Response to Comments

Lower Yakima Valley Groundwater Management Program

This document is a response to comments received during the public comment period for the Lower Yakima Valley Groundwater Management Program.

This Response to Comments document is being issued to address the public comments received for the Program during the comment period held February 25, 2019 to March 27, 2019.

The purpose of this Response to Comments document is to:

- Describe and document public involvement actions.
- List and respond to all comments received during the public comment period.

Ecology provided a public comment period, accepted comments from February 25, 2019 to March 27, 2019. Yakima County and Ecology held a joint public hearing on March 12, 2019 at the Sunnyside Community Center, 1521 South 1st Street, Sunnyside, WA 98944.

Notice of the public comment period and public hearing was published as follows:

- Notice of the open public comment and public hearing:
  - Yakima Herald: Sunday 02/24/2019
  - Sunnyside Sun: Wednesday 02/27/2019
  - Grandview Herald: Wednesday 02/27/2019
  - El Sol: Thursday 02/28/2019
- Notice of the public hearing was published again:
  - Yakima Herald Sunday 03/10/19
  - Sunnyside Sun Wednesday 03/06/19
  - Grandview Herald Wednesday 03/06/19
  - El Sol Thursday 03/07/19

Twenty-six (26) comment letters were received electronically, by mail, in person, or at the public hearing.

This document consolidates comments by categories and explains how these comments are managed. Comments are addressed using the following process; grouped by topic and addressed collectively. A list of the original comments as received are available in Appendix A

A list of recommendations collected from public comments is provided in Appendix B.

Acronyms

The following is a list of acronyms used in *Ecology Responses to Public Comments Received on the Lower Yakima Valley Groundwater Management Program* and their meanings.

Acronym	Meaning
BMP	Best Management Practice
CAFO	Concentrate Animal Feeding Operation
EPA	Environmental Protection Agency
GIS	Geographic Information System
GWAC	Lower Yakima Valley Groundwater Advisory Committee
GWMA	Lower Yakima Valley Groundwater Management Area
LYV	Lower Yakima Valley
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OSS	Onsite Sewage Systems
PGG	Pacific Groundwater Group
Program	Lower Yakima Valley Groundwater Management Program
PUD	Public Utility District
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
ROSS	Residential Onsite Sewage Systems
USGS	United States Geologic Survey
WAC	Washington Administrative Code
WSDA	Washington State Department of Agriculture
WSU	Washington State University

INTRODUCTION

The Lower Yakima Valley Groundwater Management Area (GWMA) was formed in 2012 to address the goal of reducing nitrate concentrations in groundwater. A groundwater study in the Lower Yakima Valley, which sampled over 150 private domestic wells in 2017, found 20 percent of the wells consistently exceeded the drinking water standard (USGS 2017).

There are many identified potential sources of nitrate in the Lower Yakima Valley GWMA., Nitrate is a nutrient that can be beneficially re-used to grow crops, yet many sources may contribute to nitrates in groundwater. Data collected indicates that human activities at the land surface have affected water quality.

One objective of the Lower Yakima Valley Groundwater Advisory Committee (GWAC), was to develop a program that would achieve the goal of reducing nitrate levels in groundwater. That program was developed as the "Lower Yakima Valley Groundwater Management Program" (Program). It describes the committee's completed work, including the committee's decisions, recommendations, and accomplishments. This work is the foundation for the implementation phase.

The program content describes the issue of elevated nitrate in groundwater, how the GWMA was established in the Lower Yakima Valley, and defines the goals and objectives developed for the GWMA. This report explains the environmental and health effects of nitrate in the environment, describes the sources of nitrate, and the different regulatory authorities that effect nitrate in groundwater. Additionally, the report characterizes the Lower Yakima Valley, it discusses the accomplishments of the GWAC and the recommended actions for implementation.

List of Commenters

Ecology received comments from the following individuals and group representatives listed in the table below. These groups and individuals offered diverse opinions on GWMA-related issues. We appreciate the time and effort each took to review the Lower Yakima Valley Groundwater Management Program, develop comments, and submit them.

Name	**Affiliation**
Bill DeRuyter	Concerned Citizen
Dan De Boer	Concerned Citizen
Dan DeGroot	GWAC Member – Yakima Dairy Federation
David Newhouse	Concerned Citizen
Don Young	Previous Participant GWAC Member – Yakima County Farm Bureau
Department of Ecology	GWAC Members – Department of Ecology
Lucy Edmondson	GWAC Member – U.S. EPA
Frank P. Winslow	Concerned Citizen
James H. Davenport	Concerned Citizen
Jason Rollinger	Concerned Citizen
Jason Sheehan	GWAC Member – Yakima Dairy Federation
Jean Mendoza	GWAC Member – Friends of Toppenish Creek
Joel Koopman	Concerned Citizen
Karen Sheehan	Concerned Citizen
Markus Rollinger	Concerned Citizen
Norman Peck	Concerned Citizen
Patricia Newhouse	GWAC Member – Lower Yakima Representation Pos. 2
Richard V	Concerned Citizen
Robert Stevens	Concerned Citizen
Tanner Winckler	W.S. Farms Inc.
Tony Viega	Concerned Citizen
Trevor Wagenaar	Concerned Citizen
Veldhuis Family	Concerned Citizen
Yakima County Farm Bureau	GWAC Members – Yakima County Farm Bureau
Yakima County	GWAC Members – Yakima County

ATTACHMENT 1: COMMENTS AND RESPONSES

Description of Comments:

This section provides a listing of the comments received during the public comment period and responses. Comments are grouped by topic and addressed collectively.

Comments Related to Dairies or Large Farming:

Agriculture Regulation

Comment 1 – Dan De Boer

If I'm reading the information correctly the increased regulations being discussed will only impact those living North of the Yakima River. This again doesn't appear to align with the committee's goal of addressing all sources of nitrates. This unfairly burdens those North of the river. Although farmers are general friendly with each other, at the end of the day, they do compete in the same market. Increasing regulations on one side of the river makes those folks less competitive than their friends to the South. I warn the committee to guard against potential conflicts of interest in this regard.

Comment 2 – Karen Sheehan

The GWMA report is focused too much on dairy and not enough on the rest of agriculture including hops, mint, row crops, tree fruit, grapes, etc. Dairy farmers are the only part of agriculture that is required to take annual soil samples and have a written nutrient management plan plus have inspections. The rest of agriculture can farm as they please with no oversight or required plans. Dairy is already the most regulated for nutrients.

Response Related to Agriculture Regulation

The GWAC developed a list of recommended actions. These actions were prioritized from the list of alternatives by a voting process from GWAC members. These prioritized actions were collected as "Recommended Actions" within the Program.

The Program does not include any recommendations for new regulations. The Program is the plan for implementation. There are many aspects of the plan, including alternative management strategies as presented in the recommendations section.

The GWAC made a list of approximately 300 potential alternatives, incorporating working group recommendations, ideas raised in working group conversations and reviews of scientific and environmental literature. These can be found in Appendix I of Volume II of the Program.

The GWAC refined these alternatives using a consensus based approach and identified a consensus list of 83 potential recommendations. This list was evaluated by the criteria established by WAC 173-100-100 (4). This smaller list can be found in Appendix J of Volume II of the Program.

Several of the recommendations did recommend developing strategies around soil sampling, however there was no recommendation for new regulations to require annual soil sampling. Recommended action number 24 does recommend to "Establish a multi-year Deep Soil Sampling Program where farmers subscribe for a duration with pre-determined fiscal remuneration for completed sampling. Cost share with farmer. Farmer to provide checklist indicating performance with

BMPs. Test throughout growing year, in order to observe effects of fertilization throughout year. Share data with public."

We agree that any new regulation implemented should be fairly established. No new regulations are recommended as part of the Program.

A recommendation will be added to Appendix B that other agriculture should take annual soil samples, similar to the dairy farmers.

Dairy Effectiveness

Comment 3 – Jason Rollinger

When dairy's buy land it is usually test high but as we farm it we lower the nitrogen levels.

Comment 4 - Tanner Winckler

8. Show dairymen are already doing a lot to lower nitrates and manage nitrates

Comment 5 - Trevor Wagenaar

Dairymen purchase land from other farmers and do reclaim the ground from those who have poured on the fertilizer in years previous.

Dairymen soil test twice a year which is more than most!

Our management practices are pretty efficient because we want to be economical!

Comment 6 - Veldhuis Family

There been fields that we bought throughout the years that been higher nitrogen there then our ground that we own. Seen field with 1000 pounds of N in the ground. We got it all in order now, but it took years without N of our part to do it.

Response Related to Dairy Effectiveness

The GWMA was formed to address the goal of reducing nitrate concentrations in groundwater. Techniques and stories of success help those striving to reduce nitrate concentration in groundwater. Ongoing positive techniques are encouraged to be shared with the community and with GWAC members. If the techniques used to lower nitrate levels are not currently within the Program documents, these can also be shared.

Farming Legacy

Comment 7 – Jim Davenport

10. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not reflect the often-expressed view/opinion within the Advisory Committee that there exists a "legacy" of groundwater contamination within the Lower Yakima Valley due to the length of agricultural activity which has occurred there. Historic data pertaining to the amount of agricultural production, classified by crop variety (measured in volume, economic value or other metric), acreage farmed, and percentage of farmed acreage property actually under tillage, should be assembled and compared against current data of the kind in order to establish trends in agricultural density and use.

Comment 8 – Yakima County Farm Bureau

The report does not focus enough on legacy nitrates from former crops grown in the area and former growing practices that were likely contributors to it such as furrow and rill irrigation practices. This was no fault of producers as they were using the best information and technology at the time. However, the report's slant is that current ag practices are to blame, which is contrary to what the data tells us. In fact, recommendations in the report are for agriculture to implement new irrigation technologies such as sprinkler and drip systems, much of which has already been implemented in the Groundwater area.

Comment 9 - Tanner Winckler

6b. Address legacy nitrates.

Comment 10 - Tanner Winckler

7. What studies are being done to show how legacy nitrates are being brought down?

Comment 11 - Trevor Wagenaar

Looking back in time at the crops grown in this valley such as sugar beets, potatoes, etc. There used to be fertilizer poured on those crops. There was not fertilizer management we have now. It was the "more is better theory." I am just wondering how that might have impacted what we have now???

Comment 12 - Dan DeGroot

3. Farming Legacy issues should have been a substantial portion of this report. The way farming practices were conducted over the first 70-80 years of the Sunnyside Canal system (and the later Rosa Canal system) may have had a substantial effect on the nitrogen load in the soil of the area the Lower Valley GWMA. Tillage practices, fertilization practices and irrigation practices were such that large amounts of Nitrogen were put in the soil and had the strong potential to be moved to the aquifer with the common use of rill (furrow) irrigation. It should also be noted that in the last 30 years there have been many technology changes in all three of these practices that should reduce the amount of available nitrogen in the soil and most importantly not continue to move what nitrogen is in the soil to the aquifer. I believe that this legacy issue should be strongly noted in the report and the fact that the recent changes in common farm practices will have a positive effect on the nitrogen loading of the aquifer.

Comment 13 - Jason Sheehan

1. The report is lacking enough of the farming legacy issue of nitrate buildup in the soil. The majority of the farming in the Yakima Valley when irrigation started was by rill or furrow irrigation. This method saturated the soil and caused 30-50% of the nitrogen applied to the surface to leach past the root zone. Crops such as mint, sugar beets, and potatoes that required high amounts of nitrogen were grown in the area. Nitrogen as commercial fertilizer was cheap and applied at heavy rates, from 600 lbs per acre up to 1000 lbs per acre with removal rates of the crops not nearly that high. Farmers were taught as little as 20 years ago to apply 1 lb of nitrogen per bushel corn yield expected. Easily 300+ lbs in our fertile valley. Now that same crop of corn can be raised for less 2/3 that rate and sometimes higher yields. We have purchased new fields that have been farmed and taken soil samples up to 6' deep and found extremely high nitrogen soil tests below the root zone, often in fields that have not had manure applied ever or in recent times (15 years or more). This nitrogen has been there for some time and not recently applied.

Comment 14 - Joel Koopman

4. Farming practices have made great strides using available nutrients to improve our land, our crops and our future. These strides have eliminated the farming practices of the past but we still deal with the farming practices of the past's legacy. Legacy nitrates are in the ground and has more than likely contributed to the high nitrate issues. Our farming practices of today are helping to resolve these issues by pulling the nitrates out of the ground. It would be a great step forward if farmers were acknowledged for their clean-up efforts rather than only being blamed.

Comment 15 - Karen Sheehan

There is also a legacy issue with nitrates in this area that needs more attention.

Comment 16 - Tony Viega

What about the legacy of farming practices that occurred in the valley multiple decades ago?

Response Related to Farming Legacy

Information now in the Program includes:

Legacy nitrogen was added to the most recent GWMA program plan as a way to describe and acknowledge that residual soil nitrogen may be contributing nitrate to groundwater for an extended period of time. Technically we do not have a way to quantify the extent of legacy nitrogen in groundwater. There have been no studies in the Lower Yakima Valley on legacy nitrogen. The GWAC did not propose research to address this, nor did they draw conclusions or make recommendations on this topic.

Additional information will be added:

Farming practices have made improvements over the years in how nutrients, water and chemicals are applied. It is unclear how the lingering effects of these historical practices effect water quality and it is unclear how the improvements in farming practices translate into improvements in water quality. No scientific studies within the GWMA area were presented or considered by the GWAC to evaluate legacy effects on water quality.

We will include a recommendation in Appendix B that legacy nitrogen in the LYV should be evaluated and quantified.

Manure

Comment 17 – Yakima County Farm Bureau

12. Pg 25- The term "Waste" should be taken out of the title. It should be changed to "Water Storage, Process Water Storage, or Nutrient Water Storage." The term "Contribute" in the first paragraph is misleading. It should be modified to say "can contribute" because there is no evidence that all pens or lagoons do contribute. Again, there is no mention of the engineering that is installed to prevent contamination. Very misleading report writing.

Comment 18 - Trevor Wagenaar

Manure is a fertilizer and not waste!

Comment 19 - Bill DeRuyter

5. Manure is an "organic" product, it is not a 'waste' product as stated in the GWMA report. It is very useful in farming and has been since farming started. Manure contains many natural forms or micronutrient materials that crops need to grow. Commercial Fertilizer do not contain any organic matter and will seep through the soil faster.

Comment 20 – Dan DeGroot

When manure is properly stored in stockyards, compost areas or lagoons it should be referred to as Nutrient Storage, not Waste. There is one whole section of the report titled Waste Storage Facilities. This section should be edited to be Nutrient Storage Facilities or edited out of the report. All recommendations that refer to nutrients as waste should be deleted because they indicate a lack of understanding on farming process and practices.

Comment 21 - Jason Sheehan

4. Manure is referred to as waste numerous times in the GWMA report. Manure is a useful fertilizer that is used to grow crops and add organic matter and micronutrients to the soil. Higher organic matter has been proven to retain water better and help in drought years and to hold nutrients in the root zone for crops. Commercial fertilizer does not have these qualities.

Comment 22 - Joel Koopman

7. A huge part of being a farmer is being stewards of the land. History has proven that farmers are constantly evolving and have met the large demands placed on them, especially in recent years. What could be more sustainable than using cow manure as fertilizer to grow feed for our animals? Cow manure adds organic material to our soil which, in turn, helps our soil to retain water better, retain nutrients for crops better and improve soil quality all around. Commercial fertilizer has not proven to be as effective in these ways.

Comment 23 - Karen Sheehan

Manure is referred to as waste rather than the valuable organic product that it is with nitrogen, phosphorus, potassium and many other micro nutrients. Manure should not be mentioned as waste in the GWMA report.

Response Related to Manure

The word "waste" is used in this report 116 times, 6 of those refer specifically to animal waste. The other 110 times the word "waste" refers to language used in RCWs, WACs, NRCS guidance, referenced literature, or standard language used by other activities to represent by-products as a result of their activity. The word "waste" is a common environmental term to distinguish between a product (French fries, milk) and a by-product of production (processed wastewater, manure). There are many by-products that are beneficially reused (growing crops is common with industrial and municipal wastewater). It is important whether it is a municipality, industry, residential or agricultural activity to distinguish between the product and the by-product. Typically the by-product is called waste.

In the Recommendations section the word "waste" is used 9 times and refers to multiple waste sources. The recommendations were crafted and voted on by the GWAC.

There are six (6) places in the document that refer to animal waste which will be changed to "manure" or "by-products", and are located in the following sections:

- 1 is in the text
- 3 are in the recommendation descriptions
- 2 are in volume II describing BMPs

The USDA Natural Resources Conservation Service (NRCS) publishes standards for Geomembrane or Geosynthetic Clay Liner lagoon construction. Extensive evaluation of lagoon construction at all facilities within the GWMA boundary was not complete when this program was drafted.

The program report has been updated as follows:

On Pg 25- The term "Contribute" in the first paragraph is modified to say "can contribute".

Agriculture Stakeholder Inclusion

Comment 24 - Tony Viega

We are very disappointed that during the GWMA it's seem to lack other stakeholders in our valley such as tree fruit, hops, mint, Vineyard and other commodities. Where was the rest of agriculture/commodities?

Response Related to Agriculture Stakeholder Inclusion

The GWAC is a large and diverse committee, including representatives from all identified groups affected by groundwater quality, including local, state, and federal government agencies; local citizens; farmers, dairy producers, and agronomists; irrigation districts; conservation districts; environmental groups; and other vested parties. This committee and its workgroups met regularly over the past six years. The GWAC is a voluntary group.

Also, any member of the public was invited to each of the meetings through the six years and was provided opportunity to comment.

Dairy and Agriculture Focus

Comment 25 - Yakima County Farm Bureau

The report also has a major focus on animal agriculture, primarily dairies in the area. This focus ends up being a bias that is not backed up with true data or facts, and is contrary to reports from other areas. Maps depict dairy facilities in red which makes them appear to be a larger contributor, when in actuality, engineering, regulations and regulatory inspections negate most of that potential

Comment 26 - Yakima County Farm Bureau

6. Pg 15- Nitrate leaching section is negatively biased toward ag as it does not mention anything about other sources of N. Health effects section does not mention anything about new evidence concerning how nitrates may not be the primary influencer on the very young,

Comment 27 - Don Young

I was on that committee as a retired farmer & cattleman. As I watched things progress I came to the conclusion that this was only to prove that Dairymen were responsible for Nitrates in our soil, initiated by Ecology & the Environmentalists, I concluded that even though I am retired & have time to waste I did not want to waste it there.

Comment 28 - Dan De Boer

According to the home page the goal of the GWAC is to address all sources of nitrates. However, it appears that research thus far has been almost exclusively focused on large farming and livestock operations.

Comment 29 - Dan De Boer

Deep soil sampling, as outlined in the Outcomes and Challenges section, admits that our ability based on the data in making broad observations on the farming operations throughout the GWMA is limited. I also found nothing in this study proving causation between farming practices and ground water nitrates. Yes, farms use nitrogen. And yes, there are nitrates in the ground water. But what scientific evidence links the two? How is nitrogen absorption/uptake from crop growth calculated when calculating the nitrogen cycle in the Lower Valley? Seems like a leap of faith is required to tie farming operations to elevated nitrates in groundwater and no guarantee or proof that changes in farming practices will have a measurable impact to nitrates in groundwater.

Comment 30 - Dan De Boer

A couple theories were mentioned in the study as to why community members are unwilling to participate in well testing. Ignorance was the primary theory. What the committee and Department of Ecology should know is that many very educated and intelligent citizens of this Valley have a growing discontent with environmental agencies 'taxation without representation' practices. Farmers have also been unfairly targeted by out-of-state profit seeking environmental groups adding salt to the wounds.

Comment 31 - Dan De Boer

Lastly, I wanted to mention that being a lifelong resident in the Lower Valley I know many of the farmers and dairymen and women impacted by these regulations. I see every day how they responsibly steward their farms, I see them plowing county roads when snow storms hit, I see how they raise their kids and the work ethic and morals they instill, I see how they chip in to help neighbors, I see the community service they provide to their communities, I hear about the taxes they pay and the hundreds of people they employee…. these are good hard working people and the type of people this Valley needs to keep. Let us not draw hasty conclusions with unknown benefits based on incomplete science because we don't like their smell.

Comment 32 - John Koopmans

I believe that as a dairy farmer that we have made all our land more fertile and more valuable. I believe we have been unfairly judged. <u>We are a target</u>.

Comment 33 - Richard V

I feel that dairys have been really targeted. Yes there is nitrates in the water. How are we gonna find the source? It is easy to point a finger at a farmer that is spreading his cow manure because it

stinks. There is so many other sources. So much white and liquid ferterlizer that has been used for decades. Are we supposed to take the blame for past farming practices?

Comment 34 - Richard V

Our farming community is afraid to speak up because we always get targeted. I agree we need clean water, but figure out where to problem is coming from. Don't point the easy finger.

Comment 35 - Tanner Winckler

1. The well info will be used against dairy industry/cattle industry

Comment 36 - Dan DeGroot

The report seems to focus mainly on only one area of the community, dairies. The report seems to have a bias against dairies in that there are several mentions of animal nutrients referred to as waste.

Comment 37 - Dan DeGroot

The word waste was used because of a bias, not an understanding of what needs to be accomplished. If there is going to be bias written in this report it will give a perception that dairies and their nutrients are the source of the contamination in the aquifer. Not only is this completely unacceptable to me, it will lead the community to focus on this as the sole method to mediate the contamination of the aquifer(s).

Comment 38 - Jason Sheehan

Finger pointing and only focusing on one aspect of the area, like dairy farms, will not address the widespread issues that need to be changed. The bias towards dairy farms in this report will lead to disappointing results of not addressing all factors resulting in high nitrates in groundwater.

Comment 39 - Joel Koopman

GWMA has now turned into an information hack of dairy farms and a way to place blame on the dairy industry for high nitrates with no evidence to back up that claim.

Comment 40 - Joel Koopman

6. If dairy farms are going to be targeted without evidence of their part in this issue, the actual issue cannot be resolved and the studies will provide unsatisfactory results that in turn will leave this issue at large. There are many more factors to consider in this matter that are being ignored because activist groups have placed dairy farming in the spot light due to their agenda against dairy farming.

Comment 41 - Tony Viega

We have been dairy farmers in this valley for the last 38 years. We have always been proud to live in the Yakima valley but what's been going on in regards to targeting dairies as being the sole polluter is wrong.

In our past years experience, when coming to this valley there were sugar beet, potatoes and unlimited amounts of nitrogen applied to fields which were rill irrigated.

Response Related to Dairy and Agriculture Focus

The program content describes the issue of elevated nitrate in groundwater, how the GWMA was established in the Lower Yakima Valley, and defines the goals and objectives developed for the GWMA. This report explains the environmental and health effects of nitrate in the environment, describes the sources of nitrate, and the different regulatory authorities that effect nitrate in groundwater. Additionally, the report characterizes the Lower Yakima Valley, it discusses the accomplishments and the recommended actions of the GWAC.

The Program was not meant to be biased or have an unfair focus on dairies. The Lower Yakima Valley Groundwater Management Area was formed in 2012 to address the goal of reducing nitrate concentrations in groundwater. The GWAC is a large and diverse committee, including representatives from all identified groups affected by groundwater quality, including local, state, and federal government agencies; local citizens; farmers, dairy producers, and agronomists; irrigation districts; conservation districts; environmental groups; and other vested parties. Each of these parties are valuable to the discussion.

