



CVCWA Central Valley Clean Water Association

Representing Over Sixty Wastewater Agencies

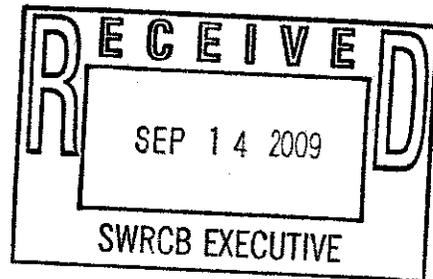
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Via Electronic and U.S. Mail

September 14, 2009

Mark Gowdy
Water Resource Control Engineer
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814



SUBJECT: Comments Regarding the Draft Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta

Dear Mr. Gowdy:

The Central Valley Clean Water Association (CVCWA) appreciates the opportunity to provide comments on the Draft Report entitled, *Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta* by Dr. Glenn Hoffman dated July 14, 2009 (Hoffman Report). CVCWA is a nonprofit association of 60 local public agencies providing wastewater collection, treatment, and water recycling in the Central Valley. Our members are keenly interested in the proper implementation of state and federal laws and regulations in waste discharge requirements and NPDES permits issued by the Central Valley Regional Water Quality Control Board (Regional Water Board)

As a preliminary matter, CVCWA encourages the State Water Board to coordinate this process for the development of South Delta objectives with the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) process. It is likely that information from the Hoffman Report will be evaluated and considered by CV-SALTS and it is imperative that the Hoffman Report not foreclose the use of other scientifically valid models by CV-SALTS.

The State Water Resources Control Board (State Water Board) is reevaluating the salinity objectives for the support of the agricultural beneficial use in the southern portion of the Sacramento – San Joaquin Rivers Delta (Delta). Currently, the salinity objective is evaluated using electrical conductivity and is specified as 700 $\mu\text{mhos/cm}$ from April 1 through August 31 based on beans, and 1000 $\mu\text{mhos/cm}$ from September 1 through March 31 based on alfalfa. The seasonality of the objective reflects the respective growing seasons of the two crops. The salinity objectives are set so that salt in the applied irrigation water will not build up in the root zone of

plants to levels where the plant yield is affected. The particular soils, crops, climate, precipitation and other factors affect the salinity requirements of irrigation water. To avoid years of growth studies for combinations of crops and irrigation waters, a model may be developed to assess the effect of varying salinity on specific crop growth in site-specific soils. The State Water Board contracted with Dr. Hoffman to review the applicable literature; compare the strengths and limitations of steady-state and transient models; determine southern Delta soils; irrigation practices, crops, etc; summarize the results indicating gaps in the literature and recommend future studies; and finally recommend a model to use to evaluate the salinity objective in the southern Delta.

Due to the time constraints of the southern Delta salinity reevaluation, it is unlikely that the studies recommended to fill data gaps or address current insufficiencies of transient models could be completed before the State Water Board determines the new objectives. Therefore, the final report should clearly separate the two major recommendations: the first being the recommended model for use in the State Water Board's current reevaluation of salinity objectives, and the second being the additional study and investigation required to address uncertainty of model inputs and the validity of alternate models to determine the most appropriate models for evaluating salinity objectives. The second set of recommendations is especially important as the irrigation water quality requirements are being evaluated in many areas within the Central Valley, including by CV-SALTS. As mentioned above, it is imperative that the Hoffman Report not prevent additional study and investigation to address uncertainty in the model used to develop south Delta objectives.

