The Minnesota Pollution Control Agency’s responses to public comments received on proposed Minnesota River selenium site-specific standard

Summary

This document responds to comments provided to the Minnesota Pollution Control Agency (MPCA) by the U.S. Environmental Protection Agency (EPA) and Gopher Resource, LLC (Gopher) in their letters dated April 18, 2019. The comments seek clarification on the proposed Minnesota River selenium site-specific standard (SSS). Comments have been presented as received, with MPCA’s response to each comment below. Where appropriate, MPCA has also incorporated this information in changes to the Technical Justification Document (TJD) and the findings of fact in the final submission to the EPA.

Comments from EPA Region 5

EPA understands that this site-specific standard will also apply to two floodplain lakes (Long Meadow Lake and Gun Club Lake). In the technical support document, MPCA mentions that these two lakes are connected to the Minnesota River during high flow events (25,800 cfs and 33,200 cfs, respectively). MPCA has made a strong argument for why the oxbow water column number of 5.6 ug/L is also protective of the floodplain lakes as well due to the higher chance of connectivity between the oxbows and the Minnesota River (which occurs at a minimum flow of 6,270 cfs). However, to the extent possible, EPA also recommends that in addition to the fish tissue monitoring that will occur in the Minnesota River and its corresponding oxbows, that MPCA also consider requiring fish tissue monitoring in one or both of the floodplain lakes in the fall during years when the Minnesota River is connected to the floodplain lakes, with the understanding that this sampling will likely need to be done from shore or via non-motor powered watercraft either through seining, trapping or hook-and-line sampling. Monitoring fish in the floodplain lakes will help assure that fish in these lakes are accumulating selenium in a similar manner to the oxbows (or identify any differences between these systems) as well as ensure that the beneficial uses (Minnesota Class 2B, 3C, 4A, 5 and 6) are met in these lakes.

MPCA response: MPCA agrees that demonstrating that the floodplain lakes are being appropriately protected is an important aspect of the site-specific standard. Because the fish tissue values take precedence over the water column values, sampling the floodplain lakes for fish tissue is a reasonable way to determine compliance. MPCA has added this component to the TJD and clarified that fish tissue sampling needs to occur in all three habitats – main channel, oxbows and floodplain lakes to ensure compliance in each habitat that the site-specific standard applies.

Comments from Gopher Resources

Comments about bioaccumulation in fish tissue versus toxicity to fish

The comments received in this section about using bioaccumulation versus toxicity to select a target species for compliance monitoring (Gopher comments 1 through 4.3) relate entirely to the implementation of the SSS. They have no impact on the numeric values of the standard, or anything related to the duration or frequency of the standard.
The general idea of the comments in this section relate to MPCA’s choice of fish species for the permittee to monitor to determine compliance with the selenium tissue standard. MPCA proposed monitoring fish tissue using freshwater drum or white bass, species that bioaccumulate selenium to a greater degree than some other species, such as bluegill. Gopher’s comments assert that this is inappropriate, and that the target species should be the species that is most sensitive to selenium.

General response to comments in this section

Many comments presented by Gopher about this topic can be answered with similar responses, so MPCA is giving a detailed account here of the reasoning for using species that bioaccumulate selenium at higher rates as target species for monitoring. MPCA will provide any additional clarifying comments in response to Gopher’s individual comments below, and otherwise, will cite the reasoning provided in the following numbered responses (MPCA responses #1 through #4). MPCA is responding to these comments here to hopefully clarify why they have chosen these implementation measures, but MPCA notes that they have no bearing on the standard that will be submitted for EPA approval.

MPCA response #1: If MPCA adopts fish tissue standards to apply as a site-specific standard for the lower Minnesota River, MPCA has to ensure that the fish tissue standards are not being exceeded. This is a requirement of the Clean Water Act, and it is MPCA’s responsibility to uphold this requirement. For example, the site-specific standard, as proposed, allows for a fish egg/ovary tissue concentration of 15.1 mg/kg. This standard does not indicate that egg/ovary selenium concentrations should be below 15.1 mg/kg only in species with known sensitivity to selenium. The criterion value was calculated with several fish species, and is driven by the most sensitive species, to protect species that are not represented by those tested in the distribution. For the tissue criterion value to be protective, it has to be met, and not just in bluegill. Because of this, the tissue standards must be met in any and all fish species. There is nothing in EPA’s guidance documents that indicate that only the sensitive species should be protected from exceedances of the fish tissue standards. EPA’s draft TMDL technical guidance (U.S. EPA 2016b) indicates that if any species of fish exceeds the fish tissue standards, the standard is exceeded, as seen in the question in guidance below (underlining added).

“Q8: How should states and authorized tribes complete assessments and section 303(d) listings when there are data for multiple fish species?

A8: EPA’s 2016 selenium criterion is designed to protect all freshwater aquatic life. If data from one or more fish species for a waterbody exceeds the criterion, then the criterion is not met and the waterbody-pollutant combination should be included on the state’s or authorized tribe’s section 303(d) list.”

MPCA response #2: MPCA is choosing to monitor species that accumulate more selenium to ensure that those species are not accumulating selenium to levels above the tissue standard. MPCA must consider the protection of species that accumulate more selenium than bluegill. As seen in the 2015 fish tissue sampling, some species residing in the Minnesota River can accumulate selenium to a greater extent than bluegill. However, the sensitivity to selenium of those species, such a freshwater drum and white bass, is unknown. If species with unknown sensitivities to selenium exceed the fish tissue standards, there is the possibility of an impairment to the aquatic life designated use observed as effects to reproduction in those species. MPCA wants to ensure protection of all species, including those with unknown sensitivity to selenium.

The site-specific water column value and tissue values were derived using species with known sensitivity, using the methods outlined in EPA guidance. Using the more sensitive species, bluegill, rather than the more bioaccumulative species to develop the site-specific water column value results in a water column value that is higher than would be calculated with a species that bioaccumulated selenium to a greater extent. Because of this, the water column selenium concentrations could rise to the concentration that is protective of bluegill (11 ug/L), but could potentially cause a greater increase in selenium in species that bioaccumulate more selenium than bluegill, such as freshwater drum or white bass. Monitoring these species to ensure they do not exceed the tissue standard ensures a margin of safety for bluegill, as tissue concentrations in bluegill should remain below the tissue standards.
MPCA response #3: In addition to species with unknown toxicity, there are also species that have known sensitivity to selenium that bioaccumulate selenium to a greater extent than bluegill, but cannot be sampled. Sturgeon species (in family Acipenseridae) have been observed to have greater sensitivity to selenium than other species, with white sturgeon being the most sensitive tested species included in EPA’s 2016 criterion document (U.S. EPA 2016). De Riu et al (2014) also tested two sturgeon species, white and green sturgeon, and observed that green sturgeon were more sensitive to selenium in the diet than white sturgeon, but the appropriate endpoints to be included in the development of EPA’s 2016 final criterion were not included. This additional study, however, demonstrates the sensitivity of additional sturgeon species to selenium.

