needs for different industries using the water. Therefore, the goal of protecting water quality sufficient to support the industrial consumption use is achieved without specifying subclasses of the use because the available information on the use of surface waters by industry indicate that the subclasses did not reflect the needs of industrial users of surface waters. The goal for all Class 3 waters continues to be that they be capable of being used “as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes,” consistent with the definition of the Class 3 use at Minn. R. 7050.0140, Subp. 4.

40 CFR § 131.10(h)(1) requires that states cannot remove designated uses if “[t]hey are existing uses ... unless a use requiring more stringent criteria is added.” As discussed above, in revising the Class 3 designated use, Minnesota determined that the previously applicable Class 3 use subclasses do not represent meaningful differences in the type of industrial use that is occurring or expected to be occurring on State waters and that industrial consumption is more appropriately represented as a single use. Therefore, replacing the Class 3 subclasses from waters throughout Minnesota with a single Class 3 use does not result in the removal of an industrial consumption use. Consequently, the removal of the Class 3 use subclasses from waters throughout Minnesota does not remove an existing use from any waters.

Thus, as described above, Minnesota considered the use and value of water for the industrial consumption use and submitted documentation supporting the State’s action. Consequently, EPA concludes that the State’s revisions to classify all Minnesota waters as a general Class 3 industrial consumption use rather than specific Class 3 subcategories and its elimination of the Class 3 use subclass categories are consistent with the CWA and 40 CFR § 131.10.

## **2. Agricultural use for wetlands moved from 4C to Class 4A and 4B**

Prior to Minnesota's revisions, the State's WQS had included separate use designations for irrigation and livestock and wildlife uses of non-wetland surface waters (classes 4A and 4B) and wetlands (Class 4C). As defined at Minn. R. 7050.0224, Subp. 4, Minnesota's Class 4C use designation for wetlands required that "[t]he quality of Class 4C wetlands shall be such as to permit their use for irrigation and by wildlife and livestock without inhibition or injurious effects ...." Minnesota's revisions replaced the Class 4C agricultural use for all wetlands with the Class 4A and 4B uses by replacing the Class 4C subclass designation with the Class 4A and 4B designations for all waters listed in Minn. R. 7050.0470 and revising Minn. R. 7050.0415, Subp. 4(B)<sup>2</sup> to specify that all wetlands not listed in part 7050.0470 are classified as Class 4A and 4B instead of Class 4C, as previously specified. Additionally, because the Class 4C use subclass was redundant with the Class 4A and 4B use subclasses, Minnesota deleted the Class 4C designation at Minn. R. 7050.0224, Subp. 4.

As discussed above, the irrigation and livestock and wildlife uses for wetlands under the Class 4C use subclass were equivalent to Minnesota's Class 4A irrigation use and Minnesota's Class 4B livestock and wildlife use for all other waters. Additionally, Minn. R. 7050.0224, Subp. 4 had applied the Class 4A and 4B criteria to the Class 4C use subclass and, thus, the re-designation of wetlands from Class 4C to Class 4A and 4B does not result in any substantive changes to the agricultural uses and criteria to protect agricultural uses that apply to wetlands<sup>3</sup>. Consequently, these revisions are non-substantive revisions that do not change the meaning or implementation of the State's existing federally-approved WQS. Therefore, EPA concludes that the revisions to the agricultural uses that apply to wetlands are consistent with the CWA and 40 CFR Part 131.

### **B. Whether the State has adopted criteria that protect the designated water uses based on sound scientific rationale consistent with § 131.11. (40 CFR § 131.5(a)(2))**

40 CFR § 131.11(a) provides that

States must adopt those water quality criteria that protect the designated use. Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. For waters with multiple use designations, the criteria shall support the most sensitive use.

In adopting criteria, 40 CFR § 131.11(b) provides that states should either:

- (1) establish numerical values based on:
  - (i) 304(a) Guidance; or

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<sup>2</sup> Prior to Minnesota's revisions, these rules were located at Minn. R. 7050.0430. In moving these rules, Minnesota did not make any substantive changes other than the re-designation of wetlands as Class 4A and 4B instead of Class 4C and the removal of the Class 3 use subclasses (discussed in Section II.A.1).

<sup>3</sup> Prior to Minnesota's revisions, Minn. R. 7050.0224, Subp. 4 had also included criteria for pH and settleable solids intended to protect "the known or perceived quality of the wetland itself." (SONAR, p. 49). As discussed in Section II.B.7 below, Minnesota preserved the settleable solids criterion by moving it to the State's Class 2D WQS at Minn. R. 7050.0222, Subp. 6 and removed the pH criterion after determining that the criterion was redundant with the State's existing pH criterion at Minn. R. 7050.0222, Subp. 6.

- (ii) 304(a) Guidance modified to reflect site-specific conditions; or
  - (iii) Other scientifically defensible methods; or
- (2) establish narrative criteria or criteria based upon biomonitoring methods where numerical criteria cannot be established or to supplement numerical criteria.

### **1. Revision of narrative criteria and establishment of numeric threshold values to protect Minnesota’s industrial consumption (Class 3) designated use**

Minnesota’s WQS at Minn. R. 7050.0140, Subp. 4 define the Class 3 beneficial use as “all waters of the state that are or may be used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes, and for which quality control is or may be necessary to protect the public health, safety, or welfare.”

Prior to the State’s revisions, Minnesota’s previous Class 3 WQS had protected this use by assigning each water body a Class 3 subclass based on the type of industry expected to use that water and applying water quality criteria (both narrative and numeric) to protect each Class 3 subclass based on the anticipated water quality needs of that industry. As established at Minn. R. 7050.0223, subs. 2 through 5, the narrative criteria that applied for each Class 3 subclass varied based on the type of industry and the degree of treatment required, as follows:

- Class 3A – The quality of class 3A waters of the state shall be such as to permit their use without chemical treatment, except softening for groundwater, for most industrial purposes, except food processing and related uses, for which a high quality of water is required. Minn. R. 7050.0223, Subp. 2.
- Class 3B – The quality of class 3B waters of the state shall be such as to permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment. Minn. R. 7050.0223, Subp. 3.
- Class 3C – The quality of class 3C waters of the state shall be such as to permit their use for industrial cooling and materials transport without a high degree of treatment being necessary to avoid severe fouling, corrosion, scaling, or other unsatisfactory conditions. Minn. R. 7050.0223, Subp. 4.
- Class 3D – The quality of class 3D wetlands shall be such as to permit their use for general industrial purposes, except for food processing, with only a moderate degree of treatment. Minn. R. 7050.0223, Subp. 5.

As discussed in Section II.A.1 above, Minnesota revised the Class 3 beneficial use as part of this rulemaking by re-designating all waters with a general Class 3 use designation and eliminating the Class 3 beneficial use subclass categories from Minn. R. 7050.0223. Consistent with the State’s revisions to the Class 3 beneficial use classification, Minnesota also removed the separate narrative criteria to protect the Class 3 beneficial use subclasses and replaced those criteria with a single narrative criterion to protect the overall Class 3 beneficial use:

The quality of class 3 waters of the state must be such as to permit their use for industrial purposes to avoid severe fouling, corrosion, or scaling. If the standard in this part is exceeded in waters of the state that have the class 3 designation, it is considered indicative of a polluted condition that is actually or potentially deleterious, harmful,

detrimental, or injurious with respect to the designated use. No sewage, industrial waste, or other wastes from point or nonpoint sources, treated or untreated, shall be discharged into or permitted by any person to gain access to any waters of the state classified for industrial purposes so as to cause any material impairment of their use as a source of industrial water supply. Minn. R. 7050.0223, Subp. 2.

Additionally, Minnesota developed a Class 3 Translator Method (April 2021) that includes two provisions that function as additional water quality criteria for protection of the industrial consumption designated use. Specifically, Minnesota's Class 3 Translator Method provides that, to protect the industrial consumption use from effects of severe scaling, dischargers either not increase hardness in waters that are appropriated for industrial water consumption (box 2) or, if a discharger does increase hardness, to not cause the calcium carbonate saturation index (CCSI) in waters that are appropriated for industrial consumption to increase above 2.0 (boxes 5 and 7). Class 3 Translator Method at 3 and 8. The Class 3 Translator Method does not address the aspects of Minnesota's industrial consumption use related to severe fouling or corrosion.

*a. Narrative criterion*

As described above, Minnesota's revised narrative criterion does not specify any particular industrial use or uses and instead requires protection of water quality sufficient to protect all industrial uses. Consequently, Minnesota's revised narrative criterion encompasses the water quality needs of all industry or category of industries included in the Class 3 use designation.

Minnesota's revised narrative criterion establishes two requirements for the protection of Class 3 waters. First, the revised narrative criterion requires that water quality in Class 3 waters be protected to "permit their use for industrial purposes to avoid severe fouling, corrosion, or scaling." Second, the revised narrative criterion prohibits the release of pollutants "so as to cause any material impairment of their use as a source of industrial water supply." Both of these requirements specifically require that water quality levels be maintained at levels that would allow those waters to be "used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes, and for which quality control is or may be necessary to protect the public health, safety, or welfare," consistent with the Class 3 use definition at Minn. R. 7050.0140, Subp. 4.

The first requirement established by Minnesota's revised Class 3 narrative criterion at Minn. R. 7050.0223, Subp. 2 specifies the conditions that must be prevented (water quality that would cause "severe fouling, corrosion, or scaling") for the Class 3 use to be attained. This water quality requirement is the same as that provided by the previously applicable narrative criterion for the Class 3C beneficial use subclass but differs from the previously applicable narrative criterion for other subclasses.

As described in the TSD submitted by MPCA in support of the State's revisions, MPCA reviewed the technical literature regarding industrial water quality requirements and surveyed industrial facilities to identify the water quality needed to ensure that waters could be "used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes." Based on its evaluation, MPCA determined that "industrial water appropriators

frequently have a wide range of water treatment needs and consequently must use a wide variety of technologies to meet their specific water quality requirements.” TSD at 21. Within this variety of technologies are technologies that do not require continuous supervision and management (passive treatment) and technologies that continuously treat wastewater using chemical and physical processes (active treatment). While MPCA determined based on its technical review that “[d]ifferent industries will make different decisions based on their individual water quality needs, where they exist in the state, how much they want to invest in treatment, and whether or not scale formation is a problem for them,” MPCA also identified a preference among industry for passive treatment. SONAR at 76. Consequently, MPCA concluded that industrial uses would be protected as long as water quality levels are not altered by other users to the extent “that would impair downstream industrial consumption by forcing an industrial appropriator to install new active treatment technologies.” Based on information relating corrosion levels with recommended treatment levels (e.g., Wilkes University Center for Environmental Quality<sup>4</sup>), MPCA determined that an industrial appropriator would be compelled to install new active treatment technologies when water quality conditions become such as to cause “severe fouling, corrosion, or scaling.” Consequently, Minnesota concluded that prevention of water quality conditions that could result in “severe fouling, corrosion or scaling” would allow waters to be “used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes,” consistent with the definition of the Class 3 use at Minn. R. 7050.0140, Subp. 4.

*b. Numeric threshold values*

As discussed above, to more specifically define ambient water quality levels to protect the industrial consumption use from effects due to severe scaling, Minnesota developed more specific water quality requirements (maintenance of current hardness levels or, if increasing hardness, no increase that would cause the CCSI to increase above 2.0 at any location where water is appropriated for industrial consumption) that Minnesota included in the Class 3 Translator Method. The Class 3 Translator Method is incorporated by reference into Minnesota’s regulations at Minn. R. 7053.0260, Subp. 3 and so are legally binding. As discussed above, Minnesota determined based on the technical literature and industrial surveys that the greatest water quality need for industry is consistency, which is needed to allow for the design of water treatment systems based on predictable water quality and to subsequently stay within the design parameters for that system. TSD at 17-18. Additionally, Minnesota determined that calcium carbonate is the form of scale that is most likely to form due to its lower solubility compared with other forms of scale and, thus, that hardness (a measure of calcium and magnesium in the water) would be an appropriate measure of the water quality constituents that would affect industrial water appropriators. Consequently, Minnesota concluded that maintenance of the existing in-stream hardness levels would allow downstream industrial water appropriators to stay within the design parameters for their selected treatment system. SONAR at 74.

Additionally, for situations where there would be an increase in in-stream hardness levels, Minnesota developed a numeric CCSI threshold, found in boxes 5 and 7 of the Class 3 Translator

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<sup>4</sup> Oram, B., B.F. Environmental Consultants Inc. Unpublished Research (2001), as found at <https://water-research.net/index.php/drinking-water-issues-corrosive-water-lead-copper-aluminum-zinc-and-more>, last accessed August 18, 2021.

Method. In developing the numeric CCSI threshold, Minnesota determined based on a review of the technical literature and industry surveys that calcium carbonate is the type of scale most likely to form and, thus, most likely to affect industrial uses. Furthermore, Minnesota determined based on the technical literature that the potential for calcium carbonate to precipitate and form scale is dependent on multiple factors and, thus, that a CCSI that considers those various factors is most appropriate for evaluating the potential effects on industrial uses. As discussed in the TSD, guidelines for CCSI in the available technical literature (e.g., Wilkes University Center for Environmental Quality) indicated that “scale is likely to form at severe levels and rates that would cause unwanted plugging of pipes” and that additional treatment is “advisable” when CCSI exceeds 2.0. TSD at 25-26. Consequently, Minnesota concluded that maintaining CCSI levels below 2.0 would avoid severe scaling and therefore would be at a level that would ensure that waters could be used for industrial purposes.

As discussed above, Minnesota’s Class 3 narrative criterion applies to all surface waters, provides protection for all types of industrial appropriators and provides protection consistent with the industrial consumption designated use. Additionally, the “no increase in hardness” and 2.0 numeric CCSI threshold when there is an increase in hardness included in the Class 3 Translator Method that define the ambient water quality levels to protect industrial consumption at locations where water is appropriated for industrial consumption are supported by the technical work described above. Therefore, EPA concludes that Minnesota’s narrative criterion at Minn. R. 7050.0223, Subp. 2 and the “no increase in hardness” and numeric CCSI threshold requirements included in the Class 3 Translator Method at locations where water is appropriated for industrial consumption are criteria that are based on sound scientific rationale and protective of Minnesota’s Class 3 industrial consumption use and so are consistent with 40 CFR §§ 131.5(a)(2) and 131.11(a).<sup>5</sup>

## **2. Revision of narrative criteria and establishment of numeric threshold values to protect Minnesota’s irrigation (Class 4A) designated use**

To protect Minnesota’s Class 4A irrigation use, the State’s WQS include an existing narrative criterion at Minn. R. 7050.0224, Subp. 2, requiring that “[t]he quality of class 4A waters of the state shall be such as to permit their use for irrigation without significant damage or adverse effects upon any crops or vegetation usually grown in the waters or area, including truck garden

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<sup>5</sup> Although, as discussed in Section II.D below, EPA has determined that the rest of the Class 3 Translator Method are not new or revised WQS, EPA has determined that the “no increase in hardness” and numeric CCSI threshold included in the Class 3 Translator Method are new or revised WQS that EPA has the authority to review under Section 303(c) of the CWA, because: 1) they are legally binding because Minn. R.7053.0260, Subp. 3 requires the use of the Class 3 Translator Method and the Class 3 Translator Method requires the application of the “no increase in hardness” and numeric CCSI threshold included in the Class 3 Translator Method; 2) the “no increase in hardness” and numeric CCSI threshold included in the Class 3 Translator Method establish specific ambient water quality threshold magnitudes for protection of the industrial consumption use and, thus, address water quality criteria to protect designated uses; 3) establish the desired ambient condition (i.e., no increase in hardness or, if hardness is increased, no increase above 2.0 at any location where water is appropriated for industrial consumption) to protect the industrial consumption use for Minnesota waters; and 4) establish new provisions that did not previously exist.

crops.” Minnesota revised this narrative criterion by removing the phrase “including truck garden crops” from Minn. R. 7050.0224, Subp. 2.

