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For Submittal as Formal Comment to EPA

Re: Formal Public Comment, EPA -910-R-12-03

Scope and Scale of Review and Comment:

These comments are restricted to the limited materials released by EPA on the web in September, 2012. A written offer made to Thomas Eaton by email in late September asking for both additional time for comments, and full access to conduct a complete and rigorous technical audit was formally refused by Thomas Eaton in early November. Access was denied to interview EPA and contract labs about their participation; how and why sampling and testing protocols were selected; why data failed basic QA/QC and reliability standards; why some test data was rejected or not relied upon by EPA upon completion of testing; Actual review of raw lab print outs, data, notes and calculations. This severely limits outside reviewers ability to fully examine and comment on this project. If such materials become available thru FOIA or other means, I will respectfully request an opportunity to provide addition comments following review.

Important Note of Clarification Re: Lower Yakima GWMA

These and other public comments regarding the EPA-910-R-12-003 document titled "Relation Between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley, Washington" are my personal and professional comments exclusively. Although I am an appointed member of the GWAC for the Lower Yakima GWMA, opinions articulated here and elsewhere are not on behalf of, nor intended to be on behalf of the GWAC or the GWMA. They are made at the request of the Washington State Dairy Federation and its producer family farmers.

Perspective/Professional Qualifications

I am a Board Certified Agronomist, one of fewer than 650 worldwide (ASA/SSSA/CSSA) and approximately 20 currently working primarily in Washington State. I began working in the lower Yakima

Valley in the late 1970's in a variety of capacities in the Ag Chem/Fertilizer business. I obtained a statewide (WA/OR/ID by reciprocity) Pest Consulting License; Operated a soil and plant tissue analysis laboratory, and managed an Ag Chem Dealership. Since 1983 I have worked as an independent consulting Agronomist, providing technical support to the very wide variety of family farming enterprises in the PNW. Tree fruit, grape, row and field crops and dairy producers dominate my professional practice. As regards dairy, I provide technical services to a significant segment of the industry in Yakima, Grant and Franklin Counties. I also work closely with WSDF, Farm Bureau, and WSU; I provided substantial assistance and support for the NAEMS WA5A and WA5B research projects under Dr. Grant (Purdue) and Dr. Ndegwa (WSU). I continue to assist Dr. Ndegwa in the second phase of this CAFO/Dairy air quality research currently underway. In addition, I worked from 2010-2012 as an invited member of the Dairy Work Group chaired by Gary Pruit, manager of the YRCAA, to assist technically in the development of a model Air Emissions Evaluation and Reduction program for Yakima County dairies.

Comments

A. How are research studies constructed? A normal, unbiased study would generally be constructed as follows: After initial scoping work, a scientific hypothesis (theory) would be formed, and the study then designed to use investigation, sampling, literature review, interviews, records reviews, analysis of sampling using both deductive and inductive reasoning to TEST the original hypothesis. In this case it appears this industry standard approach was abandoned either very early on in the scoping process, or was not utilized at all. Instead it appears that the EPA settled very quickly on a single theory – that current and recent dairy operations were the primary source of groundwater nitrates to the exclusion of any other source of significance. In fact, the best way to describe the EPA approach is that it is "reverse engineered" the final product, targeting dairy producers and either not considering or excluding all other sources as insignificant. The report then became a "fill in the blank" type of investigation where only certain questions were asked in specific ways.

   The failure to follow basic, standard scientific protocols, and the early induction of bias doomed any opportunity the study, and any conclusions reached from the study, to be reasonably accepted as being either unbiased or scientifically sound.

B. Bias or Incompetence regarding basic Nitrate loading assumptions -As evidence of this bias, and clearly further compounded by a general ignorance of the basic Nitrogen cycle and Nitrogen forms and uses in agriculture, about three years ago I attended one of the first meetings with the EPA researchers at the USDA Wapato facility. Also in attendance was Bill Wavrin, DVM (Vet, nutrition expert, dairy owner/operator), Tom DeVries (Diary Federation board member), and Laurie Crowe (Nutrient Planner/Expert from the SYCD). We were first shocked, and then horrified when the PowerPoint slide appeared with the draft EPA total Nitrate Loading estimate for the lower Yakima Valley appeared. The level of expertise (lacking), professional work experience with agriculture, and perhaps bias combined and was revealed in this Nitrate (N03-N) loading estimate. After a quick consultation between the experts listed above, we were able to show the EPA research team that they had combined Nitrogen from all sources and all forms into a number they represented as Nitrate N. Since MOST of the nitrogen in the production Ag and dairy industry is in the form of NH3+ or NH4+, this was a huge and fundamental miscalculation. Only N03- Nitrate N is water soluble and able to leach to, and impact