While sturgeon are the most sensitive tested fish and also likely readily accumulate selenium due to their diet, they are unable to be sampled because of low numbers of fish available in the Minnesota River, and their protected status (lake sturgeon are listed as a Species of Special Concern in Minnesota). Using the flow chart in Appendix K of EPA’s final criterion document (and included as Figure 3 in MPCA’s Technical Justification Document), the first choice of fish to sample for site-specific standard development would be a species in families Acipenseridae or Salmonidae. Salmonidae species are not present in the lower Minnesota River. If sturgeon species (Acipenseridae) were more readily available at the site and were not protected, Acipenseridae would have been the family of fish chosen to sample, both for the development of the site-specific water column value, and for tissue monitoring for compliance with the tissue standard. Therefore, to ensure protection of sturgeon species when they utilize the Minnesota River, a surrogate species that has a similar diet should be used. The diet of sturgeon is frequently comprised of mussels or other benthic invertebrates, which can result in greater bioaccumulation than in species consuming pelagic insects or crustaceans (U.S. EPA 2016c). The freshwater drum can serve as a surrogate of sturgeon, since it also frequently consumes mussels and benthic invertebrates, providing a proxy bioaccumulation level for sturgeon. Simply stated, freshwater drum bioaccumulation can be utilized as an indication of the potential bioaccumulation that may be anticipated in sturgeon, since their diets are likely similar. Because sturgeon are the most sensitive tested species to the effects of selenium, it is known that biological effects in sturgeon can be expected when the fish tissue standard is exceeded. Using freshwater drum as a surrogate for sturgeon can help ensure that tissue concentrations are not rising to levels that may harm sturgeon, and by association, also not harm species with unknown sensitivities to selenium.

MPCA response #4: Gopher’s comments throughout this section imply that the MPCA is being unreasonably and unjustifiably overprotective by requiring the use of freshwater drum or white bass for compliance monitoring. To clarify, the tissue standards used in the site-specific standard are taken directly from EPA’s 2016 Final Criterion (EPA 2016a). The water column site-specific standard value was calculated using methods outlined in EPA’s Final Criterion document, using bluegill as the target species – a species with demonstrated selenium sensitivity. Therefore, the standard utilizes the best available science and is not overprotective. The MPCA is not holding the permittee or the industrial user to any standard that is not based on toxic effects to aquatic life. Utilizing drum or white bass for monitoring is simply an implementation measure to ensure that tissue concentrations are not being exceeded. Gopher requested the updated standard, and that is what is being applied. Gopher’s comments relate not to the standard, but the implementation measures MPCA is proposing to ensure that standard will be met.

Gopher comment (No. 1): Overall, the MPCA’s lack of clarity on how bioaccumulative potential relates to measurable species/population effects renders the selection of a target species unjustified when species with known sensitivity effects exist in the receiving water of interest. Gopher asks that the MPCA 1) justify how the bioaccumulation approach is scientifically justifiable and provide data, research, or literature to support claims, 2) comment specifically to the five statements (below) where the U.S. EPA has clearly defined and demonstrated that bioaccumulation in fish tissue is not appropriate to measuring toxicity and ecosystem impacts within aquatic food webs when concerned with selenium.

Below Gopher demonstrates the limitation of using the bioaccumulation in fish tissue versus measured toxicity impacts to fish.

MPCA response: Using a more bioaccumulative species to monitor for compliance with the standard is justifiable because MPCA must ensure that the fish tissue standard is being met, regardless of species. See MPCA response #1 for more detail.
1) **Gopher statement (No. 1.1):** The species of the greatest bioaccumulation potential does not mean it is the species that is most sensitive to selenium effects. The U.S. EPA Final Criterion (2016) pg 59, 1st paragraph supports statement 1) by stating, "The few dietary chronic toxicity studies that are available for invertebrate species (arthropods, rotifers, and worms) indicate that they are generally less sensitive than fish, with ... whole body mean chronic values ranging from approximately 3 to 12 times higher than the fish whole body criterion." The U.S. EPA states that fish are not the most bioaccumulative prone species but were selected due to their sensitivity to selenium effects. The document continues stating, "... field observations and data indicate that there has been no evidence of effects to macroinvertebrates including crustaceans (Janz et al. 2010)." So not only does the U.S. EPA acknowledge that bioaccumulation is greater in other organisms, but it also supports that those greater bioaccumulation species do not always associate to measurable [ecological] effects. The U.S. EPA Final Criterion (2016) pg 133, section 6.3.1.1 furthers support of sensitive species assessment by stating, "Using the most sensitive assessment endpoint (based on the state of the science) reduces uncertainty in the ability of the criterion to protect aquatic life."

**MPCA response:** MPCA agrees that there are species that are not sensitive to selenium that may accumulate selenium to a greater degree than other species. However, while those species with greater bioaccumulative potential may not be the most sensitive, they may serve as surrogates for more sensitive species (see MPCA response #3). Additionally, as previously described (see MPCA response #1), the standard applies to all species (including those where sensitively is not well understood). The site-specific tissue and water column site-specific values were derived using the most sensitive species and endpoints, in order to protect sensitive species, and those that have not been tested. Because of this, the tissue standards should be met, regardless of fish species, to ensure protection of aquatic life.

a. How does the MPCA justify using bioaccumulation of fish tissue when the U.S. EPA clearly demonstrates and acknowledges the short comings of this approach in other organisms?

**MPCA response:** Please see MPCA responses #1 through #3. In addition, since the 2016 Final Criterion document was published, EPA has been developing a selenium standard for the state of California. The guidance provided for the state of California’s development of site-specific water column standards indicates that the state should “target fish and bird species (or closely related (e.g., order or closer) surrogate species with similar dietary compositions) with the greatest bioaccumulation potential for sampling” (EPA 2018). Given that there are species (sturgeon) that have greater bioaccumulation potential than bluegill, and are more sensitive, using a surrogate species with a similar dietary composition as sturgeon, that is known to bioaccumulate more than bluegill, to monitor for compliance with the standard is justifiable and reasonable.

b. The U.S. EPA also clearly demonstrates that both toxicity and bioaccumulation differ within fishes. How is the MPCA ensuring they are protecting the ecosystem and still allowing industry to operate when using bioaccumulation over toxicity?

**MPCA response:** MPCA has to ensure that there are no adverse effects to aquatic life, thus protecting the ecosystem. To do that, demonstrating that the fish tissue standards are being met ensures that effects to the fish will be below levels that cause reproductive impairments. Using fish species that bioaccumulate more selenium ensures that the fish tissue standards are being met in all species, even those with unknown sensitivities to selenium and those that are sensitive and bioaccumulate but cannot be sampled (sturgeon).

