March 21, 2019

Dear Yakima Family Farmers,

Here is Friends of Toppenish Creek's response to your request for proof to back up my claims. I believe this is sufficient, and I do not owe an apology to Jason Sheehan, Dan DeGroot or Steve George. Since you posted your challenge on the Save Family Farming website, I expect that you will post my response.

I do not disagree regarding the need to address impact from domestic septic systems. But this source is 1% of the problem in a University of California study, 1.2% of the problem in an Ecology study in Whatcom County and between 1% and 5% in the Lower Yakima Valley Groundwater Management Area. In my opinion, septics only deserve a proportionate amount of attention.

In the UC Davis study we believe Mendoza is referring to, there are similar estimates of contribution from manure lagoons in California, but this is an area (Tulare basin) where there were lots of very large dairies and small population. Also, we do not know the density of septics in this area and the density of septics as we see in the Outlook cluster significantly impacts the amount of contamination according to the EPA.

As to the Whatcom study, Mendoza conveniently does not mention the column next to that indicating 1.2% for septics. It says this same amount comes from dairy lagoons. And that is likely true of nitrogen. But this again misses the key fact that nitrogen is not nitrate. Nitrate is the issue, not nitrogen. And Ecology's figures do not reflect nitrate from the lagoons, which as we have shown repeatedly, is minimal because of denitrification.

Mendoza mentions that in the Lower Yakima Valley the contribution from septics of nitrogen may be 5%. Since much of the nitrogen in septics converts to nitrate while lagoons minimize nitrate contributions, this shows that septics are of concern. However, she continues to insist on imposing cost-prohibitive regulations on dairy lagoons and fails to mention any issue with septics relating to groundwater contamination. We believe this demonstrates her interest is not on improving water quality but simply ridding the community of dairy farms.

This response required a great deal of my time – way more than I wanted to spend. But I took the time out of respect for the people from agriculture. With this in mind, I hope you will reciprocate when I ask you to address other small but significant sources of nitrate pollution in the Yakima Valley.

Sincerely,

Jean Mendoza

Throughout her critique of our facts, Ms. Mendoza misses the essential point: nitrogen and nitrate are not the same. Nitrogen is one of the most common elements in the universe, making up 78% of earth's atmosphere. It is a necessary element of all living things and constitutes 3% of a human's weight. It is not a contaminant, except in water when it takes the form of nitrate. Nitrogen in various forms, including ammonia, can convert to nitrate if and only if it is exposed to oxygen and microbes. This is what happens when a farmer applies nitrogen from commercial or organic fertilizer (manure) to a crop field. The air, water and microbes convert some of the nitrogen to nitrate which is the form of nitrogen that plants need to grow. It is also what happens in a septic system. The effluent flows from the tank into the drain field which by design contains air, water and microbes. A drain field that does not have these qualities doesn't "perc" and therefore fails in this conversion.

We understand that it is easy to miss this key fact about the essential difference between nitrogen and nitrate. But Ms. Mendoza continues to equate the nitrogen in the manure and the small amount that leaks as if it is nitrate, which it most definitely is not. That is the crucial difference between the 8.3 pounds of nitrate-nitrogen coming from a one acre manure lagoon per year and the 6.72 pounds per person from a septic system.

As we definitively show, our information provided earlier that just five residential septic systems deliver ten times more nitrate to groundwater than a one acre manure lagoon is not only true, it is likely very conservative. While Ms. Mendoza continues to challenge this, calling it "lies" and "stupidity," we ask her to work at better understanding the science if she is going to continue to criticize dairy farms, or risk losing her credibility. We also challenge her to explain why, given these facts and her activism for clean water, why she is not more serious about addressing the issues related to residential septics, particularly in high density areas such as Outlook.

Reply to Save Family Farming

1. The SFF vimeo, designed to reach the 98% who do not own or work on a farm, states:

> *. . . just five septics systems used by just 12.5 people produce 84 pounds of nitrogen versus a one acre manure lagoon producing just 8.3 pounds.*

And

> *Put another way 12.5 people contribute as much as 10 times as a one acre manure lagoon.*

This is not true. SFF data says that leaching from five domestic septics systems used by 12.5 people produces about 140 pounds of nitrogen per year (11.2 lbs per person x 12.5 people) and most is available for transport to groundwater. Based on a WSDA literature review and analysis of Yakima Valley data (LYV GWMA at http://www.yakimacounty.us/DocumentCenter/View/17514/June-2018-Final-Nitrogen-Availability-Assessment-) a one-acre manure lagoon with an average depth of 10 ft leaches about 2,284 pounds of nitrogen per year that is available for transport to groundwater. The total amount of nitrogen produced by the manure lagoon is in the millions of pounds – most of this nitrogen ends up on cropland; about 35% is volatilized and ends up in the atmosphere.

2. Some elements of acceptable research reporting are missing from this SFF post:

- There is no literature review
- Only literature that supports the SFF position has been cited. Contradictory research was not cited
- The citations are not done in a way that allows the reader to find the supporting documents.
- Some experts are not named. For example SFF says on page 6/23 that

  > *The actual comparison between OSS and manure lagoons we used in our video that Ms. Mendoza found incorrect, or that she felt constituted "lies," came from government technical experts. This evaluation was confirmed by a leading agricultural scientist at Washington State University. The following was included in public presentations made by one expert.*

  The names of the experts should be provided, along with the dates of their statements, and titles of publications/presentations.

Mendoza wants to suggest that her info is substantiated scientifically and the information we presented is not. We stand by the careful and thorough science explanation provided in the document she is disputing.

