Central Valley Clean Water Association
Representing Over Fifty Wastewater Agencies

STEVE HOGG – CHAIR, FRESNO **MICHAEL RIDDELL – VICE CHAIR, CERES**
JEFF WILLETT – SECRETARY, STOCKTON **ED CROUSE – TREASURER, RANCHO MURIETA CSD**

May 23, 2011

Danny McClure
Water Resources Control Engineer
Water Quality Control Board Central Valley Region
11020 Sun Center Drive # 200
Rancho Cordova, CA 95670-6114

Submitted via email to dmcclure@waterboards.ca.gov

RE: Draft Cypermethrin Criteria Derivation

Dear Mr. McClure:

The Central Valley Clean Water Association (CVCWA) has reviewed the *Draft Water Quality Criteria Report for Cypermethrin (Draft Criteria)* prepared by the University of California, Davis. CVCWA is a non-profit organization of agencies that own and operate publically owned treatment works (POTWs) throughout the Central Valley. CVCWA represents its members in regulatory matters that affect surface water discharge and land application with a perspective to balance environmental and economic interests consistent with applicable law. Accordingly, CVCWA has a keen interest in the development of draft water quality criteria that may be used by the Central Valley Regional Water Quality Control Board (Regional Water Board) to interpret narrative water quality objectives and/or may be adopted as water quality objectives.

CVCWA continues to be concerned with the Regional Water Board's proposed use of the *Draft Criteria* to interpret narrative water quality objectives and potential use of the criteria to set water quality based effluent limitations in NPDES permits, thereby creating liability for Central Valley POTWs. Considering the liability associated with such effluent limitations, the Regional Water Board should take care to use only criteria that are well-developed and well-founded.

The chronic criterion is problematic for a number of reasons, particularly the lack of available reliable data and the acute to chronic ratio (ACR) used for its calculation. Within the *Draft Criteria*, the authors note that the sparse chronic toxicity data set was a major limitation, with three of the five taxa requirements not met (including salmonid, benthic crustacean, and insect). In the absence of an adequate chronic toxicity data set, the authors relied on an ACR to derive the chronic criterion. The authors also noted a major concern with this approach, which depended largely on the very high species mean acute to chronic ratio (SMACR) for *Daphnia*

magna that was determined in a study by Kim *et al.* (2008)[1]. The ACR determined for *Daphnia* in the Kim study was 949 – approximately two orders of magnitude higher than is typical for similar sensitive species. Other pyrethroid criteria reports have noted ratios between acute and chronic criteria ranging from 2 - 6.7, while the ratio between the acute and chronic criteria for cypermethrin was 333x due to the high *Daphnia* ACR from the Kim 2008 study. The authors noted that they were "suspicious of the extremely large cypermethrin SMACR for *Daphnia magna*, although there are no obvious faults in the study." One potentially significant point of the Kim study not cited by the authors of the *Draft Criteria* was that the sublethal reproductive endpoints for the 21-day exposures were either not assessed or were not reported for the solvent controls. The Kim study states that there was no significant difference in mortality between solvent controls and negative controls, but does not report the results for sublethal endpoints in solvent controls. If there were significant reproductive effects in the solvent controls or if they were not conducted or assessed, all of the findings for the sublethal endpoints (including the LOECs and NOECs used to determine the ACR) would be invalid and unusable for criteria development. Therefore the results for the solvent controls must be evaluated before the 21-day exposure results can be used to calculate an ACR and chronic criterion.

The findings of the Kim study that were not discussed or considered by the authors of the *Draft Criteria* also provide a number of additional insights into the limitations of the simplistic extrapolation-based ACR approach to developing chronic criteria. These limitations are shared by many chronic toxicity studies used in criteria development, but are particularly well illustrated by the Kim study.

- The chronic test used to develop the final ACR for Daphnia was a 21-day exposure with static renewal every 48 hours. This is completely unrealistic environmental exposure scenario that would never be expected to occur in the real world.

- The 21-day exposures and endpoints of the Kim study (brood size, time to first brood, number of broods) are used to develop criteria to be implemented as 4-day averages, even though those reproductive endpoints would not be affected by 4-day exposures at the same concentrations. The most environmentally relevant results from the 21-day static renewal exposures of the Kim study were that there were *no significant changes in population growth rates at much higher concentrations and even the highest concentration tested did not cause a population decrease*. These findings are much more environmentally relevant than the finding of a statistically significant effect on average brood size of an environmentally unrealistic exposure scenario. In spite of this, the authors ignored the population level context and chose to use a statistically significant *response* instead of a biologically significant *adverse effect* in their ACR calculation.

- In Kim's test of a more environmentally realistic exposure scenario (24 hour static exposure followed by a 20 day observation period), there were *no adverse effects at the highest concentration tested* (1.9 µg/L) on mortality, reproduction, brood size, or intrinsic population growth rate of *Daphnia* neonates. Kim noted that this finding was consistent with those of Christensen *et al*.[2], who found that *Daphnia* exposed to environmentally

[1] Kim Y, Jung J, Oh S, Choi K. 2008. Aquatic toxicity of cartap and cypermethrin to different life stages of *Daphnia magna* and *Oryzias latipes.* J Environ Sci Health B 43:56-64.
[2] Christensen, B.T.; Lauridsen, T.L.; Ravn, H.W.; Bayley, M. A com- parison of feeding efficiency and swimming ability of Daphnia magna exposed to cypermethrin. Aquat. Toxicol. 2005, 73 (2), 210–220.

relevant concentrations of cypermethrin recovered to their pre-exposure condition within 3 days after exposure.

Because there are not adequate data to derive a chronic criterion directly, CVCWA recommends that the *Draft Criteria* refrain from setting a chronic criterion until additional studies are completed. Additionally, the available studies must be fully evaluated for their completeness and environmental relevance, and the results of the studies should not be used out of context, as is done in the *Draft Criteria*. The aberrant ACR based on environmentally irrelevant exposures in a single research study should not be used as the basis for a chronic criterion. The USEPA 1985 guidance[3] for deriving numeric water quality criteria states that "It is not enough that a national criterion be the best estimate that can be obtained using available data; it is equally important that a criterion be derived only if adequate appropriate data are available to provide reasonable confidence that it is a good estimate," and that "If all required data are not available, usually a criterion should not be derived." We believe this guidance is still good policy and should also be followed by the Regional Water Board.

In addition, CVCWA is generally concerned with the Regional Water Board bypassing the USEPA process of deriving water quality criteria to create independent criteria that may be used to interpret narrative water quality objectives. The *Draft Criteria* should be thoroughly vetted through the public and regulatory process before they are made available for potential use by the Regional Water Board in NPDES permits. Considering the uncertainties associated with the *Draft Criteria*, it is ill-advised to utilize them at this stage. Thus, CVCWA respectfully requests that the Central Valley Water Board refrain from using the *Draft Criteria* for cypermethrin until the criteria are properly adopted as water quality objectives pursuant to all requirements in Porter-Cologne.

Thank you for your consideration. Please contact me at (530) 268-1338 if you have any questions.

Sincerely,

Debbie Webster

Debbie Webster
Executive Officer – CVCWA

c: Pamela Creedon – Executive Officer, CVRWQCB

[3] USEPA. 1985. Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses, PB-85-227049. Report United States Environmental Protection Agency, National Technical Information Service, Springfield, VA.