Industry will still be able to operate under these conditions. MPCA is not requiring that industry be held to any different, restrictive standard than given in EPA’s 2016 Final Criterion (U.S. EPA 2016a). MPCA is simply requiring monitoring, to determine that the tissue standards are being met, to guarantee protection for untested and sensitive species. This is not keeping industry from operating. This industrial facility has operated for years, and based on the data MPCA has received so far, is not causing exceedances in the species that MPCA is proposing to target for tissue collection (freshwater drum and white bass). Because of this (and a reasonable potential analysis against the water column standard), the facility would not receive effluent limits. To argue that a facility currently meeting tissue standards and who would not have effluent limits is not going to be able to operate simply because of the use of a certain species to monitor for compliance is unreasonable.
c. How does the use of bioaccumulation reduce the level of uncertainty in the ability of the criterion to protect aquatic life?

MPCA response: The criterion and its level of protection remain the same, no matter what species is chosen to monitor for compliance. Using the bioaccumulative species in monitoring for compliance, however, ensures more species are in compliance with the tissue standard. If bluegill were monitored and they were in compliance with the fish tissue standard, MPCA would know that bluegill and any less bioaccumulative species were protected. But, MPCA would not know if other species that bioaccumulate greater amounts were being impacted. As described in MPCA response #2, the sensitivity of some species, such as freshwater drum and white bass, is unknown. If species with unknown sensitivities to selenium exceed the fish tissue standards, there is the possibility of an impairment to the aquatic life designated use with reduced reproduction in those species. MPCA needs to ensure protection of all species, including those with unknown toxicity. Additionally, as described in MPCA response #3, any effects to sturgeon feeding in the Minnesota River should also be considered, and using a species that has a similar diet to sturgeon, and a thus greater potential to have similar bioaccumulation, is important to reduce uncertainty in the protection of aquatic life.

d. Within the TJD, the MPCA needs to clearly articulate the U.S. EPA Final Criterion (2016) stance on bioaccumulation and provide counter claims to the claims of the U.S.EPA with data, research and/or literature.

MPCA response: MPCA did articulate in the TJD that EPA guidance recommended development of the site-specific water column value based on the most sensitive species (see page 17 of the TJD). MPCA disagrees that the TJD needs to contain further information about EPA’s final criterion document. With EPA’s more recent guidance to the state of California (EPA 2018), MPCA still finds it necessary to ensure compliance with the tissue standards in species that have a greater bioaccumulative potential to protect species with unknown toxicity as well as protect sturgeon (with known sensitivity) utilizing the lower Minnesota River.

2) Gopher statement (No. 1.2): Selecting a species based on bioaccumulative potential rather than bioaccumulation impacts requires a greater understanding of food web selenium accumulation characteristics to make the best selection of a target species. This is a vague selection criterion because, 1) it is difficult to know food web characteristics without rigorous investigation, and/or 2) using generalized feeding and mobility patterns can introduce human perception and biases.

MPCA response: In cases where there are no data available, some evaluations of the food web at the site may be needed to select a target species. However, in the case of this site-specific standard, MPCA had available a dataset that contained selenium tissue concentrations for a variety of species, that spanned a variety of trophic levels and diets. This dataset indicated that there were bioaccumulation differences among species collected at the site. This is a clear, not vague, selection criterion - the data available to MPCA were evaluated to determine that those species with the highest tissue concentrations, and thus represented the worst-case-scenario, should be targeted to determine compliance with the fish tissue standards.

a. As an example, Gopher presents a hypothetical case that can commonly occur in many rivers and streams across the United States. Scenario: Two fish species exist within the main channel of a large river (e.g. 7th order river reach). Species A, is a macroinvertebrate eating species that has relatively high site fidelity (prefers to stay in a localized area) and has known sensitivity levels to selenium effects. Species B, is a species that is a more opportunistic feeder and prefers mussels (a known documented prey item with greater selenium concentration relative to other prey within the same ecosystem (U.S. EPA Final Criterion (2016)), has relatively low site fidelity (prefers to move amongst many areas), and does not have any known sensitivity to selenium. Unknown to investigators, the 7th order river reach of interest, does not have mussels due to turbidity and sedimentation impairments.

i. The MPCA is proposing to select Species B in the scenario above. Please explain how this is scientifically justified and how it ensures protection of the ecosystem.
**MPCA response:** To further define the information known about Species A and Species B, which was left out of Gopher’s “hypothetical situation,” Species B (freshwater drum) has been demonstrated to accumulate selenium to a greater extent than Species A (bluegill). Bluegill, with its known sensitivity to selenium, was used to calculate the water column site-specific standard. However, as explained previously in MPCA responses #2 and 3, tissue concentrations in freshwater drum, due to the species greater potential for bioaccumulation, are more representative of tissue concentrations that could be occurring in species that bioaccumulate to a greater extent than bluegill.

While freshwater drum may move around more than bluegill, freshwater drum are utilizing and feeding at the site, as demonstrated by the frequency of collection of freshwater drum near the site. Minnesota Department of Natural Resources (MNDNR) fish surveys conducted over several years frequently collected both freshwater drum and white bass in the Minnesota River, just upstream of the Seneca WWTP (sampling was conducted where Interstate 35W crosses over the Minnesota River). The number of freshwater drum, for instance, ranged from 7 to 24 fish collected, depending on year (data for 2010 to 2014 are available in Wenck 2015). Gopher indicated that the fish they collected in 2015 downstream of Seneca WWTP were similar in composition to the fish collected by MNDNR during previous sampling events at Interstate 35W (Wenck 2015). This information indicates that the species is frequently found in this area of the Minnesota River, including the site of the proposed site-specific standard (downstream of Seneca WWTP). If the fish were not frequenting the location, and were only passing through, lower numbers of fish and less consistency between sampling years would be expected. Regardless, while these species may enter and exit the site they are still frequenting the area and given their opportunistic feeding, undoubtedly feeding in the area downstream of Seneca WWTP. Feeding at the site will contribute to the organisms’ overall accumulation of selenium.

MPCA, through their NPDES permitting program, must ensure that pollutants are limited when they “may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard” (40 CFR 122.44(d)(1)(i); emphasis added). While the selenium discharged from Seneca WWTP may not be the only exposure to selenium by species that utilize other sites, MPCA must still consider the contribution of the discharge to any exceedances of the standard, including the fish tissue standard. The concentrations of selenium are likely highest downstream of Seneca WWTP, compared to other locations in the general area. Gopher’s water column sampling demonstrated that selenium concentrations upstream of the discharge were slightly lower, on average, than the concentrations downstream of the discharge. This was also demonstrated using Metropolitan Council data collected since 1998. Also, Gopher’s monitoring demonstrated much lower concentrations of selenium in the Mississippi River. So, fish feeding downstream of the discharge are reasonably expected to be exposed to the greatest amount of selenium there. Because the potential for exposure to the highest amounts of selenium are downstream of the WWTP, the discharge is at the very least contributing to any potential exceedance of the fish tissue standard in fish that utilize the site.

