

Minority Opinion re *Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area – Scope of Work and Budget*

December 11, 2014

Yakima County is the most productive agricultural region in Washington State. We are too important to allow the soil, air and water here to become more polluted. The proposed *Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget* is underfunded and under resourced. The results will be superficial, unreliable, and of no use as we attempt to address nitrates in our groundwater. This writer fears that the proposed *Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area* will be used to confuse the discussion, underestimate the Yakima Valley nitrate problem and divert attention away from the leading sources, away from the elephant in the room (Natural Resources Conservation Service, 2000).

### Theoretical Foundation

The study is said to be modeled after nitrogen balance studies performed in other parts of the country, especially *Technical Report 2 from Assessing Nitrate in California's Drinking Water With a Focus on Tulare Lake Basin and Salinas Valley Groundwater*. This was a \$1.7 million study of water pollution in that state that built upon data gathering and modeling that was done by the University of California under a separate \$1.5 million project entitled *California Nitrogen Assessment*. *Technical Report 2* is a 343 page document that required almost three years to complete, involved contributions from 64 individuals, was authored by 16 scientists from UC Davis and was led by Dr. Thomas Harter, whose entire professional career involves research.

The proposed *Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area* has a price tag of \$56,600 to \$58,660 and will be performed in about 7 months under the direction of Kirk Cook from WSDA who has years of experience managing water programs at the Washington State Department of Agriculture but does not provide any academic credentials. It is notable that the Washington State Department of Ecology was not involved in designing this proposed work. Qualifications and listing of Yakima staff are not provided.

The California study clearly states, "Nitrate loading to groundwater in the Tulare Lake Basin and Salinas Valley is widespread and chronic, and **is overwhelmingly the result of crop and animal agricultural activities** (emphasis added)." The WSDA/Yakima County plan states, "This area has supported a variety of agricultural practices for over 100 years. Many of these practices have required the use of nitrogen rich fertilizers and nutrients (both organic and inorganic) or where nutrient rich effluent haves (sp) been allowed to enter the soil column via permitted or other sanctioned activities. These activities are **suspected** (emphasis added) to have contributed to the elevated levels of nitrate in groundwater currently used as drinking supplies." WSDA is not willing to concede that agriculture is by far the major cause of elevated nitrates in Yakima Valley groundwater.

## Data Concerns

**Top of the Bell Curve:** This project homogenizes the Lower Yakima Valley Groundwater Management Area. All corn fields or all apple orchards will be considered to be more or less equivalent. The truth is that there are areas with elevated nitrates in the groundwater and there are areas with acceptable levels. By averaging nitrate levels in cropland over large areas the severity of pollution from fields with extremely high nitrates is hidden. We cannot access locations but we do know that there are fields where nitrogen has been egregiously over-applied. There are fields with 250 ppm nitrogen in the soil at three feet at the end of harvest. As a result of these disparities we may be recommending best management practices to growers and producers who are already doing a good job managing their fields and we will most likely miss those who are the leading contributors to the problems. It is hard to imagine that a farmer who over-applies nitrogen will volunteer for deep soil sampling.

The Valley Institute for Research and Education (VIRE) study clearly showed that nitrate levels in the lower valley often exceed safety standards while those in the middle valley do not. To better understand problems with homogenization consider these scenarios:

If we homogenize or average the population of legal drivers there are no drunk drivers  
 If we homogenize or average the population of married couples there is no spousal abuse

If we homogenize or average the population of newborn babies there are no stillbirths

If we homogenize or average the population of workers there is no unemployment

If we homogenize or average all water wells in Yakima County there is no pollution

**Already Doing A Good Job:** There is no factor or assessment for Best Management Practices already in place. The project looks at what a “typical” grower or producer does but there is no clarification of how “typical” is determined. HDR (2013) provided us with a list of about 70 BMPs for Irrigated Agriculture and about 50 BMPs for Livestock & CAFOs. The referenced grower survey that is part of the Deep Soil Sampling project (South Yakima Conservation District, 2014) only addresses six BMPs.

