REGIONALSAN
TAKING THE WASTE OUT OF WATER
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March 20, 2014

Ms. Tessa Fojut
Central Valley Regional Water Quality Control Board
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via electronic mail: Tessa.Fojut@waterboards.ca.gov

SUBJECT: Comments on the Central Valley Regional Water Quality Control Board's Draft Esfenvalerate Sediment Quality Criteria Derivation (Phase III)

Dear Ms. Fojut,

The Sacramento Regional County Sanitation District (Regional San) appreciates the opportunity to comment on the *Draft Water and Sediment Quality Criteria Report for Esfenvalerate. Phase III: Application of the Pesticide Water and Sediment Quality Criteria Methodologies* (draft criteria) developed by the University of California, Davis (UCD) (Trunnelle et al., 2014). Regional San owns and operates the Sacramento Regional Wastewater Treatment Plant, and provides wastewater collection, conveyance and treatment services to over 1.3 million residents and thousands of commercial and industrial customers in the Sacramento region. Our mission is to protect human health and the environment by keeping the Sacramento River clean and safe. We take our mission very seriously and work on a daily basis to meet our obligations to protect water quality and beneficial uses in the Sacramento River and Delta.

Regional San understands the Central Valley Regional Water Quality Control Board's (Regional Board) interest and efforts to protect the environment from adverse effects due to pesticides. However, we have concerns about the potential implementation of the draft water quality criteria (WQC) and sediment quality criteria (SQC[1]) despite their development methods generally following risk assessment and risk management practices for developing toxicity screening values. A primary concern with the draft criteria directly relates to the Regional Board staff potentially using draft criteria, developed with multiple layers of uncertainty, to interpret narrative objectives in the Sacramento-San Joaquin Basin Plan.

[1] Termed bioavailable sediment quality criteria (BSQC) by Fojut et al. (2014).

Regional San agrees with the conclusion by Trunnelle et al., (2014) that esfenvalerate SQC should be considered 'interim' *"…because there are very few SSTT data available for pesticides, and because of this it was not possible to fully test the UCDSM with larger SSTT data sets and a high degree of uncertainty remains in any BSEQ derived with this method."* These criteria should not be used as a basis for regulatory compliance limits primarily because of the lack of high quality toxicity data resulting in criteria that are overly conservative, and overly protective. Due to the uncertainties associated with developing WQC and SQC without a robust toxicity data set, these values are more appropriate as screening levels, indicating whether further assessment is needed.

Regional San also has the following concerns with the development of the esfenvalerate WQC and SQC:

- Limited toxicity data,
- Laboratory-reared *Hyalella azteca* for representing the benthic community,
- Environmental variables that could affect toxicity are lacking or uncertain,
- Practical implications of applying the draft criteria, and
- Cumulative impacts of uncertainties.

Due to all of our concerns, detailed below, we recommend only using these values as one line of evidence in the evaluation of potential impacts, and not as formal criteria that are the basis for regulation.

Limited toxicity data

With the exception of the draft acute WQC which fulfilled the data requirement of five taxa, the primary limiting factor for the esfenvalerate chronic WQC and SQC development is the lack of high quality toxicity data. The paucity of toxicity data contributing to high uncertainty with the derived draft SQC for bifenthrin was also a major concern of the following experts[2] :

- Dr. Chris Ingersoll, director, USGS Columbia Environmental Research Center,
- Dr. G. Allen Burton, Director, Professor and Director, School of Natural Resources & Environment and Cooperative Institute for Limnology & Ecosystem Research, University of Michigan,
- Dr. Steve Bay, head of the Toxicology Department, Southern California Coastal Water Research Project, Dr. Peter Landrum, Ph.D., Scientist Emeritus, National Oceanic and Atmospheric Administration, Great Lakes Environmental Research Laboratory, and
- Dr. Lisa Nowell, Research Chemist, USGS.

2

http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/sediment_quality_criteria_method_development/index.shtml

The concerns of these experts regarding using limited data sets for bifenthrin SQO development are also applicable to the draft, interim, esfenvalerate criteria.

Although adequate data are available to develop a species sensitivity distribution for acute WQC, acceptable toxicity data (as defined by the methodology) were available for only three of the five taxa needed to construct a chronic species sensitivity distribution. Representative toxicity data were not available for salmonids or benthic crustaceans, leaving substantial uncertainty in the representativeness of the chronic toxicity data used to derive the esfenvalerate chronic WQC. This is in contrast to the development of statistically-based chronic toxicity values that would be supported with a more robust data set being more fully representative of the aquatic community.

Likewise, there were few paired acute and chronic data to develop an acute-to-chronic ratio (ACR) and thus a median ACR had to be calculated with default values to determine the chronic WQC. UCD methodology allows for the lack of acceptable chronic data by applying a conservative default ACR, which is not based upon directly-applicable toxicological data. The limitations in the available toxicity data is likely to result in criteria with a high degree of uncertainty and with questionable representativeness of environmentally relevant species, while the use of conservative assessment factors may result in values that are overly protective, ***especially when compounded as done according to the UCD Methodology.***

Acceptable acute sediment toxicity data (as defined by the SQC methodology) were available for only two of the five taxa needed to construct a species sensitivity distribution. Data were unavailable for an infaunal invertebrate, a mollusk, amphibian, other, and a benthic invertebrate from an unrepresented family. Due to these few data an assessment factor of 12 was used, meaning, available toxicity data were divided by 12, and this was in addition to a default assessment factor of 2 to derive a conservative acute SQC. Likewise, due to the lack of chronic sediment toxicity data for esfenvalerate, a default ACR of 11.4 was applied to the acute value (the lowest species mean acute toxicity value divided by its assessment factor of 12). Therefore there was a lack of toxicity data for the development of acute and chronic SQC with an acceptable level of uncertainty.

