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April 1, 2010

Water Docket

U.S. Environmental Protection Agency

EPA Docket Center (EPA/DC)

MC 28221T

1200 Pennsylvania Avenue, NW

Washington, DC 20460

Via Electronic Mail: OW-Docket@epa.gov

RE: DOCKET EPA-HQ-OW-2009-0921 – Draft 2009 Update Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater

Dear Sir or Madam:

NACWA appreciates the opportunity to comment on the U.S. Environmental Protection Agency's (EPA or Agency) notice of data availability of draft criteria and request for scientific views relating to the Agency's proposed revisions to the aquatic life ambient water quality criteria for ammonia (December 30, 2009; 74 *Fed. Reg.* 69086; Docket No: EPA-HQ-OW-2009-0921). Many of NACWA's nearly 300 public wastewater treatment agency members will be affected by the proposed revisions to the water quality criteria for ammonia and the Association therefore has an interest in the science underlying the new values and the implementation of the new criteria.

Since EPA's first announcement in 2004 that it might revise its existing ammonia criteria, NACWA has raised concerns over the freshwater mussel toxicity data EPA planned to use to revise the criteria. EPA has provided NACWA with several opportunities to interact with key staff over the past several years to gain a better understanding of the new scientific information it was considering. Last summer, in a meeting with NACWA, EPA indicated that it had collected additional data confirming the sensitivity of freshwater mussels to ammonia and that it would rely less on the data with which NACWA had raised concerns. Though the December 2009 proposed revisions confirm that EPA has addressed many of NACWA's previous comments, several technical and implementation-related issues remain.

NACWA members have expressed concern that many states have just recently adopted the 1999 ammonia criteria, and that some facilities are in the process of planning or implementing major plant improvements that will not be able to meet



new, more stringent criteria. Even those facilities that currently employ modern nitrification/denitrification processes are concerned that they may not be able to meet more stringent limits without further process refinements and flow equalization to prevent ammonia breakthrough at all flow regimes. For those facilities that rely on chloramination for disinfection, in some cases to minimize the formation of disinfection byproducts, the reduced ammonia concentrations will likely require those facilities to switch to UV disinfection. As NACWA has highlighted since 2004, how these more stringent criteria will be implemented remains the most critical issue. In addition to technical comments on the proposed criteria revisions, several of these implementation challenges are discussed below.

Comments on Revised Criteria

NACWA Commends EPA for Establishing Bifurcated Criteria

NACWA supports the use of tiered criteria to provide a greater degree of protection to freshwater unionid mussels where appropriate. In establishing the bifurcated criteria, that apply the more protective numbers only where unionid mussels are present, EPA has addressed one of NACWA's major implementation concerns. Some changes, however, are needed in the criteria document to clarify the scope of the criteria. The introductory text of the criteria guidance document clearly notes that the ammonia criteria are being revised to specifically protect mussels from the family Unionidae. However, within the text of the criteria themselves, there is only reference to freshwater mussels. Freshwater mussels in the U.S. are represented by indigenous species beyond those of the family Unionidae (i.e., the Unionoid family Margaritiferidae) and also by invasive species, such as Zebra mussels and Quagga mussels. As protection of the Unionidae family is apparently the intent of the more protective criteria, this clarification is necessary in the criteria statements on pages 37 – 38.

NACWA Agrees With Decision to Exclude Certain Data Sets

Exclusion of larval mussel data

NACWA agrees with the decision to exclude this data. The uncertainty surrounding the duration of exposure for the larval stages of individual species is unacceptable for the derivation of aquatic life criteria. Until more is known, these data cannot be considered representative of in-stream exposures.

Exclusion of Hyallella data

NACWA agrees with the decision to exclude this data. There is still a great deal of uncertainty with regard to testing and culturing requirements for this species. Variability in the characteristics in culturing and dilution water has been shown to affect survival rates. It is important to optimize testing and culturing conditions in order to isolate the effect of a given toxicant. This does pose the question of how Hyallella data may be affecting other criteria. EPA should recognize in this document that use of data for this species may also introduce unacceptable uncertainty in the derivation of other water quality criteria. EPA should also ensure that the logic used to make this decision is consistently used in all criteria development documents; this would be best suited through guidance.

Exclusion of juvenile chronic data (growth)

NACWA agrees with the decision to exclude the 28-day chronic toxicity data for juvenile mussels with respect to growth. The *Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses (Guidelines)* do not support the use of an early life cycle test for invertebrates. Unless corollaries can be made between 28-day juvenile mussel tests and a partial life cycle or full life cycle test, then this data cannot be

used. There is currently too much uncertainty in assessing the impact of relatively short-term impairments on the chronic long-term health of an organism.

Juvenile Mussel Data from Tests without Sediment Should Not Be Included

Much of the mussel data included is collected from exposure tests in which sediment was not included as a component of the test dishes. Newton and Bartsch (2007) demonstrate in their study that juveniles tested without sediment did not grow well in a 96-hour acute study (control and treatments). This indicates that the organisms were stressed and this stress may impart a bias on the survival data by making the organisms more sensitive to ammonia. There is a paucity of data directly comparing the effects of sediment presence and absence on survival. Toxicity tests must only represent the stress induced by the single criterion parameter for which water quality criteria are being developed. Therefore, until more data are available, juvenile tests of any duration with these mussels must include sediment in the test vessels if their resulting data are to be used in the derivation of water quality criteria.

