

## MEMORANDUM

**DATE:** May 3, 2024

**TO:** Greg Haller, Environmental Protection Policy Analyst, NWIFC  
Fran Wilshusen, Director of Environmental Protection Services, NWIFC

**FROM:** Eric Rosenblum, PhD, Senior Toxicologist, RIDOLFI Inc.  
Bill Beckley, Principal Scientist, RIDOLFI Inc.

**SUBJECT: Focused Review of Selected Contaminants in Washington State's Proposed Updates to Aquatic Life Toxics Criteria**

The Northwest Indian Fisheries Commission (NWIFC) contracted with RIDOLFI Inc. (Ridolfi) to perform a technical review focused on specific contaminants evaluated within Washington State's *Proposed updates to Aquatic Life Toxics Criteria*. Specifically, Ridolfi conducted a review of the State's decisions not to adopt numeric criteria for iron, hydrogen sulfide, and heptachlor epoxide; not to adopt draft criteria for PFOS and PFOA; and to adopt state-specific criteria for 6PPD-quinone. Also, at the NWIFC's request Ridolfi provided general comments regarding the addition of new footnotes for human health criteria to the State's Toxic Substances Criteria table.

### **SUMMARY OF TECHNICAL REVIEW**

**Iron:** We agree with Washington's decision not to adopt the Environmental Protection Agency's (EPA's) recommended criterion for iron. This criterion has not been adopted by Oregon or Idaho; however, the biological evaluation results for the Swinomish Tribe's aquatic life toxics criteria concluded that the EPA's recommended value for iron is likely to adversely affect (LAA) biological resources.

We recommended that additional detail be added to the technical support document (TSD) detailing whether new aquatic studies available in the EcoTox database were reviewed and why the LAA determination for iron did not trigger a review of alternative approaches for the development of criteria.

**Hydrogen Sulfide:** We agree with Washington's decision not to adopt EPA's recommended criterion for hydrogen sulfide. The biological evaluation results for the Swinomish Tribe's aquatic

life toxics criteria concluded that the EPA's recommended value for hydrogen sulfide is likely to adversely affect (LAA) biological resources. The TSD should explain why the LAA determination for hydrogen sulfide did not trigger a review of alternative approaches for the development of criteria.

**Heptachlor Epoxide:** We do not believe that Washington's decision not to adopt EPA's recommended criteria for heptachlor epoxide is adequately supported. Heptachlor epoxide is a priority pollutant, and as such the State does not provide adequate rationale for not adopting numeric criteria for this pollutant as required by the Clean Water Act.

**PFOS and PFOA:** After reviewing the EPA's draft aquatic life criteria AWQC for PFOS and PFOA we agree with Washington State's decision to not adopt the EPA's draft recommendations for freshwater acute and chronic criteria and a saltwater acute benchmark value. However, there are other states that have developed alternative criteria for these compounds which may serve as alternative criteria or outline approaches that Washington State could take to develop state-specific values.

**6PPD-Quinone:** We found no issues with the State's approach to develop a state-specific acute criterion for 6PPD-Quinone.

## **SPECIFIC COMMENTS**

### **Iron**

After review of the available aquatic toxicity data for iron, we agree that the EPA's published aquatic life ambient water quality criteria (AWQC) for iron does not meet the requirements outlined in the *Proposed updates to Aquatic Life Toxics Criteria, WAC 173-201A-240 Technical Support Document* (TSD). Specifically, the EPA chronic AWQC value for iron was developed using very limited data in 1976 and does not meet the minimum data requirements for the eight-family method or alternative methods. It should be noted that the biological evaluation results for the Swinomish Tribe's aquatic life toxics criteria concluded that the US EPA's AWQC value for iron is likely to adversely affect (LAA) biological resources. As stated in the TSD "If there were LAA determinations or jeopardy calls in Idaho and Oregon for similarly listed species in Washington, then evaluate the new science since EPA last updated national recommendations".