The GWAC developed a list of recommended actions (Appendix J). These actions were prioritized from the list of alternatives presented in Appendix I, by a voting process from GWAC members. GWAC members placed a value or -3 to +3 with each recommendation, and the results were totaled. The recommended actions are listed in order of priority within the Program. The approach is meant to be comprehensive. The recommended actions do not only have recommendations for dairies, but include recommendations for the diverse group as a whole. The report and recommendations do not find that dairy farms are the "sole polluter," nor should they be seen as the sole focus to reduce nitrate in groundwater.

This document relied on the expertise of the Washington State Department of Health (WSDOH) and the United States Environmental Protection Agency (USEPA) to draft the health effects section of the Program.

The Program report was edited prior to GWAC draft approval in December 2018, one focus during that process was to try to address any perceived bias or unfair focus on dairies.

This change was made to the Program:

- Pg 17 – A source has been provided for the bullet "Agricultural practices, including the use of fertilizer and the management of manure, are linked to nitrate loading and incidents of nitrate contamination in groundwater." (Ecology 2010 – Preliminary Assessment)

Comments Related to Implementation Phase:

Ongoing Data

Comment 42 – James Davenport

4. The Departments of Ecology, Agriculture and Conservation Commission, as well as Yakima County, the Yakima County Health District and the Southern Yakima Conservation District should not regard the investigation of groundwater contamination in the Lower Yakima Valley as a fait accompli, but rather as a fait ab initio.

Comment 43 – Lucy Edmondson

Second, results from the next steps in the U.S. Geological Survey work listed above could be very useful to implementing the GWMA program. The next phase would be to conduct a reverse-loading analysis based on the 2015 particle tracking study, to estimate how much reduced nitrogen loading would need to occur to decrease nitrate concentrations in downgradient residential wells to meet the drinking water maximum contaminant level. These findings could be used to refine and focus efforts to implement the final GWMA program in the coming years.

Comment 44 – Lucy Edmondson

As you know, this year, the Washington State Conservation Commission awarded competitive grants for demonstration projects statewide to test various technological approaches to recapture or recycle nutrients, including one in the Yakima Valley. The results of these projects could be useful in the implementation phase and EPA encourages the state and county to consider that information moving forward.

Comment 45 – Lucy Edmondson

In closing, new information pertaining to both understanding the nature of groundwater contamination and strategies to reduce it will continue to emerge from research, data gathering, and technology demonstration projects nationwide. EPA hopes that you will continue to take advantage of this information in your work to reduce excess nitrogen loading in the Lower Yakima Valley's groundwater.

Comment 46 - Frank P. Winslow

1. Send a mass mailing to all residents located outside of public water supply service areas within the Lower Yakima Valley. The mailing would explain the problem of nitrates in shallow groundwater, and that it is of particular danger to expecting mothers and infants. The mailing would provide a telephone number for free testing of their well water for nitrates.

Comment 47 - Frank P. Winslow

2. Assign staff dedicated to collection of water samples from domestic wells for nitrate analysis. The staff should be able to respond to requests to sample within one week of a telephone request. Households with infants or expecting mothers (or women of childbearing age) would be bumped to the top of the list. Shallower wells should be given a higher priority than deeper wells. The sampling staff would maintain a database, including available well construction information.

Comment 48 - Frank P. Winslow

3. Identify locations for household collection of free drinking water at each community in the Lower Yakima Valley. Once a household water supply well has been tested, the owner or resident would be provided with a document allowing them to pick up free drinking water (a reasonable weekly allotment could be calculated).

Comment 49 – Frank P. Winslow

4. Begin a grant program for replacement of impacted shallow domestic wells. Such grants could be applied for by homeowners that have a shallow wells with nitrates above cleanup levels. Prioritization of grant recipients should be based on needs of the applicant. A fund for this grant can

be contributed to by taxpayers and groundwater polluters. This recommendation would require legislative action.

Comment 50 - Frank P. Winslow

The collection of nitrate data from domestic wells could substitute for monitoring wells, and provide much more meaningful data in terms of protection of public health than monitoring well data. Collection of additional data, including hydrogeological and water quality data should focus on areas with identified deeper nitrate contamination, with a goal of identifying potential conduits to deeper aquifer zones. Such investigations could use innovative technologies for the detailed characterization of water quality and hydrostratigraphy with depth, in order to better understand inter-aquifer communications and contaminant migration.

Comment 51 - Norman Peck

Formation of rural PUD Water Districts should be considered among the options for replacement water supplies, particularly in "hot spots" within the GMA. Incorporation of recirculating sand filters in areas where high density of ROSS should be considered as one option to reduce N concentrations in OSS discharges.

Comment 52 – Norman Peck

Use of radio educational information on Spanish-language radio stations has been identified as an effective outreach tool to those for whom Spanish is a language used in households in the Yakima Valley. I have been told that many workers who are fluent in Spanish listen to Spanish-language radio at work and while traveling as well as in the home.

Comment 53 – James Davenport

1. Use of the community consultation model for developing solutions to environmental contamination problems is only helpful to the extent that it broadly and proportionately represents the affected community.

Comment 54 – James Davenport

2. Duly authorized governmental agencies and duly elected public officers are charged with a public duty to execute those rules and regulations currently in effect, and exercise those powers with which they are currently authorized, notwithstanding that they are not recommended by public interest groups.

Comment 55 – James Davenport

3. Neither the final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program, nor the recommendations contained therein, are limiting upon the choices available to the public at large or governmental agencies with relevant jurisdiction.

Comment 56 – Robert Stevens

I agree with both summaries that only limited conclusions can be drawn from this data set. The Washington hop commission funded a WSU, three year, deep sampling to 6 ft. in 23 hop yards from 1990-1992. This study showed the variability between spring and fall sampling and explained some of the reasons why this happens. It also demonstrated how variable management practice can effect soil test nitrate over time.

Comment 57 - Robert Stevens

I realize that a diverse group worked to put this plan together and appreciate all the effort. I believe that the greatest reductions in ground water nitrate levels can be achieved by implementing programs that encourage adoption of irrigation and nutrient management practices.

Comment 58 - Dan De Boer

The website mentions the GWAC committee is a community-based group. However, it appears many people living outside the GWMA are being asked to participate and may or may not have a vested interest in the affected areas. I would suggest a higher percentage of the committee be comprised of members who reside in the affected GWMA area so as to more accurately represent their community and neighbors' best interests.

Comment 59 - Tanner Winckler

9. Public outreach more other causes of high nitrates

Comment 60 - Tony Viega

What about if all of agriculture work together to solve this problem?

Comment 62 – Lucy Edmondson

The EPA also offers a few additional suggestions for the implementation phase of the program. First, it is important to ensure that QAPPs are developed for any new work that includes data collection. The development of sound QAPPs will ensure that the information gathered can be used to make scientifically-defensible decisions.

Response Related to Ongoing Data

The GWAC developed a list of recommended actions. These actions were prioritized from the list of alternatives by a voting process from GWAC members. These prioritized actions were collected as "Recommended Actions" within the Program.

The Program is the plan for implementation. There are many aspects of the plan, including alternative management strategies as presented in the recommendations section.

The GWAC made a list of approximately 300 potential alternatives, incorporating working group recommendations, ideas raised in working group conversations and reviews of scientific and environmental literature. These can be found in Appendix I of Volume II of the Program.

A consensus list of potential recommendations was identified as a subset of the potential alternatives by the GWAC. This produced a list of 83 potential recommendations to be evaluated by the criteria established by WAC 173-100-100 (4). This smaller list can be found in Appendix J of Volume II of the Program.

The public comments also provided many recommendations related to the implementation of the program. A list of recommendations collected from the public comments is provided in Appendix B.

As specified in WAC 173-100-030, the Program must be periodically reviewed. The public hearing comments provide a list of potential areas of consideration during these future Program

evaluations and during the implementation phase. These include solutions not voted on by the GWAC and are consolidated in Appendix B.

Comments on Implementation

Comment 63 – Jean Mendoza

The only alternative solution that comes close to addressing safe drinking water is # 44 that asks Yakima County to:

Perform an engineering study of water supply alternatives

There is no reference to funding that would support such an endeavor. Yakima County does not have the resources to do this on our own. Incidentally, in 2015 the County returned $150,000 of state money designated for domestic water treatments. This demonstrates a lack of concern on the part of elected official who are presumed to represent the public.

Comment 62 – Jean Mendoza

2. Alternative Solution # 41 requires:

Identify and support opportunities, including education research institutions for private, public and industry investment in technology and management of fertilizers and manures, including separation of solid and liquid wastes. (17 – WSDA)

WSDA construct GWMA administrative program.

The WSDA lacks the expertise required to construct an administrative program. In addition WSDA lacks the knowledge of human health issues that form the core rationale for groundwater management

Comment 64 – Jean Mendoza

Now WSDA appears poised to perform a follow up Nitrogen Loading Assessment for a million dollars (Alternative Solution # 52) and to construct a follow up GWMA administrative program for $10 million. The WSDA has not acted in good faith during the six-year GWMA program and there is no evidence that this will change in the future.

Response Related to Comments on Implementation

The recommended action within the Program do not currently have a funding source tied to each recommendation. These actions are established as voluntary actions that have been developed and voted on as a GWAC.

Each of the GWAC members were invited to share concerns, thoughts, and vote on the recommended actions. The recommended actions within the Program reflect the outcome of the voting process, as described within the Program.

As specified in WAC 173-100-030, the Program must be periodically reviewed. Each of these recommended actions will be reviewed as the Program is implemented.

Additional detail has been added to the Program describing how the transition from Program development to Implementation will be structured.

Comments on Lawsuits

Comment 65 – Tanner Winckler

4. No protection from citizen lawsuits

Comment 66 - Jason Sheehan

8. Department of Ecology needs to provide more protection from third party lawsuits for those dairy farmers that have a NPDES CAFO permit and are in compliance with the permit. Spending money on lawyers to defend yourself as a dairy farmer when you are in compliance with the law is targeting. This needs to end.

Response Related to Comments on Lawsuits

The CAFO general permits provide a consistent set of operating requirements that permittees are required to maintain compliance with for the protection of water quality. If a permittee is in compliance with their permit, they are protecting water quality and they are not subject to third party lawsuits. Under the combined permit, if a permittee is not following the requirements of their permit, they could be subject to a third party lawsuit under the Clean Water Act directed at bringing the permittee back into compliance with their permit. The State Waste Discharge permit (state only) is authorized by the Washington State Legislature under the provisions of Chapter 90.48 RCW, which does not include citizen lawsuit provisions. These are Federal and State mandated provisions.

Comments on Lead Agency

Comment 68 – Yakima County

Yakima County cannot accept the designation of lead agency for the Program as suggested in the recommended actions.

Comment 69 – Jean Mendoza

5. Yakima County may not have the capacity/expertise/willingness to administer a robust follow up GWMA program. Yakima County has failed to keep many promises to the advisory committee and to the public over the past six years.

Response Related to Lead Agency

Yakima County disagrees that it "has failed to keep many promises to the advisory committee and to the public over the past six years."

Yakima County did indicate they appreciated the faith the GWAC put in them to be Lead Agency in implementation yet realize the expertise and resources needed to successfully implement the Program are likely housed in other organizations.

Some ideas have been developed on how to identify the right agency and provide some structure while funding for implementation is secured, however future further conversations will be required to fully address this issue.

Increased Regulations

Comment 70 – Dan De Boer

Lower Valley citizens are being pushed into corners by increased government regulations – regulations enacted by unelected officials. The more regulations that are imposed, like the ones being discussed currently, the more difficult it will be to get citizens to participate in the process. No amount of education will change this – only logic, reason, and cooperation will.

Response Related to Increased Regulations

The Program does not include any recommendations for new regulations. The Program is the plan for implementation. There are many aspects of the plan, including alternative management strategies as presented in the recommendations section.

The GWAC developed a list of recommended actions. These actions were prioritized from the list of alternatives by a voting process from GWAC members. These prioritized actions were collected as "Recommended Actions" within the Program.

The GWAC made a list of approximately 300 potential alternatives, incorporating working group recommendations, ideas raised in working group conversations and reviews of scientific and environmental literature. These can be found in Appendix I of Volume II of the Program.

Using these 300 potential alternatives the GWAC applied a consensus screen in order to reduce the large list of alternatives to those potential recommendations with which on one would disagree. This produces a shorter list of 83 potential recommendations to be evaluated by the criteria established by WAC 173-100-100 (4). This smaller list can be found in Appendix J of Volume II of the Program.

The GWAC is a large and diverse committee, including representatives from all identified groups affected by groundwater quality, including local, state, and federal government agencies; local citizens; farmers, dairy producers, and agronomists; irrigation districts; conservation districts; environmental groups; and other vested parties. This committee and its workgroups met regularly over the past six years. The tremendous amount of work produced and the ability to reach consensus on many issues, demonstrates the high level of commitment and cooperation by the committee members.

The public comments also provided many recommendations related to the implementation of the program. A list of recommendations collected from the public comments is provided in Appendix B.

Comments Related to Minority Report:

Minority Report

Comment 71 – Robert Stevens

Ms. Mendoza points out that higher soil test nitrate levels were seen with double cropping with triticale following corn. Double cropping, ie a winter cover crop, was designed to take up residual nitrate left in the soil after harvest especially in hops and then corn. Over time the addition of nitrogen to the triticale crop with out recognition of residual soil nitrogen following corn has lead to excess nitrogen addition to the two crops.

The noted range in deep soil test nitrate in alfalfa fields may well be related to high levels where liquid manure has been applied to the alfalfa because of the crops ability to remove large amounts of nitrogen.

Comment 72 - Jason Sheehan

3. The minority report that was written before a final GWAC report was even finished or approved is out of context and very targeted. How can someone even write a minority report before the main report is even finished?

Comment 73 - Bill DeRuyter

6. Minority Report – Jean Mendoza released this report prior to the release of the final GWMA report. Seems that Jean already knew that she would not like the results. In her report if Jean only wants to put blame on the dairy industry. AGAIN, how can you fix the problem when you don't know who is creating it

Comment 74 - Yakima County Farm Bureau

In addition, minority reports should not be part of the GWMA report. They are someone's opinion that should be separate from the report.

Comment 75 - Jason Rollinger

The parts of the report that were put in by a person who has a one sided point of view should be removed.

Comment 76 - John Koopmans

Jean Mendoza shouldn't be let in the process. She is too one sided.

Comment 77 - Markus Rollinger

Jean Mendoza's 400 page report needs to be thrown out.

Comment 78 - Dan DeGroot

This Minority Report is simply one person's opinion and should not have any connection to the work that the whole committee did. It is accusatory and is short on fact, long on fiction. It uses snippets of other reports, takes them out of context to arrive at conclusions that were established based on personal belief. This Minority Report has no place in the final document and should be deleted or risk the Main Report losing its credibility on any of its recommendations.

Comment 79 - David Newhouse

My second point is that a private citizen, that is not a resident of the GWMA should not be allowed to submit a minority statement.

Comment 80 - Joel Koopman

5. The minority report is a biased, premeditated report that has no scientific or factual back-up. How can that information be considered when it was written as a complete ploy against dairy farming before a main report had been concluded? We ask that the minority report not be included because of this bias.

Comment 81 - Patricia Newhouse

First, I do not believe that a private citizen who does not live in the GWMA area should be allowed to submit a minority report that will be attached to the GWAC recommendations.

Response Related to Minority Report

The GWAC voted to allow minority reports to be attached to the GWMA program as a way to allow members to express their opinions about specific topics where there may have been disagreements. While the goal of the GWAC was to try to reach consensus, and often did, they recognize that in some cases it was not possible. The minority report allows a GWAC member to express a dissenting or alternative perspective. Minority reports are contained in Volume IV (Member Contributions) of the plan.

The Program document has been updated with a clarifying statement at the beginning of Appendix 4, which includes all minority reports, that these were done individually and do not necessarily reflect the consensus or opinion of the GWAC.

Specific questions related to the content or science of a minority report should be directed to the author of the minority report.

Comments Related to Monitoring Wells:

Monitoring Wells Criteria

Comment 82 – John Koopmans

We recommend you don't use information on these substandard monitoring wells.

Comment 83 – Jason Rollinger

Why isn't there any test wells near urban growth areas when there should be.

Comment 84 – Tanner Winckler

2. Wells were drilled without knowledge of GWMA

Comment 85 - Tanner Winckler

3. Criteria for drilling additional wells wasn't followed

Comment 86 - Markus Rollinger

All 31 wells are ground level and are open to contamination. I would like to see all of them be at least 2 feet of above ground level.

Comment 87 - Veldhuis Family

What about all the test wells I've seen in the valley are ground level or below. How is this right?

Comment 88 – Bill DeRuyter

3. Test wells - make sure that the test wells were installed correctly. I was told that some of these wells were capped off at ground level. Being capped off does not keep contaminated liquid from entering the tube and therefore causing a higher count of nitrates. If these wells were installed at ground level they should be disallowed in the study.

Comment 89 - Veldhuis Family

It seems like they are targeting us dairymen to fail. Where they got all these wells in the valley are all easily next to dairymen. Why not other places.

If water never goes up hill So with these wells next to dairies it's easy to point a finger at them instead it could be coming from a few miles away higher up with a vein in the ground.

Comment 90 - David Newhouse

I am very concerned about the placement of the second group of sampling wells. The placement does not appear to be random. It looks as if they are intentionally targeted at family dairy farms. If you chose to only target one potential source, you have predetermined what the results will be

Comment 91 - Jason Sheehan

6. The GWAC spent almost 2 years discussing 30 possible test well sites of which were approved. 20 of those wells were funded and drilled. Then in less than 30 days, 11 additional wells that were not approved by the GWAC were funded, sited, and drilled without any communication at all to the GWAC. In 6+ years of being on this GWAC, there has always been numerous emails about every issue. It amazes me that there was no communication at all about the additional wells. Nothing. It's actually quite suspicious since 9 out of 11 of these wells are within 1 mile of dairy farms. Once again, this shows the targeting of dairy farms and the lack of a holistic approach to solving high nitrates in the groundwater.

Comment 92 - Joel Koopman

2. Nitrates have been found to be sporadic in their location. The original well testing from domestic wells indicated no clear evidence as to where nitrates will be found and why.

Monitoring wells were supposed to be a step forward in data collection to determine BMPs. The first 20 wells were more random in location and approved by GWMA but the last 11 were not approved; hardly communicated and 9 of them seem to have targeted dairy farms in their extreme close proximity to the farms. There have been numerous problems with the chosen locations of many of these wells. They have been put next to anomalies and large bodies of moving water. The wells in these locations will not prove to be solid evidence as it will throw off an accurate nitrate sample. If these wells are not for determining BMPs, why were they installed? Information collected from these wells also need to be examined as to the cause of the nitrates. Are they from animals, humans or man-made fertilizers?

Comment 93 - Patricia Newhouse

Second, I am concerned about the placement of the second group of monitoring wells. Even if they were randomly selected, the fact that 9 of the 11 additional wells are in close proximity to dairy farms will skew the results and should have been a disqualifying factor for many of these locations.

Response Related to Monitoring Wells Criteria

The GWAC approved the installation of an ambient groundwater monitoring network with the purpose to establish a baseline of groundwater quality conditions at the water table in the GWMA.

There are other groundwater monitoring options which the GWAC considered:

1. Spatial data gaps
2. Hot spot monitoring
3. Nitrate trends
4. Ambient monitoring network to consider basin wide average concentrations
5. Common water supply aquifers
6. Effects of current and future practices
7. Health effects

With limited resources, the GWAC voted to conduct #4 and #5. #5 was completed (USGS, 2018). #4 involved installation of monitoring wells and is the focus of these comments.

Once the GWAC approved the ambient monitoring network, Pacific Groundwater Group (PGG) developed a document "Lower Yakima Valley GWMA Proposed Ambient Groundwater Monitoring Network" dated June, 2016. This document laid out the methodology for how monitor wells would be located. This document and the methodology were approved by the GWAC in November, 2016.

The methodology included developing a statistically sound random monitoring point pool consisting of 1000 randomly distributed points within the GWMA. From this pool of random points, well locations were selected using the following process; 1) the location point furthest from the GWMA boundary (which acts as the centroid), 2) the second point is the point furthest from the combination of the boundary and first well location (centroid of the largest unsampled area), 3) each subsequent well location is then the point closest to the center of the largest unsampled area. This well selection process evenly distributes the well locations throughout the GWMA and ranks them by the size of the unsampled area. This process assures that wells are randomly located with an even spatial coverage across the GWMA.

Once the preliminary well locations were selected, they were moved, if necessary, to make sure they were located in the closest public right of way (to assure long term access). Final drilling sites also considered the following:

- Existing sampling stations should be considered instead of drilling new wells
- Avoid drill sites within one quarter mile from irrigation canals.
- Avoid drilling within one quarter mile from facilities that may result in anomalous groundwater concentrations.

The approved ambient groundwater monitoring network plan states that final drilling sites may be adjusted after a field visit has been completed.

Additional reasons for adjusting monitoring well locations include the inability to have a drilling rig operate safely onsite.

The goal of the ambient groundwater monitoring network is to monitor the state of the aquifer as a whole over time. It is NOT designed or intended to evaluate BMPs, it is not designed or intended to identify sources of nitrate. This network CANNOT provide information that would link a land use or land owner to specific groundwater conditions.

The initial monitoring well locations were marked as a courtesy to the committee to allow them to see the distribution of the wells. It was never intended that the committee would vote or approve each location.

When these locations were moved, the methodology, which is documented (PGG, 2016), was approved by the GWAC and implemented by the contractors.

