LAND IQ

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Ms. Jeanine Townsend
Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor [95814]
P.O. Box 100
Sacramento, CA 95812-0100
(tel) 916-341-5600
(fax) 916-341-5620
(email) commentletters@waterboards.ca.gov

Dear Ms. Townsend-

The following comments are being provided by Land IQ, a private scientific and research firm located in Sacramento and Los Angeles, California. I greatly appreciate the opportunity to provide these written comments as a follow up to my testimony to the State Board in Fresno on May 17, 2016 regarding the Eastern San Joaquin Revised Order.

Technical Experience and Qualifications:

My underlying technical experience and exposure to this process originates from many areas including:

- A BS, MS, and PhD in soil, water, and nutrient sciences, specifically with a focus on nitrogen (N) management in agronomic systems
- following completing those 10 years of focused technical education in this specific area, I have work as an objective technical consultant for 20 years.
- perhaps my best education centers on the fact that I was brought up on a diversified family farm here in the Central Valley of California and continue to have a participatory part in that farm still today. I fully understand the on-the-ground attributes of N and irrigation management practices for a variety of crops
- intimate involvement since 2012 in the Irrigated Lands Regulatory Program (ILRP) in the capacity of an objective technical consultant for coalitions spanning the valley from Kern to Shasta counties
- a member of the CDFA Task Force
- a member of the Nitrogen Mgt Plan, Technical Advisory Work Group (NMP TAWG)

Written Comments:

The enclosed written comments to the State Board Order revising the current Eastern San Joaquin Coalition Order are intended to expand on highlights of my testimony before the Board on May 17, 2016. Areas of discussion will include:

- Precedential Nature of the Order
- Integration of Coalitions and Associated Management
- Data Interpretation
- Low and High Vulnerability Areas/Prioritization
- Field level Record Keeping with Township level Reporting
- Integration with Other Regulatory Programs
- Applied N/Removed Ratio as a Proxy Measure

Precedential Nature of the Order: The Board and Staff should be encouraged to more fully recognize the need for balance between the regulatory process and the diversity of climatic and agricultural systems throughout the Valley and State. It is recognized that this is no easy task, however when considering comments and potential modifications to the State Board Order, inclusion of that flexibility should be considered as a result of these clear differences. The systems being regulated in this case are natural systems. They are inherently variable in nature. The final Order should recognize that variability to a much greater extent and have enough flexibility built into it to allow for the most regulatory success possible.

Flexibility is critical in this effort and the revised Order by the State Board constrains that flexibility even more than allowed in the original Order issued by the Central Valley Regional Water Quality Control Board. Too rigid of an Order can actually have the opposite of the intended effect and may not allow for unique solutions that create success

Integration of Coalitions and Associated Management: It appears as compared to the initial Regional Board Order, the current State Board Order recognizes Coalition involvement to a much lesser degree. It is important to recognize the value and strength of Coalition involvement and leadership. It is suggested that the roles and responsibilities of the Coalition are clearly stated, and in fact made clearer and possibly even expanded beyond what the Regional Board Order current contains. This suggestion is predicated on the following:

- Local knowledge is the best knowledge. Without question, this is true. Success for this program will be built from local stakeholders up to the regulating entities; not the reverse

- Without recognizing this and embracing a local leadership mechanism that is overseen and collaborated with by the regulating community, an erosion of trust and collaboration will undoubtedly occur, thus rendering success more difficult to obtain and management. This will ultimately delay completion of the end result of suitable groundwater quality.
- The Coalitions represent the grower community and provide an efficient data management, data summarization, reporting, education and outreach, and Board/Coalition communication mechanism. These leadership roles and responsibilities should be clearly spelled out in the revised Order and the Coalition level function brought forth much more than is currently in the Order.
- It is exceedingly important to allow for expert interpretation of the data at the local level first. As was stated by the State Expert Panel, certified and qualified experts should be the only people interpreting the raw data resources. And again, this should be done at the local (Coalition) level and summarized in an agreed to fashion for reporting to the regulatory community.
- It is imperative to put the burden on the Coalitions and hold them accountable through an auditing process of some kind that fully allows the regulating agencies the authority to check and monitor grower reporting, Coalition management, expert data summarization and overall reporting. This auditing process has yet to be fully developed but is seen as the key component and nexus of letting the local entities do their job, while at the same time allowing the regulating community access to information when requested. It is a partnership that has to be developed to maintain trust and achieve success.
- The Board should still have the authority to request individual grower information as necessary and this flexibility should be included in the revised Order
- No one entity can manage and interpret the monumental task of data management, interpretation, education and outreach, and regulatory oversight. It will require key partnerships and the Coalitions are critical and should be used aggressively engaged.