The *Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget* does not consider the current level of BMP implementation. How will we know where there is room for improvement if we do not have a baseline? For example, suppose some farmers choose to focus on MT 1.1.3 *Improve surface gravity system design and operation*. They implement some or all of six recommendations:

BMP 1.1.3.1 Convert to surge irrigation

BMP 1.1.3.2 Use high flow rates initially, then cut back to finish off the irrigation

BMP 1.1.3.3 Reduce irrigation run distances and decrease set times

BMP 1.1.3.4 Increase flow uniformity among furrows (e.g., compaction furrows)

BMP 1.1.3.5 Grade fields as uniformly as possible

BMP 1.1.3.6 Where high uniformity and efficiency are not possible, convert to drip, center pivot, or linear move systems

The nitrate balance study does not ask how many growers follow these recommendations. Neither does the Grower Survey. Consequently we cannot accurately describe areas for improvement and we may be assuming that pollution comes from fields where there is little nitrate leaching.

We are well aware that management practices have a major impact on the amount of nitrogen in applied manure and in the amount of nitrogen that is volatilized versus amount absorbed by plants versus amount leached to the vadose zone. For example, Rotz (2004) states, "Manure storage units improve nutrient utilization by allowing better timing of nutrient application with crop needs. At least 70% of the nitrogen entering anaerobic lagoons is typically lost, but a less than 10% loss can be maintained using slurry storage with a natural crust or other cover, or by drying poultry manure to at least 50% dry matter. Irrigation and surface spreading of manure without soil incorporation often ensures the loss of all remaining nonorganic nitrogen (typically, 20 to 40% of remaining nitrogen). Rapid incorporation and shallow injection methods decrease this loss by at least 50%, and deep injection into the soil essentially eliminates this loss."

**Deep Soil Sampling:** The *Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget* cites the Deep Soil Sampling (DSS) six times as a source of data. The plan is to use DSS data to describe irrigated agriculture in the valley. However, DSS is off to a slow start. Only half of that study will be complete when the Nitrogen Budget final report is delivered in the fall of 2015. Thirty-three area farmers signed up for sampling and survey in the fall of 2014. If 50 farmers sign up in the spring of 2015 there will be 83 sets of deep soil samples and 83 surveys to characterize irrigated agriculture at the end of the nitrogen balance project. This is not enough.

During the August 2014 meeting of the Lower Yakima Valley Groundwater Committee (GWAC) Laurie Crowe from the South Yakima Conservation District stated that the option selected from the Pacific Groundwater Group's (PgG's) list of five possible soil testing plans was the option with the highest number of sites. That option is Plan A with 4 leaching potentials, 6 crop groups, 4 irrigation practices and 307 samples. If 100 samples are available in July of 2015 and if there is a perfect fit so that each of the 96 combinations is represented, then there is only one sample for each combination of factors. This is not enough. A selected corn field with leaching potential 1 and pivot irrigation might be one where nitrogen is applied at anywhere from 100 to 2,000 lbs. per acre.

There are no plans for surveys in addition to the survey work already completed by the Irrigated Ag Work Group. There is no funding dedicated to additional grower surveys and there is no provision for more in depth survey work.

The *Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area - Scope of Work and Budget* acknowledges that there may be insufficient data from the Deep Soil Sampling project. There is an option for using group discussions to compensate for this weakness. \$1,000 to \$2,000 is allocated for up to four meetings to gather the necessary information. There is no indication of what the planners consider an adequate number of participants for these meetings,

which agricultural specialties must be represented, what questions will be asked, the format for discussion, how data will be gathered from the discussions and what approach will be taken for analysis. It is especially concerning that the two agronomists who sit on the GWAC might be the leading sources of information. Both have economic ties to the dairy industry and have withheld information that negatively impacts that industry during GWMA discussions.

Using focus groups to gather data requires a high level of structure. Otherwise the result is simply a group of people sitting around a table and talking. In order to meet recognized criteria for qualitative research, there must be planning, adequate representation of major stakeholders as well as time and resources to study the resulting data. Estimated costs to cover this amount of work are more like \$2,000 for each meeting (Morgan, 2013).

