

**AD HOC ADVISORY COMMITTEE MEETING SUMMARY**  
**Triennial Review WQS**  
**(Reassessment of six issues separated out from Triennial Review)**  
**February 18, 2009**

**Welcome and Introductions**

**Advisory Committee Members and Alternates Present:**

***Alliance for the Chesapeake Bay: Chris French***

***Chesapeake Bay Foundation: Mike Gerel***

***Dominion Power: Judson White***

***Department of Defense: Dave Cotnoir***

***Environmental Protection Agency (EPA): Cheryl Atkinson (by phone)***

***U.S. Fish and Wildlife Service: Cindy Kane, Susan Lingenfelter***

***VA Association of Municipal Wastewater Agencies (VAMWA): Jim Pletl, Dick Sedgely***

***Virginia Coal Association: Tommy Hudson***

***VA Department of Conservation and Recreation: Charles Lunsford***

***VA Department of Health (VDH): Michele Monti***

***VA Department of Game and Inland Fisheries: Ernie Aschenbach***

***VA Farm Bureau: Wilmer Stoneman***

***VA Manufacturers Association: Tom Botkins***

**DEQ Staff Present:**

***Alan Pollock (Facilitator), Alex Barron, David Whitehurst***

**Overview of the Reasons for Reconvening the Committee**

During the triennial review process that took place between 2007 and 2008, six issues were identified that required more detailed investigations than the timeline for the triennial review could accommodate. To avoid delaying the adoption of the other proposed amendments to the water quality standards, these six issues were set aside with the intention of reviewing them in more detail. At the October 2008 meeting of the State Water Control Board, the Board adopted the triennial review amendments and also authorized the DEQ staff to reconvene the ad hoc advisory committee to consider updates to the aquatic life criteria for ammonia, copper, cadmium, cyanide, and lead and consider the need for a prohibition on any new or expanded mixing zones for persistent bioaccumulative toxic substances.

The purpose of the ad hoc advisory committee meetings is to review and discuss these six issues and identify any new or additional information pertaining to them. The U.S. Environmental Protection Agency (EPA) will be consulted for assistance and recommendations on how to address these concerns. This will help DEQ determine the appropriate course of action to take on these issues. DEQ's desired goal is to return to the State Water Control Board with recommendations on these six issues by the fall of 2009.

## **Six issues to be reviewed by the committee were briefly introduced and discussed**

**Ammonia:** New toxicity studies on early life stages of freshwater mussels have demonstrated that adverse toxic effects can occur at concentrations of ammonia that are lower than the criteria would permit. This suggests that the current freshwater criteria for ammonia may not provide sufficient protection to these species and there may be a need to lower the criteria to protect these species

### **Discussion:**

This issue centers on the concern that early life stages of some species of freshwater mussels may require additional protection from possible exposure to ammonia. Several species of freshwater mussels are listed as endangered or threatened and require special considerations and protection when needed. Some of the possible options that had been discussed in the earlier triennial review ad hoc committee meetings included revising the criteria based on these new data and applying the revised criteria to critical habitat for endangered and threatened species, or applying the revised criteria statewide. Some committee members noted that any adjustments of the ammonia criteria should be based on best available science, reflect recent scientific information, be technically correct and result in criteria that are necessary and reasonable to protect designated uses.

Acute toxicity testing procedures for use with these early life stages of freshwater mussels have recently been developed and standardized and some of the data under discussion used the new standardized procedures. EPA has revised the ammonia criteria several times and it could be expected that if credible new data were presented that indicate the criteria need further adjustments then EPA would pursue this. EPA held a workshop on ammonia toxicity to freshwater mussels in the summer of 2006 and has been following this issue for some time. EPA has issued some advice on this issue in the past. The U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS) and EPA held consultations recently on this issue. It is expected that EPA will be formulating advice to states on how to view these new data and how they relate to water quality criteria. EPA will obtain information on this recent consultation and any other advice on this matter and provide the information to the Committee.

**Copper:** New toxicity studies on early life stages of some species of freshwater mussels have demonstrated adverse effects at concentrations lower than the levels of copper allowed for by the current water quality criteria.

### **Discussion:**

This issue also centers on the concern that early life stages of some species of freshwater mussels may require additional protection from possible exposure to copper than is provided by the current criteria. This is essentially the same issue as with ammonia discussed above. Some of the same toxicity tests that are important to the reassessment of ammonia toxicity also contain information on copper toxicity for the same species of freshwater mussels. The question was raised concerning what effect a lowering of the

copper criteria might have on additional impaired waters and additional TMDLs. It was remarked that relatively few impaired waters were impaired due to a violation of the metals criteria. The thoughts were that a lowering of the copper criteria would be more likely to affect permit limits more than result in many additional TMDLs. Regardless of any potential effects on permit limits or TMDLs, the purpose of the criteria is to protect aquatic life.