Minnesota stated in its SONAR that the reference to truck garden crops was redundant, since the narrative criterion requires protection of “any crops or vegetation usually grown in the waters or area” and, thus, would include truck garden crops. Therefore, Minnesota stated that this revision does not modify the protection provided for the State’s Class 4A irrigation use by the narrative criterion at Minn. R. 7050.0224, Subp. 2.

Minnesota’s WQS at Minn. R. 7050.0140, Subp. 5 define the Class 4 beneficial use as “all waters of the state that are or may be used for any agricultural purposes, including stock watering and irrigation, or by waterfowl or other wildlife and for which quality control is or may be necessary to protect terrestrial life and its habitat or the public health, safety, or welfare.” Following Minnesota’s revisions, the State’s Class 4A narrative criterion continues to protect “*any crops or vegetation* usually grown in the waters or area” (emphasis added) and, thus, would continue to protect “any agricultural purposes,” consistent with the definition of the Class 4 beneficial use at Minn. R. 7050.0140, Subp. 5.

Additionally, Minnesota developed a Class 4A Translator Method (April 2021) that includes specific numeric thresholds that the State developed to protect the Class 4A use where there are irrigation appropriators. Specifically, Minnesota’s Class 4A Translator Method includes numeric thresholds for sodium adsorption ratio (SAR)<sup>6</sup> and specific conductance that ensure water quality sufficient to protect the irrigation use. The Class 4A Translator Method includes two sets of SAR and specific conductance thresholds based on whether irrigated crops in the area are considered sensitive or not.

As discussed in the TSD, the SAR and specific conductance thresholds included in the Class 4A Translator Method are based on root zone salinity tolerance ratings for SAR and specific conductance published in the 2011 *Agricultural Salinity Assessment and Management* manual<sup>7</sup> (hereafter referred to as the “ASAM manual”), a reference text in the agricultural field. Because crops vary in their sensitivity to salinity, the ASAM manual provides SAR and specific conductance reference values that vary based on whether crops are “sensitive,” “moderately sensitive,” “moderately tolerant” or “tolerant.” For sensitive crops, Minnesota selected values for SAR (6) and specific conductance (1,500 µS/cm) based on the values for the most sensitive category (“sensitive”) in the 2011 ASAM manual. For non-sensitive crops, Minnesota selected values for SAR (10) and specific conductance (3,000 µS/cm) based on the values for the second-most sensitive category (“moderately sensitive”) crops in the 2011 ASAM manual.

For both “sensitive” and “moderately sensitive” crops, the 2011 ASAM manual provides a range of root zone salinity tolerance ratings for SAR and specific conductance. As discussed in sections 4.2.3 through 4.2.11 of the TSD, Minnesota determined based on its literature review that the soil characteristics and climate of an area influence the sodium and specific conductance levels in the crop root zone. For example, while higher specific conductance levels in irrigation

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<sup>6</sup> SAR is defined as  $\frac{Na}{\sqrt{\frac{1}{2}(Ca+Mg)}}$ , with all inputs expressed as milliequivalents per liter.

<sup>7</sup> Wallender, W.W. and K.K. Tanji, *Agricultural Salinity Assessment and Management*, 2<sup>nd</sup> Ed., (2011).

water used on a soil would be expected to contribute to higher specific conductance levels in the root zone, the extent of that contribution is affected by how long the irrigation water is held within the root zone, which is affected by the local soil characteristics, and how much rainfall occurs, which will flush salts away from the root zone. As discussed in the TSD, Minnesota considered the soil types and climate in Minnesota and determined that soils in Minnesota have a lower salinization risk and receive more rainfall during the growing season than the areas used to derive the protective values in the ASAM manual (primarily arid or semi-arid areas with moderately saline soils and poor soil drainage). Consequently, MPCA determined that salts in irrigation water will be flushed away from the root zone more readily in Minnesota soils than in the areas used to derive the protective values in the ASAM manual and that irrigation water with higher sodium and specific conductance levels can be used on soils in Minnesota than in an arid, poorly drained environment without soils accumulating salts in the crop root zone to levels that would adversely affect the crops grown in the area. Therefore, Minnesota concluded that values at the upper bound of the ranges of protective thresholds published in the ASAM manual would be protective of crops grown in Minnesota.

Commenters expressed concern that the specific conductance and SAR values included in the Class 4A Translator Method would not be protective of all sensitive crops (e.g., strawberries and raspberries) and would not be protective of medicinal and culturally important plants for which tribes hold reserved rights. Although the scientific literature cited by the commenters clearly indicates that salt and ions (as measured by specific conductance and SAR) can cause adverse impact to trees and other plants, as discussed below, the studies do not provide specific effect levels to allow a comparison with the specific conductance and SAR values included in the Class 4A Translator Method.

Some of the commenters cited values in Table 3 of the University of Minnesota's *Minnesota Surface Water Quality Investigation – Industrial Supply, Irrigation and Livestock Uses* (June 29, 2010) (hereafter referred to as “the U of M Class 3 and 4 Review”) prepared for Minnesota, which identified specific conductance levels below 1,500  $\mu\text{S}/\text{cm}$  to protect intolerant crops such as strawberries, raspberries, beans and carrots. However, the U of M Class 3 and 4 Review noted that the values provided may “be modified by management, climate and soil conditions.” U of M Class 3 and 4 Review at 19. For example, the values were selected assuming that, “[r]ainfall is low and does not play a significant role in meeting crop demands” and, thus, that “[t]he guidelines may be too restrictive for wetter areas.” U of M class 3 and 4 Review at 20. As discussed above, Minnesota considered the soil types and climate in Minnesota in developing the Class 4A Translator Method and determined that maintaining specific conductance at or below 1,500  $\mu\text{S}/\text{cm}$  would be protective of sensitive crops and plants, including the intolerant crops included in Table 3 of the U of M Class 3 and 4 Review, because Minnesota soils have lower salinization potential and receive more rainfall during the growing season than the areas used to derive the values included in the U of M Class 3 and 4 Review.

Commenters also cited conductivity levels from studies on the effects of salt on tree species<sup>8</sup> as evidence that the 1,500  $\mu\text{S}/\text{cm}$  value in the Class 4A Translator Method would not be protective

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<sup>8</sup> Foster, A.C. and M.A. Maun, “Effects of highway deicing agents on *Thuja occidentalis* in a greenhouse,” *Canadian Journal of Botany* 56: 863-859 (1976).

of irrigated trees, including culturally important tree species (e.g., white cedar, sugar maple and paper birch). However, the studies cited either did not report specific conductance levels in the irrigation water and instead reported soil conductivity levels or reported adverse effects in the control group at similar levels as the test exposure groups, indicating that the reported adverse effects were not due to salt (as measured by conductivity). Additionally, the studies did not report soil and rainfall conditions, which as indicated by the technical literature considered by Minnesota, may affect the sensitivity of trees in those studies as compared with trees in areas of Minnesota. Consequently, EPA does not find that the studies provided by the commenters are sufficient to conclude that the specific conductance and SAR thresholds included in Minnesota's Class 4A Translator Method are not protective of sensitive crops or culturally important plants and trees, including those for which tribes hold reserved rights.

As discussed above, Minnesota's revisions to the State's Class 4A narrative criterion to protect irrigation uses maintain protection for all types of crops or vegetation. Additionally, the numeric SAR and specific conductance thresholds included in the Class 4A Translator Method are consistent with the current technical guidelines to prevent adverse effects to crops from effects of salts in irrigation water and, thus, are protective of the irrigation designated use. Therefore, EPA concludes that Minnesota's revisions to the State's Class 4A narrative criterion at Minn. R. 7050.0224, Subp. 2 and the numeric SAR and specific conductance thresholds included in the Class 4A Translator Method are based on sound scientific rationale and protective of Minnesota's Class 4A irrigation use and so are consistent with 40 CFR §§ 131.5(a)(2) and 131.11(a).<sup>9</sup>

### **3. New and revised numeric criteria to protect Minnesota's livestock and wildlife (Class 4B) designated use**

Minnesota's WQS at Minn. R. 7050.0140, Subp. 4 define the State's agriculture and wildlife (Class 4) designated use as, "all waters of the state that are or may be used for any agricultural purposes, including stock watering and irrigation, or by waterfowl or other wildlife and for which quality control is or may be necessary to protect terrestrial life and its habitat or the public health, safety, or welfare." To protect the livestock and wildlife aspects of Minnesota's agriculture and wildlife use, Minnesota's WQS designate waters with a livestock and wildlife

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Kutscha, N.P., F. Hyland, and A.R. Langille, "Salt damage to northern white-cedar and white spruce," *Wood Fiber Science* 9: 191-201 (1977).

Willmert, H.M., J.D. Osso, M.R. Twiss, and T.A. Langen, "Winter road management effects on roadside soil and vegetation along a mountain pass in the Adirondack Park, New York, USA," *Journal of Environmental Management* 225: 215-223 (2018).

<sup>9</sup> Although, as discussed in Section II.D below, EPA has determined that the rest of the Class 4A Translator Method is not a new or revised WQS, EPA has determined that the numeric SAR and specific conductance thresholds are a new or revised WQS that EPA has the authority to review under Section 303(c) of the CWA, because: 1) they are legally binding because Minn. R. 7053.0263, Subp. 3 requires the use of the Class 4A Translator Method and the Class 4A Translator Method requires the application of the SAR and specific conductance thresholds; 2) the SAR and specific conductance thresholds establish specific ambient water quality threshold magnitudes and, thus, address water quality criteria to protect designated uses; 3) establish the desired ambient condition (i.e., SAR less than 6 or 10, depending on crop sensitivity and specific conductance less than 1,500  $\mu\text{S}/\text{cm}$  or 3,000  $\mu\text{S}/\text{cm}$ , depending on crop sensitivity) to protect irrigation use for Minnesota waters; and 4) establish new provisions that did not previously exist.

designated use subclass (Class 4B) and apply narrative and numeric criteria at Minn. R. 7050.0224, Subp. 3 to protect that use subclass.

Minnesota's rulemaking revises the State's numeric criteria at Minn. R. 7050.0224, Subp. 3 to protect the livestock and wildlife (Class 4B) designated use by replacing the existing 1,000 mg/L criterion for total salinity with a 3,000 mg/L criterion for total dissolved solids and adopting new numeric criteria for nitrate and nitrite (100 mg/L) and sulfate (600 mg/L). EPA reviewed each new or revised livestock and wildlife criterion in this WQS revision package, as discussed below.

*a) Total salinity/total dissolved solids*

In updating the Class 4B criteria to protect livestock and wildlife uses, Minnesota conducted a review of the technical literature regarding water quality requirements for livestock and wildlife and identified several peer-reviewed journal articles and recommended guidelines documents from science advisory councils, universities, industry groups or government agencies. The available literature indicated that, whereas the existing Class 4B criterion was for "total salinity," that the current science used the analytical term "total dissolved solids." TSD at 121. Both analytical terms relate to dissolved substances in the water. However, since the current technical literature regarding effects on livestock and wildlife uses the term "total dissolved solids," Minnesota concluded that a total dissolved solids criterion would be more consistent with the current state of science than a total salinity criterion. TSD at 121.

Based on the available literature regarding the effects of total dissolved solids on livestock and wildlife, Minnesota determined that the primary impacts to livestock and wildlife from total dissolved solids are related to altered osmolar regulation in the body associated with intake of total dissolved solids through drinking water. TSD at 121. Minnesota identified several peer-reviewed journal articles and other documents that provided recommended guidelines to prevent adverse effects from total dissolved solids. Based on those guidelines, Minnesota concluded that sensitivity to total dissolved solids varies based on the species of interest and that poultry and dairy cattle are the most sensitive species with respect to total dissolved solids.

For poultry, Minnesota identified several peer-reviewed journal articles that evaluated the effects of total dissolved solids in drinking water. The identified journal articles indicated that poultry species generally have reduced growth when exposed to total dissolved solids concentrations greater than 3,000 mg/L in drinking water. TSD at 123. For example, Ilian et al. (1981)<sup>10</sup> found that growth in broiler chicks and leghorn pullets was not affected by drinking water with total dissolved solids concentrations of 2,760 mg/L. Ahmed (2013)<sup>11</sup> observed reduced growth in broiler chicks when exposed to drinking water with 3,448 mg/L of total dissolved solids but not when exposed to drinking water with 3,154 mg/L of total dissolved solids. Therefore, MPCA concluded that a total dissolved solids criterion of 3,000 mg/L would not cause adverse effects to poultry.

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<sup>10</sup> Ilian, M.A., M.F. Diab, M.D. Hussein and A.J. Salman, "Effects of brackish water utilization by broilers and growing pullets on performance," *Poultry Science* 60: 2374-2379 (1981).

<sup>11</sup> Ahmed, A.S., "Performance and immune response of broiler chicks as affected by different levels of total dissolved solids in drinking water under hot arid environments," *Animal Production Science* 53(4): 322-327 (2013).

For dairy cattle, Minnesota identified several peer-reviewed journal articles that evaluated the effects of total dissolved solids in drinking water on milk production and growth. Two of the studies identified by Minnesota<sup>12,13</sup> observed reduced milk production when dairy cattle were provided water with total dissolved solids concentrations of approximately 4,000 mg/L or greater as compared with dairy cattle provided treated or desalinated water. TSD at 123. One article identified by Minnesota<sup>14</sup> observed a small reduction in milk production in dairy cattle provided water with total dissolved solids concentrations of approximately 2,700 mg/L as compared with dairy cattle provided tap water with approximately 200 mg/L total dissolved solids. However, this difference was not statistically significant. TSD at 123. Additionally, the identified articles that studied growth effects all observed effects at concentrations of 3,000 mg/L or greater. Therefore, Minnesota concluded that the 3,000 mg/L total dissolved solids criterion identified to protect poultry would also be protective of dairy cattle.

Because Minnesota's Class 4B designated use is intended to protect wildlife, Minnesota also searched the literature for studies evaluating the effects of total dissolved solids on wildlife. While data was limited, Minnesota identified a few studies that indicated that waterfowl are less sensitive to total dissolved solids than poultry, with effects to waterfowl typically observed at total dissolved solids concentrations between 7,700 and 10,000 mg/L<sup>15</sup>. TSD at 122. Therefore, Minnesota concluded that the 3,000 mg/L total dissolved solids criterion would also be protective of waterfowl and other wildlife.

