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M E M O R A N D U M

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SUBJECT: REVIEW OF PHASE I REPORT ON METHODOLOGY FOR PESTICIDE SEDIMENT QUALITY CRITERIA DERIVATION: REVIEW OF EXISTING METHODOLOGY

This report provides a comprehensive review on existing methodologies for pesticide sediment quality criteria (SQC) derivation. It took an approach of conducting an extensive search for existing SQC derivation methodologies, evaluating those methodologies for their strengths and weaknesses, identifying key components for SQC derivation, and discussing the components with considerations of regional pesticide issues in the Sacramento and San Joaquin River basins. This approach effectively provides a solid scientific foundation to develop and/or propose a SQC derivation methodology in the next phase of the project for the Sacramento and San Joaquin River basins. The extensive search results in a list of existing methodologies developed by five foreign countries (Australia/New Zealand, Canada, France, The Netherlands, and the United Kingdom), two international organizations (the European Union/European Commission, the Organization for Economic Co-operation and Development), two national agencies (USEPA and the National Oceanic and Atmospheric Administration) and several individual states. To my knowledge, the list well represents the methodologies currently used worldwide for SQC derivation. The components identified based on those methodologies and several critical literature reviews thoroughly cover our current knowledge of scientific and policy elements for SQC derivation.

The key components identified in the report constitute the bases for SQC derivation. The report discussed, compared and contrasted the components with sufficient details in the context of the existing methodologies. The evaluation process leads to recognitions on challenges of deriving SQCs, and weaknesses and uncertainties of the existing methodologies, and most importantly, to indicating the directions for a future methodology of SQC derivation with site specific solutions in the Sacramento and San Joaquin River basins. Particularly, the report recognized the lack of guidance on locating quality data sources and evaluating data quality in most of the existing methodologies. Multi-route exposures, chemical bioavailability, sediment spiking procedures and variations in site-specific K_{oc}s specifically attribute to sediment toxicity testing and SQC

derivation were accurately discussed in the report. Appropriate considerations in incorporating those components in the future SQC derivation methodology were adequately addressed.

The report concisely summarized each of the individual existing methodologies and compared each other under three main SQC derivation approaches: empirical, equilibrium partitioning (EqP) and spiked-sediment toxicity testing (SSTT). Their advantages and disadvantages were critically evaluated. The empirical approach is understandably excluded from further considerations for the future methodology primarily because methodologies developed from the empirical approach are unable to yield single numerical values with a direct causal relationship between a single sediment contaminant and toxicological endpoints. Each of the other two approaches has their pros and cons. The EqP approach that uses aquatic toxicity data with equilibrium partitioning models can derive SQCs without need of large field datasets or SSTT data but it ignores existing sediment toxicity data and could result in unrealistic SQCs. The SSTT approach yields SQCs with direct cause-effect relationships but SSTT data is scarce. After evaluating the existing methodologies, it is concluded that a methodology incorporating both EqP and SSTT approaches appears to be the most favored for SQC derivations. The combination approach has been applied in The Netherlands and European Union methodologies and is valid in developing SQCs for Sacramento and San Joaquin River basins.

Overall, the report is well organized and concisely written. It meets its goal to build a solid foundation for the next phase of the project towards a more robust methodology for developing SQCs for the protection of aquatic life in the Sacramento and San Joaquin River basins.

I only have a few editorial suggestions that may be considered in future revisions:

1. Page 4, Table 1. Quantitative structure activity relationships (QSARs) were briefly discussed under section 5. Should it be included in the table?

2. Page 7, Table 2. It may be beneficial to re-group the list of methodologies in certain format, for instance, by methodology types—EqP, SSTT, empirical approach and combined approach. The Australia/New Zealand methodology was discussed in the text of various occasions. Should it be included in the table?

3. 4.2 Portion of species to protect
   Page 12, “In contrast to water quality criteria derivation methodologies, SQC derivation methodologies do not primarily rely on single-species toxicity data to calculate criteria or guidelines” The statement appears to be inaccurate because the equilibrium partitioning methods can be based on single-species toxicity data. Some of the SSTT method such as French method uses the single most sensitive datum to derive a SQC by applying an assessment factor.

4. 5.3 Ecotoxicity data
   Page 19, "…Internationally accepted protocols for aquatic toxicity testing have been in place for over a decade, whereas standardized methods for sediment toxicity tests are still in the process of being developed or finalized in some cases, …". Does the "standardized methods" mean the internationally accepted protocols? In fact, as described in Section 5.3.1, standardized methods for sediment toxicity testing have been developed in several organizations such as USEPA, OECD and ASTM and some of them have been adopted.