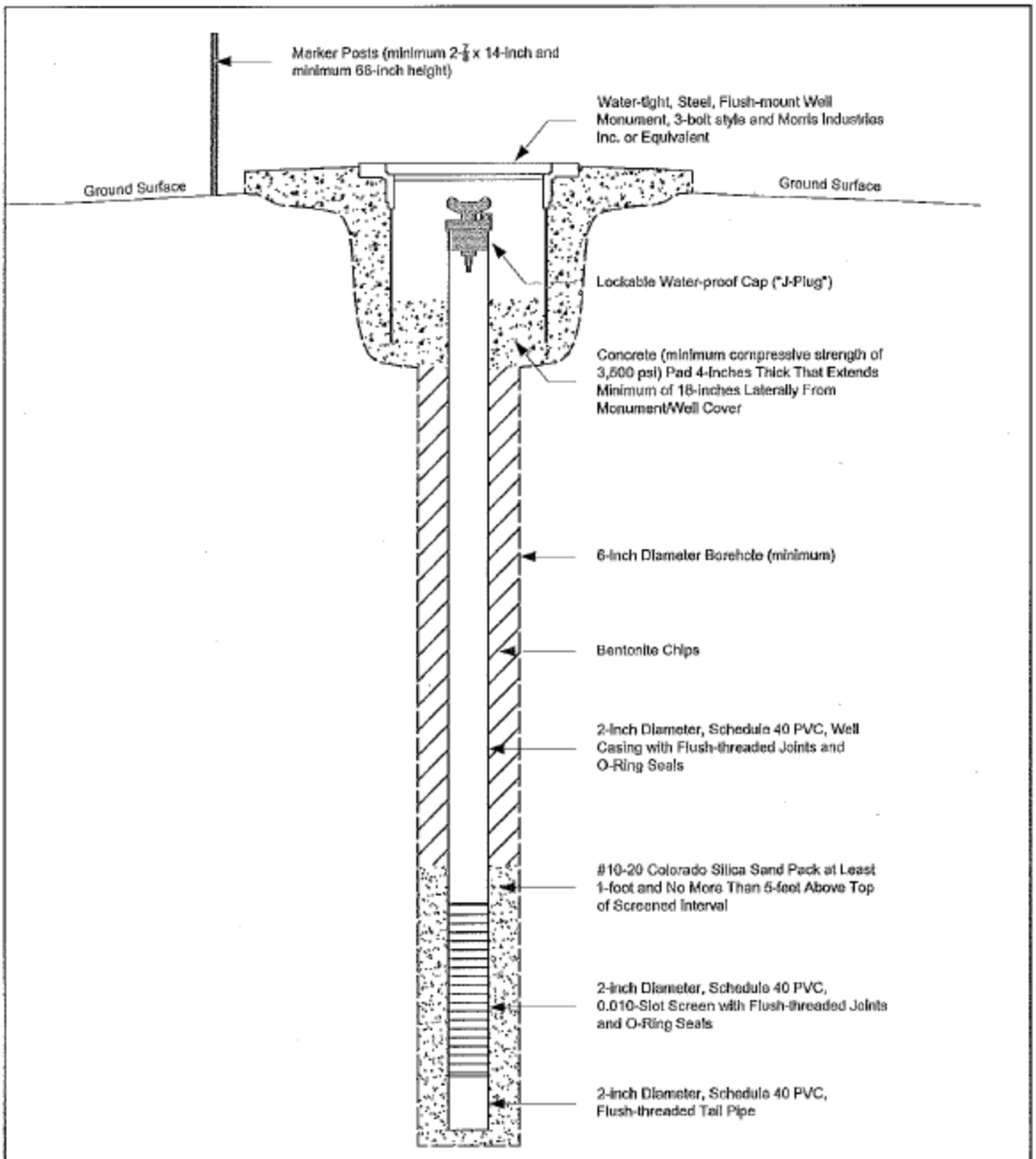
Well Construction -- Rationale for using flush mount monitoring wells

Below ground monitoring wells, or flush mount wells, are common. They are installed in parking lots, gas stations, agricultural fields, and common areas such as parks. The benefit of a below ground monitoring well is that they prevent damage by vehicles backing up or driving over them, including mowers, tractors and other heavy duty vehicles. This below ground construction prevents surface contamination in the event that a vehicle accidently damages or removes the top of the well.

A monitoring well which is constructed below the ground surface has a number of safe guards that prevent contamination and flooding (see figure below). First, a concrete pad that extends laterally around the well with sloped sides prevents ponding at the well site and prevents surface water from migrating directly along the borehole into groundwater. The well access cover at the surface of the well monument is waterproof and is secured with a lock. The monument serves to protect the well which is located inside this protective enclosure. Additionally there is a compression cap on the well casing which seals the well. A diagram of a below ground well is included below, which highlights the construction specifications and water protection elements.

All wells were constructed consistent with Chapter 173-160 WAC Minimum Standards for Construction and Maintenance of Wells. This regulation specifically addresses below ground monitoring wells, WAC 173-160-420 (13)

> *(13) If the well is completed below land surface, a watertight cap with a lock shall be attached to the top of the well casing. A metal monument or equivalent shall be installed over and around the well. The monument shall serve as a protective cover and be installed level with the land surface and be equipped with a waterproof seal to prevent the inflow of any water or contaminants. Drains will be provided, when feasible, to keep water out of the well and below the well cap. The cover must be designed to withstand the maximum expected loading.*



Not To Scale

Any substantive differences between this schematic and WAC 173-160 shall be resolved in favor of the WAC

FIGURE 1
Monitoring Well Schematic

Groundwater Monitoring Well Installation
Yakima County GWMA

JE1600_MonWellSchematic.dwg March 2016

PgG

Reviewing contract and agreements related to the monitoring wells, no violation of drilling criteria was found.

The Program is not meant to be biased or have an unfair focus on dairies. Specific facilities or land uses were not targeted when locating well sites.

Additional Monitoring Well Data

Comment 94 – James Davenport

7. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does recommend the collection of data from the Ambient Groundwater Monitoring Well system. The Groundwater Monitoring Well system should:

a. Maintain a longitudinal record of measurements taken from groundwater monitoring wells so as to document trends in improvement or worsening of the present condition.

b. Map the "horizon" of analysis of monitoring well measurements from the groundwater monitoring well system (an undulating plane established by points (elevations) at each monitoring well, with the intervening spaces being calculated with reference to influence from proximate point data) should be mapped. This might indicate how the measured horizon intersects with the geologic regimes already known (theoretically) to exist within the study area.

c. Introduce some sort of non-pollutive tracer in selected monitoring wells in order to ascertain whether that tracer expresses itself in other monitoring wells. This may be possible due to the density and location of monitoring wells within the study area. This may provide information helpful in establishing direction of groundwater flow (albeit at a rather surficial elevation).

Comment 95 – Markus Rollinger

I would like to see all 31 of the test wells be tested for whether the nitrates are coming from human waste or from animals and commercial fertilizer.

Comment 96 – Markus Rollinger

I also think there should be a few wells around the town of Outlook to determine whether the nitrates are coming from people or agriculture.

Comment 97 – Norman Peck

In addition to randomly placed monitoring wells, consideration should be given to more intensive targeted monitoring at and around "hot spots" as changes in N concentrations (improvements and further degradation) will be particularly important in those areas.

Comment 98 – Markus Rollinger

If there is no wells in the urban growth areas around towns there needs to be.

Comment 99 – Tanner Winckler

5. Why can't info from wells deemed anomalies be thrown out

Response Related to Additional Monitoring Well Data

See response to Monitoring Wells Criteria.

As specified in WAC 173-100-030, the Program must be periodically reviewed. The public hearing comments provide a list of potential areas of consideration during these future Program evaluations and during the implementation phase. These include solutions not voted on by the GWAC. These are possible alternative data, information, or analysis to gather within the Program should it be determined that the Program need improvement or determined by the GWAC during implementation to consider. They have been collected into Appendix B.

Comments Related to Program Format or Focus:

Comment 100 – Frank P. Winslow

In my opinion, the root problem is not that there are nitrates in shallow groundwater. The root problem is that people think that shallow groundwater is a viable source of water for drinking water purposes. I would submit that it is generally inappropriate for any water wells to be constructed for drinking water purposes less than one hundred feet deep. Water quality concerns with shallow groundwater include nitrates in agricultural area, nitrates and other constituents in areas where septic systems are used, and various contamination sources from point and non-point sources in urban areas. Very few places do not have a water quality concern with respect to shallow groundwater.

Comment 101 - Frank P. Winslow

Once protection of public health has been ensured (i.e. no ingestion of nitrates in shallow groundwater is taking place), then, and only then, other recommendations can be given priority. These other recommendations should be prioritized. For example "Explore technology to utilize nutrients as energy" is a recommendation that would not have a high priority in terms of protecting public health and the environment.

Comment 102 - Markus Rollinger

I feel that the BMPs need to be voluntary, because as a dairy farm is already has earthen lagoons designed by NRCS and if you want to see them get lined there needs to be some kind of cost share for that.

Comment 103 - Jason Sheehan

The GWMA needs to focus on a voluntary and educational approach for all involved parties to help lower the nitrates in the groundwater. This needs to be a community effort that looks forward and makes changes now that can affect what happens years in the future.

Comment 104 - Karen Sheehan

The whole GWMA area needs to work together and look hard at all areas if they expect to lower the nitrates in our groundwater. Voluntary and education is the best way to fix this problem.

Comment 105 - Frank P. Winslow

The most critical concern with respect to any contamination concern is to eliminate exposure pathways. Eliminating contamination within the environment is a lofty and admirable goal, but removing exposure mechanisms to both human and ecological receptors is of critical importance. In the case of nitrates in shallow groundwater, the exposure pathway is broken by ensuring that contaminated water is not ingested. Other groundwater pathways may be of concern for other types of contaminants (e.g. shower pathway for volatile constituents); however for nitrates, ingestion is the only critical pathway of concern.

Therefore, the greatest need with respect to nitrates in shallow groundwater is ensuring that no people are drinking this water. This can be accomplished with various mechanisms. In order to clearly differentiate between recommendations pertaining to preventing consumption of contaminated groundwater and other less immediate concerns, I recommend splitting recommendations between those pertaining to eliminating potential exposures and other miscellaneous recommendations. This comment applies to the Recommend Actions section and the Executive Summary. Separating immediate concerns from less immediate concerns is important to ensure that protection of public health is of foremost priority.

Comment 106 - Jean Mendoza

In spite of lip service regarding the need for safe drinking water the LYV GWMA provided zero relief to the people whose health is threatened.

Response Related to Format or Focus of Program

Washington State has groundwater quality standards (Chapter 173-200 WAC) which protect all groundwater as a potential source of drinking water. Many private domestic wells are completed in the uppermost aquifer. There are no laws or regulations which would willfully allow a community to contaminate their shallow aquifer. Additionally, it would be expensive, unfair, and illegal to require homeowners to abandon their private wells and obtain their drinking water from deeper sources.

There are no requirements or recommendations to line lagoons.

The BMPs suggested came from GWAC participation and recommendations. No new regulation was proposed to require any certain BMPs mandatory.

Voluntary and educational approaches are both considered in the Program and Recommended Actions. Recommendations made are included in Appendix B.

Comments Related to Science:

Potential Further Information

Comment 107 – Frank P. Winslow

I strongly disagree with a focus on reducing nitrate concentrations in groundwater. As previously stated, nitrates and other contamination in shallow groundwater systems is a ubiquitous global concern. Implementation of best management practices (BMPs) can reduce the amount of loading to aquifers of various contaminants (including nitrates), but the risk to shallow groundwater system will always exist.

Comment 108 - Norman Peck

Because of potential negative effects on fish and fish habitat, ammonia (NH3) should be investigated in irrigation return flows to surface waters. Arid area waters tend to be more alkaline than those in wetter areas, and NH3 toxicity to aquatic organisms increases as pH increases. (EPA Quality Criteria for Water, 1986 as updated). If initial investigations do not indicate a problem, no further monitoring should be required.

Comment 109 - Norman Peck

Consideration should be given to supplemental funding to include nitrogen analysis of groundwater samples from Superfund/MTCA site monitoring wells within the study area. This would potentially increase the number of available data points within the study area at a very modest increase in cost.

Comment 110 – James Davenport

5. Information not provided to the GWAC but obtainable from the Washington State

Department of Agriculture should be analyzed:

a. Growth in agricultural use intensity (density/acre, acreage fanned, production volume)

b. Amount of chemical fertilizer sold or used within GWMA

c. Report of dairy nutrient management plan information on distribution of manure (see RCW 90.64.026(3), RCW 42.56.270(7), WAC 16-06-210(29))

d. Nitrogen Loading Assessment (as distinguished from Nitrogen Availability Assessment, see: June 19, 2014, August 21, 2014, October 16, 2014, and December 18, 2014 GWAC meeting summaries; Yakima County/Department of Agriculture Interagency Agreement

Comment 111 - James Davenport

6. Information not provided to the GWAC but obtainable from the Department of Ecology should be analyzed:

a. Report on enforcement of RCW groundwater standards

b. Report on effect of large scale water usage on groundwater quality

Comment 112 - James Davenport

9. Neither the final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program, nor the recommendations contained therein, identify or analyze information about the amount of chemical fertilizers sold or distributed to managers of orchards and crops, or applied to orchards and crops within the study area. This information should be collected and analyzed.

Comment 113 to 130 - James Davenport

11. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not reflect the often-expressed view/opinion within the Advisory Committee that the effect of groundwater contamination in the Lower Yakima Valley influences the lives and health of human demographic groups disproportionately. Nor does it study or describe the socioeconomic effect of groundwater contamination within the study area upon on future generations. Both effects should be studied.

12. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not correlate the economic benefit derived from the private small industrial, agricultural, urban/suburban residential sector sources' activity within the study area with the economic costs likely to be incurred by the public remedial, corrective, educational, or regulatory activities responding to the problem, nor does it quantify the economic value of the natural resource (groundwater) consumed

through contamination (an unmeasured and undocumented expense incurred as part of the private small industrial, agricultural, and urban/suburban residential sectors' entrepreneurial enterprise). This relationship should be studied in order to determine correlate costs of remediation, if any, with the economic benefits of groundwater consumption.

13. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not evaluate the causal relationship, if any, between the method and volumes of water applied to the ground surface (either generally or at specifically identifiable locations, or the volume of groundwater stored within the ground, within the studied area, and the extent, location or degree of groundwater contamination within the studied area or at specific contaminated wells. This correlation, if any, should be studied.

14. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not evaluate the correlation, if any, of the location, volume or movement of surface water within lined or unlined artificial conveyance systems (irrigation canals) with the extent, location or degree of groundwater contamination within the studied area. This correlation, if any, should be studied.

15. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not correlate changes in concentration, density, intensity, or use of source-related activities within the studied area with changes, if any, in the extent, location or degree of groundwater contamination within the studied area. This correlation should be studied.

16. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not analyze specific deep soil sampling data collected from known locations. More deepsoil sampling data should be collected, with data collection sites located, and that data analyzed.

17. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not analyze trends in well data from Valley Institute for Research and Education Report (2002), Nitrate Pilot Project Well Samples, LVYGWMA High Risk Well Assessment Well Samples, and USGS 2017 Well Testing Data. Trends in this data should be analyzed.

18. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not identify plausible hypotheses of causation, transmission, or accumulation of contaminant between categorical sources and contamination events or locations. These hypotheses should be stated and explored.

19. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not describe the processes of hydrogeologic or chemical transmission or accumulation of contaminant in the area of contamination. These processes should be more completely explored and described.

20. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not investigate or analyze the geologic and hydrogeologic properties of denser locations of contaminated wells ("hotspots). These should be investigated and analyzed.

21. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not investigate or analyze the plausible causal relationship between specifically identifiable sources and specific contamination events. These should be investigated and analyzed.

22. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not explore the correlation, if any, between specific land use types and proximate water supply contamination events. This potential correlation should be explored.

23. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not address the specific land use regulations, or other regulation types, that might used rectify, ameliorate or otherwise alter the general or specific contamination condition within the study area. These should be explored and analyzed.

24. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not address the effect of generic or specific sources on the protection of areas with "critical recharging effect on aquifers used for potable water or areas where a drinking aquifer is vulnerable to contamination that would affect the potability of the water" as designated by Yakima County pursuant to the Growth Management Act or otherwise (RCW 36.70A; WAC 365-190-030 (3); and YCC 16A, 16C), as "environmentally sensitive or special areas" as contemplated by WAC 197-1l-330(2)(e)(i), WAC 197-11-305 (l)(a), WAC 197-1l-908(l)(b) and the Growth Management Act. These effects should be described and analyzed.

25. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not explore the strategy of taxation on the use or sale of materials containing chemical constituents common to known constituents of groundwater contamination as a means of source reduction. This strategy should be considered.

26. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not explore the strategy of usage limitations, imposed through land use regulation, on the nature, density, or intensity of use (analogous to limitations on industrial development). This strategy should be considered.

27. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not recommend any remedial action. Remedial actions should be studied.

28. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not evaluate the costs or implications of inaction. These should be evaluated.

Comment 131 - Don Young

A study was done 40 to 50 years ago showing Nitrates in the water, I requested that information, it was never searched for!

Comment 132 – Robert Stevens

In reviewing the draft plan I am especially concerned about the presentation of the deep soil sampling data. If this data is to become a permit part of the record, I believe some additional editing needs to be done on both reports. This is especially true in Ms. Mendoza's summary. The units on the tables and grafts are very confusing. Soil test nitrate is reported as nitrogen as nitrate (nitrate-N). Ms. Mendoza uses a number of units such as NO3-N, N lbs/acre, lbs NO3 per acre. The units in the tables and figures should be consistent and an explanation of how they were reached should be presented.

Comment 133 – Robert Stevens

I strongly agree with the plan's stress on nutrient and irrigation management as the two critical BMPs that need to be addressed. On page 189 under Appendix G I would recommend that residual soil nitrogen be included in the list of accounting for all sources on nitrogen. The relative return on investment for most of the other BMPs listed is very small compared to water and nutrient management.

Comment 134 – Lucy Edmondson

The EPA continues to believe that the final GWMA plan would be improved by including a more thorough accounting of the sources and amounts of nitrogen in the GWMA by using scientific data from additional sources. The current draft contains information from the important collaborative work carried out by local, state and federal agencies in 2010, "Lower Yakima Valley Groundwater Quality." Data from other scientific studies are also available. Taking advantage of as much quality-assured/quality controlled available data and information as possible would strengthen the foundation of the report, its policy recommendations and most importantly, its ability to protect and improve the safety of drinking water. A few examples to draw upon include:

• United States Geological Survey (USGS): "Particle tracking for selected groundwater wells in the lower Yakima River Basin, Washington," 2015. The USGS assessed nitrate sources in specific geographic areas within the GWMA with groundwater contamination and identified associated likely nitrogen source areas, https://pubs.er.usizs.izov/publication/sir20155149

• The EPA: "Relation Between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley, Washington," 2013 contains soil information such as permeability data from lagoons, and nitrogen concentrations in manured dairy crop fields, https://www.epa.izov/wa/lower-yakima-vallevgroundwater

• Since a Consent Order was signed with three Lower Yakima Valley dairies in 2013, these dairies have made great strides in reducing the amount of nitrogen accumulating in their fields. In reports submitted under the EPA Consent Order and approved Quality Assurance Project Plan (QAPP), there are several years of biannual data from fields prior to the AOC-required limitations of field applications of manure and the subsequent transition to the present conditions. These dairies are also providing post-harvest data that can inform soil concentration estimates in the draft GWMA Plan.

https://www.epa.gov/wa/lower-vakima-valley-groundwater

These reports contain information on soil permeability, lagoons, and post-harvest deep soil sampling that can contribute to the data in the GWMA program and strengthen its findings.

Comment 135 – Dan De Boer

Prior to imposing regulations on one group, I believe more research needs to be done to discover the proportional impact of all sources so as not to overly burden one group over another without knowing their respect impacts to groundwater nitrates.

Comment 136 - Dan De Boer

Farmers and dairymen have already been subject to increasing waste management regulation over the last couple of decades. Is there any scientific evidence that these regulations are having an impact? If not, then perhaps there are other theories that need consideration.

Response Related to Potential Further Information

This goal of reducing nitrate concentrations in groundwater was established by the GWAC early on when the group was first formed in 2012. Other goals could have been chosen, but this is what the group voted on as their guiding principle. The program supports this goal and is a roadmap for how to achieve this goal.

There are many recommendations. These are included in Appendix B for consideration during program implementation.

One commenter mentioned a historic study. The title, author and date of this study would be useful in tracking down this important information.

Another comment noted units in tables and figures of one DSS analysis were missing. The GWAC did not take an action or use either analysis to draft the Program. The analysis is considered informational only, any clarification or questions can be directed to the author.

Potential Program Error or Misleading

Comment 137 to 145 – Yakima County Farm Bureau

7. Pg 17 - MDL of .03mg/L is misleading and not explained as some areas can have background levels much higher that .03mg/L.

9. Pg 20-The N sources graph is very misleading. Different potential agricultural sources are treated equal, when they should not be. Sources on dairies are subject to regulatory constraints and engineering requirements that serve to contain materials. Having a position that these materials have the same potential to migrate, is not accurate. In addition, there is information available from California that pens and lagoons have less than one percent contribution (0.7 percent), significantly lower than the 31percent noted in the report.

14. Pg 30- Why is there an emphasis on highly regulated bio applications? There was no evidence presented that bio solids play any role.

15. Pg 31- Legacy N section does an incomplete job of describing past uses on N on crops such as potatoes and sugar beets, and the amount of N left in the soil profile 20 to 50 years ago. The current description makes it sound like the problem is with current applications on a current annual basis. For the most part, this is not accurate.

17. Pg 40/41- Groundwater recharge appears faulty or not clearly defined- Little of the irrigated land in the GWMA area recharges groundwater 12 to 48 inches of water. This is not accurate for the farmed lands.

19. Pg 64- The Yakima River is not the "source" of irrigation water for the Yakima Valley. The Yakima River is the conduit for irrigation water. The source of the water is the five storage reservoirs filled by either snow or rainfall precipitation, or natural flow before storage control is implemented.

21. Pg 83 - ID of N sources is not complete. No mention of wholesale commercial N supplies. Only refers to what is "produced" in the GWMA area, not what is imported. Very confusing and negatively biased toward the natural nutrients produced by animal agriculture operations.

22. Pg 85-Graph is biased against certain locations depicted in red (likely dairy lagoons). It does not explain the engineering that these lagoons have and their minimal potential to negatively affect groundwater.

30. Pg 100- Rec 39 Incorporation of fertilizer cannot be done on established crops. Irrigating in can take longer than 24 hrs.

Comment 146 – Jean Mendoza

In 2014-2015 the WSDA insisted upon performing a Nitrogen Loading Assessment for the GWMA at a cost of $58,000. The project was delivered 18 months behind schedule thus delaying completion of the GWMA program. The NLA/NAA (Nitrogen Availability Assessment) is extremely flawed, did not comply with the scope of work for the project and has never been approved by the GWMA advisory committee.

Comment 147 to 148 - Jean Mendoza

3. The GWMA Report and Plan is scientifically indefensible and violates principles of ethical research by omitting the overwhelming data from the LYV "dairy cluster".

4. The GWMA report underestimates the amount of atmospheric nitrogen deposition by a factor of at least five.

Response Related to Potential Program Error or Misleading

We are happy to provide clarity of the role of an MDL or method detection limit, however, a reference to an MDL on pg 17 or in volume 1 was not found. An MDL is a laboratory limit that clarifies how low a lab can reliably achieve a number based on a parameter and method. An MDL has nothing to do with environmental limits or goals.

Reference to bio application is evidence of all sources being considered, an emphasis was not intended.

The Nitrogen Availability Assessment (NAA) (WSDA, 2018) was a study that was contracted by the GWAC to develop a refined estimate of nitrogen sources in the Lower Yakima Valley using local data and literature. It is not intended to be precise, it is still an estimate of nitrogen sources and their loading to the land surface, not potential to migrate. Data included in this study is described in the document as well as limitations of the assessment. Data not included in the NAA is recommended to be considered during implementation. This document was peer reviewed by scientists from WSU and other state agencies.

The GWAC relied on technical experts, such as the USGS, to provide the most technically accurate and reliable information. Further, the GWAC created a data committee to assure that only credible data was considered by the GWAC to make decisions. This process was rigorously followed.

The graph on page 85 does not identify sources, it is a compilation of total nitrogen availability at the surface and not the potential to migrate.

Nitrate Proof

Comment 149 – Don Young

What is ironic to me is that there has never been a case in Yakima County of anyone reporting that diagnosis! And no one wants to talk about Bickelton having the highest nitrates in the Valley! No dairy's & no cows. Explain that! So we have spent over 2 million & we don't know anything, sounds like a Government program!

Comment 150 - Dan De Boer

Having lived in the Lower Valley my whole life I have never heard of a local person suffering the health effects of nitrates in the ground water. I see the committee sent surveys to local health officials asking if they had seen illnesses of the sort but I didn't see any survey results. When will the survey results be posted and will they indicate we have an actual health issue? If we are not going to wait for this data to be collected, why then send out the surveys in the first place?