The studies used by Minnesota to develop the 3,000 mg/L total dissolved solids criterion were based on drinking water exposures of three weeks to several months and, thus, Minnesota set the duration of the criterion as a 30-day average. Additionally, because any exceedance of the criterion would be expected to result in a reduction of producer's profits through reduced weight gain or milk production, Minnesota set the frequency of the criterion as "never to be exceeded." SONAR at 47-48.

As discussed above, Minnesota demonstrated that a total dissolved solids criterion is more consistent with the current science than a total salinity criterion and that the 3,000 mg/L total dissolved solids criterion is protective of the most sensitive livestock or wildlife species (poultry or waterfowl) based on peer-reviewed literature. Therefore, the criterion ensures that Class 4B waters may be "used for any agricultural purposes, including stock watering ..., or by waterfowl or other wildlife." Additionally, Minnesota demonstrated that the revised total dissolved solids

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<sup>12</sup> Challis, D.J., J.S. Zeinstra and M.J. Anderson. "Some effects of water quality on the performance of high yielding cows in an arid climate," *The Veterinary Record* 120(1): 12-15 (1987).

<sup>13</sup> Solomon, R., J. Miron, D. Ben-Ghedalia and Z. Zomberg, "Performance of high producing dairy cows offered drinking water of high and low salinity in the Arava Desert," *Journal of Dairy Science* 78(3): 620-624 (1995).

<sup>14</sup> Jaster, E.H., J.D. Schuh and T.N. Wegner, "Physiological effects of saline drinking water on high producing dairy cows," *Journal of Dairy Science* 60: 2374-2379 (1978).

<sup>15</sup> E.g., Barnes, G.G. and T.D. Nudds, "Salt tolerance in American black ducks, mallards, and their F1-hybrids," *The Auk: Ornithological Advances* 108(1): 89-98 (1991).

Bennett, D.C. and M.R. Hughes, "Comparison of renal and salt gland function in three species of wild ducks," *Journal of Experimental Biology* 206: 3273-3284 (2003).

Moorman, A.M., T.E. Moorman, G.A. Baldassarre, and D.M. Richard, "Effects of saline water on growth and survival of mottled duck ducklings in Louisiana," *Journal of Wildlife Management* 55(3): 471-476 (1991).

Stolley, D.S., J.A. Bissonette, J.A. Kadlec, and D. Coster, "Effects of saline drinking water on early gosling development," *Journal of Wildlife Management* 63(3): 990-996 (1999).

criterion will be applied based on the relevant exposure period from the relevant studies and will not allow exceedances that would impact the beneficial use. Therefore, EPA concludes that Minnesota's replacement of its Class 4B total salinity criterion at Minn. R. 7050.0224, Subp. 3 with a total dissolved solids criterion of 3,000 mg/L is based on sound scientific rationale and protective of Minnesota's Class 4B livestock and wildlife use and so is consistent with 40 CFR §§ 131.5(a)(2) and 131.11(a).

*b) Nitrate and nitrite*

Based on the available literature regarding the effects of nitrate and nitrite on livestock and wildlife, Minnesota determined that the primary impacts to livestock and wildlife from nitrate and nitrite are related to nitrite toxicity associated with intake of nitrate and/or nitrite through drinking water. TSD at 134. Additionally, Minnesota determined that while nitrite is more toxic than nitrate, nitrate is converted to nitrite in animal bodies after consumption and, thus, that a criterion was needed for both forms of nitrogen. The available studies indicated that ruminants are most sensitive to nitrate and nitrite due to differing digestive processes that more rapidly convert nitrate to nitrite. *Id.* Consequently, Minnesota searched the technical literature to determine the level of nitrate and nitrite that would be protective of ruminants.

Several guideline documents identified by Minnesota indicated that 100 mg/L nitrate in water would be protective of ruminants. TSD at 135. However, because livestock can consume nitrate through both their drinking water and diet, other studies recommended a protective level of nitrate based on total nitrate intake of 0.11% NO<sub>3</sub>-N, on a dry matter basis. Therefore, Minnesota also compared the 100 mg/L "water only" recommendation with the total nitrate intake recommendation to ensure that it would be protective of ruminant livestock. Using typical water and feed consumption rates from the literature, Minnesota calculated that livestock drinking water with 100 mg/L nitrate would have a total nitrate intake of 0.08%, on a dry matter basis, or less. *Id.* Because the 100 mg/L nitrate concentration would not cause the total nitrate intake to exceed the protective level of total nitrate intake identified in the literature for ruminants, Minnesota concluded that the 100 mg/L nitrate and nitrite criterion would be protective of ruminants and other livestock that are less sensitive to nitrate and nitrite.

Minnesota searched the literature but did not identify any studies evaluating the effects of nitrate and nitrite on wildlife. TSD at 119-120. Therefore, Minnesota determined that the livestock data are the best surrogates for wildlife and, thus, that the 100 mg/L nitrate and nitrite criterion would be protective of wild ruminant species (e.g., deer and moose), which would be expected to be the most sensitive wildlife species.

The studies used by Minnesota to develop the 100 mg/L nitrate and nitrite criterion were based on drinking water exposures of three weeks to several months and, thus, Minnesota set the duration of the criterion as a 30-day average. Additionally, because any exceedance of the criterion would be expected to result in a reduction of producer's profits through toxic effects on livestock, Minnesota set the frequency of the criterion as "never to be exceeded." SONAR at 47-48.

As discussed above, Minnesota demonstrated that the 100 mg/L nitrate and nitrite criterion is protective of the most sensitive livestock or wildlife species (ruminants) based on peer-reviewed literature. Consequently, the criterion would ensure that Class 4B waters may be “used for any agricultural purposes, including stock watering . . . , or by waterfowl or other wildlife.”

Additionally, Minnesota demonstrated that the criterion will be applied based on the relevant exposure period from the relevant studies and will not allow exceedances that would impact the beneficial use. Therefore, EPA concludes that Minnesota’s Class 4B nitrate and nitrite criterion at Minn. R. 7050.0224, Subp. 3 is based on sound scientific rationale and protective of Minnesota’s Class 4B livestock and wildlife use and so is consistent with 40 CFR §§ 131.5(a)(2) and 131.11(a).

### *c) Sulfate*

Based on the available literature regarding the effects of sulfate on livestock and wildlife, Minnesota determined that the primary impacts to livestock and wildlife from sulfate are related to sulfur toxicity associated with intake of sulfate through drinking water. TSD at 126. While Minnesota determined that sulfate is not directly toxic to livestock and wildlife, it can be converted in animal bodies to sulfur, which can be toxic. As with nitrate and nitrite, the available literature indicated that ruminants are most sensitive to sulfate due to the production of hydrogen sulfide during the process of synthesizing sulfur-based amino acids in ruminants.

The studies identified by Minnesota consistently identified a protective level of total sulfur intake (both drinking water and feed) between 0.30% and 0.50% sulfur, on a dry matter basis. *Id.* To ensure the protectiveness of the criterion, Minnesota selected the lowest value from this range (0.30% sulfur, on a dry matter basis) to develop its criterion. Using typical water and feed consumption rates from the literature, Minnesota calculated the sulfur percentage supplied by drinking water to three ruminant species (sheep, dairy cow and finishing steer) at different water sulfate concentrations. The state determined that a 600 mg/L sulfate concentration in water would contribute sulfur percentages between 0.13% and 0.16%. TSD at 127-128. Given typical sulfur concentrations in feed (e.g., 0.11% to 0.17% sulfur in corn), Minnesota determined that a 600 mg/L sulfate concentration in drinking water would prevent the total sulfur intake for livestock from exceeding the identified 0.30% sulfur guideline and, thus, would be protective of ruminants and other livestock that are less sensitive to sulfur than ruminants. The 600 mg/L sulfate criterion identified by Minnesota was consistent with recommendations from the National Resource Council<sup>16</sup>. TSD at 128.

Minnesota searched the literature but did not identify any studies evaluating the effects of sulfate on wildlife. Therefore, Minnesota determined that the livestock data are the best surrogates for wild ruminant species (e.g., deer and moose), which would be expected to be the most sensitive wildlife species based on physiology. Additionally, the available literature indicated that livestock and wildlife that consume greater than 40% forage convert sulfur to sulfide more slowly and, thus, can tolerate higher levels of sulfur in their diet. TSD at 128-129. Because wildlife consume most of their diet as forage, Minnesota concluded that wild ruminant species

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<sup>16</sup> National Resource Council, *Mineral tolerance of animals (2<sup>nd</sup> Revised Ed.)* (2005).

are likely more tolerant of sulfur in their diet than the livestock for which the criterion was derived and, thus, that the 600 mg/L sulfate criterion would be protective of wildlife.

The studies used by Minnesota to develop the 600 mg/L sulfate criterion were based on drinking water exposures of three weeks to several months and, thus, Minnesota set the duration of the criterion as a 30-day average. Additionally, because any exceedance of the criterion would be expected to result in a reduction of producer's profits through toxic effects on livestock, Minnesota set the frequency of the criterion as "never to be exceeded." SONAR at 47-48.

As discussed above, Minnesota demonstrated that the 600 mg/L sulfate criterion is protective of the most sensitive livestock and wildlife species (ruminants) based on peer-reviewed literature. Consequently, the criterion would ensure that Class 4B waters may be "used for any agricultural purposes, including stock watering . . . , or by waterfowl or other wildlife." Additionally, Minnesota demonstrated that the criterion will be applied based on the relevant exposure period from the relevant studies and will not allow exceedances that would impact the beneficial use. Therefore, EPA concludes that Minnesota's Class 4B sulfate criterion at Minn. R. 7050.0224, Subp. 3 is based on sound scientific rationale and protective of Minnesota's Class 4B livestock and wildlife use and so is consistent with 40 CFR §§ 131.5(a)(2) and 131.11(a).

Commenters stated that sulfate can also affect livestock and wildlife by facilitating the release of mercury and/or nutrients and that the adopted sulfate criterion is not stringent enough to prevent such effects. Consequently, the commenters argued that the 600 mg/L sulfate criterion is inconsistent with 40 CFR § 131.11(a) and therefore impermissible under the CWA<sup>17</sup>.

While the relevant technical literature indicates that sulfate may play a role in the release of mercury and nutrients from sediment, the associated effects to livestock and wildlife as a result of such releases would not be due to the sulfate itself (or conversion of sulfate within the body) but to increased availability of a separate pollutant. EPA's criteria derivation guidelines (e.g., EPA's 1985 Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses<sup>18</sup>) are designed to establish criteria for the pollutant directly causing toxicity (or other adverse effect). Where another parameter affects this toxicity (or other adverse effect), EPA's criteria derivation guidelines recommend that this relationship be incorporated into a criterion equation for the pollutant of interest, rather than by developing a separate criterion for the parameter that affects toxicity (or other adverse effect). For example, the toxicity of aluminum to aquatic life is affected by the levels of pH, total hardness and dissolved organic carbon in the water. In the 2018 *Final Aquatic Life Ambient Water Quality Criteria for Aluminum*, EPA developed models to adjust the aluminum criteria

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<sup>17</sup> E.g., See February 24, 2021 Joint Tribal Comments on Proposed Amendments to Rules Governing Water Quality Standards, Minnesota Rules chapters 7050 and 7053; Revisor ID No. 4335; OAH Dkt No. 65-9003-37102; February 1, 2021 comments from North American Water Office; February 24, 2021 WaterLegacy Comments Opposing Minnesota Pollution Control Agency Proposed (Class 3 and 4) Pollution Deregulation Rules; March 3, 2021 Comments by Bruce L. Johnson and Maureen K. Johnson addressing MPCA's Post-Hearing Response and Proposed Amendments to Minnesota Rules, Chapters 7050 and 7053 Governing Water Quality Standards; OAH Docket # 8-9003-37102 and Revisor No. 04335.

<sup>18</sup> Stephan, C., D. Mount, D. Hansen, J. Gentile, G. Chapman, and W. Brungs, *Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (1985).

based on pH, total hardness and dissolved organic carbon but did not establish separate criteria for those other parameters based on aluminum toxicity. Therefore, Minnesota's decision to derive the Class 4B sulfate criterion based solely on direct effects to livestock and wildlife from sulfate and to not consider the potential release of mercury and nutrients from sediment is reasonable. EPA notes that Minnesota's Class 2 WQS at Minn. R. 7050.0222 include numeric criteria for mercury to protect human health and eutrophication criteria for nutrients to protect aquatic life. Additionally, Minnesota's Class 4B WQS at Minn. R. 7050.0225, Subp. 3 include a narrative criterion that requires that, "[t]he quality of class 4B waters of the state must be such as to permit their use by livestock and wildlife without inhibition or injurious effects." This narrative criterion is available to Minnesota if site-specific numeric translations become necessary to protect livestock and wildlife from the effects of mercury or nutrients.

#### **4. Removal of numeric criteria to protect Minnesota's industrial (Class 3) and irrigation (Class 4A) designated uses**

Prior to the State's revisions, Minnesota's WQS had included several numeric criteria at Minn. R. 7050.0223 and Minn. R. 7050.0224, Subp. 2 to protect the State's industrial (Class 3) and irrigation (Class 4A) designated uses. As discussed in the TSD and SONAR submitted by the State in support of its WQS revisions, Minnesota adopted the numeric Class 3 and 4A criteria in the 1960s and the criteria had not been updated since then. Based on a review of the technical literature regarding water quality requirements for industry and agriculture and as discussed in more detail below, Minnesota determined that the following numeric Class 3 and 4A criteria were no longer scientifically defensible:

- all of the numeric Class 3 criteria at Minn. R. 7050.0223 to protect industrial use, which included criteria for chlorides, hardness (Ca + Mg as CaCO<sub>3</sub>) and pH and
- the numeric criteria at Minn. R. 7050.0224, Subp. 2 for bicarbonates (HCO<sub>3</sub>), pH, specific conductance, total dissolved salts and sodium to protect irrigation use.

Therefore, Minnesota removed the numeric criteria listed above from the State's WQS at Minn. R. 7050.0223 and Minn. R. 7050.0224, Subp. 2.

##### *a. Industrial consumption*

Prior to the State's revisions, Minnesota's WQS had included several numeric criteria for chlorides, hardness and pH at Minn. R. 7050.0223 to protect the State's industrial (Class 3) designated use. Based on a review of the technical literature regarding water quality requirements for industrial and agricultural uses and as discussed in more detail below, Minnesota removed those numeric criteria from Minn. R. 7050.0223 and proposed protecting the Class 3 industrial designated use and the Class 4 agricultural use with narrative criteria.

As discussed in the TSD and SONAR submitted by the State in support of the State's WQS revisions, Minnesota adopted the numeric Class 3 criteria in the 1960s and the criteria had not been updated since then. To determine whether the current science still supports the numeric criteria as being protective of the State's industrial and agricultural uses, Minnesota searched the technical literature regarding water quality requirements for industry and agriculture.

