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**Re: Comment Letter, Eastern San Joaquin River Watershed Agricultural Order
SWRCB/OCC Files A-2239(a)-(c)**

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Dear Chairwoman Marcus, Members of the Board,

On May 17, 2016, I provided testimony as part of the Technical Panel presenting to the Board on the Draft of the Eastern San Joaquin River Watershed Agricultural Order, http://www.swrcb.ca.gov/public_notices/petitions/water_quality/docs/a2239/workshops/harter.pdf. A video of my presentation will be available at http://www.swrcb.ca.gov/public_notices/petitions/water_quality/a2239_sanjoaquin_ag_wrkshops.shtml.

The purpose of this letter is to briefly summarize the main points of my presentation:

1. I support the central role that agricultural coalitions (“Third Party”) have been given in the Central Valley Regional Water Board’s existing irrigated lands program, Waste Discharge Requirements General Order No. R5-2012-0116 (“existing order”). The Third Party has a leading role in developing the Management Practices Evaluation Program (MPEP), which plays a critical role in addressing nitrate contamination problems in irrigated agriculture (Harter, 2015): first, it provides the research and understanding to relate nutrient application and uptake data, reported annually by the growers, to the actual potential for nitrate discharge. Through field research and modeling work, it is anticipated that the MPEP will more clearly identify a relationship between agricultural practices, applied nitrogen (“A”), removed nitrogen (“R”), and the potential discharge to groundwater. Second, the MPEP will develop a framework used to identify acceptable practices that significantly improve nitrate discharge conditions to groundwater, including outreach, education, and extension tools that will actively engage growers in adopting improved practices. The Third Party is anticipated to coordinate a broad collaboration between academic institutions, University of California Cooperative Extension, the National Resource Conservation Service, local

Resource Conservation Districts, agricultural consultants, the Third Party, other organizations, and growers as a central element to implement improved practices across the Central Valley.

Limiting or focusing on just reporting the ratio A/R to the Regional Water Board is not helpful in the implementation of the program. Instead, any reporting between the Third Party and the Regional Water Board must identify both, (a) the relative practice performance among growers, and (b) the potential nitrate discharge to groundwater. The Third Party therefore needs to provide the following data to the Regional Water Board for each crop in each township:

- the total area harvested
- the total nitrogen applied to that area (“A”)
- the total nitrogen removed from that area (“R”)
- and the average ratio of A/R across the fields within that area.

In addition, it is useful to have statistical information, such as minimum, maximum, various quantiles, of A/area, R/area, and A/R across the individual fields. A “field” is here considered to be an individual field or equivalent accounting unit, e.g., group of fields within a farm that are managed equally and with the same crop and used as the reporting unit in the Nutrient Management Plan. The values of A/R provide a basis for comparing the relative performance in nutrient use efficiency among growers. However, that ratio is unrelated to the magnitude of potential nitrate losses to groundwater. Potential nitrate losses to groundwater are assessed by considering the difference between the total applied nitrogen, A, and the total removed nitrogen, R, over the area harvested. It is therefore essential that all of these numbers and their statistics are reported by the Third Party to the Regional Water Board. This finding is consistent with the findings of the SWRCB-CDEFA Nitrogen Tracking Task Force Report of 2013

(<https://www.cdfa.ca.gov/environmentalstewardship/pdfs/NTRSTFFinalReport122013.pdf>). To the degree not already required in the existing order, the existing order may have to be modified to specifically require the separate reporting of total A, total R, and mean A/R, separately for each crop in each township, rather than, for example, mean A and mean A/R only.

2. The township is an adequate aggregation area to report the above numbers from the Third Party to the Regional Water Boards. The township is somewhat larger but of similar order in spatial size as the source area of large production wells (irrigation wells or public supply wells) and the potential source area contributing to a domestic supply wells. Domestic supply wells have a relatively small source area, but the location of that source area is highly uncertain due to unknown variability in aquifer properties, often unknown well construction details, and due to the seasonal and inter-annual variability in regional and local groundwater flows, which are affected by local pumping in large wells. As I outlined in my presentation, and as we reported in Lockhart et al. (2013, Appendix B) and Horn and Harter (2009), we typically approximate the potential source area that contributes recharge to a domestic well in the Central Valley by a circular area with a diameter of 3 miles – half the length of a township. This is not the size of the actual source area, but the area potentially contributing recharge to a domestic well given the uncertainty in our site-specific knowledge. It is very difficult if not impossible to determine the specific contribution that any one field within this area may have on the nitrate concentration in a particular domestic well. In light of such uncertainty, aggregated information, for each crop in each township, on total A, total R, and mean A/R and their respective areas, provides sufficient information to guide regulators with information needed to implement the program and assess and evaluate the potential nitrate discharges to groundwater and trends in such discharges.
3. Regardless of whether or not the Board decides to move forward with the proposed domestic well monitoring requirement, strong and active coordination is needed among an array of already existing and any new shallow groundwater / domestic well monitoring programs in the Central Valley. Currently, four programs – all within programs under responsibility of the Water Boards – are independently conducting or planning to conduct shallow groundwater / domestic well monitoring programs:
 - a. The Central Valley dairy coalition, through Dairy CARES is conducting the Central Valley Dairy Representative Monitoring Program, which includes a monitoring well network across over 40

- dairies, <http://dairycares.com/CVDRMP>. In addition, dairies are reporting domestic and irrigation well water quality directly to the Regional Water Board.
- b. The State Water Board GAMA program's Priority Basin Project, under contract with the U.S. Geological Survey, is now engaged in a survey of shallow groundwater across the entire state, conducting groundwater sampling across a representative selection of domestic wells (<http://www.swrcb.ca.gov/gama/projects.shtml>)
 - c. The Existing Order in the RWB's irrigated lands regulatory program includes requirements for a trend monitoring program, likely to be conducted using a representative set of domestic or other shallow wells (http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/regulatory_information/eastern_sanjoaquin_watershed_wdrs/index.shtml)
 - d. The Central Valley Salinity Alternative for Long-term Sustainability (CVSALTS) program is developing a Central Valley wide representative shallow groundwater monitoring program that, based on draft reports, may target the monitoring of at least one well per square mile across much of the Central Valley (<http://www.cvsalinity.org/index.php/committees/technical-advisory/implementation-plannings/159-surveillance-monitoring-program.html>)

A fifth domestic well monitoring program that includes regular nitrate measurements has managed by the Department of Pesticide Regulation (<http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh2015.pdf>). These programs should be tightly coordinated to minimize cost, avoid duplication, and leverage the implementation of each toward meeting objectives across all of these programs.

References Cited:

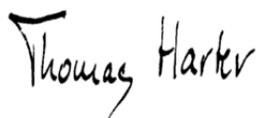
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Please feel free to contact me if you have questions or would like to discuss these comments in more detail.

Best regards,



Thomas Harter, Ph.D.
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