Comment 151 - Dan De Boer

Only 12% of tested wells have indicated an elevated nitrate level and the study admits the sample size was inadequate to draw meaningful conclusions. Is there any historical evidence of what the groundwater nitrate levels have been over the last 50-100 years? It might be a good idea for the committee to overlay historical nitrate levels against farming practices over the same time and the population growth of the area of both livestock and people. If this long term (more than a decade) historic data is not available, perhaps a trend or timeline should be established prior to making broad decisions. On a side note, I find it ironic that the City of Sunnyside recently drilled groundwater wells to service its residents in the middle of an old 40,000 cow feed lot.

Has there been any elevated nitrate levels in these wells? Have any public wells been analyzed?

Comment 152 - Veldhuis Family

City of Bickleton drilled well. They found it had high nitration. Where does this come from?

Comment 153 - Bill DeRuyter

1. Why are the nitrates not specified - if we do not know what specific nitrates we are dealing with how can we fix the problem.

Comment 154 - Bill DeRuyter

4. If high nitrates are hazardous to the elderly or infants, then what documentation is there that claim this area is the cause for their sickness. I have not heard of any cases of "Blue Baby Syndrome" related to the Lower Yakima Valley.

Comment 155 - Jason Sheehan

5. Through the 6+ years of the GWAC work, I have not heard of any cases of blue baby syndrome or other documented nitrate related illnesses in the Yakima Valley. In fact, many studies are showing that high nitrates foods might be healthy for you.

Comment 156 - Joel Koopman

1. Initially, GWMA was started as a means of a protection against health issues from high nitrates. However, there have been no reported cases linked to high nitrates which begs the question, why are we "protecting" people from an issue that does not exist?

Response Related to Nitrate Proof

The GWMA was not formed in response to medical cases, but rather was formed due to a known issue of high nitrate in groundwater. The GWMA was formed in 2012 to address the goal of reducing nitrate concentrations in groundwater.

Groundwater in the Lower Yakima Valley contains elevated nitrate concentrations. Several historic groundwater studies have documented nitrate concentrations in excess of the drinking water standard of 10 mg N/L. A compilation of data collected between 1988 and 2008 indicated that 12 percent of wells tested in the area had nitrate concentrations above the standard (PGG 2011). This information prompted the formation of the Lower Yakima Valley Groundwater Management Area (GWMA). Since then, a more recent groundwater study in the Lower Yakima Valley sampled over 150 private domestic wells in 2017 and found that 26 percent of the wells had at least one of its six samples exceeding the drinking water standard. Twenty percent of the wells sampled consistently exceeded the drinking water standard for all samples collected. Nitrate was not detected in 13 percent of the wells sampled (USGS 2017).

Nitrate is the most prevalent contaminant in groundwater (Spalding and Exner 1993), and there are health effects associated with elevated nitrate concentrations in drinking water (WDOH 2016).

Nitrate impacts to groundwater are common in agricultural areas (Harter 2009). There are many sources that contribute to nitrates in groundwater, including animal and human wastes, fertilizers, plants, and atmospheric deposition. In the Lower Yakima Valley, agriculture is the primary economic and land use activity, and most cropland is irrigated (PGG 2011).

Articles entitled "Hidden Wells, Dirty Water" written by Leah Beth Ward ran in the *Yakima Herald Republic* in 2008, detailing nitrate issues affecting public and private wells. The articles suggested that a lack of coordination between local, state, and federal agencies aggravated the problem. These newspaper articles prompted a series of public meetings hosted by the Environmental Protection Agency (EPA) along with state and local agencies.

In January 2010, EPA issued a finding in support of Section 1431 of the Safe Drinking Water Act to address groundwater contamination. EPA found that groundwater in the Lower Yakima Valley is contaminated. This water is an underground source of drinking water, and contamination may present an imminent and substantial endangerment to human health. (Ecology 2010).

The goal of GWAC is to bring nitrate concentrations in groundwater to below the state drinking water standard. The groundwater quality standards in Washington State (Chapter 173-200 WAC) protect all groundwater as a drinking water source. Groundwater in the Lower Yakima Valley is a significant source of drinking water for its residents.

We are not aware of groundwater contamination in the City of Bickleton, WA. A recent water quality status report from the municipal water supply indicated that all tested contaminants (including nitrate) are well below the drinking water standards.

Nitrate in water can come from many sources including residential onsite sewage systems and fertilizer use, commercial and industrial businesses, municipal wastewater treatment systems, irrigated agriculture, livestock operations, atmospheric deposition, as well as other sources. One of the objectives of the GWMA was to assess the relative contribution from all sources in the Lower Yakima Valley. All of these sources contribute nitrogen to the environment.

A summary of survey results is included in Vol 1 and the specifics are included in Vol 3.

Suggestions from the public comments related to historic trends of nitrate have been collected into Appendix B.

Comments Related to Septic Systems/Onsite Sewage/Drain Fields:

Comment 157 – Dan DeGroot

I also would recommend that as homes are sold in areas that have a high density of OSS that the county should require the update of a conventional OSS to one that does reduce the nitrogen concentrations in the effluent. If all potential sources of nitrogen are not considered then any efforts to reduce nitrogen in the aquifer(s) will fall short.

Comment 158 – Yakima County Farm Bureau

Maps in the report depict that many of the high N concentrations are where there are higher rural population, but there is little focus on this, nor is there a focus that septic drain fields are designed to leach. Information and focus from other sources about nitrates leaching from drain fields into the groundwater is lacking.

Comment 159 - Yakima County Farm Bureau

5. Pg 10-There is no mention of DOH responsibility to act on WAC 246-272A-015{5) which states "shall develop a written plan that will provide guidance to the local jurisdiction regarding development and management activities for all OSS within the jurisdiction". This has NOT been done.

Comment 160 – Richard V

We bought numerous parcels of ground that had high levels of nitrogen. We get monitored heavily. We double crop. I can't explain well enough how much ground we have cleaned up.

What about all the sub divisions in the valley? What happened to big open farm ground. All these house taking up valuable farms. They all have septics. I hear way too many per section than there should be.

Comment 161 - Tanner Winckler

6. Address septic systems

Comment 162 - Bill DeRuyter

2. It has come to my attention that there are more septic systems per allowed area - there are less acreage used in farming every year. Many pieces of land are split up and sold in smaller lots. People are buying and installing a septic tank. Tanks leach sewage below any root layer and put unusable nitrates in the soil. (So again, let's specify the nitrates).

Comment 163 - Jason Sheehan

7. On site septic systems have not had enough focus or education in this report. The concentration of OSS is increasing with no rules or regulations by Yakima County. OSS is designed to leach all nitrogen to the groundwater. A real threat as the number and concentration of OSS continues to increase in Yakima County.

Comment 164 - Joel Koopman

3. On site septic systems have not been given enough research or monitoring. On site septic systems are designed to leach all of their nitrogen into groundwater while dairy farm's lagoons have been built to government specifications and are NOT designed to leach anything. Dairy lagoons are inspected yearly as well as the land that is farmed by the dairies to ensure no leaching of nitrogen has occurred.

Comment 165 - Karen Sheehan

Septic systems should be looked into more closely with both proper maintenance and also density of septic systems.

Comment 166 - Tony Viega

What about the septic systems in the valley that are not regulated?

Comment 167 - Dan DeGroot

4. Onsite Sewage Systems (OSS) should be controlled by the county and a plan that is required by WAC 246-272A-015(5) should be developed by the Health Department for OSS. I would recommend that any parcel that requests an OSS permit that is less than 20 acres (just under High Density standards) should have an OSS that is designed to reduce the nitrogen flow in its effluent. OSS are designed to return water to the aquifer, in fact a request for an OSS requires that a percolation test be passed proving that the soil for the drain field will indeed return the water to the aquifer, and a conventional OSS does little to treat nitrogen (less than 15% at best). Drain fields on conventional systems are placed below the root zone so there is no uptake of nitrogen from them. The EPA considers more than 40 OSS per square mile (one per 16 acres) to be high density of OSS and a high risk to the aquifer. For many years the EPA considered OSS to be the primary contributor of contaminates to the aquifers of the United States. There are many areas of the United States where there is little to no farming of any sort that have high nitrate concentrations in the aquifers. This should be of great concern to the stakeholders of the Lower Valley GWMA.

Response Related to Septic Systems/Onsite Sewage/Drain Fields

On-site sewage systems were discussed during the Program development, including recommended actions. The Nitrogen Availability Assessment considered OSS across the GWMA, and the relative contribution is included in the graphs and tables from this report on page 20 of the program. On-site sewage systems are discussed starting on page 27 and they are graphically depicted on figure 30. Additionally, the Program does include recommended actions related to septic systems, such as recommendations 12, 43, and 47.

As specified in the WAC, the Program must be periodically reviewed.

Recommendations made by commenters are included in Appendix B for consideration in implementation of the program.

Comments Related to Program Writing:

Ideas to Improve Program Report

Comment 168 to 178 – Yakima County Farm Bureau

31. Pg 102- Rec 49 Oppose, regulatory. DNM plans extended to all lands

10. Pg 22- fifth paragraph left out when describing benefits of using organic fertilizer also include "adding soil structure which enhances moisture holding capacity and soil biological communities."

13. Pg 26- There are discussions about lagoons. But, there is no mention of why lagoons came into existence which was a mandate from DOE to help with nutrient distribution throughout the year, mitigating winter applications.

16. Pg 37- Third paragraph states that natural groundwater flow may be influenced by irrigation practices, structures and dairy structures. However, it does not explain that lagoons are engineered to contain what they hold, therefore they do not have the same "potential" as the others. The lack of this information being provided presents a bias toward a particular structure that has been shown to be a benefit. The term "potentiometric surface" should be explained as the more common term, "static level"

20. Pg 69-Income comparisons very biased, compared to overall state incomes. Education section is biased and misleading. No mention of past or recent immigrants coming here to better themselves. Ethnicity section paints a false picture and is divisive. Aren't we all Americans?

24. Pg 95- Rec 11 and 13 are very similar

25. Pg 97- Rec 23 needs to be voluntary

26. Pg 98 - Rec 27 needs terminology change. "Waste" should be changed to "nutrients."

27. Pg 98- Rec 28 needs to be voluntary

28. Pg 99 - Rec 35 "waste" should be changed to "nutrients"

29. Pg 100- Rec 37 should be voluntary

Comment 179 – Lucy Edmondson

The Washington State Department of Agriculture's report titled "Estimated Nitrogen Available for Transport in the Lower Yakima Valley Groundwater Management Area — A Study by the Washington State Department of Agriculture and Yakima County," (June 2018) is an integral part of the GWMA program as it estimates nitrogen availability in the geographic area. It is currently presented as a separate document in Volume III, "member contributions." We recommend that its data and information be incorporated directly into the body of the final GWMA plan to ensure transparency.

Comment 180 - Lucy Edmondson

Uncertainty is inherent in almost every scientific endeavor, especially one of this magnitude and complexity. Considering this, several GWAC members requested that the program include a section that discusses the intrinsic uncertainties in the relevant variables. The EPA appreciates the work to develop this, which is provided in the current draft as a supporting document. Given its importance to understanding the plan, we recommend that it be added to Volume 1, and describe opportunities for additional research to reduce uncertainty.

Response Related to Ideas to Improve Program Report

Recommendations made by commenters are included in Appendix B for consideration in implementation of the program.

The following existing text in the Program is designed to address the agricultural nature and lower cost of living within the GWMA boundary:

"*In the GWMA, economics and livelihood play a critical role in the decision to live in a rural area instead of an urban one. Affordable housing is a draw to rural areas, and so is the proximity to agricultural employment.*"

Edits will be made to the program to clarify:

- Benefits of using organic fertilizer also include adding soil structure which enhances moisture holding capacity and soil biological communities
- The term static level will be added in the discussion of potentiometric surface

Recommendations were voted on by the GWAC via consensus

Potential Program Report Errors

Comment 181 – Jean Mendoza

6. The GWMA report does not comply with the legal mandates for groundwater management programs in RCW 90.44 and WAC 173-100. Legal requirements for a GWMA that are missing from the LYV GWMA plan include:

A. RCW 90.44.410 (1) The groundwater area or sub-area management programs shall include:

(b) A management program based on long-term monitoring and resource management objectives for the area or sub-area;
(d) Projection of water supply needs for existing and future identified user groups and beneficial uses;
(h) Identification of water quality objectives for the aquifer system which recognize existing and future uses of the aquifer and that are in accordance with department of ecology and department of social and health services drinking and surface water quality standards;
(j) Annual withdrawal rates and safe yield guidelines which are directed by the long-term management programs that recognize annual variations in aquifer recharge;
(k) A description of conditions and potential conflicts and identification of a program to resolve conflicts with existing water rights;
(m) A process for the periodic review of the groundwater management program and monitoring of the implementation of the program.

B. WAC 173-100-100 The program for each groundwater management area will be tailored to the specific conditions of the area. The following guidelines on program content are intended to serve as a general framework for the program, to be adapted to the particular needs of each area. Each program shall include, as appropriate, the following:

(1) An area characterization section comprised of:
(g) Estimates of the historical and current rates of groundwater use and purposes of such use within the area;
(h) Projections of groundwater supply needs and rates of withdrawal based upon alternative population and land use projections;
(3) A section identifying water quantity and quality goals and objectives for the area which (a) recognize existing and future uses of the aquifer, (b) are in accordance with water quality standards of the department, the department of social and health services, and the federal environmental protection agency, and (c) recognize annual variations in aquifer recharge and other significant hydrogeologic factors;
(6) An implementation section comprised of:
(a) A detailed work plan for implementing each aspect of the groundwater management strategies as presented in the recommendations section. For each recommended management action, the parties responsible for initiating the action and a schedule for implementation shall be identified. Where possible, the implementation plan should include specifically worded statements such as model ordinances, recommended governmental policy statements, interagency agreements, proposed legislative changes, and proposed amendments to local comprehensive plans, coordinated water system plans, basin management programs, and others as appropriate;
(b) A monitoring system for evaluating the effectiveness of the program;
(c) A process for the periodic review and revision of the groundwater management program.

Comment 182 to 187 - Yakima County Farm Bureau

2. Pg1- third paragraph, citing that the GWAC had contentious discussions and whether or not they were respectful, is not relevant to the report or summary. This statement furthers the divisions of the group.

3. Pg 3- bullet point to "enhance" regulations. There was not an agreement to recommend to enhance or add to regulations.

32. Pg 103- draft recs should be deleted as there was not an agreement on moving them forward. They should not be in the report

4. Pg 4- Formation of the Lower Valley GWMA. Environmental groups were not the first to identify the problem. It was known by government agencies for a number of years. It was also brought to DOE's attention by the dairy industry before there was any talk about formally addressing the problem. Giving so-called environmental groups credit for identifying the issue is biased and not true.

8. Pg 19 - Citing the median N use scenario as most likely may not be accurate. Farmers do not buy any more N than is necessary because it is expensive, so a more accurate scenario could be the low use amount.

11. Pg 23- While farming fruit I rarely applied high amounts of nutrients, especially nitrogen, to producing trees because it makes the tree grow vegetatively. Vegetative growth does not allow for good fruit production. Citing that fruit growers apply high amounts of nitrogen to producing orchards is not accurate.

Comment 188 – Department of Ecology

Provided list of typographical errors

Comment 189 - Dan DeGroot

5. This report should have been written with the average stakeholder of the Lower Valley GWMA in mind. It is too technical in nature and difficult for the average person to comprehend. It has too many tangential issues throughout it that serve to confuse and mislead those who would like to know what the Ground Water Advisory Committee has discussed and concluded over the past 6 1/2 years. It should be written in simple, plain language and if technical issues need to be cited, they should be another section for those who are interested in them, not spread throughout the report.

Comment 190 – James Davenport

8. Neither the final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program, nor the recommendations contained therein, identify the means by which to determine the effectiveness of recommended educational or "best management practices" strategies. These should be identified and implemented ("ambient groundwater monitoring" will not accomplish this).

Comment 191 - Yakima County Farm Bureau

18. Pg 64- Needs clarification. Is the term fertilizers used in the first paragraph "commercial fertilizer?" Fourth paragraph terminology should be changed. The term "manure" should be changed to more accurately reflect the product that is being applied. It is mostly liquid or other nutrients that have had some sort of treatment, either from solids being separated from the liquid or composting and drying.

Comment 192 - Yakima County Farm Bureau

23. Pg 93- Rec 1 needs to be better explained. What does 42 mean, 42 out of what?

Comment 193 - Jason Rollinger

What are the plans for onsight septic systems?

Comment 194 - Jason Rollinger

What kind of help or protection are you providing?

Comment 195 – Jean Mendoza

7. Alternative Solution #25 is to Streamline current regulatory enforcement activities. Improve customer service and protocols, increase clarity of process, escalate enforcement for facilities not following management practices, identify methods to discourage repeatedly unfounded complaints, and improve overall transparency.

This is so vaguely worded that it is meaningless.

Comment 196 - Jean Mendoza

8. Alternative Solution # 32 is to

Adopt and Implement an Adaptive Management Plan. Utilizing data collected, progress made, or lack of progress, to inform the community on adjustments that need to be implemented. Plan would

incorporate necessary adjustments to availability of technology, education and outreach, tracking exports,7 land use regulations, treatment systems, and other changes to inform decision makers regarding management changes necessary for a successful Program.

This is so vaguely worded that it is meaningless.

Comment 197 – Jean Mendoza

10. Where is the plan for analyzing the well samples from the thirty LYV monitoring wells?

A. How often will sampling be done?

B. Will it be passive or active sampling?

C. What is the relationship between individual wells and nitrogen sources?

D. What hypotheses are we testing?

E. Which statistical tests will we use for trend analysis?

F. How will the monitoring "address effects of changes in nutrient application over the agricultural cycle" as described in Alternative Solution #2?

G. How will the monitoring "track whether time-based performance objectives are being met" as described in Alternative Solution #2

H. What are the GWMA approved "time based performance objectives"?

Comment 198 – Yakima County Farm Bureau

Unnecessary verbiage is quite evident when one reads through the Benton County Groundwater report.

In summary, the Yakima report is too long and focuses on items that have nothing to do with the subject.

Comment 199 – Yakima County Farm Bureau

In particular, there is still a biased focus on how depressed the Yakima Groundwater area is, and the number of so-called poor people of color without means. The lower cost of living in our area was not factored into the report. Nor was the fact that many people who came here to work, while not highly educated by today's standards, did have the skills necessary to perform needed tasks and make a living. This depiction paints a false picture. Job opportunities abound in our region and people have flocked here to get them. The number of farm workers coming from other countries expands by thousands every year. People from the south are clamoring to get into our country. Our public and private schools are second to none and every child has an opportunity to attend. These points paint a very different picture than what the report is trying to imply.

Comment 200 - Yakima County Farm Bureau

1. The report is too long. Few rank-and-file citizens will take the time to read it

Response Related to Ideas to Potential Program Report Errors

RCW 90.44 was written originally for water quantity and later modified to include water quality. To implement RCW 90.44.410, WAC 173-100 was developed. In the LYV-GWMA situation, the GWAC focus is specific to nitrate in groundwater, water quality. Groundwater supply, water quantity, is not in the scope of work for the GWAC.

WAC 173-100-100 is written with the knowledge that GWMA programs are site specific issues. The WAC accommodates this need by specifically noting "The program for each groundwater management area will be tailored to the specific conditions of the area and provides guidelines to serve as a general framework adapted to the particular needs of each area. Each program shall include, as appropriate, the following:"

Specific concerns raised:

- 1 (g), (h) are water quantity objectives, not part of the scope of work
- 3 (a) is a water quantity objective, not part of the scope of work
- 6 (a) the Program is an Implementation Plan
- 6 (b) Monitoring systems are in place to evaluate ambient groundwater quality conditions across the basin
- 6 (c) The Plan will be periodically reviewed by the implementation team

Text in the program will be modified:

- Remove statement about contentious discussions in the Executive Summary
- Delete the first sentence on pg 4 under Formation of the GWMA

Groundwater monitoring is summarized on pages 76 and 77 of the program with a more detailed description in documents contained or reference in Volume 3.

The document does not state that regulations will be enhanced, rather there is a recommendation to enhance regulatory and enforcement mechanisms.

The median nitrogen availability was chosen as the most representative way to represent the relative sources of nitrogen in the LYV. The NAA states the reasoning that they chose this scenario.

Recommendations made by commenters are included in Appendix B for inclusion in the program.

Recommendations voted on by the GWAC will not be modified.

APPENDIX A: COLLECTED PUBLIC COMMENTS

From: Bill DeRuyter <viewpoint@bentonrea.com>
Sent: Wednesday, March 27, 2019 3:36 PM
To: Bowen, David (ECY) <dabo461@ECY.WA.GOV>
Subject: letters for GWMA

Hi David
This letter is in regard to the GWMA.

1. Why are the nitrates not specified - if we do not know what specific nitrates we are dealing with how can we fix the problem.

2. It has come to my attention that there are more septic systems per allowed area - there are less acreage used in farming every year. Many pieces of land are split up and sold in smaller lots. People are buying and installing a septic tank. Tanks leach sewage below any root layer and put unusable nitrates in the soil. (So again, let's specify the nitrates).

3. Test wells - make sure that the test wells were installed correctly. I was told that some of these wells were capped off at ground level. Being capped off does not keep contaminated liquid from entering the tube and therefore causing a higher count of nitrates. If these wells were installed at ground level they should be disallowed in the study.

4. If high nitrates are hazardous to the elderly or infants, then what documentation is there that claim this area is the cause for their sickness. I have not heard of any cases of "Blue Baby Syndrome" related to the Lower Yakima Valley.

5. Manure is an "organic" product, it is not a 'waste' product as stated in the GWMA report. It is very useful in farming and has been since farming started. Manure contains many natural forms or micronutrient materials that crops need to grow. Commercial Fertilizer do not contain any organic matter and will seep through the soil faster.

6. Minority Report – Jean Mendoza released this report prior to the release of the final GWMC report. Seems that Jean already knew that she would not like the results. In her report if Jean only wants to put blame on the dairy industry. AGAIN, how can you fix the problem when you don't know who is creating it

Hello,

My name is Dan De Boer and I live in rural Yakima County north of Outlook along with my wife and three kids. After review of the data provided on the Yakima County GWMA website I would like to provide my comments as outlined below for your review and I thank you for your consideration.

Goal and Premise of the GWAC

According to the home page the goal of the GWAC is to address all sources of nitrates. However, it appears that research thus far has been almost exclusively focused on large farming and livestock operations. Prior to imposing regulations on one group, I believe more research needs to be done to discover the proportional impact of all sources so as not to overly burden one group over another without knowing their respect impacts to groundwater nitrates.

Equity

The website mentions the GWAC committee is a community-based group. However, it appears many people living outside the GWMA are being asked to participate and may or may not have a vested interest in the affected areas. I would suggest a higher percentage of the committee be comprised of members who reside in the affected GWMA area so as to more accurately represent their community and neighbors' best interests.

If I'm reading the information correctly the increased regulations being discussed will only impact those living North of the Yakima River. This again doesn't appear to align with the committee's goal of addressing all sources of nitrates. This unfairly burdens those North of the river. Although farmers are general friendly with each other, at the end of the day, they do compete in the same market. Increasing regulations on one side of the river makes those folks less competitive than their friends to the South. I warn the committee to guard against potential conflicts of interest in this regard.