In considering revisions to the State's Class 3 WQS, the State started by requesting that the University of Minnesota (U of M) departments of Bioproducts and Biosystems Engineering and Soils, Water and Climate evaluate the current information regarding the water quality needs for industrial water appropriators. As described in the U of M Class 3 and 4 Review, the University researchers consulted national and international experts, databases of scientific literature, specialized reports, and WQS in other states. Because publicly available information was limited, the University researchers also conducted interviews with representatives from various industrial sectors, including the semiconductor, beverage and refining industries. Based on the available data and feedback from industrial representatives, the University researchers determined that, while industries generally require consistent water quality, the specific water quality considerations vary widely between industries. For example, representatives of the semiconductor industry identified low organics and consistent temperature as important to their industry while representatives of the refining industry identified solids (suspended and dissolved), ammonia and chlorides as important. U of M Class 3 and 4 Review at 100. Therefore, the University researchers concluded that "industrial users have specific water chemistry requirements tailored for particular operational or production needs." U of M Class 3 and 4 Review at 112.

As described in the TSD and SONAR submitted by MPCA in support of the State's revisions, MPCA considered the results of the U of M Class 3 and 4 Review, as well as data from other sources, to identify what water quality requirements would be needed to ensure that waters could be "used as a source of supply for industrial process or cooling water, or any other industrial or commercial purposes" consistent with the definition of the Class 3 designated use at Minn. R. 7050.0140, Subp. 4.

Based on the available technical literature, Minnesota determined that industrial processes and treatment technologies have changed since the Class 3 numeric criteria were adopted in the 1960s and, thus, that the numeric criteria for pH, hardness and chloride are "based on outdated assumptions about what water quality industrial appropriators require and are capable of treating for." TSD at 23. The results of MPCA's industrial facility surveys supported this conclusion, as none of the surveyed industrial facilities considered the Class 3 chloride or hardness criteria to be "of essential importance for their industrial appropriation needs." TSD at 22. While three industrial facilities considered the Class 3 pH criteria to be "of essential importance," that importance was more related to the consistency of pH levels than to the absolute levels of pH. Additionally, Minnesota consulted MPCA's and Minnesota Department of Natural Resources' records and found that no industrial appropriator had submitted a notification to the State "expressing concern with the quality of their appropriation water with respect to chloride, hardness, pH, or any other parameter." TSD at 22. Based on this information, Minnesota concluded that there was no longer a sound scientific rationale to support the Class 3 numeric criteria for chlorides, hardness and pH. In developing the State's Class 3 WQS revisions, Minnesota submitted a draft TSD describing its analysis and the proposed revisions for peer review with independent experts from the University of Minnesota and North Dakota State University. As summarized in the *Appendix A: Peer review summary and documentation of changes made to the technical support document* submitted as Exhibit 8 to the SONAR, the peer reviewers agreed that the existing chlorides, hardness and pH criteria were "based on an outdated

understanding of theory and practice” and none of the reviewers were aware of any professional or technical guidelines to support the continued use of those numeric criteria.

Minnesota consulted the technical literature to determine whether updated water quality requirements could be identified for chlorides, hardness or pH, but concluded that there is a “lack of quality published information on industrial water treatment needs and specific technologies capable of meeting those needs.” TSD at 22. Additionally, consistent with the results of the U of M Class 3 and 4 Review, Minnesota determined based on the available technical literature that “[i]ndustrial water appropriators have a wide range of water quality needs based on their specific industrial process requirements” and that “[t]he water quality parameters industrial water appropriators are concerned with varies widely from dissolved salts to pathogens to invasive species to contaminants of emerging concern.” TSD at 20. Therefore, because of the lack of quantifiable data on specific industrial water quality requirements and wide variation in water quality requirements for different industrial facilities, Minnesota concluded that it is not possible to “specify a single numeric value that would appropriately protect for all industrial appropriation uses.” TSD at 21.

Because of the significant variation in industrial water quality requirements based on site-specific characteristics, Minnesota determined that a narrative criterion would be more appropriate for the protection of industrial use “because it allows for individualized and location-specific considerations and does not make presumptions about industrial consumption water quality treatment needs.” SONAR at 30. As discussed in Section II.B.1 above, Minnesota revised its narrative criterion and adopted “no increase in hardness” and numeric CCSI threshold requirements included in the Class 3 Translator Method to protect the State’s Class 3 industrial consumption use and EPA has concluded that those provisions are based on sound scientific rationale and protective of Minnesota’s Class 3 industrial consumption use, consistent with 40 CFR § 131.11(a).

40 CFR § 131.11(a)(1) requires states to “adopt those water quality criteria that protect the designated use. Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use.” 40 CFR § 131.11(b) provides that states may establish narrative or numeric criteria.

As discussed above, Minnesota demonstrated that the current science regarding industrial water quality requirements no longer supports the State’s existing Class 3 numeric criteria for chlorides, hardness and pH and that because of the wide variation in industrial water quality requirements between industrial facilities there is not a sound scientific rationale to establish updated statewide numeric criteria for those parameters. Additionally, Minnesota demonstrated that its revised Class 3 narrative criterion at Minn. R. 7050.0223, Subp. 2 and the “no increase in hardness” and numeric CCSI threshold requirements included in the Class 3 Translator Method, which EPA has determined are protective of industrial uses based on a sound scientific rationale and provide sufficient protection for the Class 3 designated use. Therefore, EPA concludes that the State’s removal of the Class 3 criteria does not remove water quality criteria sufficient to protect the designated use and that the State’s revised Class 3 WQS contain the water quality criteria sufficient to protect the designated use. Accordingly, EPA concludes that Minnesota’s

removal of the State's Class 3 numeric criteria for chlorides, hardness and pH at Minn. R. 7050.0223 is consistent with 40 CFR §§ 131.5(a)(2) and 131.11(a).

EPA notes that the removal of the numeric criteria for chlorides, hardness and pH does not remove the State's ability to regulate those pollutants, but only removes the specific, previously adopted numeric criteria for those parameters from Minnesota's WQS. The State's Class 3 narrative criterion would require the regulation of chlorides, hardness and pH wherever necessary to permit the use of surface waters for industrial purposes.

#### *b. Irrigation*

Prior to the State's revisions, Minnesota's WQS had included several numeric criteria at Minn. R. 7050.0224, Subp. 2 to protect the State's irrigation (Class 4A) designated use. Additionally, Minn. R. 7050.0224, Subp. 2 incorporated by reference "the recommendations in Handbook 60 published by the Salinity Laboratory of the United States Department of Agriculture" (hereafter referred to as "Handbook 60") which was a technical document published in 1954. Based on a review of the technical literature regarding water quality requirements for agriculture and as discussed in detail below, Minnesota removed the numeric criteria to protect irrigation use at Minn. R. 7050.0224, Subp. 2 for bicarbonates ( $\text{HCO}_3$ ), pH, specific conductance, total dissolved salts and sodium and the reference to Handbook 60.

As discussed in the TSD and SONAR submitted by the State in support of the State's WQS revisions, Minnesota adopted the numeric Class 4 criteria in the 1960s and the criteria had not been updated since then. TSD at 38-40. Additionally, Handbook 60 was published in 1954 and had been developed to provide guidance to improve saline and alkali soils in western areas where average annual precipitation is less than that in Minnesota. TSD at 41. To determine whether the current science still supports the numeric criteria as being protective of the State's agricultural uses, Minnesota searched the technical literature regarding water quality requirements for agriculture.

As with the Class 3 WQS revisions, Minnesota started developing its revisions to the Class 4 agricultural criteria by considering the result of the U of M Class 3 and 4 Review. For irrigation uses, the U of M Class 3 and 4 Review identified a set of salinity tolerance thresholds for various crops typically grown in Minnesota. However, the University researchers also determined that the water quality requirements for irrigated crops varies based on the specific crop species, soil type and crop uptake interactions and, thus, concluded that it would be "necessary to explore questions of soil characteristics and crop needs and tolerance to avoid crop toxicity." U of M Class 3 and 4 Review at 25. The U of M Class 3 and 4 Review did not analyze those factors or provide recommendations on how to update the Class 4A WQS based on such considerations.

To further explore the factors that influence crop toxicity, Minnesota consulted the technical literature on irrigation<sup>19</sup> and determined that irrigation water quality needs are influenced by

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<sup>19</sup> In particular, Minnesota relied on the following irrigation manuals:  
Wallender, W.W. and K.K. Tanji. 2011. *Agricultural Salinity Assessment and Management* (2<sup>nd</sup> Ed.). American Society of Civil Engineers. DOI: 10.1061/97807844111698.

several factors, including crop type, soil type, soil drainage management techniques, precipitation patterns, irrigation practices and soil mineral content. For example, water quality sensitivity varies between crop types and the soil type (e.g., soil texture) affects how quickly irrigation water will move through the crop root zone and, thus, affects the potential for salt to accumulate in the crop root zone. TSD at 64-69. As discussed in the TSD, Minnesota assessed each identified factor that affects crop toxicity and determined that many of the factors (e.g., crop type, soil type) vary at both large and small scales throughout Minnesota and, thus, the protective level of water quality also varies throughout the state and cannot be determined without evaluating the local conditions in a given area. TSD at 53-101. Because crop toxicity is dependent on these factors and these factors vary significantly at both large and small scales, Minnesota determined that “[t]here is no ‘one size fits all’ irrigation water quality parameter or numeric value that protects for the wide variety of irrigation water quality needs in Minnesota” and concluded that a narrative criterion would “provide[] an appropriate level of tailored protection for irrigated crops of all types.” TSD at 53.

Minnesota’s existing, previously approved Class 4A narrative criterion at Minn. R. 7050.0224 requires that “[t]he quality of class 4A waters of the state must be such as to permit their use for irrigation without significant damage or adverse effects upon any crops or vegetation usually grown in the waters or area.”<sup>20</sup> Consequently, the revised narrative criterion is based on sound scientific rationale and protective of Minnesota’s Class 4A irrigation use, consistent with 40 CFR § 131.11(a).

40 CFR § 131.11(a)(1) requires states to “adopt those water quality criteria that protect the designated use. Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use.” 40 CFR § 131.11(b) provides that states may establish either narrative or numeric criteria.

As discussed above, Minnesota demonstrated that the current science no longer supports the State’s existing Class 4A numeric criteria for bicarbonates, pH, specific conductance, total dissolved salts and sodium because those criteria do not consider the effects of local factors, such as crop type and soil type, on crop toxicity. Minnesota also demonstrated that the reference to Handbook 60 is no longer supported by the current science because Handbook 60 is outdated and reflects guidance applicable to areas with different soil and precipitation conditions than Minnesota. Minnesota demonstrated that there is not a sound scientific rationale to establish updated statewide numeric criteria for those parameters because of the variability of those local factors throughout the state. Additionally, Minnesota demonstrated that its revised Class 4A narrative criterion at Minn. R. 7050.0224, Subp. 2, which EPA has previously determined is protective of irrigation uses based on a sound scientific rationale, provides sufficient protection for the Class 4A designated use. Therefore, EPA concludes that the State’s removal of the numeric Class 4A criteria for bicarbonates, pH, specific conductance, total dissolved salts and

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Ayers, R.S. and D.W. Westcott. 1994. *Water Quality for Agriculture*. Food and Agriculture Organization of the United Nations.

<sup>20</sup> Minnesota revised its Class 4A narrative criterion to replace the word “shall” with “must” and to remove a reference to “truck garden crops.” As discussed in sections II.B.2 and II.C of this document, these revisions do not change the meaning or implementation of the State’s narrative criterion and, thus, EPA has determined that these revisions are consistent with the CWA and 40 CFR Part 131.

sodium does not remove water quality criteria sufficient to protect the designated use and that the State's revised Class 4A WQS contain the water quality criteria sufficient to protect the designated use. Accordingly, EPA concludes that Minnesota's removal of the State's Class 4A numeric criteria for bicarbonates, pH, specific conductance, total dissolved salts and sodium at Minn. R. 7050.0224, Subp. 2 is consistent with 40 CFR §§ 131.5(a)(2) and 131.11(a).

EPA notes that the removal of the numeric criteria for bicarbonates, pH, specific conductance, total dissolved salts and sodium does not remove the State's ability to regulate those pollutants, but only removes the specific, previously adopted numeric criteria for those parameters from Minnesota's WQS. The State's Class 4A narrative criterion would require the regulation of bicarbonates, pH, specific conductance, total dissolved salts and sodium wherever necessary to permit the use of surface waters for irrigation purposes.

*c. Comments regarding the removal of the Class 3 and 4 numeric criteria*

40 CFR § 131.11(a) provides that, “[f]or waters with multiple use designations, the criteria shall support the most sensitive use.” During Minnesota's rulemaking process, commenters stated that Minnesota's prior numeric criteria to protect the Class 3 industrial consumption and Class 4 agriculture and wildlife uses that Minnesota deleted from its WQS also provided necessary protection for aquatic life, wild rice and human health<sup>21</sup>. Consequently, the commenters argued that removing the numeric criteria to protect Class 3 and 4 agricultural and industrial uses, particularly the criteria for salinity, specific conductance and hardness, and adoption of numeric total dissolved solids (3,000 mg/L), nitrate and nitrite (100 mg/L) and sulfate (600 mg/L) criteria to protect the Class 4B (livestock and wildlife) use that the commenters argue are not protective of aquatic life, wild rice and human health, would be inconsistent with 40 CFR § 131.11(a) and therefore impermissible under the Clean Water Act (CWA)<sup>22</sup>.

Section 303(c)(2)(A) of the CWA requires states to adopt water quality standards that “shall consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses.”

When evaluating whether a state's new or revised criteria protect the most sensitive use for purposes of 40 CFR § 131.11(a), EPA interprets and implements its regulation at 40 CFR § 131.11(a) to consider whether “criteria” are holistically protective. In other words, the

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<sup>21</sup> Some of the commenters also expressed concerns that removing the numeric Class 3 and 4A criteria would impair tribal reserved rights related to aquatic life (e.g., fishing) and wild rice. Because protection of Minnesota's aquatic life and wild rice uses would ensure that tribal reserved rights related to aquatic life and wild rice are not impaired, EPA's evaluation in this section also applies to the comments related to tribal reserved rights.

<sup>22</sup> E.g., See the February 23, 2021 Initial Comments of Minnesota Center for Environmental Advocacy, Minnesota Well Owners Organization, Duluth for Clean Water, Friends of the Boundary Waters Wilderness, Save Our Sky Blue Waters, Save Lake Superior Association, and Sierra Club North Star Chapter, submitted to MPCA by Minnesota Center for Environmental Advocacy; February 24, 2021 WaterLegacy Comments Opposing Minnesota Pollution Control Agency Proposed (Class 3 and 4) Pollution Deregulation Rules; and February 24, 2021 Comments on Proposed Amendments to Rules Governing Water Quality Standards, Minnesota Rules chapters 7050 and 7053; Revisor ID No. 4335; OAH Dkt No. 65-9003-37102, submitted by 11 Minnesota tribes and tribal entities.

set of adopted criteria, which may include both numeric and narrative criteria, are taken as a whole to protect the most sensitive use.

