SOMACH SIMMONS & DUNN
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
500 CAPITOL MALL, SUITE 1000, SACRAMENTO, CA 95814
OFFICE: 916-446-7979 FAX: 916-446-8199
SOMACHLAW.COM

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VIA ELECTRONIC MAIL ONLY

Ms. Tessa Fojut
California Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670
Tessa.Fojut@waterboards.ca.gov

SUBJECT: Comments on October 2014 Preliminary Draft Pyrethroid Basin Plan Amendment

Dear Ms. Fojut:

Our firm represents the Pyrethroid Working Group (PWG), which is a coalition of registrants of pyrethroid pesticides. We appreciate the opportunity to submit these early comments on the October 2014 Preliminary Draft Pyrethroid Basin Plan Amendment (Preliminary Draft Amendments). Further, we appreciate the efforts of you and other Central Valley Regional Water Quality Control Board (Central Valley Water Board) staff to communicate with stakeholders interested in this process. We recognize that this takes tremendous time and effort, and we fully appreciate having the opportunity to submit early comments on the Preliminary Draft Amendments, as well as the opportunity to submit suggested issues/questions for consideration in the peer review process that will begin early next year. To that end, the PWG submits the following comments on the Preliminary Draft Amendments, including the specific proposed objectives, implementation language, and issues for peer review.

I. Beneficial Uses Being Protected

As a preliminary matter, we believe it important to provide perspective on the purpose of water quality objectives in general, as well as the specific pesticide objectives proposed here. Water quality objectives, as defined in the Porter-Cologne Water Quality Control Act (Porter-Cologne), "means the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area." (Wat. Code, § 13050(h).) Regional water quality control boards (regional boards) are required to establish water quality objectives in water quality control plans, which in the regional board's judgment "will ensure the reasonable protection of beneficial uses and the prevention of nuisance; . . . ." The Water

Code further states, however, that, "it is recognized that it may be possible for the quality of the water to be changed by some degree without unreasonably affecting beneficial uses." (Wat. Code, § 13241.) Next, when establishing such objectives, regional boards are required to consider certain specified factors, including, but not limited to environmental characteristics of the hydrographic unit under consideration, water quality conditions that could reasonably be achieved, and economic considerations. (Wat. Code, § 13241.)

In this case, the beneficial uses proposed for protection are the WARM and COLD beneficial uses.[1] These are uses of water that support warm and cold water ecosystems (respectively), including but not limited to preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. Thus, the beneficial uses are the cold and warm ecosystems as a whole—not individual species within the ecosystem. We believe this point to be important and relevant because it provides context with respect to establishing water quality objectives that provide for the reasonable protection of these two beneficial uses.

Here, the Preliminary Draft Amendments propose water quality objectives for six pyrethroid pesticides. The proposed water quality objectives come from Water Quality Criteria Reports prepared by the University of California Davis (UCD) (collectively referred to as "UCD criteria reports"), and the criteria in the reports were derived using a new criteria methodology, also prepared by UCD.[2] Overall, the criteria values established in the UCD criteria reports are at levels that would be protective of the most sensitive known species. In this case, it is *Hyalella Azteca*, which is a laboratory-reared species. Further, the studies that suggest pyrethroids are toxic to such species at such levels were conducted in clean water, and thus do not reflect environmentally relevant conditions. While such an approach may be appropriate for deriving criteria from an academic perspective, simply proposing to adopt the criteria as developed by UCD as water quality objectives fails to actually consider what levels

[1] Warm Freshwater Habitat (WARM) is defined to mean, "Uses of water that support warm water ecosystems including but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates." (Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Fourth Edition-1998) (Basin Plan) at p. II-2.00.) Cold Freshwater Habitat (COLD) is defined to mean, "Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates." (Basin Plan at p. II-2.00.

[2] Since the criteria reports were published, there has been an ongoing registration review process being conducted by the United State Environmental Protection Agency (US EPA), which includes new data and information that has been gathered and developed by the PWG and its member companies. Considering the new data and information, the PWG believes it appropriate and timely to review this new information with Central Valley Water Board staff in the near future. To that end, the PWG will seek to set up a meeting with Central Valley Water Board staff in early 2015 for such a discussion. However, until that discussion can occur, the PWG believes it appropriate to focus its comments and concerns on the proposed water quality objectives as they appear in the Preliminary Draft Amendments.

of pyrethroids may be present in California's waterways and still ensure reasonable protection of the WARM and COLD beneficial uses.[3]

