

State of Minnesota
Minnesota Pollution Control Agency

In the Matter of Proposed Amendments to rules governing water quality: Minnesota Rules, Chapter 7050 (Water Quality Standards for Protection of Waters of the State); Addition of Minnesota Rules, Chapter 7053 (Effluent Limits and Treatment Requirements for Discharges to Waters of the State); Repeal of Minnesota Rules, Parts 7056.0010 to 7056.0040 (Classification for Use and Standards for Select Reaches of the Mississippi River and its Stream Tributaries); and Repeal of Minnesota Rules, parts 7065.0010 to 7065.0260 (Specific Effluent Limits for Select Watersheds)

Staff Post-Hearing
Response to Public
Comments

October 3, 2007

I. Introduction

The Minnesota Pollution Control Agency (Agency or MPCA) published its notice of hearing and intent to adopt proposed amendments to Minn. R. ch. 7050, establish a new rule, Minn. Rule ch. 7053 and to repeal two rules, Minn. R. ch. 7056 and ch. 7065, in the Minnesota *State Register* on July 30, 2007 (32 SR 250). One week earlier, on July 23, 2007, the proposed amended rule language in Minn. R. ch. 7050 and proposed new Minn. Rule ch. 7053 were published in the *State Register* (32 SR 87).¹

The Agency has presented information to demonstrate that the proposed amendments are needed and reasonable, mostly in the Statement of Need and Reasonableness (SONAR) together with the supporting exhibits. Also, the Agency responded orally to public comments and questions during the public hearings in St. Paul and at the Agency's five Regional Offices. This document, the Staff Post-Hearing Response to Public Comments (Response), will first address changes to the rule language proposed by the Agency since the rule was published in the *State Register*. That will be followed by the Agency's response to:

1. Written and oral comments received at the public hearings;
2. Comments in Public Exhibits 1 through 16; and
3. Comments received during the post hearing comment period through September 27, 2007.

The response to comments will be organized by major topic. Citations to the rules are to the proposed new rules unless stated otherwise, acronyms and abbreviations are those used in the SONAR, and some words or phrases are in bold for emphasis.

¹ Due to an oversight the hearing notice was not included with the publication of the proposed amended rules on July 23, 2007. Publication in the following issue of the *State Register* (July 30, 2007) met the minimum 30-day notice requirement.

Comments received from the public since the time the proposed rule language was published in the *State Register* on July 23, 2007 until the first public hearing on August 29, 2007, were covered in MPCA Public Hearing Exhibit 11.²

The Response will not include a response to comments or questions that, in the opinion of the Agency, are outside the scope of this rulemaking and would entail a substantial change to the amendments as proposed. This category includes:

1. Questions pertaining to specific mining permits;
2. Adoption of nutrient standards for rivers and streams; and
3. Changes to nondegradation provisions beyond the proposed changes to Minn. R. 7050.0185, subpart 1.

The Agency intends to review comments submitted by other parties during the 20-day post hearing comment period and submit final comments to the Administrative Law Judge by October 10, 2007.

II. Proposed Changes to Rule Language

A. Introduction

The Agency is proposing several changes to the originally proposed rule language in response to public comments and to correct several errors. All rule language changes are shown in Attachment 1.

Two very minor changes to the original proposed rule language to Minn. R. ch. 7050 are described in PH-Ex-12.

B. Changes to Minn. R. 7053.0255, Subp. 4, Item A. and Item C.

1. Introduction and Proposed New Wording

The Agency is proposing two changes to Minn. R. 7053.0255, subp. 4, item A. and item C. This is the part of Minn. R. 7053.0255 that contains the proposed exemptions (also called “off ramps”) that describe situations that may qualify a new or expanding discharger (that discharge more than 1,800 pounds of total phosphorus per year) for an exemption from the 1 mg/L phosphorus (TP) effluent limit, upon request. All of proposed Minn. R. 7053.0255, subp. 4 is included in Attachment 1 for context. The reasons for these changes are discussed in the two sections that follow.

² This Response to comments will use the following abbreviations for citations to the record: Ex. means Exhibit or Exhibits. For example, Ex.EU-1 at 20 means page 20 of SONAR exhibit EU-1; PH-Ex.-1 at 2 means page 2 of MPCA Public Hearing exhibit 1; and P-Ex.-1 at 10 means page 10 of Public exhibit 1. Tr. means the hearing transcript. Tr. 8/29 at 20 means page 20 of the hearing transcript for August 29, 2007. SONAR means the Agency’s Statement of Need and Reasonableness. SONAR-I at 20 means page 20 of Book I of the SONAR

In the discussion of all proposed changes in this Section (Section II), the proposed added language is shown in bold with double underline and proposed deleted language is in bold with strikethrough.

[Minn. R. ch. 7053.0255] Subp. 4.

A. the discharge is to or upstream of a water body listed on the applicable impaired water list, section 303(d) of the Clean Water Act, and the ~~subsequent~~ total maximum daily load study is complete and approved by the United States Environmental Protection Agency, **as required by Code of Federal Regulations, title 40, part 130, section 7,** at the time the new or expanding facility is in the planning and design phase. The total maximum daily load study must have considered impacts from phosphorus loading on the impaired water body. In this case the total maximum daily load study will determine the applicable phosphorus effluent limit;

C. the treatment works, regardless of the type of treatment technology, ~~must use~~ **uses** chemical addition to achieve compliance with the one milligram per liter limit and the discharge is to a receiving stream in a watershed listed in subitems (1) to (3). In this case the discharger may be granted a seasonal one milligram per liter limit, applicable from May 1 through September 30 and not applicable from October 1 through April 30:

2. Changes to Minn. R. 7053.0255, Subp. 4, Item A

The first change was prompted by a comment to Agency staff (off the record) from Administrative Law Judge, Steve Mihalchick. Judge Mihalchick indicated that the reference to the total maximum daily load (TMDL) study in proposed Minn. R. ch. 7053, subpart 4, item A might need clarification. The provision in question is the proposed TMDL off ramp, which says that the TMDL will determine the TP effluent limit if timing conditions are met.

Judge Mihalchick suggested that the reference to **the** TMDL study might be confusing, and he also suggested that a citation to the relevant Code of Federal Regulations (CFR) would help clarify the provision. Agency staff proposed to add the word “subsequent” to the sentence that first mentions the TMDL study to indicate that the TMDL study referred to is the one that follows the listing of the waterbody in question as being impaired due to excess nutrients or nutrient-related conditions. The citation to 40 CFR 130.7 is the relevant federal TMDL regulation (Attachment 1).

3. Changes to Minn. R. 7053.0255, Subp. 4, Item C

Mr. Joseph Sullivan with Flaherty and Hood P.A., representing the Coalition of Greater Minnesota Cities (CGMC), said that CGMC believes that off ramp “C” is unworkable, and that the provision “requires a community to prove that chemical nutrient removal is the only option available” to remove TP from the wastewater. This is not the Agency’s intended interpretation of this off ramp.

The off ramp is intended to apply to any new or expanding discharger (that exceeds the *de minimis* loading) that uses chemicals to remove TP from wastewater. This includes facilities that rely on chemicals exclusively to remove TP, those that use a combination of biological phosphorus removal technologies and chemical addition, and those that use other technologies plus chemicals to remove TP. A facility that uses biological phosphorus removal (Bio-P) technologies or other non-chemical methods as the primary means to remove TP, but the operator feels the need to add small quantities of chemical to assure compliance with the TP limit on a monthly basis, may not be good candidates for this off ramp. In any case, the off ramp does not require the discharger to **prove** that chemical addition is the only alternative, it simply means that if they do use chemicals, they potentially qualify for this off ramp. The Agency does not want to adopt any rule language that would have the effect of discouraging municipalities from considering using Bio-P technologies in new or expanding facilities. The Agency is proposing to remove the words “must use” in this off ramp and replace them with “uses” to clarify its intended application (Attachment 1).

C. Changes to Proposed Chronic Water Quality Standard for Acetochlor

The Agency is proposing to change the proposed chronic standard for acetochlor from 1.7 µg/L to 3.6 µg/L based on the consideration of additional plant toxicity data provided by Monsanto just prior to the public hearings and consideration of Dr. Giddings’ report (P-Ex. 6, see Section VII).

The chronic acetochlor standard appears in six locations in Minn. R. ch. 7050 as listed below.

Minn. R 7050.0220, subp. 3a, item C, subitem (2)
Minn. R 7050.0220, subp. 4a, item C, subitem (2)
Minn. R 7050.0220, subp. 5a, item C, subitem (2)
Minn. R 7050.0222, subp. 2
Minn. R 7050.0222, subp. 3
Minn. R 7050.0222, subp. 4

The proposed change is shown in the two examples below. The proposed chronic and acute standards are the same for all Class 2 subclasses. No changes are proposed for the acute standards.

[Minn. R 7050.0220, subp. 3a, item C, subitem (2)]

2A	2A	2A	1B	3A/3B	4A	4B	5
CS	MS	FAV	DC	IC	IR	LS	AN
(2) <u>Acetochlor, µg/L</u>							
3.6 1.7	86	173	--	--	--	--	--

[Minn. R 7050.0222, subp. 2]

Substance, Characteristic or Pollutant (Class 2A)	Units	CS	Basis for CS	MS	FAV	Basis for MS,FAV
Acetochlor	µg/L	3.6 1.7	Tox	86	173	Tox

D. Change to Class 2A Proposed Chronic Water Quality Standard for Benzene

The Agency is proposing to revise the proposed chronic standard for benzene for Class 2A waters to account for a minor calculation error. The basis and input to the standard has not changed, but an error was made in the calculations for the proposed Class 2A chronic standard of 5.4 µg/L; the correct value is 5.1 µg/L.

The Agency is proposing to change the Class 2A chronic benzene standard in the two locations where it appears as shown below.

[Minn. R 7050.0220, subp. 3a, item C, subitem (10)]

2A	2A	2A	1B	3A/3B	4A	4B	5
CS	MS	FAV	DC	IC	IR	LS	AN
(10) Benzene (c), µg/L							
5.1	5.4	4,487*	8,974*	5	--	--	--

[Minn. R 7050.0222, subp. 2]

Substance, Characteristic or Pollutant (Class 2A)	Units	CS	Basis for CS	MS	FAV	Basis for MS,FAV
Benzene (c)	µg/L	5.1	5.4 HH	4,487*	8,974*	Tox

E. Removal of Proposed Lower Limit of 10 mg/L Total Hardness for Calculation of Hardness-related Trace Metal Standards

The Agency proposed to include a minimum total hardness of 10 mg/L for the calculation of the hardness-variable trace metal standards. Proposed language associated with standards for seven trace metals is impacted (cadmium, chromium [trivalent], copper, lead, nickel, silver [MS and FAV only] and zinc). Under the proposal, if the hardness of a given waterbody was below 10 mg/L, we would not use the measured value but use 10 mg/L to calculate the metal standard for that waterbody. The Agency usually uses a central value of hardness to calculate these metal standards (see SONAR-I at 110 and 155).

The Agency is now proposing to withdraw this proposal for the reasons outlined below. We propose to return to the hardness provision in the current rule, which establishes a maximum hardness of 400 mg/L but has no minimum.

The Minnesota Center for Environmental Advocacy (MCEA) objected to this change and their consultant, Dr. Lawrence Baker critiqued the proposal (P-Ex.-11, Part VI at 1). The Agency does not fundamentally disagree with the comments of MCEA and Dr. Baker on this issue. Staff at the U.S. Environmental Protection Agency (EPA) Region 5 (which must approve Minnesota's changes to water quality standards) has also not supported this change.

The language associated with each of the seven metal standards will need to be revised in both Minn. R. 7050.0220 and 7050.0222, the two parts where numeric standards are listed

individually. Below are examples of the proposed changes at the two locations for cadmium. None of the numeric standards for any of the seven metals is impacted.

Minn. R. 7050.0220, subp.3a, item B, subitem (7)

(7) Cadmium, total, µg/L ~~See Note No. 3 below~~

1.1 3.9 7.8 5 -- -- -- --

Class 2A cadmium standards are hardness dependent. Cadmium values shown are for a total hardness of 100 mg/L only. See part 7050.0222, subpart 2, for examples at other hardness values and equations to calculate cadmium standards for any hardness value ~~between 10 and not to exceed~~ 400 mg/L.

Minn. R. 7050.0222, subp.2

Cadmium, total	µg/L	Formula	Tox	Formula	Formula	Tox
		<u>equation</u>		<u>equation</u>	<u>equation</u>	

~~Cadmium, total~~ The CS, MS, and FAV vary with total hardness and are calculated using the following equations:

The CS in µg/L shall not exceed: $\exp_{\cdot}(0.7852[\ln(\text{total hardness mg/L})]-3.490)$

The MS in µg/L shall not exceed: $\exp_{\cdot}(1.128[\ln(\text{total hardness mg/L})]-3.828)$

The FAV in µg/L shall not exceed: $\exp_{\cdot}(1.128[\ln(\text{total hardness mg/L})]-3.1349)$

Where: exp. is the natural antilogarithm (base e) of the expression in parenthesis.

For hardness values ~~less than 10 mg/L, 10 mg/L shall be used to calculate the standard~~ ~~and for hardness values~~ greater than 400 mg/L, 400 mg/L shall be used to calculate the standard.

Example of total cadmium standards for five hardness values:

TH in mg/L	50	100	200	300	400
<u>Cadmium, total</u>					
<u>CS µg/L</u>	<u>0.66</u>	<u>1.1</u>	<u>2.0</u>	<u>2.7</u>	<u>3.4</u>
<u>MS µg/L</u>	<u>1.8</u>	<u>3.9</u>	<u>8.6</u>	<u>14</u>	<u>19</u>
<u>FAV µg/L</u>	<u>3.6</u>	<u>7.8</u>	<u>17</u>	<u>27</u>	<u>37</u>

The same changes are proposed at a total of 12 additional locations for the other six hardness-related metal standards in Minn. R. 7050.0220 and 7050.0222.

F. Changes to Certain Classification Listings

In addition to the subitem cross reference change in Minn. R. 7050.0470, subp. 1, item B, subitem (129) as noted in PH-Ex.-12, the following corrections and additions to the classification listings are proposed for change. The referenced listings are cited from the rule as originally noticed. These corrections were discovered as a result of an ongoing water use classification mapping effort.

Minn. R. 7050.0470, subp. 2, item A, subitem (12)

(12) Dumbbell River, (T.60, R.7, S.3,4,5,7,8,9,10,16,18,19,20,28,29,31,32; **T.61, R.7, S.34**) : 1B, 2A, 3B;

Minn. R. 7050.0470, subp. 3, item A, subitem (42)

(42) Mustinka River Ditch, (T.128, R.45, S.19; T.128, R.46, S.**13,14**,23,24; **T.129, R.46, S.13,14**) : 2C;

Minn. R. 7050.0470, subp. 5, item A, subitem (85)

(85) Judicial Ditch No. 4, Dawson, Lac Qui Parle Oil Coop, (T.117, R.43, S.7,17,18,**20**,21 NW1/4; T.117, R.44, S.12) : 7;

Minn. R. 7050.0470, subp. 5, item A, subitem (93)

(93) Judicial Ditch No. 29 (**Spring Creek**), Evan, (T.110, R.33, S6; T.111, R.33, S.21,22,28,31,32,33) : 7;

III. Comments on Proposed Eutrophication Standards

A. Introduction and General Comments

Steve Nyhus of Flaherty and Hood P.A. and John Hall of Hall and Associates, Washington, D.C., representing the Minnesota Environmental Science and Economic Review Board (MESERB), offered written (P-Ex.-1) and oral comments on the proposed eutrophication standards at the hearing on August 30, 2007 (St. Paul). The Agency's response to MESERB's comments incorporates the testimony of both Mr. Nyhus and Mr. Hall. The Minnesota Center for Environmental Advocacy (MCEA) also offered written and oral comments on the proposed eutrophication standards at the September 12, 2007 hearing in Rochester (P-Ex.-11). In general MCEA strongly supports the proposed eutrophication standards (P-Ex.-11 at 1). MCEA's comments regarding the protection of lakes with water quality conditions better than standards has more to do with their suggestions for wholesale changes to the nondegradation provisions than protecting high quality lakes. With the exception of the Agency's minor proposed changes to Minn. R. 7050.0185, subp. 1, (see Section VI), it is the Agency's opinion that a thorough review of nondegradation provisions in Minn. R. ch. 7050 is outside the scope of this rulemaking.