### **The Elephant in the Room**

According to EPA estimates and data from Whatcom County (Carey & Harrison, 2014) nitrogen from livestock operations and CAFOs accounts for about 65% of the nitrogen available for land application and potentially for leaching to groundwater in areas such as ours. However, only 11% of the budget for this project is dedicated to Livestock Sources Quantification.

“One meeting is planned with the Livestock/CAFO working group to review and receive feedback regarding ‘typical’ management practices and implemented BMPs within the LYV. Potential nitrogen sources and sinks on local CAFOs will also be discussed as an exercise to identify potentially overlooked sources or sinks.” This is not enough. Neither advocates for the environment nor advocates for dairy will accept personal opinions as sufficiently factual for prediction or policy recommendations. As we are frequently told, many practices on Yakima Valley dairy CAFOs are well-guarded proprietary secrets. We cannot expect two dairymen to speak with authority about the practices on the other 60 odd dairies. It is this writer’s understanding that Nutrient Management Plans are not stored at WSDA headquarters in Olympia but rather with individual conservation districts and the CD’s do not share this data. We need more in depth data for such a major source of nitrogen.

Section 6.0 of the document states, “Required data for this analysis is the current number of head per facility.” It is this writer’s understanding that individual dairy CAFOs provide this data to the WSDA and the CDs on the condition that it is only shared with the public in ranges. At times the top end of a range is twice the lower end of a range. This makes analysis difficult.

### **What About the Beef Industry?**

Section 6.0 Livestock Sources Quantification says, “Evaluation of N loading from livestock sources will be confined to those areas under the jurisdiction of WSDA (dairy) or under permit by Ecology as a Confined Animal Feeding Operation. Nevertheless there are many beef operations in the valley and one large feedlot with a capacity of near

100,000 head. The only other section that might accommodate beef cattle is “hobby farms” under Residential, Commercial, Industrial and Municipal but this hardly seems appropriate or within the expertise of Yakima County staff.

### Funding Gaps

The budget for this project is:

3.1 Evaluate current and planned data sources to determine necessary database fields. 100 hrs@ \$26/hr	\$ 2,600.00
3.2 Develop comprehensive database for all nitrogen sources covered by RCIM, Irrigated Agriculture, and Livestock Agriculture. 100 hrs@\$35/hr	\$ 3,500.00
3.3 Population of database with data collected as a result of grower surveys, estimates for various land uses associated with RCIM sources and data collected from on-site livestock operations. 80 hrs@\$26/hr	\$ 2,080.00
4.1 Analysis of septic system N loading using existing parcel data and database. 90 hrs@\$30/hr	\$ 2,700.00
4.2 Identify and analyze N loading from permitted land application sites. 30 hrs@\$30/hr	\$ 900.00
4.3 Develop N loading estimates from municipal Underground Injection Control (UIC) devices. 60 hrs@\$30/hr	\$ 1,800.00
4.4 Develop N loading estimates from hobby farm operations. 60 hrs@\$30/hr	\$ 1,800.00
4.5 Assemble data analyses for RCIM elements and produce estimated N loading in both database and GIS formats. 60 hrs@\$30/hr	\$ 1,800.00
5.1 Develop spreadsheet of grower survey results including estimates of N application, irrigated amounts and timing, biomass removal, crop type, etc. 50 hrs@\$55/hr	\$ 2,750.00
5.2 Conduct statistical analysis of survey populations, and analyze spreadsheet data as to major influences. 30 hrs@\$55/hr	\$ 1,655.00
5.3 Develop crop specific and basin wide NO3 loss estimation. 280 hrs@\$55/hr	\$15,400.00
Grower meetings	\$ 2,000.00
6.1 Conduct literature review to assemble peer reviewed data on lagoon leakage rates, regional nitrogen content of manure from dairy and beef cattle, required manure handling activities on facility sites.	\$ 780.00

