Training materials on Copper BLM: Implementation

US Environmental Protection Agency
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Training materials on the Biotic Ligand Model for copper

1. Implementation

1.1 What options are available to states and tribes for adopting and implementing the updated national recommended criteria statement?

States and tribes have flexibility in implementing the updated copper criteria. States and tribes can implement the BLM-based criteria as a performance-based approach and may choose either incremental or statewide implementation depending on their needs and resources. For many states and tribes, EPA regards incremental implementation as the most feasible and efficient means of implementing the updated criteria.

For states and tribes choosing to implement the BLM-based criteria using an incremental approach, EPA recommends moving as quickly as possible to adopt the BLM methodology into State or tribal water quality standards (while retaining the hardness criteria) to utilize the latest available science to develop site-specific copper criteria on a targeted basis. This approach should result in more appropriate criteria more quickly for waters where the hardness-based copper criteria may be potentially over-protective, such as waters with high DOC, or potentially under-protective, such as waters with low pH. Under this approach, the hardness-based criterion remains in State (or tribal) water quality standards and applies to all waters except for those where site-specific criteria are derived using the BLM.

States choosing to use the BLM on a targeted basis may consider adding a paragraph to their water quality standards noting that site-specific criteria for copper may be developed on a case-by-case basis using the approach described in EPA's *Aquatic Life Ambient Freshwater Quality Criteria – Copper 2007 Revision* (EPA-822-R-07-001). Or, states may choose to include a footnote indicating that if a site-specific criterion is generated using the BLM, the BLM-derived value becomes the site-specific copper criterion (see 40 CFR §131.36(b)(2) for an example). EPA recommends that states and tribes maintain an updated listing of the water bodies for which the BLM has been used as the basis for a site-specific freshwater copper criterion.

This incremental or targeted approach would provide states and tribes with the flexibility to use the BLM on a limited basis where it will have the most impact. Once developed for particular water segments, BLM-based criteria would provide the basis for permitting and assessment decisions.

In situations where states or tribes choose not to use the BLM, the state (or tribe) may continue to use the WER method as a means of developing site-specific criteria. Done this way, there would be two ways to develop site-specific criteria: 1) using the hardness-based criteria with a WER, and 2) using the BLM on a targeted basis. The permitting authority may consider requiring individual dischargers to collect the monitoring data in order to use the BLM, which EPA expects in most cases would be less expensive to obtain than site-specific toxicology data to develop a WER.

An alternative implementation approach would be where states or tribes choose to adopt the national criteria recommendation (the BLM) as the statewide standard. States and tribes can develop numeric results up front when adopting the revised criteria or later when developing permits or conducting assessments. Under this approach, the BLM-based criteria would replace the hardness-based criteria for copper. This approach allows states and tribes to use the latest available science to apply a copper criterion to each site that would best reflect predicted effects on aquatic life based on the behavior of copper in the receiving stream. States and tribes can incorporate BLM input parameters into their statewide monitoring programs to ensure that data are available to use the BLM. The additional monitoring data may later prove to be useful if and when the BLM is developed and calibrated for other metals, such as zinc and silver.

This statewide implementation option could likely result in increased costs to state monitoring programs, because some of the BLM input parameters (particularly DOC) are not routinely monitored. In addition, selecting this option may obligate the state or tribe to use the BLM, even for waters where the hardness-based criteria may be adequate.

1.2 Have any states or tribes used the BLM to calculate site-specific copper criteria?

Yes. Colorado has used the BLM as an alternative means to develop site-specific WER for several effluent dominated stream segments. The Colorado Water Quality Division developed informal guidance regarding use of the BLM. This informal guidance suggests the following:

- Water quality samples should be taken above and below wastewater treatment facilities. The downstream sample should be taken where the effluent has fully mixed with the receiving water. More than one sampling site is recommended for stream segments longer than five miles.
- Water quality samples should be taken below each National Pollutant Discharge Elimination System (NPDES) permit discharge for stream segments with more than one NPDES permit.
- Water quality data should adequately describe seasonal attributes of a stream.
- At least one year of water quality data is recommended, with a minimum of 24 sampling events.