CVCWA is concerned with the levels of conservatism that may be embodied in the final model. It is entirely appropriate to review the available information to develop the model inputs and select appropriately conservative values. The crop information available to provide inputs to the model was largely generated in Riverside, CA at the salinity laboratories. The climate conditions at Riverside including daily, minimum, and maximum temperature, and relative humidity are more strenuous, which result in lower salt tolerance for crops than would result in the climate of the southern Delta. Additionally, the summer crop of beans is entirely irrigated by the furrow method in the southern Delta, which is widely accepted as 70% efficient (hypothetical leaching fraction of 0.3). The overall irrigation in the southern Delta is calculated as 75% effective (hypothetical leaching fraction of 0.25). Using data from 14 tile drains in the southern Delta the leaching fraction is estimated to be 0.23. These factors should be carefully considered when selecting the leaching fraction used in the model to determine the salinity objective as selecting an artificially low leaching fraction will result in an unnecessarily stringent salinity objective. Because the models are sensitive to the selected leaching fraction, the report should clearly define how the recommended leaching fraction is calculated. Finally, the use of a steady state model over a transient model will result in a conservative salinity objective for equivalent inputs. CVCWA recommends adding a list of the conservative assumptions made in selecting model parameters, so there will be confidence that the modeled result will be protective of the irrigation use with out being needlessly stringent.

Additionally, the endpoint selected for the model is currently 100% yield of the target crops. Due to the variability in the natural environment, it is not reasonable to expect 100% yield for all conditions. Basing the objectives on 100% yield 100% of the time is analogous to setting an aquatic life or human health criteria value based on zero risk of impact, which is not reasonable. Moreover, the Porter Cologne Water Quality Control Act (Porter-Cologne) requires water quality objectives be set at a level that provides for reasonable protection of the beneficial use. (See

Wat. Code §§ 13000, 13050(h), 13241.) Thus consideration should be given to determination of a reasonable yield target that reflects some level of risk. When considering a transient model, it may be appropriate to perform a continuous simulation using historical conditions, whereby the model may generate yields less than 100% due to conditions unrelated to the irrigation water quality. The historical yield generated by the model for conditions where the irrigation water quality is not a factor should be the benchmark for the yield.

Currently, the report focuses on the summer irrigation season of beans. The report should be expanded to also consider what are reasonable water quality objectives for winter irrigation of alfalfa.

The transient modeling approach should be utilized in the evaluation of the salinity objective. Information listed in the Hoffman Report and presented at the August 13, 2009 workshop point toward the ability of transient models to accurately replicate irrigation practices and crop responses to more robustly calculate the proper salinity objective. The steady state models calculate more conservative salinity requirements due to the fact that they cannot account for the natural variations that occur in the growing cycle. In the event the State Water Board determines the use of a steady state model is appropriate for the current salinity objective evaluation, the specific model should be carefully selected. Because of the demonstrated large variability in ability to replicate validation tests (depending on conditions, either greatly overestimating or greatly underestimating salinity requirements), the 40-30-20-10 model used in the Ayres and Westcott United Nations work does not appear as well suited to determine the salinity objectives in the southern Delta as the exponential model developed by Hoffman and van Genuchten, which replicated the validation data reasonably well. All parameters for the recommended model should be tabularized in the report, including the recommended values for the parameters specific for the critical crops in the southern Delta.

In conclusion, CVCWA supports a critical review of the salinity objectives necessary to reasonably support the agricultural beneficial use in the southern Delta. CVCWA requests the winter salinity objective (for alfalfa) be reevaluated concurrently with the summer salinity objective. A list of the conservative assumptions used in the model input selection could enhance confidence in the salinity requirements calculated by the recommended model. Knowing that the finalized Hoffman Report will recommend a modeling procedure given what is currently known and available in the literature, and the recommended model will be used by the State Water Board in the current reevaluation of the southern Delta salinity standard and possibly in other areas, it seems appropriate to clearly define why the recommended model is selected and why other models were not selected. Additionally, the recommendation should clearly include: (1) additional studies necessary to provide confidence in other models or approaches, and (2) provisions for the objectives to be reconsidered when new information becomes available from the recommended studies and transient models or CV-SALTS, possibly through the triennial review process.

Please feel free to contact me at (530) 268-1338 if you have any questions or wish to discuss our comments.

Sincerely,



Debbie Webster
Executive Officer

c: Pamela Creedon – CVRWQCB (electronically)
Daniel Cozad – CVSC/CV-SALTS (electronically)