3) **Gopher statement (No. 1.3):** The MPCA is proposing the use of species other than bluegill within the study reach, however, there is a lack of clarity in how these other species will be considered in relation to the SSS. Also, there is a lack of clarity in how the MPCA will approach the use of multiple species when there are differences in tissue concentrations in relation to the fish tissue criterion. Below is a scenario to illustrate the issue.

a. Scenario: Two fish species exist within the main channel of a large river (e.g. 7th order river reach). Species A, is a macroinvertebrate eating species that has relatively high site fidelity (prefers to stay in a localized area) and has known sensitivity levels to selenium effects. Species B, is a species that is a more opportunistic feeder and prefers mussels (a known documented prey item with greater selenium concentration relative to other prey within the same ecosystem (U.S. EPA Final Criterion (2016)), has relatively low site fidelity (prefers to move amongst many areas), and does not have any known sensitivity to selenium. Unknown to investigators, the 7th order river reach of interest, does not have mussels due to turbidity and sedimentation impairments.
i. Upon review of results from this scenario, all samples and the average tissue concentration of Species A are below the SSS fish tissue criterion. One sample from Species B is above the SSS, while all other samples and the average tissue concentration from Species B are below the SSS fish tissue criterion. Please answer the following questions to help Gopher understand how MPCA will interpret this data with respect to the SSS.

1. How will the MPCA interpret and use the results of Species A?
2. How will the MPCA interpret and use the results of Species B?
3. How will the MPCA interpret and use the results of Species A compared to Species B?

**MPCA response:** As indicated in the TJD, MPCA anticipates addressing specific implementation details using the most recent version of EPA guidance for implementation of the selenium criterion. These questions have no bearing on the site-specific standard, and will be dealt with during permit development.

b. Please revise document to explicitly address how the use of multiple target species should be implemented and interpreted. Please also revise document to address cases where species assessed have differing levels of selenium in tissue concentrations. Also address how results should be interpreted when one species is found to meet SSS, while another species does not. Further expand on this as to how results should be interpreted when a species of known toxicity is meeting SSS but a species of unknown toxicity does not meet standard.

**MPCA response:** MPCA updated the TJD to further explain that all species must be in compliance with the tissue standards, and that sturgeon would have been the target species if it were more readily available and not a species of special concern. With the inability to sample sturgeon, a species that has a similar diet, such as freshwater drum can serve as a surrogate to determine the level of bioaccumulation that might be observed in sturgeon.

4) **Gopher statement (No. 1.4):** The issue of target species being selected based on bioaccumulative potential is made more complex when attempting to link whole-body and/or filet only sample concentrations back to egg/ovary tissue concentrations. U.S. EPA Final Criterion (2016) Appendix K pg 5 2nd paragraph, "Fish accumulate selenium in different tissues of the body in differing amounts. Species physiology, age, diet, sex, and spawning status are some of the factors that affect selenium partitioning in the body. Because the primary selenium criterion element is expressed as a concentration in the eggs and/or ovaries, ... Different species of fish accumulate selenium in their eggs and ovaries to different degrees." The U.S. EPA Final Criterion (2016) also provides additional evidence (Tables 3.3, 3.5 and 3.7) for tissue specific accumulation difference in fish by summarizing the four lowest reproductive effect genus mean chronic values in egg/ovary, whole-body, and muscle. Gopher provided a relative rank summary of the three U.S.EPA Final Criterion (2016) tables below in Table 1. Table 1 clearly demonstrated that species sensitivity is not consistent across tissue type.

a. Please demonstrate and clarify in the TJD how bioaccumulation method is appropriate given the complexity of relating fish tissue, to whole body to egg/ovary tissue samples. The U.S.EPA Final Criterion (2016) acknowledges and suggests that egg/ovary is the most appropriate end point measurements for SSS development, however, that is based on measured toxicity impacts.

**MPCA response:** MPCA understands the complexities of the different fish tissue concentrations. However, with the adoption of the fish tissue site-specific standards, MPCA will be required to ensure that all tissue standards are being met (unless multiple types are provided, and one tissue type supersedes the others). The order of relative sensitivity for each tissue type is irrelevant, when considered from the standpoint of a standard value. Standards are derived to protect most species, and thus the most sensitive value, regardless of species, drives what the criterion is. And once the criterion is determined, MPCA must ensure compliance with it (see MPCA response #1 for additional detail).
Table 1: Relative genus mean chronic values (mg Se/kg dw) rank for the lowest four reproductive effects measured in various fish tissue.

<table>
<thead>
<tr>
<th>Relative GMCV Sensitivity Rank</th>
<th>Egg/Ovary</th>
<th>Whole-body</th>
<th>Muscle</th>
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<tr>
<td>4</td>
<td>Oncorhynchus</td>
<td>Salmo</td>
<td>Salmo</td>
</tr>
<tr>
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<td>Oncorhynchus</td>
<td>Lepomis</td>
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<tr>
<td>1</td>
<td>Acipenser</td>
<td>Acipenser</td>
<td>Acipenser</td>
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5) **Gopher statement (No. 1.5):** The U.S. EPA Final Criterion (2016) criterion provides additional support against selecting species based first and/or only on bioaccumulative potential. Gopher provides some of the supporting statements here:

a. Pg 19, 2nd paragraph, "Ecological effects data are used as measures of direct and indirect effects to growth, reproduction, and survival of aquatic organisms." Increased bioaccumulation potential of a species does not equate to that species having increased growth, reproduction, and survival effects. U.S. EPA Final Criterion (2016) states that they did not use the most bioaccumulative species as it did not ensure protection of the ecosystem (based on the current state of the science).

i. Selenium toxicity in the U.S. EPA Final Criterion (2016) relates to a measured organism impact endpoint? What evidence has the MPCA used to determine that selenium bioaccumulation relates to a measured organism impact endpoint?

**MPCA response:** MPCA is not arguing that the degree of bioaccumulation is directly related to organism impact in every species. However, to adequately protect most species, EPA has developed tissue concentrations that should minimize any adverse effects to aquatic life, if those concentrations in tissue are not exceeded. Utilizing a variety of species in calculating a criterion value helps represent species that are not included in the distribution of tested species. The criteria values are driven by the most sensitive species, to protect the species that are not represented by the species in the distribution. For the tissue criterion value to be protective, it has to be met, and not just in bluegill. When only assessing bluegill, the tissue criterion may not be met in other species, as bluegill was one of the species with the lower bioaccumulation factors. Bluegill live relatively short lives and have less fat content, so they do not accumulate chemicals to as great extent as the longer-lived predator species, such as sturgeon (WDNR 2008). Therefore, they do a poor job of representing the bioaccumulation that may be expected in longer-lived, predator fish. By the time that bluegill have accumulated selenium in their tissue to cause effects to that species, the amount of accumulation in larger predator fish could be in excess of concentrations that could cause effects even if they are less sensitive than bluegill. Therefore, only sampling bluegill would leave more bioaccumulative species open to the potential of accumulating selenium well over the tissue standard, which could lead to reproductive effects, even if they are not as sensitive.

