North American Metals Council
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October 25, 2017

Via Docket Submission

Ms. Diana Eignor
U.S. Environmental Protection Agency
Mail Code 4304T
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: Request for Scientific Views: Draft Updated Aquatic Life Ambient Water Quality Criteria for Aluminum in Freshwater; Docket No. EPA-HQ-OW-2017-0260

Dear Ms. Eignor:

The North American Metals Council (NAMC)[1] is pleased to submit these comments in response to the U.S. Environmental Protection Agency's (EPA) request for scientific views on its "Draft Updated Aquatic Life Ambient Water Quality Criteria for Aluminum in Freshwater" (Notice of Availability, 82 Fed. Reg. 35198 (July 28, 2017), Docket No. EPA-HQ-OW-2017-0260). In addition to the points set forth below, NAMC supports and incorporates by reference here the positions and views expressed in comments submitted by the Aluminum Association. We are encouraged and extremely supportive of the EPA effort to endorse a bioavailability-based model in deriving the revised aluminum criteria and to consider site-specific water quality conditions in the development of those criteria. Our comments below are aimed at insuring implementation can be done in a manner that is both scientifically defensible and acceptable to the States.

- **Test Methods for Aluminum in Water** -- EPA notes in the draft criteria that natural waters contain mineral particulate forms of aluminum that are

[1] NAMC is an unincorporated, not-for-profit organization serving as a collective voice for the North American metals producers and users. NAMC has been a leading voice for the metals industry on science- and policy-based issues affecting metals. Our organization has worked closely with the U.S. federal and international agencies to address risk assessment issues that are unique to metals and various stages of their lifecycle -- sourcing, production, engineering, use, recycling, and recovery.