The issue with assessing the new freshwater mussel toxicity data for copper is somewhat different than the issue with ammonia in that EPA's most recent recommended criteria for copper is a newly developed computer program called a biotic ligand model or BLM. The dataset used to develop the BLM does contain some toxicity data on some freshwater mussels (but not the new data on early life stages that has prompted this latest concern). It would be informative to investigate how the BLM calculated criteria would compare to the water quality of the test conditions in the laboratory tests that are under discussion. However, some of the water quality characteristics needed for the BLM were not reported in the toxicity tests, which make it difficult to evaluate the protectiveness of the BLM under those test conditions. If it is determined that the current Virginia freshwater copper criteria should be amended to take into consideration the new data for the freshwater mussels, DEQ can make adjustments to the current Virginia criteria (equal to the older EPA criteria that is not based on the BLM). However, DEQ can not make adjustments to the BLM as this is a computer model. The general experiences with the BLM in other states such as Colorado indicates that comparisons between the BLM and the older criteria for copper are variable and are neither consistently higher nor lower than the older criteria. The BLM criteria values depend on the specific natural chemical and physical characteristics of the specific waterbody. The data needed to use the BLM to calculate a copper criterion include; temperature, pH, dissolved organic carbon, calcium, magnesium, sodium, potassium, sulfate, chloride and alkalinity. Several of these parameters are not routinely analyzed in typical environmental samples because until the development of the BLM, there was generally no need to determine their concentrations in natural waters. Water samples will have to be analyzed for these parameters in order to be able to evaluate the BLM based copper criteria. There was discussion on the need to generate data for the water quality parameters needed to evaluate the BLM, especially in waters with endangered species of freshwater mussels. EPA will assist DEQ to better evaluate the BLM. EPA will report on any current developments or advice regarding the issue of the sensitivity of freshwater mussels compared to the current copper criteria.

The extent of Virginia waters that contain endangered species of freshwater mussels was discussed. The Department of Game and Inland Fisheries will consult with DEQ staff to provide maps of Virginia showing ranges of endangered species of freshwater mussels, and endangered fish) as well as non-endangered species of freshwater mussels. This will help evaluate where these species exist in Virginia and where any revised criteria would be applied.

**Cadmium:** In addition to an EPA update in 2000 of their recommended criteria for cadmium, two new recalculated criteria documents are available. One proposal titled "Addendum to the U.S. EPA Cadmium Water Quality Criteria Document - Technical

Review and Criteria Update” (dated 2004) produced by Chadwick Ecological Consultants, Inc on behalf of the Association of Metropolitan Sewerage Agencies (AMSA). Also, a more recent attempt to recalculate the cadmium criteria has been published by the U.S. Geological Survey (USGS), titled; “Cadmium Risks to Freshwater Life: Derivation and Validation of Low-Effect Criteria Values Using Laboratory and Field Studies”, December 2006.

**Discussion:**

There was little discussion regarding cadmium. EPA will report on recent/current criteria development studies for cadmium and the status of EPA’s position regarding those studies.

**Cyanide:** VAMWA has requested that DEQ recalculate the water quality criteria (WQC) for cyanide based on a report “Scientific Review of Cyanide Ecotoxicology and Evaluation of Ambient Water Quality Criteria: Final Report” (January 2007) produced on behalf of the Water Environment Research Foundation (WERF).

**Discussion:**

The reasons for WERF’s interest in this criterion were briefly discussed. The dataset for cyanide in the original EPA criteria document is relatively small. WERF investigated some of the important information contained in the criteria document. In saltwater both the acute and chronic criteria values are 1.0 µg/L. WERF researchers attempted to reproduce one of the key toxicity tests responsible for this saltwater criterion, but could not reproduce the toxicity test results reported in the original literature. They then combined the results of the old test as reported in the criteria document with the results of the new test and recalculated the criteria values. WERF also did some other updates to the criteria dataset from more recent literature and presented their revised recommendations for the criteria for cyanide in this report. There have also been some recent consultations between EPA and USFWS regarding cyanide. USFWS has data to suggest that the current criteria are not as protective as it needs to be for some species, including the endangered sturgeon.

**Lead:** This issue involves the proper conversion factor to apply to the Virginia aquatic life criteria for lead to convert the criteria concentrations to dissolved concentrations.

**Discussion:**

There was more detailed discussion on this topic and DEQ staff discussed their recommended approach to resolving this issue. DEQ staff explained why EPA recommends applying conversion factors to their national criteria for metals. The EPA national criteria documents originally expressed the criteria for metals as “total recoverable metals” measurements, but EPA later amended their policy on this to recognize that “dissolved “ metals more closely approximates the bioavailable fraction of metal in water. EPA believes that it is necessary to use a conversion factor to convert the old criteria’s total recoverable concentrations into dissolved concentrations. In order to develop these conversion factors EPA conducted experiments to simulate the types of test conditions that were in the original toxicity tests that are important to the calculation of

the criteria. These types of tests are different for each metal's dataset and criterion. The different possible test conditions to be considered included such things as the duration of the tests, the presence or absence of food in the test chambers and static, renewal or flow-through exposure or dosing of the metals. The intent of these experiments was to mimic the way the criteria would have been derived if the dissolved metal had been measured in the original toxicity tests. These simulated tests measured the metal's concentration both as total recoverable and dissolved and a conversion factor (dissolved metal concentration as a percent of the total recoverable metal concentration) was developed for each type of toxicity test. EPA conducted simulation tests that simulated the test conditions in the toxicity tests that were most important to the calculation of the criteria values. These include the toxicity tests for the four most sensitive genera (responsible for calculating the final acute value) and the final acute to chronic ratio. These simulated tests resulted in EPA's recommended conversion factors for each of EPA's national recommended criteria for metals.

