ENVIRONMENTAL LAW & POLICY CENTER
Protecting the Midwest's Environment and Natural Heritage

November 30, 2009

Sent via e-mail to Dr. Thomas Armitage at armitage.thomas@epa.gov

Dr. Thomas Armitage
Designated Federal Officer
EPA Scientific Advisory Board (1400F)
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington D.C., 20460

Re: December 3, 2009 draft *"SAB Review of Empirical Approaches for Nutrient Criteria Derivation."*

Dear Dr. Armitage:

This letter contains the comments of the Mississippi River Collaborative on the December 3, 2009 draft *"SAB Review of Empirical Approaches for Nutrient Criteria Derivation."*

We believe that many of the scientific criticisms contained in the draft SAB Review are sound. As explained in the attached evaluation by Dr. JoAnn Burkholder, the draft makes many suggestions for important improvements to the draft EPA guidance that, if adopted, will strengthen that document. Dr. Burkholder also outlines her concerns regarding some of the proposals made in the draft.

We fear, however, that the draft does not sufficiently take into account the practical considerations involved in the development of water quality standards. While a standard that perfectly tracks cause and effect relationships between the maximum allowable concentration of the subject pollutant parameter and adverse environmental effects is desirable, in practice water quality standards must be developed in "a-few-sizes-fit-almost-all" fashion. State laws allow for variances from standards in circumstances where the relationship between the standard and adverse effect to be avoided is unusually attenuated.

NPDES permit writers and others must be able to use water quality standards without access to large amounts of site-specific data or great scientific expertise. Such data and expertise will only rarely be available, and a standard that requires such data and expertise to be applied is not of great practical value.

35 East Wacker Drive, Suite 1300 Chicago, Illinois 60601-2110
Phone: (312) 673-6500 Fax: (312) 795-3730 www.elpc.org elpcinfo@elpc.org
Harry Drucker - Chairperson Howard A. Learner - Executive Director
100% Post Consumer Soy Based Inks

All of the existing water quality criteria are to some extent overprotective or underprotective of some water bodies. These standards were generally based on laboratory studies, sometimes supported by short-term field experiments, and fail to gauge various factors such as synergistic stresses on aquatic life which undoubtedly exist in the environment.

EPA and state and tribal water resource managers do not have the resources to develop *in situ* criteria for each water body, or for each segment within a water body. Insisting that standards be perfect before they be made effective is a sure remedy for continuing environmental degradation and failing to pass meaningful, protective numeric nutrient criteria.

The approach suggested by the EPA guidance, one among a number of possible approaches, uses field data to develop numeric standards that will generally be somewhat protective. While this approach may be imperfect and can be improved upon, it would not serve the nation's waters to ask EPA to write a guidance that made it impossible to adopt standards that will begin to address the recognized, severe degradation that the nation's rivers, estuaries, lakes and streams are sustaining from nitrogen and phosphorus pollution.

Senior Staff Attorney
Environmental Law & Policy Center

Kris Sigford
Water Quality Director
Minnesota Center for Environmental Advocacy

Enclosure

Evaluation of the draft *"SAB Review of Empirical Approaches for Nutrient Criteria Derivation"*

by JoAnn Burkholder, Ph.D.

To the SAB:

EPA's draft guidance specifically focused upon empirical approaches to determine stressor-response relationships for deriving numeric nutrient criteria. Your draft critique supports this document as an important, commendable effort, since nutrients are a major cause of water quality impairment in the Nation's waters. The critique clarified (and it would be helpful for EPA to add to the document) that EPA's Office of Water regards numeric nutrient water quality standards as important because they would support development of nutrient-related TMDLs, provide targets for nutrient trading programs, facilitate writing NPDES permits, and help in evaluating the success of various management strategies to control nutrient pollution. Your draft comments (p.2) described the draft document as providing "a primer on a limited set of statistical methods that could be used in deriving nutrient criteria based on stressor-response relationships". You recognized the stressor-response approach as "a legitimate, scientifically based method for developing numeric nutrient criteria if it is appropriately applied."