If freshwater drum were to demonstrate that they accumulated selenium above the tissue standard, this could lead to an impact on measured endpoints. While we do not know if freshwater drum are sensitive to selenium, we do know that sturgeon are. Since freshwater drum and sturgeon have similar diets (benthic invertebrates), and we know that sturgeon accumulate selenium, freshwater drum can serve as a surrogate for effects in sturgeon. As previously stated, if we could sample sturgeon, this would be the ideal species to use in monitoring due to its sensitivity and bioaccumulation of selenium. Instead, MPCA has chosen to use freshwater drum as a surrogate for sturgeon species due to their similar diets and known bioaccumulation in freshwater drum.

b. Pg 34, 1st paragraph, "All available, relevant, and reliable chronic toxicity values were incorporated..." The U.S. EPA states that they developed U.S. EPA Final Criterion (2016) criterion based on the best available information. The MPCA fails to state what information was used that justifies deviation from the U.S. EPA Final Criterion (2016).
**MPCA response:** The statement quoted by Gopher relates to the available, relevant and reliable data used to calculate the fish tissue egg/ovary criterion value in the 2016 Final Criterion. MPCA has adopted this fish tissue egg/ovary criterion as presented in the 2016 Final Criterion (U.S. EPA 2016a). The site-specific water column value was derived using methodology in Appendix K of the criterion document, by choosing the most sensitive species to calculate the value. Therefore, MPCA has not deviated from the tissue Final Criterion value.

i. What updated information has the MPCA acquired and/or what changes in the best available science has the MPCA found that is different or builds about what the U.S. EPA compiled, reviewed and developed methodology upon?

**MPCA response:** MPCA is not deviating from the science presented in EPA guidance for developing the site-specific standard. MPCA is choosing an implementation method that better represents protection of the entire fish community. More recent EPA guidance (EPA 2018) supports this approach, and indicates that the most bioaccumulative species should be used to develop the water column value for a given site.

ii. Please provide peer-reviewed evidence that supports the bioaccumulation-based species selection approach.

**MPCA response:** Lemly et al (2007) indicates: "it is essential to know the maximum fish tissue selenium concentrations in order to derive a protective water concentration" and "identifying the maximum tissue concentrations of selenium, which is key to environmentally sound risk analysis...". They also note that species life history should be considered, because species with long life cycles and low reproduction are more susceptible to effects from selenium, as small effects to reproduction have more significant impacts than species that have short life cycles and high reproduction. Female lake sturgeon do not reach reproductive maturity until they are 24 to 26 years old, and only spawn once every four to six years (WDNR 2018). Any reproductive effects to this species, even a 10% reduction, could have a much greater impact on sturgeon populations than bluegill (who begin spawning at approximately 2 years of age (IDNR 2018), and have been observed to spawn more than once a year (SRAC 2008)).

**Comments on Figure 7 of the TJD**

The following comments were received related to Figure 7 of the TJD (page 17 of the draft TJD), which summarized the selenium concentration collected from different tissue types from nine fish species.

**Gopher comment (No. 2):** Figure 7 is presented as the motivation for selection of target species. However, this figure is misleading as it is a compilation of different seasons, years and sample sizes among the nine species of fish plotted without showing the variability in the datasets. Below Gopher provides steps to more accurately portray the data summarized in Figure 7.

1) **Gopher statement (No. 2.1):** The scale of the figure should be changed to 0-100% to accurately communicate the comparison the data collected to the standards.

   **MPCA response:** The purpose of the figure was to compare species differences, not to compare to the magnitude of the standard. Having a smaller scale allowed for a better view of the differences between the species, which was the intention of the figure.

2) **Gopher statement (No. 2.2):** Some species have less than five samples. The required minimum number of samples is five for pollutants with toxicity-based standards for the Water Quality Assessments: 305(b) Report and 303(d) list. Therefore, there is uncertainty if the data plotted represents the population mean as stated by the MPCA. For example, on page 16 of the TJD "Small sample size could also account for some differences. Where only one individual was collected for a species, that one individual may not be representative." Under this requirement the only fish species that should be included in the figure are bluegill, freshwater drum, walleye and green sunfish.
**MPCA response**: The intent of the figure was not to determine whether the tissue values were in compliance with the tissue standards, or to complete an assessment of the standard for the 305(b) Report or 303(d) list. The figure is a visual representation of the observed differences in tissue concentrations in different species, based on the available data, to demonstrate why the MPCA has some concern about the protectiveness of the water column values in preventing accumulation above the standard in species other than bluegill.

3) **Gopher statement (No. 2.3)**: Not all of the 2015 data should be included in Figure 7, as the selenium concentrations measured in fish in the lower Minnesota throughout the year was deemed suspect on page 11 of the TJD “Based on data provided by Gopher in 2015, there was some uncertainty as to whether the fish tissue data were representative of, and therefore protective for, fish residing in the Minnesota River during different seasons and in different habitat types.” This would result in only bluegill being included in Figure 7.

**MPCA response**: The selenium concentrations in the fish were not deemed suspect, as Gopher indicates in this comment. Gopher’s phrasing implies that MPCA had concerns about the data quality. This is not what MPCA indicated in the text Gopher quotes here from the TJD. The text clearly indicates that MPCA was uncertain if the data that were collected were representative of different seasons and habitat types. The data themselves were not considered suspect, but the lack of data (particularly in bluegill, which was being used for the development of the water column value) from different habitat types and seasons led to uncertainty in the protectiveness of the calculated value. Later sampling demonstrated that there are significant differences in concentrations in the different habitat types and seasons. Gopher acknowledges in their 2018 application that the different habitats (oxbows versus main channel) need different water column standards due to the differences in accumulation of selenium in those habitats. The 2015 dataset did not clearly demonstrate these differences, and that is what MPCA had concerns about, not the quality of the 2015 data. If only the 2015 data were used, the water column standard would not have been protective enough, especially so for the lentic sites. This further describes MPCA’s uncertainty about the data. The concentrations in other species collected in 2015 are still considered useful data to use to inform decision-making, in the absence of additional data. Only using bluegill data after 2015 would be ignoring important information about the additional species collected at the site.

4) **Gopher statement (No. 2.4)**: This figure also only shows the mean of the samples collected; however, it does not show how representative the dataset is to the plotted mean. The MPCA should also plot error bars onto the bar plots to more accurately portray confidence in population means. Without these error bars it is misleading to reviewers in what the data set looks like. An alternative option would be to use boxwhisker plot to represent the dataset.

**MPCA response**: MPCA agrees that error bars would improve the figure. The figure has been revised in the TJD.

**Comment on the implementation of tissue standards**

The following comment was received related to the statement on page 20 of the draft TJD:

"There are a limited number of species that have been tested to assess their sensitivity to selenium, and this results in some uncertainty when choosing one target species to develop the BAF. The fish that accumulate more selenium than bluegill may be less sensitive to its effects, and therefore not need as protective of a value to ensure they are not affected. However, the reverse may be true, and they may be as or more sensitive to selenium, which could indicate that they would not be sufficiently protected by the water column value that protects bluegill. We do not have the information to answer that question with certainty (additional testing would be needed)."