For example, EPA recommends that states adopt separate criteria for individual pollutants to protect aquatic life itself and to protect people when consuming the aquatic life. In operation, these endpoints may be encompassed in the same aquatic life use, as Minnesota does<sup>23</sup>, or may be separated into distinct aquatic life and human health uses. Taken together, these criteria collectively protect the most sensitive use (either aquatic life itself or consumption of aquatic life by people), but their relative stringency may differ markedly. For many pollutants, there are insufficient data to derive criteria for all designated uses potentially affected by the pollutant (e.g., both aquatic life and human health protection). EPA does not consider the lack of consideration of one endpoint (e.g., aquatic life or human health) in a numerical criterion to be a violation of 40 CFR § 131.11(a) with respect to protecting the most sensitive use. Rather, EPA would consider other elements of WQS, such as narrative criteria, to provide the necessary protection of designated uses.

The Fourth Circuit in *Natural Resource Defense Council v. U.S. EPA* upheld EPA's interpretation and implementation of its regulations to consider narrative and numeric criteria holistically when evaluating whether criteria together protect the most sensitive use. 16 F.3d 1395, 1404-05 (4th Cir. 1993). The court considered the term "criteria" in the statute and regulations and concluded that "where multiple uses are designated for a body of water, there may be multiple criteria applicable to it, as long as the criteria support the most sensitive use of that particular body of water." *Id.* at 1405. In that case, the court upheld EPA's approval of numeric dioxin criteria for both Virginia and Maryland where EPA evaluated whether the numeric criteria would protect the states' intended human health use, acknowledged that dioxin may have adverse effects on aquatic life, and concluded that the application of the states' "existing, separate narrative criteria protecting such aquatic life and wildlife could require more stringent controls in some cases than would be required through use of the human health criteria alone." *Id.* The court rejected the claim that "[s]tates have an obligation under the CWA or its accompanying regulations to adopt a single numeric criterion to protect against all identifiable effects to human health, aquatic life and wildlife." *Id.*

More recently, the District Court for the Western District of Missouri Central Division also upheld this interpretation in its decision regarding EPA's approval of numeric nutrient criteria for Missouri. *Missouri Coal. for Env't Found. v. Wheeler*, 2021 WL 2211446 (W.D. Mo. June 1, 2021). In that case, the court upheld EPA's approval of numeric nutrient criteria for Missouri where EPA evaluated whether the numeric criteria would protect the State's intended aquatic life use, acknowledged that nutrients may have adverse effects on human health through drinking water and recreation, and concluded that the application of "the State's existing general narrative criteria would protect the drinking water supply use until protective numeric criteria could be established." *Id.* As described below, Minnesota's Class 2 aquatic life criteria, Class 4 wild rice criteria and Class 1 domestic consumption criteria that EPA previously approved and are not at issue in this action provide protection for aquatic life, wild rice and human health designated uses.

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<sup>23</sup> See Minn. R. Ch. 7050.0222.

i) *Aquatic Life*

EPA submitted a written comment<sup>24</sup> to MPCA during its initial development of the Class 3 and 4 WQS revisions that, for the pollutants affected by Minnesota’s revisions, “Minnesota currently does not have numeric water quality criteria to protect Class 2 [aquatic life] uses from adverse impacts due to the presence of these pollutants. To satisfy the requirements of 40 CFR § 122.44(d)(1)(i) ..., Minnesota will need to be able to generate a numeric expression of its narrative criteria to protect Class 2 uses to determine whether limits on discharges of these pollutants are necessary to protect Minnesota’s Class 2 uses.”

The criteria of primary interest to the commenters that were revised by Minnesota in this rulemaking pertain to ionic pollutants (chloride, specific conductance, total dissolved salts, sodium, salinity, hardness, bicarbonate and sulfate). In response to EPA’s comment and subsequent comments from the public regarding effects of ions on aquatic life, MPCA considered whether numeric criteria could be derived to protect aquatic life from the effects of ions. However, as explained in MPCA’s document entitled *Implementing the Aquatic Life Narrative Standard*, included as Exhibit 5 to the SONAR, MPCA considered the current state of the science regarding ion toxicity and determined that the existing information was inadequate for purposes of deriving numeric ion criteria to protect aquatic life. Specifically, MPCA determined that “[t]here is active research around the appropriate magnitude or level of those Class 2 standards, specifically around chloride and sulfate, that MPCA anticipates being the foundation for a future Class 2 rulemaking.” As discussed in the February 24, 2021 Response to Comments, MPCA stated that it is “tracking EPA’s work to develop recommended criteria, as well as Michigan’s work to implement chloride and sulfate water quality values in permits to support their narrative standards.” EPA has published 304(a) recommended criteria for chloride, which Minnesota has adopted at Minn. R. 7050.0222 to protect the Class 2 aquatic life use, but has not published 304(a) recommended aquatic life criteria for other ions or for ion mixtures. This is a matter of evolving science. The current science indicates that ion toxicity is complex and dependent on multiple factors, including the background water chemistry and the interactions between multiple ions<sup>25</sup>. As indicated in EPA’s Health and Ecological Criteria Division (HECD) Update, presented at the WQS Managers Association September 2019 meeting, EPA is itself evaluating the current science of ion toxicity to inform how to develop updated aquatic life criteria for ions and what would be the appropriate form of ion criteria.

Additionally, as discussed above, the documentation submitted by MPCA in support of its Class 3 and 4 criteria revisions indicates that the water quality requirements for industrial and

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<sup>24</sup> Letter from Linda Holst, EPA Region 5, to Katie Izzo, MPCA (April 8, 2016).

<sup>25</sup> E.g., See:

Mount, D.R., R.J. Erickson, T.L. Highland, J.R. Hockett, D.J. Hoff, C.T. Jenson, T.J. Norberg-King, K.N. Peterson, Z.M. Polaske, and S. Wisniewski, “The acute toxicity of major ion salts to *Ceriodaphnia dubia*: I. Influence of background water chemistry,” *Environmental Toxicology and Chemistry* 35(12): 3039-3057; Erickson, R.J., D.R. Mount, T.L. Highland, J.R. Hockett, D.J. Hoff, C.T. Jenson, T.J. Norberg-King, and K.N. Peterson, “The acute toxicity of major ion salts to *Ceriodaphnia dubia*. II. Empirical relationships in binary salt mixtures,” *Environmental Toxicology and Chemistry* 36(6): 1525-1537; and Erickson, R.J., D.R. Mount, T.L. Highland, J.R. Hockett, D.J. Hoff, C.T. Jenson, T.J. Norberg-King, and K.N. Peterson, “The acute toxicity of major ion salts to *Ceriodaphnia dubia*. III. Mathematical models for mixture toxicity,” *Environmental Toxicology and Chemistry* 37(1): 247-259.

agricultural uses are highly variable based on local site characteristics (e.g., soil type, crop type, etc.). Therefore, without more information, it is not possible to make a general characterization about whether aquatic life, industrial consumption or irrigation is the most sensitive use with respect to ions or which use is most sensitive to ions for a specific water body. However, that to the extent industrial or agricultural uses are the most sensitive use, the numeric and narrative Class 3 and 4 criteria provide protection, and to the extent it becomes evident that aquatic life uses are the most sensitive use, Minnesota's existing narrative and biological criteria provide protection.

Additionally, Minnesota's existing narrative aquatic life criteria that protect the aquatic life use. Specifically, Minnesota's narrative criteria to protect waterbodies with an aquatic life use provide that

- “the quality of ... surface waters shall be such as to permit the propagation and maintenance of a healthy community of ... aquatic biota<sup>26</sup>” Minn. R. 7050.0222, subps. 2, 3 and 4 and
- “No sewage, industrial waste, or other wastes from point or nonpoint sources shall be discharged into any of the waters of this category so as to cause any material change in any other substances, characteristics, or pollutants which may impair the quality of the waters of the state or the aquatic biota of any of the classes in subparts 2 to 6 or in any manner render them unsuitable or objectionable for fishing, fish culture, or recreational uses. Additional selective limits or changes in the discharge bases may be imposed on the basis of local needs.” Minn. R. 7050.0222, Subp. 7(A).

In addition, Minnesota has biological criteria at Minn. R. 7050.0222, subps. 2d, 3d and 4d to ensure maintenance of healthy and diverse aquatic communities and an antidegradation policy at Minn. R. 7050.0250 requiring that “existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected.”

Each of these provisions cited above is duly adopted, approved by EPA and effective for all CWA purposes and therefore required to be considered and implemented in all water quality management actions that require compliance with states' WQS, including NPDES permits under section 402 of the CWA, listing of impaired waters and development of total maximum daily loads under section 303(d) of the CWA and water quality certifications under section 401 of the CWA. As part of the supporting documentation for these revisions, MPCA described methods of implementing these narrative and biological criteria and antidegradation requirements to protect aquatic life from non-chloride ions and the combined effects of multiple ions (see, e.g., *Implementing the Aquatic Life Narrative Standard*, included as Exhibit S-5 to MPCA's SONAR). Specifically, MPCA described using its macroinvertebrate index of biotic integrity to assess rivers and streams for potential impacts from ions; using a conditional probability model developed based on monitoring data for specific conductance and macroinvertebrate communities; and using regional conductivity benchmarks developed using the method described in EPA's *A Field-Based Aquatic Life Benchmark for Conductivity in Central Appalachian Streams* (March 2011), which was specifically developed to protect aquatic life from the effects

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<sup>26</sup> The omitted language describes the specific type of biological community to be protected (e.g., cold water aquatic biota) and varies between the different subparts to reflect the relevant aquatic life use subclass.

of ions and which underwent an extensive peer review process from both reviewers within EPA and external reviewers, including a review by EPA's Science Advisory Board<sup>27</sup>.

For these reasons, in the absence of the numeric criteria for ions associated with Class 3 and 4 that Minnesota is removing, Minnesota's existing narratives protect against the types of harm excess ions may present to aquatic life in waterbodies designated for aquatic life. As is the case with all states, EPA is available to work with Minnesota, as additional data and information become available, to support state efforts to develop numeric criteria for aquatic life uses.

Minnesota's WQS also include a general provision addressing protection of downstream water uses: "All waters must maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters, including the waters of another state." Minn. R. 7050.0155. This provision addresses the requirements of 40 CFR § 131.10(b) regarding downstream protection. It is comparable to the narrative provisions EPA suggests states use for this purpose (*See* <https://www.epa.gov/wqs-tech/templates-narrative-downstream-protection-criteria-state-water-qualitystandards>).

Finally, as discussed above, the numeric criteria that Minnesota removed were developed in the 1960s based upon an evaluation of then current scientific literature regarding levels necessary to protect industrial and agricultural uses; they were not based on scientific literature regarding levels necessary to protect aquatic life. Consequently, there was not then and there is not now a sound scientific rationale to support a conclusion that the criteria that Minnesota has removed would be protective of aquatic life uses. EPA anticipates that greater reliance on implementation of Minnesota's approved narrative criteria will result in its NPDES permitting and other regulatory decisions including limitations more stringent than ones based on the now-removed criteria, to the extent that best available current or evolving science indicates that such more stringent limits would protect aquatic life.

#### *ii) Wild rice*

Minnesota's Class 4A WQS at Minn. R. 7050.0224, Subp. 1 include protection for wild rice based on a recognition that "[t]he harvest and use of grains from this plant serve as a food source for wildlife and humans."

With regard to wild rice, the commenters expressed concern about the numeric criteria for ionic pollutants (chloride, specific conductance, total dissolved salts, sodium, salinity, hardness, bicarbonate and sulfate) being removed in these revisions, with particular concern about the Class 4B sulfate criterion (600 mg/L) adopted to protect livestock watering uses.

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<sup>27</sup> Because these methods are not legally binding, EPA determined that they are not new or revised WQS that EPA has the authority to review under Section 303(c) of the CWA (see EPA's *What is a New or Revised Water Quality Standard Under CWA 303(c)(2)? Frequently Asked Questions* (October 2012)). Therefore, EPA did not review these methods to determine whether they are protective of aquatic life. However, EPA previously approved Minnesota's aquatic life narrative criteria and biological criteria as being protective of the State's aquatic life use. Additionally, as discussed in this section, Minnesota's proposed methods to implement its narrative criterion for ions are based on accepted methods for identifying effects to aquatic life.

For sulfate, Minnesota’s Class 4A WQS include a numeric criterion (10 mg/L) that was unchanged in this rulemaking and that applies to “water used for production of wild rice.”<sup>28</sup> This criterion was duly adopted, approved by EPA, and is effective for all CWA purposes and therefore required to be considered and implemented in all water quality management actions that require compliance with states’ WQS, including NPDES permits under section 402 of the CWA, listing of impaired waters and development of total maximum daily loads under section 303(d) of the CWA and water quality certifications under section 401 of the CWA. Minnesota’s WQS, therefore, include a specific numeric criterion for sulfate that protects the wild rice where it occurs in quantities that support “the harvest and use of grains from this plant as a food source for wildlife and humans.”

For ionic pollutants, in response to the public comments regarding effects of ions on wild rice, MPCA considered whether numeric criteria could be derived to protect wild rice from the effects of ions. As explained in the SONAR submitted by Minnesota in support of its WQS revisions, MPCA considered the current state of the science regarding ion toxicity to aquatic plants and determined that “additional data and analysis regarding wetland plant responses are needed.” SONAR at 191. Therefore, MPCA concluded that the existing information was inadequate for purposes of deriving numeric ion criteria. However, because of the sensitivity of wetland plants, such as wild rice, to ionic stressors, MPCA stated in the SONAR that it “would consider the response of wetland plants to these pollutants as MPCA proceeds in future rulemakings to develop aquatic life-based water quality standards.” EPA has not published 304(a) recommended criteria to protect wetland plants for ions or for ion mixtures. This is a matter of evolving science. As indicated in EPA’s HECD Update, presented at the WQS Managers Association September 2019 meeting, EPA is itself evaluating the current science of ion toxicity to inform how to develop updated aquatic life criteria for ions and what would be the appropriate form of ion criteria. EPA’s standard method for developing aquatic life criteria (*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organism and Their Uses* (1985)) includes consideration of toxicity to aquatic plants.

Given that data regarding sensitivity of wild rice to ions are limited and that the water quality requirements for industrial and agricultural uses are highly variable based on local site characteristics (e.g., soil type, crop type, etc.), it is not possible to make a general characterization about whether wild rice, industrial consumption or irrigation is the most sensitive use with respect to ions or which use is most sensitive to ions for a specific water body without more information. However, to the extent industrial or agricultural uses are the most sensitive use with respect to ions, the numeric and narrative Class 3 and 4 criteria provide protection, and to the extent it becomes evident that wild rice uses are the most sensitive use, Minnesota’s existing narrative criteria provide protection of wild rice uses.