I strongly agree with your evaluation of the EPA guidance as not being able to "stand alone" because it fails to provide basic (introductory) information on what is known about cause-and-effect between nutrient pollution and key response variables. This problem weakened the document, compounded by the fact that the writing failed to specifically acknowledge that statistical associations alone cannot prove cause-and-effect. I also agree that EPA's approach of simply referring readers to various other EPA documents is insufficient; instead, this document should include a summary synthesis of the major points in all of the pertinent earlier documents. Your critique stressed the need, as well, for EPA to clarify the data needed for each statistical approach, and how statistics should be applied together with empirical cause-and-effect data in developing numeric nutrient criteria.

Another serious shortcoming of EPA's draft document that you described is that it suffers from a general lack of clarity about scope, limitations, and intended use. The draft document seemed to be written by statisticians for statisticians. I support your suggestion that EPA should hire technical writers to translate it to facilitate its use by resource managers (p.7: "the current draft…is written for a user with far more expertise than is likely possessed by water managers.") Unfortunately, the fundamental statistical nature of the document makes this problem difficult to resolve, but improved clarity would surely help.

A major concern with your draft critique, however, is that some recommendations seem unrealistic without further clear guidance. It would be especially helpful in your critique to define the "tiered, weight-of-evidence" approach more clearly and to provide detailed, clear examples and supporting references. That approach, without further careful definition and illustration, could leave EPA in the untenable position of requiring much more data than would be practical or economically possible for many state and tribal water resource managers to obtain – which would defeat the valuable goal of developing numeric nutrient criteria. In its present version, the draft review also leaves readers with the impression that the SAB considers that each waterway segment must have empirical, *in situ* (not laboratory) data to build the weight of evidence toward cause-and-effect, and that resource managers must be familiar with a wealth of statistical approaches in building a strong tiered approach for each waterway segment where numeric nutrient criteria are to be applied. Such a wealth of data seems impractical and has not been required for any other water quality standard.

Certain other recommendations seem impractical for EPA as well: For example, you recommend that this document should be a comprehensive guidance on *many* statistical procedures that can be applied (p.25: the writing calls for inclusion of multiple statistical methods in the document, rather than "only a limited list"), which seems beyond EPA's goal in creating the document: EPA stated that its intent was *not* to provide an exhaustive list/description of statistical methods.

Other comments

P.11 – Recommends broadening the focus beyond total N and total P to include more emphasis on inorganic nutrient forms. I strongly agree, for N. For P, however, total phosphorus is better to consider

than inorganic phosphate unless the waterway is most affected by major point sources such as sewage treatment plants with high phosphate discharge or a phosphate mine. You also maintain (p.11), I believe incorrectly, that it is easier to measure inorganic nutrients such as ammonium and phosphate than it is to measure TN and TP.

P. 15 – Recommends that the stressor-response framework should be based upon a direct causative relationship between stressor and response in the specific system, founded upon a mechanistic understanding of a causative link between nutrient levels and impairment, to ensure that managing for specific nutrient levels will lead to desired outcomes. This is a sound recommendation. However, on p.15 you went further, advising that EPA must make sure that the response variables respond specifically to nutrients – you then suggested using periphyton instead of macroinvertebrates as a response variable. This guidance should be rethought and carefully worded; otherwise it would seem to negate the fact that there can be strong *indirect* responses of system components to nutrient over-enrichment, which you acknowledge elsewhere in the document. Indirect response variables can be valuable.

Pp.19-20 – States that experimental validation of causal relationships between nutrient and response variables should be approached with caution, and recommends use only of *in situ* experiments to ensure that all other environmental variables are similar to the specific aquatic system. This counsel seems to discount any value of laboratory studies. EPA's wording should be retained instead, because it does not negate, for example, the utility of carefully designed laboratory bioassays (EPA's draft document, p.14 – "most stressor-response analyses of nutrients and response variables are based on empirical data collected in the field….Laboratory studies provide much stronger causal inferences. However, the applicability of information extracted from these studies…needs to be evaluated for comparability and relevance….").