<u>Data Interpretation:</u> Let the experts in the field and local areas interpret the data.

- Misinterpretation of data is even more detrimental than no interpretation of data.
- The data should be interpreted and summarized by qualified professionals at the local level that understand the unique farming systems of that level. It is best, by far to put this responsibility on the Coalitions. Allowing just anyone to interpret the raw data is a recipe for erroneous conclusions and worse yet, false actions.
- As the Expert Panel recommended, this type of data interpretation should only be performed by a qualified expert.

- Therefore making this information public on a field by field basis is not a wise decision.
- There has been vocal pressure on the regulatory community to move quickly … for the sake of moving quickly. It is suggested that movement towards success be done in a scientifically valid and measured approach. Be cautious about "acting" too soon. Statements like:
    - "There is a lot of uncertainty and gaps in the data, but we need to act anyway."
    - "Set a number and work towards it."
- This is the exact opposite of what I was trained in technically for my entire career. That's like someone saying, "Let's do something, even if it's wrong." An objective, science-based, measured, and planned approach is most valuable and will result in the best outcome in the shortest time possible.

<u>High vs Low Vulnerability/Prioritization:</u> The Board and Staff should recognize the incredible effort that has gone into development of Groundwater Assessment Reports and other characterization of individual Coalitions. This work is extremely valuable and should be integrated into the final Order.

- It is the best summarization of risk that currently exists.
- In most all cases the work performed by the Coalitions has included the influential variables of irrigation method and management, soil type, crop type, environmental conditions, existing conditions, travel time, etc.
- It is suggested that integration of this already existing information that was developed at the Coalition/Local level be strongly considered.
- A prioritization mechanism should absolutely be included in the final Order because the size of the area and the complexity of the systems demands prioritization and phasing. Much of this work has already been completed.
- It is very likely the most efficient, timely, and effective method with which to achieve success most rapidly.

<u>Field level Record Keeping with Township level Reporting:</u> Coalitions have already developed their programs based nearly on, or completely at a field by field level. Management decisions and changes are performed at a field level. Thus this is the level of granularity necessary to achieve success. Saying that, the summarization of various fields into township-level reporting is critical for efficient interpretation and grower privacy. In particular, this field to township-level approach:

- Achieves the balance of granularity for action (at the grower, coalition, and regulatory levels) with the power of summarization for understanding trends, comparison of one area to another

- Allows for the purpose of using the information in a meaningful way.
- Many coalitions are at or near the field level in their coalition management practices. Growers essentially have to report out at this level in most cases.
- Therefore, in some manner the data exist however summarization of that data is the most powerful mechanism to understand the larger picture.

Integration with Other Regulatory Programs: There is a definite need to recognize CV SALTS, SGMA, and other work being done to realize efficiencies in data collection, data interpretation, reporting efficiencies, agency collaboration, etc. Without intensive collaboration with these other organizations, diverging conclusions and approaches may occur.

Applied N/Removed Ratio as a Proxy Measure: According to recommendations by the Agricultural Expert Panel in their Final Report, the State Board Revisions to the East San Joaquin Water Quality Coalition General Order includes provisions for using the ratio of applied N/removed N (A/R) ratio as a proxy measure for determining appropriate crop N management. The comments provided in this letter are regarding the use of the A/R ratio as a regulatory tool. Our comments are centered on the following main points:

1. The value of the A/R ratio as a regulatory tool is in the direction it provides to minimize N leaching, not as a representation of good vs. bad N management
2. Using the A/R ratio is duplicative of proving the efficacy of management practices.
3. Because of the variability associated with agricultural systems, multi-year averages of A/R must be used. The three to five year averaging period suggested by the Expert Panel should be regarded as a minimum.
4. Because management practices (including irrigation) and crop varieties are continually evolving, the N removed value is a moving target and should be interpreted as a range of values rather than an absolute or single value. Therefore, the applicable A/R will also be a range of values.
5. A range of desired A/R ratios must be considered for applicability to various cropping systems throughout California.