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<sup>28</sup> Minnesota has not specifically identified which waters are “waters used for the production of wild rice” to which the 10 mg/L sulfate criterion applies, with the exception of 24 waters listed as wild rice waters in Minn. R. 7050.0470. However, the WQS does not specifically limit the applicability of the criterion and, thus, applies to all “waters used for the production of wild rice.” As discussed in a letter from Katrina Kessler, MPCA, to Tera L. Fong, EPA, dated March 15, 2021, MPCA stated that the proposed list of approximately 1300 waters included in Minnesota’s proposed 2017 wild rice sulfate rulemaking “could likely be considered the most narrow list of waters that demonstrate the wild rice beneficial use.”

Additionally, Minnesota has existing narrative criteria that protect wild rice uses. Minnesota's narrative criterion at Minn. R. 7050.0224, Subp. 2 to protect waterbodies with a Class 4A irrigation use require that "[t]he quality of class 4A waters of the state must be such as to permit their use for irrigation without significant damage or adverse effects upon any crops or vegetation usually grown in the waters or area." In the State's February 24, 2021 Preliminary Response to Comments, Minnesota reiterated that "'waters used for the production of wild rice' remain protected for the Class 4A use and through the translator methods." Therefore, cultivated, irrigated wild rice (i.e. "paddy rice") would be considered "crops or vegetation usually grown in the waters or area" under Minnesota's Class 4A beneficial use and Minnesota's narrative criterion to protect irrigated crops at Minn. R. 7050.0224, Subp. 2 would require the water quality necessary to "permit their use for irrigation without significant damage or adverse effects." As discussed in Section II.B.2 above, Minnesota's narrative criterion to protect irrigation uses is protective of the use and, thus, is protective where cultivation of wild rice is occurring.

Additionally, Minnesota's specific narrative criteria at Minn. R. 7050.0222, identified above in the context of aquatic life protections, apply to all waters designated as Class 2. As seen above, these narrative criteria require "the maintenance of a healthy community of ... aquatic biota" (Minn. R. 7050.0222, subps. 2, 3 and 4) and prohibit the introduction of wastes that "may impair ... the aquatic biota" (Minn. R. 7050.0222, Subp. 7). The term "aquatic biota" includes aquatic plants and, thus, Minnesota's Class 2 WQS would apply to wild rice as a wetland plant. Consequently, Minnesota's Class 2 numeric chloride criteria and narrative criteria identified in the context of aquatic life above would also be applicable to the protection of wild rice as a wetland plant. Additionally, Minnesota's antidegradation policy at Minn. R. 7050.0250, Subp. 1 requires the protection of existing uses.

Each of these provisions cited above is duly adopted, approved by EPA and effective for all CWA purposes and therefore required to be considered and implemented in all water quality management actions that require compliance with states' WQS, including NPDES permits under section 402 of the CWA, listing of impaired waters and development of total maximum daily loads under section 303(d) of the CWA and water quality certifications under section 401 of the CWA. As part of the supporting documentation for these revisions, MPCA described methods of implementing these narrative and antidegradation requirements to protect wild rice from ions and the combined effects of multiple ions (see, e.g., *Implementing the Aquatic Life Narrative Standard*, included as Exhibit S-5 to MPCA's SONAR). Specifically, MPCA considered the potential effects to aquatic plants, including wild rice, during the development of the conductivity benchmarks included in MPCA's document *Implementing the Aquatic Life Narrative Standard*, included as Exhibit S-5 to MPCA's SONAR and determined that the conductivity thresholds necessary to protect aquatic plants are similar to the conductivity benchmarks derived based on macroinvertebrate responses and, thus, this "approach to protecting aquatic life should be sufficient for both macroinvertebrates and wetland plants." *Implementing the Aquatic Life Narrative Standard* at 8.

For these reasons, Minnesota's existing narratives protect against the types of harm excess ions may present to wild rice in waterbodies designated for aquatic life or irrigation uses and must be considered to protect such uses. As is the case with all states, EPA is available to work with

Minnesota, as additional data and information become available, to support state efforts to develop numeric criteria for wild rice uses.

Minnesota's WQS also include a general provision addressing protection of downstream water uses: "All waters must maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters, including the waters of another state." Minn. R. 7050.0155. This provision addresses the requirements of 40 CFR § 131.10(b) regarding downstream protection. It is comparable to the narrative provisions EPA suggests states use for this purpose (See <https://www.epa.gov/wqs-tech/templates-narrative-downstream-protection-criteria-state-water-qualitystandards>).

Finally, as discussed above, the numeric criteria that Minnesota removed were developed in the 1960s based upon an evaluation of then current scientific literature regarding levels necessary to protect industrial and agricultural uses; they were not based on scientific literature regarding levels necessary to protect wild rice. Consequently, there was not then and there is not now a sound scientific rationale to support a conclusion that the criteria that Minnesota has removed would be protective of wild rice uses. EPA anticipates that greater reliance on implementation of Minnesota's approved narrative criteria will result in its NPDES permitting and other regulatory decisions including limitations more stringent than ones based on the now-removed criteria, to the extent that best available current or evolving science indicates that such more stringent limits would protect wild rice.

### *iii. Human health/public water supplies*

Because ionic content can affect the corrosion potential of water, the commenters expressed concern that removal of numeric criteria for ionic pollutants (chloride, specific conductance, total dissolved salts, sodium, salinity, hardness, bicarbonate and sulfate) would affect human health through increased corrosion of drinking water pipes (e.g., lead pipes). Additionally, the commenters stated that the numeric nitrate criterion (100 mg/L) to protect the Class 4B livestock and wildlife use would not be protective of human health effects associated with nitrate in drinking water (e.g., blue baby syndrome).

Both of the concerns raised by the commenters relate to human health concerns associated with drinking water. The Clean Water Act does not establish requirements for drinking water supplies. However, Section 303(c)(2)(A) of the CWA directs states to consider the use and value of water for public water supplies when establishing WQS and many states, including Minnesota, have adopted WQS to ensure that surface water quality is sufficient to allow waters to be used as a drinking water source. Under Section 303(c) of the CWA, though, these WQS apply to the surface water, and do not establish requirements or standards for public water supplies or drinking water quality. Public drinking water supplies are subject to separate requirements under the Safe Drinking Water Act, including the requirement to comply with all maximum contaminant levels established under the Safe Drinking Water Act.

Minnesota's WQS protect surface waters for use as a water supply through the State's Class 1 (domestic consumption) WQS at Minn. R. 7050.0221, which include three use subclasses that vary based on the degree of treatment. The narrative criteria for all three use subclasses require

that the quality of waters be such that either raw waters (in the case of Class 1A) or treated waters (in the case of Class 1B or 1C) meet “both the primary (maximum contaminant levels) and secondary drinking water standards issued by the United States Environmental Protection Agency.” Minn. R. 7050.0221, subps. 2, 3 and 4. EPA’s primary and secondary drinking water standards include maximum contaminant levels for nitrate and lead and secondary maximum contaminant levels for corrosivity to prevent corrosion of pipes. As seen above, Minnesota’s Class 1 narrative criteria would require that surface water quality be sufficient to allow these primary and secondary drinking water standards to be met.

Minnesota’s Class 1 narrative criteria were duly adopted, approved by EPA, and are effective for all CWA purposes and therefore required to be considered and implemented in all water quality management actions that require compliance with states’ WQS, including NPDES permits under section 402 of the CWA, listing of impaired waters and development of total maximum daily loads under section 303(d) of the CWA and water quality certifications under section 401 of the CWA. Minnesota’s WQS, therefore, include specific narrative criteria to protect human health that specifically reference the Safe Drinking Water Act standards established to prevent adverse public health effects associated with exposure to pollutants in drinking water.

To the extent industrial or agricultural uses are the most sensitive use, the numeric and narrative Class 3 and 4 criteria provide protection, and to the extent it becomes evident that domestic consumption uses are the most sensitive use, Minnesota’s existing Class 1 narrative criteria and the incorporated primary and secondary drinking water standards protect the water as a source of domestic consumption.

For these reasons, Minnesota’s existing narrative criteria protect against the types of harm excess ions and nitrate may present to human health in waterbodies designated for domestic consumption. As is the case with all states, EPA is available to work with Minnesota, as additional data and information become available, to support state efforts to develop numeric criteria for ions to protect domestic consumption uses.

Minnesota’s WQS also include a general provision addressing protection of downstream waters: "All waters must maintain a level of water quality that provides for the attainment and maintenance of the water quality standards of downstream waters, including the waters of another state." Minn. R. 7050.0155. This provision addresses the requirements of 40 CFR § 131.10(b) regarding downstream protection. It is comparable to the narrative provisions EPA suggests states use for this purpose (*See <https://www.epa.gov/wqs-tech/templates-narrative-downstream-protection-criteria-state-water-qualitystandards>*).

Finally, as discussed above, the numeric criteria that Minnesota removed were developed in the 1960s based upon an evaluation of then current scientific literature regarding levels necessary to protect industrial and agricultural uses; they were not based on scientific literature regarding levels necessary to protect human health. Consequently, there was not then and there is not now a sound scientific rationale to support a conclusion that the criteria that Minnesota has removed would be protective of human health uses. EPA anticipates that greater reliance on implementation of Minnesota’s approved narrative criteria will result in its NPDES permitting and other regulatory decisions including limitations more stringent than ones based on the now-

removed criteria, to the extent that best available current or evolving science indicates that such more stringent limits would protect human health.

#### **5. Revision of the duration and frequency components of the criteria to protect Minnesota's irrigation (Class 4A) designated use**

Prior to the State's revisions, Minnesota's WQS had not specified the duration and frequency components of the Class 4A numeric criteria at Minn. R. 7050.0224, Subp. 2 to protect the Class 4A irrigation beneficial use. Minnesota's revisions add a provision at Minn. R. 7050.0224, Subp. 2(B) requiring that "[i]rrigation water quality must be protected over the growing season as an average."

As described in the TSD submitted by MPCA in support of the State's revisions, MPCA searched the technical literature regarding water quality requirements for irrigation. The technical literature indicates that "mean soil seasonal salinity" is generally the relevant exposure period when evaluating the effects of root zone water quality on crops. TSD at 103. Therefore, MPCA set the duration of the Class 4A criteria as the growing season average. Additionally, because annual crops pass through their entire life cycle within one growing season, MPCA determined that exceedance of the criteria during the growing season in any year would impact annual crops. TSD at 103. Therefore, MPCA set the frequency component of the criteria as "never to be exceeded." Minnesota's revised rules at Minn. R. 7050.0224, Subp. 2(B) reflect this by requiring that irrigation water quality "must be protected over the growing season." While not specified in rule, Minnesota stated in the SONAR that June to September would typically be considered the growing season for purposes of implementing the Class 4A criteria because that is typically the period in which Minnesota farmers irrigate their crops. SONAR at 44.

Because Minnesota's revisions to the duration and frequency components of the State's Class 4A criteria ensure that the criteria will be applied based on the relevant exposure period for irrigated crops and will not allow exceedances that would impact the beneficial use, EPA concludes in accordance with 40 CFR §§ 131.5(a)(2) and 131.11(a) that Minnesota's revisions to the State's Class 4A narrative criterion at Minn. R. 7050.0224, Subp. 2 are based on sound scientific rationale and protective of Minnesota's Class 4A irrigation use.

#### **6. Revision of the duration component of numeric criteria to protect Minnesota's livestock and wildlife (Class 4B) designated use**

Prior to the State's revisions, Minnesota's WQS had not specified the duration component of the Class 4B numeric criteria at Minn. R. 7050.0224, Subp. 3 to protect the Class 4B livestock and wildlife beneficial use. To clarify the applicable duration and frequency of these criteria, Minnesota revised Minn. R. 7050.0224, Subp. 3 to require that the criteria "must not be exceeded, as a 30-day average, in the waters of the state."

The revised 30-day average duration applies to Minnesota's Class 4B numeric criteria for pH, total dissolved solids, nitrate and nitrite, and sulfate. EPA's review of the duration component of the total dissolved solids, nitrate and nitrite, and sulfate criteria are discussed in Section II.B.4 above. For pH, for which the magnitude of the criteria was not changed in the State's revisions,

Minnesota searched the technical literature regarding pH effects on livestock. The studies identified by Minnesota were all based on drinking water exposures of three weeks to several months. TSD at 138. Therefore, Minnesota concluded that the Class 4B criteria for pH were based on chronic effects and set the duration of the criteria as a 30-day average, consistent with the exposures used in the literature studies identified by Minnesota.

Minnesota demonstrated that the 30-day duration of Class 4B pH criterion is consistent with the relevant exposure period from the relevant studies on pH effects to livestock and will not allow exceedances that would impact the beneficial use. Therefore, EPA concludes in accordance with 40 CFR §§ 131.5(a)(2) and 131.11(a) that Minnesota's revised duration for the State's Class 4B pH criterion at Minn. R. 7050.0224, Subp. 3 is based on sound scientific rationale and protective of Minnesota's Class 4B livestock and wildlife use.

## **7. Revisions to criteria to protect wetlands**

Prior to the State's revisions, Minnesota's WQS had designated all wetlands with the State's Class 3D industrial use and Class 4C agricultural use subclasses and applied specific numeric water quality criteria for chlorides, hardness and pH to protect the Class 3D use and water quality criteria for pH and settleable solids to protect the Class 4C use. Additionally, Minnesota's Class 4C WQS had applied a narrative criterion at Minn. R. 7050.0224, Subp. 4 requiring that wetlands "be suitable for erosion control, groundwater recharge, low flow augmentation, storm water retention, and stream sedimentation." As discussed above in Section II.A.3, as part of these revisions, Minnesota eliminated the Class 3D industrial use and Class 4C agricultural use subclasses and designated all wetlands with the State's class 3, 4A and 4B subclasses. However, as specified at Minn. R. 7050.0223, Subp. 5 and Minn. R. 7050.0224, Subp. 4, the water quality criteria associated with those use subclasses required the prevention of a "significant adverse impact to the designated *uses*" (emphasis added) and, thus, provided protection for multiple designated uses, including uses other than the State's industrial and agricultural uses. As discussed in the SONAR, Minnesota consulted the supporting documentation from when those criteria were adopted and determined that those criteria had not been intended to protect industrial or agricultural uses but had instead been intended to protect "the known or perceived quality of the wetland itself." SONAR at 49. Therefore, Minnesota evaluated whether those criteria are still needed to protect wetlands. The State concluded that the criteria for chloride and settleable solids are still needed to protect wetlands and moved the criteria to the State's Class 2D wetlands use by deleting the criteria from Minn. R. 7050.0223, Subp. 5 and Minn. R. 7050.0224, Subp. 4 and adding the criteria at Minn. R. 7050.0222, Subp. 6. Additionally, Minnesota determined that the Class 4C narrative criterion is still needed to protect wetlands and moved the criterion to the State's general wetland WQS at Minn. R. 7050.0186, Subp. 1. In the case of the numeric criteria for hardness and pH, Minnesota determined that the criteria are either not needed to protect wetlands or are redundant with other criteria that apply to wetlands and removed the criteria by deleting them from Minn. R. 7050.0223, Subp. 5 and Minn. R. 7050.0224, Subp. 4.