Ms. Marcie Moe and Mr. Walter Moe asked how the proposed eutrophication standards relate to Lake Vermillion (Tr. 9/4 at 16 and 31). Mr. Walter Moe also asked about discharges from mining operations, questions which are generally outside the scope of these rulemaking proceedings. Mr. Biz Clark, Chairman of the Cook Co. Coalition of Lake Associations asked about the protection of lakes that have water quality better than standards (Tr. 9/4 at 19). Mr. Le Roger Lind asked how the proposed amendments in general would impact Lake Superior (Tr. 9/4 at 25).

Mr. David Holmbeck of the Minnesota Department of Natural Resources said he was pleased that the Agency had recognized in the proposed rule language that some lakes might never be able to achieve the proposed standards due to natural causes (Tr. 9/5 at 16). Ms. Moriya Rufer asked about the list of MDNR designated lake trout lakes (Tr. 9/6 at 16).

B. Representativeness of Lake Data and Summer Average

MESERB expressed concern that the data used to arrive at the proposed eutrophication standards may not reflect the conditions of lakes to which the standards are subsequently applied, particularly when applied to reservoirs (Tr. 8/30 at 32 and 33; see Section III.F). Mr. Hall cited page 7 of the 1985 EPA national guidance on criteria development.³ The sentence we believe he was referring to says: “*Criteria must be used in a manner that is consistent with the way in which they were derived if the intended level of protection is to be provided in the real world.*” The Agency agrees with this statement and believes the proposed eutrophication standards more than satisfy this goal.

The proposed eutrophication standards are based on very extensive and multi-faceted data sets. For example, the “assessment” database includes data for almost 2,800 lakes. These data are supplemented with data from the Environmental Protection Agency (EPA) nutrient criteria data base (this large data set broadly overlaps with the former), citizen lake monitoring program data including user perception data, data from reference lakes, historical trophic condition data (diatom reconstruction), and biological data (SONAR-II at 48). Despite this, due to the variability in lakes state-wide, it is possible that the standards might be applied to lakes or reservoirs not adequately represented in this very robust data set. Not every lake in Minnesota has been monitored. It is not only impractical to try to do so, it is not necessary. The large and multifaceted data sets for the four lake types (lake trout, stream trout, deep and shallow lakes) adequately represent the vast majority of lakes in Minnesota. The Agency has the flexibility and means to accommodate the exceptions (e.g., site-specific modification of a standard).

MESERB seems to support the concept that the proposed eutrophication standards do not reflect “worst case” water quality conditions (P-Ex.-1 at 3). By specifying a summer average and the practice of taking an integrated sample (a two-meter tube that takes an “integrated” vertical sample of the surface water⁴), the assessment of lakes does not focus on only a “worst case”

³ U.S. EPA, 1985. Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses. EPA Office of Research and Development, Environmental Research Laboratories, Duluth, MN; Narragansett, RI; Corvallis, OR.

⁴ The integrated sample is not part of the proposed rule language but is in Agency guidance on lake monitoring and lake assessment, **Attachment 2**.

summer condition. However, the robustness of the data the standards are based on allows us to estimate in general the magnitude and duration of algae blooms at the TP concentrations represented by the standards; or to put it another way, we can estimate the percentage of the summer period when algae blooms are likely to hinder full recreational use (a “worst case” period).

The narrative portion of the proposed standards addresses several important issues regarding the implementation of lake standards. First, the standards are compared to lake data averaged over the growing season. In practice, data are averaged over two or three growing seasons for assessment purposes. Averaging the data “smooths” out some of the seasonal variability. Second, the TP (cause) and either Chlorophyll-a (Chl-a) and Secchi depth (SD) (response) must be exceeded for the standard to be violated. Third, high quality lakes will be protected to keep them in that condition. Fourth, exceedance of the standards due to natural causes is not a violation of the standard. Finally, the option of developing a site-specific standard is available.

In assessing lakes for potential impairment, the Agency uses a “weight of evidence” approach, carefully evaluating all the data and relevant information collected over two or more years before making a decision. The Agency’s recommended conclusion regarding impairment can be taken before a professional judgment team of experts, which reviews all the relevant information and the Agency’s recommendation. Also the public has ample opportunity to comment on the proposed impairment listings.⁵ Not only do the proposed standards recognize data variability but there are also multiple safeguards that are invoked when the standards are implemented.

As stated, MCEA generally supports the proposed adoption of eutrophication standards for lakes, shallow lakes and reservoirs, but they expressed reservations about some specifics aspects.

MCEA is concerned that the proposed phosphorus (TP) and chlorophyll-a (Chl-a) standards appear to be too high in the Western Corn Belt Plains (WCBP) ecoregion, and that proposed standards appear to be set at the upper range of values that are protective of beneficial uses.

These two concerns will be addressed jointly. The standards for each ecoregion were derived based on several databases as described in the response to MESERB’s comments above and as described in Ex.EU-1. Information from these databases was used collectively to arrive at the eutrophication standards put forth in this rulemaking. Comparisons of the TP distributions from these various databases relative to the standards are shown in Figure II-9 in SONAR-II at 70. Similar figures for Chl-a and SD are in Ex.EU-1 at 123 and 124, with the WCBP and Northern Glaciated Plains (NGP) ecoregion distributions noted in Figures 31 and 32 respectively.

Lakes in the WCBP and NGP ecoregions are relatively nutrient-rich based on all the data sets. Based on Figure II-9 (SONAR-II at 70), the TP standard of 90 µg/L is near the 50th percentile for the WCBP reference lakes, below the 25th percentile for the MPCA assessed lakes and just above the 75th percentile for the pre-European diatom reconstructed TP. This implies that about 50% of the “reference” lakes would be above the recommended standard, and ecoregion-wide, over 75% of the lakes assessed (monitored) in the WCBP ecoregion would be above this value as well.

⁵ The Agency is holding public meetings around the state at this time to get public input on the draft impaired waters list for 2008. Such meetings are held for each proposed impaired waters list on the two-year cycle.

The recommended Chl-a criterion for the WCBP/NGP ecoregions of 30 µg/L is a relatively high value as compared to values found elsewhere in Minnesota (e.g. Northern Lakes and Forests (NLF) and North Central Hardwood Forest (NCHF) ecoregions). However, 30 µg/L is near the 25th percentile for the reference and Agency assessed lakes (Figure 31; Ex.EU-1), which implies that it would be lower than the chlorophyll-a concentration measured in over 75% of the lakes in the ecoregion. The Secchi standard of 0.7 m is near the 50th percentile for these databases (Ex.EU-1, Figure 31).

Given the collective information provided by these databases, it would be unrealistic to propose lower (more stringent) standards for TP or Chl-a for shallow lakes in these two ecoregions (see discussion on shallow lakes in Section III.E). For those lakes currently above the 90 µg/L standard, reduction to this level should produce measurable and perceptible reduction in the frequency and intensity of nuisance algal blooms and allow for modest increases in Secchi transparency, both of which will increase the opportunity (percent of summer season) for support of aquatic recreational use.

MCEA noted that averaging results over the summer season was workable but pointed out two scenarios where doing so might lead to an incorrect decision on potential impairment (P-Ex.-11, Part I.A at 1).

First, MCEA describes a situation where the recommended minimum 12 samples for TP and Chl-a or SD has not been met but the available data clearly show that the lake is impaired. MCEA says the lake should be placed on the impaired waters (303(d)) list. In general, the Agency agrees. The Agency addressed this question in recent updates of the Assessment Guidance Manual (Attachment 2 at 69) and in our completed assessments for the 2006 impaired waters list (Ex.A-6). In the 2007 revision of the guidance manual, the number of observations needed for 303(d) assessment was reduced from 12 to 10 pairs (page 70); since it was found that some lakes were being excluded from the assessment process for lack of one or two observations. This does not change the overall intent that data be collected over the course of two or three summers to allow for consideration of annual variability in trophic condition. Further, the guidance acknowledges that sometimes means based on less than 10-12 values may be so high that an additional one or two samples (even at the detection limit) would not be enough to bring the lake in compliance with the threshold values. This consideration was factored into the 2006 listings. Two relevant examples include Crystal Lake (07-0098)⁶ and George Lake (46-0024); both are on the 2006 303(d) list.⁷

Second MCEA describes a lake that is experiencing toxic algae blooms and they maintain that the TP, Chl-a and SD measurements are immaterial – in this condition the lake is impaired. Again, the Agency agrees. The Assessment Guidance also addressed this issue (Attachment 2 at 74). The guidance acknowledges the significance and human and animal health implications of blue-green algal toxicity. The Agency makes use of measured toxin values and/or reports of animal deaths or human health impacts as a basis for determining whether the lake should be

⁶ MN Department of Natural Resources Bulletin 25 lake ID numbers.

⁷ Memo to Howard Markus (Agency staff) from Steve Heiskary, December 21, 2005. 2006 TMDL nutrient-impaired lake list: status and review notes.

included on the 303(d) list for nutrient impairment. Examples include Lake Crystal (noted above) in the 2006 assessment and more recently (summer of 2007), in response to severe blue-green blooms, dog deaths and related issues for two lakes: Fountain Lake in Wright County (86-0086) and Little Rock Lake in Benton County (05-0013). Both lakes were placed on the 2008 draft list of nutrient impaired lakes. The two memoranda recommending these listings are Attachment 3.

It should be noted that the ability to provide scientifically sound interpretations of the weight of evidence and have the flexibility to interpret the guidance in these two situations are a good example of why this level of detail (number of samples, presence of toxic algae, etc.) belongs in guidance and not the rule (see Section III.D).

C. Protection of Class 2 Beneficial Uses

MESERB says we should very clearly outline which aquatic life and recreation (Class 2) sub-use the proposed standards are designed to protect and which sub-use controlled the derivation of the standard, but this information does not have to be in rule (P-Ex.-1 at 4, no. 8; Tr. 8/30 at 44). The Agency has detailed exactly what MESERB asks in SONAR-II at 72 and in Table II-11 at 73.⁸ The proposed standards have been set at levels that focus on a particular sub-use, with the recognition that there is considerable variability in what constitutes protection of that sub-use. Ultimately the standards are designed to protect all sub categories of Class 2 uses.

The Agency does not intend to add the principal sub-use to the rule because doing so could easily confuse the public about the uses for which individual lakes or groups of lakes are protected. Any suggestion that sub-uses other than the primary one is not achievable in a waterbody would require a use attainability analysis. Again, all lakes are protected for a variety of aquatic life and recreational uses (plus aesthetics) until a use attainability analysis demonstrates otherwise.

MCEA is concerned that the standards for shallow lakes located in the two southern ecoregions will not be protective of swimming during part of the summer. This is likely to be true for many shallow lakes in this part of the state. However, the Agency is not “writing off” shallow lakes for swimming use; they will still be protected for swimming where attainable (removal of the swimming use would require a use attainability analysis). The “attainability” concept in rule is long-standing language associated with Class 2 standards, which include the clause: “*These waters shall be suitable for aquatic recreation of all kinds, including bathing, **for which the waters may be usable***” (emphasis added; Minn. R. 7050.0222 subp. 3 and 4). The Agency will work to protect and enhance swimming uses in shallow lakes where that use is attainable. The reality is that considerably less than 25 percent of assessed shallow and deep lakes in the Western Corn Belt Plains ecoregion (assessment data base) meet the proposed phosphorus standard for shallow lakes of 90 µg/L (SONAR-II at 69, and Figure II-9 at 70).

MCEA is concerned that, because the standards are purposely set near the threshold that protects the critical sub-use, there will be an endless round of listing (as impaired) and delisting (P-Ex.-

⁸ Coldwater fishery in trout lakes; recreational and swimming uses in “deep” lakes and reservoirs, and ecological diversity (healthy macrophyte communities) in shallow lakes.

11, part I.A. at 1). This seems unlikely given the variability in lakes and the time and effort that will be expended to restore an impaired lake to compliance with standards through the TMDL process. One could voice the same concern about any standard and any waterbody in which the concentrations of the pollutant hover close to the standard.

D. Deep Lakes and Rule vs. Guidance

MESERB indicated that the data supporting the proposed standards for deep lakes was adequately representative of the population of deep lakes. They suggested, however, that the standards include several additional caveats (P-Ex.-1 at 3). The Agency believes none of these should be added to the rule for the reasons outlined below.

As noted, the proposed rule language specifies that the data is to be averaged over the growing season⁹, and that exceedance of the standard must be based on exceedance of the phosphorus (cause) and at least one response standard (for example see Minn. R. 7050.0222, subp. 2a, item A.). These two points provide critical information concerning application of the eutrophication standards, and it is reasonable to include them in the rule. Beyond this, the Agency believes that the details MESERB says should be included in rule (items 1 – 5 in P-Ex.-1 at 3 and Tr. 8/30 at 25) are better left to guidance documents. Guidance is the appropriate place for detailed instructions on how to monitor and assess surface waters. Monitoring and assessing a broad range of lake types demands considerable flexibility as noted in the examples of lakes with toxic algae blooms above. No amount of detail in rule can address all the variables and complexities of monitoring the huge variety of lakes in Minnesota. Excessive detail in rule can clutter and confuse rule language unnecessarily.

The issue of what level of detail belongs in rule vs. guidance, and whether guidance should be adopted into rules, was discussed extensively in the record for the assessment factor rulemaking (Ex.EU-46a at 36, EU-46b at 10 and EU-46c at 3). The Administrative Law Judge for the assessment factor rulemaking, Judge Kenneth Nickolai, in his report, found that guidance was an appropriate means for dealing with detail and that guidance did not need to be part of a rule (Attachment 4 at 31).

E. Shallow Lakes

MESERB indicated that the standards would be applied to shallow lakes with characteristics different from those that were monitored to provide data upon which the standards are based (P-Ex.-1 at 4, Tr. 8/30 at 55). This is the same issue that was addressed in Section III.B above, except that the subset of data for shallow lakes, which, while extensive, is considerably smaller than the data set for deeper lakes. Nevertheless, the Agency believes it is more than adequate to support the proposed standards for shallow lakes and is representative of those lakes. Mr. Hall pointed out that some lakes sampled to provide data for establishment of the shallow lake standards did not exactly fit the shallow lake definition. In order to provide the range of data needed to establish the TP, Chl-a and SD conditions that become unacceptable to maintain a healthy diverse aquatic plant community, sampling a broad range of trophic conditions in

⁹ The averaging period or duration is normally specified in rule; see for example Minn. R. 7050.0222, subp. 7, item B and item C.

shallow lakes was required (see EU-1 at 117 and Fig. 30). To keep the data set as large as possible, some lakes did not meet all the criteria that define a shallow lake. These lakes are still considered representative of the shallow lake category, since a large proportion of each lake was shallow (<15 feet) or had extensive zones of emergent vegetation. Mr. Hall urged that the Agency remain flexible when assessing shallow lakes. The Agency fully intends to do that.

MESERB suggests that a statement be included in rule that says, upon petition, the Agency will stay the application of the standards to a shallow lake if the characteristics of that lake are not represented by the data used to set the standards (P-Ex.-1 at 4, Tr. 8/30 at 53). Such a statement could be very cumbersome in its application and is not needed in the opinion of the Agency. Ample safeguards are already in place to accomplish the same end. Any person can petition the Agency under existing rules.¹⁰ Site-specific natural conditions can be taken into account through Minn. R. 7050.0170. The Agency can develop a site-specific standard if necessary (Minn. R. 7050.0220, subp. 7), and the uses of the lake can be evaluated through a use attainability analysis if warranted. Also, any member of the public can bring data and information relevant to a particular lake to the Agency for consideration; in fact, the Agency encourages the public to collect and submit data to the Agency.¹¹

Mr. Nyhus suggests that the standards should apply to shallow lakes less than 50 acres only on a case-by-case basis (P-Ex.-1 at 4). There is no basis for such a size cutoff. The Agency is charged with protecting all waters of the state, small and large. A case-by-case approach to small shallow lakes would place an unnecessary burden on the Agency to assess these lakes before standards could be applied. It could cause a delay in taking action to protect small lakes. The discussion in SONAR-II at 90 about lakes smaller than 10 acres also applies to lakes smaller than 50 acres as well. In the vast majority of cases the standards will be appropriate for any given shallow lake. If it is determined that the standards are not appropriate for a given lake for any reason, the Agency has several options, as discussed above.

