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August 16, 2013

Ms. Betty Yee
Senior Water Resources Control Engineer
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive #200
Rancho Cordova, CA 9670

Dear Ms. Yee:

This letter will serve as an addition to my peer review of the Proposed Basin Plan Amendments to Add Policies for Variances and Exceptions. As before, please note that I am sending you this on university stationary but the opinions and statements are my personal conclusions and do not represent the opinion of the University of California or any other individuals or departments at the University.

With respect to green house gas emissions (carbon dioxide in this case), they will increase if RO treatment is used to reduce the salinity of the treatment plant effluents. RO is energy intensive and typically the effluent would need to be pressurized up to about 300 psi for treatment. Recovery would be 80 to 90%. Pump and motor inefficiency further increase power consumption. Also there is no off-setting benefit that might reduce green house gas emissions as there are in other treatment processes, such as anaerobic digestion, which produces methane as a byproduct.

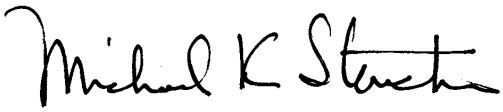
The use of RO will increase green house gas emissions. The magnitude of the increase depends on assumptions such as the type of fuel being used to generate the additional required electricity. Disposal of the brine will also require energy and hence will generate green house gases. The magnitude of the increase from brine disposal is less certain since there are questions about how the brines might be disposed.

I concur with the staff report that green house gas emissions will increase if RO is used to reduce effluent TDS. I published a paper in 2005 in Water Research (pp 4197-420) with my former graduate student F. Cakir where we compared green house gas emissions of aerobic and anaerobic wastewater treatment. If I use the parameters from my paper for CO2 from power generation I obtain higher CO2 emissions than the staff estimates. Therefore the situation may be worse with respect to green house gas emissions than the staff anticipates.

With respect to the estimated changes in ground water salinity, which is your review request 5, I found the calculations supporting the staff's conclusions in the Larry Walker report on the first CD, pages 37 to 46. I followed the calculations in this section and I agree that they are

sound. They are a simplified way to describe the impact of the more saline recharge. An alternative procedure would require the use of a dynamic ground water model, which is a much more involved procedure. The simplified model contains a number of assumptions for parameters, such as the hydraulic gradient, dimensions of the aquifer, etc. Although I have no reason to doubt their values, there is no way for me to check or validate them. The accuracy of the predictions will be dependent on these parameter values.

Very truly yours,



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