Based on data limitations, and given a conclusion by the author that the draft esfenvalerate criteria should not be considered more than interim values due to these uncertainties in the underlying data (Trunelle et al., 2014), these esfenvalerate criteria should not be used as a basis for regulatory compliance at this time. The proposed values are appropriate as screening levels to indicate if further assessment is needed to determine if adverse effects are occurring when concentrations are elevated beyond the WQC and SQC.

Available toxicity data may not accurately represent the sensitivity of the benthic community
Hyalella azteca, one of the two test species for which acceptable sediment toxicity data for determining the bioavailable sediment quality criteria were available has been reported to have a much greater sensitivity to pyrethroids in sediment than a suite of other aquatic taxa (Palmquist et al. 2011). Moreover, laboratory-reared *H. azteca* have been reported to be up to 700 times more sensitive than resident populations in the Central Valley (Weston et al., 2013). Use of lab-based *H. azteca* toxicity data in criteria development may overestimate the potential for adverse effects to the benthic community, downwardly biasing the draft SQC. Trunnelle et al., (2014) expressed concern over a lack of *H. azteca* data and inclusion of these data should be considered with caution.

Environmental variables that could affect toxicity are lacking or uncertain
Available information indicates that ambient temperature can have a significant effect on the toxicity of pyrethroids in sediment. Wheelock et al. (2008) demonstrated an inverse relationship between temperature and the toxicity of pyrethroids to aquatic invertebrates. Temperature has in fact been used as a method in Toxicity Identification Evaluation procedures to help determine if the cause of toxicity to invertebrates is due to pyrethroids. This relationship, although noted as an uncertainty in the methodology document, is not accounted for by the current model. Between 2006 and 2008, for example, surface water temperature in the Sacramento River around the Sacramento Regional Wastewater Treatment Plant discharge ranged from 43 to 73°F. Although identified as a potential uncertainty in Trunnelle et al. (2014), there were no recommendations to account for the effect of this broad range in temperature on the toxicity of esfenvalerate. WQC and SQC that do not consider temperature may not accurately estimate the potential for adverse effects to organisms and result in criteria that are not representative of ambient conditions.

When developing sediment criteria, the bioavailability of esfenvalerate in sediment is adjusted based on consideration of the organic carbon content in sediment. Although it is recognized that site-specific partition coefficients should be used when available, it is proposed that the geometric mean of acceptable partition coefficients (Koc of 161,000) be used in the absence of a site-specific value. The values reported in Trunnelle et al. (2014) as acceptable varied by more than two orders of magnitude (5,248 to 630,957), and use of the geometric mean with such a broadly-ranging set of values may mask the high degree of variability, and possible uncertainty, associated with this indicator of bioavailability.

The form of carbon also has been shown to have a significant effect on the partitioning (and bioavailability) of organic compounds in sediment. Black carbon, for example, has been demonstrated to have an increased partitioning coefficient relative to other forms of carbon in sediment (Burgess and Lohmann 2004; Burgess et al. 2013). Based on the possible range of Koc values and its critical impact on the resulting sediment criteria, use of the geometric mean Koc is likely to be overly simplistic when developing the sediment criteria.

Trunnelle et al., (2014) recommended that the freely dissolved esfenvalerate concentration be measured for determining WQC compliance because this appears to be the best predictor of the bioavailable fraction. This freely dissolved fraction is a data gap in developing appropriate toxicity data for WQC and SQC. Environmental factors that significantly affect esfenvalerate toxicity need to be considered and fully evaluated in the development of these draft criteria.

The practical implications of applying the proposed criteria should be further considered
Given the uncertainties associated with these values, further discussion is necessary about the appropriate application of such criteria to achieving regulatory objectives, with detailed consideration given to the practical implications of applying these criteria to the Sacramento and San Joaquin River basins. Additionally, specific guidance for the implementation of these values needs to be developed to ensure that any implementation of WQC or SQC that are highly uncertain are used only as triggers for further investigation, and not as the basis for regulatory limits.

The cumulative impacts of uncertainties have not been fully characterized
Trunnelle et al. (2014) provides a useful and important summary of assumptions, limitations, and uncertainties associated with the derivation of the draft criteria (Section 12.1). This section would benefit from additional evaluation considering the relative importance and the potential direction and magnitude of the bias/error associated with each assumption, limitation, and uncertainty discussed in this section, and the effect it is expected to have on the draft criteria. In particular, it is recommended this section consider the cumulative impact of these factors on the proposed criteria, and the range of criteria values that could result from the cumulative effect of the assumptions, limitations, and uncertainties on the criteria values. Please note that in section 7.2 "*only 2 of 5 taxa ….available for bifenthrin*…" should probably be referring to esfenvalerate.

Conclusion

Although the methodology used for the development of the proposed criteria is generally acceptable, there are substantial uncertainties associated with the development and application of these interim WQC and SQC for esfenvalerate. Based on the many uncertainties associated with the proposed interim draft criteria, and the potential over-protectiveness of the methodology with the implementation of conservative default assumptions, Regional San cannot currently support the implementation of the draft WQC and SQC by the Regional Board. Better characterization of esfenvalerate toxicity, factors affecting its toxicity, and defined and practical methodologies for the determination of criteria exceedance in surface water and sediment would help gain support for these criteria. Until these uncertainties are addressed, care must be taken in the application of these values and they should serve as only one line of evidence in the evaluation of potential impacts, and not as formal criteria that are the basis for regulation.

Thank you for your considerations. Please contact me at (916) 876-6030, dornl@sacsewer.com, if you have any questions.

Sincerely,

Linda Dorn
Environmental Program Manager

cc: Tim Mussen
Christoph Dobson
Terrie Mitchell
Prabhakar Somavarapu

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