F. Reservoirs

MESERB asserts that applying a 14-day residence time at relatively low flow conditions (a 122-day average low flow with once in 10 year recurrence interval) is not supported in the literature (P-Ex.-1 at 5, Tr. 8/30 at 29). The Agency disagrees (see SONAR-I at 137, Ex.EU-16 at 3-1 and Ex.PL-1c). To be clear, the 122Q₁₀ applies only to reservoirs. A flow must be specified to establish a flow benchmark to determine the 14-day residence time to distinguish reservoirs from rivers. The 122-day period is a four-month, season-long average low flow, which coincides with the period over which lake data are averaged for comparison to the standards.

It is true that eutrophication standards will be applied to reservoirs in instances when the residence time is less than 14 days because flows at the time are greater than the 122Q₁₀. This is appropriate. If the Agency is to carry out its mandate to protect water resources under most conditions, water quality standards must be applicable under most conditions, not just average

¹⁰ New petition language was recently added at Minn. R. 7050.0405 as part of the Session Law rulemaking.

¹¹ For example, see <http://www.pca.state.mn.us/publications/manuals/vswmg-section5.pdf>

and better than average conditions. Impacts from excess nutrients occur in riverine systems and reservoirs when residence times are less than 14 days as we have seen in some major rivers such as the lower Minnesota (see Ex.PL-7). Also, flow through a reservoir can decline to a 122Q₁₀ flow or less for days or weeks at a time during summer dry periods, with a concomitant increase in residence time longer than 14 days.

The more common Class 2 toxicity-based standards apply at a much lower flow than the 122Q₁₀; i.e., the 7Q₁₀ and at all greater flows. This is necessary to protect the aquatic community at essentially all flows except those flows under severe drought conditions. The analogous policy of applying eutrophication standards to reservoirs at a larger flow, the 122Q₁₀, is a reasonable more lenient policy for nutrients, which are not toxic.

MESERB recommends (P-Ex.-1 at 5, Tr. 8/30 at 48) creating separate classes for reservoirs, specifying that the standards should apply presumptively only to “reservoirs similar to natural lakes (not dammed streams/rivers),” and to name the reservoirs to which the standards do not fit. The Agency questions where one would draw the line between the two types of reservoirs? To do this would create considerable unnecessary work for Agency staff. The recommendations are simply not practical or needed. Creating two classes, one for more lake-like reservoirs and one for dammed streams or rivers, does not address the real issue, which is that reservoirs have unique characteristics that demand site-specific analysis. The Agency recognizes this fact. We have included language in the narrative portion of the lake standards to emphasize it (Minn. R. 7050.0222, subp. 2a, 3a and 4a), and we are already doing site-specific analyses on three of the four reservoirs mentioned by Mr. Hall (Tr. 8/30 at 38 and 50).¹²

In summary, the 122Q₁₀ as applied to the determination of residence time for reservoirs is needed and reasonable because:

- The eutrophication standards apply to lakes and reservoirs, not rivers and streams; a precise and unequivocal method is needed to make the distinction (Tr. 9/12 at 108).
- The time frame for the 122Q₁₀ coincides with the season-long period over which lake/reservoir data are averaged.

MCEA objects to the proposed definition of reservoir. MCEA also objects to the site-specific modification of standards in general and in particular its application to reservoirs (P-Ex.-11 Part II at 3 and Part III, Tr. 9/12 at 106). MCEA cites Lake Byllesby as an example of the misuse of the site-specific analysis for reservoirs. On the contrary, the Agency believes that Lake Byllesby is a prime example of how the site-specific approach to reservoirs works and why it is needed and reasonable, particularly in the context of a TMDL study. The site-specific standard for Lake Byllesby is being carried out in concert with the local party responsible for the TMDL (Cannon River Watershed Partnership) and other stakeholders throughout the watershed.

MCEA says that the need to define “reservoir” is driven by “the use of the term in the phosphorus effluent limitations language” (P-Ex. 11, Part II at 1). This is not so; again the need

¹² Lakes Pepin and the Zumbro, Byllesby, and Redwood River reservoirs. Note: Lake Pepin is a natural lake.

for this definition is driven by the requirement to separate reservoirs from rivers for the application of the eutrophication standards. The standards will apply to reservoirs but not to rivers and streams (Tr. 9/12 at 108). MCEA's statements about the definition of reservoir and about TP effluent limits seem to be influenced by their desire for the Agency to adopt nutrient standards for rivers, which is not part of this rulemaking. Regardless, river standards, once in place, will not eliminate the need for this definition because river standards are very likely to be different than lake and reservoir standards.

MCEA's suggested definition for reservoirs as any body of water retained by a dam is too abstract, vague and unworkable (P-Ex.-11, Part II at 3; Tr. 9/12 at 83). Such a definition would create a situation ripe for controversy, debate and potential litigation. Many rivers have small or low-head dams that retain water for a very short time period. These "pools" are clearly not reservoirs. Many true lakes have dams or control structure at their outlet.¹³ The fact that other organizations have different definitions for "reservoir" is irrelevant. The Agency has a specific purpose for its definition (distinguish reservoirs from rivers) and the proposed definition serves that purpose. The Agency believes that the way to address the impact of excess nutrients in rivers and streams is adoption of the extension of the TP effluent limit to new and expanding discharges, and to continue on our path to develop nutrient standards for rivers and streams (P-Ex.-11, Part II at 4).

MCEA claims the proposed definition of reservoir is "unmanageable" because it is highly technical and obscure to the public (P-Ex.-11, Part II at 5). That may be true. Out of necessity many provisions in Minn. R. ch. 7050 are highly technical (see for example, Minn. R. 7050.0218). The determination of residence time and the statistics of low flow frequency and recurrence interval are technical and not always easy for the layperson to understand. However, when the public needs to understand these concepts, such as in the context of TMDL stakeholder groups, they are able to do so. The solution is not to "dumb-down" the definition to the point where it is meaningless for its intended purpose.

G. Definition of Natural Causes

MESERB asked the Agency to expand the definition of natural causes to contain language that recognizes some level of irretrievable human-induced conditions (P-Ex.-1 at 3 and Tr. 8/30 at 39). MCEA objected to the definition and, in particular, the discussion in the SONAR that the concept of natural causes recognizes "essentially irreversible" human-induced alterations that could impact water quality (P-Ex. 11 part III at 7). This concept is discussed in detail in SONAR-I at 89 and 139, and SONAR-II at 81.

As the concept of "essentially irreversible" alterations took shape as a result of extensive internal Agency discussions, the Agency considered including language in the definition that would attempt to accomplish what MESERB suggests. At the conclusion of these deliberations the Agency decided to leave the definition of natural causes as proposed and rely on the expanded explanation in the SONAR and in possible future guidance to address the issue. The primarily

¹³ The Agency has for many years used and continues to use the MN Department of Natural Resources (MDNR) Bulletin 25 to identify both lakes and reservoirs (P-Ex.-11, Part II at 2). The Agency disagrees with the MDNR on use of a 30Q₁₀ instead of a 122Q₁₀ for the reasons discussed in Section III.F (Ex. A-14b).

reason behind this decision is the difficulty of adequately capturing the nuances of the “essentially irreversible or irretrievable” concept in a few words in a definition. For example, the Agency is concerned that added language may:

- Imply that more anthropogenic activities are “irreversible” than the Agency believes is reasonable and protective; i.e., the definition would become too lenient;
- Hinder the consideration of legitimate site-specific conditions; i.e., what is essentially irreversible varies depending on the human-induced changes being considered (e.g., dam, urbanization, row-crop agriculture, etc.);
- Fail to capture the need to implement all reasonable and cost-effective point and nonpoint source controls; and
- Fail to take into account the possibility that future unforeseen improvements or technological advances may alter our view of what is “irreversible.”

This is an important and complex concept. Any additions to the definition would require input from Agency staff in other programs as well as Agency management. At this time the staff is not suggesting a modification of this definition, preferring to rely on the SONAR and future guidance to explain the concept.

MESERB asked that the Agency use a word other than “practicable” in the sentence at the bottom of page 84 in SONAR Book II (Tr. 8/30 at 42) (Note: the Agency uses the word “practical” in the discussion in SONAR-II beginning at 81 and “practicable” in SONAR-I at 141) We believe there is no significant difference in the Agency’s and MESERB’s position on this point. The SONAR is clear that the type of point and nonpoint source measures we are asking for are reasonable and cost-effective measures. (Furthermore, the SONAR as signed by the Commissioner is a final document and the Agency is very reluctant to change it.) “Practical” or “practicable” in this context means the same thing; i.e., that all normal, routine, well established, reasonable and cost-effective steps have been taken to reduce both point and nonpoint sources of TP. Neither term is intended to require very expensive, experimental or novel wastewater treatment or best management practices, although it does not prevent or exclude such measures.

MCEA objected to the definition of natural causes and says that the discussion in the SONAR on “essentially irreversible” changes is another method for the Agency to avoid using the proper procedure – a use attainability analysis (UAA) or full promulgation of water quality standards (P-Ex.-11, Part III at 8). This is not true. A UAA is required (along with rulemaking) when beneficial uses are proposed for removal or downgrade (limited resource value waters are an example of this process). The recognition of “essentially irreversible” human-induced changes does **not** change the Class 2 uses. No change in the protected uses is intended. Also, MCES claims that the definition and our interpretation allow us to avoid full promulgation of standards, or that we should create a new classification for lakes like Powderhorn in Minneapolis. The promulgation of new standards for lakes impacted by essentially irreversible changes is not a timely or practical solution. The formation of a new class for lakes such as Powderhorn (and Como Lake in St. Paul) is a reasonable idea. They could be a subcategory of Class 2, still protected for support of an aquatic community and some types of recreation, but this would take a great deal of research, data analysis, public input, rulemaking and several years to complete.

It seems naive and shortsighted to ignore the fact that over the last 200 years of development and population growth, Minnesota has become a modern industrialized and agricultural society, and that this has resulted in “essentially irreversible” changes to the landscape that will not change in the foreseeable future. These changes can impact water quality. The Agency recognizes the challenge (and potential pitfalls) of making the distinction between essentially irreversible changes on the one hand and human-induced impacts that require a remedy on the other. This will be evaluated on a case-by-case basis sometimes as part of a TMDL study. To say that “natural causes” is not open to interpretation, as MCEA does (P-Ex.-11, Part III at 7), defies reason. With or without the concept of essentially irreversible changes, what constitutes “natural” will always be open to interpretation and potential disagreement.

In conclusion, the definition of natural causes is clearly needed because it is important to recognize that not all lakes can achieve the proposed standards due to natural factors. MCEA agrees (P-Ex.-11 part III at 7). It is reasonable to recognize, once all reasonable point and nonpoint source controls have been implemented, that natural causes can be influenced by certain human actions that are essentially irreversible. A site-specific analysis as described in the SONAR-II at 81, which may be part of a TMDL, is the appropriate approach to determining what constitutes “essentially irreversible” changes.

IV. Comments on Proposed Phosphorus Effluent Limit for New and Expanding Discharges

A. General Comments from MESERB and CGMC

Steve Nyhus and John Hall, representing MESERB, and Joseph Sullivan of Flaherty and Hood P.A., representing the Coalition of Greater Minnesota Cities (CGMC), offered comments on the proposed extension of the phosphorus (TP) effluent limit to new and expanding discharges that discharge more than 1,800 pounds of TP per year. MESERB (P-Ex. 1) and CGMC (P-Ex.-9 and 10) oppose this change; their comments are similar and they will be responded to together.

MESERB and CGMC comments focus on the implementation of TP limits without the demonstration of “affects” or in the absence of a demonstration of impairment. The basis for the Agency’s proposal is far broader than simply “phosphorus can contribute to algal growth in streams during summer low flow periods” as MESERB asserts (P-Ex.-1 at 7; see SONAR-II beginning at 98). MESERB and CGMC offer specific suggestions for changes to the rule that will remedy their concerns (e.g., P-Ex.-1 at 8), which are:

1. Impose TP limits only when the receiving stream has been identified as impaired. (It is not stated but we assume that the impairment must be related to excess nutrients in some way);
2. The completed [nutrient-related] TMDL will determine the required point source TP limits;
3. If the TMDL is not completed, impose a summer-only TP limit if the discharge materially impacts algal growth in the stream; and

4. If material impact has not been demonstrated, freeze the TP loading for the summer months until the TMDL is complete.

On their face these may seem like reasonable suggestions, except for one major and overriding concern on the part of the Agency. That is, under these suggestions a TP limit is implemented only after a waterbody has become impaired, a TMDL is complete or pending, or where impacts in the receiving stream can be documented.

Excess nutrients, TP in particular, are having impacts on rivers and streams throughout the state (e.g., see Ex.PL-7 and Ex.PL-8). In the face of this mounting evidence, the Agency cannot fulfill its responsibility to protect surface waters from eutrophication by waiting until an impaired condition is manifested. Also, presently, rivers and streams are not being assessed for nutrient impairment because the Agency does not have nutrient standards (or criteria based on a narrative standard) for rivers and streams. The Agency is probably at least three years away from being ready to promulgate river and stream standards. Without a standard (or criterion) there are no assessments, no impaired waterbodies and no TMDLs for that pollutant. The nutrient TMDL for the lower Minnesota River is based on low dissolved oxygen, caused by excess nutrients. The Lake Pepin (Mississippi River) TMDL is based on exceedances of nutrient criteria, applicable because Lake Pepin is a natural lake. Otherwise, there are no pending nutrient-related TMDLs for rivers or streams. Also, once a waterbody is impaired due to excess nutrients, restoration is likely to be very expensive, and full recovery may not prove to be practical or even possible at any price. The Lake Pepin TMDL is providing the Agency with a large-scale “test case” for these issues, which includes substantial stakeholder input.

For waterbodies with a pending TMDL, a requirement that impacts must be demonstrated before a limit is applied may seem reasonable at first, but it is not. If a TMDL is pending, it means the waterbody is already impaired. A demonstration of further impacts from excess nutrients would require extensive biological and water quality monitoring over several years (data that may be collected as part of the TMDL). But by the time impacts can be demonstrated, the waterbody would be further degraded and it may be too late to reverse the negative trend.

Mr. Sullivan submitted the MESERB, CGMC and League of Minnesota Cities “Phosphorus Rule White Paper” into the record at the Rochester hearing (White Paper, P-Ex.-10). The White Paper details the opposition of these groups to the Agency’s proposed extension of the TP limit to new and expanding discharges above the *de minimis* load. As stated, the basis for the proposed extension of the TP limit is very broad-based. The SONAR-II at 98 to 168 plus relevant exhibits provide the overall response to the White Paper.¹⁴ The Agency will respond to certain arguments but not attempt to respond to all issues covered in the White Paper in this Response.

Phosphorus Strategy. Since 2000 under the Phosphorus Strategy (Strategy, Ex.TP-1a-1c), about 35 new or expanding facilities above the *de minimis* load (plus about nine smaller facilities), were assigned TP limits that are attributed to the Strategy. Many of these discharges are to rivers or streams with no downstream lake or reservoir that was “affected.” The Strategy includes a “decision tree” to guide people through the steps leading to a decision as to whether or not a

¹⁴ The Agency’s rationale is summarized in slide number 7 in the Agency’s opening presentation (PH-Ex.-14).

facility should receive a TP limit (cover page of Ex.PL-1c). The “decision tree” includes pathways (on the left side of Ex.PL-1c) which lead to a 1 mg/L limit for facilities that expand and are above the *de minimis* load that do not discharge to or “affect” a lake or reservoir. The policy articulated in the decision tree has been implemented since 2000, thus the 35 facilities with TP limits mentioned above. As often stated, the Agency’s proposal is the codification of this policy.