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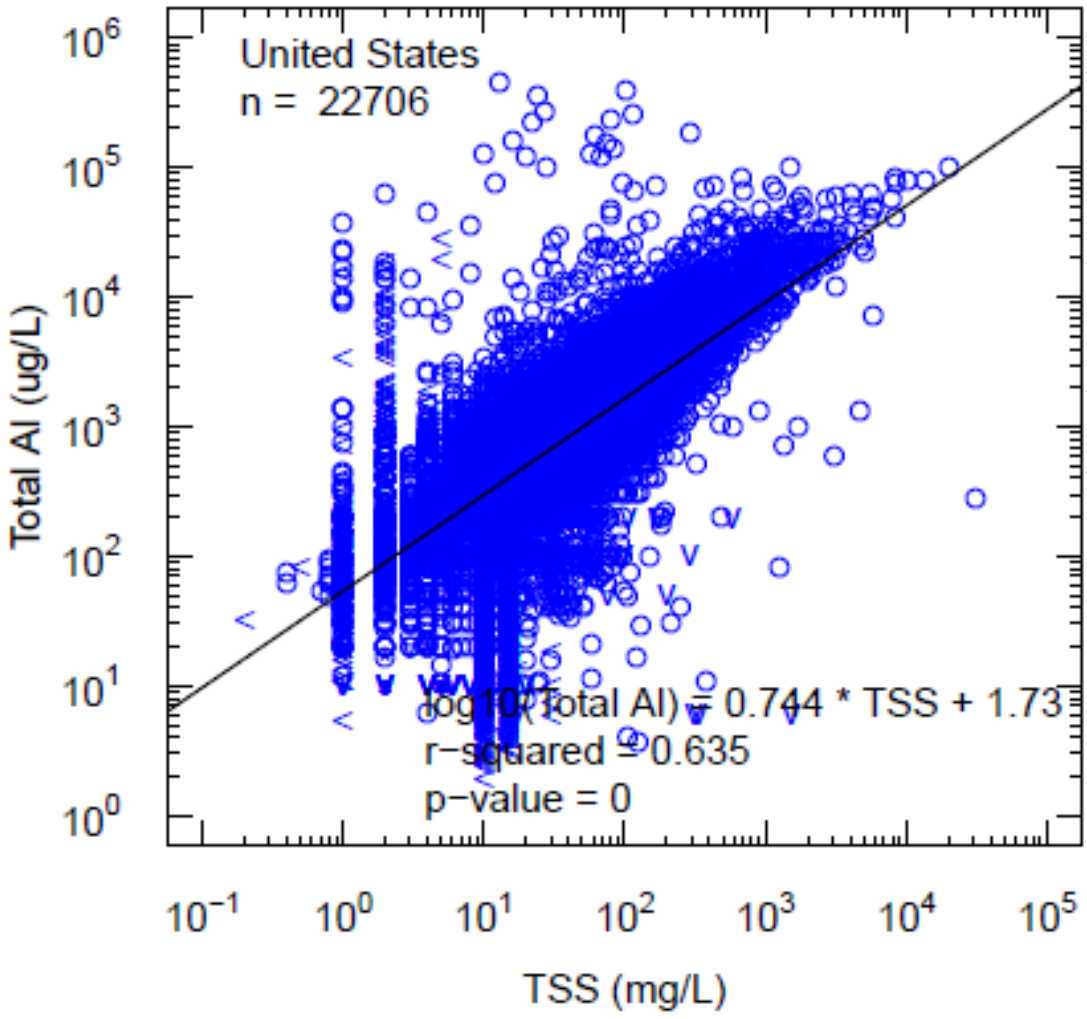
subject to measurement uncertainty when using "total recoverable" measurements of aluminum. This is a critical issue and further guidance from EPA is needed in managing this uncertainty in interpreting the toxicity data and applying aluminum criteria. The extrapolation of laboratory toxicity data for aluminum to regulatory criteria implementation in natural waters has long been problematic due to the complex chemistry of precipitated and solid phases of aluminum. The methods for total recoverable aluminum use a strong acid digestion resulting in an overestimation of the potential risks of toxicity to aquatic organisms due to the overly aggressive digestion procedure, which captures the mineral phases of aluminum that are normally non-bioavailable in the environment. This analytical procedure has resulted in numerous waters across the U.S. being listed as impaired for aluminum when in actuality the aluminum comes from the solids and is non-toxic. NAMC is concerned that absent further EPA explanation and guidance in this area, there will be numerous false positive outcomes in the implementation of the criteria generated because the total recoverable aluminum concentrations will exceed the criteria, whereas the true bioavailable concentration of aluminum would not exceed the criteria. Below, we provide further details on the magnitude of the issue of aluminum derived from suspended solids using a strong acid digestion, as well as our recommendation on an analytical approach to solve this issue. The multi-linear regression (MLR) approach is a step in the right direction and will alleviate some of the problems due to the fact that the criterion will go up for neutral and alkaline waters. Slightly acidic natural waters, which are high in suspended solids, however, will not be able to meet the new proposed criteria.

