

Response to Agricultural Expert Panel Questions

May 5, 2014

Vulnerability and Risk Assessment

1. A thorough understanding of the area hydrology is required. Perched, unconfined and confined groundwater bodies can all be very different in terms of susceptibility to degradation, the origin of various constituents of concern and the flow of those waters. All potential threats to those different bodies should be considered. This includes not only crop production ag, but animal production which should be viewed separately, septic systems, various turf and urban sources. When evaluating crop production agriculture, attention should be given to how well the resources are managed. Are nutritional and water applications made in a reasonable manner given the conditions? Local programs managed by those with local knowledge and expertise is best. By that, I mean people with a science education and real world experience in various aspects of crop production, irrigation and nutrition.

2. Methods a through d are simplistic metrics and they would be grossly unfair to some growers who are efficiently managing their resources, while minimizing adverse effects. For instance, surface irrigation can be quite efficient as well as have a low energy requirement. On the other hand, poorly designed or badly maintained and managed low volume irrigation systems can be very inefficient. The NHI is a good tool to help growers and researchers understand the potential for problems and address corrections. It was not designed to be used as an enforcement tool. Furthermore, no mention is made in any of these approaches of the leaching requirement. To reiterate Hung Less comments, accumulated salts must be removed from the root zone in order to maintain long term productivity.

2 c. To address item c further: The amount of nitrogen needed for optimum production in table grapes will depend not only on crop removal, but on the unique combination of rootstock and scion. This is the case for many other permanent crops as well. It should be noted that the last U.C. publication on grapevine nutrition and fertilization was issued 1978. At that time, the yield and quality expectations were significantly less, and low volume irrigation practices were only beginning to be adopted. In 2014, yields have nearly doubled and drip irrigation has dramatically altered our ability to discretely apply water and nutrients in the amounts needed, and when they are needed. Under drip, the root architecture is radically different from surface irrigated vines and that has had a profound effect on the

relationship between canopy and fruit, and roots and nutrients. Certainly, the table grape industry needs more current research. Much of the old dogma no longer applies. For instance, many of us now consider the standard tissue sampling protocol of full bloom petioles to no longer be relevant as a guide to determining nitrogen application rates. Tissue sampling in particular can be a useful tool in assisting a grower to adjust a crop's nutritional program. However, it is critical that the tools used be current and relevant for today's conditions. It would be a dis-service to all if we were to take a step backward and be required to adhere to antiquated plant tissue guidelines. In particular, the petiole sampling method is quite transitory and not consistently a good representation of the overall plant nutritional status. In defense of the table grape industry, efforts have been made to update research. However, CDFA's Fertilizer Inspection Advisory Board chose not to co-fund a proposed project, even though it was recommended for approval by the FREP technical advisory sub-committee.

2 d. There should not be discrimination based on the size of an operation. For instance, a single unprotected well head can be a threat to groundwater for an entire region. Emphasis has been and should continue to be directed towards education of some of the small, non-English speaking growers who are understood to be a particular cause of nutrient management problems. Also, larger operations may more often have the resources available to devote people to specialize in certain activities.

3. I suggest a search and review of indexing systems from other states that can be adapted to California ag. Most states with summer rainfall are better aware of surface water risks and how to protect them. Fertigation with Nitrogen should not necessarily be considered a discharge of a pollutant if it is confined to the field or farm where it was applied.

4. Assessing risk to or vulnerability to surface water

4 b. US EPA and for many years now, DPR, have evaluated the various safety aspects of pesticides. This includes the potential to leach and the environmental fate of a material. The scientific review of pesticides is thorough. Pesticide labels address specific limitations and DPR and counties dictate additional restrictions. The layers of regulatory restrictions and protections are already quite adequate. Additional restrictions will put growers at risk of failure to protect their crop for lack of available plant protection materials. Regarding fertilizers, the behavior of nitrogen and its various forms is already well understood. The challenge is to increase the level of understanding of the proper use of nitrogen fertilizers and the proper irrigation techniques for each delivery system. Education is key. The U.C. has suffered tremendous reductions over the last many years and is less able to conduct relevant research and effectively communicate than it once was.