Bio-P Technology. Most of the facilities that have expanded or built new since 2000 have adopted some form of biological phosphorus removal technology (Bio-P). Bio-P is often the treatment technology of choice because of the advantages it offers in addition to removing TP (SONAR-II at 184). The Bio-P technology has proven capable of meeting a TP limit of 1 mg/L (especially on an annual average basis), but many communities in greater Minnesota add some chemical to assure compliance (Ex.PL-5, SONAR-II at 192). Several large Metropolitan Council Environmental Services wastewater treatment plants (e.g., Seneca, Blue Lake and the Metro Plant [about 220 million gallons per day]) meet 1 mg/L TP effluent limits with Bio-P alone.

Legal Authority. MESERB/CGMC claims that the Agency does not have the legal authority to adopt the proposed extension of the TP limit for new and expanding facilities (P-Ex.-10 at 8 and Tr. 8/30 at 65). The Session Law¹⁵ required the Agency to adopt rules that provides that the Agency must consider temperature and detention time effects on algal populations when addressing nutrient impairments in Minnesota waters. The Agency adopted these rules required by the Session Law in a separate rulemaking that has been completed in accordance with the Administrative Procedures Act.

Neither the Session Law nor the rules passed in compliance with the Session Law preclude the Agency from establishing generally applicable discharge limits outside the context of impaired waters. The Agency still has broad authority and responsibility to adopt rules that limit the amount of pollution discharged to Minnesota waters in order to help prevent waters from becoming impaired (Minn. Stat. § 115.03). There is ample evidence in Minnesota and around the country, particularly as states assemble data in preparation for the adoption of nutrient standards for rivers and streams, to support general rules limiting the amount of phosphorus discharged to Minnesota’s surface waters.

Expected Improvements. MESERB/CGMC quote from the SONAR that improvements in river water quality will go unnoticed by the average Minnesotan (P-Ex.-10 at 27). This is probably true for many rivers for several reasons. First, it probably takes a fairly dramatic change in water quality, either for the worse or for the better, before the causal observer will notice a change. Some improvements are subtle or invisible, such as improved dissolved oxygen levels. Small improvements in chlorophyll-a, for example, are likely to go unnoticed unless the observer has a special interest in the waterbody. Second, under our proposal, net TP loading in the future may decline in some situations but actually increase in others. That is, loading to receiving streams from expanding facilities should go down, at least temporarily, because the reduction in effluent TP concentrations through treatment (typically from 3-8 mg/L to less than 1 mg/L) should more

¹⁵ Minn. Laws 2003, ch. 128, art. 1, § 156.

than offset the increase in wastewater flow due to the expansion. However, for a new wastewater treatment facility that receives a 1 mg/L limit, the net TP loading to the river increases, but the increase will be well below the amount it would be if they did not get a limit. The overall net effect may not be discernable improvements in water quality, but we will be reducing the **rate of increase** in future TP loadings.

B. CGMC Comments on Proposed Exemptions

CGMC objected to the proposed exemptions (off ramps) in Minn. R. 7053.0255, subp. 4 as not providing meaningful relief (P-Ex.-9 at 5 and P-Ex.-10 at 27).

TMDL Off Ramp. As explained in the SONAR-II at 115, the Agency originally proposed rule language that did not require a petition from the discharger, but as the Agency gained more experience with nutrient-related TMDLs and TMDLs in general, it became apparent that crafting rule language that would accommodate all the possible TMDL scenarios (not to mention unforeseen situations down the road) became unworkable. The Agency is reluctant to place more burden on dischargers but in this situation it seemed to be the most reasonable solution. Of course, to date, no petitions have been received and none processed, so there is no history upon which to base predictions as to how the process will work, how many will be accepted or rejected. But it is the Agency's intent to make this process as straightforward and simple as possible and to make sure dischargers are aware of the petition option as part of the TMDL. TMDLs offer a convenient vehicle to inform dischargers of the opportunity to petition the Agency for relief under this off ramp through direct correspondence, stakeholder groups, Web pages, etc.

MESERB/CGMC does not trust the Agency to respect its own TMDL recommendations citing the Minnesota River TMDL as an example (P-Ex-9 at 5 and P-Ex.-10 at 27). The impairment of the lower Minnesota River was due to exceedances of the dissolved oxygen (DO) standard, a condition **caused** by excess nutrients and excess algae (which died and decayed causing the drop in DO, see Tr. 8/30 at 79). The river was not listed based on its very eutrophic condition because, as stated, Minnesota does not yet have nutrient standards (or criteria) for rivers to compare to river TP or chlorophyll-a concentrations or to transparency data. Seasonal effluent TP limits, rather than year-round limits, were imposed to correct a DO problem in the river, not an eutrophication problem. Low DO is usually not a problem in major rivers during the winter months because at cold temperatures, water can hold more DO before it becomes saturated, decay rates (which use up the DO) are much slower, and, in addition, sensitive early life stages of resident fish are not present in the winter (they are not spawning). As facilities in the Minnesota River basin build new or expand and exceed the *de minimis*, under our proposal, they will be given a 1 mg/L effluent limit to help minimize the eutrophication of the Minnesota River (subject to petitions under one or more off ramps). Some of the highest chlorophyll-a readings ever reported for a river in the U.S. have been measured in the lower Minnesota River.

Environmental Harm Off Ramp. Again, there is no record of evaluating petitions under this off ramp that refutes or supports CGMC's claims that the Agency will reject all petitions for relief. The Agency's rejection of a blanket staying of TP limits during the winter and under high flow conditions is not a good indication of how the Agency will implement this off ramp (P-Ex.-9 at

6). Phosphorus released during the winter does not just go away but can have negative impacts during the winter or a delayed impact during future growing seasons. High flow does not negate all possible impacts from phosphorus. Phosphorus does not degrade and ends up somewhere downstream. The off ramps will be applied on a case-by-case basis. Evaluation will weigh all relevant factors such as the nature of the receiving stream, how much dilution is available during all seasons, the technology used, sludge disposal and costs of removing TP and other relevant environmental issues.

Watershed-Specific Off Ramp. The Agency is proposing to change the language in this off ramp to make the Agency's intentions more clear (see Section II.B.3).

C. General Comments from MCEA

MCEA says it supports the proposal to impose a TP limit on new and expanding discharges above the *de minimis* size, but also says that they oppose the majority of the proposed changes to the TP effluent limits (P-Ex. 11, Part II). MCEA also says that a "better approach is to simply assign a 1 mg/L limit to all dischargers of phosphorus above the *de minimis* level" (P-Ex. 11, Part II at 6 and 7). The reasons they oppose the changes are:

- Proposed definitions for "reservoir" and "affects" will weaken the existing TP limit requirements;
- Changes are not supported by the Agency's findings regarding impacts of TP in rivers and streams; and
- The inclusion of the off ramps for allowing dischargers to escape limits is not needed or reasonable.

MCEA says that adopting the new TP limits will mean the Agency will no longer issue limits under the existing ("to and affects") TP rule; that only moderate to large size facilities will get limits. To some extent this is true for the following reasons even though the Agency will continue to implement the existing TP rule as it has in the past.

- If a facility is new or expands and exceeds the *de minimis* load, they will get a limit without the need to do an "affects" analysis; and
- The Agency has been implementing the existing phosphorus rule for over 30 years and most facilities that qualified for a limit under this rule already have a TP limit. Relatively few are coming along that qualify for a limit under this rule.

The *de minimis* load (>1,800 pounds/yr.) does not apply to a wastewater treatment facility that discharge to or "affect" a lake. A facility of any size is eligible. Also, the Agency predicts that the adoption of eutrophication standards will result in some facilities, that most likely already have a 1 mg/L limit, will receive TP limits lower than 1 mg/L (SONAR-II at 91 and 175).

The response to MCEA's comments on the definition of reservoir in P-Ex.-11, Part II at 1 is included in Section III.F.

D. Comments from MCEA on the Definition of “Affects” and “Material Increase”

MCEA says that the proposed definitions for “affects” and “material increase” and “material impacts” further restrict application of the TP effluent limits on dischargers. MCEA’s consultant Andrea Plevan of Emmons and Oliver Resources, Inc., provided a critique of the two definitions (P-Ex.-11).

The Agency’s intent is to define these terms consistently with how they have been used and interpreted for about 30 years in the implementation of the current phosphorus effluent rule, which says discharges get a 1 mg/L TP effluent limit, “[w]hen the discharge is directly to or affects a lake or reservoir.” “Affects” refers to the impact of the TP loading from the particular discharger under consideration. The “affect” of the TP loading must be “measurable” in order for the Agency to demonstrate that there are in fact effects from the loading. Again, this is the way the existing TP effluent limit rule has been implemented for many years (SONAR-I at 138 and SONAR-II at 101). The use of the term “measurable” in the definition of “affects” helps establish the need to define “measurable impact.”

MCEA and Ms. Plevan’s concern about the impact these definitions will have on determining the impact of TP loading on lakes and on the setting of TP effluent limits in the future are without merit (P-Ex.-11, Part II at 6). Contrary to their statements, the Agency will not (be):

- Limited to measurements of Chl-a and SD to determine “affects” (the definition says “including **but not limited to**...”). The definition is of “affects,” not “causes,” which is why we include the examples of the response variables, Chl-a and SD. The Agency will measure TP and any other relevant indicators of trophic status, such as the frequency and magnitude of algae blooms and the composition of the algal community (e.g., relative dominance of blue-green algae) to assess “affects.”
- Required to show a change from one trophic state to another; i.e., from oligotrophic to mesotrophic or mesotrophic to eutrophic. These are broad categories for classification of lakes. A measurable shift of trophic conditions **within** a trophic category, by far the most common scenario, is a measurable change.
- Fail to protect the most highly polluted lakes or fail to require needed effluent limits because the definitions limit our ability to measure impacts (P-Ex.-11, Part II at 7), or overlook highly eutrophic lakes as some indicators of increased concentrations of TP plateau as lakes become highly eutrophic (Figures 1 and 2 in Ms. Plevan’s written testimony, P-Ex.-11). The Agency agrees that the continued increase of TP in such eutrophic lakes continues to have negative impacts, which may not be reflected in increases in Chl-a or decreases in SD. Again, the Agency has a broad range of tools to measure these impacts and it will use them (for example see Attachment 3).
- Be hindered in its ability to restore lakes that are already degraded by excess nutrients.

No one disputes that nutrients come from a wide range of point and nonpoint sources. However “affects,” in the context of the existing TP limit has, for nearly 30 years, been interpreted to mean the effects from an individual point source discharger – the discharger whose permit is under consideration for a potential TP limit. The proposed definition reflects that context, intent and history. The inclusion of TP limits in the permits for about 148 dischargers since the

Agency started implementing the existing TP rule illustrates why the Agency finds Ms. Plevan's statements in her written testimony at 4 ("By including this requirement, [effects from an individual discharger] the MPCA makes it even more unlikely that a discharge will be shown to "affect" a lake," [P-Ex.-11]), to be inaccurate. The proposed definition of "affects" is the same as the working definition in use for decades. These TP limits were imposed through the analysis of effects from individual point sources. Nothing has changed except the addition of the definition to the rule. Other regulatory and voluntary programs are in place to address other point sources such as stormwater runoff, onsite septic systems and a range of nonpoint sources.

There is no contradiction between the two definitions as Ms. Plevan claims in her written testimony (P-Ex.-11 at 5). Again, "affects" need to be measurable for the discharger to receive a TP limit under the existing TP rule. By citing Chl-a and SD as examples of "affects" the Agency is not placing any restrictions on the use of other measurements of trophic status, nor is it establishing a priority for which indicator to use first (TP vs. Chl-a vs. SD, etc.).

Ms. Plevan's discussion of the variability in lake trophic measurements and the limitations of the Bathtub model (Figures 3 and 4 in her written testimony, P-Ex.-11) have little relevance to the proposed definitions. For 30 years Agency staff have assessed data for lakes located throughout the state, used statistical tools including models and evaluated all available and relevant information to decide whether or not to impose a TP limit on the discharger under the current TP rule. No one claims that the process is perfect. A decision to not include a TP limit in some permits has been challenged by MCEA; but, over all, history shows that the process has worked to the benefit of lake water quality.

V. Comments on Variances and Proposal to Expand Site-specific Modification of Standards to All Use Classes

MCEA objects to The Agency's proposal to extend the review period of variances to effluent limits from three to five years (P-Ex.-11, Part III). The Agency originally proposed to extend the review period for both types of variances, variances to water quality standards and variances to effluent limits. Referring to variances to **water quality standards**, EPA cautioned the Agency to consider the federal requirements for periodic review (every three years) for waterbodies that do not meet the "fishable/swimmable goals of the Clean Water Act (Section 101 (a)(2)) (Ex. A-66). Their caution did not include variances from effluent limits. As a result, the Agency changed its proposal to lengthen the review period only for variances to effluent limits. Variances to effluent limits are not subject to the same EPA requirements for review that the variances to water quality standards are (SONAR-I at 95 and 142). The Agency is not questioning the importance of periodically reviewing variances, regardless of the type, to determine whether the conditions upon which the variance was based have changed, such that the variance may no longer be needed (some variances have been eliminated in this way). The Agency is simply proposing to have this review coincide with the review of the permit to which the variance is associated. The permit review period is five years. This is a reasonable and practical approach to reviewing variances for effluent limits.

MCEA discusses in some detail the federal requirements and guidance for variances in P-Ex. 11 at 3. This is the process the Agency uses to assess variance requests, evaluate the merits of the request and periodically review the variance. EPA has approved all of the Agency's variances currently in place.

MCEA opposes extending the authority to modify an existing standard on a site-specific basis to all use classes. They claim that it is contrary to federal regulations and that it circumvents the appropriate solution, a use attainability analysis (UAA) (P-Ex. 11, Part III). The Agency disagrees.

Existing Minn. R. ch. 7050.0222, subp. 8, limits the Agency to modification of Class 2 standards. The Agency is proposing to extend this authority to all use classes. Class 3 (industrial use) and Class 4 (agricultural uses) standards were adopted in the late-1960s and have never been updated. In an ideal world, the Agency would have the resources needed to revise and update all of these standards (it may do so in the future). Meanwhile the lack of a review and update enhances the need to allow site-specific modifications of these standards (SONAR-I at 107 and 153). Specifically, in regard to statements made in P-Ex.-1, Part III:

1. The Agency is not changing the site-specific modification provision *per se*; that is, how it is used or implemented. We are not "removing any existing limitations" except the limitation that it applies only to Class 2 standards.
2. Site-specific modification of a standard does **not** change the existing beneficial use or "downgrade" the waterbody. The assigned beneficial uses are never in question in the site-specific modification process. Thus, contrary to MCEA's statements (P-Ex.-11, Part III), the site-specific process and the proposal to extend it does not circumvent the UAA process because the UAA process is irrelevant in this context. Again, the local modified standard protects the same beneficial uses the original statewide standard does.
3. Modification of existing standards conforms to the Clean Water Act; it is a recognized process by EPA. They offer guidance to states on how to acceptably modify aquatic life (Class 2) criteria and standards.¹⁶ EPA has approved the site-specific standards developed by the Agency demonstrating their consistency with the Clean Water Act. The Agency must get EPA approval for modified standards, but they do not have to be promulgated into rule (Attachment 5 at 3-40). The Agency has adopted some site-specific standards, but not others, into Minn. R. ch. 7050 (SONAR-I at 155).
4. Surface geology, land use, native vegetation and water quality conditions vary dramatically from one end of Minnesota to the other. The magnitude of the impact some pollutants have on aquatic life, recreation or other protected uses can be strongly influenced by these differences. The ability to make changes to a statewide standard to accommodate these local differences is cost-effective and reasonable.
5. Interested public parties, including MCEA and other environmental organizations, not just the regulated party, are apprised of any permit including those that have an effluent limit based on a site-specific standard through the normal permit public notice process. Permits on public notice are listed on the Agency's "notice" Web page (<http://www.pca.state.mn.us/news/data/index.cfm?PN=1>).