### *a) Chlorides*

For chlorides, the previously applicable Class 3D criterion at Minn. R. 7050.0223, Subp. 5 had been established as “maintain background.”<sup>29</sup> In moving this criterion to Minn. R. 7050.0222, Subp. 6, Minnesota modified the criterion to add the phrase, “[i]f background is greater than the class 2B chloride standard.” Minnesota’s revisions, therefore, modify the existing wetlands “maintain background” criterion by allowing an increase in chlorides above background in wetlands where the background concentration is less than Minnesota’s Class 2B chloride criteria of 860 mg/L (acute) and 230 mg/L (chronic), which are found at Minn. R. 7050.0222, Subp. 4.

Minnesota’s WQS at Minn. R. 7050.0140, Subp. 3 define the State’s Class 2 aquatic life use as “all waters of the state that support or may support aquatic biota, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare.”

Minnesota’s existing Class 2B chloride criteria are equivalent to EPA’s current 304(a) national recommended aquatic life criteria and were previously approved as being protective of the State’s Class 2 aquatic life use. As discussed in EPA’s Narrative Templates FAQs:

The numeric aquatic life criteria, although not designed specifically for wetlands, were designed to be protective of aquatic life and are generally applicable to most wetland types. Narrative Templates FAQs at 4.

Minnesota’s Class 2B chloride criteria, although not designed specifically for wetlands, were designed to be protective of aquatic life regardless of waterbody type. EPA previously reviewed those criteria and determined there was a sound scientific rationale to conclude that those criteria are protective of aquatic life in surface waters. EPA’s review of Minnesota’s chloride criteria at that time was not based on the type of water body that the criteria applied to but was only based on the available data on potential effects to aquatic life.

Because Minnesota’s chloride criteria are protective of aquatic life use designations irrespective of water body type, allowing an increase in chlorides above background up to the levels allowed by Minnesota’s Class 2B chloride criteria would not allow adverse impacts to aquatic life. Consequently, EPA concludes that Minnesota’s revisions to the chloride criterion applicable to wetlands at Minn. R. 7050.0222, Subp. 6 is based on sound scientific rationale and protective of Minnesota’s Class 2D wetlands use.

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<sup>29</sup> Minn. R. 7050.0223, Subp. 5 had defined “maintain background” as “the concentration of the water quality substance, characteristic, or pollutant shall not deviate from the range of natural background concentrations or conditions such that there is a potential significant adverse impact to the designated uses.” Minn. R. 7050.0222, Subp. 6 includes an existing definition of “maintain background” that is equivalent to the removed definition at Minn. R. 7050.0223, Subp. 5. Therefore, the movement of the criteria to Minn. R. 7050.0222, Subp. 6 does not change the meaning or implementation of the phrase “maintain background.”

### *b) Hardness*

For hardness, the previously applicable Class 3D criterion at Minn. R. 7050.0223, Subp. 5 had been established as “maintain background.” As discussed in the TSD, Minnesota consulted the supporting documentation for the rulemaking when the wetland criteria were adopted and determined that the Class 3D hardness criterion was intended to be applied in combination with the Class 3A, 3B and 3C hardness criteria “to ensure that wetlands with naturally high levels of hardness were not required to be reduced to levels outside of background.”

As discussed in Section II.B.4 above, Minnesota determined that it is not possible to “specify a single numeric value that would appropriately protect for all industrial appropriation uses” and that a narrative criterion is more appropriate to protect industrial uses. TSD at 21. Additionally, Minnesota’s Class 2 aquatic life WQS do not include hardness criteria and EPA has not published 304(a) recommended numeric criteria. As discussed in EPA’s 1986 Gold Book<sup>30</sup>, “[t]he effects of hardness on freshwater fish and other aquatic life appear to be related to the ions causing the hardness rather than hardness.” Gold Book at 149. Consequently, there is no available information indicating that maintenance of background concentrations of hardness is required to protect aquatic life and industrial consumption uses. Additionally, Minnesota’s narrative aquatic life criteria at Minn. R. 7050.0222, subps. 4, 6 and 7 and Minnesota’s narrative industrial consumption criterion at Minn. R. 7050.0223, Subp. 2 apply to all wetlands and are available to Minnesota if site-specific numeric translations for hardness become necessary to protect such uses.

As discussed above, Minnesota demonstrated that the current science regarding aquatic life and industrial water quality requirements indicates that the State’s Class 3D criterion for hardness is not needed to protect aquatic life and industrial consumption uses. Additionally, Minnesota’s Class 2 narrative criteria at Minn. R. 7050.0222, subps. 4, 6 and 7 and its revised Class 3 narrative criterion at Minn. R. 7050.0223, Subp. 2, which EPA has determined is protective of industrial uses based on a sound scientific rationale, provides sufficient protection for the Class 2 and Class 3 designated uses. Therefore, EPA concludes that there is a sound scientific rationale for the removal of the Class 3D hardness criteria and that the State’s WQS will still contain the water quality criteria necessary to protect the designated use. Accordingly, EPA concludes that Minnesota’s removal of the State’s Class 3D criteria for hardness at Minn. R. 7050.0223, Subp. 5 is consistent with 40 CFR §§ 131.5(a)(2) and 131.11(a).

### *c) pH*

The Class 2D wetlands WQS at Minn. R. 7050.0222, Subp. 6 included a pH criterion that is equivalent to the removed Class 3D and Class 4C pH criteria at Minn. R. 7050.0223, Subp. 5 and Minn. R. 7050.0224, Subp. 4. Consequently, Minnesota determined that the Class 3D and Class 4C pH criteria were redundant and, thus, that removing those criteria would not affect the protections to wetlands provided by Minnesota’s WQS. Additionally, both the previous Class 4C designated use subclass and the general wetland WQS at Minn. R. 7050.0186 apply to all wetlands and, thus, the movement of the narrative criterion does not result in the applicability of the criterion. Because the existing Class 2D pH criterion provide the same protections provided

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<sup>30</sup> EPA, *Quality Criteria for Water 1986*, EPA 440/5-86-001 (May 1, 1986).

by the removed Class 3D and Class 4C pH criteria and Minnesota's WQS revisions do not modify that existing Class 2D pH criterion, EPA concludes that Minnesota's removal of the Class 3D and Class 4C pH criteria at Minn. R. 7050.0223, Subp. 5 and Minn. R. 7050.0224, Subp. 4 is a non-substantive revision that does not change the meaning or implementation of these criteria. Therefore, EPA concludes that these non-substantive revisions are consistent with the CWA and 40 CFR Part 131.

*d) Settleable solids*

In moving the wetlands numeric criteria to Minn. R. 7050.0222, Subp. 6, Minnesota made no changes to the settleable solids criterion previously located at Minn. R. 7050.0223, Subp. 5. Additionally, both the previous Class 4C designated use subclass and the Class 2D designated use subclass apply to all wetlands and, thus, the movement of the narrative criterion does not result in any changes to the applicability of the criterion. Therefore, the movement of the settleable solids criterion does not affect the protections to wetlands provided by Minnesota's WQS and EPA concludes that this revision is a non-substantive revision that does not change the meaning or implementation of these criteria. Therefore, EPA concludes that this non-substantive revision is consistent with the CWA and 40 CFR Part 131.

*e) Narrative criterion*

In moving the wetlands narrative criterion previously located at Minn. R. 7050.0224, Subp. 4 to Minn. R. 7050.0186, Subp. 1, Minnesota made no changes to the wording of the criterion. Additionally, both the previous Class 4C designated use subclass and the general wetland WQS at Minn. R. 7050.0186 apply to all wetlands and, thus, the movement of the narrative criterion does not result in the applicability of the criterion. Therefore, the movement of the wetlands narrative criterion does not affect the protections to any wetlands provided by Minnesota's WQS and EPA concludes that Minnesota's movement of the wetland narrative criterion is a non-substantive revision that does not change the meaning or implementation of this criterion. Therefore, EPA concludes that this non-substantive revision is consistent with the CWA and 40 CFR Part 131.

**C. Other items that EPA is taking action on.**

In addition to the revisions discussed above, Minnesota made several non-substantive revisions to Minn. R. Ch. 7050 to make grammatical edits, update references and clarify intent. As discussed in EPA's 2012 document, titled "What is a New or Revised Water Quality Standard Under CWA 303(c)(3)? Frequently Asked Questions," EPA considers non-substantive edits to existing WQS to constitute new or revised WQS that EPA has the authority and duty to approve or disapprove under CWA Section 303(c)(3).

EPA reviewed these non-substantive revisions and concluded that these revisions do not change the meaning or implementation of the State's existing federally-approved WQS. Therefore, EPA concludes that these reorganizational revisions are consistent with the CWA and 40 CFR Part 131.

**D. New and revised items upon which EPA is taking no action under Section 303(c) of the CWA because they are not new or revised WQS.**

The adopted rules include several revisions to the State's NPDES permitting rules at Minn. R. Ch. 7053 regarding effluent limits and treatment requirements for discharges to waters of the State, including revisions that are included in Minnesota's "Class 3 Translator Method" and "Class 4A Translator Method" that are incorporated by reference into Minnesota's regulations at Minn. R. 7053.0260, Subp. 3 and 7053.0263, Subp. 3. As described in Section II.A above, EPA has authority and duty to review state rules under section 303(c) of the CWA if those rules constitute new or revised WQS. The EPA document entitled "What is a New or Revised Water Quality Standard Under CWA 303(c)(3)? Frequently Asked Questions" describes the criteria by which EPA determines whether a provision constitutes a new or revised WQS, which include:

- whether the provision "address[es] designated uses, water quality criteria (narrative or numeric) to protect designated uses, and/or antidegradation requirements for waters of the United States" and
- whether the provision "express[es] or establish[es] the desired condition (e.g., uses, criteria) or instream level of protection (e.g., antidegradation requirements) for waters of the United States immediately or mandate[s] how it will be expressed or established for such waters in the future?" What is a New or Revised Water Quality Standard Under CWA 303(c)(3)? Frequently Asked Questions at 3.

With the exception of the "no increase in hardness," numeric CCSI, SAR and specific conductance thresholds included in Minnesota's Class 3 Translator Method and Class 4A Translator Method that are discussed above, the revised rules in Minn. R. Ch. 7053 do not change or establish the magnitude, duration or frequency of the State's water quality criteria but only establish how the State will determine whether a facility has reasonable potential to exceed a water quality standard and calculate effluent limits based on the State's water quality criteria. Therefore, with the exceptions described above, the revised rules in Minn. R. Ch. 7053 do not address designated uses, water quality criteria or antidegradation requirements or establish the desired condition for Minnesota waters or mandate how the desired condition will be expressed or established for such waters in the future. Instead, with the exceptions noted above, the revised rules only identify how the State will develop effluent limits and requirements in NPDES permits to protect the desired condition established by the State's water quality criteria. Consequently, EPA concludes that these revisions are not new or revised WQS and is taking no action under Section 303(c) of the CWA on these revisions.

As discussed above, EPA has determined that the "no increase in hardness," numeric CCSI, SAR and specific conductance thresholds included in Minnesota's Class 3 Translator Method and Class 4A Translator Method are new or revised WQS that EPA has the authority to review under Section 303(c) of the CWA. EPA's review of those thresholds with the requirements of 40 CFR § 131.11 can be found in sections II.B.1 and 2.

**E. Whether the State has followed applicable legal procedures for revising or adopting standards. (40 CFR § 131.5(a)(6))**

In a letter dated July 26, 2021 and received by EPA on August 10, 2021, Jean L. Coleman, MPCA Senior Attorney certified that the revisions were duly adopted in accordance with Minnesota Law and are legally enforceable in the State of Minnesota.

In adopting the rules, the State also provided opportunities for public input consistent with federal requirements at 40 CFR § 131.20(b) and 40 CFR Part 25. During development of the rules, MPCA published Requests for Comments in the State Register on February 8, 2016 and March 11, 2019. On December 14, 2020, a Notice of Hearing and a copy of the draft rules were published in the State Register, notifying the public that a public hearing would be held to discuss the proposed rules on February 4, 2021 and that written comments would be accepted through February 24, 2021. MPCA also mailed electronic copies of the Notice of Hearing and the draft rules to all interested parties. The agency held a public hearing on February 4, 2021. MPCA received approximately 160 written comments and more than 2,000 form letters or signatures during this comment period and 41 members of the public provided comments or asked questions at the public hearing. After MPCA published its response to comments on February 24, 2021, a post-hearing public comment period was provided until March 3, 2021 to allow commenters to rebut the agency's response. Six written comments were received during this period. MPCA publicized the public hearing more than 45 days prior to the date of the hearing, recorded the hearing and met other requirements for public hearings specified at 40 CFR § 25.5. Consequently, EPA concludes that the State satisfied the public participation requirements at 40 CFR § 131.20(b).

MPCA considered and responded to the public comments before adopting the rules. MPCA proposed amendments to the rules in response to some of the comments. EPA reviewed and considered all the public comments and MPCA's responses in deciding whether to approve Minnesota's new and revised WQS.

**F. Whether the State submission meets the requirements included in §131.6 of this part and, for Great Lakes States or Great Lakes Tribes (as defined in 40 CFR § 132.2) to conform to section 118 of the Act, the requirements of 40 CFR 132. (40 CFR § 131.5(a)(8))**

40 CFR § 131.6 identifies the minimum requirements of a WQS submission. As described below, MPCA's submittal meets all the relevant requirements of 40 CFR § 131.6.

**1. Minimum requirements for WQS submission (40 CFR § 131.6)**

**a. Use designations consistent with the provisions of section 101(a)(2) and 303(c)(2) of the Act (40 CFR § 131.6(a))**

Minnesota's revisions do not affect any of the uses specified in Section 101(a)(2) of the CWA. As discussed in Section II.A above, all revisions to Minnesota's industrial (Class 3) and agricultural (Class 4) designated uses were supported with documentation justifying how MPCA

considered the use and value of waters in the State for those uses consistent with 40 CFR §§ 131.10(a) and (k)(3).

**b. Methods used and analyses conducted to support WQS revisions (40 CFR § 131.6(b))**

The State submitted the following documents in support of these rules:

- Letter from Peter Tester, MPCA Temporary Commissioner, to Cheryl Newton, EPA Region 5 Acting Regional Administrator, RE: Minnesota Pollution Control Agency Adopted Rule Amendments to Minn. R. ch. 7050, Rules Governing Class 3 (industrial consumption) and Class 4 (agriculture and wildlife usage) Water Quality Standards, dated August 9, 2021;
- Letter from Jean L. Coleman, MPCA Senior Attorney, to Tera Fong, EPA Region 5 Water Division Director, dated July 26, 2012, certifying that the amendments were duly adopted pursuant to State law;
- Notice of Hearing for Proposed Amendments to Rules Governing Water Quality Standards, *Minnesota Rules*, chapters 7050 and 7053 and Repeal of *Minnesota Rules*, parts 7050.0410; 7050.0425; 7050.0430; and 7050.0450; Revisor's ID Number 04335, OAH docket number 65-9003-37102, published in the December 14, 2020 *Minnesota State Register*; and
- Adopted Permanent Rules Relating to Water Use Classification, showing strikeout/underlined changes since the rules were proposed, dated May 21, 2021.