To establish the appropriate level of pyrethroids that may be present in water while reasonably assuring protection of the WARM and COLD beneficial uses, we believe it necessary for the Central Valley Water Board to consider environmentally relevant conditions, rather than relying solely on laboratory toxicity tests with clean water and laboratory reared species. Thus, to properly calculate water quality objectives, field data where resident taxa are exposed to real world concentrations of pyrethroids would provide the best information for determining if the presence of pyrethroids at certain levels are, in fact, unreasonably impacting resident benthic macroinvertebrates, which would then be considered impairment of the WARM or COLD beneficial use.[4] While laboratory toxicity tests in clean water with laboratory reared *Hyalella* may indicate high intrinsic toxicity of pyrethroids (i.e., high hazard), pyrethroid toxicity has not been observed in the field where actual exposure may be reduced as a result of various factors such as binding to organic matter and low bioavailability. Moreover, field populations of *Hyalella* have been reported to be the most dominant taxa in California water bodies such as Pleasant Grove Creek (a 303(d) listed water body based on pyrethroids) (Hall et al. 2014b), and native *Hyalella* have been reported to be much more tolerant of pyrethroids such as bifenthrin and cypermethrin than laboratory reared *Hyalella* (Clark et al. in press). Results from the field studies described above would certainly question the adoption of water quality objectives that are based solely on impacts to laboratory reared species for assessing the possible impacts of pyrethroids on resident aquatic taxa found in the environment. Moreover, for species such as *Hyalella*, which have short generation times, loss of some individual organisms that are sensitive to pyrethroids is quickly compensated by resistant (less sensitive) individuals with a high reproductive rate. Thus, the population in the environment remains viable, which means that the aquatic ecosystem as a whole remains viable.

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[3] The Central Valley Water Board's approach here is a hazard assessment-based approach that simply compares environmental concentrations of a pesticide against some estimated threshold effects to determine if there is impairment to the beneficial use. Typically, the estimated threshold values used in such a comparison fail to consider environmentally relevant data. Rather than determining impairment in this manner, the PWG contends that a risk-based approach is more appropriate and scientifically superior as compared to a hazard-based approach. The risk-based approach is a process whereby one estimates the probability of some adverse effect from a present or anticipated exposure to stressors such as pesticides. Accordingly, a risk-based approach uses environmentally relevant data to determine the probability of exposure. Considering its use of environmentally relevant data, the risk-based approach is a better measurement for determining what constitutes reasonable protection of beneficial uses.

[4] For example, bioassessment multiple stressor studies using resident benthic taxa in four urban streams in California have demonstrated that pyrethroids were the least important stressor in these streams when evaluated along with other stressors such as physical habitat and metals (Hall et al. 2014a). Furthermore, for two of these four streams, pyrethroids were not found to be a significant stressor when considered in a multiple stressor analysis.

In summary, the Central Valley Water Board must consider a number of factors when establishing water quality objectives at levels necessary to protect the beneficial uses. While adopting the most conservative number developed by academia may appear appropriate, it fails to incorporate the balancing principles that are a fundamental part of Porter-Cologne. Specifically, the Legislature declared that, "activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (Wat. Code, § 13000.)

II. Proposed Individual Pyrethroid Objectives Are Overly Conservative

Keeping in mind the need to provide reasonable protection for the WARM and COLD beneficial uses, the PWG contends that the proposed objectives for the pyrethroid pesticides are overly conservative in many ways. As indicated above, they are set at levels to protect sensitive laboratory species and fail to consider environmentally relevant data. Further, the chronic values are calculated with limited if any data, and, if not further clarified, fail to take into account the highly hydrophobic nature of these pesticides. Moreover, the proposed water quality objective for additivity perpetuates the overly conservative nature of the objectives, and further compounds the conservatism by using the proposed objectives, that include significant safety factors, as the denominator. Each of these concerns is discussed further here.

A. Compliance With Pyrethroid Water Quality Criteria Should Be Based on the Bioavailable Fraction of Pyrethroids

First, pyrethroids are highly hydrophobic insecticides with K_{ow} values in the 6-7 range. Their sorptive behavior means that the parent molecules will largely bind reversibly to sediment particles, organic matter, or even inert surfaces in aquatic systems. Water column measurements of pyrethroids in the environment are generally measures of whole water concentrations (without filtration). In comparison, however, laboratory toxicity tests used to generate pyrethroid criteria have been conducted in laboratories where the water source is generally filtered and free of organic material and suspended sediment found in the environment. Toxicity data from these tests are generally considered to represent the dissolved fraction that is bioavailable to aquatic life. In order to compare the pyrethroid concentrations from field-collected samples with dissolved based criteria, the bioavailable fraction can be calculated by using K_{oc} and K_{doc} values. Other reasonable options for assessing the bioavailable fraction include direct measures of freely dissolved concentrations (e.g., Solid-Phase Micro-Extraction (SPME)) or sample filtration. This issue of bioavailability was clearly recognized and discussed in the UCD criteria methods development report by TenBrook and Tjeerdema (2006), and in the UCD criteria reports for the individual pyrethroids. (See, e.g., Water Quality Criteria Report for Bifenthrin (March 2010) at p. 10 ["The studies above suggest that the freely dissolved fraction of