NACWA Questions Use of Invasive Species Data in Criteria Calculation

Two invasive species, the Asian clam (*Corbicula fluminea*) and the New Zealand mud snail (*Potamopyrgus antipodarum*), are among the most sensitive species used in the calculation of the Criteria Maximum Concentrations (CMC). Both the Asian clam and the New Zealand mud snail (NZMS) are considered exotic invasive species. These species appear on invasive species lists in a number of states, including Georgia, Massachusetts, Colorado, Florida, Montana, Utah, and Idaho. Efforts to control and remove these species continue nationwide. In fact, the environmental damage and loss caused by all invasive species in the United States totals approximately \$137 billion dollars per year (Pimentel *et al.* 2000). The use of these species, which could be considered biological pollutants, to set criteria for a chemical toxin seems counterproductive even if the toxicology studies are valid. Utilizing any invasive exotic species to set criteria implies that the species deserve protection by EPA.

The Asian clam is the only fresh-water representative of the Family *Corbiculidea* in North America (James H. Thorp 1991). According to the Integrated Taxonomic Information System, the only other genus of this Family is *Polymesoda* (January 25, 2010, from the Integrated Taxonomic Information System (ITIS) on-line database, <http://www.itis.gov>), an estuarine species unregulated by freshwater criteria development. This raises the question of what similar species are being protected by using the Asian clam in the development of these criteria. The NZMS is the only representative of its genus in North America (January 25, 2010, from the ITIS). Neither the Asian clam nor the NZMS are of commercial or recreational importance (Lorek *et al.* 1999). In fact, both are commercially, recreationally, and environmentally harmful.

NACWA recommends that EPA carefully consider the precedent set by including these invasive species in the criteria calculation. NACWA recommends removing these data from the acute criteria calculations and utilizing the next most sensitive species in Table 3 of the criteria to replace them. The Unionidae-present CMC would increase approximately 3 percent and the Unionidae-absent CMC would increase approximately 30 percent. Removing these species would not affect either Criteria Continuous Concentration (CCC). If it is determined that the data will be used for criteria derivation, then implementation guidance should make it clear that the species should not be used in actual implementation of the criteria. For example, if site specific criteria are developed, presence of these species would not require protection above what is necessary for native species.

Sparks and Sandusky (1981) Data Should Not Be Included

After review of the original Sparks and Sandusky (1981) report, NACWA has concerns about the inclusion of these data for the fingernail clam, *Musculium transversum*, in the chronic data set. The chronic values between this and an earlier study on the same species differ by nearly an order of magnitude. The authors cite two potential causes for the higher degree of sensitivity relative to the earlier work by Anderson et al (1978). One suspected cause is a lower dissolved oxygen saturation level in the later study. The second possible cause is that the clams in the later study were likely pre-exposed to ammonia at their collection site. In the work by Anderson et al (1978), the clams were collected from the Keokuk pool in the Mississippi River in 1975. The ammonia levels at the time of collection were low and the population was abundant. The authors note that in subsequent years (1976-1977) there was an increase in ammonia concentrations and the population of clams declined in this area. The organisms for the Sparks and Sandusky study were collected in 1980 from this same area of the Mississippi. Sparks and Sandusky note that ammonia levels were “generally high” less than 6 months prior to clam collection. The authors then express concern that the combined effects of low dissolved oxygen and the previous exposure to ammonia, both of which are known to increase the sensitivity of gills to ammonia, contributed to the greater mortality rates seen in this later study. The *Guidelines* expressly state that data should be excluded if organisms “...were previously exposed to substantial concentrations of test material”. This is clearly the case with the Sparks and Sandusky study and these data, therefore, should not be included in the chronic data set.

Use of Water Column Ammonia for Sediment Dwelling Species Raises Concern

Mussels can dwell on, in and below sediment surfaces and their route of exposure to water column ammonia can potentially be that of full-body, siphoning of surface waters, or no exposure when they are buried below sediment. The draft criteria are based on ambient water column pH and temperature that may not reflect sediment exposure conditions for mussels. Sediment pH is commonly lower than that of ambient waters and measured receiving stream pH and temperature will likely not accurately reflect ambient exposure conditions for mussels.

Key Table Missing from Current Draft

Typically criteria documents include a table which lists in rank order the Genus Mean Chronic Values (GMCVs). This table is not present in this criteria document. Though the information is available in other parts of the document, it is useful to have this information consolidated in one table that clearly indicates the ranked order of each genus.