4 d. The High Vulnerability Area Methodology is an effective approach that allows for a targeted and efficient use of resources. The vulnerability map, within the scope of the ILRP, provides clues to guide further investigative efforts into determining potential reasons why nitrates may be detected at elevated levels in water (surface and groundwater). In and of itself, the map is not, nor should it be focused at a granularity that would pinpoint any one farming operation. However, I think it is fair to assume that the map does provide a clue as to where there may be some activity, past or present, which may relate to the elevated levels of nitrate, as detected through appropriate sampling. 4 d. was not given in the oral presentation in the interest of time.

Application of Management Practices

5. 6. 7. What is mandated and what is reasonable and effective are two different things. From a regulatory point of view it's always most simple to assign a metric and apply it across the board. The speed limit is 35. Exceed that and you get ticket, pay the fine. But this is farming and it's not nearly so simple. How do we keep from penalizing those who already manage Nitrogen and irrigation very well when instituting draconian reductions based on formulas or ratios without evaluation of an individual operator's efficiency? The focus of all of this regulatory attention really starts at the root zone. The management of a healthy root zone includes a whole host of considerations including but not limited to water chemistry, the distribution uniformity, the scheduling of irrigation and fertilization relative to crop demand, the form of fertilization, root health as affected by pathogens, the condition of the soil profile. The list goes on. The point is that a grower must have enough freedom to be able to tailor his or her program so that they can adjust whatever is necessary to accommodate for their unique set of circumstances. There must be flexibility. The other side of this equation is that a grower should be able to explain his rationale for employing certain irrigation and fertilization practices.

A good agronomic practice does include the development of a nutrient management plan. This includes an accounting of the nitrogen inputs from the various sources including soil, water, amendments, crop residues and fertilizers. The inputs are weighed against the crop demand, including that portion removed by the crop. Nitrogen soil reserves are not an easily determined or repeatable measurement. We need a calibrated mineralizable Nitrogen soil test. In the case of permanent crops, how significant a contribution do surface applied amendments and crop residues make in the total scheme of things? An unanswered question is how much nitrogen from compost and crop residues is actually available to a crop under low or no till with low volume irrigation having incomplete wetting? As mentioned before, in

the case of table grapes, and many other perennial crops, the amounts of the various nutrients needed today differ significantly from any publicly available peer reviewed sources. Public research is not current with today's production. Irrigation, varieties, rootstocks, even training systems and cultural practices have evolved tremendously from what they were 40 years ago. Crop demand for nitrogen, in many cases, has increased significantly. I suggest that growers be asked, to provide the rationale behind the irrigation and nitrogen rates, timing and delivery methods. Growers may find it useful to provide measurements such as irrigation efficiency and uniformity. Over time, there should be enough data collected that it would be possible to determine where the outliers are. The outlier growers may in fact, be the best producers, but various analyses will contribute to understanding the range of grower practices as well as help determine the possible contributions to elevated nitrates found in water.

8. I suggest that growers or their designated representatives (same as the signers for the permit) be required to take a one to two hour short course annually, to receive certification in order to receive their restricted materials permit from their county Agricultural Commissioner. The course could be online or at other events held by the Coalitions, CAPCA, and Cooperative Extension and others with a sign in and sign out. The basics of the various forms of nitrogen and the properties thereof should be described, as well as irrigation and fertigation practices for a high Nitrogen Use Efficiency and application timing of crop Nitrogen demand.

Consultants, including salesmen, should be held to a higher standard, approximately equal to a PCA, as they are in a position to educate and provide guidance to those using nitrogen products.

Commercial applicators should also be certified, somewhat like a PCO, in order to made aware of and prevent application hazards.