30 hrs@\$26/hr	
6.2 Conduct evaluation of manure generation using latest livestock population data, evaluate 3 <sup>rd</sup> party application, develop lagoon leakage rates, evaluate soil testing results and evaluate manure export activities. 90 hrs@\$45/hr	\$ 4,050.00
6.3 Develop N loading estimate for designated dairy and CAFO properties. 35 hrs@\$45/hr	\$ 1,575.00
7.1 Conduct evaluation of synthetic fertilizer use. 40 hrs@\$45/hr	\$ 1,800.00
7.2 Evaluate DSS results with N assessment results and determine relative gaps in assessment. 80 hrs@\$55/hr	\$ 4,400.00
8.1 Develop draft report on nitrogen loading and loss for the Lower Yakima Valley Groundwater Management Area. 120 hrs@\$45/hr	\$ 5,400.00
8.2 Review comments from GWAC and workgroups. 50 hrs@\$45/hr	\$ 2,250.00
Total	\$58,660.00

- There is no funding for BMP evaluation
- There is no funding for determining the impact of abandoned wells or dry wells
- There is no funding for surveys
- There is no funding for analysis of atmospheric loading of nitrogen. This accounted for 8% of nitrogen in a Whatcom County study. (Almasri & Kaluarachchi, 2004). Yakima County has a known problem with nitrates in the air. (WA State Doe, 2014)
- There is no funding for analysis of silage leachate
- The funding for literature reviews is inadequate. *Technical Report 2 from Assessing Nitrate in California's Drinking Water With a Focus on Tulare Lake Basin and Salinas Valley Groundwater* had 20 pages of references
- There is no funding to address beef operations
- There is no funding to address "relative gaps in assessment".
- Why is compensation to Yakima County staff so much less than compensation to WSDA staff?

### Assumptions

Some of the assumptions for this study may be difficult to substantiate. For example, the proposal states "Removal of nitrogen from a field via runoff or tile drainage is negligible." However a study by the Roza-Sunnyside Joint Board of Control (2009) found increasing amounts of nitrate and nitrite in drainage water from Granger Drain, Sulfur Creek Wasteway, Spring Creek Wasteway and Snipes Creek Wasteway during the non-irrigation season, which strongly suggests leaching and runoff to the groundwater.

The project assumes that “excess nitrate is denitrified in the vadose zone or leaches to groundwater”. However, Volland, Zupancic & Chappelle (2002) tell us that nitrogen in the form of ammonium binds to clay in soils lining manure lagoons. When lagoons are decommissioned and exposed to oxygen the ammonium salts readily convert to nitrate with a high potential to flush into the groundwater. The age, number and acreage of lagoons and ponds should be part of this project. This writer understands that most lagoons last about 25 to 30 years, at which point they require replacement.

The project assumes that “Input and results are not variable over time and can be approximated with average annual values.” However, data from WSDA tells us that the number of cattle in Yakima County is increasing by 4,000 head per year and the number of milk cows is increasing by 2,500 per year. According to the Capital Press (2014) Washington State added 11,000 more milk cows in 2014. New lagoons and ponds are under construction. Although WSDA has verbally stated an ability to provide the number of acres in lagoons and the number of acres where manure is stored and/or composted that is not part of the written plan. It needs to be. The statement that there is no long-term storage of manure should be clarified. Neighbors of lower valley dairies confirm that there are stacks of manure two years old on some operations and excess manure has been a problem here since 2000 (Natural Resources Conservation Services, 2001),

### **Conclusion**

Thank you for reading my concerns regarding the *Comprehensive Nitrogen Loading Assessment for the Lower Yakima Valley Groundwater Management Area – Scope of Work and Budget*. It is worth remembering that the Lower Yakima Valley GWMA Deep Soil Sampling project began with a similar estimated cost of \$60,000 and the final cost is now well over \$400,000. Greater precision can be accomplished through more careful data gathering and analysis that includes stakeholders from groups outside of WSDA. This is a question that should be addressed at the outset. If the results from this study are too general does the study have a useful role in our discussions? If we dedicate more time and monies to a nitrate balance analysis will that subtract from groundwater studies?

*Jean Mendoza*

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