bifenthrin is the primary bioavailable portion, and that this concentration is the best indicator of toxicity, thus, it is recommended that the freely dissolved fraction of bifenthrin be directly measured or calculated based on site-specific information for compliance assessment."].)

Considering that the criteria in which the proposed water quality objectives are derived from are considered to be "dissolved" based criteria, it is therefore appropriate for the proposed water quality objectives to also be recognized as "dissolved" objectives. There is clear legal precedent for adopting water quality criteria/objectives that are considered to be "dissolved" objectives. For example, in its adoption of the California Toxics Rule, US EPA specifically notes that the metals criteria are dissolved objectives. (See 40 C.F.R. § 131.38(b)(1), fn. m.) In another example, the Basin Plan includes water quality objectives for certain water bodies in Table III-1. (Basin Plan at pp. III-3.00 – III-4.00.) The footnote to this table clearly specifies that the metal objectives in the table are "dissolved" concentrations. Thus, when appropriate, US EPA and the Central Valley Water Board have both adopted water quality criteria/objectives that recognize bioavailable fractions. We believe it appropriate here as well.

US EPA (1994) uses a water effects ratio (WER) for metals in order to account for a difference between the toxicity of a metal in laboratory dilution water and its toxicity in ambient water at a site. In the US EPA (1994) document, it is recommended that: (1) measuring the dissolved metal is the most appropriate approach; and (2) dissolved metals criteria are not numerically equal to total recoverable criteria. The bioavailability issue with pyrethroids is similar to the metals issue. US EPA has clearly set a precedent and correctly addressed the bioavailability issue by recommending that field constituent concentration measurements must be comparable with criteria derived from laboratory toxicity data. As stated above, this is the same approach that should be used for pyrethroids by converting the whole water field measured pyrethroid concentrations to filtered or bioavailable concentrations using K_{oc} and K_{doc} values, or using other approaches such as direct measures of the bioavailable fraction or sample filtration.

B. Criteria Development Should Include Use of Toxicity Data From Field-Collected Native Taxa

Second, toxicity data with field-collected native taxa should be included in criteria development. Whether certain taxa adapt to a particular stressor, or are simply adapting to the multiple stressors present in a natural environment, the point is that adaptation occurs and as long as the taxa are successful, the beneficial uses (i.e., WARM and COLD ecosystems) are not impaired. Moreover, a document on the US EPA website that is an appendix to the Aquatic Life Guidelines developed by Stephen et al. 1985 lists a total of 13 reasons when toxicity data would not be appropriate for use in criteria development.[5] For example, a few reasons for rejecting toxicity data for criteria development include: the test species is not

[5] See http://water.epagov/scitech/swguidance/standards/criteria/aqlife/upload/review_toxicity.pdf.

aquatic; test species lives naturally in only a unique habitat; and, the test species is not a resident of North America. Notably, the use of toxicity data with field-collected native taxa is not listed as a reason for rejection of toxicity data for criteria development. Further, US EPA (2003) has previously used toxicity data from field-collected Atlantic menhaden (*Brevoortia tyrannus*), Sheepshead minnow (*Cyprinodon variegatus*), Mummichog (*Fundulus heteroclitus*), grass shrimp (*Palaemonetes sp.*), and amphipod (*Gammarus sp.*) as reported by Bushong et al. 1988 and Bushong et al. 1987 in the development of saltwater acute water quality criteria for tributyltin.

C. Additivity Formula Should Use a Definitive Toxicity Endpoint

Third, additivity occurs when the cumulative toxicity of a mixture of chemicals can be estimated from the sum of the individual potencies of each component. Additivity results when there are no interactions between chemicals in a mixture. The additivity equation in the Preliminary Draft Amendments is incorrect. The denominator for all the pyrethroids used in the sum equation should be a definitive toxicity endpoint such as an LC50/EC50 value for similar taxa—not the water quality criteria (objective) for each pyrethroid. Use of the objective in the denominator in the sum equation is incorrect because each individual objective includes significant safety factors in its calculation. Thus, by using the proposed objective in the additivity equation, the conservatism is further compounded. It is also incorrect to assume that additive toxicity exists if reported pyrethroid concentrations are well below established effects thresholds.