groundwater. This enormous error was an ominous clue to the ultimately flawed final work product. This was the one and only opportunity for industry contact in the preliminary/planning phase. The EPA team failed to present data showing how they quantified the Nitrogen loss by denitrification – instead of converting to Nitrate (N03-) it is converted to N2 and lost to the atmosphere. The recent very extensive California Study (www.groundwaternitrate.ucdavid.edu; technical reports 1-4) concluded that this in total amounted to a 38% loss or reduction of N as it relates to dairies. The EPA study does not "show the math" allowing an understanding about how much total N dairies produce, and the end fate of that N in a total basin Nitrate in groundwater loading. Instead they elected to knowingly use highly inflated and inaccurate numbers. Most baffling of all, why the EPA did also elect to not account for crop removal, the largest of the "losses" of applied nitrogen.

This is either evidence of clear bias, or of gross incompetence. It would appear this was done to inflate, in combination with other decisions by
EPA, to inflate the potential leaching numbers by orders of magnitude while excluding other contributors identified in other peer reviewed and published research. The use of biased or slanted science to advance a political cause or agenda is cruel and deliberate, and very underhanded at best. While I can understand non industry political agenda groups taking this path, I expect much more than this from a public agency living on my tax dollars. This is especially so since EPA presents itself to the taxpayers as an unbiased, scientific driven organization. Based on my review of this report, nothing could be further from the truth.

C. Scientific value of Water testing -In Phase I of the EPA project, a significant number of wells were screened for Nitrate concentrations using a simple and inexpensive tool, the colorimetric strip test. While it only provides a general guideline to the approximate range of nitrates in a water sample, it is good enough to separate out wells with water low in nitrates with wells with moderate or high levels of nitrates. However, EPA neglected the MOST important element of this initial screening process; they failed to investigate and document the critical details of well depth, static level, construction, surface sealing and distance to potential point sources like rural septic systems. Therefore, the data obtained in the initial screenings, as well as all of the data obtained in Phase II and Phase II is of little value, since it provides no real scientific basis to reach and scientific conclusions about the one piece of information the study authors defined as their goal; a determination of why a given well had good, fair or poor quality water based on nitrate concentrations.

D. Evidence ofbias in selection of sampling sites and intensity of sampling -In the initial screening process of Phase I, there is demonstrably very strong bias in the locations EPA elected to sample (or not sample). Even though the intensively farmed irrigated acreage on the Yakima Indian Reservation is larger than the area across the river to the North, off the reservation, it appears (see EPA Map) that less than 25% of the sample sites were located on the reservation. Even those limited sample sites were not spatially dispersed and random in nature. A higher percentage of the irrigated lands within the Reservation are still irrigated by flood or rill (furrow) irrigation compared to the non-reservation acres to the North which were much more intensively sampled. Research has long demonstrated that Nitrate N leaching losses are typically 30-40% higher on flood or rill irrigated cropland compared to well managed sprinkler or

drip irrigation. What reason could there be for not conducting a more fair, balanced and thorough sampling for nitrate N on Reservation lands? This is especially puzzling as demographics available readily demonstrate that land and housing values, and income on average is much lower on the Reservation compared to similar land just outside the Reservation. If EPA's stated goal for this program under the auspices of "Environmental Justice" is to reach this target demographic, why did they fail to aggressively canvass and sample/analyze the dominant land area? Could it be that since EPA is the sole authority for groundwater quality on the Reservation that they did not want to indict their own environmental stewardship and management?

