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Review Comments on report entitled "Relative-Risk Evaluation for Pesticides Used in the Central Valley Pesticide Basin Plan Amendment Project Area"

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The goal of this relative risk evaluation report for pesticides is to provide a screening level evaluation methodology for identifying and prioritizing a target list of current-use pesticides that pose the greatest overall relative risk to aquatic life in surface waters of the Central Valley region. In general, the process described in this report does provide some useful guidance on how to prioritize pesticides that may pose ecological risk in the Central Valley Region. Although the process used generally has various logical components, the authors have failed to provide sufficient references to support the approach that they used. For example, the Swanson and Socha (1997) book entitled " *Chemical Ranking and Scoring: Guidelines for Relative Assessments of Chemicals'* - a highly respected SETAC publication - could be cited and used to provide scientific credibility to the entire process. Other chemical ranking references could also be used (see numerous references in the Swanson and Socha 1997 book). The most common types of chemical ranking and scoring systems are: (1) simple categorizations based on expert judgement; (2) decision rule with predefined criteria; (3) endpoint scoring, with or without aggregations and (4) generic risk calculations. The authors need to clearly define what approach they have used and why.

Specific Comments by page are listed below:

Executive Summary – This section should contain a summary of the results. For example, at least a list of the pesticides with high and moderate risk rankings should be included.

Page 2, last parag – Were the monitoring data properly screened for QA/QC procedures? All sources of monitoring data should be clearly identified with the associated QA/QC procedures. How were non-detection pesticide values addressed, particularly in cases where difference sources of data have different levels of detection for specific pesticides.

Page 3, parag 2 – The most current PUR database was obtained from 2004. Can the authors provide some insight on how representative these older data are for current (2008) pesticide uses?

Page 4, parag 6 – The influential benchmark for the toxicity data is the use of the lowest aquatic life value for each pesticide. All of these low values – which are key drivers in this entire process - need to be very carefully evaluated by reviewing the **original** document reporting these values. Have the authors considered using a species sensitivity distribution (SSD) approach with the receptor species for each pesticide (i.e., plants for herbicides) and using a 5^{th} or 10 centile as the toxicity value for the ranking analysis. Using a centile developed from a distribution of toxicity values is much more credible that simply using the lowest toxicity value.

Page 5, parag 1 – As mentioned above for the PUR data, are the authors convinced that monitoring data collected from 1992-2003 represent current exposure patterns for the pesticides of interest?

Page 5, Section 3, parag 1 – For the three step process the authors should clearly state here (as they state on page 7 and 8) that a hazard quotient (HQ) approach (maximum environmental concentration/lowest toxicity value) is being used for risk ranking. Why not include the HQ for each pesticide in Table 2A?

Page 5, Section 3.1, parag 3 – What was the reason for selecting the top 30 pesticides based on application and/or total areas applied? Did the authors evaluate the distribution of application data and use these data to decide on a cutpoint of 30?

Page 8, parag 1 – See above comment about relevance of the 1998-2004 pesticide amounts for (2008) use.

Page 9, Section 3.4 – The sediment risk evaluation is very crude and only includes risk ranking categories of potential, possible and unlikely. It is based on the presence and degree (K_{oc} values) of pesticides in sediment and does include a relationship to toxicity. **A measured concentration of a pesticide in sediment is not equivalent to an adverse ecological effect.**

Page 10, parag 5 – It appears that tralomethrin and PHMB were included as high risk pesticides based on best professional judgement by one individual. This type of action is subjective and does not follow the process used for ranking the other pesticides. Perhaps it would be more appropriate to add these two pesticides to a "Watch List" at this point in time until more data are available for a proper risk ranking.

Page 10, parag 6 – The discussion of "joint toxicity" should be more balanced and state that there are three basic types of mixture interactions: **antagonism** – the toxicity of a mixture of chemicals is less than a simple summation of individual toxicities of individual chemicals; **additive** – the toxicity of a mixture of chemicals is approximately equal to that expected from a simple summation of toxicities of individual chemicals; and **synergism** – the toxicity of the mixture is greater than expected from a simple summation of toxicities of individual chemicals.

Figure 5 – The HQ concept (maximum environmental concentration/lowest toxicity value) should be included in this flow chart to provide "real world context" for the toxicity data. For example, a very low pesticide LC50 value of say 50 ng/L would be irrelevant if the environmental concentration never exceeds 10 ng/L.

Table 2A – The lowest toxicity value reported for diazinon (0.2 ug/L for *Gammarus fasciatus*) is incorrect as this value should be 2.0 ug/L due to a units problem with data reporting from this 1966 study. This issue is explained in detail in Hall and Anderson (2005). This is good example of why the lowest toxicity value for each pesticide needs to be carefully checked by reviewing the **original** data.

If HQ values are reported in Table 2A as recommended above, this would provide a initial approach for determining which of the 29 pesticides ranked as high risk would have the highest risk priority.

References

Hall, L. W. Jr. and R. D. Anderson. 2005. Acute toxicity of diazinon to the amphipod, *Gammarus pseudolimnaeus*: Implications for Water Quality Criteria Development. Bull. Environ. Contam. Toxicol 74: 94-99.

Swanson, M. B. and A. C Socha. 1997. Chemical Ranking and Scoring: Guidelines for Relative Assessments of Chemicals. SETAC Press, Pensacola, FL.