D. The UCD Methodology to Develop Chronic Criteria for Pyrethroids is Not Appropriate Considering the Lack of Chronic Data

Fourth, the Preliminary Draft Amendments propose water quality objectives for both acute and chronic criteria calculated with the UCD methodology. The primary issue with the proposed chronic criteria is the default Acute to Chronic Ratio (ACR) used in the UCD criteria reports. In general, the PWG does not contest the use of an ACR to calculate chronic criteria, but rather questions the overly conservative nature of the default ratio generally used in the UCD criteria reports. Based on new data and information recently developed, the PWG believes that new information supports development of more accurate ACRs for calculating chronic criteria. As we indicated in footnote 2 above, the PWG would like to meet with Central Valley Water Board staff in the near future to review this new data and information.

III. Direction to Peer Reviewers

At the November 7, 2014 Stakeholder Meeting, Central Valley Water Board staff indicated a willingness to consider comments from stakeholders with respect to the direction that should be issued to those individuals that will ultimately be selected for conducting peer review of certain portions of the Preliminary Draft Amendments. We appreciate staff's willingness to provide us this opportunity. In particular, the PWG believes that rigorous, independent peer review of the six UCD water quality criteria reports is necessary considering

that the Central Valley Water Board's proposed water quality objectives are in fact the "criteria" as calculated in the UCD criteria reports. To date, this level of peer review of these reports has not occurred. Rather, to our knowledge, peer review so far has been limited to review by other state agencies and Lawrence Livermore Laboratories.

The PWG also believes it imperative that the questions/issues directed to peer review be scientific/technical in nature, and not include (directly or indirectly) questions/issues that are policy questions reserved for the Central Valley Water Board. For example, it would be inappropriate to ask the peer reviewers their opinion as to whether the proposed water quality objectives "reasonably" protect the beneficial uses. Under the California Water Code, the Central Valley Water Board is required to answer this question considering a number of factors. The peer reviewers are not in a position to answer this question, which is policy oriented.

Accordingly, we recommend the following questions be directed to those that will conduct peer review of the UCD criteria reports and the Preliminary Draft Staff Report.

1. How can bioavailability be considered when determining compliance with pyrethroid water quality criteria that will be used as a regulatory endpoint?

2. Should toxicity data from native field-collected taxa be used in pyrethroid criteria development?

3. Is the additivity equation proposed by the Central Valley Water Board using a pyrethroid criterion (objective) in the denominator correct given that the criterion includes safety factors? How do differences in data sets and methods for each criterion impact adding them altogether in the manner proposed?

IV. Proposed Implementation Language Needs Further Review and Revision

The Preliminary Draft Amendments propose some limited changes to existing Basin Plan language, and wholesale additions specific to pyrethroid pesticides. With respect to the proposed changes to existing language, the PWG is concerned that these changes are surgical in nature and fail to address the outdated nature of this section of the Basin Plan. This section of the Basin Plan, "Pesticide Discharges from Nonpoint Sources," was adopted many years ago and does not reflect current regulatory practices or current permitting approaches. As such, the proposed limited surgical changes do not correct the outdated nature of these provisions and do little in making this section of the Basin Plan relevant. Accordingly, we recommend that Central Valley Water Board staff make no changes, delete the whole section, or undertake the appropriate level of effort to revise the section in its entirety.

Next, the Preliminary Draft Amendments apparently borrow extensive language from a Bay Area pesticide total maximum daily load (TMDL). The Central Valley is very different from the Bay Area and thus the language in that broad TMDL is not necessarily applicable

here. Further, the proposed language with respect to TMDLs in the Preliminary Draft Amendments needs extensive revision to avoid the imposition of numeric effluent limits on National Pollutant Discharge Elimination System permittees. The PWG encourages Central Valley Water Board staff to work directly with different stakeholders to develop appropriate implementation language for the various types of dischargers.

In closing, the PWG looks forward to working with staff to resolve our issues of concern. Please contact me at (916) 446-7979 or tdunham@somachlaw.com.

Sincerely,

Theresa A. Dunham

cc: Ann B. Orth, Ph.D., Pyrethroid Working Group
James Wells, Environmental Solutions Group, LLC
TAD:cr

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