Health & Safety

Having lived in the Lower Valley my whole life I have never heard of a local person suffering the health effects of nitrates in the ground water. I see the committee sent surveys to local health officials asking if they had seen illnesses of the sort but I didn't see any survey results. When will the survey results be posted and will they indicate we have an actual health issue? If we are not going to wait for this data to be collected, why then send out the surveys in the first place?

Science

Deep soil sampling, as outlined in the *Outcomes and Challenges* section, admits that our ability based on the data in making broad observations on the farming operations throughout the GWMA is limited. I also found nothing in this study proving causation between farming practices and ground water nitrates. Yes, farms use nitrogen. And yes, there are nitrates in the ground water. But what scientific evidence links the two? How is nitrogen absorption/uptake from crop growth calculated when calculating the nitrogen cycle in the Lower Valley? Seems like a leap of faith is required to tie farming operations to elevated nitrates in groundwater and no guarantee or proof that changes in farming practices will have a measurable impact to nitrates in groundwater. Farmers and dairymen have already been subject to increasing waste management regulation over the last couple of decades. Is there any scientific evidence that these regulations are having an impact? If not, then perhaps there are other theories that need consideration.

Only 12% of tested wells have indicated an elevated nitrate level and the study admits the sample size was inadequate to draw meaningful conclusions. Is there any historical evidence of what the groundwater nitrate levels have been over the last 50-100 years? It might be a good idea for the committee to overlay historical nitrate levels against farming practices over the same time and the population growth of the area of both livestock and people. If this long term (more than a decade) historic data is not available, perhaps a trend or timeline should be established prior to making broad decisions. On a side note, I find it ironic that the City of Sunnyside recently drilled groundwater wells to service its residents in the middle of an old 40,000 cow feed lot. Has there been any elevated nitrate levels in these wells? Have any public wells been analyzed?

Representation

A couple theories were mentioned in the study as to why community members are unwilling to participate in well testing. Ignorance was the primary theory. What the committee and Department of Ecology should know is that many very educated and intelligent citizens of this Valley have a growing discontent with environmental agencies 'taxation without representation' practices. Farmers have also been unfairly targeted by out-of-state profit seeking environmental groups adding salt to the wounds. Lower Valley citizens are being pushed into corners by increased government regulations – regulations enacted by unelected officials. The more regulations that are imposed, like the ones being discussed currently, the more difficult it will be to get citizens to participate in the process. No amount of education will change this – only logic, reason, and cooperation will.

Final Thoughts

Lastly, I wanted to mention that being a lifelong resident in the Lower Valley I know many of the farmers and dairymen and women impacted by these regulations. I see every day how they responsibly steward their farms, I see them plowing county roads when snow storms hit, I see how they raise their kids and the work ethic and morals they instill, I see how they chip in to help neighbors, I see the community service they provide to their communities, I hear about the taxes they pay and the hundreds of people they employee…. these are good hard working people and the type of people this Valley needs to keep. Let us not draw hasty conclusions with unknown benefits based on incomplete science because we don't like their smell.

Respectfully submitted,
Dan De Boer

Comments on Groundwater Management Area Report

1. Nitrates in the groundwater of the Lower Yakima Valley are a community issue. The report seems to focus mainly on only one area of the community, dairies. The report seems to have a bias against dairies in that there are several mentions of animal nutrients referred to as waste. When manure is properly stored in stockyards, compost areas or lagoons it should be referred to as Nutrient Storage, not Waste. There is one whole section of the report titled Waste Storage Facilities. This section should be edited to be Nutrient Storage Facilities or edited out of the report. All recommendations that refer to nutrients as waste should be deleted because they indicate a lack of understanding on farming process and practices. The word waste was used because of a bias, not an understanding of what needs to be accomplished. If there is going to be bias written in this report it will give a perception that dairies and their nutrients are the source of the contamination in the aquifer. Not only is this completely unacceptable to me, it will lead the community to focus on this as the sole method to mediate the contamination of the aquifer(s). Since the problem of Nitrates in the Aquifer(s) in the Lower Valley were well documented prior to dairy expansion in the late 1980"s and 1990"s mediating the issue by focusing on a narrow portion of the community will not correct the issue over time. There has been livestock husbandry performed in the valley for over 100 years and even to the current time there are approximately twice as many animals raised for beef than there are dairy cattle. This has not been noted in the report and serves to show the bias that the report has in it. Nitrates in the groundwater are a community issue and needs to have a whole community action to correct.
2. A Minority report that has not been reviewed by the Ground Water Advisory Committee has no place in the final report. This Minority Report is simply one person's opinion and should not have any connection to the work that the whole committee did. It is accusatory and is short on fact, long on fiction. It uses snippets of other reports, takes them out of context to arrive at conclusions that were established based on personal belief. This Minority Report has no place in the final document and should be deleted or risk the Main Report losing its credibility on any of its recommendations.
3. Farming Legacy issues should have been a substantial portion of this report. The way farming practices were conducted over the first 70-80 years of the Sunnyside Canal system (and the later Rosa Canal system) may have had a substantial effect on the nitrogen load in the soil of the area the Lower Valley GWMA. Tillage practices, fertilization practices and irrigation practices were such that large amounts of Nitrogen were put in the soil and had the strong potential to be moved to the aquifer with the common use of rill (furrow)

irrigation. It should also be noted that in the last 30 years there have been many technology changes in all three of these practices that should reduce the amount of available nitrogen in the soil and most importantly not continue to move what nitrogen is in the soil to the aquifer. I believe that this legacy issue should be strongly noted in the report and the fact that the recent changes in common farm practices will have a positive effect on the nitrogen loading of the aquifer.

4. Onsite Sewage Systems (OSS) should be controlled by the county and a plan that is required by WAC 246-272A-015(5) should be developed by the Health Department for OSS. I would recommend that any parcel that requests an OSS permit that is less than 20 acres (just under High Density standards) should have an OSS that is designed to reduce the nitrogen flow in its effluent. OSS are designed to return water to the aquifer, in fact a request for an OSS requires that a percolation test be passed proving that the soil for the drain field will indeed return the water to the aquifer, and a conventional OSS does little to treat nitrogen (less than 15% at best). Drain fields on conventional systems are placed below the root zone so there is no uptake of nitrogen from them. The EPA considers more than 40 OSS per square mile (one per 16 acres) to be high density of OSS and a high risk to the aquifer. For many years the EPA considered OSS to be the primary contributor of contaminates to the aquifers of the United States. There are many areas of the United States where there is little to no farming of any sort that have high nitrate concentrations in the aquifers. This should be of great concern to the stakeholders of the Lower Valley GWMA. I also would recommend that as homes are sold in areas that have a high density of OSS that the county should require the update of a conventional OSS to one that does reduce the nitrogen concentrations in the effluent. If all potential sources of nitrogen are not considered then any efforts to reduce nitrogen in the aquifer(s) will fall short.
5. This report should have been written with the average stakeholder of the Lower Valley GWMA in mind. It is too technical in nature and difficult for the average person to comprehend. It has too many tangential issues throughout it that serve to confuse and mislead those who would like to know what the Ground Water Advisory Committee has discussed and concluded over the past 6 1/2 years. It should be written in simple, plain language and if technical issues need to be cited, they should be another section for those who are interested in them, not spread throughout the report. When we are evaluating an aquifer it tends to affect all equally and discussions of ethnicity, education or economic status really have no place in this report and only serve to encourage bias and divisiveness among the stakeholders of the Lower Valley GWMA.

Dan DeGroot

Name: David Newhouse
Address: 700 Wendell Phillips Rd
City: Sunnyside
State: Washington
ZIP: 98944
Email: drnewhouse@usa.net

Draft Lower Yakima Valley Groundwater Management Program

I am very concerned about the placement of the second group of sampling wells. The placement does not appear to be random. It looks as if they are intentionally targeted at family dairy farms. If you chose to only target one potential source, you have predetermined what the results will be

My second point is that a private citizen, that is not a resident of the GWMA should not be allowed to submit a minority statement.

David Newhouse
Sunnyside, WA.

Mr. David Brown, Department of Ecology
1250 W Alder St.
Union Gap WA. 98903-0009

Mr. Brown;

I am writing in regard to GWMA !

I was on that committee as a retired farmer & cattleman. As I watched things progress I came to the conclusion that this was only to prove that Dairymen were responsible for Nitrates in our soil, initiated by Ecology & the Environmentalists, I concluded that even though I am retired & have time to waste I did not want to waste it there.

What is ironic to me is that there has never been a case in Yakima County of anyone reporting that diagnosis ! And no one wants to talk about Bickelton having the highest nitrates in the Valley ! No dairy's & no cows, Explain that ! so we have spent over 2 million & we don't know anything, sounds like a Government program !

A study was done 40 to 50 years ago showing Nitrates in the water, I requested that information, it was never searched for!

You probably do not want this opinion however I decided to send it.

I am an 83 year old Cattleman who was Beef Program Director in 5 States for an A.I. stud, before I purchased a cattle ranch.

Sincerely,

Don Young

Identified Typographical Errors and Clarifications During Review

(These edits will be addressed in the next draft of the plan)

- Add Robert Black, USGS to the list of GWAC Members
- Pg 2, 15, 24 - Replace word effect with affect
- Pg 2, 70 - Point of use treatment systems – clarify, this effort was prior to GWMA formation
- Pg 4 – USGS 2018
- Pg 5 – Missing bullet
- Pg 6 – Volume 4 referenced, edit to Volume 3
- Pg 8 – Volume 4 referenced, edit to Volume 3
- Pg 9 – Clarify a representative for the Yakama Nation was an active participant on the GWAC
- Pg 11 – Add citation to text (Heath, 1983)
- Pg 16 – Add citation to text (Powlson, find year)
- Pg 21 - Number of irrigated ag acres, edit acreage
- Pg 25 – Equation typos, edit equation
- Pg 29 – Check total GWMA acreage, edit acreage ~175,161
- Pg 40 – Correct spelling of Appendix and replace xx with D
- Pg 56 - Yellow highlight, remove yellow & delete last sentence
- Pg 61 - Yellow highlight, remove yellow
- Pg 63 - Remove green highlight
- Pg 65 - SVID – correct lined vs unlined sections
- Pg 82 - Discuss DSS QAPP
- Pg 85 & 86 – Check legends – "Tons Per Acre" or "Tons Per Cell"
- Pg 95 – NRCS Acronym EQIP used. Edit "Environmental Quality Incentives Program"

- Figures
  - Pg 28 – Figure 11 referenced, edit to Figure 12
  - Pg 29 – Figure 5 needs to be discussed in the text
  - Pg 56 – Figure 15 referenced, edit to Figure 16
  - pg 80 – Figure 22 needs to be discussed in the text
  - pg 81 – Figure 23 needs to be discussed in the text
- Tables
  - Pg 61 –Ttable 11 needs to be discussed in the text
- Recommendations
  - Add explanatory text for #6
- References
  - Remove multiple references. Include only references to final documents
  - Consistent formatting – remove double spaces
- Volume 2 - Appendices
  - Pg 3 – Appendix I needs to be discussed in the text

- Pg 3 – Appendix J needs to be discussed in the text
- Pg 35 – add reference for the figure
- Pg 40 – change word "northeastern" to "southeastern"

- Volume 3 - Accomplishments, Add:
  - Public opinion survey results
  - Operating guidelines
  - High risk well survey results
  - Add the link to the USGS drinking water QAPP
  - Add Monitoring Well Information
    - Location
    - Well construction
    - Methodology for siting wells
    - Results of monitor well sampling
- Volume 4 – Member Contributions
  - Rename reference list. Current title appendix J, may confuse with appendix J in Vol. 2
  - Add Minority report(s)

- References needing citation edits or link repairs from original draft document
  - Pg 15 Harter
  - Pg 25 Kellog
  - Pg 35 USGS
  - Pg 42 – Legend in figures 6, 7 and 9 references wrong report. Should be 5152, not 2152
  - Pg 57, 58, 60, 61, 64, 65, 68, – WSDA 2013, edit citation
  - Pg 64 – Sentence regarding 2,874 groundwater rights needs a reference
  - Pg 64 – USGS 2011 which reference? a or b?
  - Pg 101 – Add reference to nitrate treatment pilot program June 2011 to reference list
  - Pg 110 – Reference to EPA 1999 is incorrect. Maybe R-99-002? Rather than 022
  - Pg 110 – Link to EPA 2009 broken, provide updated link
  - Pg 110 – EPA 2010 is also listed as Ecology 2010. This is the preliminary assessment. It has an Ecology publication, reference should be deleted to avoid confusion.
  - Pg 110 – EPA animal waste – link is about nutrient pollution
  - Pg 112 – Two references for the same document Harter et al., 2012a and Harter et al., 2012b. Delete one.
  - Pg 112 – HDR 2013a, attached link is to a memo written by Charlie McKinney. Need correct link
  - Pg 117 – PGG 2018 -- Multiple references and links to what appears to be the same document with slight changes. Need one link to the final document.
  - Pg 119 – Scanlon et al., 2008, listed in text as only Scanlon, 2008. Need to edit.
  - Pg 119 – Scott et al., 2004 is listed in text as only Scott, 2004. Need to edit.
  - Pg 121 – 2 references for USBR 2018. Are they the same or different? Need to clarify.
  - Pg 123 – USGS 1984 broken link.
  - Pg 123 – USGS 1985. Was listed as 1984. Edit references in text to reflect actual year.

- Pg 124 – USGS 1997. Was listed as 1998c. Edit references in text to reflect actual year.
- Pg 129 – State of Vermont 2016 – Text is listed only as (Vermont). Edit citation in text.
- Pg 130 – WDOH 2007b link does not work. Update link
- Pg 130 – Reference for WRCC is incomplete. Provide link or reference details.
- Pg 130 – WSDA, 2010 – Provide link, reference or details.
- Pg 130 – WSDA n.d. – Provide link, reference or details
- Appendices pg 14. Provide date for Richardson citation
- Appendices pg 43 – Provide reference for Foxworthy 1962

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
WASHINGTON OPERATIONS OFFICE
300 Desmond Drive Southeast, Suite 102
Lacey, Washington 98503

March 27, 2019

David Bowen
Washington State Department of Ecology
Central Regional Office
1250 W. Alder Street
Union Gap, Washington 98903-0009

Dear Mr. Bowen:

Thank you for the opportunity to comment on the draft Lower Yakima Valley Groundwater Management Area (GWMA) program. The Lower Yakima Valley Groundwater Advisory Committee (GWAC) was formed in 2012 to develop a program that would achieve the goal of reducing nitrate levels in groundwater, which consistently exceed the United States Environmental Protection Agency's (EPA) health-based drinking water standard of 10 milligrams per liter (mg/L). The GWAC is comprised of representatives from a variety of groups, including local, state, and federal government agencies; local citizens; dairy producers and other farmers, and agronomists; irrigation districts; conservation districts; environmental groups; and other vested parties. An EPA representative has served on the GWAC since its inception in 2012, and I became the primary representative in the fall of 2015.

Developing the GWMA program has been an ambitious project, requiring significant data gathering, complex technical and policy analysis, and a robust stakeholder process. The EPA commends Yakima County, the federal, state, and local agencies, as well as the community members for their commitment and perseverance in developing this draft program. We offer the following comments intended to strengthen the final program to protect public health.

The Washington State Department of Agriculture's report titled "Estimated Nitrogen Available for Transport in the Lower Yakima Valley Groundwater Management Area -- A Study by the Washington State Department of Agriculture and Yakima County," (June 2018) is an integral part of the GWMA program as it estimates nitrogen availability in the geographic area. It is currently presented as a separate document in Volume III, "member contributions." We recommend that its data and information be incorporated directly into the body of the final GWMA plan to ensure transparency.

The EPA continues to believe that the final GWMA plan would be improved by including a more thorough accounting of the sources and amounts of nitrogen in the GWMA by using scientific data from additional sources. The current draft contains information from the important collaborative work carried out by local, state and federal agencies in 2010, "Lower Yakima Valley Groundwater Quality." Data from other scientific studies are also available. Taking advantage of as much quality-assured/quality controlled available data and information as possible would strengthen the foundation of the report, its policy recommendations and most importantly, its ability to protect and improve the safety of drinking water. A few examples to draw upon include:

- United States Geological Survey (USGS): "Particle tracking for selected groundwater wells in the lower Yakima River Basin, Washington," 2015. The USGS assessed nitrate sources in specific geographic areas within the GWMA with groundwater contamination and identified associated likely nitrogen source areas. https://pubs.er.usgs.gov/publication/sir20155149

- The EPA: "Relation Between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley, Washington," 2013 contains soil information such as permeability data from lagoons, and nitrogen concentrations in manured dairy crop fields. https://www.epa.gov/wa/lower-yakima-valley-groundwater

- Since a Consent Order was signed with three Lower Yakima Valley dairies in 2013, these dairies have made great strides in reducing the amount of nitrogen accumulating in their fields. In reports submitted under the EPA Consent Order and approved Quality Assurance Project Plan (QAPP), there are several years of biannual data from fields prior to the AOC-required limitations of field applications of manure and the subsequent transition to the present conditions. These dairies are also providing post-harvest data that can inform soil concentration estimates in the draft GWMA Plan. https://www.epa.gov/wa/lower-yakima-valley-groundwater

These reports contain information on soil permeability, lagoons, and post-harvest deep soil sampling that can contribute to the data in the GWMA program and strengthen its findings.

Uncertainty is inherent in almost every scientific endeavor, especially one of this magnitude and complexity. Considering this, several GWAC members requested that the program include a section that discusses the intrinsic uncertainties in the relevant variables. The EPA appreciates the work to develop this, which is provided in the current draft as a supporting document. Given its importance to understanding the plan, we recommend that it be added to Volume 1, and describe opportunities for additional research to reduce uncertainty.

The EPA also offers a few additional suggestions for the implementation phase of the program. First, it is important to ensure that QAPPs are developed for any new work that includes data collection. The development of sound QAPPs will ensure that the information gathered can be used to make scientifically-defensible decisions.

Second, results from the next steps in the U.S. Geological Survey work listed above could be very useful to implementing the GWMA program. The next phase would be to conduct a reverse-loading analysis based on the 2015 particle tracking study, to estimate how much reduced nitrogen loading would need to occur to decrease nitrate concentrations in downgradient residential wells to meet the drinking water maximum contaminant level. These findings could be used to refine and focus efforts to implement the final GWMA program in the coming years.

As you know, this year, the Washington State Conservation Commission awarded competitive grants for demonstration projects statewide to test various technological approaches to recapture or recycle nutrients, including one in the Yakima Valley. The results of these projects could be useful in the implementation phase and EPA encourages the state and county to consider that information moving forward.

In closing, new information pertaining to both understanding the nature of groundwater contamination and strategies to reduce it will continue to emerge from research, data gathering, and technology demonstration projects nationwide. EPA hopes that you will continue to take advantage of this information in your work to reduce excess nitrogen loading in the Lower Yakima Valley's groundwater.

Thanks for the opportunity to comment.

Sincerely,

Lucy Edmondson, Director
Washington Operations Office

Comments on:

Yakima Valley Groundwater Management Program, dated August 20, 2018

Comments Prepared by: Frank P. Winslow

Comments Dated: February 26, 2018

Statement of Qualifications:

I am a Licensed Professional Geologist (Florida P.G. #2415), and have 31 years of experience in contamination and water resources work. This included 29 years working in environmental consulting as a Senior Hydrogeologist, and almost two years as a Cleanup Site Manager with the Department of Ecology, Toxic Cleanup Program. I have a Bachelor's degree in Geology, and a Master's degree in Environmental Sciences from the Colorado School of Mines. The M.S. studies focused on hydrogeology, water quality, and environmental geochemistry. My work has included studies throughout the United States and Canada, and in the Middle East and South America. One exemplary role was as the Technical Director for the Study of the Water Resources of the Western Coastal Plain of Saudi Arabia, a 23 million dollar study of a 1,800 km long area. That study included the collection of 1,800 groundwater samples, and nitrates proved to be the number one water quality problem within that area.

Nature of the Problem

The problem of nitrates in shallow groundwater is a globally ubiquitous concern. This problem is exacerbated by a traditional separation in managing water into two area; water resources, which has traditional focused on water quantity, and contamination concerns, which are generally separated between point source and non-point source contamination sources. Slowly, the nexus of water quantity of water quality is gaining ground under a new field: Integrated Water Resources Management.

In general, the shallower the water supply well, the greater risk to the well from various sources of contamination (**Figure 1**). The deeper the well, the lower the chance of the aquifer being impacted from point and non-point sources. These principles were summarized within the Lower Yakima Valley Groundwater Quality, Preliminary Assessment and Recommendations Document dated February 2010, as follows:

> *Nitrate-nitrogen concentrations are greatest in shallow groundwater. A significant decrease in nitrate-nitrogen concentrations is found in groundwater samples collected from depths below 300 feet. The highest percentage of samples exceeding state Drinking Water Standards (l0 mg/l nitrate-nitrogen) are obtained from shallow wells (less than 300 feet deep). Most private domestic drinking water wells appear to be shallow wells.*

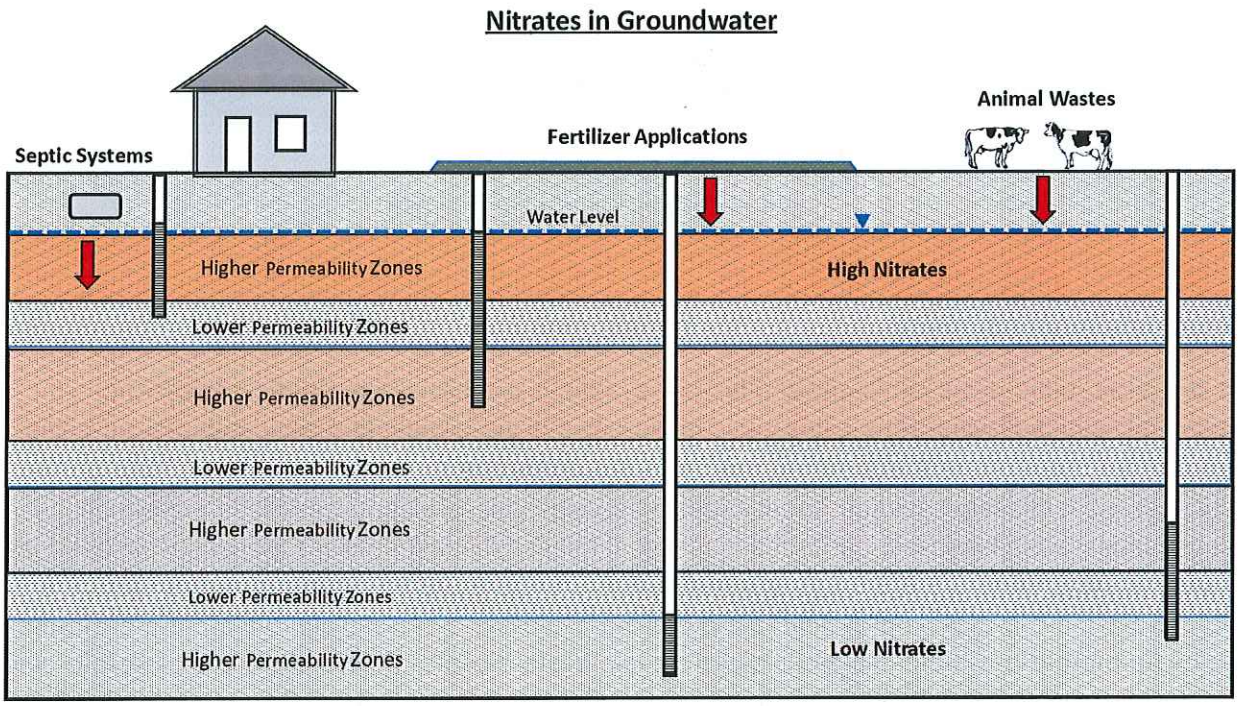


Figure 1: Conceptual Schematic of Distribution of Nitrates in Groundwater

Shallow groundwater is not necessarily easy to define. In assessing individual wells, the top of the well screen or open interval (not total depth of the well) is the critical depth of concern. However, a well that has a total depth of less than 100 feet would have contamination risks much higher than a deeper well. In addition to depth, the number and thickness of lower permeability beds is a critical component of risk to a well. Another factor effecting risk to wells is the potential presence of improperly constructed wells or boring that have breached separating low permeability strata (**Figure 2**). In this case, deeper wells can still have a risk of contamination from surficial releases, especially if there is a downward hydraulic gradient between aquifer zones.

