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ARNOLD SCHWARZENEGGER, Governor  
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## Review of Criteria Derivation Drafts for Diuron, Diazinon, Malathion, and Bifenthrin

Thank you for the opportunity to review the drafts of water quality criteria for the pesticides diuron, diazinon, malathion, and bifenthrin. As the agency charged with protection of fish and wildlife in California, the Department of Fish and Game developed and proposed water quality criteria in the past that were protective of aquatic life in California's water bodies. We have previously developed WQC for the three insecticides but not for the herbicide.

There have been several methodologies developed in recent years to generate water quality criteria, and these all have advantages and disadvantages. Rather than assess the method(s) used here, my comments pertain to the ability of the proposed values to protect aquatic life and comply with Basin standards.

### Diuron

Your proposed acute and chronic criteria are 84 and 1.3 µg/L, respectively.

The chronic criterion was derived using four tests on algae and plants. As plants and algae tend to be more sensitive to herbicides, this is appropriate. The final chronic criterion proposed is 1.3 µg/L.

The acute criterion was derived using only animal studies because "all plant studies were considered chronic because the typical endpoints of growth or reproduction are inherently chronic". Although this is technically true, as a general rule animals are not as sensitive to herbicides as are plants and algae. It is reasonable to assume that an acute or short-term exposure to diuron would have significant impacts on algae growth. This needs to be addressed in the development of acute criteria. As toxicity tests measuring toxicity to algae are the only tools available, it would be prudent to use these values to generate both acute and chronic criteria. The chronic criterion of 1.3 µg/L could also be used as the acute criterion to protect fish and wildlife.

### Diazinon

Your proposed acute and chronic criteria for diazinon are 0.2 µg/L and 0.1 µg/L, respectively. The most sensitive species in the data set used to generate these criteria is the cladoceran *Ceriodaphnia dubia*. The Genus Mean Acute Value for *C. dubia* is 0.36 µg/L, based on 9 different tests. There is little variation within this dataset (0.21 to 0.507 µg/L) with no obvious outliers. It is generally accepted that toxic effects to an organism can be demonstrated at approximately ½ the LC<sub>50</sub>

value. This would mean that toxic effects to *C. dubia* may be expected at concentrations as low as 0.1 µg/L.

The narrative criterion of the Basin Plan states “Waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life”. Adherence to this narrative criterion and protecting fish and wildlife would likely prevent the acute criterion from being above 0.1 ug/L. Cladocerans are an important component of freshwater invertebrates in the upper Sacramento-San Joaquin Estuary and their numbers have been in decline since the early 1970s. Having similar acute and chronic criteria for diazinon is substantiated by there being little difference between the acute and chronic toxicities of most organophosphates to invertebrates.

### Malathion

Acute and chronic criteria proposed for malathion are 0.15 and 0.03 µg/L, respectively. Given the available toxicity values, these criteria seem appropriate for the protection of aquatic organisms.

### Bifenthrin

Acute and chronic criteria proposed for bifenthrin are 4 ng/L and 0.3 ng/L, respectively. Given the limited chronic toxicity values available, the chronic value appears appropriate. However, the acute value does not appear sufficiently low to protect sensitive aquatic invertebrates. Five acute toxicity tests for amphipod *Hyalella azteca* had a range of LC<sub>50</sub> values from 2.7 to 9.3 ng/L with no obvious outliers. This range of sensitivities has been demonstrated in recent field work. To prevent acute toxicity and adhere to the Basin Plan, the acute criterion should be lowered to ½ the LC<sub>50</sub> value to 1.4 µg/L.

### Summary

New criteria in these documents developed for malathion appear appropriate to protect aquatic organisms. The acute criterion developed for diuron should consider impacts to algae and aquatic plants and be lowered accordingly. Acute criteria developed for diazinon and bifenthrin should be lowered to be protective of sensitive aquatic invertebrates.

Thank you for the opportunity to comment on this issue. Please contact me at (916) 358-2954 if you have any questions.

Sincerely,

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