Review of available aquatic data within the EPA EcoTox database indicates that numerous acute and chronic studies using iron and iron oxide have been conducted since 1976; however, the technical support document does not indicate whether these studies were sufficient to meet the requirements for development of an AWQC value. In addition, there does appear to be some new scientific approaches for the development of aquatic life AWQC for iron that may be useful

in Washington State's data review. For example, the Canadian government has established Federal environmental quality guidelines for iron using modeling (CCME 2019) and Cadmus (2018) proposed a chronic water quality criterion for iron using single species and mesocosm data.

Additional detail should be added to the TSD detailing if the new aquatic studies available in the EcoTox database were reviewed and why the LAA determination for iron did not trigger a review for alternative approaches for the development of criteria.

### **References**

CCME 2019. Federal environmental quality guidelines – Iron Official title: Federal environmental quality guidelines – Iron Environment and Climate Change Canada. Available at <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/federal-environmental-quality-guidelines-iron.html#toc7>

Cadmus 2018. Chronic Toxicity of Ferric Iron for North American Aquatic Organisms: Derivation of a Chronic Water Quality Criterion Using Single Species and Mesocosm Data. Available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5893738/>

### **Hydrogen Sulfide**

After review of the available aquatic toxicity data for hydrogen sulfide we agree that the EPA's published AWQC for the compound does not meet the requirements outlined in the TSD. Specifically, the US EPA chronic AWQC value for hydrogen sulfide was developed in 1986 using very limited aquatic toxicity data which does not meet the minimum data requirements for the eight-family method or alternative methods.

Following a review of available data collected after 1986 using the EPA EcoTox database, we found only one additional aquatic toxicity test was conducted in a standard test species (*Chlamydomonas reinhardtii* Green Algae) and concluded that additional data is not sufficient to support the derivation of an AWQC for hydrogen sulfide. It should be noted that North Carolina Division of Water Resources Surface Water Quality Standards, Criteria & Protective Values includes an aquatic life criteria value for hydrogen sulfide (0.21 ug/L) that was published in 2007 and is lower than the EPA's chronic value (2 ug/L). This lower value was developed using the lowest available LC<sub>50</sub> value for the compound with an adjustment value and does not meet the requirements for development of an AWQC as outlined in the TSD.

## **Heptachlor Epoxide**

The TSD states: *"EPA recommendations for heptachlor epoxide are based on toxicity studies for heptachlor. Heptachlor is the parent component of the metabolite heptachlor epoxide. Metabolites or degrades of parent compounds do not have the same chemical structure and can result in toxicity greater or less than a parent compound. There is uncertainty regarding aquatic life species sensitivity to heptachlor epoxide."* This conclusion, however, is not supported by the US EPA's Ambient Water Quality Criteria for Heptachlor which indicates *"heptachlor epoxide, which is of comparable toxicity to heptachlor but more stable in biological systems."* Similar statements can also be found in the 2011 Heptachlor/Heptachlor epoxide Environmental Quality Standards (EQS) dossier; it is stated that *"The lowest ecotoxicological data is a 96h-LC50 for Penaeus duorarum. It can be noted that for this individual test assessing the effects of both heptachlor and heptachlor epoxide, there is no apparent difference of toxicity between the two substances"* (EU 2011). Therefore, it is recommended that specific referenced details be added to the TSD to support the conclusion that the EPA's recommended aquatic life criteria AWQS for heptachlor epoxide has not been adopted by Washington state as it may be under conservative.

In addition, the TSD states that *"EPA recommendations for heptachlor epoxide does not use EPA 1985 standard methods for deriving toxics and are based on limited toxicity studies."* It is recommended that additional detail be added to explain why the difference between the US EPA 1980 criteria which was used for the development of the AWQC for the compound and the derivation procedures from the 1985 Guidelines prevents the use of this value. Specifically, it appears that many states are able to use the heptachlor/heptachlor epoxide AWQC value developed using 1980 criteria by simply halving the 1980 criterion value so that it is applicable to the 1985 averaging times.