E. Refusal by EPA to test one of three key sources of Nitrates -In Phase II, the largest land area in the subject study local, the Yakima Reservation, was essentially ignored. Instead EPA chose to do extremely limited tested in a very small area, a place populated by diverse irrigated agriculture and a cluster of medium to large dairies. This area is representative of less than 10% of the total land area in the Lower Yakima Valley. The testing was not spatially at random, but as best as can be determined by examination of Google Earth images, it appears to be specifically targeted to a single segment of agriculture; dairies. This is in contrast to the specific statement on page E-2 of the Executive Summary; "Based on the estimates developed in Phase 1, EPA focused the Phase 2 and 3 sampling on three predominant sources; dairies, irrigated cropland; and residential septic systems". Only the first part of that statement ended up resembling the truth in any way; over 80% of the total testing was targeted exclusively towards the dairies; the balance of the testing was limited to six fields (three crops of the 100+ grown in Yakima County) and six wells considered to be down gradient of these same fields. There was ZERO testing of any rural septic; for reasons not explained there was limited "surrogate" testing of some nearby municipal waste water treatment plants. Anyone with even a passing knowledge of the characteristics of rural septic in comparison with muni plant waste water knows they are not even distant cousins. There was no scientific data or research presented to support the EPA hypothesis that in any way the municipal plant effluent bore any resemblance to rural septic. Rural homes have very little impermeable paved, roofed or concreted areas; do not contain medium or heavy industry, and do not comingle storm runoff. Since most septic systems are pumped every 12-24 months, access is not difficult to obtain; why then would EPA, spending a million or more of our tax dollars, flub this very simple exercise? First they identify rural septic as one of the three leading suspects they intend to sample, analyze and consider as a source of nitrates. At the end of the project we find they have failed to sample and analyze even a single septic system for scientific characterization. This action by EPA, while clearly deliberate, is inexplicable. How can a research project that identified three sources of groundwater nitrate loading be considered complete or viable when NO work is done on one of the three sources?

F. Selection of Pharmaceuticals as "tracers" to dairies -At the bottom of page ES 6, the EPA report states as follows: "The pharmaceuticals tetracycline and monensin were detected in all but one of the dairy samples, which indicate they are used by the dairies in the Dairy Cluster." There are many problems with this statement, some of which are in the following sentence from the EPA report "Tetracycline was detected in two of the down gradient residential drinking water wells,

two dairy supply wells, dairy lagoons, manure piles and application fields". These statements clearly indicate that tetracycline is present in the aquifer, in dairy and domestic wells; why then would there not be an assumption that tetracycline passed through the dairy cows, to be found in the liquid and solid manure, and in fields with receive these recycled nutrients? Not only has EPA not considered this most likely scenario, it appears that they are either severely ignorant or they have willfully disregarded the obvious, real source of Tetracycline: its ubiquitous use on deciduous tree fruits. Yakima County has over 77,000 acres of stone and pome fruits, and has been a leading fruit producer for over 70 years. Had EPA bothered to consult the current (and all past) editions of the annually revised WSU Tree Fruit Spray Guide they would have learned that it is THE recommended pesticide for control of the very serious disease Fire blight (causal organism, bacteria *erwinia*) on apples and pears, and for Bacterial Spot on peach and nectarine. The label for the Tetracycline product Fireline 17 WP lists use rates of 1 to 5 # per acre, depending on crop 5 to 8 applications per year are permitted. Even if we assume a conservative application of 2# per acre on 70,000 acres of tree fruit, that is equal to a potential 140,000# of tetracycline per year in Yakima County from tree fruit use alone. It is fair to assume that use of tetracycline on dairies by comparison is less than 1% of that number. It would appear here that the odds favor the dairies as recipients of their neighbor's use of this pharmaceutical, not the inverse as EPA speculates in this case. Further complicating the situation with EPA's selection and testing for Tetracycline as a tracer pharmaceutical linked to dairies is this important factor apparently not known to EPA; dairy cows are fed substantial quantities of raw and partially processed fruit. This fruit contains in many cases (an allowable, regulated food safety tolerance) of Tetracycline; therefore, it would be expected to be found in manure and fields where that manure was land applied, recycled for nutrient value. In that case the dairy is not the source, merely a thru put for Tetracycline residues, which are essentially ubiquitous in the landscape. This creates yet another concern; this compound was discovered in 1948 as a product of naturally occurring bacteria *Streptomyces* spp. There is no discussion in the EPA or supporting lab summary reports (no raw data provided) as to how their sampling and analysis procedure accounted for, or differentiated between naturally produced and synthetically cultured Tetracycline. Monensin, the other product selected as a tracer for dairy sourced nitrate, was only approved for use on milking cows in late 2004 (see October, 2004 Federal Register). Assuming an aggressive marketing campaign and rapid consumer acceptance, it seems unlikely that in just the few years since this product has migrated in significant quantities to be found in groundwater sampling as reported by EPA in this report. While Monensin was approved years earlier for non milking cows, many dairies raise their heifers and calves on separate facilities out of the area. Further, research published in 1984 (Journal of Animal Science 58:1528-1539) established that Monensin, incorporated in soil with manure (see table 10) was degraded below lab detection limits at one month. This is not an environmental fate profile which points to a persistent, bio-accumulating, leaching pharmaceutical useful as a tracer for dairy sourced Nitrates.