In addition, Minnesota's letter submitting the State's WQS revisions to EPA stated that it was also submitting the following documents to EPA in support of these rules:

- Findings of Fact and Order Adopting Rules Governing Water Quality Standards, Minnesota rules, Chapter 7050 and 7053; relating to Class 3 and Class 4 Beneficial Use Designations, dated June 4, 2021;
- Notice of Adopted Permanent Rules Relating to Water Use Classification, published in the July 6, 2021 *Minnesota State Register*;
- Statement of Need And Reasonableness for Proposed Amendments to Class 3 and 4 Water Quality Standards, dated December 14, 2020;
- SONAR exhibits, which included:
  - S-1 List of References;
  - S-2 Class 3 & 4 Water Quality Standards Revision Technical Support Document (TSD), dated December 2020;
  - S-3 Class 3 Translator Method: Draft Industrial Consumption Narrative Translator;
  - S-4 Class 4A Translator Method: Draft Irrigation Narrative Translator;
  - S-5 Implementing the Aquatic Life Narrative Standard;
  - S-6 Technical Support Document Summary: University of Minnesota Class 3 and Class 4 Water Quality Standards Review: Minnesota Surface Water Quality Investigation – Industrial Supply, Irrigation and Livestock Uses, dated June 29, 2010;

- S-7 Draft Class 3 & 4 Water Quality Standards Revision Technical Support Document (TSD), dated January 2019;
- S-8 – Appendix A to the TSD: Peer review summary and documentation of changes made to the technical support document;
- S-9 – Comments received in response to the February 8, 2016 Request for Comments on Planned Amendments to Rules Governing Water Quality Standards – Use Classifications 3 and 4, *Minnesota Rules*, chapter 7050; Revisor’s ID Number 04335;
- S-10 – Comments received in response to the March 11, 2019 Request for Comments on Planned Amendments to Rules Governing Water Quality Standards – Use Classifications 3 and 4, *Minnesota Rules*, chapters 7050 and 7053, Revisor’s ID Number 04335;
- S-11 – Request for Comments on Planned Amendments to Rules Governing Water Quality Standards – Use Classifications 3 and 4, *Minnesota Rules*, chapter 7050; Revisor’s ID Number 04335, published February 8, 2016;
- S-12 –Request for Comments on Planned Amendments to Rules Governing Water Quality Standards – Use Classifications 3 and 4, *Minnesota Rules*, chapters 7050 and 7053 Revisor’s ID Number 04335, published March 11, 2019;
- S-13 – EPA Interim Economic Guidance for Water Quality Standards Workbook, dated March 1995;
- S-14 – Class 4A Irrigation Narrative Translator Tool;
- S-15 – Water Quality Standards Regulatory Revisions; Final Rule, 80 Fed. Reg. 162: 51020-51050, dated August 21, 2015;
- S-16 – Letter from Denise Keehner, Director of EPA Standards and Health Protection Division, to Derek Smithee, State of Oklahoma Water Resources Board, dated September 5, 2008;
- S-17 – Industrial Use Survey Results;
- S-18 – Memo from Leon Bernstein, Plant Physiologist, to C.A. Bower, U.S. Salinity Laboratory Director, re: Water quality standards proposed for irrigation by Water Pollution Control Commission, Minnesota, dated February 4, 1966;
- S-19 – Taconite Industry Enhanced Economic Analysis;
- S-20 – Chloride Linkage Justification Memo, dated November 18, 2020;
- Public comments received;
- Comments received in the 2019 Request for Comment Period;
- Transcript to public hearing held on February 4, 2021 for Proposed Amendments to Rules Governing Water Quality Standards Minnesota Rules Chapters 7050 and 7053;
- MPCA Response to Public Comments Submitted by WaterLegacy During the Public Comment Period and at the Public Hearing, dated February 12, 2021;
- Letter from Claudia Hochstein, MPCA Rules Coordinator, to the Honorable Eric J. Lipman, Administrative Law Judge, submitting MPCA’s post-hearing response and proposed amendments to Minnesota rules, Chapters 7050 and 7053 governing water quality standards; OAH Docket # 8-9003-37102 and Revisor No. 04335, dated February 14, 2021;
- MPCA Response to Public Comments Submitted During the Pre-Hearing Public Comment Period, at the February 4, 2021 Public Hearing, and During the Post-Hearing

Public Comment Period up to February 22, 2021, dated February 24, 2021, and the following attachments:

- Attachment 1 – Spreadsheet of comments and MPCA responses;
- Attachment 2 – Minnesota wetland plant response to salinity stressors; conductivity, chloride and sulfate; and
- Attachment 3 – Letter from Laura Bishop, MPCA Commissioner, to 10 tribal leaders, dated October 9, 2020;
- Letter from Yolanda Letnes, MPCA Planner Principal, to the Honorable Eric J. Lipman, Administrative Law Judge, submitting MPCA’s Final Response for Proposed Amendments to Minnesota Rules Chapters 7050 and 7053 Governing Water Quality Standards; OAH Docket #8-9003-37102; and Revisor No. 4335, dated March 3, 2021;
- MPCA Rebuttal Response to Comments Submitted during the Post-hearing Comment Period, dated March 3, 2021, and the following attachments:
  - Attachment 1 – Spreadsheets of rebuttal comments and MPCA responses;
  - Attachment 2 – Letter from Laura Bishop, MPCA Commissioner, to Minnesota Indian Affairs Council, dated November 30, 2020;
  - Attachment 3 – Letter from Laura Bishop, MPCA Commissioner, to 10 tribal leaders, dated October 9, 2020; and
  - Attachment 4 – Talking points for October 14, 2020 Governor’s Office Call delivered by April McCormick, Grand Portage Band Secretary/Treasurer; and
- Report of the Administrative Law Judge in the Matter of the Planned Amendments to Rules Governing Water Quality Standards – Use Classification 3 and 4, Minnesota Rules, chapters 7050 and 7053.

**c. Water quality criteria sufficient to protect the designated uses (40 CFR § 131.6(c))**

As discussed in Section II.B above, Minnesota’s revisions to the State’s criteria to protect industrial (Class 3) and agricultural (Class 4) uses and wetlands are consistent with 40 CFR § 131.11.

**d. An antidegradation policy consistent with 40 CFR 131.12 (40 CFR § 131.6(d))**

These rules do not affect Minnesota’s existing, EPA-approved and effective antidegradation policy.

**e. Certification by the State Attorney General or other appropriate legal authority within the State that the WQS were duly adopted pursuant to State law (40 CFR § 131.6(e))**

In a letter dated July 26, 2021 and received by EPA on August 10, 2021, Jean L. Coleman, MPCA Senior Attorney, certified that the revised WQS were duly adopted in accordance with Minnesota Law and are enforceable in the State of Minnesota by MPCA.

**f. General information which will aid the Agency in determining the adequacy of the scientific basis of the standards which do not include uses specified in section 101(a)(2) of**

**the Act as well as information on general policies applicable to State standards which may affect their application and implementation (40 CFR § 131.6(f))**

Minnesota's use revisions do not affect any of the uses specified in Section 101(a)(2) of the CWA. As discussed in Section II.B above, Minnesota submitted the Class 3 Translator Method and Class 4A Translator Method, which may affect the implementation of the revised Class 3 and 4 narrative criteria. The data and analysis used to support the use designations adopted in this rule package are listed in Section II.F.1.b.

**2. Requirements of 40 CFR Part 132**

Federal regulations specific to the Great Lakes System in 40 CFR Part 132 do not include requirements regarding changing designated uses and so have no applicability to Minnesota's revisions pertaining to use designations. Those regulations also have no applicability with respect to developing any type of criteria or implementing narrative criteria of any sort for pollutants listed in Table 5 of 40 CFR Part 132. *See* 40 CFR §§ 132.4(c) and (g). One reason for this exclusion is that the methodologies for developing criteria and implementing narrative criteria in 40 CFR Part 132 were developed for certain types of pollutants that have certain qualities and characteristics. The pollutants in Table 5, however, have different qualities and characteristics from the types of pollutants that the 40 CFR Part 132 methodologies address and, because of those different qualities and characteristics, the 40 CFR Part 132 methodologies are not well suited for developing criteria and implementing narrative criteria for the Table 5 pollutants.

As described above, Minnesota removed criteria for chlorides, hardness (Ca + Mg as CaCO<sub>3</sub>), pH, bicarbonates (HCO<sub>3</sub>), specific conductance, total dissolved salts, and sodium; and added or revised criteria for total dissolved solids, sulfate, and nitrate and nitrite. With the exception of nitrate and nitrite, all of these pollutant parameters are included in Table 5: dissolved solids and pH are both specifically included in Table 5, and all of the other pollutant parameters with the exception of nitrate and nitrite fall within salinity and/or dissolved solids (both of which are specifically included in Table 5), with bicarbonates also falling within alkalinity (another pollutant parameter specifically included on Table 5). 40 CFR Part 132 therefore has no applicability to Minnesota's decisions about criteria for those pollutant parameters.

Nitrate and nitrite is not specifically included in Table 5 and does not fall within any of the categories in Table 5. Unlike the other pollutants described above, nitrate and nitrite has its own toxicity, unrelated to ion toxicity, and so the 40 CFR Part 132 methodologies are well-suited for use in developing criteria and implementing narrative criteria with respect to nitrate and nitrite. Thus, 40 CFR Part 132 requires that Minnesota utilize methodologies consistent with those in 40 CFR Part 132 when developing, adopting or revising nitrate and nitrite criteria for aquatic life, human health and wildlife for the Great Lakes System, *see* 40 CFR § 132.4(b); and methodologies consistent with those in 40 CFR Part 132 pertaining to aquatic life and human health when implementing narrative criteria. Minnesota is not adopting or revising nitrate and nitrite criteria for aquatic life, human health or wildlife nor implementing narrative criteria for aquatic life and human health, and so there is nothing in these revisions inconsistent with 40 CFR Part 132. Minnesota has adopted methodologies which EPA previously approved as

being consistent with those in 40 CFR Part 132 for implementing narrative criteria pertaining to aquatic life and human health, *see* Minn. R. 7052.0110, subps. 2 and 4, and must utilize those methodologies or others consistent with those in 40 CFR Part 132 with respect to nitrate and nitrite when implementing narrative criteria in developing NPDES permits for discharges into the Great Lakes System.

Finally, it is worth noting that, to protect wildlife, 40 CFR § 132.3(d) requires Great Lakes States and Tribes to adopt the water quality criteria in Table 4 of 40 CFR Part 132 for waters of the Great Lakes System and 40 CFR § 132.4(a)(5) requires Great Lakes States and Tribes to adopt a methodology for development of wildlife criteria consistent with Appendix D of 40 CFR Part 132. Minnesota's existing WQS include the 40 CFR Part 132 wildlife criteria and methodology at Minn. R. 7052.0100 and 7052.0110, respectively. EPA previously reviewed those WQS and determined that Minnesota's wildlife criteria and methodology are consistent with the requirements of 40 CFR Part 132. Minnesota's revisions do not modify these existing WQS.

Although Minnesota adopted new and revised criteria to protect the State's Class 4B livestock and wildlife use, these criteria apply independently of the requirements of Minn. R. 7052.0100 and 7052.0110 and, thus, the previously approved wildlife criteria and methodology of Minn. R. 7052.0100 and 7052.0110 continue to apply.

### **III. Endangered Species Act (ESA) Requirements**

Consistent with Section 7 of the ESA and 50 CFR Part 402, EPA is required to consult with the Services on any action taken by EPA that may affect federally-listed threatened or endangered species or their designated critical habitat.

EPA has concluded that it has no discretion to consult on its approval of Minnesota's revisions to the Class 3 and 4A WQS, as discussed above in Section II, because the action pertains to a WQS revision related to industrial- and agriculture-related designated uses and is not designed to protect aquatic life or wildlife. The rationale for this decision is articulated in the 2009 Memorandum from Benjamin Grumbles, Office of Water Assistant Administrator, which stated that:

For ESA section 7(a)(2) to apply, EPA must be taking an action in which it has sufficient discretionary involvement or control to protect listed species. State WQS actions where EPA has concluded that it lacks such discretion include... [a]pproval of water quality criterion to protect human health... [H]uman health water quality criteria are designed to protect humans, not plants and animals. EPA's discretion to act on a State submission is limited to determining whether the criteria ensure protection of designated uses upon which the criteria are based (i.e., use by humans). Therefore, EPA has no discretion to revise an otherwise approvable human health criterion to benefit listed species.

Minnesota's designated uses and criteria affected by the State's revisions are intended to protect industrial facilities and crops from adverse effects of salinity in irrigation water, not naturally growing plants or animals. As with human health criteria, EPA's discretion to act on WQS

revisions related to these designated uses and criteria is limited to determining whether the criteria ensure protection of the designated use upon which the criteria are based (i.e., industrial cooling and materials transport and agricultural irrigation). Therefore, EPA concludes that it has no discretion to revise the Class 3 and Class 4A WQS to benefit listed species.

Because Minnesota's adopted Class 4B criteria are intended to protect wildlife as well as livestock, EPA determined that its approval of the Class 4B criteria has the potential to affect listed species in the action area and, thus, that consultation under Section 7 of the ESA is required for its approval of the Class 4B criteria.

Because Minnesota's adopted Class 4B criteria apply statewide, they have the potential to affect any federally-listed aquatic, aquatic-dependent or wetland species in the State. As discussed in its biological evaluation, EPA reviewed all available data on the potential effects of total dissolved solids, nitrate and nitrite, and sulfate on listed species in Minnesota and determined that its approval of the Class 4B criteria may affect, but is not likely to adversely affect, federally-listed species in Minnesota.

EPA has initiated but not completed consultation with FWS on the Class 4B criteria approved above. EPA has determined that this approval action does not violate Section 7(d) of the ESA, which prohibits irreversible or irretrievable commitments of resources that have the effect of foreclosing the formulation or implementation of reasonable and prudent alternatives, and has included in the record the basis for the conclusion that there are not impacts of concern during the interim period until the consultation is completed.

#### **IV. Tribal Consultation**

On May 4, 2011, EPA issued the "EPA Policy on Consultation and Coordination with Indian Tribes" to address Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments." The EPA Tribal Consultation Policy states that "EPA's policy is to consult on a government-to-government basis with federally recognized Tribes when EPA actions and decisions may affect tribal interests."

Eleven tribes have resources in the state of Minnesota. In a letter dated August 12, 2021, EPA Region 5 extended an invitation to these 11 tribes to consult on Minnesota's revisions to its WQS to protect industrial and agricultural uses. Conference calls to present the Minnesota rule revisions and take comments were held on August 31, 2021 and September 10, 2021. Five tribes attended one or both of the calls and one of the tribes also submitted written comments through a letter dated September 16, 2021. During the consultation conference call and in the written comments, the tribal representatives raised a number of issues, some of which are addressed in this decision document. Consultation was concluded with a letter sent from Tera Fong to the chairperson or designated representative of each tribe that attended the calls. In this letter, EPA summarized the issues identified by the tribes during consultation related to EPA's review of Minnesota's WQS revisions and provided responses to the tribes' issues.