## **References**

US EPA 1980. Ambient Water Quality Criteria for Heptachlor. Available at  
<https://www.epa.gov/sites/default/files/2019-03/documents/ambient-wqc-heptachlor-1980.pdf>

WHO 1984. Environmental Health Criteria 38 Heptachlor. Available at  
<https://iris.who.int/bitstream/handle/10665/37298/9241540982-eng.pdf>

EU 2011. Heptachlor/Heptachlor epoxide EQS dossier 2011. Available at  
<https://circabc.europa.eu/sd/a/53641c85-d467-4c03-9100-b5fddf8bbfce/Heptachlor%20EQS%20dossier%202011.pdf>

## **PFOS and PFOA**

After reviewing the EPA's draft aquatic life criteria AWQC for PFOS and PFOA we agree with Washington State's decision to not adopt the EPA's draft recommendations for freshwater acute and chronic criteria and a saltwater acute benchmark value. It should be noted that there are other states that have developed alternative criteria for these compounds which may serve as alternative criteria or outline approaches that Washington State could take to develop state specific values in the interim. While the TSD does not provide the rationale for why Washington State has chosen not to adopt the recommended criteria, the conclusion made in this review is based on the following:

- For draft PFOA and PFOS acute freshwater criteria and PFOA chronic freshwater criteria, EPA has elected to calculate values without achieving the eight minimum data requirements (MDRs) recommended in the 1985 Guidelines. In this case, US EPA has not obtained sufficient quantitative insect study data typically required for criterion calculation. Failure to meet minimum data requirements (particularly for insect data) and other deviations from criteria calculation methods established in EPA's 1985 Guidelines may result in freshwater acute criteria for PFOA and PFOS and water column chronic criteria for PFOA that are under protective.
- It appears that the draft PFOS criteria are based on the inclusion of Non-North American Species in aquatic life AWQC derivation.
- EPA states in the draft AWQC that it has, in certain instances, chosen to diverge from the 1985 Guidance and, in the future, it will update the 1985 Guidelines to reflect the permissibility of these new, divergent practices. . However it appears that, EPA has not substantiated the scientific soundness of the new methods it proposes to use in the draft AWQC.
- The EPA draft criteria values do not sufficiently quantify or account for the bioaccumulative effects of PFOA or PFOS to issue freshwater chronic tissue criteria. The effects of PFOA and PFOS bioaccumulation are not adequately reflected in the PFOA and PFOS freshwater chronic criteria and the criteria values should provide more specific details to explain why 95 percent of freshwater genera would be protected using a 20th percentile Bioaccumulation Factor (BAF) value.
- Approved analytical methods are not yet available to determine compliance.

### **6PPD-quinone**

No issues were identified regarding the TSD approach used to develop an acute AWQC for 6PPD-quinone. However, it appears that the decision to develop a criterion value for this compound, using alternative methods, is not consistent with the decision to not adopt or not develop alternative state-specific criteria for other data-poor toxic substances. For example, it appears that no effort was made to use alternative methods to develop an AWQC value for iron, hydrogen sulfide, or PFOS/PFOA. Therefore, to ensure transparency and consistency in the approach used throughout the documents, it is recommended that the TSD clearly indicate why alternative approaches are used to develop AWQCs for 6PPD-quinone while other compounds are not similarly addressed.

### **GENERAL TSD REVIEW COMMENT**

Following our review of the TSD we suggest that additional text be added that would clearly outline why alternative approaches in developing criteria are used for some compounds (e.g. 6PPD) while the State has decided to not develop criteria using alternative approaches for other compounds (e.g. heptachlor epoxide, iron). It is our opinion that the decision-making matrix for when numeric criteria are developed using alternative approaches should be clearly outlined for all compounds for which a not to adopt decision was made. This addition to the text would be helpful to ensure that the approach implemented in TSD is both clear and transparent.

### **HUMAN HEALTH CRITERIA**

While not the subject of this rulemaking effort, in updating the Toxic Substances Criteria table (Table 240, WAC 173-201A-240) the State has added footnotes for the human health criteria in Table 240, including footnote H, which states "Human health criteria applicable for Clean Water Act purposes in the state of Washington are contained in 40 C.F.R. 131.45 and effective as of December 19, 2022 (87 FR 69183)." The criteria values in the table that include this footnote have been disapproved by EPA and are not valid for Clean Water Act purposes. We recommend that as part of this update Ecology also update the values for human health criteria to reflect the federally promulgated criteria that are applicable.