



**PRECISION AG**  
CONSULTING

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Central Coast Regional Water Quality Control Board  
895 Aerovista Place, Suite 101  
San Luis Obispo, CA 93401  
Attn: Mr. Chris Rose  
Irrigated Land Regulatory Program

### **Comments on Ag Order Version 3.0**

Board Members and Staff

I appreciate this opportunity to comment on the new ag order (version 3) which is to be adopted in March of 2017.

Introduction:

Precision Ag Consulting is an agricultural consulting company that has a number of clients on the Central Coast. Many of our clients are large vegetable growers, primarily in the Salinas Valley, but also in San Luis Obispo and Santa Barbara Counties.

I am the principal of Precision Ag Consulting. I have a Ph.D. from UC Davis in soil science, specializing in fertility and irrigation management and was a member of the State Board's Expert Panel on Nitrates in Agriculture.

Comments:

- 1) Working with Mr. Chris Rose and his staff has been productive, and I hope, mutually beneficial in administering Ag Order 2.0 as well as developing Ag Order 3.0 .
- 2) It is clear that the board is interested in conducting another round of groundwater monitoring. The current regulations call for the analysis of many constituents that may

be interesting, but are not especially relevant to groundwater quality on the Central Coast. Additionally, there is at least one element -- namely Boron -- that is especially problematic for agriculture throughout the Central Coast, and this element is not required in the analysis. For the Board's purposes, I suggest that analysis be limited to constituents that impact water quality for both human and agricultural concerns. These would be: nitrate, boron, chloride and sodium. Additionally, I suggest that Calcium and Magnesium be analyzed as this allows for the calculation of an important water quality criteria, which is the Sodium Absorption Ratio (SAR). The adoption of this modification would decrease the cost of the analysis and enhance the value of the results.

Additionally, the requirement that samples be collected by an "independent" third party and be submitted in a form that is electronically up-loadable to "Geo-Tracker" is unnecessary. Both of these items can be accomplished by individual growers, and with the appropriate forms developed by the regional board, would be just as accurate and less expensive if these requirements are removed from Ag Order 3.0. Therefore, I suggest that Board's staff develop detailed sampling protocol, sample bottle pre-treatment with preservative, length of time that a well should be pumping prior to sample collection, and hold time requirements, et cetera to serve as a guide for sampling. These modifications to the Order would save tens of thousands of dollars with no decrease in reliability of samples.

Well water sampling does raise an important question that should be answered before the next round of sampling. Other than nitrate in domestic wells, what did the Board do with all the other information? If the answer is nothing or very little, why was it required?

- 3) I submitted an email to Mr. Chris Rose regarding the TIER 3 MRP requirement to "guess at" loading of nitrate to groundwater and changes in loading over time. I am inserting many parts of that email here:

*There are two problems with responding to questions regarding loading: 1) Scientific and 2) Legal*

*Scientific*

*First off, it is not known what current or past NO<sub>3</sub> loading amounts are for farm sized entities. It is clear, that in the past that NO<sub>3</sub> loading to groundwater was greater than zero when you consider the Salinas Valley as a whole, but it cannot*

*be known how much an individual farm or even field contributed to the loading issue.*

*If we are to discuss NO<sub>3</sub> loading to surface water and NO<sub>3</sub> concentration and discharge amounts are measured, you can estimate loading and potentially changes in loading to surface water, however groundwater is a completely different situation.*

*It should be obvious that loading does not equal the difference between applied N and removed N. There are many possible fates of applied N in agricultural settings.*

*Applied N - is not an accurate measure of how much N even made it to the root zone and had the potential for crop uptake. N available for uptake needs to be proximal to roots and especially root hairs as that is where uptake occurs. It also needs to be in a form that has the potential for uptake. Many forms of N in soils are not available for uptake in their current form but transformations are constantly occurring at an unknown rate and direction. These transformations will influence uptake of N and therefore may increase or decrease the potential for loading of NO<sub>3</sub> to groundwater. Which transformations are occurring and if they are making N more or less available to crops is not known to any level of precision and this is a critical component in estimating loading.*