**Gopher comment (No. 3)**: The bioaccumulative approach and “additional testing would be needed” requires entities to collect the data and develop the toxicity research and criteria. Revise the TJD to clearly state when the MPCA will commence the scientific investigation (i.e. toxicity testing) and ecosystem impact assessments on all species present and not present within the ecosystem of interest. Species of low site fidelity do not accurately depict the impacts of selenium within the area of interest. If the MPCA selects species based on bioaccumulation and these species have low site fidelity, how will the MPCA address selenium concentrations in these specimens.
Arguments could be made that selenium bioaccumulation is not the result of the area of interest. Rather the issue and contributors to selenium bioaccumulation exceedances are the result of sources outside of the study reach.

**MPCA response:** MPCA will not be commencing toxicity testing or assessments. Gopher is welcome to provide information that demonstrates the sensitivity of these species to the MPCA, but must consider that regardless of their sensitivity, tissue concentrations in all species must still meet the tissue standards that would be applied for the lower Minnesota River site.

As discussed previously in MPCA’s response to Gopher’s Statement 1.2(a)(i), MPCA must consider that the discharger may contribute to an exceedance of the fish tissue standard. Additionally, exposure to the highest concentrations of selenium are likely to be encountered downstream of Seneca WWTP. Selenium concentrations upstream in the Minnesota River are, on average, lower than those seen below Seneca’s discharge.

Concentrations of selenium in the Mississippi River, both upstream and downstream of the Minnesota River, are lower than the concentrations downstream of Seneca’s discharge. Therefore, it is also reasonable to argue that selenium bioaccumulation downstream of the discharge is, at a minimum, contributing to any exceedances in fish that utilize the site downstream of the discharge.

**Comments on toxicity of bluegill versus largemouth bass**

The following comments were received related to the statement in the TJD “freshwater drum and white bass are most closely related to bluegill and largemouth bass. Bluegill and largemouth bass are sensitive to selenium,” which was found in the 2nd paragraph of page 21 of the draft TJD.

**Gopher comment (No. 4):** This is a relative statement, misleading to readers, and oversteps conclusions the MPCA can draw about selenium sensitivity. Gopher makes three specific arguments (provided below) that demonstrate the MPCA’s statement needs revision.

1) **Gopher statement (No. 4.1):** Bluegill are much more sensitive to selenium than largemouth bass (U.S. EPA Final Criterion (2016)). Therefore, one could conclude that largemouth bass are in fact not sensitive to selenium when compared to a species of the same family (taxonomic classification).

   a. Please explain how you made this conclusion and cite your reference(s) to your statement that these two species are sensitive to selenium.

   **MPCA response:** According to EPA’s 2016 final criterion document (US EPA 2016a), bluegill and largemouth bass are among the more sensitive species that have been tested. The individual EC10 values from the literature for the four most sensitive genera range from 14.7 mg Se/kg dw to 27.7 mg Se/kg dw (see pages 45-46 of U.S. EPA 2016a). The largemouth bass EC10 value falls in this range as well (26.3 mg Se/kg dw). More specifically to Gopher’s point, the given EC10 values for bluegill range from 14.7 to 26.3 mg Se/kg dw, which overlaps with the EC10 value for largemouth bass of 26.3 mg Se/kg dw. Based on the overlap in toxicity values, for Gopher to claim in Statement 4.1 that “bluegill are much more sensitive to selenium” (emphasis added), is an overstatement. Toxicity testing is not an exact science, so there will be variability in EC10 values. Where the true EC10 for each species lies is not known, and is subject to individual variability. Because the EC10 value of largemouth bass falls in the range of observed EC10 values for bluegill, to state that one species is much more sensitive to selenium than the other is not accurate.

   Additionally, Gopher previously argued that the bluegill toxicity value should be raised (indicating the species was less sensitive than EPA was proposing). In the same discussion, Gopher also ranked largemouth bass as more sensitive to selenium than bluegill (Wenck 2015). For Gopher to now argue that bluegill are “much more sensitive to selenium” is misleading about conclusions that can be drawn about the sensitivity of those species.

   Because bluegill are considered sensitive to selenium, and the largemouth bass toxicity EC10 value (26.3 mg Se/kg dw) falls into the range of observed EC10 values for bluegill (14.7 to 26.3 mg Se/kg dw), largemouth bass could be considered, at the least, relatively sensitive. MPCA has edited the language in the TJD to clarify this point.
2) **Gopher statement (No. 4.2):** Knowing that differences in selenium sensitivity exist between two species (bluegill and largemouth bass) of the same family (taxonomic classification), the MPCA’s comment about freshwater drum and white bass also being sensitive because they are of the same order (a broader taxonomic classification) is unknown. The argument could be made that in fact these species are not sensitive to selenium. Making comparisons of selenium sensitivity within the same Order is not accurate as there is no scientific evidence that selenium sensitivity is consistent amongst organisms at this high level of taxonomic rank.

   a. Please explain how you made this conclusion and cite your reference(s) to your statement that these two species are sensitive to selenium.

**MPCA response:** MPCA stated precisely in the TJD what Gopher states here about the species having unknown sensitivities. MPCA agrees that the relative sensitivity of the organisms is unknown, and explicitly said so: “The fish that accumulate more selenium than bluegill may be less sensitive to its effects, and therefore not need as protective of a value to ensure they are not affected” (TJD, p. 20). But the concern of the MPCA is that those species could be at least as sensitive and therefore need protection from accumulation of selenium to concentrations higher than the tissue standards (see MPCA response #2). The tissue standards are based on species with known sensitivity, and monitoring of species with greater bioaccumulation should protect against impacts to species with unknown sensitivities. Also, these species can serve as surrogates for other sensitive species, such as sturgeon (see MCPA response #3). MPCA’s job is to ensure that Minnesota’s designated uses are being attained, and MPCA is implementing this measure to ensure that the site-specific standard will be met. Accumulating selenium into the tissue above the tissue standards would lead to listing an impairment of the designated use (see MPCA response #1).

3) **Gopher statement (No. 4.3):** To further highlight difference among fish of the same order, targeting White Bass and Freshwater Drum species display a lot less site fidelity than bluegill sunfish. Therefore, choice of targeting these species for an SSS is not appropriate as there is no way to demonstrate that these species are residents to the site or are simply passing through (per conversation with MnDNR and other fisheries biologists).

**MPCA response:** As previously discussed in the response to Gopher Statement 1.2(a)(i), while freshwater drum may move around more than bluegill, freshwater drum and white bass are utilizing and feeding at the site, as demonstrated by the frequency of collection of these species near the site. This information indicates that the species is frequently found in this area of the Minnesota River, including the site of the proposed site-specific standard (downstream of Seneca WWTP), and the fish are not likely just traveling through. If the fish were not frequenting the location, and were only passing through, lower numbers of fish and less consistency between sampling years would be expected. While these species may enter and exit the site, they are still utilizing the area, and given their opportunistic feeding, undoubtedly feeding in the area downstream of Seneca WWTP. Feeding at the site will contribute to the organisms’ overall accumulation of selenium.