Virginia's criteria for lead are different than EPA's national criteria for lead. During 1995-1996 Virginia conducted a literature search and review of toxicity research papers published after the EPA 1985 criteria document and recalculated the water quality criteria (WQC) for lead using an updated database that included additional toxicity information on the four most sensitive genera that are important to the calculation of the criteria. Thus the basis for the VA 1996 WQC for lead is different than EPA's 1985 WQC. Virginia developed their lead criteria before the conversion factors for lead were finalized and a conversion factor was not applied to Virginia's lead criterion when it was adopted as a dissolved criterion. The last triennial review proposed to apply EPA's recommended conversion factor to the Virginia lead criterion. However, public concern was raised during the triennial review that because the basis for the Virginia lead criteria is different than the EPA criteria, the conversion factor for EPA's criteria may not be appropriate for Virginia's criteria. The concern is that some of the important tests that are the basis for the Virginia criteria for lead are different than the EPA criteria's dataset and may have been developed under different test conditions than what EPA considered important when they developed their conversion factor for lead. Other concerns are that some of the tests important to the Virginia criteria may have been equivalent to dissolved measurements of lead and if so, then the Virginia criteria is already partially influenced by dissolved lead measurements and applying a conversion factor to the finished criteria values may be imprecise

DEQ staff proposed to review the original literature that directly influenced the calculation of the Virginia criteria for lead. These tests include all those responsible for the four most sensitive genera which are used to calculate the final acute value as well as the acute and chronic ratio used to calculate the chronic criterion. After identifying these key tests, the literature will be obtained from libraries and reviewed to determine what type of toxicity tests were conducted, how the exposure was done (static, renewal, or flow-through) and how the concentrations of lead were determined in those tests. Then this information would be used along with the approach used by EPA to determine their recommendations for their lead conversion factor. This will allow for a determination if the conversion factor recommended by EPA for their lead criteria should apply to the

Virginia criteria, or if it would be feasible to convert any “non-dissolved” lead data in the important tests for Virginia’s criteria into dissolved concentrations (using EPA’s simulated test data for these conversions) and recalculate the criteria based on these “dissolved” concentrations, or whether some alternate conversion factor could be more appropriate, EPA will investigate this approach with their criteria specialists to determine if this or some other approach can be considered appropriate.

**Mixing Zone Prohibitions:** This issue involves the potential prohibition of mixing zones for persistent bioaccumulative toxic substances for new or expanded dischargers.

**Discussion:**

This issue involves concerns for aquatic life residing in or lingering in the mixing zone associated with permitted discharges where fish or shellfish residing in the mixing zone will be exposed to concentrations of the toxic pollutant that are higher than the water quality criteria allowed outside the mixing zone. This has implications for concerns about human health protection from exposure via consumption of fish or shellfish harvested from the mixing zone where the fish could have bioaccumulated toxic pollutants to levels higher than allowed by the human health criteria. The USFWS expressed concerns about potentially inadequate protection of aquatic life that reside in the mixing zones, especially benthic organisms such as endangered species of mussels. There was general discussion on this topic and it was agreed that the committee needs to review the lists of chemicals that are under consideration for being classified as persistent bioaccumulative substances. Several such candidate lists were referred to. Members of the committee will attempt to gather the lists for review in the next meeting. There was interest in also identifying the various bioconcentration factors and bioaccumulation factors that are associated with the various toxic chemicals to help focus on the most important ones. DEQ will ask the permitting staff to evaluate how many permits have permit limits for these type substances, and this will help determine the potential for this issue to impact the environment as well as the number of dischargers potentially impacted by a prohibition.

**Other Issue, Antidegradation:** DEQ staff updated the committee on one additional issue dealing with antidegradation, which they will discuss with the committee in future meetings. The State Water Control Board directed DEQ to form an ad hoc advisory committee to assist the DEQ permitting staff in the development of guidance on application of the Antidegradation Policy to tier 1 waters. Because most of the members of this triennial review committee would be interested in this topic as well, DEQ staff plans to include discussions about antidegradation on the agendas of several upcoming meetings.

**Future Meetings**

Plans for future meetings were discussed and the following schedule was proposed:

<u>Date</u>	<u>Main Topics</u>
March 26, 2009	Lead & Mixing Zones

**April 29, 2009**

**Cadmium & Cyanide**

**May 26, 2009**

**Ammonia & Copper**

**June 17, 2009**

**as needed**