

# Adopting BLM-based Copper Water Quality Criteria: Nationwide Efforts and Successes

On behalf of the Copper Development Association (CDA), the International Copper Association (ICA) and each of their members, GEI Consultants, Inc. (GEI) has spent the last four years encouraging states to adopt the Biotic Ligand Model (BLM) for development of aquatic life protection criteria. The BLM is the most scientifically advanced method for deriving these criteria, and was developed in collaboration with CDA and ICA science teams and other researchers throughout the world. As part of our current advocacy efforts, GEI developed and currently maintains a database of each state's approach for and timing of updating their water quality criteria, offering technical support to states as they embark on the update process. This project involves direct contact with the water quality regulators in all 50 states, the American territories and several tribes.

The BLM works by evaluating how dissolved copper behaves in the environment depending on a suite of readily-measured, water-quality parameters. Water-quality conditions may favor the formation of certain forms of copper that are more readily taken up by organisms than others (termed "bioavailable") and, thus, are ultimately more responsible for toxicity. The BLM predicts the concentrations of these bioavailable forms of copper, given a set of water-quality conditions, in order to determine a level of dissolved copper that would be protective of aquatic life. The benefit of using the BLM was recognized by the USEPA when, in 2007, they updated their national recommended criteria to use the BLM as its basis rather than the outdated, hardness-normalized criteria that had been used previously.

However, even though USEPA's national recommendations have been updated, copper criteria in all states still use outdated hardness-based equations, even though most states allow site-specific approaches to modify criteria based on factors other than hardness (which is based only upon  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  concentrations in water), such as the water-effect ratio (WER). While incorporating the WER with the water hardness-based standard is a reasonable approach for considering metal bioavailability and potential toxicity, the BLM is a superior site-specific method because it offers a more robust explanation of all chemical and physical factors that drive metal bioavailability and, thus, are also more cost-effective compared to WER toxicity testing.

Currently, 12 states and two California Regional Boards allow site-specific usage of the BLM, and one state (South Carolina) allows state-wide usage of the BLM as an option. As part of states' triennial water quality standards update process (mandated under the USEPA Clean Water Act), GEI has submitted public comments proposing adoption of BLM-based water quality standards in 26 states and seven California Regional Boards. At least 12 states and one California Regional Board are now considering adding the BLM to their regulations. Therefore, the CDA HESD team's advocacy efforts have achieved a success rate of nearly 50 percent when it comes to states adopting the BLM. GEI will continue to monitor activity in the remaining states and will continue

to encourage the use of BLM within both the regulatory and regulated communities.

A major recent success involved implementing the BLM to derive a site-specific copper standard in Colorado. In June 2013, the Colorado Water Quality Control Commission, as part of the Triennial Review of the Arkansas River Basin in Colorado, approved a site-specific copper standard for upper Monument Creek (near Colorado Springs). This is the first approved standard that combines the BLM with a new criteria derivation approach, known as the Fixed Monitoring Benchmark (FMB). The FMB method, developed by HDR|HydroQual for the USEPA in 2012, incorporates instream copper concentrations to determine a safe level based on the probability of exceeding the BLM-based water quality criteria more than once every three years. The previous standard for upper Monument Creek was based on water hardness alone, resulting in a chronic copper standard of 9  $\mu\text{g/L}$ . The BLM predicted limited bioavailability of copper and, when combined with the FMB, this analysis resulted in the adoption of a new chronic copper standard of 17.8  $\mu\text{g/L}$ . USEPA Region 8 staff was supportive of this proposal and commended the use of the FMB to develop BLM-based criteria. The effort was aided by a national effort of CDA HESD for broader application of the copper BLM, specifically related to development of copper BLM implementation case studies.

Building on this momentum and success, GEI is currently working with several other stakeholders in Colorado, including wastewater treatment plants, energy producers, municipalities and manufacturers who are interested in developing BLM-based criteria for copper in their streams of interest. Proposals for these clients will be presented to the Colorado Water Quality Control Commission in hearings occurring over the next 1-3 years.

Adoption of BLM-based criteria is likely to provide more regulatory certainty for dischargers. Since Colorado appears to be moving towards replacing current hardness-based, site-specific copper standards with BLM-based alternatives, it is anticipated that the BLMs for other metals will be adopted in the future as well. Given that BLM-based approaches often result in less restrictive discharge limits, costly additional treatments and capital investments could be avoided when it comes to meeting the lower hardness-based standard, by offering adequate levels of aquatic life protection for less cost. CDA and ICA members, therefore, are encouraged to explore BLM-based alternatives for site-specific criteria at their facilities, where applicable.

In conjunction with other partner metals industries, CDA HESD will continue to encourage adoption of BLM-based water quality criteria for metals as additional regulatory agencies begin their triennial review processes. Furthermore, implementation guidance and published case studies are being developed by the CDA HESD team of scientists to support states as they begin to utilize the BLM to develop site-specific standards and incorporate BLM-based effluent limits in discharge permits.

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