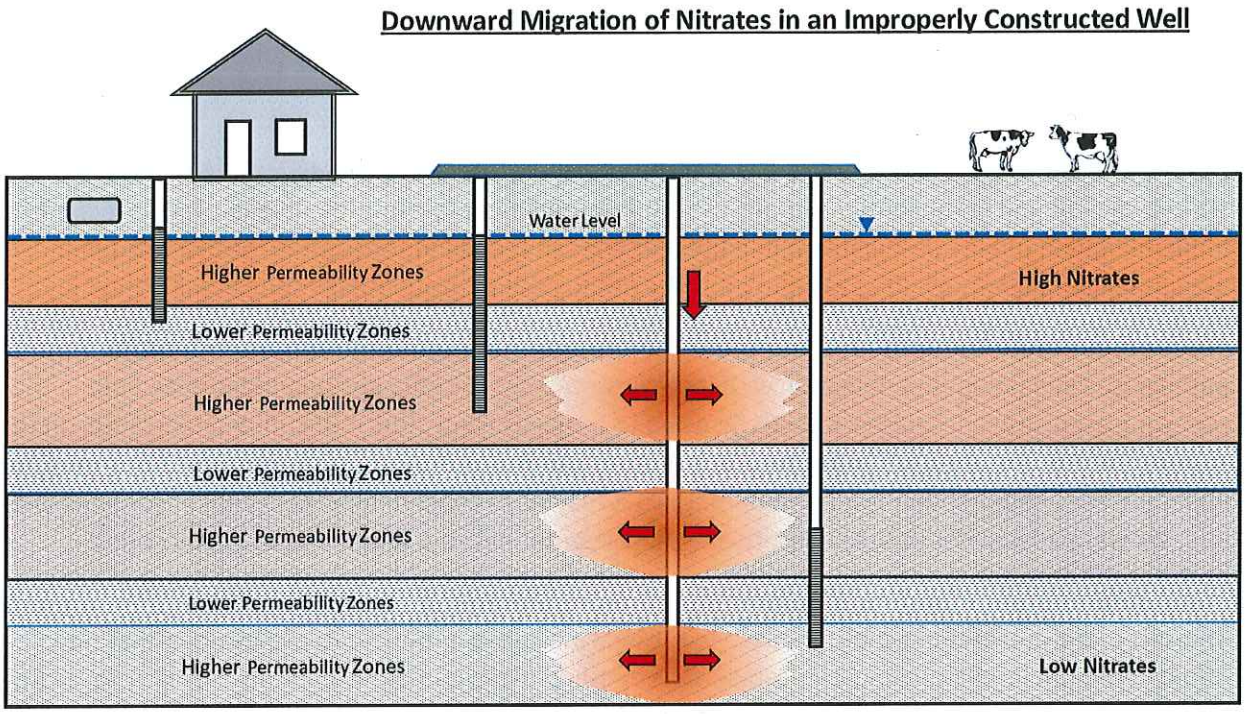


Figure 2: Conceptual Schematic of Downward Migration of Nitrates in an Improperly Constructed Well

Potential Solutions

The program document included the following recommendations:

- *Support the implementation phase of the GWMA*
- *Continue groundwater and soil monitoring*
- *Promote voluntary source reduction strategies for all nitrate sources*
- *Continue education and public outreach strategies for all Lower Yakima Valley residents, including homeowners and farmers*
- *Improve irrigation efficiency*
- *Develop and support research about innovative nitrate reduction strategies*
- *Consider incentives that support nitrate reduction*
- *Explore technology to utilize nutrients as energy*
- *Enhance and streamline regulatory and enforcement mechanisms*
- *Maintain the established GIS database*

The program document also stated:

Implementation

The next phase of the GWMA program is implementation. The GWAC's completed work from the assessment and planning phase provides a solid foundation for this next phase. Within this document are specific recommendations for reducing nitrate concentrations in groundwater.

At one of its final meetings, the GWAC recommended that Yakima County act as lead agency in future Lower Yakima Valley groundwater management.

Implementation of recommendations is subject to future funding.

I strongly disagree with a focus on reducing nitrate concentrations in groundwater. As previously stated, nitrates and other contamination in shallow groundwater systems is a ubiquitous global concern. Implementation of best management practices (BMPs) can reduce the amount of loading to aquifers of various contaminants (including nitrates), but the risk to shallow groundwater system will always exist.

The most critical concern with respect to any contamination concern is to eliminate exposure pathways. Eliminating contamination within the environment is a lofty and admirable goal, but removing exposure mechanisms to both human and ecological receptors is of critical importance. In the case of nitrates in shallow groundwater, the exposure pathway is broken by ensuring that contaminated water is not ingested. Other groundwater pathways may be of concern for other types of contaminants (e.g. shower pathway for volatile constituents); however for nitrates, ingestion is the only critical pathway of concern.

Therefore, the greatest need with respect to nitrates in shallow groundwater is ensuring that no people are drinking this water. This can be accomplished with various mechanisms. In order to clearly differentiate between recommendations pertaining to preventing consumption of contaminated groundwater and other less immediate concerns, I recommend splitting recommendations between those pertaining to eliminating potential exposures and other miscellaneous recommendations. This comment applies to the Recommend Actions section and the Executive Summary. Separating immediate concerns from less immediate concerns is important to ensure that protection of public health is of foremost priority.

The program has an exceptionally high Environmental Justice (EJ), component, as follows:

- Water wells are expensive, and the deeper the well, the more expensive.
- Poor people are less likely to afford a deeper water well.
- Poor people are less likely to afford bottled water.
- Therefore, poor people are more likely to drinking nitrate contaminated shallow groundwater.
- In addition, poor people may be less likely to have a public water supply system in rural areas which would include required water quality testing.

In my opinion, the root problem is not that there are nitrates in shallow groundwater. The root problem is that people think that shallow groundwater is a viable source of water for drinking water purposes. I would submit that it is generally inappropriate for any water wells to be constructed for drinking water purposes less than one hundred feet deep. Water quality concerns with shallow groundwater include nitrates in agricultural area, nitrates and other constituents in areas where septic systems are used, and various contamination sources from point and non-point sources in urban areas. **Very few places do not have a water quality concern with respect to shallow groundwater.**

Recommendations

I believe that public communication is a critical component of the program. If people are aware that their water supply may be contaminated, this might reduce the chance of their ingesting the water. This is particularly true if there are options for alternative drinking water supply. The following are the actions that I would give highest priority:

1. Send a mass mailing to all residents located outside of public water supply service areas within the Lower Yakima Valley. The mailing would explain the problem of nitrates in shallow groundwater, and that it is of particular danger to expecting mothers and infants. The mailing would provide a telephone number for free testing of their well water for nitrates.
2. Assign staff dedicated to collection of water samples from domestic wells for nitrate analysis. The staff should be able to respond to requests to sample within one week of a telephone request. Households with infants or expecting mothers (or women of childbearing age) would be bumped to the top of the list. Shallower wells should be given a higher priority than deeper wells. The sampling staff would maintain a database, including available well construction information.
3. Identify locations for household collection of free drinking water at each community in the Lower Yakima Valley. Once a household water supply well has been tested, the owner or resident would be provided with a document allowing them to pick up free drinking water (a reasonable weekly allotment could be calculated).
4. Begin a grant program for replacement of impacted shallow domestic wells. Such grants could be applied for by homeowners that have a shallow wells with nitrates above cleanup levels. Prioritization of grant recipients should be based on needs of the applicant. A fund for this grant can be contributed to by taxpayers and groundwater polluters. This recommendation would require legislative action.

The collection of nitrate data from domestic wells could substitute for monitoring wells, and provide much more meaningful data in terms of protection of public health than monitoring well data. Collection of additional data, including hydrogeological and water quality data should focus on areas with identified deeper nitrate contamination, with a goal of identifying potential conduits to deeper aquifer zones. Such investigations could use innovative technologies for the detailed characterization of water quality and hydrostratigraphy with depth, in order to better understand inter-aquifer communications and contaminant migration.

Once protection of public health has been ensured (i.e. no ingestion of nitrates in shallow groundwater is taking place), then, and only then, other recommendations can be given priority. These other recommendations should be prioritized. For example "Explore technology to utilize nutrients as energy" is a recommendation that would not have a high priority in terms of protecting public health and the environment.

March 27, 2019

To the WA State Dept. of Ecology:

Please accept and consider the following comments from the Friends of Toppenish Creek regarding the 2018 Lower Yakima Valley Groundwater Management Area (LYV GWMA) plan and report

FOTC is a 501 (C) 3 non-profit group based in the LYV with a mission:

> *FOTC is dedicated to protecting the rights of rural communities and improving oversight of industrial agriculture. FOTC operates under the simple principle that all people deserve clean air, clean water and protection from abuse that results when profit is favored over people. FOTC works through public education, citizen investigations, research, legislation, special events, and direct action.*

We have actively served on the GWMA advisory committee for the past six years and have done our best to support science and common sense while protecting the environment and the people who live in the LYV. We have been especially mindful of the children under the age of 18 who make up 35% of the LYV population, have no voice. These children and their children will pay the price for today's pollution.

FOTC raises valid concerns and asks pertinent questions in the pages that follow. We respectfully ask for serious answers before Ecology certifies the GWMA report and plan.

Sincerely,

Jean Mendoza

Jean Mendoza

Executive Director, Friends of Toppenish Creek

Comments – Lower Yakima Valley Groundwater Management Area

1. People who live in the Lower Yakima Valley (LYV) most likely spend a million dollars per year purchasing bottled water because the people who were supposed to protect the aquifer failed to do their job. This is a million dollar per year hidden tax.

In spite of lip service regarding the need for safe drinking water the LYV GWMA provided zero relief to the people whose health is threatened. On the contrary the GWMA has not confronted the polluters or the careless regulators, but has cruelly launched a public information campaign that transfers responsibility to home owners and renters. The GWMA solution merely instructs people to test their well water at a cost of $30 to $40 per test, another hidden tax.

The only alternative solution that comes close to addressing safe drinking water is # 44 that asks Yakima County to:

> *Perform an engineering study of water supply alternatives*

There is no reference to funding that would support such an endeavor. Yakima County does not have the resources to do this on our own. Incidentally, in 2015 the County returned $150,000 of state money designated for domestic water treatments. This demonstrates a lack of concern on the part of elected official who are presumed to represent the public.

Washington laws that declare citizens' rights to clean drinking water include RCW 90.48.010, RCW 90.48.040, RCW 90.48.240, and RCW 90.48.260.

2. Alternative Solution # 41 requires:

> *Identify and support opportunities, including education research institutions for private, public and industry investment in technology and management of fertilizers and manures, including separation of solid and liquid wastes. (17 – WSDA)*
> *<u>WSDA construct GWMA administrative program.</u>*

The WSDA lacks the expertise required to construct an administrative program. In addition WSDA lacks the knowledge of human health issues that form the core rationale for groundwater management.

In 2014-2015 the WSDA insisted upon performing a Nitrogen Loading Assessment for the GWMA at a cost of $58,000. The project was delivered 18 months behind schedule thus delaying completion of the GWMA program. The NLA/NAA (Nitrogen Availability Assessment) is extremely flawed, did not comply with the scope of work for the project and has never been approved by the GWMA advisory committee.

A. The WSDA did not bring together focus groups of farmers to share their fertilizing practices as promised. Instead WSDA relied on the opinions of a few anonymous experts. For example, one man spoke for 5,000 acres of alfalfa. (See Attachment 1) Who is this man?

B. The WSDA omitted nitrogen from 536 acres of composting in their NAA. Composting is an acknowledged and significant source of nitrate pollution.

C. The WSDA estimated that apple growers apply, on average, 60 lbs per acre of nitrogen to their land at the beginning of the season and end up with an average of 90 lbs of nitrogen per acre at the end of the season. (See Attachment 2). How does this make any sense at all?

Now WSDA appears poised to perform a follow up Nitrogen Loading Assessment for a million dollars (Alternative Solution # 52) and to construct a follow up GWMA administrative program for $10 million. The WSDA has not acted in good faith during the six-year GWMA program and there is no evidence that this will change in the future.

3. The GWMA Report and Plan is scientifically indefensible and violates principles of ethical research by omitting the overwhelming data from the LYV "dairy cluster".

The GWMA target area covers about 271 square miles in the Lower Yakima Valley (LYV). The GWMA report states that 12% to 20% of domestic wells in the area have nitrate levels above the safe standard of 10 mg/L.

The report omits the fact that 61% of domestic wells one mile down gradient from the "dairy cluster" exceed the standard, or that monitoring wells on the "dairy cluster" have nitrate levels over 100 mg/L. This is significant. It is the most compelling data gathered from the GWMA target area and the GWMA report pretends it does not exist.

4. The GWMA report underestimates the amount of atmospheric nitrogen deposition by a factor of at least five.

The GWMA report estimates nitrogen deposition at 2.05 lbs per acre. WSDA states that the data was hard to access.

James Davenport, the GWMA advisor who gathered cost data for discussion of proposed solutions told the advisory committee that estimating emissions from animal agriculture, fertilizer and manure applications is not feasible because the Yakima Regional Clean Air Agency is unwilling to do this. The YRCAA has said they were never asked. Mr. Davenport advised the GWMA advisory committee that such a project would be "big and expensive". (See page 223/226 of GWMA Plan Appendix II)

In fact the work is already being done at Washington State University. See WSU AIRPACT-V at http://lar.wsu.edu/airpact/monthly_depo_ap5.php#

WSU scientists, using the best, most current models, calculate atmospheric deposition in the LYV of about one lb of nitrogen per acre per month for most of the year and over 2 lbs of nitrogen per month for the months August, September and October. This equates to at least five times the amount of atmospheric deposition in the GWMA NAA.

5. Yakima County may not have the capacity/expertise/willingness to administer a robust follow up GWMA program. Yakima County has failed to keep many promises to the advisory committee and to the public over the past six years.

A. At the beginning Yakima County hired a hydrogeologist to oversee the GWMA project. Then, in 2015, Yakima County replaced him with an attorney.
B. The County scheduled no GWMA discussions to develop programs that help impacted people access safe drinking water. At this point in time the only program to help the people is the Clean Drinking Water Project administered by the Community Association for Restoration of the Environment (CARE) and the Friends of Toppenish Creek (FOTC) with funds obtained through litigation.
C. In June of 2014 the GWMA advisory committee approved a Deep Soil Sampling plan with costs not to exceed $245,025. In August of 2014 Yakima County signed a contract for Deep Soil Sampling at a cost of $394,563, an unauthorized increase of nearly $150,000.
D. Yakima County contracted to evaluate the nitrogen contributions from bio-solids in the LYV. The County did not do this and simply ignores requests for that study.
E. Yakima County contracted with the Yakima Health District to perform a survey of LYV domestic wells. The surveys were not completed but the YHD received payment anyway.
F. The GWMA collected data through Deep Soil Sampling in 2014 – 2016 and sampling of 156 domestic wells in 2017. The data was never analyzed and the GWMA simply proceeded without discussing the implications.
G. In 2012 the GWMA advisory committee agreed to form a work group to address *Funding*. That work group was not convened until 2017 and only met three times.
H. The GWMA failed to inform and engage the large community of Spanish speakers in the LYV. The only outreach was a campaign telling people to test their wells and buy bottled water. Outreach to inform non-English speakers about the GWMA discussions is non-existent.
I. At this point in time there is an impressive, interactive GIS map on Yakima County's GWMA website. The data in that map is highly inaccurate. For example, the map states that there is no leaching of nitrogen from alfalfa fields. GWMA DSS data shows

the exact opposite. Many of the fields with the highest levels of nitrate were planted in alfalfa and had been for years.

6. The GWMA report does not comply with the legal mandates for groundwater management programs in RCW 90.44 and WAC 173-100. Legal requirements for a GWMA that are missing from the LYV GWMA plan include:

A. RCW 90.44.410 (1) The groundwater area or sub-area management programs shall include:

(b) A management program based on long-term monitoring and resource management objectives for the area or sub-area;

(d) Projection of water supply needs for existing and future identified user groups and beneficial uses;

(h) Identification of water quality objectives for the aquifer system which recognize existing and future uses of the aquifer and that are in accordance with department of ecology and department of social and health services drinking and surface water quality standards;

(j) Annual withdrawal rates and safe yield guidelines which are directed by the long-term management programs that recognize annual variations in aquifer recharge;

(k) A description of conditions and potential conflicts and identification of a program to resolve conflicts with existing water rights;

(m) A process for the periodic review of the groundwater management program and monitoring of the implementation of the program.

B. WAC 173-100-100 The program for each groundwater management area will be tailored to the specific conditions of the area. The following guidelines on program content are intended to serve as a general framework for the program, to be adapted to the particular needs of each area. Each program shall include, as appropriate, the following:

(1) An area characterization section comprised of:

(g) Estimates of the historical and current rates of groundwater use and purposes of such use within the area;

(h) Projections of groundwater supply needs and rates of withdrawal based upon alternative population and land use projections;

(3) A section identifying water quantity and quality goals and objectives for the area which (a) recognize existing and future uses of the aquifer, (b) are in accordance with water quality standards of the department, the department of social and health services, and the federal environmental protection agency, and (c) recognize annual variations in aquifer recharge and other significant hydrogeologic factors;

(6) An implementation section comprised of:

(a) A detailed work plan for implementing each aspect of the groundwater management strategies as presented in the recommendations section. For each recommended management action, the parties responsible for initiating the action and a schedule for implementation shall be identified. Where possible, the implementation plan should include specifically worded statements such as model ordinances, recommended governmental policy statements, interagency agreements, proposed legislative changes, and proposed amendments to local comprehensive plans, coordinated water system plans, basin management programs, and others as appropriate;

(b) A monitoring system for evaluating the effectiveness of the program;

(c) A process for the periodic review and revision of the groundwater management program.

7. Alternative Solution #25 is to

Streamline current regulatory enforcement activities.
Improve customer service and protocols, increase clarity of process, escalate enforcement for facilities not following management practices, identify methods to discourage repeatedly unfounded complaints, and improve overall transparency.

This is so vaguely worded that it is meaningless.

8. Alternative Solution # 32 is to

Adopt and Implement an Adaptive Management Plan.
Utilizing data collected, progress made, or lack of progress, to inform the community on adjustments that need to be implemented. Plan would incorporate necessary adjustments to availability of technology, education and outreach, tracking exports,

land use regulations, treatment systems, and other changes to inform decision makers regarding management changes necessary for a successful Program.

This is so vaguely worded that it is meaningless. This is like saying we need a floor plan for a house without saying whether it is a $50 cabin or a $1 million castle, whether it is one or three stories, whether it is wood or concrete construction, whether there is indoor plumbing or not.

The GWMA has not discussed what an Adaptive Management Plan would look like. It is a popular buzz word with many interpretations. Thinking people need more clarity before voicing support or rejection for this particular solution. Effective Adaptive Management Plans are complex.

There is no reference to funding that would support such an endeavor. The Alternative Solution requires Yakima County to create an Adaptive Management Plan and the County does not have the resources to do this on our own.

10. Where is the plan for analyzing the well samples from the thirty LYV monitoring wells?

A. How often will sampling be done?

B. Will it be passive or active sampling?

C. What is the relationship between individual wells and nitrogen sources?

D. What hypotheses are we testing?

E. Which statistical tests will we use for trend analysis?

F. How will the monitoring "address effects of changes in nutrient application over the agricultural cycle" as described in Alternative Solution #2?

G. How will the monitoring "track whether time-based performance objectives are being met" as described in Alternative Solution #2

H. What are the GWMA approved "time based performance objectives"?

- What are the plans for onsight septic system's

- When dairy's buy land it usually test high but as we farm it we Lower the nitrogen Levels.

- The parts of the report that where put in by a person who has a one sided point of view should be removed.

- Why isn't there any test wells near urban growth area's. When there should be.

- What Kind of help or protection are you providing

Jason Bollinger

3-25-19

Comments on Groundwater Management Area

1. The report is lacking enough of the farming legacy issue of nitrate buildup in the soil. The majority of the farming in the Yakima Valley when irrigation started was by rill or furrow irrigation. This method saturated the soil and caused 30-50% of the nitrogen applied to the surface to leach past the root zone. Crops such as mint, sugar beets, and potatoes that required high amounts of nitrogen were grown in the area. Nitrogen as commercial fertilizer was cheap and applied at heavy rates, from 600 lbs per acre up to 1000 lbs per acre with removal rates of the crops not nearly that high. Farmers were taught as little as 20 years ago to apply 1 lb of nitrogen per bushel corn yield expected. Easily 300+ lbs in our fertile valley. Now that same crop of corn can be raised for less 2/3 that rate and sometimes higher yields. We have purchased new fields that have been farmed and taken soil samples up to 6' deep and found extremely high nitrogen soil tests below the root zone, often in fields that have not had manure applied ever or in recent times (15 years or more). This nitrogen has been there for some time and not recently applied.

2. The GWMA needs to focus on a voluntary and educational approach for all involved parties to help lower the nitrates in the groundwater. This needs to be a community effort that looks forward and makes changes now that can affect what happens years in the future. Finger pointing and only focusing on one aspect of the area, like dairy farms, will not address the widespread issues that need to be changed. The bias towards dairy farms in this report will lead to disappointing results of not addressing all factors resulting in high nitrates in groundwater.

3. The minority report that was written before a final GWAC report was even finished or approved is out of context and very targeted. How can someone even write a minority report before the main report is even finished?

4. Manure is referred to as waste numerous times in the GWMA report. Manure is a useful fertilizer that is used to grow crops and add organic matter and micronutrients to the soil. Higher organic matter has been proven to retain water better and help in drought years and to hold nutrients in the root zone for crops. Commercial fertilizer does not have these qualities.

5. Through the 6+ years of the GWAC work, I have not heard of any cases of blue baby syndrome or other documented nitrate related illnesses in the Yakima Valley. In fact, many studies are showing that high nitrates foods might be healthy for you.

6. The GWAC spent almost 2 years discussing 30 possible test well sites of which were approved. 20 of those wells were funded and drilled. Then in less than 30 days, 11 additional wells that were not approved by the GWAC were funded, sited, and drilled without any communication at all to the GWAC. In 6+ years of being on this GWAC, there has always been numerous emails about every issue. It amazes me that there was no communication at all about the additional wells. Nothing. It's actually quite suspicious since 9 out of 11 of these wells are within 1 mile of

dairy farms. Once again, this shows the targeting of dairy farms and the lack of a holistic approach to solving high nitrates in the groundwater.