G. Mischaracterization of Nitrogen contenct of organic vs synthetic fertilizers -On page ES 7, under the title Irrigated Cropland the following initial sentence appears: "Nitrogen rich fertilizers, such as inorganic synthetic fertilizer and manure, are applied to irrigated cropland, and are a possible source of nitrate in drinking water wells". This statement is grossly incorrect, as it is wrong in two related dimensions; First and foremost, since liquid manure averages around .16% Total N, it is not and cannot be considered "Nitrogen rich". Since common synthetic fertilizers average

around 28% Nitrogen (range 16-82%) they contain on a per ton basis more than 100 times as much Nitrogen. It is very concerning to see such a basic, sloppy error and to such an extreme extent; again, this is either evidence of bias, or perhaps worse, ignorance. Furthermore, almost all synthetic forms of N are either in the form of Nitrate, or are readily converted by soil microbes to plant available (and leachable) Nitrate N. In manure, much of the N is in an organic complex, and breaks down more slowly, on average only 80% converts in the year of application. By comparison, under most conditions all synthetic forms of N, if not already in the Nitrate form, are converted to Nitrate within 30 to 60 days. There is no scientific basis to use the same assumptions for these very substantially different materials, especially as it relates to potential to leach to groundwater in the form of Nitrate.

H. Incorrect assumptions about the herbicide Bentazon -On this same page, ES-7, EPA links the findings of the herbicide Bentazon in soil samples with findings in nearby wells, and implies that there is a direct and immediate link between application and leaching to groundwater. There is not information provided about well construction, surface seal, depth, etc. as apparently EPA failed to accurately characterize about 70% of the wells they sampled. Assuming the soil analysis is correct, and since soil samples were essentially 0-2" by EPA, a finding there would likely indicate application of this pesticide in the current crop cycle. If one were to assume the finding in the well water of the same pesticide was analytically correct, given well circulated, authoritative published numbers, this assumption of leaching cannot be correct. If that were the case, the application or series of applications subject to leaching would almost certainly be 10-25 years OLD and not current practice as implied. The 9th Edition of the WSSA Herbicide Handbook, considered the most authoritative reference work on environmental chemistry of herbicides, says the following about Bentazon: (Page 46), "**Mobility**: Does not leach below the plow layer". Soil half-life is listed in this same reference work as 20 days; any pesticide with this short a soil half-life and not a leacher, cannot reasonably be expected to reach groundwater as a result of normal use. A simple Google search using the string "Bentazon soil leaching" identifies a wide range of peer reviewed, scientific journal articles supporting this position. An often cited article is published in the journal *Reviews of Environmental Contamination and Toxicology* by Huber and Otto (1994, 137:111-134) which states as follows in the abstract: "...However, several field lysimeter studies unambiguously proved that it does not leach under field situations..." It would seem reckless and unsupported for EPA to conclude the findings in several wells are due to leaching; it is far more probable that it is as a result of using wells with no backflow devices to mix and load sprayers with this chemical resulted in this well contamination. This is but one example of a long and obvious series of incorrect and unsupportable assumptions made by EPA in this report.

I. Speculation about Monensin unsupported by both field studies and EPA sampling and analysis- At the bottom of page ES-7 and the top of the following page are a series of theories offered to explain one finding of the pharmaceutical Monensin in a well and in a soil sample from a single (Hop) field: "Possible manure application to the hop field could account for the monensin detected in the down gradient well. The isotopic analysis indicated that the dominant source of nitrate for one drinking water well was synthetic fertilizer". Given what is known about Monensin (short half-life, degradation enhanced by manure) and the completely unsupported speculation about a "possible" manure application, the known science here would clearly not support such a conclusion. Further proof to the contrary is in the remainder of the EPA

statement; most of the nitrate in this subject well, according to their isotopic analysis, was not of organic, but rather from synthetic origin fertilizer. This isotopic finding then also refutes the theory of leaching of Monensin from excessive manure applications; and rather than suggesting over application of nutrients from manure, this subject site, if ever fertilized with manure, was done so at appropriate, agronomic rates and did not result in leaching nitrate to groundwater.