¹⁶ EPA has outlined three methods for modifying aquatic life (Class 2) standards in guidance (Attachment 5). EPA has not developed analogous methods for other beneficial uses.

6. The proposed eutrophication standards would be eligible for modification under the current rule because they are Class 2 standards; thus, the proposal has no effect on whether or not a site-specific standard is developed for Lake Byllesby, for example. The Agency believes that the site-specific standard for Lake Byllesby, rather than being an example of abuse of the site-specific process (P-Ex.-11, Part III at 6) is an example of its appropriate use.

A modified copper standard for the South Branch of the Crow River at Hutchinson and a modified ammonia standard for the Red River at Moorhead are two examples where the Agency modified an existing Class 2 standard. Both modified standards were based on documented local conditions that justified the change.¹⁷ Both received approval from EPA; in fact, it was EPA staff that carried out the local on-site toxicity testing that led to the site-specific copper standard. This was a demonstration project to field-test EPA procedures for modifying aquatic life standards. Both standards were the basis for effluent limits in discharge permits.

VI. Comments on Proposed Changes to Nondegradation to All Waters

MCEA objects to the Agency's proposed changes to the nondegradation language in Minn. R. 7050.0185, subp. 1 (P-Ex. 11, Part IV at 1). In this rulemaking the Agency is proposing to: 1) split Minn. R. ch. 7050 into two rules, 2) move provisions from place to place without changing their wording or meaning, 3) clarify and consolidate some provisions without making any substantive change to the language, 4) improve or update wording without making a substantive change to the intent or implementation, and in some cases, and 5) change the wording with the intent of making a substantive change. The Agency's proposed changes to the nondegradation rule fall in the fourth category. The Agency wanted to remove the reference to assimilative capacity and bring the policy statements more into line with the relevant CFR without changing how protective the overall nondegradation provision is or how it is implemented (SONAR-I at 93 and 141). The proposed new language says that a lowering of water quality is acceptable after "*full satisfaction of this part*," which includes provisions for public input (Minn. R. 7050.0185, subp. 8) and a consideration of important economic and social development (Minn. R. 7050.0185, subp. 4).

Clearly MCEA's intent is for the Agency to completely revise its nondegradation provisions in both Minn. R. 7050.0185 and 7050.0180, which is well beyond the scope of the current rulemaking. In response to a MCEA petition asking for a full review (Tr. 9/12 at 114), the Agency has indicated its intent to do just that. This review is underway now and the Agency has published two requests for comments in the *State Register* (January 29, 2007 and May 29, 2007).¹⁸

¹⁷ The toxicity mitigative properties of the receiving stream in the case of copper, and the application of a new EPA criterion (1999) that modified a statewide standard adopted in 1980 in the case of ammonia.

¹⁸ Agency Web page on plans to amend nondegradation rules,
<http://www.pca.state.mn.us/water/nondegradation-rule.html>

VII. Comments on Proposed Acetochlor Standard

A. Introduction and General Comments

The Agency is proposing to replace the original proposed chronic standard for acetochlor of 1.7 µg/L with a less stringent standard of 3.6 µg/L. The proposed acute standards (MS and FAV) do not change.

Agency staff met with representatives from Monsanto and Dow AgroScience, the registrants for herbicides containing acetochlor, on August 28, 2007.¹⁹ Monsanto and Dow AgroSciences make up the Acetochlor Registration Partnership for registration of acetochlor in the U.S.. At the August 28 meeting, Dr. Honegger outlined Monsanto's critique of the Agency's proposed plant-based chronic standard for acetochlor. She said that data was available for five species of algae and one macrophyte species that the Agency did not include when it developed its proposed standard. At the meeting and over the next week, Monsanto made the additional data available to the Agency (Attachments 6 to 12). At the hearing in Marshall on September 11, 2007 Monsanto's consultant, Dr. Jeffrey Giddings of Compliance Services International (CSI), presented a critique of the Agency's approach used to develop the plant-based standard. His report describes his analysis of the available plant data that resulted in a recommended alternative chronic standard of 4.3 µg/L (P-Ex.-6; full response is below).

Others commented more generally on the proposed herbicide standards at the hearing in Marshall on September 11, 2007.

Dr. Gustafson of Monsanto stated the importance of acetochlor as a preferred herbicide for corn growers in Minnesota and indicated that the standard was unnecessary because positive actions are being taken by the Minnesota Department of Agriculture (MDA) to implement voluntary best management practices to reduce runoff from farm fields (P-Ex.-3). Dr. Gustafson said that the proposed standard seems contradictory to the positive assessments coming out of EPA, and that adoption could bring immediate harm to Minnesota's corn growers, "all over the theoretical possibility that acetochlor might slow the growth of algae."

The Agency, at the request of and with the full cooperation of MDA, is proposing a standard for acetochlor. We believe that having a standard in place for a pesticide that is applied (as approved by the federal and state registration processes) at the rate of two to three million pounds per year over large portions of the state is consistent with the Agency's responsibility to protect surface and ground waters from pollution by toxic chemicals. The Agency's proposed standard (and that of Monsanto's consultant as well) is aimed at protecting the integrity of the aquatic plant community as a whole, not just to prevent slower growth of algae (P-Ex.-3). The new information from EPA regarding acetochlor's human health impacts (Re., protection of drinking water and fish consumption) and its status as a possible carcinogen is included in our assessment. Human health effects occur at concentrations well above acetochlor's ecological effects (SONAR-III, Table III-6 at 42).

¹⁹ Dr. Joy Honegger, Monsanto; and Dr. Marvin Schultz, and Mr. Ted McKinney, Dow AgroSciences LLC.

The Agency believes that the adoption of the acetochlor standard, including the possibility of new impaired water listings and future herbicide TMDLs, is completely compatible with MDA's voluntary best management practices program already underway. A promulgated standard will give the Agency and MDA a scientifically sound yardstick with which to assess surface waters and identify watersheds where implementation of BMPs could head off further impairments and the more costly TMDL process. It is true, as Dr. Gustafson says (P-Ex.-3), an adopted standard and potential impairment listings may prompt a review of acetochlor's label recommendations and restrictions; in fact such discussions between the registrants and MDA have already taken place.

Curt Watson, President of Minnesota's Corn Growers Association expressed concern about the fast pace at which the Agency is pursuing an acetochlor standard and impairment listings. He said corn growers are willing to implement BMPs to address acetochlor detects (Tr. 9/11 at 53). Steve Commerford of the Soybean Grower's Association asked about submitting written comments (Tr. 9/11 at 70).

Paul Torkelson, Vice President of the Minnesota Farm Bureau and a representative on the Governor's Clean Water Council, reminded the Agency that it is pursuing a very serious and important undertaking and the consequences are real for farmers and others working and living in watersheds considered potentially impaired due to exceedances of the acetochlor standard (P-Ex.-7 and Tr. 9/11 at 65). Mr. Torkelson urged the Agency to carefully consider the information provided by Monsanto and their consultant (see below) so that any proposed standard is based on the best information available. He also emphasized the importance of using sound science to identify the true sources of herbicides to surface waters, including the evaluation of remedies, as part of the TMDL process. We believe Mr. Torkelson is quite correct about the significance of promulgating an acetochlor standard and the Agency takes this responsibility very seriously. We are also aware of the potential precedent-setting implications of these actions. Other states may be interested in what Minnesota does and EPA has already indicated an interest.

Ken Myers, a concerned citizen, told Ms. Preimesberger at the Marshall hearing that he supported adoption of the proposed water quality standards (herbicides, mercury and industrial chemicals), and he provided sources of information to the staff on risk assessment and chemical sensitivity among people (Tr. 9/11 at 69).

Richard Halterman, a biology teacher, supported adoption of herbicide standards and is also concerned about the contamination of drinking water and fish with chemicals. He expressed concern about the synergistic effects of combinations of chemicals with similar modes of toxic action plus the impacts of their metabolites (see response to MCEA below). He also expressed concern about the impacts of chemicals on human embryos and fetuses, concluding that ultimately our children are more important than economics (Tr. 9/11 at 56).

Mr. Patrick Moore, Executive Director of Clean Up the River Environment expressed his interest in enhancing fishing and recreation in the upper Minnesota River basin and supports the Agency's efforts to strengthen water quality standards in general (Tr. 9/11 at 71).

MCEA indicated that they support the proposed standards for both acetochlor and metolachlor, but also urged the Agency to adopt standards for the additional pesticides of interest to MDA, and to consider the cumulative or additive effects of herbicide mixtures in surface waters (Tr. 9/12 at 119; P-Ex.-11, Part V; note: the units at 1 should be µg/L, not µg/mL). The Agency is considering developing standards or criteria (values comparable to standards which are not promulgated) for additional pesticides. Also, in light of the Agency's work with acetochlor and metolachlor and based on our conversations with EPA staff, EPA has indicated a renewed interest in developing 304(a) criteria for more pesticides.

The Agency is aware of potential cumulative impacts from multiple herbicides plus degradates and considers these issues, particularly when proposed impairment listings are reviewed by professional judgment teams. For example, in its assessment of waterbodies for potential exceedances of the atrazine standard, the Agency combines the concentrations of degradates with that of the parent chemical in the assessment for exceedances of the human health-based standards.

B. Re-analysis of Plant Toxicity Data

As noted, Monsanto identified data for six species of plants that the Agency had not used in its original analysis. All six studies are published in the scientific literature. Monsanto also provided a published paper describing a statistical approach to evaluating plant toxicity data (Attachment 12). The Agency's search of the published literature and other sources of toxicity data is described in SONAR-III at 39. The Agency's search found two (plus a supporting paper describing methods) of the six studies identified by Monsanto (Junghans et al., 2003, Attachment 6 and Ma et al., 2003, Attachment 7), however, Agency staff inadvertently overlooked these studies in its review. We are perplexed as to why our initial search failed to find the other four papers (Attachments 8 to 11), except that our search ended in the fall of 2005 and some of the papers may not have been included in the ECOTOX database by that time. After receiving these studies we conducted another literature search (during this post-hearing comment period) and found no additional studies or unpublished data. The Agency appreciates that the Acetochlor Registration Partnership pointed these studies out to us in time to re-evaluate the data for the record.

The Agency reviewed the six additional studies provided by Monsanto and believes all six are acceptable. The Agency has misgivings about the study by Junghans et al, on *Scenedesmus vacuolatus* (Attachment 6) because the concentrations of acetochlor to which the algae were exposed in the test were not reported. Also, information on temperature and light intensity at which the test was run, and information on controls, was missing. Junghans et al. cited the methods used by Faust et al. to culture the algae populations in the laboratory but did not cite test methods. The Agency's acceptance of this paper is based on the assumption that the test was run under the same temperature and light conditions at which the algae were cultured.

The Agency has carefully reviewed Dr. Giddings' report (P-Ex.-6). In general, we find Dr. Giddings' analysis to be very credible. Based on the new data and Dr. Giddings' analysis, the Agency is proposing a more lenient standard for acetochlor of 3.6 µg/L (see next Section).

The major aspects of Dr. Giddings' analysis:

1. Included the data the Agency had not seen;
2. Attempted, where possible, to standardize the effect end points (i.e., cell density, growth, biomass loss, frond number, etc.);
3. Attempted, where possible, to standardize test durations (4-days for algae, 7-days for macrophytes);
4. Used EC20s rather than Maximum Acceptable Toxicant Concentrations (MATC); and
5. Estimated EC20s from data reported in the study or from raw data available to Monsanto, in some cases from no effect or "greater than" values.

In response to Dr. Giddings' analysis and the points listed above, we offer the following observations.

EPA has provided some guidance for conducting tests with green algae but not for rooted plants. The American Society for Testing and Materials (ASTM) has protocols for tests with duckweed (very small rooted plants). However, the lack of standardized test methodologies used by the research community makes comparing the results of plant toxicity tests difficult. Since some of the data was reported for durations other than the periods selected by Dr. Giddings (4-day and 7-day) the results he reports for the preferred durations are mathematically interpolated. This often requires data not included in the published version. The Agency had to use the plant data that was available. Dr. Giddings efforts to standardize endpoints and test durations are laudable. But, in our view, the overall variability and large range in plant test results from the most sensitive to least sensitive species (0.434 to 26,302 µg/L for the EC20 results) tends to overshadow the standardization effort.

Dr. Giddings standardized the chronic data for acetochlor by selecting, or retroactively calculating, an EC20 from the data (Attachment 12). For the most part the Agency used MATCs (see SONAR-III at 47). In general, the Agency agrees that the EC20 is an improved means of estimating the threshold of chronic effects. Again, retroactively calculating an EC20 required raw data or information sometimes not reported in the study and unavailable to the Agency. Also, it appears that some EC20s were estimated that did not meet all the desired requirements outlined in Attachment 12 (i.e., lack of dose response values that bracket the estimated EC20, Figures 11 and 12 in P-Ex.-6 at 24). The MATC is an approach that has been used by EPA and others for many years. For example, EPA calculated and reported MATCs for atrazine plant toxicity data in their 2003 draft criterion (Ex.H-59, Text Table A (chronic value) at 16), although these MATCs did not enter into the calculation of the atrazine criterion. EPA's first significant use of EC20s was in the determination of a chronic criterion for ammonia in the 1999 criteria update.²⁰ The large amount of good quality chronic data for ammonia facilitated the calculation of EC20s for this toxicant.

²⁰ The chronic criterion for ammonia is the 5th percentile of the animal-based EC20s. Page 74 in EPA, 1999. 1999 update of ambient water quality criterion for ammonia. EPA Office of Water, EPA-822-R-99-014. (<http://www.epa.gov/waterscience/criteria/ammonia/99update.pdf>).

Among the details in the Agency's approach that Dr. Giddings criticizes is our estimate of an EC50 for *Elodea canadensis* from a no effect concentration, concluding that it, "has little reliability and should not be used to derive water quality standards." (P-Ex.-6 at 16; this estimated EC50 did not figure significantly into the determination of the proposed chronic standard, we relied more heavily on the MATCs). The Agency believes that some of the same criticisms can be applied to Dr. Giddings' estimate of an EC20 for *Elodea canadensis* from two no effect concentrations (6.02 and 6.76 µg/L, P-Ex.-6 at 15; also see Ex.H-30 and Ex.H-31); and his estimate of EC20s for *Glyceria maxima* and *Myriophyllum spicatum*, also based on no effect concentrations (P-Ex.-6 at 17; the "greater than" EC20s in Figure 14 at 27).

Dr. Giddings and Monsanto accept the Agency's overall stated goal of a "community level of protection" afforded to aquatic plants (P-Ex.-6, Table 4 at 29), but the Agency disagrees with Dr. Giddings' statement that, "few, if any, aquatic plants species merit specific protection" (P-Ex.-6 at 5). Wild rice (*Zizania aquatica*) is probably the best-known example of an ecologically, economically and socially important aquatic plant species that merits individual protection. Other examples of ecologically important species worthy of protection are arrowhead (*Sagittaria latifolia*) and wild celery (*Vallisneria americana*), which are important sources of food for waterfowl and several mammal species.

Monsanto argues that the proposed standard for a herbicide should take into account the ability of algae to recover from impacts following exposure to the chemical (P-Ex.-6 at 26). In general, Agency water quality standards and EPA aquatic life criteria address the issue of recovery by associating the standard (or criterion) with an averaging period (duration) and an exceedance recurrence interval. The averaging period for toxicity-based standards is set based on impacts to organisms with short life spans such as some aquatic insects or the time-span of sensitive life stages of vertebrates such as the embryo-larval period of young fish. EPA criteria and Agency standards specify a four-day averaging period (Minn. R. 7050.0222, subp. 7, item C). The four-day averaging period will apply to the proposed acetochlor standard. EPA criteria recommend, and the Agency uses, a three-year exceedance interval; that is, concentrations of a chemical must exceed the standard twice in three years to be considered a violation (Attachment 2 at 45). Three years is based on the time it takes a typical aquatic community, as a whole, to recover from a perturbation. Of all the organisms in an aquatic community, some species of algae probably are among the first to recover. However, repeated short-term exposures to pesticides and resulting impacts may allow other potentially less desirable species to increase in number or become dominant. The Agency's stated community level of protection goal, with which Monsanto agrees, also takes recovery into account in that the standard is not designed to protect sensitive species from all impacts all the time, but it is intended to protect the overall integrity of the plant community. This is consistent with the protection goals and discussion of recovery articulated in the EPA draft atrazine criterion (Ex.H-59 at 23-25). EPA's selection of the 5th percentile effect level for the atrazine criterion is based on a loss of community **structure** (meaning the species composition of the aquatic plant community) rather than the community **function** (meaning the ecological relationships within the members of the community), and that the structure of the community may be slower to recover (Ex.H-59 at 23).

