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November 5, 2014
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-611
Sent by email to Kerri Yee, Keri.Yee@Waterboards.ca.gov

Dear Regional Board members and staff:

The comments in this letter are given in response to the Region 5 Board's email (October 6, 2014) request for public input on the Nitrogen Management Plan Worksheet, dated April 11, 2013. These are my own comments and do not represent an official UC position.

I have recently retired from a 34-year career as a soil scientist and cooperative extension specialist with UC Davis. My specialty is nitrogen use and management by California's growers and dairy producers, and I have conducted several applied research projects, workshops and short courses on this topic.

The comments herein are aimed specifically at pages 12-14 of the East San Joaquin Water Quality Coalition Template Submittal. The comments target several major concerns and several minor problems. All of the shortcomings described here can be fixed. Three main concerns are the following:

- Use of vague or inconsistent terminology. An example of a vague term is "crop N need", which in common usage has several very different meanings. Precise definitions must be provided; otherwise the metrics generated from these quantities will be useless.
- Insufficient information is provided in the NMP Summary to the coalition responsible for aggregating collected data. For example: Growers are required to calculate and report the ratio of crop N applied to crop need, but they are not required to report crop species. Aggregating ratio values of annual and perennial crop species or aggregating values of high N-requiring and low-N requiring crops will generate misleading and nearly useless average values.
- Guidelines or procedures for determining several of the important values required in the Worksheet are lacking. Some of the needed guidelines can be relatively easily produced by experts – for example the quantities "N from previous legume crop" and "N in irrigation water". Others will be more difficult, e.g., available N from residual manure/compost.

These and other problems with the NMP worksheet and summary are described in the appendix below my signature in the following pages.

Sincerely,

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General comment

The title (top of page 12) is “Nitrogen Management Plan Worksheet”. Although this has the word “plan” in it, it apparently will be used both at the beginning of the season and at the end of the season to evaluate the immediate past performance. This needs to be clarified. Several items in the worksheet need to be more carefully worded to eliminate any confusion about what time period is being covered. More specifically:

- Reword to clarify the difference between “1. Crop Year, Actual” and “3. Crop Year, Recommended”. Are these meant to be, respectively, projected and after-the-fact values for the same crop year?
- Reword to clarify the difference between “8. Crop N Needs to meet actual yield” and “10. N Needs to Meet Projected Yield”. Are these meant to be the same quantity but (respectively), projected and after-the-fact values for the same crop year?
- For consistency, possibly there should be both planning (forecast) and actual (end of year updates) for the N application and credit items, especially inputs of N fertilizers, N in manure and other organics, and irrigation water N. Currently, it is not clear which time period these refer to.

Item 6.

We recommend that item 6 (“Crop”) be included in the NMP Summary Report and not only in the NMP worksheet. Without the ability to sort and aggregate the reported ratios by crop species, interpretation of the ratios will be severely limited, and it will be difficult to determine where follow-up is needed. We wondered if this was an oversight. Or is it the intent of the ESJWQC that growers would on the one hand be required to report detailed locations and acreages but on the other hand would not be required to report the crop species?

Item 7.

The term “Actual Yield (lbs of N per acre)” is potentially confusing. Is it crop yield, or is it crop N yield? If the latter, we suggest it be renamed “Actual N removed in the harvested crop”, with the attached explanatory phrase as follows: “In lb N/acre. Includes N in both the marketed product and any non-marketable portion of crop that is removed from the field, such as culls or shells.”

Items 8 and 10.

“Crop N Needs to meet actual yield” (item 8) and “N Needs to Meet Projected Yield” (item 10) need to be more precisely defined. The word “needs” is horribly ambiguous. Growers would take various approaches in quantifying this due simply to the ambiguity. Resulting ratios would be meaningless.

It is unclear which of the following concepts is intended: (a) the amount of N taken up by the crop at yield and quality target levels, (b) the minimum amount of N that must be applied under careful management/low rainfall situations to achieve yield and quality goals, (c) the minimum amount of N that must be applied under higher leaching loss situations to achieve yield and quality goals, (d) the average amount of N that growers apply in a county or region, (e) the amount of fertilizer N recommended by the fertilizer supplier, or (f) the minimum amount of N that must be applied to achieve yield and quality goals after taking into account soil test nitrate or other factors. Until a definition of “need” is established, it will not be possible for experts to develop a generic list of crop N needs.

Even if “need” is defined, a consensus value based on input from fertilizer suppliers – which currently is in the language of the ESJWQC template -- would destroy the credibility of the regulatory process.

Item 9.

“Projected Yield”. Clarify whether this is nitrogen yield, the counterpart to Item 7 (“actual yield”). If that is true, a suggestion is to reword it “Projected N removed in harvested crop.”

Items 7 and 9 (crop N yield, i.e., N harvest removal), page 12

An additional comment on items 7 and 9 is that neither of these are to be included in the proposed NMP Summary Report. So why are they required in the NMP Worksheet? It is potentially a significant expense to the grower to obtain samples and measure the N content of the harvested product, and in some cases this would have to be done as well for the unmarketable portion of the crop that is removed from the field.

If this is retained in the worksheet and is required in the Summary Report, guidelines will need to be developed and provided to growers for sample collection, handling, and analysis.

Item 11. Total Acres. Add wording to clarify whether this is acres planted, acres fertilized, or acres harvested.

Nitrogen Applications and Credits (page 13) is the heading for items 12-16, fertilizers and organic materials applied to the field or crop. The group of items after this (17-20) are under the heading “Soil Nitrogen Credits”. It is confusing to have two sections of inputs with the word “credit” in them. Suggest removing the word “Credits” from the first group, i.e., change “Nitrogen Applications and Credits” to simply “Nitrogen Credits”.

Item 15. Available Organic Material N.

- Perhaps reword for clarity as “Available N in applied manure and other organic amendments and fertilizers”.
- Guidelines must be developed and provided to growers for this. The guidelines should include the definition of “available” and address time of sampling and sample preservation. The latter is important, e.g., for poultry manure which can be subject to large losses of volatile ammonia.

Item 17. N from previous legume crop is subject to uncertainty. Guidelines must be developed and provided to growers for this. Peer-reviewed UC guidelines are not available, and a very wide range of recommendations for “legume N credit” are published by other states, but a provisional expert judgment on this can probably be developed.

Item 18. Available N residual from manure/compost. Guidelines must be developed and provided for this. This will be a challenge. The normal approach to crediting N from earlier manure applications is to use soil nitrate testing close to the time of crop N uptake, but the soil test value does not lend itself easily to use in a planning budget for N.

Item 19. N in irrigation water (annualized). Clarify meaning of the word “annualized”. Does this mean total for the crop season? Also: Guidelines must be developed and provided to growers for estimating this credit; however that should not be difficult to do.

Item 23. Balance. What is the point of including this in the Worksheet, given that it is not used in the NMP Summary? We recommend that it be included in the NMP Summary. This balance would be useful (together with the reported ratio of input to need) for identifying the relative importance of a high ratio value. As an example, envision two scenarios. In scenario 1 the N input is 500 lb N/acre, N need is 300. In scenario 2, the N input is 100 lb N/acre, N need is 60. In both scenarios, the reported ratio will be 1.67, which could warrant follow-up, depending on various assumptions and concerns. However in Scenario 1, the excess N is 200 lb N/acre (500 minus 300), a significant amount of N if it were eventually to enter a drinking water aquifer, while in Scenario 2, the excess N is one-fifth of that, 40 lb N/acre (100 minus 60), with an eventual impact on groundwater that will likely be quite small.