7. On site septic systems have not had enough focus or education in this report. The concentration of OSS is increasing with no rules or regulations by Yakima County. OSS is designed to leach all nitrogen to the groundwater. A real threat as the number and concentration of OSS continues to increase in Yakima County.

8. Department of Ecology needs to provide more protection from third party lawsuits for those dairy farmers that have a NPDES CAFO permit and are in compliance with the permit. Spending money on lawyers to defend yourself as a dairy farmer when you are in compliance with the law is targeting. This needs to end

James H. Davenport

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jhdavenportllc@gmail.com

March 11, 2019

David Bowen
Department of Ecology
Central Regional Office
1250 W. Alder St.
Union Gap, Wash., 98903-0009.

Re: Written submission in connection with March 12 hearing on Lower Yakima Valley Groundwater Management Area Program

Dear David,

I submit this comment today not in the capacity of my prior contracted assistance to Yakima County in the performance of its role as lead agency in the near six-year process of the Lower Yakima Valley Groundwater Advisory Committee, but rather in the capacity of a private citizen resident of the Lower Yakima Valley which is the subject of the Advisory Committee's inquiry. I am no longer contracted to Yakima County in the former capacity.

I write today in order to make the few following observations, none of which, I hope, are inconsistent with the Washington State departments of Ecology's, Agriculture's or Conservation Commission's, or Yakima County's successful implementation of the GWAC's numerous recommendations, to wit:

1. Use of the community consultation model for developing solutions to environmental contamination problems is only helpful to the extent that it broadly and proportionately represents the affected community.

2. Duly authorized governmental agencies and duly elected public officers are charged with a public duty to execute those rules and regulations currently in effect, and exercise those powers with which they are currently authorized, notwithstanding that they are not recommended by public interest groups.

3. Neither the final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program, nor the recommendations contained therein, are limiting upon the choices available to the public at large or governmental agencies with relevant jurisdiction.

4. The Departments of Ecology, Agriculture and Conservation Commission, as well as Yakima County, the Yakima County Health District and the Southern Yakima Conservation District should not regard the investigation of groundwater contamination in the Lower Yakima Valley as a *fait accompli*, but rather as a *fait ab initio*.

5. Information not provided to the GWAC but obtainable from the Washington State Department of Agriculture should be analyzed:

a. Growth in agricultural use intensity (density/acre, acreage farmed, production volume)
b. Amount of chemical fertilizer sold or used within GWMA
c. Report of dairy nutrient management plan information on distribution of manure (see RCW 90.64.026(3), RCW 42.56.270(7), WAC 16-06-210(29))
d. Nitrogen Loading Assessment (as distinguished from Nitrogen Availability Assessment, see: June 19, 2014, August 21, 2014, October 16, 2014, and December 18, 2014 GWAC meeting summaries; Yakima County/Department of Agriculture Interagency Agreement

6. Information not provided to the GWAC but obtainable from the Department of Ecology should be analyzed:

a. Report on enforcement of RCW groundwater standards
b. Report on effect of large scale water usage on groundwater quality

7. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does recommend the collection of data from the Ambient Groundwater Monitoring Well system. The Groundwater Monitoring Well system should:

a. Maintain a longitudinal record of measurements taken from groundwater monitoring wells so as to document trends in improvement or worsening of the present condition.
b. Map the "horizon" of analysis of monitoring well measurements from the groundwater monitoring well system (an undulating plane established by points (elevations) at each monitoring well, with the intervening spaces being calculated with reference to influence from proximate point data) should be mapped. This might indicate how the measured horizon intersects with the geologic regimes already known (theoretically) to exist within the study area.
c. Introduce some sort of non-pollutive tracer in selected monitorin wells in order to ascertain whether that tracer expresses itself in other monitoring wells. This may be possible due to the density and location of monitoring wells within the study area. This may provide information helpful in establishing direction of groundwater flow (albeit at a rather surficial elevation).

8. Neither the final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program, nor the recommendations contained therein, identify the means by which to determine the effectiveness of recommended educational or "best management practices" strategies. These should be identified and implemented ("ambient groundwater monitoring" will not accomplish this).

9. Neither the final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program, nor the recommendations contained therein, identify or analyze information about the amount of chemical fertilizers sold or distributed to managers of orchards and crops, or applied to orchards and crops within the study area. This information should be collected and analyzed.

10. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not reflect the often-expressed view/opinion within the Advisory Committee that there exists a "legacy" of groundwater contamination within the Lower Yakima Valley due to the length of agricultural activity which has occurred there. Historic data pertaining to the amount of agricultural production, classified by crop variety (measured in volume, economic value or other metric), acreage farmed, and percentage of farmed acreage property actually under tillage, should assembled and compared against current data of like kind in order to establish trends in agricultural density and use.

11. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not reflect the often-expressed view/opinion within the Advisory Committee that the effect of groundwater contamination in the Lower Yakima Valley influences the lives and health of human demographic groups disproportionately. Nor does it study or describe the socioeconomic effect of groundwater contamination within the study area upon on future generations. Both effects should be studied.

12. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not correlate the economic benefit derived from the private small industrial, agricultural, urban/suburban residential sector sources' activity within the study area with the economic costs likely to be incurred by the public remedial, corrective, educational, or regulatory activities responding to the problem, nor does it quantify the economic value of the natural resource (groundwater) consumed through contamination (an unmeasured and undocumented expense incurred as part of the private small industrial, agricultural, and urban/suburban residential sectors' entrepreneurial enterprise). This relationship should be studied in order to determine correlate costs of remediation, if any, with the economic benefits of groundwater consumption.

13. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not evaluate the causal relationship, if any, between the method and volumes of water applied to the ground surface (either generally or at specifically identifiable locations, or the volume of groundwater stored within the ground, within the studied area, and the extent, location or degree of groundwater contamination within the studied area or at specific contaminated wells. This correlation, if any, should be studied.

14. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not evaluate the correlation, if any, of the location, volume or movement of surface water within lined or unlined artificial conveyance systems (irrigation canals) with the extent, location or degree of groundwater contamination within the studied area. This correlation, if any, should be studied.

15. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not correlate changes in concentration, density, intensity, or use of source-related activities within the studied area with changes, if any, in the extent, location or degree of groundwater contamination within the studied area. This correlation should be studied.

16. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not analyze specific deep soil sampling data collected from known locations. More deep-soil sampling data should be collected, with data collection sites located, and that data analyzed.

17. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not analyze trends in well data from Valley Institute for Research and Education Report (2002), Nitrate Pilot Project Well Samples, LVYGWMA High Risk Well Assessment Well Samples, and USGS 2017 Well Testing Data. Trends in this data should be analyzed.

18. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not identify plausible hypotheses of causation, transmission, or accumulation of contaminant between categorical sources and contamination events or locations. These hypotheses should be stated and explored.

19. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not describe the processes of hydrogeologic or chemical transmission or accumulation of contaminant in the area of contamination. These processes should be more completely explored and described.

20. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not investigate or analyze the geologic and hydrogeologic properties of denser locations of contaminated wells ("hotspots). These should be investigated and analyzed.

21. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not investigate or analyze the plausible causal relationship between specifically identifiable sources and specific contamination events. These should be investigated and analyzed.

22. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not explore the correlation, if any, between specific land use types and proximate water supply contamination events. This potential correlation should be explored.

23. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not address the specific land use regulations, or other regulation types, that might used rectify, ameliorate or otherwise alter the general or specific contamination condition within the study area. These should be explored and analyzed.

24. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not address the effect of generic or specific sources on the protection of areas with "critical recharging effect on aquifers used for potable water or areas where a drinking aquifer is vulnerable to contamination that would affect the potability of the water" as designated by

Yakima County pursuant to the Growth Management Act or otherwise (RCW 36.70A; WAC 365-190-030 (3); and YCC 16A, 16C), as "environmentally sensitive or special areas" as contemplated by WAC 197-11-330(2)(e)(i), WAC 197-11-305 (1)(a), WAC 197-11-908(1)(b) and the Growth Management Act. These effects should be described and analyzed.

25. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not explore the strategy of taxation on the use or sale of materials containing chemical constituents common to known constituents of groundwater contamination as a means of source reduction. This strategy should be considered.

26. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not explore the strategy of usage limitations, imposed through land use regulation, on the nature, density, or intensity of use (analogous to limitations on industrial development). This strategy should be considered.

27. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not recommend any remedial action. Remedial actions should be studied.

28. The final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program does not evaluate the costs or implications of inaction. These should be evaluated.

The purpose of this letter is <u>not</u> criticism. This is not an easy problem. I make these comments with the hope that they will lead to improvement of the quality of the environment in which I live. Thank you for the opportunity to provide comment on this important project.

Best regards,

James H. Davenport

Groundwater Management Comments:

1. Initially, GWMA was started as a means of a protection against health issues from high nitrates. However, there have been no reported cases linked to high nitrates which begs the question, why are we "protecting" people from an issue that does not exist? GWMA has now turned into an information hack of dairy farms and a way to place blame on the dairy industry for high nitrates with no evidence to back up that claim.

2. Nitrates have been found to be sporadic in their location. The original well testing from domestic wells indicated no clear evidence as to where nitrates will be found and why. Monitoring wells were supposed to be a step forward in data collection to determine BMPs. The first 20 wells were more random in location and approved by GWMA but the last 11 were not approved; hardly communicated and 9 of them seem to have targeted dairy farms in their extreme close proximity to the farms. There have been numerous problems with the chosen locations of many of these wells. They have been put next to anomalies and large bodies of moving water. The wells in these locations will not prove to be solid evidence as it will throw off an accurate nitrate sample. If these wells are not for determining BMPs, why were they installed? Information collected from these wells also need to be examined as to the cause of the nitrates. Are they from animals, humans or man-made fertilizers?

3. On site septic systems have not been given enough research or monitoring. On site septic systems are designed to leach all of their nitrogen into groundwater while dairy farm's lagoons have been built to government specifications and are NOT designed to leach anything. Dairy lagoons are inspected yearly as well as the land that is farmed by the dairies to ensure no leaching of nitrogen has occurred.

4. Farming practices have made great strides using available nutrients to improve our land, our crops and our future. These strides have eliminated the farming practices of the past but we still deal with the farming practices of the past's legacy. Legacy nitrates are in the ground and has more than likely contributed to the high nitrate issues. Our farming practices of today are helping to resolve these issues by pulling the nitrates out of the ground. It would be a great step forward if farmers were acknowledged for their clean-up efforts rather than only being blamed.

5. The minority report is a biased, premeditated report that has no scientific or factual back-up. How can that information be considered when it was written as a complete ploy against dairy farming before a main report had been concluded? We ask that the minority report not be included because of this bias.

6. If dairy farms are going to be targeted without evidence of their part in this issue, the actual issue cannot be resolved and the studies will provide unsatisfactory results that in turn will leave this issue at large. There are many more factors to consider in this matter that are being ignored because activist groups have placed dairy farming in the spot light due to their agenda against dairy farming.

7. A huge part of being a farmer is being stewards of the land. History has proven that farmers are constantly evolving and have met the large demands placed on them, especially in recent years. What could be more sustainable than using cow manure as fertilizer to grow feed for our animals? Cow manure adds organic material to our soil which, in turn, helps our soil to retain water better, retain nutrients for crops better and improve soil quality all around. Commercial fertilizer has not proven to be as effective in these ways.

(1) Wke recommend yoa don't use information on These sabstandard monitering wells

(2) I believe That as a dairy farmer That wke have made all our land more fertile and more valagble. I believe wke have beem unfairly judged wke are a Target

(3) Jean Mendoza shouldn't be ~~that~~ let in The process she is to one sided

RECEIVED
MAR 25 2019
Dept of Ecology
Central Regional Office

John Koopmans
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Ellah Wa 98953
3-25-19

From: Bowen, David (ECY) [mailto:dabo461@ECY.WA.GOV]
Sent: Thursday, April 4, 2019 9:48 AM
To: Lisa Freund <lisa.freund@co.yakima.wa.us>; David Haws <davidh@co.yakima.wa.us>
Subject: FW: Draft Lower Yakima Valley Groundwater Management Program comment

From: noreply@smartcomment.com <noreply@smartcomment.com>
Sent: Wednesday, March 27, 2019 3:43 PM
To: jkdairy2003@gmail.com
Subject: Draft Lower Yakima Valley Groundwater Management Program comment

Thank you for your comments on the Draft Lower Yakima Valley Groundwater Management Program. Your comments have been received.

Name: Karen Sheehan
Address: 1641 Harrison Road
City: Sunnyside
State: Washington
ZIP: 98944
Email: jkdairy2003@gmail.com

Draft Lower Yakima Valley Groundwater Management Program

The GWMA report is focused too much on dairy and not enough on the rest of agriculture including hops, mint, row crops, tree fruit, grapes, etc. Dairy farmers are the only part of agriculture that is required to take annual soil samples and have a written nutrient management plan plus have inspections. The rest of agriculture can farm as they please with no oversight or required plans. Dairy is already the most regulated for nutrients. Manure is referred to as waste rather than the valuable organic product that it is with nitrogen, phosphorus, potassium and many other micro nutrients. Manure should not be mentioned as waste in the GWMA report. Septic systems should be looked into more closely with both proper maintenance and also density of septic systems. There is also a legacy issue with nitrates in this area that needs more attention. The whole GWMA area needs to work together and look hard at all areas if they expect to lower the nitrates in our groundwater. Voluntary and education is the best way to fix this problem.

- I would like to see all ~~the~~ 37 of the test wells be tested for weather the nitrates are coming from Human waste or from animals & ~~for~~ commercial fertilizer.

- I feel that the BMPs need to be voluntary, because as a dairy farm is already has earthen lagoons designed by NRCS and if you want to see them get lined there needs to be some kind of cost share for that.

- all 37 wells are ground level and are open to contamination. I would like to see all of them be at least 2 feet of above ground level.

- I also think there should be a few wells around the town of outlook to determine weather ~~it is~~ the nitrates are coming from People or agriculture.

- Jean Mendoza's 400 page Report needs to be thrown out.
- If there is no wells in the urban Growth area's around towns there needs to be.

Markus Rollinger
3/25/19

Norm Peck (03/01/2019): Thank you for the opportunity to comment.

The Lower Yakima Groundwater Management Area Committee should be complimented on the thoroughness of the Draft Plan; obviously a lot of quality work on this controversial topic has been completed by a wide range of stakeholders.

In addition to randomly placed monitoring wells, consideration should be given to more intensive targeted monitoring at and around "hot spots" as changes in N concentrations (improvements and further degradation) will be particularly important in those areas.

Because of potential negative effects on fish and fish habitat, ammonia (NH_3) should be investigated in irrigation return flows to surface waters. Arid area waters tend to be more alkaline than those in wetter areas, and NH_3 toxicity to aquatic organisms increases as pH increases. (EPA Quality Criteria for Water, 1986 as updated). If initial investigations do not indicate a problem, no further monitoring should be required.

Consideration should be given to supplemental funding to include nitrogen analysis of groundwater samples from Superfund/MTCA site monitoring wells within the study area. This would potentially increase the number of available data points within the study area at a very modest increase in cost.

Formation of rural PUD Water Districts should be considered among the options for replacement water supplies, particularly in "hot spots" within the GMA.
Incorporation of recirculating sand filters in areas where high density of ROSS should be considered as one option to reduce N concentrations in OSS discharges.

Use of radio educational information on Spanish-language radio stations has been identified as an effective outreach tool to those for whom Spanish is a language used in households in the Yakima Valley. I have been told that many workers who are fluent in Spanish listen to Spanish-language radio at work and while traveling as well as in the home.

Name: Patricia Newhouse
Address: 700 Wendell Phillips Road
City: Sunnyside
State: Washington
ZIP: 98944
Email: plnewhouse@gmail.com

Draft Lower Yakima Valley Groundwater Management Program

I have two major concerns at this point in the process.
First, I do not believe that a private citizen who does not live in the GWMA area should be allowed to submit a minority report that will be attached to the GWAC recommendations.
Second, I am concerned about the placement of the second group of monitoring wells. Even if they were randomly selected, the fact that 9 of the 11 additional wells are in close proximity to dairy farms will skew the results and should have been a disqualifying factor for many of these locations.

3-25-2019

I feel that dairys have been really targeted. yes there is nitrates in the water. How are we gonna find the Source? It is easy to point a finger at a farmer that is Spreading his cow manure because it stinks. there is So Many other Sources, So much white and liquid feterlizer that has been used for decades. Are we Supposed to take the blame for past farmly practices?

we bought numerous parcels of ground that had high levels of nitrogen. we get monitered heavely. we doble crop. I can't explain well enough how much grand we have cleaned up.

what about ALL the Sub divisions in the valley? what happened to big open farm ground. All these house taky up valueable farms. the All have Septics. I hear way to many per Section then there Should be.

Our farmy cuminty is afraid to Speak up because we Always get targeted. I Agree we need clean water, but figure out where to problem is coming from. don't point the easy finger.

March 18,2019

Mr. David Brown
Section Manager
Department of Ecology
1250 W Alder St
Union Gap, WA 98903-0009

Dear Mr. Brown,

I writing to comment on the draft Lower Yakima Valley Ground Water Management Program. I live in Prosser and attended the public hearing in Sunnyside. I served as the extension soil scientist with WSU at the Irrigated Agriculture Research and Extension Center at Prosser from 1985 to 2009. I worked extensively in the area of nutrient and irrigation management. I was also active in the Columbia Basin GWMA.

In reviewing the draft plan I am especially concerned about the presentation of the deep soil sampling data. If this data is to become a permit part of the record, I believe some additional editing needs to be done on both reports. This is especially true in Ms. Mendoza's summary. The units on the tables and grafts are very confusing. Soil test nitrate is reported as nitrogen as nitrate (nitrate-N). Ms. Mendoza uses a number of units such as NO_3-N, N lbs/acre, lbs NO_3 per acre. The units in the tables and figures should be consistent and an explanation of how they were reached should be presented.

I agree with both summaries that only limited conclusions can be drawn from this data set. The Washington hop commission funded a WSU, three year, deep sampling to 6 ft. in 23 hop yards from 1990-1992. This study showed the variability between spring and fall sampling and explained some of the reasons why this happens. It also demonstrated how variable management practice can effect soil test nitrate over time.

Ms. Mendoza points out that higher soil test nitrate levels were seen with double cropping with triticale following corn. Double cropping, ie a winter cover crop, was

designed to take up residual nitrate left in the soil after harvest especially in hops and then corn. Over time the addition of nitrogen to the triticale crop with out recognition of residual soil nitrogen following corn has lead to excess nitrogen addition to the two crops.

The noted range in deep soil test nitrate in alfalfa fields may well be related to high levels where liquid manure has been applied to the alfalfa because of the crops ability to remove large amounts of nitrogen.

I strongly agree with the plan's stress on nutrient and irrigation management as the two critical BMPs that need to be addressed. On page 189 under Appendix G I would recommend that residual soil nitrogen be included in the list of accounting for all sources on nitrogen. The relative return on investment for most of the other BMPs listed is very small compared to water and nutrient management.

I realize that a diverse group worked to put this plan together and appreciate all the effort. I believe that the greatest reductions in ground water nitrate levels can be achieved by implementing programs that encourage adoption of irrigation and nutrient management practices.

Please contact me if I can provide any explanation of my comments (509 781 0588).

Sincerely,

Robert G. Stevens Ph. D.
bobcathys@embarqmail.com

1. The well info will be used against dairy industry/cattle industry.
2. Wells were drilled without knowledge of Gwama.
3. Criteria for drilling additional wells wasn't followed
4. No protection from citizen lawsuits.
5. Why can't info from wells deemed ~~[illegible]~~ anamolies be thrown out.
6. Address septic systems, and legacy nitrates.
7. What studies ~~are~~ being done to show how legacy nitrates are being brought down
8. Show dairymen are already doing a lot to ~~[illegible]~~ lower nitrates and manage nitrates
9. Public outreach more other causes of high nitrates.

Tamer Winckler
W.S. Farms inc.
3-25-19

Espinoza, Joy (ECY)

From: Espinoza, Joy (ECY) on behalf of Bowen, David (ECY)
Sent: Wednesday, March 27, 2019 2:03 PM
To: Espinoza, Joy (ECY)
Subject: FW: Groundwater comments

-----Original Message-----
From: Tony Veiga <tony.veiga@yahoo.com>
Sent: Wednesday, March 27, 2019 1:58 PM
To: Bowen, David (ECY) <dabo461@ECY.WA.GOV>
Cc: jkdairy@yahoo.com
Subject: Groundwater comments

Today we are commenting on the ground water report in our valley.

We are very disappointed that during the GWMA it's seem to lack other stakeholders in our valley such as tree fruit,hops,mint Vineyard and other commodities. Where was the rest of agriculture/commodities ?
In this report.

We have been dairy farmers in this valley for the last 38 years. We have always been proud to live in the Yakima valley but what's been going on in regards to targeting dairies as being the sole polluter is wrong. In our past years experience, when coming to this valley there were sugar beet, potatoes and unlimited amounts of nitrogen applied to fields which were rill irrigated.

What about the septic systems in the valley that are not regulated?

What about the legacy of farming practices that occurred in the valley multiple decades ago?

What about if all of agriculture work together to solve this problem?

Tony and Brenda Veiga
7010 e. Edison Rd.
Sunnyside, WA 98944

Sent from my iPhones

Trevor Wagenaar 3/25/19

in time

Looking back at the crops grown in this valley such as sugar beets, potatoes, etc., there used to be fertilizer poured on those crops. There was not fertilizer management we have now. It was the "more is better theory." I am just wondering how that might have impacted what we have now ?????

Dairymen purchase land from other farmers and do reclaim the ground from those who have poured on the fertilizer in years previous.

Dairymen soil test twice a year which is more than most!

Our management practices are pretty efficient because we want to be economical!

Manure is a fertilizer and not waste!

The Veldhuis family

City of Bichleton drilled well.
they found it had high Nitrotion.
where does this come from.

March 25
Hessel Veldhuis
Jacob Veldhuis
Anna Veldhuis
Ruud Veldhuis

There been fields that we bought throughout the years that been higher nitrogen there then our ground that we own. Seen field with 1000 pounds of N in the ground. We got it all in order nowbut it took years without N of our part to do it.

It seems like they are targeting us dairymen to fail.
Where they got all these wells in the valley are all easily next to dairymen. Why not other places.

water never goes up hill.
So with these wells next to dairies it's easy to point a finger at them instead it could be coming from a few miles away higher up with a vein in the ground

What about all the testwells, ire seem in the valley are ground level or below. how is this right.

TO: David Bowen, Washington State Dept. of Ecology
Central Regional Office
1250 W. Alder St.
Union Gap, WA 98903-0009

FROM: Yakima County Farm Bureau

RE: Comments on Lower Yakima Valley Groundwater Management Plan

March 12, 2019

Yakima County Farm Bureau represents over 3,000 Yakima County members on agricultural related issues in Yakima County, and is the largest agricultural organization in Yakima County. It is a voluntary, grassroots advocacy group representing the social and economic interests of farm and ranch families at the local, state and national levels. Yakima County produces over $1 billion farm gate value in agricultural products annually and is one the most diversified agricultural producing counties in the country.