C. Proposed Revised Chronic Standard for Acetochlor

An important premise in the Agency's approach to determine a chronic standard for a herbicide using plant data was that use of the EPA statistical (final acute value [FAV]) calculations with either of the three following approaches would yield roughly comparable results, and that any of the three would accomplish the goal of providing a community level of protection to the aquatic plant community (SONAR-III at 47).

1. The 20th percentile of MATCs or EC20s,
2. The 5th percentile of EC50s, or
3. The 5th percentile of effect concentrations from micro- or mesocosm studies.²¹

Assessment of the quality and quantity of the data available for the three methods to arrive at a chronic value would dictate which one, or which combination of two or even three, would be used as the primary basis for the proposed standard (taking into consideration the sensitivity of any ecologically or economically important species). This premise has not proven to hold true, at least for acetochlor. Fifth percentile EC50s and 20th percentile EC20s are more divergent than expected.

Table 1 shows 5th and 20th percentile values for both EC50s and EC20/MATCs using the EPA (FAV) statistical method for calculating criteria, as used by both the Agency and Dr. Giddings. There is greater disparity between the 5th percentile of the EC50s and the 20th percentile EC20/MATCs than expected (0.093 vs. 1.74 µg/L for the original MPCA data, 0.29 vs. 4.34 µg/L for Dr. Giddings data, respectively).

The amount of micro- mesocosm data for acetochlor is entirely inadequate to be used alone as the bases for the proposed standard. In contrast, the abundance of micro- mesocosm data for atrazine allowed EPA to use it exclusively to derive the draft atrazine chronic criterion. It is worth noting that to arrive at the atrazine criterion, EPA used a model-estimated 5th percentile level of protection using data representing a variety of end points (from no effect to significant effects/no recovery) and a range of test durations (Ex. H-59, Figure E at 35).

²¹ Mesocosm and microcosm toxicity studies typically measure ecological responses to an aquatic community after exposure to a chemical in a semi-natural environment such as a pond (meso-) or in a laboratory (micro-).

Table 1. List of EC50, EC20 and MATCs used by the Agency (MPCA) and Dr. Giddings to Calculate Proposed Standards, and Comparison of 5th and 20th Percentile Calculations (shaded cells, lowest four values used in FAV calculations in bold).

Plant Species*	MPCA		Giddings	
	MATC µg/L	EC50 µg/L	EC20 µg/L	EC50** µg/L
<i>Se. capricornutum</i>	0.2186	0.5152	0.434	0.697
<i>Lemna gibba</i>	0.7256	5.596	1.169	5.396
<i>Elodea canadensis</i>		37.32	>6.38	>6.38
<i>Sc. vacuolatus</i>			8.47	12.2
<i>Lagarosiphon major</i>	79.05	107.22	35	141
<i>Glyceria maxima</i>		200	>113	>113
<i>Myriophyllum spicatum</i>		200	>133	>113
<i>Sc. quadricauda</i>			690	4300
<i>Navicula pelliculosa</i>	819	1380	741	1738
<i>Spirodela oligorrhiza</i>			2239	23442
<i>Chlorella pyrenoidosa</i>			2245	6765
<i>Sc. obliquus</i>			14840	33895
<i>Chlorella vulgaris</i>			15050	34756
<i>Anabaena flos-aquae</i>	2791	35000	26302	42442
FAV Calculations				
5 th percentile, N=8	0.0041	0.093		
20 th percentile, N=8	1.74	3.58		
5 th percentile, N=14			0.25	0.29
20 th percentile, N=14			4.34	24.32

*Ranked by sensitivity based on EC20s from Figure 14 in Dr. Giddings' report (P-Ex.-6 at 27).

Se. = *Selenastrum* and *Sc.* = *Scenedesmus*.

** Greater than value for *Elodea canadensis* not used in FAV calculations for EC50s but number of values retained at 14.

In light of the similarity in EC50s and EC20s, the Agency believes that, especially when dealing with relatively small data sets, it is not necessarily clear whether the 20th percentile of the EC20/MATCs, or the 5th percentile of the EC50s (or some other percentile between 5 and 20) is a clear choice for the basis of the proposed standard. This implies that any FAV calculation should be carefully reviewed in light of all the available data. The proposed standard for metolachlor uses this "iterative" approach.

The Agency's proposed revised chronic standard of 3.6 µg/L is based on the following considerations, it is:

1. Roughly twice the current proposed standard of 1.7 µg/L. In light of the additional data supplied by Monsanto and Dr. Giddings' analysis of all the data, 1.7 µg/L appears to be lower than necessary to protect the aquatic plant community.

2. A little more stringent than the 20th percentile, EC20-based standard of 4.3 µg/L proposed by Dr. Giddings and Monsanto.
3. Above the EC50 and EC20s for *Selenastrum capricornutum*, and above the EC20s but below the EC50s for *Lemna gibba*, the two sensitive commonly used test species.
4. Roughly one half the concentration of Dr. Giddings' estimated EC20 for the important resident species, *Elodea canadensis* (6.38 µg /L), and the 27-day no effect level for this species of 8 µg/L.
5. Equal to the 20th percentile of the eight EC50s available to the Agency in its original analysis (3.58 µg/L, Table 1 above and Ex.H-57). While this value was derived prior to the addition of the new data, the Agency believes it is a reasonable number to review in the context of all the data. The greater than expected similarity of EC20 and EC50 values, as shown in Table 1, plus the relatively low number of values (N = 8) used to calculate this chronic value suggest that it should be protective of the aquatic community. (Note: The addition of the new data from Monsanto did not dramatically alter the lowest four EC50s [compare MPCA and Giddings lowest four EC50s in Table 1] but it does expand the "N." Other variables being equal, the lower the N the lower the result of the FAV calculation.)
6. At a reasonable point in the "low end" of all the plant data as shown in Attachment 13, and consistent with the stated goals for protection of the aquatic plant community.
7. Consistent with the approach used to arrive at the proposed standard for metolachlor.

Another way to examine the similarity of EC50s and EC20s and the sensitivity of the FAV calculation to the selection of a percent effect level (5 to 20 percent), is to calculate "equivalent" percentiles for the Agency's proposed revised standard of 3.6 µg/L. This proposed standard equates to the 18.7th percentile of Dr. Giddings' EC20s (N=14), just 1.3 percentage points less than the 20th percentile used to arrive at 4.3 µg/L. And the 3.6 µg/L standard equates to the 12.3th percentile of Dr. Giddings EC50s (N=14). Further analysis of aquatic plant data for a range of herbicides in the future may indicate that percentile goals between 5 and 20 may be appropriate for either EC50s or EC20s.

In conclusion, the Agency believes the proposed revised chronic standard for acetochlor of 3.6 µg/L is reasonable in light of the additional data made available to the Agency, Dr. Giddings' analysis and his proposed alternative standard, and the Agency's re-analysis of all the data. It is consistent with the stated goal for protection of the overall aquatic plant community.

VIII. Comments on Proposed Benzene, Naphthalene and Mercury Standards

As noted in this response to comments in Section II.D, a calculation error was made in the Class 2A benzene chronic standard. The correct value is 5.1 µg/L; this will replace 5.4 µg/L in the final version of Minn. R. ch. 7050 (summary sheets for the revised standard is Attachment 20).

MCEA provided comments to the Agency on the proposed revisions to the human health-based standards for benzene and naphthalene (Tr. 9/12 at 121). MCEA referenced the human health toxicological assessments the Minnesota Department of Health (MDH) published in 2004, which show that more stringent concentrations may be needed to protect all populations (and specific

life stages, infant to adult) exposed to drinking water contaminated with these chemicals (Ex.HH-5 and HH-6).

The more stringent values referred to by MCEA result from draft changes to how MDH plans to calculate Health Risk Limits (HRLs, drinking water criteria for ground water) for contaminants, and the proposed use of additional "Adjustment Factors" in the calculation of HRLs to account for differences in drinking water intake rates for infants and children plus greater early life sensitivity to carcinogens. The cancer slope factor and reference doses used by MDH for these chemicals are identical to the ones used by the Agency to calculate the proposed standards but the Agency is not using the MDA draft Adjustment Factors at this time. Starting in 2004 and continuing today, MDH is evaluating their approach to updating the HRLs including use of Adjustment Factors; they released another new draft approach in September 2007. As discussed in SONAR-I at 14, the Agency plans to incorporate MDH's final approach for protecting developmental life stages in future revisions to Minn. R. ch. 7050 after MDH has finalized their approach and adopted the new methods into the HRL rule, Minn. R. 4717.7100 to 4717.7800.

Mr. Patrick Moore, Executive Director of Clean Up the River Environment supports the adoption of a fish tissue standard for mercury and the Agency's efforts to strengthen water quality standards in general (Tr. 9/11 at 71). Richard Halterman supports the proposed mercury standard of 0.2 ppm (Tr. 9/11 at 57).

IX. Comments on Proposed *E. coli* Standards

MCEA commented on the proposed *E. coli* standard (P-Ex.-11, Part V; Tr. 9/12 at 122). They support the adoption of the 30-day geometric mean criterion of 126 cfu/100 ml for assessment of potential health risks over the long-term. MCEA supports the adoption of a 10 percent of samples "not-to-be-exceeded" part of the standard, but does not believe that the Agency's proposed number of 1,260 cfu/100 ml is adequately protective.²²

The Agency's justification for the proposed *E. coli* standard starts in SONAR-III at 96. Very briefly, the proposed 1,260 10 percent maximum value is based on two very large data sets of side-by-side analyses of fecal coliform and *E. coli* (plus a third smaller data set) that showed:

- A very strong positive relationship between the two indicators (if one is at high levels then the other is very likely to be high as well; SONAR-III, Figure III-6 at 103);
- The current fecal coliform 10 percent maximum standard of 2,000 is equivalent to 1,500 to 1,960 *E. coli* (We are proposing 1,260; SONAR-III, Table III-19 at 104).
- The current fecal coliform 10 percent maximum standard of 2,000 is exceeded three percent of the time, the proposed *E. coli* maximum is projected to be exceeded five percent of the time (SONAR-III, Table III-20 at 105); and
- *E. coli* (and fecal coliform) exhibit much greater variability in Minnesota surface waters (river data) than EPA found in their epidemiological studies used to determine the *E. coli*

²² In this Response, all *E. coli* and fecal coliform measurements are expressed as colony forming units (cfu) per 100 ml.

criterion. This fact has a major impact on the calculation of the 10 percent maximum standard, as per EPA guidance (SONAR-III at 107, Ex.EC-1 and EC-17).

MCEA urges the Agency to adopt a single-sample maximum that will be protective of beaches in the short-term. The Agency explored this option in its deliberations over the adoption of the *E. coli* criterion. Ultimately, we rejected the idea of promulgating a 10 percent maximum more appropriate for short-term “beach” situations, or promulgating two 10 percent maximum standards (short and long-term) for these reasons:²³

- While it may seem obvious at first glance, it is actually very difficult to clearly identify a “beach.” All Class 2 waters are protected for swimming (where usable); obviously some are used for swimming far more than others. The question is, where does one draw the line between a beach and no beach when you must address thousands of river miles and thousands of lakes state-wide; and does each waterbody that is not protected by the beach standard need a UAA and re-classification? We felt that such an undertaking could not only require huge resources but it might be counterproductive; that the current “universal” rule wording that protects all Class 2 waters for swimming (where usable) has worked well in the past and should continue to do so. Also, we believe that it is preferable to protect designated beaches on a case-by-case basis by the local entity that has the responsibility for monitoring the beach (see below).
- The Agency’s bacteriological monitoring programs (except for the BEACH program on L. Superior) are geared to infrequent sampling (once/month) and the long-term assessment of swimming use. This type of monitoring normally does not address the needs of assessing beach safety.
- Beach monitoring is typically the responsibility of local units of government; each has their own ideas about “what is protective,” their own approach to monitoring, and each can select their own thresholds for posting warnings based on these policy decisions. These decisions are best left to the local units of government, which makes adoption of a state-wide beach standard less necessary.

The Agency is retaining the current level of protection for swimmers of eight projected illness per 1000 swimming events, which is the more protective end of the range (8 to 10) recommended by EPA (SONAR-III at 97). MCEA recognizes (P-Ex.-11 Part V at 5) the different requirements of long-term monitoring vs. short-term beach monitoring discussed in the SONAR-III at 89. Entities that monitor beaches, because of the need to respond quickly with few measurements, have the freedom to use a more protective criterion, which is what the Agency does for the BEACH monitoring program along the North Shore of Lake Superior (SONAR-III at 114).

No one has presented any data or information that shows the proposed 10 percent maximum standard, used together with the 30-day geometric mean as intended, is not protective or will increase the risk of illness to swimmers. If anything, the data analyzed by the Agency indicate that the proposed *E. coli* standard is more stringent than the current standard.

²³ This decision now does not mean that the question will not be revisited some time later, especially as new quicker analytical methods are developed and EPA updates the *E. coli* criterion as they plan to do.

EPA Region 5 reviewed the Agency's proposed *E. coli* standards and the supporting documentation provided in SONAR-III and considers the decisions made and the justification provided to be reasonable and defensible. Further, EPA Region 5 believes that the proposed *E. coli* standards are consistent with the Clean Water Act, Federal regulations and guidance.²⁴

X. Comments on Proposed Classification Changes

A. Introduction

Written and oral comments were received on three proposed sets of water use classification changes. These include proposed rule amendments that would: 1) change the classification for industrial use protection for most surface waters from Class 3B to Class 3C; 2) reclassify twelve Class 2 waters as Class 7 limited resource value waters; and 3) extend the current Class 2A water use classification reach on the Vermillion River in Dakota County. The Agency's response to comments or issues of concern on these three categories of use classification changes follow.

B. Proposed Class 3B to Class 3C Industrial Use Protection Changes

The Agency is proposing to change the Class 3 industrial use sub-classification applicable to most surface waters of the state from Class 3B to 3C. This would be accomplished by changing the "default" industrial use classification for most surface waters from Class 3B to 3C. For consistency, the Agency also proposes to change the classification of 106 specifically-listed waters in Minn. R. 7050.0470 from 3B to 3C. If adopted into rule, these amendments will relax the Class 3 chloride and hardness water quality standards applicable to most surface waters as indicated in the following table. (Note: the chronic chloride standard for all Class 2 aquatic life and recreational use waters is 230 mg/L which then becomes the controlling standard for this class of waters; see SONAR-III beginning at p. 129.)

Table 2. Class 3B and 3C Industrial Use Standards.

Substance, characteristic or pollutant, units	Class 3B	Class 3C
Chlorides (Cl), mg/L	100	250
Hardness, mg/L Ca+Mg as CaCO ₃	250	500

At the public hearing in Brainerd, a general statement was made by a representative of Crow Wing County regarding the relaxation of the Class 3 industrial use class assignments as an administrative means to address certain variance requests (Tr. 9/5 at 20). The MPCA response (Tr. 9/5 at 21-22) and the discussion at SONAR-III at 147 emphasize that even if the proposed

²⁴ Personal communication with David Pfeifer, EPA Region 5 Water Quality Standards Coordinator. October 1, 2007

Class 3B to Class 3C changes are adopted during this rulemaking proceeding, the Agency anticipates that variances will continue to be submitted for one or both of these analytes, especially from areas of the State with low flow receiving waters and high background chloride and total hardness concentrations. Additionally, the proposed changes will enable the Agency to assign aquatic life based effluent limits to discharges to those low flow receiving waters which have little-to-no potential for use as industrial water supplies.