J. EPA conclusions about source of nitrates completely unsupported by well water sample and analysis-On page ES 9, EPA summarizes their "proof" of likely nitrate contamination by dairy sources by saying that their analysis showed 6 of 25 residential wells tested in Phase 3 were primarily Nitrate sourced from animals. They went on to say they could not differentiate animal from human sources. So, at best, using EPA's own analysis, 76% of the wells tested in Phase 3 did not have Nitrate contamination from any living source. Of the remaining 24%, it was at best a 50-50 whether that source was dairy or human from septic. I don't know if EPA subjected this limited data to any type of scientific statistical analysis; however, I can say that from a purely common sense viewpoint, initially excluding over three quarters of the Phase 3 (intensively tested) wells as having a dairy sourced problem, and then saying that the remaining 24% are at best only 50% likely to be affected by the "Dairy Cluster" source does not, and rationally could not lead any reasonable person to the conclusion EPA has adopted.

K. EPA rejects their own sampling and analysis results as it relates to age dating -There is no explanation offered by EPA to their statement that "The age dating results were not useful to determine when the Nitrate contamination was introduced into the well." Was there a testing problem? Did the data set fail to pass QA/QC? Is this a generally reliable and accepted analytical procedure? All important questions with no answers provided by EPA. We were told initially by EPA that they considered this age dating testing critical to their project; it was the single tool available to definitively understand and separate historic sources and loading from current practices and loading. EPA's complete abandonment of this important tool demands a complete and detailed explanation. Abandonment of this tool so highly promoted initially by EPA after the results were in from the lab prevents EPA from forming any scientific conclusions about one of the most critical issues facing both EPA from an enforcement perspective, and the GWMA from its stated goal of reducing nitrates in groundwater. Nothing can change the nitrate loading by prior generations (many of whom were following then current recommendations from WSU and other Land Grant Sources); but by improving existing nutrient BMP's, and encouraging the development of even better practices we have the opportunity to move beyond the "study" of nitrates, and move progressively towards partnerships with industry, residential, agricultural and municipal leaders to actually reduce nitrates in groundwater.

L. EPA concludes there are no upgradient nitrate sources of nitrate despite overwhelming historic and physical evidence to the contrary -The EPA assertion that there are no significant up gradient sources of nitrates to the "dairy cluster" is demonstrably false. There are thousands of acres of intensively farmed irrigated fields which are generally up gradient from the "Dairy Cluster"; see Google Earth and related images on the Yakima County GIS data base. Since this area has been farmed for over 100 years, with sprinkler and drip only replacing flood or furrow/rill irrigation in the past 25 years to any significant extent, EPA is turning a blind eye to the obvious; the majority of all nitrates found in current sampling of drinking water wells are of historic origin. Farming practices have changed substantially over the past 25 years and in

particular in the past ten years at an accelerated rate. Since passage of the Dairy Nutrient Management Act (1998, RCW 90.64 and related) dairies in the subject area have been under very different regulations and requirements. All these facilities are currently, and have been under permits from WA DOE and WSDA for some time. Compliance inspections, including site visit/inspection, soil testing and nutrient application records have been inspected on almost an annual basis for the past 14 years. EPA has made no references in this report to consideration of that important data set; instead they make a vague reference to general, second hand reports from WSDA of "high nitrate levels in fields". If that nitrate was in the top 1' of soil, generally that is not an issue; only when it is found in high concentrations in depths below 3' is there a high risk of leaching to groundwater. Recall that EPA decided to use a 0-2" soil sampling protocol; this is not an accepted sampling protocol to evaluate soil nitrates. Since EPA has not considered in their calculations crop removal, and the report generally is very weak on all agronomic issues, let me use a single example to illustrate the folly of their position, stated in this report, in this regard.
Typical Dairy forage double crop system:
Crop 1: Winter Triticale; seeded late September; harvested early May: Crop removal of Nitrogen for a 3 ton (average crop) cut first week of May would average 135#/acre.

