**Comments on the October 29, 2010 Draft SJR Flow and Southern Delta Salinity Technical Report**

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I will only comment on evaluating the salinity objectives for the purpose of protecting agricultural productivity. The statement was made on page 75, "This evaluation will rely in large part on the conclusions and the modeling methodologies presented in a January, 2010 report by Dr. Glenn Hoffman entitled *Salt Tolerance of Crops in the Southern Sacramento-San Joaquin Delta* (Hoffman, 2010)." The main conclusions from that report are listed on page 76.

I have no comment on items listed "a" through "h". The most important points are listed as "i" and "j". I will present the following background information before commenting on these two items.

The relationships between water salinity, leaching fraction, and crop yield have historically been established assuming steady-state flow conditions. Mathematically a steady-state flow analysis does not include a time variable; whereas, a more complex transient-flow analysis does. Considering a steady-state flow analysis of water and solute, the water content and solute concentration at a given point remains constant with time in a steady-state system and can vary in a transient-state system. In fact, "true" steady-state conditions never exist in the field. Steady-state specifies that applied irrigation water is continuously flowing downward at a constant rate, irrespective of irrigation frequency. In addition, steady-state specifies that evapotranspiration is constant over the growing season. Consequently, steady-state solutions assume that the salt concentration of the soil solution at any point in the soil profile is constant at all times. None of these is real. Nevertheless the analyses based on steady-state conditions have been very useful in guiding irrigation under saline conditions. Transient-state models were not feasible until the more recent development of computers that can rapidly do the mathematical computations that the transient-state analyses require.

Dr. Hoffman did a very detailed extensive analysis for the southern Delta using steady-state analysis. Significantly, he incorporated the important effect of rainfall in his analysis. Neglecting reference to transient models, conclusion "i" would read, "Steady-state modeling presented in the report suggests the water quality standard could be increased up to 0.9 to 1.1 dS/m and be protective of all crops normally grown in the southern Delta under current irrigation practices. During low rainfall years, however, this might lead to yield loss of about 5 percent under certain conditions."

The University of California Center for Water Resources appointed a workgroup with a charge to answer the question, "Do the current recommended guidelines on leaching requirements (based on steady-state analyses) need to be revised?" This information is not only important to farmers, but also for regulatory agencies that apply or establish salinity standards for water bodies designed to protect agricultural production. The

workgroup consisted of Drs. Glenn Hoffman, James Oster, Steve Grattan, Jan Hopmans, Donald Suarez, Laosheng Wu, Chris Amrhein, Dennis Corwin, and John Letey (Chair).

The workgroup concluded that the present guidelines based on steady-state analyses overestimate the leaching requirements and the negative consequences of irrigating with saline waters. This error is particularly large at low leaching fractions. This is a fortuitist finding because irrigating to achieve low leaching fractions is desirable for the purpose of reducing the transport of chemicals that degrade groundwater quality and also provides for a more efficient use of limited water supplies. The feasibility of using saline waters for irrigation is also enhanced. Thus these positive goals can be pursued without an erroneous overestimate of developing soil salination. However, soil salination is still a potentially very negative consequence of irrigation and cannot be ignored. (Letey et al., 2010. Evaluation of Soil Salinity Leaching Requirement Guidelines. Ag. Water Man. That is presently accessible at http://dx.doc.org/10.1016/j.agwat.2010.08.009 )

I will now refer to item "i". Based on the workgroup findings, the water quality standard could definitely be increased up to 0.9 to 1.1, with the higher value being acceptable. Furthermore, maintaining current irrigation practices are not required. If a more uniform irrigation system is used, a much lower field-wide average leaching fraction than 15 to 20 could be applied without loss of yield. With respect to "j", rainfall is absolutely important in any modeling whether it be transient-state or steady-state. The model previously used very definitely was overly conservative and overestimated crop damage.