At the Rochester public hearing on September 12, 2007, representatives from MCEA submitted a package of written testimony and information (P-Ex.-11). MCEA's package contains two documents germane to the Class 3B to Class 3C proposed amendments: a two page prepared statement titled "Part VI, Industrial Standards for Hardness and Maximum Hardness Calculation of Trace Metals Standards" (identified here for reference purposes as P-Ex.-11, Part VI); and a seven page critique by Dr. Lawrence Baker titled "Comments on the Proposed 3B to 3C Default Classification" and "Comments [on the] Proposed Minimum Hardness for Calculation of Trace Metal Standards" (identified here for reference purposes as P-Ex.-11, Part VI Baker).

MCEA states that: 1) the Class 3B to Class 3C proposed changes under the Unlisted Waters provisions of Minn. R. 7050.0430 are subject to the Use Attainability Analyses requirements of 40 CFR 131.10; 2) if adopted, this set of amendments would mean industry is passing on the costs of treatment (water softening) to individuals; and 3) increased individual home water softening treatment will result in increased chloride concentrations in ambient waters. The Agency's response to issues in these three categories is as follows.

1. Class 3B to Class 3C Amendments and Use Attainability Analyses.

Agency staff dispute the conclusion offered by MCEA that use attainability analyses (UAAs) are required in order to adopt the proposed Class 3B to Class 3C changes (P-Ex.-11, Part VI at 1). 40 CFR 131.10(g) outlines the requirements States must follow for the removal of a *designated use which is not an existing use ... or the establishment of sub-categories of a use* (Attachment 15). The proposed changes do not remove the Class 3 industrial water use from these surface waters nor do these changes establish a sub-category of a water use. If the Class 3B to Class 3C rule amendment is adopted, these waters will continue to be assigned a Class 3 use classification and continue to be protected for industrial use. The net affect of these changes is the assignment of a different presumptive sub-classification to these waters, a sub-category of the Class 3 water use classification system that has been in rule since the late 1960s.

This may be a fine distinction to make, but it gets to the heart of MCEA's argument that UAAs are procedurally warranted for these waters. To provide some background, the following excerpt from the EPA Water Quality Standards Handbook is offered.

2.3 Use Subcategories - 40 CFR 131.10(c)

States are required to designate uses considering, at a minimum, those uses listed in section 303(c) of the Clean Water Act (i.e., public water supplies, propagation of fish and wildlife, recreation, agriculture and industrial purposes, and navigation). However, flexibility inherent in the State process for designating uses allows the development of subcategories of uses within the Act's general categories to refine and clarify specific use classes. Clarification of the use

class is particularly helpful when a variety of surface waters with distinct characteristics fit within the same use class, or do not fit well into any category. Determination of non-attainment in waters with broad use categories may be difficult and open to alternative interpretations. If a determination of non-attainment is in dispute, regulatory actions will be difficult to accomplish (USEPA, 1990a). ...

If States adopt subcategories that do not require criteria sufficient to fully protect the goal uses in section 101(a)(2) of the Act (see section 2.1), a use attainability analysis pursuant to 40 CFR 131.10(j) must be conducted for waters to which these subcategories are assigned. Before adopting subcategories of uses, States must provide notice and opportunity for a public hearing because these actions are changes to the standards. (Emphasis added) (Attachment 16).

The bolded sections speak to the States' flexibility on sub-category (sub-class) use classifications and the requirement specifying that UAAs must be conducted if there is a removal of a use specified in section 101(a)(2) of the Clean Water Act; commonly referred to as the "fishable/swimmable" uses. In Minnesota, the fishable/swimmable uses are included under the Class 2 aquatic life and recreational use classifications. The provision of 40 CFR 131.10(k) specifies that "A State is not required to conduct a use attainability analysis under this regulation whenever designating uses which include those specified in section 101(a)(2) of the Act." (See also Attachment 16, section 2.9). Therefore, with the exception of the waters proposed for Class 7 reclassification, a UAA is not required for all other waters proposed for the Class 3B to Class 3C change as MCEA suggests since these waters will continue to retain their Class 2 aquatic life and recreational ("fishable/swimmable") water use classifications. For the proposed Class 7 limited resource value waters, which were subjected to a use attainability analysis, if reclassified, they will be assigned a Class 3C use classification pursuant to Minn. R. 7050.0410.

2. Treatment Costs of Water Softening Passed on to Individuals by Industry

MCEA states that the proposed Class 3B to Class 3C amendments "will result in increased costs to individuals for the benefit of industry" (P.Ex.-11, Part VI at 1) and that the proposed [Class 3] reclassifications "flies in the face of the 'polluter pays' principle" (P.Ex.-11, Part VI Baker at 1 - 3). These issues, as well as several other statements made in these two documents, are addressed below.

In their written submission, MCEA indicates that the SONAR is cavalier about the need for increased water treatment downstream users may encounter as a result of the proposed Class 3B to Class 3C changes. The Agency has previously stated that there may be costs associated with the proposed Class 3 changes to parties who require a certain level of water quality for a desired intended use. The parties most likely to be affected would be in the municipal water treatment and industrial sectors that withdraw surface waters from low flow streams for their respective drinking water or industrial uses. To a much lesser degree, agricultural and commercial water appropriators that use surface waters for irrigation purposes may also be affected. While a potential cause and effect directly attributable to the proposed Class 3 rule changes is difficult to quantify, the overall impact these changes will have to both the environment and individuals are thought to be minimal. (SONAR-III at 143)

By citing a partial quote from the SONAR, MCEA contends that the Agency is "implying that downstream users should pick up the costs of upstream pollutant discharges." (P.Ex.-11, Part VI

Baker at 1). The bulleted quotation MCEA cites from on page 139 in SONAR-III is shown below:

- *Modern water quality treatment technology permits water of virtually any quality to be treated to provide the characteristics desired by industry at point of use. Occasionally, this may be costly; but in general the cost of treating water for specific processes is acceptable to industry, because it is only a small part of the total production and marketing costs.*

This particular statement was one of several conclusions excerpted from the EPA “Blue Book” (Water Quality Criteria 1972) in the section discussing industrial water supplies (Ex. UC-30 at 371). The Agency believes that this remains a factual statement in its own right and that its inclusion in the SONAR does not imply a departure from the long standing principal that dischargers should be responsible for the treatment of their wastewaters. Wastewater treatment continues to be a reasonable expectation of these facilities, and it is incumbent upon the Agency to assign reasonable effluent limitations to insure the protection of downstream water users. The proposed Class 3B to Class 3C changes do not jeopardize this approach. The identification and evaluation of downstream water appropriators on a site specific basis is a standard operating procedure when assigning effluent limits to facilities (mainly industrial dischargers) that have either high chloride or total hardness concentrations in their wastewaters. (SONAR-III at 158).

Several other statements included in MCEA’s written submission warrant Agency response and clarification. The first concerns a statement that the “SONAR does not represent, or misrepresents, other costs.” (P.Ex.-11, Part VI Baker at 2). The example provided by MCEA focuses on a statement in SONAR-III at 144 regarding the Agency’s conclusion that the proposed Class 3B to Class 3C changes will have a minimal impact on surface water appropriators using surface waters for irrigation purposes (as cited below).

*Agricultural, commercial, and other water appropriators using surface waters for irrigation purposes could be impacted by the proposed changes but these impacts are thought to be minimal since only **one percent** of the total surface water appropriations are for irrigation versus a 31 percent use of ground water for this purpose. (Emphasis added)*

MCEA goes on to state that “This statement suggests that the surface water is not an important source of irrigation water. In fact, according to the U.S. Geological Survey’s Water Use Database, 19% of Minnesota’s irrigation water – about one-fifth of the total irrigation withdrawal – is surface water withdrawal.” In making their comparison, MCEA cites to data which represents the proportion of surface water used for irrigation relative to the total water appropriation (ground water plus surface water) used for irrigation in the State. This differs from the comparison MPCA made in the statement above.

The Agency’s statement that “one percent of the total surface water appropriations are for irrigation” provides some perspective, in relative terms, comparing surface water appropriations used for irrigation purposes to the combined total surface water appropriations for the other identified uses. The basis for the Agency’s one percent estimate comes from a Minnesota Department of Natural Resources information sheet on Minnesota Water Use in 2005 (Attachment 17). An internet search revealed a 2004 U.S. Geological Survey Circular Report

No. 1268 titled *Estimated Use of Water in the United States in 2000*

(<http://pubs.usgs.gov/circ/2004/circ1268/>). While it is uncertain whether this is the reference that was used by MCEA, a comparison of surface water withdrawal data from Table 7. *Irrigation water withdrawals, 2000* and Table 1. *Total water withdrawals by source and State, 2000* indicates that irrigation waters taken from surface water sources in Minnesota represented 1.16% of the total surface water withdrawals (Attachment 18). Available data from this same report also indicates that surface water irrigation withdrawals represent approximately 16% of the total irrigation water withdrawals in the State. The Agency maintains that surface water appropriations used for irrigation are relatively small and minimal irrigation related impacts are anticipated as a result of the adoption of the proposed changes in the Class 3 listings.

Another cost related issue presented by MCEA dealt with water softening costs that could potentially be incurred by homeowners operating in-home cation ion exchange water softeners should the source water total hardness increase up to 500 mg/L CaCO₃. (P.Ex.-11, Part VI Baker at 2). Ion exchange water softening units in most residential settings require periodic salt brine regeneration cycles to backwash the accumulated hardness related cations (i.e. calcium and magnesium) from the ion exchange resins. Sodium chloride is commonly used to regenerate the ion exchange resins. In the example provided by MCEA, the total hardness of the source water was assumed to be 250 mg/L CaCO₃. Calculations as presented yielded an annual increase in the amount of salt used ranging from 315 pounds to 569 pounds, depending on the efficiency of the softening unit. This translates out to an additional \$35 to \$71 per year for a household of four people above what would be paid on an annual basis if the source water hardness was 250 mg/L CaCO₃.

The MCEA example is an informative look at the salt usage and costs associated with water softening from the perspective of individual homeowners. There are roughly 713 municipal public water systems in Minnesota. Most of these municipal community water supply systems utilize ground water as their source water supplies and would therefore not be affected by the proposed Class 3B to Class 3C changes. Five community water supply systems on the Iron Range could potentially fit the scenario outlined by MCEA in their example (Aurora, Biwabik, Chisholm, McKinley, and Virginia). These communities withdraw their drinking water, at least in part, from abandoned mine pits that have been allowed to fill with ground water. While these mine pits are dominated by ground water inflows, they are considered surface waters and in theory, could fit the MCEA example assuming the total hardness of the source waters were raised to 500 mg/L CaCO₃. There are two other communities on the Iron Range, Eveleth and Hoyt Lakes, who acquire their drinking water from natural lakes (St. Mary's Lake and Colby Lake). The total hardness concentrations in both of these lakes are low in comparison to the mine pit lakes (65 – 90 mg/L vs. 125 - 310 mg/L CaCO₃).

Additional discussion on community water systems that utilize surface waters, either in whole or in part, for their source water supplies can be found at SONAR-III at 150.

3. Increases in Total Hardness Concentrations and Increases in Chloride Concentrations.

MCEA raises the issue that increases in ambient total hardness concentrations can result in increases in ambient chloride concentrations (P.Ex.-11, Part VI at 1 and P.Ex.-11, Part VI Baker

at 2 – 3). MPCA staff agrees that this can happen, especially in areas of the State with elevated levels of total hardness in ground waters that are used for drinking water supplies (see Ex. UC-23). Chloride is considered a conservative substance (conservative in the sense that it is not easily removed by conventional treatment methods) and wastewater treatment facilities that receive ion exchange unit backwash regeneration wastes will often times have high concentrations of chloride in their wastewater effluents. This can be especially problematic where these wastewater treatment facilities discharge to low flow receiving streams. There are no easy solutions to this problem as long as cation exchange water softeners continue to be used as the primary means for residential water softening. The proposed Class 3B to Class 3C changes will not have a significant impact on this situation since, as described above, ground water is the most widely used source water supply within this State.

In summary, individual use attainability analyses are not required by federal regulation in order to make the proposed Class 3B to Class 3C changes since the proposal does not remove a water use as provided under section 101 (a) (2) or 303 (c) of the Clean Water Act. These changes are needed and reasonable in that they fall within the purview of the State's authority to propose such changes. These changes also strike a balance between the protection of the water quality, needs of industrial users and assignment of defensible effluent limits for dischargers to low flow receiving waters that have a limited potential for use as either industrial or municipal source water supplies. It also bears repeating that the proposed Class 3 changes are viewed as a first step toward a more comprehensive examination of the salinity related parameters in the State's Class 2 aquatic life, Class 3 industrial consumption, and Class 4 agriculture and wildlife use classifications (SONAR-III at 131).

C. Proposed Class 7 Limited Resource Value Waters

1. General Class 7 Responses.

There were several comments offered at the public hearing in Marshall (Tr.9/11 at 45) and (Tr.9/11 at 72) as well as written submissions (P.Ex.-11, Part VII) and (P.Ex.-12) concerning the proposed Class 7 limited resource value water reclassifications. Class 7 waters are generally low flow streams and ditches where the Clean Water Act "fishable/swimmable" goals are considered to be unattainable.

The Marshall testimony and P.Ex.-12 were offered by representatives of CURE (Clean Up the River Environment), an organization who's mission is "*to focus public awareness on the Upper Minnesota River Watershed and to take action to restore and protect its quality, biological integrity and natural beauty for all generations.*" Agency staff understands the basis for the comments expressed by the CURE representatives on the two upstream segments of County Ditch No. 45 at Renville, MN and Judicial Ditch No. 4 at Dawson, Minnesota. MCEA offered written comments specifically on the two County Ditch No. 45 segments in the Renville area as well as Judicial Ditch No. 29 at Evan, Brown County, Minnesota. (P.Ex.-11, Part VII at 3).

SONAR-III at 185 – 193 provide the Agency's rationale for the proposed Class 7 reclassifications and these discussions reference the individual use attainability analyses that have been entered into the hearing record as exhibits. In response to the comments submitted by

CURE, Minnesota's water use classification system groups surface waters of the state into one of two water use classifications – Class 2 or Class 7. Waters in either one of these two classifications also carry the “core” water use classifications Class 3, 4, 5, and 6. A use attainability analysis is required in order to change a Class 2 water to a Class 7 water. Use attainability analyses are water assessments that consider the physical, chemical, and biological factors affecting the attainment of a use. These assessments can either be used to document attainable uses or they can be used to justify changes in uses designated in State water quality standards. The complexity of these survey assessments will vary depending on the type of water being assessed and the purpose of the assessment. A commonality of all these survey assessments is the fact that they should be designed in sufficient detail to answer the following questions:

- What are the aquatic use(s) currently being achieved?
- What are the causes of any impairment of the aquatic uses?
- What are the aquatic use(s) that can be attained based on the physical, chemical, and biological characteristics of the waterbody?

Field survey use attainability analyses were conducted on each of these ditches proposed as Class 7 waters and the conclusions drawn from these assessments indicate that the fisheries and recreational uses in and along these watercourses are limited. As a result, twelve waters are being proposed for Class 7 reclassification, six of which are located within the Minnesota River watershed.

CURE and MCEA representatives raised a question regarding impacts Class 7 waters may have on downstream waters. In general, continuous discharges to Class 7 waters are assigned advanced secondary effluent limits of 15 mg/L Five-day Carbonaceous Biochemical Oxygen Demand (CBOD₅), 30 mg/L Total Suspended Solids (TSS), and 200 fecal coliform group organisms per 100 ml. There are provisions in the current rule Minn. R. 7050.0214, subp. 3 (Minn. R. 7053.0245, subp. 3, rule as proposed) that require the protection of downstream waters of a higher water use class. This provision allows for the assignment of more restrictive effluent limits if the Class 7 discharge has the potential to cause violations of applicable water quality standards in the downstream waters.