Crop 2: Corn Silage direct drilled second week of May; Nitrogen removal for a modest crop of 30 tons/acre would average 185#/acre (WSU estimate 220#).
Total average crop removal N for one year, standard double cropping system: 320#/acre.
This represents the net minimum N that must be available for uptake in a given year. When consideration for other (non leaching, denitrification to the atmosphere) environmental losses are considered, they are estimated in the just published California report (www.groundwaternitrate.ucdavis.edu; Technical report #2) at 38% total; Assuming half those losses occur prior to field application, the amount of Nitrogen that needs to be applied to meet the minimum crop requirement, a total of 380 # N must be applied to achieve realistic, sustainable yields. EPA presents no specific sampling, lab analysis or other data to establish that farming practices on fields provided dairy nutrients are in any way different than synthetic fertilizer supplied fields. In fact, the sampling plan selected by EPA does not lead to any scientifically valid data which even suggests that current practices are contributing in any way to the (dominantly historic in nature) groundwater nitrate contamination. Measuring elevated nitrates in the top inch of soil, and somewhere below in some areas there is elevated nitrate in groundwater provides no scientific causal connection that current practices are contributing significantly to what most research shows is primarily "legacy" nitrate from 20+ years ago. There is no way to change the past; we can change the future, but only with the use of scientifically valid, repeatable and reliable data. Such data does not exist within the subject EPA report.

M. EPA misuse of USGS groundwater modeling to establish up from down gradient on a micro scale
-As it relates to the basic EPA choice to designate "up gradient" vs. "down gradient", this was a designation not based on their sampling and analysis; it was instead a misuse of the USGS computer model useful only on a "macro" scale. It is not a scientifically valid tool to use it on the extreme micro scale that EPA attempts to do in this case. For such very local information, dye or tracer material injection and intensively spaced and sampled test wells are required to

reach reasonable certainty for very local areas. Given the complex terrain and soil variation, the effects of land leveling, irrigation and drainage, the decision by EPA to rely on the computer model crafted by USGS which is intended to be used on a more macro scale, for a very small scale specific sites (5 named dairies) without any verification of actual flow directions, rates, and lateral movement is not scientifically reliable. This is further compounded by the failure of EPA to adequately study, sample (soils to depth, drilling test wells, repeated over time), analyze, take crop histories/nutrient input calculations for surrounding agricultural enterprises and septic as other viable, potential sources. Failure here is in both the inductive (lack of proper sample plan; sampling; analysis, data gathering) and deductive (study, sample plan, sampling, analysis, data gathering to reasonably allow, based on evidence the exclusion of other contributing sources) analysis.

N. EPA ignores key published peer reviewed study which establishes appropriate research requirements to link manure applications to potential for nitrate loading in groundwater. -An intensive, ten year study published in 2005 in the Journal of Environmental Quality (Vol. 34, Sept-Oct 2005 pp. 1672-1681, Ferguson, et al) compared a number of manure application regimes and rates of application, compared to a conventional fertilizer program. Not only were yields measured, but nutrient removal, effect of winter cover crops, and effects on accumulation of Nitrate in soil with depth, and potential for leaching were investigated in detail. When manure was applied at treatment CP (matching crop requirement for P removal, composted manure) the study concluded "...Applications of manure to match crop P removal, and basing application rates on at least 70% of total manure P being available to the crop in the year of application, effectively utilizes nutrient resources from manure and minimize the environmental risk of manure application." This study is the blueprint for the type of study design, sampling, and research over a ten year period which is the optimum scientific approach to determine what the potential is for nitrate leaching, and which manure application rates, timing and field culture result in the lowest potential impact to groundwater quality with respect to nitrate leaching and accumulation. Since this is a 2005 study, it was available for EPA to review and consider if they were in fact committed to gaining a specific understanding of how land application of dairy nutrients can be safely and appropriately recycled. It appears instead that EPA deliberately ignored the standard rule of research; search for and review current peer reviewed journal articles to understand the current state of the science in this particular area. Failure to do so in even a master's thesis would result in automatic rejection of the research presented; many of the EPA people associated with this study have advanced degrees and know full well this is an absolute minimum requirement. It appears that what very limited technical source review took place, at least as it is reported by EPA, was selectively limited to articles and work EPA felt would support the direction they wanted this study to go from the start.