Short, reasonable, concise and effective educational programs and the appropriate tests can be written by some of the talented people within the ag industry and administered by CDFA. There are qualified people on Soil Improvement Committee of the WPHA having the appropriate expertise.

The less accessible certification route in terms of time, testing and documentation, is the nationally administered CCA test. If the certification process is made too difficult for the ag community, compliance and results will be less. Growers should be able to able to become

educated and certified on their own as an alternative to becoming a captive market to a limited number of CCA's.

Verification Measures

10. Evaluate and Recommendations: Verification Measurements of Nitrogen Control

First, let me say that for this to work well, costs would be reduced and industry sample volumes increased if Ag labs, certified for nitrates at a level less than a full ELAP protocol, could be used.

Second, there is industry wide concern over how verification data will be handled. The fear is that data will be put into a publicly accessible data base for those with their own misguided agenda to manipulate and ultimately cause economic harm to either the entire industry or specific individuals.

10 b. Direct sampling of any water may or may not be indicative of ag activity close or far away. Groundwater may flow and can be impacted any number of factors, which is why an understanding of the local hydrology is so important in order to have a meaningful program.

10 c. The challenge in sampling a soil profile is to have a high degree of confidence that the results of an analysis are accurately representative of the conditions and furthermore that those results are indicative of current and not past practices. This can be done. It is critically important that it be done well.

10 d. A careful evaluation of practices with consideration given to significant variables may be useful in assessing the effectiveness of management practices programs in similar conditions. This would not be a cookie-cutter, one-size-fits-all template that should be utilized from the south valley to the north coast. Instead it could be a tool for understanding and evaluating the adaptation of different practices and their effectiveness.

10 f. It is extremely important to understand that as briefly discussed earlier, table grape and likely other permanent crops consumption of nitrogen is not at all well-defined. Furthermore, crop water use is not well defined either. The DWR grape ET measurement was determined more than 35 years ago by the late Norman MacGillivray, who calculated crop water use from row irrigated Thompson Seedless near Arvin. Though some limited work has been done since then in grapes, many of us don't consider it to be satisfactory. The differences can be very significant. An early variety like flame seedless, will use significantly less water than a heavy

producing, late variety, such as Red Globe. If a vineyard is weak, say, due to nematodes, it will use less water and use nitrogen less efficiently than if it had a healthy root system. In addition, the quality of grapes produced for table, wine, juice or raisin is influenced greatly by the management of the irrigation. Not everyone has the same expectations nor are the quality characteristics achieved in the same way. There continues to be debate over crop water use coefficients among specialists. The point of these examples is that much is not well defined and there are no hard and fast metrics. In evaluating the potential for groundwater contamination, care must be taken so that a judicious evaluation is performed with an awareness of the limitations of the tools available. I urge diligence and caution when attempting to evaluate whether or not a grower is efficient or is employing measures which can be expected to increase efficiency. In addition, let's not forget that economics and limited resources are powerful forces which increase efficiencies.

Reporting

12. Any nitrogen and water use information collected must be relevant in the context in which it was utilized in order to be of any value. Agricultural production systems are much more inter-related, complicated and sophisticated than can be evaluated by simple metrics. An evaluation should resemble a complex multi-variable analysis. There should be a way of allowing a grower to have the needed flexibility to manage his crop appropriately, even though research in some areas is many decades behind. Let the grower have the opportunity to reasonably justify his nitrogen use within his set of operating conditions.

13. I've already covered this but to re-iterate, there is much value to be had in compelling growers to think more about the how and why of nitrogen and also irrigation applications. It is most effective for the Coalitions to report the nitrate loading risk unit, as it is the collective unit as a whole which will have the greatest effect on groundwater. Individuals are still responsible and should be subject to review by the Coalition. But this should be at the Coalition level, out of the public view and judgment. Again, local control with the ability to deal with local issues will allow for a better outcome.

Thank you,

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