2. MCEA Class 7 Comment Responses.

In addition to their comments on three proposed Class 7 waters, MCEA questioned the Agency's use attainability analysis procedures relative to the federal requirements relating to the removal of designated uses (40 CFR 131.10) and the triennial review of waters assigned Class 7 use classifications during previous rulemaking proceedings.(P.Ex.-11, Part VII). Agency responses to the MCEA Class 7 issues that were raised are as follows.

a) MPCA Use Attainability Analyses and Federal Law 40CFR131.10 – Designation of Uses.

MCEA asserts that the Agency is proposing to impermissibly remove Class 2 water uses by re-designating certain waters as Class 7 limited resource value waters via a use attainability process that relies on factors that “are considerably less inclusive than those found in federal law.”(P.Ex.-

11, Part VII at 1 – 2). MCEA seems to infer that the Agency is relying solely on factors contained in Minn. R. 7050.0200, subp.8 as the bases for the proposed Class 7 reclassifications in deference to the designated water use removal requirements in 40 CFR § 131.10(g). The Agency disagrees with this characterization.

Minn. R. 7050.0200, subp. 8 lists factors for water use classification removal that are intended to parallel the federal requirements specified in 40 CFR § 131.10(g)(1) – (5). The factors outlined in section 131.10(g)(1) through (5) are examined during each use attainability assessment that is performed on candidate Class 7 waters through the completion of the stream assessment worksheet. This field worksheet, which serves as a support document in the use attainability decision making process, incorporates the factors typically used in conducting waterbody surveys and assessments outlined in the USEPA Water Quality Standards Handbook, (Attachment 16 at section 2.9, Table 2-1). As noted in SONAR-III at 186, the economic and social impact issues referenced in section 131.10(g)(6) are generally addressed in processing variance requests in accordance with State rules, Minn. R. 7050.0190 and 7000.7000.

In addition to the evaluation of the section 131.10(g) assessment factors, Agency staff consider impacts from point and nonpoint discharges on the assessed waterbody during the use attainability analysis. This effort is designed to determine whether the fishable/swimmable uses would be “*attained by implementing effluent limits required under sections 301(b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.*” [40 CFR § 131.10 (h)(2)]. The need to address the section 131.10 (h)(2) considerations was a far more common practice during the late 1970s when inadequately treated sewage was being discharged to a number of waterbodies that were assessed for possible Class 7 reclassification. In those situations, field crews knew they had to focus on the other physical, chemical, and biological factors that were present and to not be overly influenced by the impacts the poor quality effluent was having on the receiving water. See also the brief discussion at the Marshall hearing (Tr.9/11 at 47) on this topic.

b) Triennial Review of Existing Class 7 Waters.

Federal requirements in 40 CFR § 131.20 (a) requires the following of States:

... Any water body segment with water quality standards that do not include the uses specified in section 101(a)(2) of the Act shall be re-examined every three years to determine if any new information has become available. If such new information indicates that the uses specified in section 101(a)(2) of the Act are attainable, the State shall revise its standards accordingly.

In other words, for those waters where the fishable/swimmable uses are not attainable (in Minnesota these are the Class 7 limited resource value waters), a review should be conducted every three years to see if something has changed which allows for these uses to be met.

Quite frankly, this is an onerous requirement that Minnesota, and many other States, struggle with on an ongoing basis. For those waters where channelization is cited as a factor that limits the fisheries and recreational uses of the water, past history has shown us that these systems are rarely, if ever, intentionally reverted back to “natural” watercourses. Drainage law petitioning

and in-channel maintenance practices almost guarantees that these ditches will be maintained and dredged in order to insure that the drainage systems “serve [their] original purposes” (Minn. Stat. § 103E.715). For those waters where low flow is the determining factor precluding attainment of fishable/swimmable uses, most of these watercourses experience seasonal low flow or no flow due to their limited upstream watershed sizes. Whether it is a channelized watercourse or a near zero low flow stream segment, in reality it is difficult to justify field survey re-assessment of these waters on a three year cycle.

Prior to and during this current rulemaking proceeding, all of the existing Class 7 waters received some degree of scrutiny as part of the Agency’s involvement in the establishment of the EPA National Hydrography Database, a computerized mapping of the assigned water use classifications for the surface waters of the State (SONAR-III at 165). Whether or not the Agency has met the statutory requirements of 40 CFR 131.20 (a) will be a judgment call made by the EPA, Region 5 office during their review of our rule.

c) Specific MCEA Comments on Three Proposed Class 7 Waters.

The Agency’s responses to issues raised by MCEA regarding three candidate Class 7 waters (P.Ex.-11, Part VII at 3) are as follows.

(1) Branch Lateral 3, County Ditch No. 45 – Renville County – Golden Oval Eggs

MCEA states that the downgrading (Class 2B → Class 7) water use reclassification “*rests largely on its low flow, yet the volume of the future effluent from Golden Oval’s proposed discharge (70 - 80,000 gallons per day) is not weighed as a factor mitigating against reclassification...*”. While low flow is considered a factor that limits the aquatic life and recreational uses of this watercourse (Ex.UC-2 at 2) the fact that the ditch is 100 percent channelized also limits the amount of instream fisheries habitat along its entire length. If Golden Oval Eggs chooses to, and is allowed to, discharge their wastewaters into Branch Lateral 3, at an average discharge rate of 80,000 gallons per day only an additional one gallon per second would be added; a somewhat insignificant increase in the ditch flow.

(2) County Ditch No. 45 - Renville County – So. Minnesota Beet Sugar Cooperative

In a similar manner, MCEA questioned whether the 2.5 million gallon per day discharge from the Southern Minnesota Beet Sugar Cooperative (SMBSC) would provide adequate flow volume in the ditch system to make the Class 2 uses attainable. First of all, Agency staff acknowledge that a flow rate of 2.5 million gallons per day (roughly 3.9 cubic feet per second) is a substantial instream flow whether you are in a natural watercourse or a ditch system. While in theory such a flow could maintain Class 2 conditions, in the case of County Ditch No. 45, this possibility is very limited due to: 1) the fact that this segment of County Ditch No. 45 is upstream of another Class 7 designated reach; 2) the fact that the SMBSC discharge is seasonal (September – March) to coincide with the beet slice portion of the campaign; and 3) there are certain instream high flow triggers incorporated in the NPDES/SDS permit requiring SMBSC to cease discharge to County Ditch No. 45 and divert their treated wastewater to their holding ponds. This last requirement was incorporated into the permit in order to address downstream landowner concerns about ditch channel capacity. These same concerns resulted in the recent “cleaning” (re-dredging) of segments of this reach of County Ditch No. 45. Lack of habitat due to the

degree of channelization and the sporadic nature associated with the effluent flows are the factors that limit the fisheries and recreational uses afforded by this ditch system. As a result, potential fishable/swimmable uses are largely independent of the salinity quality of the SMBSC effluent. As alluded to earlier, the widespread economic and social impact discussions are contained in the variance related submissions that led to the issuance of the most recent NPDES/SDS permit for this facility.

3) Judicial Ditch No. 29 – Brown County – Evan, Minnesota

MCEA questioned what impact the reclassification of Judicial Ditch No. 29 might have on the downstream trout water segment (Hindeman Creek – aka. Spring Creek). Minnesota Department of Natural Resources Fisheries Section staff had previously raised a similar concern (Ex.A-11f). As referenced earlier in this response, Minn. R. 7050.0214, subp. 3 (Minn R. 7053.0245, subp. 3, rule as proposed) requires that the quality of limited resource value waters must not allow a violation of water quality standards in downstream waters. At Evan, Minnesota, the problem of inadequately treated wastewater being discharged into Judicial Ditch No. 29 was remedied by the construction of a wastewater stabilization pond system that discharges on a seasonal, controlled basis. Since this is a controlled discharge, the effluent limits currently assigned to this treatment facility are essentially the same as those for a discharge directly to a trout water. The only difference is with the fecal coliform limit. The disinfection period for most dischargers to Class 2 waters is April 1st through October 31st whereas the disinfection period for most dischargers to Class 7 waters is May 1st through October 31st. Therefore the Evan discharge will have minimal impact on the downstream trout water segment.

D. Proposed Update to Class 2A (Trout Waters) List

There are 13 existing Class 2A trout waters in Minn. R. 7050.0470 where the designated trout stream reach is being extended. The Vermillion River in Dakota County is an example of one of these listed trout waters where a proposed Class 2A reach is being added to Minn. R. ch. 7050 to reflect the Minnesota Department of Natural Resources listing of designated trout streams in Minn. R. 6264.0050, subp. 4. The reach of the Vermillion River proposed for Class 2A classification extends east from the City of Farmington in the vicinity of State Highway 3 to a point just to the east of the U.S. Highway 52 bridge crossing. The public land survey legal description of the existing and proposed Class 2A reach of the Vermillion is shown below. The proposed Class 2A reach that is being added is shown with underscoring.

Minn. R. 7050.0470, subp. 7, item A, subitem (194) (rule as proposed)

(194) Vermillion River, T. 113, R. 20, S. 1, 2, 3, 4, 9;

T. 114, R. 18, S. 19, 20;

T. 114, R. 19, S. 21, 22, 23, 24, 28, 29, 30, 31;

T. 114, R. 20, S. 33, 34, 35, 36): 1B, 2A, 3B

Two comment letters in opposition to extending the Class 2A classification to the new trout water listings for the Vermillion River were submitted to the Agency. These letters were subsequently identified for the record as Public Exhibit 13 (Vermillion River Watershed Joint Powers Organization, September 12, 2007 which also contained two August 31, 2007

memorandum attachments from LimnoTech) and Public Exhibit 14 (City of Farmington, September 12, 2007). Public Exhibit 14 also references two similar LimnoTech memoranda, both draft dated August 10, 2007. These two memoranda were marked as P.Ex.-15 and P.Ex-16. These letters requested either a segmented Class 2A designation approach or a delay in the assignment of a Class 2A water use classification for the extended trout water reach on the Vermillion River.

From a historical perspective, Agency's classification of certain waters as Class 2A waters is predicated on MDNR information and their listing of the water segments as designated trout streams. This practice dates back to the establishment of our first state-wide water quality standards and use classification rules in the late 1960s. The stream population assessment survey data submitted by MDNR for stations identified as 4a, 4b, 6a, 6b confirm that there are trout present in the Vermillion River east of the City of Farmington (Attachment 19).

Both comment letters, P.Ex.-13 and P.Ex.-14, acknowledge the trout fishery in the reach of the Vermillion River being proposed by the Agency for Class 2A classification. Notwithstanding a discussion on the merits of the administrative issues surrounding future TMDL listings of the Vermillion River, the data as presented clearly demonstrates that the reach in question is an appropriately listed MDNR trout stream and therefore deserves to be classified in Minn. R. ch. 7050 as a Class 2A water. MPCA staff appreciates the information provided by the City of Farmington and the Vermillion River Watershed Joint Powers Organization but respectfully decline to offer support for their recommendation to delay or segment the Class 2A classification of this watercourse.

E. Other Proposed Classification Changes

There are several minor changes to the rule as originally noticed for the classification listings in Minn. R. 7050.0470. These changes can be categorized as corrections in the legal descriptions for several listed waters and the addition of an alternate name to one of the listings. These changes are listed in Attachment 1 to this Response.

XI. Conclusion

The Agency has, through the SONAR, exhibits, oral testimony and this Response demonstrated that the proposed amendments, including the proposed changes to rule language discussed in Section II and Attachment 1, are needed and reasonable.

XII. Attachments

1. Agency staff proposed changes to language in Minn. R. ch. 7050 and Minn. R. ch. 7053 as originally proposed in the July 23, 2007 *State Register* (32 SR 87).
2. MPCA 2007. Guidance manual for assessing the quality of Minnesota surface waters for determination of impairment 305(b) report 303(d) list. Minnesota Pollution Control Agency, September 2007 (updated version of Ex. A-7)
3. Memo from Steve Heiskary to Shannon Lotthammer, July 31, 2007. Little Rock Lake (05-0013) investigation and recommendation for inclusion on 2008 303(d) draft list for nutrient impairment; and
Memo from Pam Anderson to Shannon Lotthammer, August 21, 2007. Fountain Lake (86-0086) investigation and recommendation for inclusion on 2008 303(d) draft list for nutrient impairment
4. Front page and pages 31–35 from Report of the Administrative Law Judge, Kenneth A. Nickolai, September 17, 2002. In the matter of proposed permanent rules governing water quality standards, Minn. R. chapter 7050.
5. Cover page and pages 3-38 to 3-45. from Water Quality Standards, Water Quality Handbook, U.S. Environmental Protection Agency, EPA-823-B-94-005a, August 1994. Site-specific aquatic life criteria.
6. Junghans, M., T. Backhaus, M. Faust, M. Scholze, and L.H. Grimme. 2003. Predictability of combined effects of eight chloroacetanilide herbicides on algal reproduction. *Pest Manag. Sci.* 59: 1101-1110. Attached is MPCA's review of the study.
7. Ma, J. and W. Liang. 2001. Acute toxicity of 12 herbicides to the green algae *Chlorella pyrenoidosa* and *Scenedesmus obliquus*. *Bull. Environ. Contam. Toxicol.* 67: 347-351. Attached is MPCA's review of the study.
8. Ma, J. and L. Xu, and S. Wang. 2002a. A quick, simple, and accurate method of screening herbicide activity using green algae suspension cultures. *Weed Sci.* 50: 555-559. Attached is MPCA's review of the study. Attached is MPCA's review of the study.
9. Ma, J., X. Ligen, S. Wang, R. Zheng, S. Jin, S. Huang, and Y. Huang. 2002b. Toxicity of 40 Herbicides to the green alga *Chlorella vulgaris*. *Ecotoxicol. and Environ. Saf.* 51: 128-132. Attached is MPCA's review of the study.
10. Ma, J. F. Lin, S. Wang, and L. Xu. 2003. Toxicity of 21 herbicides to the green alga *Scenedesmus quadricauda*. *Bull. Environ. Contam. Toxicol.* 71:594-601. Attached is MPCA's review of the study.
11. Ling-zhi, Z., T. Bo-ying, M. Xiao-quan, Y. Min, and S. Jian. 2005. Toxic effects of Cr6+ and acetochlor on *Spirodela oligorrhiza* L. *J. Plant Resources and Environment* 14 (3): 37-41.

Attached is MPCA's review of the study and an email dated August 31, 2007 from Dr. Joy Honegger of Monsanto with information concerning this study.

12. Bruce, R.D. and D.J. Versteeg. 1992. A statistical procedure for modeling continuous toxicity data. *Environ. Toxicol. Chem.* 11: 1485-1494.
13. Plant data for acetochlor ranked from lowest to highest, including the additional data identified by Monsanto.
14. Acetochlor. Table 1, list of all the toxicity data the Agency reviewed for the proposed acetochlor standard. Table 4a, list of plant toxicity data used to develop the proposed chronic standard. Revised summary sheets for proposed standard. These update Ex. H-9.
15. Excerpts from Title 40 Code of Federal Regulations Part 131: 40 CFR §131.10 and 40 CFR § 131.20.
16. U. S. Environmental Protection Agency, Water Quality Standards, Water Quality Handbook, Chapter 2: Designation of Uses (40 CFR 131.10). EPA-823-B-94-005; August 1994 with some additional new information (June 2007).
[<http://www.epa.gov/waterscience/standards/handbook/chapter02.html>]
17. Minnesota Department of Natural Resources, fact sheet titled: Minnesota Water Use containing 2005 Ground Water Use and 2005 Surface Water Use information.
18. U. S. Geological Survey Circular 1268, *Estimated Use of Water in the United States in 2000*. U. S. Geological Survey, Reston, Virginia, 2004.
19. Minnesota Department of Natural Resources, Section of Fisheries, Stream Population Assessments, October 2003 and November 2004, Vermillion River, Dakota County, Minnesota.
20. Minnesota Pollution Control Agency aquatic life criteria. Corrected summary sheets for benzene showing correction of Class 2A chronic standard from 5.4 µg/L to 5.1 µg/L.