O. You will note in reviewing this study that their sampling took place over a ten year period, with 5 or 6 sample points even spaced out to a depth of 1.37 meters (about 4.5'). This is typical of a standard nitrate leaching study; the 0-2" standard selected by EPA is not recognized as a scientific, accepted method of sampling for nitrates. To further illustrate this point; please review the attached documents from both private and public sources. The A & L labs sampling guide (www.al-labs.west.com) suggests a maximum sample size of 40 acres; there is no information provided by EPA as to the acres in each of the six fields (2 each, Corn, Mint, Hops) but it is likely some fields were larger than 40 acres, in which case the sample area is too large to

be accurately represented. There was no discussion of soil types present in the sampled fields; yet the web soil survey is available online to identify the different soil types; in fields smaller than 40 acres two samples would be the recommended minimum if there were differing soils in these EPA selected fields. More importantly, specifically to address the issue of characterizing Nitrate nitrogen, the mobile form of interest here, A & L labs (recognized as the largest commercial soil lab in the country) recommends sampling in 1' increments down to 3' (3 samples per site). This allows not only an accurate assessment of total Nitrates present, but the level at which the highest nitrates are found will provide a clear indicator if nutrient practices are likely, over the long run, to produce excess leaching on Nitrate to groundwater. Soil sample guides from Oregon State University (bulletin PNW 570-E), and University of Idaho (EB 704, revised) provide similar guidance for appropriate sampling protocols to accurately assay Nitrate nitrogen. The soil sampling protocol utilized by EPA in this case is one used less than 1% of the time, and is only used when looking for freshly surface applied chemicals (like pesticides). This unusual very shallow sample protocol is not recognized anywhere in the great body of literature as an appropriate technique when the research is focused on an assay of Nitrate nitrogen. The odd, deliberate and unacceptable sampling protocol used by EPA negates fully any scientific value of the results obtained. In addition, the number of fields sampled (total of 6) cannot possibly be representative of the variation in crops, cultural techniques, soil rotational history of the Lower Yakima Valley. At least ten fields and ten crops, with full field histories, and sampled in 1' increments to 3' (sampling to further depth would be even better) would be necessary (two consecutive years) at a minimum to provide data which would withstand peer review and scientific journal publication.

P. Missing data not taken by EPA would negate the test results even if the proper sample protocol were followed for Nitrates -EPA presents essentially no data on the fields selected for soil sampling (2 each, corn, hops and mint) other than the current crop at time of sampling. As previously described, the sample plan chosen by EPA is not correct, and based on an extensive literature search has never been used before to study nitrate nitrogen. Missing data necessary to allow any reasonable evaluation of soil test data (assuming an appropriate protocol using sampling to depth of at least 3', 5' better is followed) includes the following:

a. Field history – crop rotation prior 3 years minimum; 5 years better;
b. Field history of all nutrient applications – form of nutrient, when and how applied, amounts;
c. For the three or five year prior rotational crop need yield to calculate nutrient removal in harvested crops, and whether or not it was cover cropped;
d. Based on nutrient applications and crop removal, add expected denitrification and other losses to estimate N balance for each field (net deficiency or removal or addition of nitrate);
e. Irrigation type, amounts, application rates and frequency;
f. Presence of any soil tile or surface waterways thru or adjacent to subject fields;
g. Source and nitrate analysis of irrigation water;
h. Crop residue management;
i. Soil tillage or lack thereof (no till or min till farming);
j. Whether field has protective soil berms to prevent any run on and run off;
k. Historic and current annual soil and any available plant tissue nitrogen analysis;

Without this data, even if EPA had selected and executed an appropriate sampling plan and analysis for nitrates (and NH4-N which converts to Nitrate) the test data is not meaningful for the purpose of evaluating the key question; Are current nutrient management techniques,

including land application of organic or synthetic nutrients likely to contribute to groundwater Nitrate loading in the future?

P. EPA failed to obtain, review and consider the wide body of technical literature, including research within Washington State and Yakima County in particular; instead chose a single 10 year old report from Kansas with only a single dairy basin evaluated -The EPA report relies exclusively on the report by J.M. Ham (Trans ASAE Vol. 45(4): 983-992) in calculating their critical estimate of leaching losses from dairy manure storage basins. It is rather odd that EPA would pick this report, which is ten years old, when there are more current reports in the technical literature; odd that this is a study from the Midwest (Kansas) where the author makes specific reference to extending these findings only to the great plains area; particularly unusual in that of the 20 storage basins studied, only one was a dairy basin. This single dairy basin it should be noted was only 1 year old at the time of the study, and the author acknowledges that initial loss rates are always higher due to the additive effects over time of very fine sedimentation and head pressure increasing the seal by about an order (factor of 10x). In order to select this report above all others, EPA also had to ignore studies conducted by the Washington State DOE on storage basins here in Washington State, some of which were within the EPA/Yakima County study area. In addition, several privately funded studies on site in Yakima County with a combined total of 20 years of data specific to this issue are not available to EPA as a direct result of their enforcement actions pending against five listed dairies in the "cluster" near Outlook identified in their report. With EPA targeting this important segment of the ag economy, this is but one example of a great lost opportunity for cooperative, rather than legal, adversarial based relationships between EPA and family farmers.