*Removed N - is even a more difficult parameter to measure. The amount removed assumes many unknown quantities. They may be known in a very general sense but specifically, to a three-acre block of lola rosa grown in mid-summer on a non-uniform sandy loam field grown with irrigation water of differing levels of NO<sub>3</sub> at each irrigation - this is simply impossible to know. To ask anyone, especially growers who are not aware of the nuances of the nitrogen cycle, is foolish. The data is useless because even the magnitude of the inaccuracy is unknown. N removed additionally assumes that yields are uniform over a field and that the amount of N removed is consistent across varying yield levels. Protein content in harvested fractions of a crop (i.e. N content) varies with the amount of N taken up by the crop. This may even be independent of yield.*

*Essentially, that unless you measure N content of crops harvested on a very small spatial extent you cannot make even a rough estimate of N removed. More than*

*that – even if there is you have this information for each of the dozens of crops grown, not counting the 100's of differing varieties, the yield also varies on this limited spatial extent for a number of physical (compaction), chemical (salinity) and biological (weed pressure) reasons.*

*Loading is also a function of irrigation management and winter season rainfall. Both components suffer from temporal and spatial variability that is unknown on the scale necessary to estimate loading.*

### Legal

*There are additional concerns regarding providing estimates on loading. The greatest concern is how will this information be used? And to whom would it be available? If it is just a subjective GUESS than what value does it have, other than a potentially negative one to my clients?*

*If we provide an INACCURATE estimate of loading, and it exceeds zero, might we not be in violation of the state's anti-degradation policy regarding groundwater quality? And, if so, why would we document that in this potentially public record?*

*Therefore, I will resist efforts to compel my clients to provide this information, because it will be inaccurate, and I can't even tell you by how much. Additionally, it could be construed as an admission of guilt regarding previous loading – and there is NO WAY to confirm nor deny this accusation.*

### Finally

*The state board commented clearly on this very issue:*

*"An accurate calculation of the load discharged to surface water and groundwater requires a much more nuanced calculation than simply comparing the nitrogen applied to the fields and the amount expected to be taken up by the crops. Without reliable data on annual nitrate loading to groundwater in the first place, estimates of annual reductions in that loading are also unreliable. For these reasons, we will strike the requirements in the Agricultural Order to include calculations of the balance ratio of nitrogen applied to nitrogen uptake, the estimation of annual loading of nitrogen to groundwater and surface water, and the*

*annual reduction in nitrogen loading to groundwater, as well as the requirement to report this information to the Central Coast Water Board."*

*State Water Quality Control Board Order WQ 2013-0101 p49*

*For the above reasons, if compelled to provide the information requested I will respond with:*

*What is our estimate of loading of NO<sub>3</sub> to groundwater: unknown*

*Has loading increase, decreased or remained the same: Since current loading is unknown and past loading is unknown*

*Thus, the answer to any question regarding loading to groundwater is: unknown – and not possible to know*

I am aware that the current requirement of the Tier 3 MRP requires an estimate of loading; however, as I have indicated above, an accurate and useful estimate of loading is not possible to provide. Mr. Rose has indicated that these facts raise issues and he needs to discuss them with Board's Staff in order to formulate a response.

I request that the Board correct the Tier 3 MRP by adopting the State Board's recommendations. I have also encouraged other state agencies (FREP, CDFA) to investigate the question of whether or not an accurate estimate of loading of nitrate to groundwater can be made on a farm or field scale? And if it can, to demonstrate how can it be done and with what degree of "accuracy" the estimate can be made? Personally, I don't think it can be estimated much beyond "somewhere between none and a lot", and that this information isn't useful to anyone, and does not advance water quality improvement.

Lowell Zelinski, President  
Precision Ag Consulting