- **Implications Arising from the Use of Total Recoverable Aluminum** -- A review of data available in the United States Geological Survey (USGS) - National Water Information System (NWIS) for total aluminum, dissolved aluminum, and total suspended solids (TSS) to evaluate the relationships across U.S. waters shows little or no relationship between dissolved aluminum versus TSS. A strong relationship exists, however, between total aluminum and TSS based on 22,607 samples. (*See* Figure 1 below.) If one draws a line across the Figure at 87 µg/L, it is clear that more than 85% of the national surface waters would not be able to meet

the current chronic water quality standard (87 µg/L). A standard of 400-500 µg/L would have to be adopted to achieve 50% compliance for the waters in this data set. Whichever standard value is considered, it is clear that the aluminum value is derived from the TSS and would not be bioavailable, since strong acid digestion was required to release the aluminum.

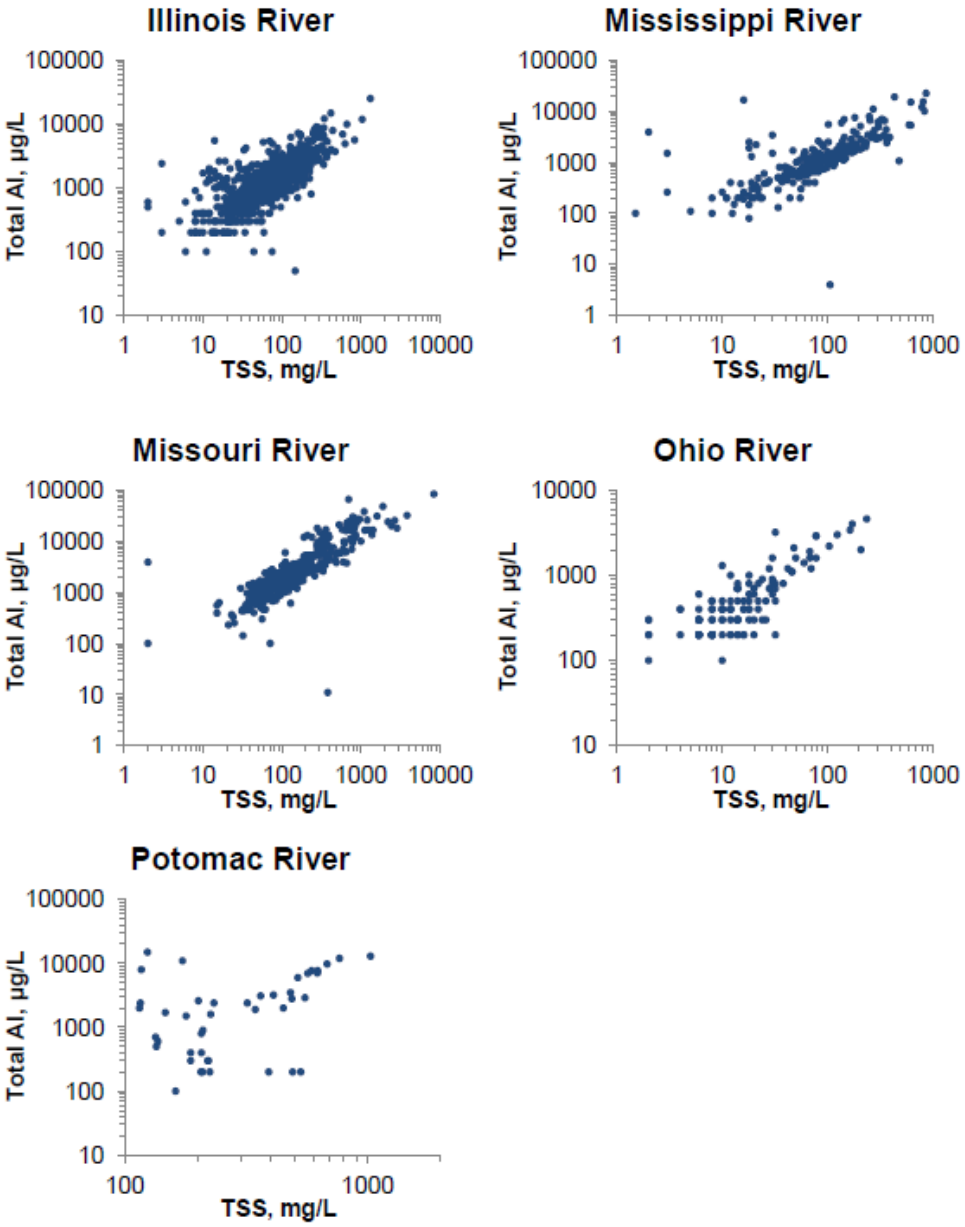
Figure 1



Also presented are data for total aluminum versus TSS from five major U.S. rivers: Illinois, Mississippi, Missouri, Ohio, and Potomac Rivers (Figure 2). As shown, these five rivers cannot meet the current water quality standard of 87 µg/L. Furthermore, the TSS levels are high enough

that even with the proposed draft aluminum criteria based on the MLR, each of these rivers would still not meet water quality standards and would therefore need to be listed as impaired under Section 303(d) of the Clean Water Act.

Figure 2


Illinois River
Total Al, µg/L
TSS, mg/L
Mississippi River
Total Al, µg/L
TSS, mg/L
Missouri River
Total Al, µg/L
TSS, mg/L
Ohio River
Total Al, µg/L
TSS, mg/L
Potomac River
Total Al, µg/L
TSS, mg/L

These data clearly demonstrate the need for an analytical method that measures bioavailable aluminum, and not the aluminum contained in TSS. A manuscript outlining a method to measure bioavailable aluminum is in preparation, with the goal of establishing a modified method of analysis. In the interim, however, it would be extremely helpful if EPA reverted to the language in the 1988 aluminum criteria document, citing the acid-soluble method (EPA 1991; method 200.1) as the recommend method for implementation, which EPA has done in the past. This EPA action would accomplish three things: (1) it would take the emphasis off total recoverable aluminum; (2) it would open the door to a subsequent adoption of a modified version of this method using a less stringent extraction procedure designed to measure only bioavailable aluminum; and (3) it would reduce the likelihood of anti-degradation and/or anti-backsliding claims. Failure to do this will have significant implication for the States to adopt and implement the draft criteria approach.