Summary of Comments

It is apparent that EPA research group, other than the single meeting previously described over three years ago, sought to internally design and execute their selected plan, and to exclude outside comment and review through the entire process. Science itself has no ideology; it is simply a tool to be used for good or, as in this case, for what appears to be a politically driven, anti-dairy agenda. While there is adequate evidence of incompetence in the design, execution, and conclusions reached by EPA in this final report, perhaps of even greater concern is the perception created. Overall the dominant impression created is of an adverse bias, directed against a single and important element of our food production system; family dairy farming enterprises. This focus by EPA, to the exclusion of the other well know sources, and the relegation of historic practices of generations past to a mere footnote, have resulted in an indictment of EPA in the general scientific community.

The conclusions in the report are simply not scientifically supported by the very limited, biased sampling and flawed analytical data provided. A reading of each labs comments on the limitations of the data which they generated at EPA's behest with samples provided, and how and where it should be used, should have been enough to prevent EPA from using any of it, good, bad or somewhere in between, in their summary and conclusions in this report.

The non-public so called "peer reviews" plan utilized by EPA in this case is almost unbelievable in its form and nature. I have been told that the entire completed plan was not provided to, and was not what was sent to the selected reviewers. If it turns out that important sections, including those where EPA made conclusions from the data in the (partial/draft) report were not provided, then there was no

this was a deliberate and deceptive act. The limited selection of only FEDERAL employees within EPA and affiliated agencies is at best, a badly incestuous idea. At worse, it could be reasonably viewed as a calculated way of controlling the potential for negative feedback of substance. The lack of a real peer review by independent experts, at least some of whom should have had some detailed local knowledge, was a crucial decision point that ultimately led to the release of this mortally flawed research report. The refusal of EPA to cooperate in a joint, true independent peer review process after its public release was compounded severely when the stated reason for the rejection was that the quality of the data was so good there was no point to such an exercise. Within a week of that assertion, I learned that EPA was scouting locations for geo-probe data gathering, seeking new, apparently "better" field and lab data. Folks, you can have it one way or the other, but definitely not both. Either EPA stands by their stated position that the data is of such high quality, and their conclusions unassailable, or there are major defects, errors and omissions which require a substantial "fix", if not a complete do over.

For over three decades I have worked with the EPA, and developed a high level of respect as a result of those many experiences. It is with deep regret that I pass such critical judgment with respective to their report EAP-910-R-12-03. EPA has lost all credibility within the agricultural, rural population that lives and works every day in their "study area". Yakima County is a one pony show economically; it has production ag, processing, storage and distribution as a primary employer. In my over 35 years of direct experience working with family farming enterprises in Yakima County, I have found these producers to be intelligent, progressive, and eager to embrace new technology and BMP's as they are developed. They were strong supporters of the 1998 DNMP, and more recently voluntarily cooperated with EPA in providing critical testing sites for the NAEMES and follow-on research projects, and worked for two years with Gary Pruitt at the YRCAA on identifying and adopting comprehensive BMP's to reduce air emissions. The dairy industry has worked very hard and has been the most committed group of ag producers I have worked with on environmental issues. Given the quality of leadership in the fruit, grape, hop, mint, wheat and potato commodity organizations, that is saying a great deal.

The decision to turn what could have been an even handed, progressive work to assist the GWMA, the group with the real opportunity to make positive long term changes and reducing groundwater nitrate levels into an unscientific, unsupported, targeted attack on one segment of Yakima County agriculture will in my opinion be viewed as a disastrous, watershed moment. EPA has decided that litigious pursuit of a handful of dairies, unsupported by sound science, driven by bias and politics, is more important than really identifying how to solve the problem of nitrates in groundwater. This report, and the actions of EPA against the dairies, represent in my opinion the largest obstacle to be overcome by GWMA in their long term pursuit of sustained and significant reduction in groundwater Nitrate contamination. I respectfully request that EPA consider carefully this brief analysis and critique, and reconsider their commitment to this deeply flawed report.

Yours Very Truly,

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