### Comments on the calculation of the site-specific water column values

The following comments were received related to the specifics of the calculation of the water column value, specifically the statement “The calculation of the water column criterion follows methods outlined in the 2016 EPA selenium criterion document” (page 2 of the draft TJD).

**Gopher comment (No. 5):** The MPCA uses the same calculation technique as in U.S. EPA Final Criterion (2016), however, implements an additional rounding technique that does not conclude the same site-specific standard value that the U.S. EPA Final Criterion (2016) document would determine, therefore, this statement is misleading and inaccurate. Please clarify in the TJD. Additionally, Gopher does not agree with the additional rounding technique of the MPCA and ask that it not be used. Gopher provides greater reasoning here:

1) **Gopher statement (No. 5.1):** Using the same dataset, the MPCA calculated a River Main Channel Site Specific Selenium Standard of 11 μg/L while the U.S. EPA Final Criterion (2016) would calculate a standard value of 11.3 μg/L. Therefore, the MPCA’s rounding method is placing an arbitrary, non-scientifically defensible 0.3 μg/L limitation to the site-specific standard.
**MPCA response:** EPA guidance (U.S. EPA 1996), other guidance (Franson 2012), as well as general mathematical principles dictate that when multiplying or dividing measured values, the results should contain no more significant figures than contained in the number with the least amount of significant figures. Using additional significant figures indicates a level of precision that you do not have when one of the measured values has less precision.

In this case, to calculate the water column site-specific standard, the measured values used were 1.82 mg/kg (three significant figures) and 2.4 µg/L (two significant figures). When 1.82 mg/kg is divided by 2.4 µg/L, it results in a BAF of 0.76 (two significant figures). Two significant figures are used because 2.4 µg/L only contains two significant figures. Additionally, the water column standard is further calculated as the division of 8.5 mg/kg (whole body tissue standard, containing 2 significant figures) by the BAF of 0.76, resulting in 11 µg/L, since both 8.5 and 0.76 have 2 significant figures.

Using the value that Gopher is proposing overestimates the precision of the measured values used in the calculation.

2) **Gopher statement (No. 5.2):** The analytical lab that was used to process the fish tissue samples have analytical accuracy and reporting to the nearest tenth of a decimal place. Since the tenth of a decimal place is more accurate and representative of the data 11.3 µg/L is the more appropriate site-specific standard value to adopt.

**MPCA response:** While it is true that the fish tissue samples contain three significant figures, the water column values only contain two significant figures. As stated in the previous response, when dividing values with differing significant figures, the result should be rounded to the number of significant figures contained in the value with the least amount of significant figures.

3) **Gopher statement (No. 5.3):** The MPCA calculated a value of 5.6 µg/L while the U.S. EPA Final Criterion (2016) document would calculate a value of 5.7 µg/L. The MPCA states that it applies a rounding down to the nearest significant digit, while the U.S. EPA Final Criterion (2016) does not make any statement that this is an appropriate method. Thus, the two methods result in different scores. Gopher supports the rounding down to remain protective, rather than rounding the hundreds decimal place up. However, Gopher supports rounding down to the nearest tenth of a decimal place and do not support the MPCA's rounding method of significant digits. Our justification for the tenth of a decimal rounding is the same as previously mentioned.

**MPCA response:** MPCA has made this change in the TJD.

**Comment on the use of rounding in the calculation of the standard values**

The following comment was received related to the rounding method used in the calculation of the water column values of the standard (Table 4, footnote 1 on page 18 of draft TJD).

**Gopher comment (No. 6):** Rounding is not warranted, and method is not scientifically defensible. Please remove MPCA rounding method. Actual value should be 11.3 µg/L. Additionally, the U.S. EPA defined Fish Tissue Criterion values (whole-body 8.5 mg/kg; dry weight) is already conservatively protection of the fish population. Additional conservative rounding measures are not warranted to protect the biotic community.

**MPCA response:** MPCA has removed the footnote. See responses to previous comments, regarding the proposed 11.3 value cited by Gopher.

**Comments on the 90% exceedance value**

The following comments were received related to the 90% exceedance value, which is an intervention concentration that would trigger a review of the SSS. This information was found on pages 21-22 of the draft TJD.

**Gopher comment (No. 7):** Please remove all text regarding and supporting the 90% exceedance and it triggering updating effluent limits when 90% is reached.
**MPCA response:** The comments received in this section about the 90% exceedance (comment 7 and subsequent statements as part of comment 7) relate entirely to the implementation of the standard. They have no impact on the numeric values of the standard, or anything related to the duration or frequency of the standard. MPCA is responding to these comments here to hopefully clarify why MPCA has chosen these implementation measures, but MPCA notes that they have no bearing on the standard that will be submitted for EPA approval.

1. **Gopher statement (No. 7.1):** The 90% intervention concentration does not ensure any level of greater protection than the 100%. The process in which the fish tissue standards were developed already include a level of conservatism so that if the standard values are hit in fish tissue that they trigger an impairment status but does not associate to a significant biotic impact. Once the concentrations are above the standard value, then significant population impacts can begin to associated. Therefore, introducing the 90% is adding unnecessary governance to an already conservative measurement.

**MPCA response:** The determination of reasonable potential and any corresponding water quality based effluent limits (WQBELs) are designed to prevent exceedances of the water quality standard (impairment). WQBELs are concentrations that a facility can discharge in order to prevent the exceedance of a standard (impairment) in the receiving waterbody or downstream. The calculations provide conservative measures that decrease the likelihood of the standards being exceeded. That is the goal of WQBELs – to not get to the point of exceeding the standard (impairment) and causing population impacts, only to then have to correct the problem. Gopher’s comment seems to indicate that it is acceptable to exceed the water quality standard because there may not be an immediate biotic impact. Peer reviewed literature disagrees: “there should be no provision to allow tissue concentration to periodically exceed the criterion value. The concentration-toxicity curve for selenium is very steep, and a small exceedance could cause an exponential increase in death of young fish” (Lemly 2007). This can be even more impactful in species with low reproductive rates, such as sturgeon.

The 90% intervention value would allow MPCA to be able to reassess the bioaccumulation of selenium in the system prior to an exceedance of the standard. If selenium concentrations only go up slightly in the water column (for example, to an average of 5 µg/L), and this results in concentrations in freshwater drum or white bass to reach 90% of the tissue standard, this would be a good indication that the 11 ug/L water column site-specific standard was not appropriate to prevent exceedances of the tissue standard in species other than bluegill. If selenium concentrations in water continued to rise beyond the example concentration of 5 µg/L, as allowed by the higher site-specific water column value, while the tissue concentrations had already exceeded 90% of the tissue standard, it would be negligent for MPCA to not intervene to ensure protection of the tissue standards, and thus prevent biological effects. MPCA could then develop an adjusted bioaccumulation factor and site-specific water column value that would prevent the fish tissue concentrations from continuing to rise and thus exceed the standard. Collection of additional data to support the reevaluation of the standard would take time, and not collecting this information until after the standard was exceeded would lead to an increased likelihood of prolonged biological effects.