- **New Analytical Method** -- NAMC believes a new analytical method is needed that measures only bioavailable aluminum. NAMC is aware that there is a method under development, which is a modification to the acid soluble test described in the existing EPA 1988 national aluminum criteria, that uses a pH 4.0 extraction method to obtain bioavailable aluminum fractions. The method is being prepared for publication and will be made available to EPA in the near future. We believe a more thorough discussion by EPA of the uncertainties regarding the use of total recoverable aluminum concentrations in natural waters and the possibilities offered by a modification to the test method would help inform the ultimate implementation of the revised criteria and facilitate its implementation in the future.

MLR Modeling Approach

NAMC supports the EPA proposal to update the ambient water quality criteria for aluminum as the current approach uses an outdated approach to deriving criteria and does not reflect today's scientific advancements. The proposed approach using a MLR model allows for the incorporation of bioavailability of aluminum into the criteria dataset, thus providing protection for even the most sensitive waters of the U.S. without over protecting many non-sensitive waters. NAMC notes some key areas for further EPA consideration below.

- **Extrapolation of MLR Input Variables** -- NAMC supports the EPA proposal to cap the model input hardness values at 150 mg/L and model input dissolved organic carbon (DOC) values at 5 mg/L based on the uncertainty of modeling predictability above those thresholds. NAMC recommends that a similarly restricted approach to model input pH should also be pursued. The MLR is fully validated between pH 6 and 8.1, which encompasses the range of most water bodies. In the draft criteria, EPA extrapolates model performance up to waterbody pH 9.0 at which the model predicts increasing toxicity up to pH 9.0. When modeling in the range of pH 8.1 to pH 9.0, there is significant uncertainty in the model's predictions as the speciation of dissolved aluminum changes considerably in this pH range to favor more strongly the aluminate anion. The binding of aluminate to gill surfaces has not been fully evaluated. NAMC recommends that if a waterbody pH is greater than pH 8.1, a value of 8.1 should be entered into the model and the resulting model output would be used to set the aluminum water quality criteria limit for that waterbody.

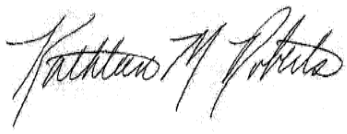
  NAMC has similar concerns with using the model for lower pH ranges. The MLR is not validated in the range of pH 5.0-6.0. It is likely that toxicity would be greater as the pH decreases below pH 6.0 due to increasing concentrations of Al^{+++}, however, resulting toxicity is due to both hydrogen ion content as well as aluminum, which would mitigate any increases in toxicity with decreasing pH. NAMC requests that EPA set a floor of pH 6.0 for model usage with the recognition that this still provides an expansion of modeling applicability below the 1988 pH floor of 6.5.

- **Use of the Chronic Dataset to Develop the Acute MLR** -- NAMC notes that EPA applied the MLR based on the chronic dataset to normalize the acute dataset in the development of the acute MLR model. It is not clear whether this is the best approach to deriving acute criteria. NAMC requests EPA to compare this approach with the use of an acute to chronic ratio (ACR) used in reverse, *i.e.*, use the MLR outputs divided by the ACR. EPA could also use the Biotic Ligand Model (BLM) to develop acute criteria for purposes of comparison and determining the best approach to generate the final acute value.

- **Determination of Acceptable Data for Use in Model Development** -- NAMC requests that the results of the Gensemer *et al.* (2017) seven-day *P. promelas* tests be included in the chronic toxicity database as these short-term chronic data have been shown to predict reliably early life stage (ELS) chronic toxicity.[2] Specific studies were performed with aluminum to insure the accuracy of the seven-day studies. This will improve the robustness of the database.

Thank you for the opportunity to submit these comments.

Sincerely,



Kathleen M. Roberts
NAMC Executive Director

[2] Gensemer, R, Gondek J, Rodriquez P, Arbildua JJ, Stubblefield W, Cardwell A, Santore R, Ryan A, Adams W, Nordheim E. (2017). Evaluating the effects of pH, hardness, and dissolved organic carbon on the toxicity of aluminum to freshwater aquatic organisms under circumneutral conditions. *Environ Toxicol Chem*. Accepted Author Manuscript. doi:10.1002/etc.3920.