These comments are presented in more detail below.

1. **The value of the A/R ratio as a regulatory tool is in the direction it provides to minimize N leaching, not as a representation of good vs. bad N management.** Using the A/R ratio as an enforcement mechanism is scientifically unsupported, and would be difficult to do consistently across California in the many types of agricultural systems and climates that it comprises. Minimizing N leaching is a practical and achievable goal in all agricultural systems. Fine-tuning a cropping system to achieve a specific A/R

value *is not* practical or achievable and would defeat the purpose of using A/R. Relative movement in A/R (decreases or increases) is an indicator of how efficiently an agricultural system is functioning. Comparisons between A/R values in different but similar systems can be an indicator of improvement that can be potentially made in N management. However, absolute values of A/R are not meaningful in and of themselves, because most farms are already managed to optimize N fertilizer and water use in a cost-efficient fashion.

2. **Using the A/R ratio is duplicative of proving the efficacy of management practices.** As the Agricultural Expert Panel has pointed out, "good" A/R ratios are achieved only with good management practices. The exercise of determining good practices as described in the Management Practices Evaluation Program is therefore only useful if it points to A/R ratios that result from these practices. Best management practices are widely known (and proven) and need not be proven again. Determining the specifics of how each agricultural system needs to be managed is an impractical an unachievable research goal due to the extent of differences and variability in the agricultural systems of the entire Central Valley. However, gathering A/R information from several like-systems is achievable and would contribute more meaningful information than duplicating research already known about management practices.
3. **Because of the variability associated with agricultural systems, multi-year averages of A/R must be used. The three to five year averaging period suggested by the Expert Panel should be regarded as a minimum.** California is currently experiencing a drought in its fourth year. During years of low water application to agricultural fields, N dynamics are very different compared to years of ample water supply. The A/R ratios calculated from crop sampling during these years on various crops would likely not be representative of normal or wet years. This scenario is a good example of how a three to five year averaging period may not be representative of reasonable A/R values. Ultimately, A/R values should encompass and be representative of several years of data (i.e. more than 5 years).
4. **Because management practices (including irrigation) and crop varieties are continually evolving, the N removed value is a moving target and should be interpreted as a range of values rather than an absolute or single value.** Multiple studies have demonstrated that the N removed value is dependent on numerous environmental and crop physiological factors. Many of these factors are beyond the control of the field manager. N use efficiency (how well the crop converts applied N into yield) can be dependent on soil conditions, crop varieties and the supply of other nutrients as well as management practices. Therefore, the N removed value for a particular crop, even in the same field, varies from year to year. Newer varieties often have better N use efficiencies also. It is unreasonable to expect that N removed should be the same for a single type of crop over time. Therefore, the A/R value will also likely

vary within a range, and that range may change over time. This concept is critical in understanding the use and value of the A/R measure as an indicator of the potential for N leaching.

5. **A range of desired A/R ratios must be considered for applicability to various cropping systems throughout California.** Though the N removed value for many crops is unknown or uncertain, it is well known for one of California's major crops, almonds, because of extensive research conducted in the Central Valley that focused on this research need. Though the tendency might be to apply known N applied and N removed values to determine a single desired A/R for almonds across the state, we caution against the over-simplistic representation of A/R as a single value in this circumstance. Even with known N removed values, N use efficiency can vary within and between the many agricultural systems (even considering only one crop) within the state. Minimizing leaching in one part of the state may be represented by different scenarios in different parts of the state depending on environmental buffers and constraints. Good morning Chair Marcus and State Board Members. I appreciate the opportunity to speak briefly to you today regarding my personal, objective scientific opinions on the current State Board Order.

Please feel free to reach out to me with any questions or comments you may have regarding this comment letter. I'm happy to discuss this further if necessary.

Sincerely,

Joel Kimmelshue, PhD, CPSS (Certified Professional Soil Scientist)
Principal Scientist/Owner, Land IQ
2020 L Street, Suite 110
Sacramento, CA 95811
916.265.6350 direct
916.517.2482 cell
916.265.6330 main
www.LandIQ.com