We would like to take this opportunity to thank DOE staff for their willingness to review and rewrite the Yakima GWMA report. This was the fourth rewrite. Overall, we found it to be much more succinct and technical. It is also more concise and does not contain as much controversial opinionated material as previous draft versions. Since Yakima County did not retain a professional water quality contractor to write this report as other Ground Water Management Areas have done, but instead hired a retired attorney to do it, made this process take almost an extra year to complete.

There are still a number of items that are expressed improperly, show a considerable bias or do not provide all of the information related to the particular topic being discussed. *For these reasons that are explained in further detail below, Yakima County Farm Bureau voted against accepting this report.*

Unnecessary verbiage is quite evident when one reads through the Benton County Groundwater report. Benton County originally was part of Lower Yakima GWMA effort. They opted out after about a year and went on their own contracting directly with the DOE, with the Benton County Conservation District as Lead Entity. While both Yakima and Benton Counties were dealing with the exact same issue, the Benton County Groundwater report released a few months ago, is approximately 40 pages long, while the Yakima report is over 130 pages long. This is very compelling as to the nature of the Yakima report. In summary, the Yakima report is too long and focuses on items that have nothing to do with the subject.

In particular, there is still a biased focus on how depressed the Yakima Groundwater area is, and the number of so-called poor people of color without means. The lower cost of living in our area was not factored into the report. Nor was the fact that many people who came here to work, while not highly educated by today's standards, did have the skills necessary to perform needed tasks and make a living. This depiction paints a false picture. Job opportunities abound in our region and people have flocked here to get them. The number of farm workers coming from other countries expands by thousands

every year. People from the south are clamoring to get into our country. Our public and private schools are second to none and every child has an opportunity to attend. These points paint a very different picture than what the report is trying to imply.

The report also has a major focus on animal agriculture, primarily dairies in the area. This focus ends up being a bias that is not backed up with true data or facts, and is contrary to reports from other areas. Maps depict dairy facilities in red which makes them appear to be a larger contributor, when in actuality, engineering, regulations and regulatory inspections negate most of that potential.

Maps in the report depict that many of the high N concentrations are where there are higher rural population, but there is little focus on this, nor is there a focus that septic drain fields are designed to leach. Information and focus from other sources about nitrates leaching from drain fields into the groundwater is lacking.

The report does not focus enough on legacy nitrates from former crops grown in the area and former growing practices that were likely contributors to it such as furrow and rill irrigation practices. This was no fault of producers as they were using the best information and technology at the time. However, the report's slant is that current ag practices are to blame, which is contrary to what the data tells us. In fact, recommendations in the report are for agriculture to implement new irrigation technologies such as sprinkler and drip systems, much of which has already been implemented in the Groundwater area.

Particular items of concern:

1. The report is too long. Few rank-and-file citizens will take the time to read it.
2. Pg 1 – third paragraph, citing that the GWAC had contentious discussions and whether or not they were respectful, is not relevant to the report or summary. This statement furthers the divisions of the group.
3. Pg 3 – bullet point to "enhance" regulations. There was not an agreement to recommend to enhance or add to regulations.
4. Pg 4 – Formation of the Lower Valley GWMA. Environmental groups were not the first to identify the problem. It was known by government agencies for a number of years. It was also brought to DOE's attention by the dairy industry before there was any talk about formally addressing the problem. Giving so-called environmental groups credit for identifying the issue is biased and not true.
5. Pg 10 – There is no mention of DOH responsibility to act on WAC 246-272A-015(5) which states "shall develop a written plan that will provide guidance to the local jurisdiction regarding development and management activities for all OSS within the jurisdiction". This has NOT been done.
6. Pg 15 – Nitrate leaching section is negatively biased toward ag as it does not mention anything about other sources of N. Health effects section does not mention anything about new evidence concerning how nitrates may not be the primary influencer on the very young.
7. Pg 17 - MDL of .03mg/L is misleading and not explained as some areas can have background levels much higher that .03mg/L.

8. Pg 19 - Citing the median N use scenario as most likely may not be accurate. Farmers do not buy any more N than is necessary because it is expensive, so a more accurate scenario could be the low use amount.
9. Pg 20 – The N sources graph is very misleading. Different potential agricultural sources are treated equal, when they should not be. Sources on dairies are subject to regulatory constraints and engineering requirements that serve to contain materials. Having a position that these materials have the same potential to migrate, is not accurate. In addition, there is information available from California that pens and lagoons have less than one percent contribution (0.7 percent), significantly lower than the 31 percent noted in the report.
10. Pg 22 – fifth paragraph left out when describing benefits of using organic fertilizer also include "adding soil structure which enhances moisture holding capacity and soil biological communities."
11. Pg 23 – While farming fruit I rarely applied *high* amounts of nutrients, especially nitrogen, to producing trees because it makes the tree grow vegetatively. Vegetative growth does not allow for good fruit production. Citing that fruit growers apply high amounts of nitrogen to producing orchards is not accurate.
12. Pg 25 – The term "Waste" should be taken out of the title. It should be changed to "Water Storage, Process Water Storage, or Nutrient Water Storage." The term "Contribute" in the first paragraph is misleading. It should be modified to say "can contribute" because there is no evidence that all pens or lagoons do contribute. Again, there is no mention of the engineering that is installed to prevent contamination. Very mis leading report writing.
13. Pg 26 – There are discussions about lagoons. But, there is no mention of why lagoons came into existence which was a mandate from DOE to help with nutrient distribution throughout the year, mitigating winter applications.
14. Pg 30 – Why is there an emphasis on highly regulated bio applications? There was no evidence presented that bio solids play any role.
15. Pg 31 – Legacy N section does an incomplete job of describing past uses on N on crops such as potatoes and sugar beets, and the amount of N left in the soil profile 20 to 50 years ago. The current description makes it sound like the problem is with current applications on a current annual basis. For the most part, this is not accurate.
16. Pg 37 – Third paragraph states that natural groundwater flow may be influenced by irrigation practices, structures and dairy structures. However, it does not explain that lagoons are engineered to contain what they hold, therefore they do not have the same "potential" as the others. The lack of this information being provided presents a bias toward a particular structure that has been shown to be a benefit.
    The term "potentiometric surface" should be explained as the more common term, "static level"
17. Pg 40/41 – Groundwater recharge appears faulty or not clearly defined – Little of the irrigated land in the GWMA area recharges groundwater 12 to 48 inches of water. This is not accurate for the farmed lands.
18. Pg 64 – Needs clarification. Is the term fertilizers used in the first paragraph "commercial fertilizer?" Forth paragraph terminology should be changed. The term "manure" should be changed to more accurately reflect the product that is being applied. It is mostly liquid or other nutrients that have had some sort of treatment, either from solids being separated from the liquid or composting and drying.

19. Pg 64 – The Yakima River is not the "source" of irrigation water for the Yakima Valley. The Yakima River is the conduit for irrigation water. The source of the water is the five storage reservoirs filled by either snow or rainfall precipitation, or natural flow before storage control is implemented.
20. Pg 69 – Income comparisons very biased, compared to overall state incomes. Education section is biased and misleading. No mention of past or recent immigrants coming here to better themselves. Ethnicity section paints a false picture and is divisive. Aren't we all Americans?
21. Pg 83 – ID of N sources is not complete. No mention of wholesale commercial N supplies. Only refers to what is "produced" in the GWMA area, not what is imported. Very confusing and negatively biased toward the natural nutrients produced by animal agriculture operations.
22. Pg 85 – Graph is biased against certain locations depicted in red (likely dairy lagoons). It does not explain the engineering that these lagoons have and their minimal potential to negatively affect groundwater.
23. Pg 93 – Rec 1 needs to be better explained. What does 42 mean, 42 out of what?
24. Pg 95 – Recs 11 and 13 are very similar
25. Pg 97 – Rec 23 needs to be voluntary
26. Pg 98 – Rec 27 needs terminology change. "Waste" should be changed to "nutrients."
27. Pg 98 – Rec 28 needs to be voluntary
28. Pg 99 – Rec 35 "waste" should be changed to "nutrients"
29. Pg 100 – Rec 37 should be voluntary
30. Pg 100 – Rec 39 Incorporation of fertilizer cannot be done on established crops. Irrigating in can take longer than 24 hrs.
31. Pg 102 – Rec 49 Oppose, regulatory. DNM plans extended to all lands
32. Pg 103 – draft recs should be deleted as there was not an agreement on moving them forward. They should not be in the report.

<u>In addition, minority reports should not be part of the GWMA report. They are someone's opinion that should be separate from the report.</u>

Public Services

128 North Second Street • Fourth Floor Courthouse • Yakima, Washington 98901
(509) 574-2300 • 1-800-572-7354 • FAX (509) 574-2301 • *www.co.yakima.wa.us*

LISA H. FREUND – Director

March 22, 2019

Department of Ecology Central Regional Office
David Bowen
1250 West Alder Street
Union Gap, WA 98903

Re: Lower Yakima Valley Groundwater Management Program

Dear David Bowen:

Yakima County submits the following comments for the Lower Yakima Valley Groundwater Management Program (Program).

Yakima County cannot accept the designation of lead agency for the Program as suggested in the recommended actions.

Please find attached the previously submitted letter to Ecology from the Board of County Commissioners regarding this item.

Sincerely,

Lisa Freund, Director
Yakima County Public Services

cc: Board of Yakima County Commissioners
Director Sage Park, Department of Ecology

Attachment

BOARD OF YAKIMA COUNTY COMMISSIONERS

Michael D. Leita	Ron Anderson	Norm Childress
District 1	District 2	District 3

February 14, 2019

Department of Ecology Central Regional Office
Director Sage Park
1250 West Alder Street
Union Gap, WA 98903

Re: Lower Yakima Valley Groundwater Management Program – Lead Agency Designation

Dear Director Park:

After considerable thought, we have concluded that Yakima County cannot accept the designation of lead agency for the Lower Yakima Valley Groundwater Management Program (Program) as suggested in the Program recommended actions. We appreciate the opportunity and confidence bestowed by the GWAC in recommending that Yakima County serve as lead during the implementation phase. However, Yakima County lacks the necessary resources to implement the health and environmental actions recommended to the lead agency of the Program.

Please be assured that Yakima County will continue to serve as lead agency for the Program through the adoption process. We remain committed to the GWMA Program's implementation and will support the lead agency ultimately selected.

Sincerely,

Michael D. Leita, Chairman
District 1

Ron Anderson
District 2

Norm Childress
District 3

cc: David Bowen, Department of Ecology

APPENDIX B: COLLECTED RECOMMENDATIONS RECIEVED FROM PUBLIC COMMENT

These recommendations came out of the public comments (as presented above) and have been collected here. In many instances the exact statement have been pasted, however some have been edited for length.

During the Program creation process, the GWAC met for 6 years, spending many hours drafting, analyzing, and voting on potential recommended actions for the program. Some of the items in Appendix B have previously been discussed by the committee, however all items have been included as documentation for future use.

Recommendations Related to Dairies or Large Farming:

All agriculture (including hops, mint, row crops, tree fruit, grapes) should be required to take annual soil samples and have a written nutrient management plan plus inspections.

Encourage adoption of irrigation and nutrient management practices.

Create means for all agriculture to work together.

Create a cost share program for earthen lagoons.

Recommendations Related to Ongoing Data:

The Departments of Ecology, Agriculture and Conservation Commission, as well as Yakima County, the Yakima County Health District and the Southern Yakima Conservation District should not regard the investigation of groundwater contamination in the Lower Yakima Valley as a fait accompli, but rather as a fait ab initio.

Results from the next steps in the U.S. Geological Survey work could be useful to implementing the GWMA program. The next phase would be to conduct a reverse-loading analysis based on the 2015 particle tracking study, to estimate how much reduced nitrogen loading would need to occur to decrease nitrate concentrations in downgradient residential wells to meet the drinking water maximum contaminant level. These findings could be used to refine and focus efforts to implement the final GWMA program in the coming years.

The Washington State Conservation Commission awarded competitive grants for demonstration projects statewide to test various technological approaches to recapture or recycle nutrients, including one in the Yakima Valley. The results of these projects could be useful in the implementation phase.

Use new information from research, data gathering, and technology demonstration projects nationwide pertaining to both understanding the nature of groundwater contamination and strategies to reduce it.

Collect nitrate data from domestic wells as a substitute for monitoring wells. Collection of additional data, including hydrogeological and water quality data should focus on areas with identified deeper nitrate contamination, with a goal of identifying potential conduits to deeper aquifer zones.

Seek to broadly and proportionately represents the affected community.

Duly authorized governmental agencies and duly elected public officers are charged with a public duty to execute those rules and regulations currently in effect, and exercise those powers with which they are currently authorized, notwithstanding that they are not recommended by public interest groups.

Neither the final draft of the Lower Yakima Valley Groundwater Advisory Committee's Program, nor the recommendations contained therein, are limiting upon the choices available to the public at large or governmental agencies with relevant jurisdiction.

The Washington hop commission funded a WSU, three year, deep sampling to 6 ft. in 23 hop yards from 1990-1992. This study showed the variability between spring and fall sampling and explained some of the reasons why this happens. It also demonstrated how variable management practice can effect soil test nitrate over time. Take this into account.

Ensure that QAPPs are developed for any new work that includes data collection.

Overlay historical nitrate levels against farming practices over the same time and the population growth of the area of both livestock and people. If this long term (more than a decade) historic data is not available, perhaps a trend or timeline should be established prior to making broad decisions.

Recommendations Related to Public Outreach and Education:

Send a mass mailing to all residents located outside of public water supply service areas within the Lower Yakima Valley. The mailing would explain the problem of nitrates in shallow groundwater, and that it is of particular danger to expecting mothers and infants. The mailing would provide a telephone number for free testing of their well water for nitrates.

Use Spanish-language radio educational information as an outreach tool.

Provide education on double cropping and agronomic application of nitrogen

Recommendations Related to Gathering Additional Data:

Assign staff dedicated to collection of water samples from domestic wells for nitrate analysis. The staff should be able to respond to requests to sample within one week of a telephone request. Households with infants or expecting mothers (or women of childbearing age) would be bumped to the top of the list. Shallower wells should be given a higher priority than deeper wells. The sampling staff would maintain a database, including available well construction information.

A higher percentage of the committee be comprised of members who reside in the affected GWMA area so as to more accurately represent their community and neighbors' best interests.

Because of potential negative effects on fish and fish habitat, ammonia (NH_3) should be investigated in irrigation return flows to surface waters. Arid area waters tend to be more alkaline than those in wetter areas, and NH_3 toxicity to aquatic organisms increases as pH increases. (EPA Quality Criteria for Water, 1986 as updated). If initial investigations do not indicate a problem, no further monitoring should be required.

Consideration should be given to supplemental funding to include nitrogen analysis of groundwater samples from Superfund/MTCA site monitoring wells within the study area. This would

potentially increase the number of available data points within the study area at a very modest increase in cost.

Information not provided to the GWAC but obtainable from the Washington State

Department of Agriculture should be analyzed:

a. Growth in agricultural use intensity (density/acre, acreage fanned, production volume)

b. Amount of chemical fertilizer sold or used within GWMA

c. Report of dairy nutrient management plan information on distribution of manure (see RCW 90.64.026(3), RCW 42.56.270(7), WAC 16-06-210(29))

d. Nitrogen Loading Assessment (as distinguished from Nitrogen Availability Assessment, see: June 19, 2014, August 21, 2014, October 16, 2014, and December 18, 2014 GWAC meeting summaries; Yakima County/Department of Agriculture Interagency Agreement

Information not provided to the GWAC but obtainable from the Department of Ecology should be analyzed:

a. Report on enforcement of RCW groundwater standards

b. Report on effect of large scale water usage on groundwater quality

Identify or analyze information about the amount of chemical fertilizers sold or distributed to managers of orchards and crops, or applied to orchards and crops within the study area.

Reflect the often-expressed view/opinion within the Advisory Committee that the effect of groundwater contamination in the Lower Yakima Valley influences the lives and health of human demographic groups disproportionately. Study or describe the socioeconomic effect of groundwater contamination within the study area upon on future generations. Both effects should be studied.

Correlate the economic benefit derived from the private small industrial, agricultural, urban/suburban residential sector sources' activity within the study area with the economic costs likely to be incurred by the public remedial, corrective, educational, or regulatory activities responding to the problem. Quantify the economic value of the natural resource (groundwater) consumed through contamination (an unmeasured and undocumented expense incurred as part of the private small industrial, agricultural, and urban/suburban residential sectors' entrepreneurial enterprise). Study this relationship in order to determine correlate costs of remediation, if any, with the economic benefits of groundwater consumption.

Evaluate the causal relationship, if any, between the method and volumes of water applied to the ground surface (either generally or at specifically identifiable locations, or the volume of groundwater stored within the ground, within the studied area, and the extent, location or degree of groundwater contamination within the studied area or at specific contaminated wells.

Evaluate the correlation, if any, of the location, volume or movement of surface water within lined or unlined artificial conveyance systems (irrigation canals) with the extent, location or degree of groundwater contamination within the studied area.

Correlate changes in concentration, density, intensity, or use of source-related activities within the studied area with changes, if any, in the extent, location or degree of groundwater contamination within the studied area.

Analyze specific deep soil sampling data collected from known locations. Collect more deep soil sampling data, with data collection sites located, and that data analyzed.

Analyze trends in well data from Valley Institute for Research and Education Report (2002), Nitrate Pilot Project Well Samples, LVYGWMA High Risk Well Assessment Well Samples, and USGS 2017 Well Testing Data. Analyze trends in this data.

Identify plausible hypotheses of causation, transmission, or accumulation of contaminant between categorical sources and contamination events or locations. These hypotheses should be stated and explored.

Describe the processes of hydrogeologic or chemical transmission or accumulation of contaminant in the area of contamination. These processes should be more completely explored and described.

Investigate or analyze the geologic and hydrogeologic properties of denser locations of contaminated wells ("hotspots). These should be investigated and analyzed.

Investigate or analyze the plausible causal relationship between specifically identifiable sources and specific contamination events. These should be investigated and analyzed.

Explore the correlation, if any, between specific land use types and proximate water supply contamination events.

Address the specific land use regulations, or other regulation types, that might use, rectify, ameliorate or otherwise alter the general or specific contamination condition within the study area.

Address the effect of generic or specific sources on the protection of areas with "critical recharging effect on aquifers used for potable water or areas where a drinking aquifer is vulnerable to contamination that would affect the potability of the water" as designated by Yakima County pursuant to the Growth Management Act or otherwise (RCW 36.70A; WAC 365-190-030 (3); and YCC 16A, 16C), as "environmentally sensitive or special areas" as contemplated by WAC 197-1l-330(2)(e)(i), WAC 197-11-305 (l)(a), WAC 197-1l-908(l)(b) and the Growth Management Act. These effects should be described and analyzed.

Explore the strategy of taxation on the use or sale of materials containing chemical constituents common to known constituents of groundwater contamination as a means of source reduction.

Explore the strategy of usage limitations, imposed through land use regulation, on the nature, density, or intensity of use (analogous to limitations on industrial development).

Recommend any remedial action. Remedial actions should be studied.

Evaluate the costs or implications of inaction. These should be evaluated.

Locate and evaluate any past nitrate studies done for this area, specifically an unspecified study done approximately 40-50 years previous.

Use scientific data from additional sources, including: Collaborative work carried out by local, state and federal agencies in 2010, "Lower Yakima Valley Groundwater Quality." Data from other scientific studies are also available. Quality-assured/quality controlled available data. A few examples to draw upon include:

- United States Geological Survey (USGS): "Particle tracking for selected groundwater wells in the lower Yakima River Basin, Washington," 2015. The USGS assessed nitrate sources in specific geographic areas within the GWMA with groundwater contamination and identified associated likely nitrogen source areas, https://pubs.er.usizs.izov/publication/sir20155149
- The EPA: "Relation Between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley, Washington," 2013 contains soil information such as permeability data from lagoons, and nitrogen concentrations in manured dairy crop fields, https://www.epa.izov/wa/lower-yakima-vallevgroundwater
- Since a Consent Order was signed with three Lower Yakima Valley dairies in 2013, these dairies have made great strides in reducing the amount of nitrogen accumulating in their fields. In reports submitted under the EPA Consent Order and approved Quality Assurance Project Plan (QAPP), there are several years of biannual data from fields prior to the AOC-required limitations of field applications of manure and the subsequent transition to the present conditions. These dairies are also providing post-harvest data that can inform soil concentration estimates in the draft GWMA Plan. https://www.epa.gov/wa/lower-vakima-valley-groundwater

Study proportional impact of all sources of nitrate so as not to overly burden one group over another without knowing their respect impacts to groundwater nitrates.

Study scientific evidence of impacts related to regulations on farmers and dairymen.

Recommendations Related to Monitoring Wells:

Maintain a longitudinal record of measurements taken from groundwater monitoring wells so as to document trends in improvement or worsening of the present condition.

Map the "horizon" of analysis of monitoring well measurements from the groundwater monitoring well system (an undulating plane established by points (elevations) at each monitoring well, with the intervening spaces being calculated with reference to influence from proximate point data) should be mapped. This might indicate how the measured horizon intersects with the geologic regimes already known (theoretically) to exist within the study area.

Introduce some sort of non-pollutive tracer in selected monitoring wells in order to ascertain whether that tracer expresses itself in other monitoring wells. This may be possible due to the density and location of monitoring wells within the study area. This may provide information helpful in establishing direction of groundwater flow (albeit at a rather surficial elevation).

Test monitoring wells whether the nitrates are coming from human waste or from animals and commercial fertilizer.

Place some wells around the town of Outlook to determine whether the nitrates are coming from people or agriculture.

In addition to randomly placed monitoring wells, consideration should be given to more intensive targeted monitoring at and around "hot spots" as changes in N concentrations (improvements and further degradation) will be particularly important in those areas.

Include wells in the urban growth areas.

Wells deemed anomalies to be discontinued.

Recommendations Related to Providing Resources:

Identify locations for household collection of free drinking water at each community in the Lower Yakima Valley. Once a household water supply well has been tested, the owner or resident would be provided with a document allowing them to pick up free drinking water (a reasonable weekly allotment could be calculated).

Begin a grant program for replacement of impacted shallow domestic wells. Such grants could be applied for by homeowners that have a shallow wells with nitrates above cleanup levels. Prioritization of grant recipients should be based on needs of the applicant. A fund for this grant can be contributed to by taxpayers and groundwater polluters. This recommendation would require legislative action.

Formation of rural PUD Water Districts for replacement water supplies, particularly in "hot spots" within the GWMA.

Use recirculating sand filters in areas where high density of ROSS.

Coordinate with DOH on WAC 246-272A-015 (5) which states "shall develop a written plan that will provide guidance to the local jurisdiction regarding development and management activities for all OSS within the jurisdiction".

Recommendations Related to Additional Regulations:

Drinking water wells required depth of greater than one hundred feet deep.

Onsite Sewage Systems (OSS) should be controlled by the county and a plan that is required by WAC 246-272A-015(5) should be developed by the Health Department for OSS. I would recommend that any parcel that requests an OSS permit that is less than 20 acres (just under High Density standards) should have an OSS that is designed to reduce the nitrogen flow in its effluent.

Recommendations Related to Additional Approaches:

Provide greater focus on eliminate exposure pathways.

Make providing drinking water to affected the top priority.