2. **Gopher statement (No. 7.2):** NPDES permitting (and similar permitting) often implement an intervention concentration (90% exceedance), however, that is not appropriate for SSS development and is an arbitrary limit.

**MPCA response:** The implementation of the intervention concentration would be in the NPDES permitting process, not included in the site-specific standard. It was included in the site-specific standard document to demonstrate the further protections that would be provided during implementation. This is not an “arbitrary limit” or a limit of any sort, but a value that, if exceeded, would open additional study to ensure that the tissue standard is not exceeded. It has been clarified in the TJD that this is/will be a permitting requirement, not part of the site-specific standard.

3. **Gopher statement (No. 7.3):** It is possible that the foodweb and abiotic factors vary on an annual basis. Therefore, a tissue sample of a species could exceed 90% but be below 100% one year and then the same individuals could be found to be below 90% the next year. Using the 90% trigger in this scenario would cause unnecessary monitoring and/or increased regulation that is not justified.
**MPCA response:** MPCA is trying to ensure that there are protections in place to re-assess the standard given that there is the potential for increased selenium loading due to a higher water column standard than is currently in rule. The current protective water column value is more than twice the current standard in the main channel, which could lead to an increased discharge, due to not having to meet a more restrictive standard. With an increased loading of selenium, certain species of fish could begin to start accumulating greater amounts of selenium.

MPCA’s objective is to prevent an exceedance, and because the site-specific value was calculated to protect a more sensitive, but less bioaccumulative species, MPCA is implementing this 90% trigger value to have the option to re-assess the bioaccumulation prior to an exceedance. Based on the data set collected in 2015, freshwater drum and white bass tissues contain selenium at approximately 44% and 57% of the tissue standard, respectively, on average. Tissue concentrations would have to rise considerably to exceed even the 90% of the tissue standard trigger threshold.

MPCA understands that the selenium accumulations and tissue concentrations could vary year to year, but once the standard is exceeded, the water body would be considered impaired. The tissue standards are instantaneous measurements, never to be exceeded. MPCA’s goal is to prevent the exceedance of the tissue standard, and given the uncertainty in the ability of the water column value to prevent exceedances in species that bioaccumulate greater amounts of selenium, a re-evaluation of the water column value after an increase in tissue concentrations is reasonable. Collection of additional data to support the reevaluation of the standard would take time, and not collecting this information until after the standard was exceeded would lead to an increased likelihood of prolonged biological effects.

**Comments on the implementation of tissue standards**

The following comments were received related to the specifics of the implementation of the tissue standards (page 24 of the draft TJD).

**Gopher comment (No. 8):** Please clarify that 15.1mg/kg, 8.5 mg/kg and 11.3mg/kg concentration limits in fish tissue are average populations means of instantaneous measurement using a minimum of five samples.

**MPCA response:** The specifics of the sampling regime will be further fleshed out at a later time. As indicated in the TJD, MPCA plans to consult EPA implementation guidance and recommendations. These details are implementation measures, not a part of the site-specific standard, and will be further elaborated on in the permit.

**Gopher comment (No. 9):** Please clarify that an instantaneous measurement is the average value of a composite tissue sample following guidance from the U.S. EPA Final Criterion (2016) in how to develop an appropriate composite sample.

**MPCA response:** The specifics of the sampling regime will be further fleshed out at a later time. As indicated in the TJD, MPCA plans to consult EPA implementation guidance and recommendations. These details are implementation measures, not a part of the site-specific standard, and will be further elaborated on in the permit.

**Comments on for additional revisions to the TJD**

The following comments were received asking for specific revisions to the text of the draft TJD.

**Gopher comment (No. 10) revision request:** Please change the word ‘significant’ to ‘statistically significant’ on page 16, 3rd paragraph of the Section titled “Habitat and seasonal variations”. There is a difference between statistically significant and ecologically significant. Without further definition, the reviewer is uncertain and led to assume.

**MPCA response:** The differences being statistically significant was clarified in the TJD.

**Gopher comment (No. 11) revision request:** Please revise the 2nd and 3rd paragraphs in the Section titled “History of site-specific standard development” on Page 10 of the TJD. Provided below is the suggested revision. Underlined text is newly added text and strike out text should be deleted.
Gopher employs a ferrihydrite adsorption and iron co-precipitation treatment technology at the Eagan facility, which is the best available technology for selenium removal from water (identified by the U.S.EPA). In the early 2000s, Metropolitan Council Environmental Services (MCES) approached Gopher about selenium in their discharge. After which, Gopher began process review to identify sources of selenium and research/bench test selenium removal technologies. In 2013, the MPCA recommended that the Seneca WWTP (operated by Metropolitan Council Environmental Services – MCES) receive permit effluent limits protective of the 5 μg/L Class 2B aquatic life and recreation selenium criterion. In order to comply with the proposed effluent limits, MCES developed a compliance schedule for reduction of Gopher’s selenium discharge. On August 30, 2013, Gopher notified MCES that it would not be able to meet the compliance schedule requirements to submit design plans by December 31, 2013, because it had not been able to identify a viable treatment technology for removing selenium. By 2013, Gopher had completed reviews of approximately forty potential selenium treatment technologies that could be implemented and found three proprietary technologies to be evaluated further. Also, Gopher voluntarily began daily monitoring and reporting of selenium to MCES. From 2013 to 2015, various process changes were implemented to reduce selenium loading and meet the revised MCES Stipulation Agreement (Agreement) requirements put in place in February 2015.

The Agreement provided a schedule by which Gopher was to undertake certain efforts to reduce selenium in its effluent. Gopher is pursuing the selenium reduction schedule, as provided in Section 5 of the Agreement, and is also pursuing an SSS application to the Minnesota Pollution Control Agency (MPCA), as provided in Section 7 of the Agreement. Gopher and MCES ultimately entered into a stipulation agreement, allowing Gopher to apply for a site-specific selenium standard in the Minnesota River. Gopher subsequently applied for a site-specific selenium standard in December 2015 (Wenck 2015), based on data collected in 2015, consisting of selenium concentrations in fish tissue, surface water, sediment and suspended particulate matter. MPCA had some concerns about the suitability of the data to properly characterize the Minnesota River site.

MPCA response: Revisions were made, as appropriate, to clarify.

Gopher comment (No. 12) revision request: The statement "Additionally, if Seneca discharged 132 mg/L, they would exceed the SSS main channel standard (11 mg/L) during low flow conditions." on Page 23 the last paragraph of proceeding section should be revised. The recommended revision should read "Additionally, if Seneca discharged 132 mg/L, they would exceed the SSS main channel standard (11 mg/L) during low flow conditions (30Q3)."

MPCA response: The revision was made.
References used in MPCA responses to comments