The suggestions outlined in Colorado's informal guidance should not be construed as EPA's recommendations for how to use the BLM; rather, the guidelines are presented here as an illustrative example of how one State has used the BLM.

Additionally, Massachusetts Department of Environmental Protection (MA DEP) evaluated the applicability of the BLM to develop site-specific copper criteria in the Taunton River watershed. Water quality samples were collected at 13 sites (10 in stream locations and three publicly-owned treatment works (POTWs) discharge points) in the watershed; samples were taken in the spring (to capture average to high flow conditions)

and the summer (to capture low flow conditions). Samples were taken both upstream and downstream of three POTWs discharging to the Taunton River and its tributaries.

1.3 How does the BLM compare to the WER method in terms of cost?

In general, EPA expects the water chemistry data required by the BLM to be less expensive than WER toxicity testing on a per site basis. States routinely monitor for some of the BLM input parameters; therefore, the need for a state or tribe to initiate monitoring for all 10 input parameters to use the BLM represents a worst-case scenario. States and tribes may choose to work with direct dischargers to collect monitoring data for the BLM. Parameter estimation techniques may also eventually reduce the implementation costs.

It is difficult to do a direct cost comparison of the BLM and WER method because the cost of data collection and analysis will vary depending on the location and site-specific conditions of the site. Currently, dischargers typically pay for WER testing, while the costs of using the BLM may be borne by the discharger or the state (or tribe), depending on how states (and tribes) choose to implement the updated criteria.

Costs associated with implementing the BLM include those for field work (including sample collection containers and technician-hours in the field) and laboratory services (including analytical services and other lab charges, such as sample handling and disposal and reporting forms). EPA estimates that the total cost for one set of 10 input parameters is approximately $325. Depending on the number of data sets collected, BLM-related costs may range from $325 (the cost of an “instantaneous criterion”) to $1300 (the cost of one sampling event per season, for a total of four) or more per site. There could be additional costs that vary depending on the location and complexity of the site, including study design to define the site, statistical evaluation of the sampling scheme, and transportation.

Costs associated with the Streamlined WER method to develop a site-specific criterion include the costs of two (or more) sampling events (with a representative sample of upstream water and effluent taken for each sampling event), side-by-side toxicity tests for laboratory and site water with one test species; and other measurements (including hardness, pH, alkalinity, total suspended solids (TSS), and DOC for both the site water and the laboratory water). EPA estimates the cost of the Streamlined WER method (two samples and one test species) to be approximately $10,000.

Costs associated with the 1994 Interim WER method (the “non-streamlined” method) are likely to be higher, given that the Interim WER method recommends three sampling events for one species, and one sampling event with a second species (for a total of four WER tests). EPA estimates the cost of using the1994 Interim WER method at a relatively simple site to be on the order of $20,000. Some more complex applications of the WER method have costs over $100,000.

1.4 Will existing site-specific freshwater copper criteria derived using the WER method need to be revised using the BLM?

A state or tribe may choose to retain the WER-adjusted hardness criterion or use the BLM on a targeted basis to develop site-specific criteria. EPA developed different BLM implementation options for states and tribes to consider (see Question 1.1).

1.5 If the BLM results in a different criterion than a state currently has, will a use attainability analysis (UAA) be needed to change a use?

A UAA would not be required if application of the BLM for copper resulted in different criteria, assuming that the state or tribe would not be revising the underlying designated use. In that circumstance, a UAA would not be necessary regardless of whether application of the BLM results in a more or less stringent copper criterion. On the other hand, if the designated use would be revised to a different aquatic life use subcategory, and a less stringent criterion for copper (or any other parameter) would also be adopted, a UAA would need to be prepared pursuant to 40 CFR 131.10(j)(2).