Implementation Concerns

In the proposal, EPA has addressed one of NACWA’s top implementation concerns by establishing bifurcated criteria based on whether unionid mussels are present. However, no details are provided in the criteria document as to how this determination will be made. EPA only notes in the criteria document that based upon the literature, it appears that many states in the continental U.S. have freshwater mussel fauna in at least some of their waters. Where it is determined that the more stringent criteria must be met, clean water agencies will have difficulty meeting the new, lower numbers and their efforts to comply will result in other operational impacts. Given the complexity of the tiered criteria and the potential impacts on clean water agencies, NACWA believes that detailed implementation guidance is needed before the criteria can be finalized. EPA

representatives have indicated that implementation guidance will be released with the final criteria, but NACWA believes that any guidance must be released for public review and comment before the final criteria are released.

EPA should consider the following implementation impacts and concerns as it works to finalize the criteria and as it develops implementation guidance:

- Current treatment units – Many NACWA members predict that they will need to make improvements in even the most modern nitrification/denitrification units currently in use to comply with any more stringent criteria. Small wastewater systems still using lagoon-based treatment will incur additional costs due to the required construction of mechanical plants to achieve the more stringent levels.
- Lower ammonia concentrations will affect chloramination used for disinfection – Lower ammonia concentrations will make chloramination less effective to the point where it may no longer meet their disinfection requirements. For some wastewater utilities that are involved in reuse projects, the generation of disinfection byproducts prevents them from using free chlorine. If chloramination is rendered ineffective, they will have to use UV disinfection. UV disinfection will be very expensive to implement at larger wastewater treatment facilities and will dramatically increase the electric power requirements and carbon footprint of those facilities.
- Lower limits will result in less room for error or biological upset – Operating biological nutrient removal (BNR) facilities can present a challenge when faced with operational or biological excursions. This is especially true when the room for error is very small – as would be the case with significantly more stringent ammonia limits. A BNR facility is more sensitive to fluctuations and returning it to the desired biological environment could take days to re-establish the balance between the anoxic, anaerobic and oxic zones required to achieve BNR. Upsets could also affect denitrification and/or phosphorus removal. Current facilities would need to make adjustments in operations. These adjustments could be as easy as operational changes, more chemical use or as significant as capital expenses, ranging from adding blowers to adding extra tankage, a major capital expense.
- Some of the most sensitive mussels have habitat requirements specific to small rivers while others only exist in large river systems. Given the specific distributions and known habitat requirements for the various freshwater mussel species, EPA should provide additional guidance on the appropriate use of the Recalculation Procedure to derive site-specific ammonia criteria and encourage states to use it to avoid misapplication of the new criteria.
- The current and historical range of the endangered eastern U.S. freshwater mussel species used to develop the revised criteria does not extend to the western U.S. Additionally, pH and temperatures frequently exceed 8.0 and 25°C, respectively, in some western receiving waters. Implementation of the criteria should take these unique water characteristics into account.
- Many treatment plants discharge to effluent dominated water bodies, where little or no dilution credit is provided in determining water quality based effluent limits. This is an especially acute problem in the

arid west. Application of a “mussels present” criterion will have significant compliance ramifications for these plants.

- Determining whether mussels are present will be a key implementation issue. Again, NACWA understands that the criteria were developed for the protection of mussels in the family Unionidae, and is recommending that EPA make this clear in the final criteria document and forthcoming implementation guidance. NACWA’s members have raised a number of questions regarding the details of the “unionid mussels present” determination. Will historic distribution of mussels (mussels that were present in the past) be considered? In other words, are the criteria designed to protect unionid mussels or unionid mussel habitat? This raises additional questions discussed below regarding other confounding factors and the appropriate use of non-native species information. Also, will mussel populations that would not be present if not for the wastewater discharge (e.g., effluent dominated waterbodies) be considered? These and other issues must be addressed in any implementation guidance.
 - NACWA believes it is inappropriate to allow non-native organisms to drive the determination of whether a particular stream reach provides a suitable habitat for sensitive organisms. Though the data may support their use as surrogates from a toxicological standpoint, this does not automatically translate to defensible use of non-native species to determine habitat acceptability for native species. The use of these non-native surrogate species is likely to increase in the coming years and the potential exists for a conflict between the use of non-native species for criteria development and their presence in the water as a sensitive organism (i.e., freshwater mussel, early life stage, etc). EPA must develop guidance which clearly outlines the acceptable use of non-native organisms in criteria development and implementation.
 - For many waterbodies, a very real question exists whether the return of Unionid mussels would result from changes in ambient ammonia concentrations due to other non-effluent related factors including habitat destruction, introduced species, and water availability. For these waters, where ammonia may not be the most limiting impact, the issue of “mussels present” is further complicated.

NACWA appreciates the opportunity to provide EPA with input on its draft revised criteria for ammonia. Please contact me if you have any questions about this information.

Sincerely,



Chris Hornback

Senior Director, Regulatory Affairs

REFERENCES

James H. Thorp, A. P. C., Ed. (1991). Ecology and Classification of North American Freshwater Invertebrates. San Diego, CA, Academic Press Inc.

Lorek, H. and M. Sonnenschein (1999). "Modelling and simulation software to support individual-based ecological modelling." Ecological Modelling **115**: 199-216.

Pimentel, D., L. Lach, et al. (2000). "Environmental and economic costs of nonindigenous species in the United States." Bioscience **50**(1): 53-65.