

**Oral Comments of Chris Hornback, Senior Director, Regulatory Affairs  
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**Science Advisory Board  
Ecological Processes and Effects Committee  
Augmented for the Review of Nutrient Criteria Guidance**

**September 9, 2009**

Thank you for the opportunity to address the panel and provide some brief comments on the draft document *Empirical Approaches for Nutrient Criteria Derivation*.

NACWA represents the nation's publicly owned wastewater treatment agencies. As you know our members will be responsible for implementing the nutrient criteria we are discussing today.

Despite being only a small portion of the nutrient load in some watersheds, NACWA's utility members stand ready to be a part of the solution. That solution, however, must ensure that our ratepayer's investments result in real water quality improvements.

The nutrient over-enrichment problem in this country is well documented. What we have increasingly learned lately, however, is the difficulty states are having in applying the Clean Water Act's water quality programs to nutrients.

The states need more time and tools to work with key stakeholders to develop water quality criteria and standards for nutrients that are meaningful and implementable. NACWA appreciates EPA's attempts to develop more tools for the states, including the document before the SAB today.

Given what's at stake, however, we must be confident that the approaches we use, including those discussed in the *Empirical Approaches* document, result in water quality criteria that are environmentally significant, not just statistically significant.

In other words, we must be certain that the significant investments made at the nation's POTWs to meet water quality standards will actually improve water quality and reduce impairments.

NACWA's first concern is that the SAB Committee is not being asked to peer review this document and the novel application of certain statistical methods to nutrient criteria derivation. Instead, the Committee has been asked to provide suggestions to improve the "utility of the draft document." NACWA believes that anything less than a full review of the document will fall short of meeting the Agency's own peer review guidelines and its obligations under Section 304(a) of the Clean Water Act to develop criteria that accurately reflect the latest scientific knowledge.

Overall, the document as currently drafted serves as a fine introduction to some statistical methods that can be used to explore empirical relationships among nutrients and other variables.

The document, however, falls well short of actually enabling states to characterize the causal effects associated with various levels of nutrients. Simply using a statistical analysis to show two variables are correlated does not mean that there is a causal link between those two variables. If a pollutant is to be limited, we must be able to determine if that pollutant is actually causing the impairment.

- Throughout the document, there appears to be an implicit assumption that by developing a statistical model, we can predict the environmental consequences of holding one variable under a certain numerical level. This can only be true if the statistical model accurately describes the causal structure behind the data. The guidance does not significantly advance our ability to determine that causal structure and instead assumes, as with the discussion of conditional probability in Appendix C, that this causal relationship exists “for discussion” purposes.
- Each waterbody that is impacted by excess nutrients will have its own individual characteristics. The guidance does not begin to unravel the complex interrelationships among all the important variables or sufficiently address the multiple levels of uncertainty that exist in the assessment of nutrient over-enrichment and simply states that confounding factors may affect the stressor-response relationship.
- The document also assumes that by protecting aquatic life, all other uses will be protected. This may be true with toxic pollutants, but is not the case with nutrients.

Values in statistical analysis of biological data are arguably more variable than in other sciences, but some of the relational values (including one R-squared value of 5%) are extreme given the management decisions that could be based on this information. Explaining only 5% of the response may not be any better than random chance.

It is unclear why, in almost every example presented, EPA relies on impacts to invertebrate levels or “taxa/total richness” in the stream to illustrate response relationships. Figure 10 in the document presents a “simplified diagram” of the causal pathway between nutrients and aquatic life use impacts.

That figure makes it clear that there is nothing simple about the linkage between nutrients and aquatic life. Assuming direct linkages between nutrient levels and aquatic life across this complex web of potential interactions and confounding factors is problematic at best. It’s not clear why EPA relies upon a response variable throughout the document that has such a tenuous link to nutrient concentrations.

The guidance itself on page five states that an appropriate response variable:

1. Can be used to measure whether the designated use of the waterbody is supported; and

2. Responds causally to changes in nutrient concentration.

Chlorophyll *a* concentration, generally viewed as one of the major response variables, is recognized by EPA in the document as satisfying both of these conditions, yet only in a few rare examples does EPA use chlorophyll *a* data to demonstrate the utility of its empirical approaches. There are ways to assess nutrient impacts on invertebrates that first evaluate increasing plant growth in the context of the other relevant physical, chemical, and biological factors that can affect how a stream responds to various nutrient levels. The guidance should focus on how some of these empirical approaches may be helpful in those carefully controlled cases and not how they can be used by themselves to demonstrate direct relationships.

In conclusion, NACWA urges the Committee to do more than provide suggestions to “improve the utility of the draft document.” Some of these approaches are being applied to environmental data for the very first time and only your thoughtful and thorough review will ensure that we are not simply rushing to find ways of linking nutrients to in-stream impacts to expedite development of numeric nutrient water quality standards.

Thank you.