- There is no reference list

3. The SFF document makes a comparison between Septic Systems and Manure Lagoons. The two are really not comparable. One is a system and the other is a component of a

system. A more accurate assessment would be either to compare leakage from Septic Tanks versus Manure Lagoons or the more holistic approach, to compare the leakage from Septic Systems (septic tanks + drain fields) versus Manure Management Systems (pens and corrals + settling ponds + manure lagoons + application fields).

The depiction below shows what happens in a manure management system and a septic system when they are in the same general area, with the similar soils

Hypothetical Map

Corn Field Alfalfa Pens/Corrals/Compost Septics

^ Manure Lagoon

This "hypothetical map" may show what Mendoza believes to be the facts about manure systems, but it is very far from representing the truth. She wants to compare manure lagoons and septic tanks. We refer to our detailed explanation that shows that material from the septic system is designed to distribute the contents (minus solids) to the ground. To do so and keep from rising to the surface and puddling up, the ground has to "perc" which means it has to be pervious to allow for air or oxygen to penetrate. Nitrogen converts to nitrate in the presence of oxygen, water and microbes –– exactly the condition required for a septic system. The clay liner, combined with manure solids in the lagoon, prevents almost all material containing nitrogen from leaching. While the septic system including drainfield is purpose built to distribute nitrogen and its converted form nitrate, the lagoon is the opposite, it is intended to hold it. The small amount of nitrogen that does leak does not convert to nitrate because of the lack of oxygen in the liner and the soil beneath, as well as the denitrification qualities of the liner itself.

Manure Management – One Acre Lagoon that averages 10 ft of liquid	**Five Septic Systems with one acre drain fields for homes with 2.5 people each**

Cows poop & pee in the open lots. Urine goes into the ground; manure is stacked and later hauled to compost yards or cropland. Manure and runoff is also piped to lagoons. The average lactating cows produces .90 to 1.11 lbs of nitrogen per day (NRCS Agricultural Waste Management Field Handbook, Ch. 4, page 4-13)	People poop & pee into toilets. This waste plush water and chemicals from laundry, showers, and dishwashing is piped to septic tanks. For every 1,000 lbs of human weight people produce .2 lbs of nitrogen per day (NRCS Agricultural Waste Management Field Handbook, Ch. 4, page 4-26)
Influent is mostly organic nitrogen, ammonia & ammonium plus wash water and runoff. Average nitrogen concentration in lagoons is 800 mg/L with a range of 500 to 3,000 mg/L	Influent is mostly organic nitrogen plus household chemicals. Average nitrogen concentration = 75 mg/L with a range of 40 mg/L to 100 mg/L.
Lagoons are mostly anaerobic so there is little nitrification. There is solids separation and	Septics are mostly anaerobic so there is little nitrification. Digestion takes place

some digestion. At least annually lagoons are emptied.	and ammonia is produced. Periodically, every 3 – 10 years, solids are removed. She is referring to the septic tank only, ignoring the fact that the nitrate issue arises through the drainfield, an essential component of the system. It is deceptive to compare septic tanks to manure lagoons because the septic system including drainfield is the issue related to nitrates.
Liquid manure from the lagoons is piped to cropland for fertilizer application. Depending on the amount of organic nitrogen it may take several years to break down. Nitrification takes place and nitrate is taken up by plants. There is evaporation if the liquid manure is not injected. Excess nitrate leaches to groundwater. Only what is not taken up by plants is "excess" and can leach to groundwater. But this is exactly what Washington dairy regulations are designed to prevent. Nutrient management plans control application so that only what plants can use is applied.	Decanted liquids flow through pipes to the drain field. Most of the ammonia and ammonium is nitrified to nitrate. There is some uptake by plants and evapotranspiration. Most of the liquid and nitrate gravitates to groundwater. We note her statement that most of the liquid is nitrified to nitrate. That is the critical issue. This is what septic systems are designed to do, in contrast to lagoons which are designed to prevent conversion to nitrates. Nitrates are the issue of water quality.
Lagoon leachate goes through clay liners and cracks in the liners. Leachate has little nitrate. There is potential for nitrification if the soils are aerobic.	Septic tank leachate – there is none. The only leachate from septic systems comes from drain fields
Potential for denitrification if the soils are anaerobic. Conditions for denitrification are not generally present in the Lower Yakima Valley. (Expert report of Dr. Byron Shaw in CARE versus Cow Palace) Soil conditions do matter which is why the NRCS standards for lagoons take into consideration local conditions. Also, this fails to recognize the denitrification that occurs in the clay or soil liner.	Potential for denitrification if the soils are anaerobic If they are anaerobic, which means having no oxygen, the property owner has a problem because the system is not working properly. Heavy soil like the clay used for lagoon liners fails the "perc" test needed for drainfields precisely because they are anaerobic. Drainfields must have

	air and water if they are to work properly.
Any lagoon nitrate will follow the water and, most likely, eventually reach the groundwater. Water and nitrate follow preferential pathways that may be lateral. Yes, this is correct except it misses the point we made repeatedly that very little nitrate leaks from a lagoon and what may leak is mostly denitrified.	Nitrate will follow the water and, most likely, eventually reach the groundwater. Water and nitrate follow preferential pathways that may be lateral. This is exactly what happens in a drainfield which is designed to convert nitrogen to nitrate, the form of nitrogen of concern to water quality.
Lagoon ammonia or ammonium will more likely cling to the soil and accumulate beneath the lagoons. Not sure what point she is trying to make here. Nitrate, not ammonia or other forms of nitrogen, is the concern. Even if ammonia or ammonium converts to nitrate, the nitrate is still subject to denitrification.	There is little accumulation of nitrogen compounds beneath the drain fields. The compound she is referring to, nitrate, does not accumulate because it is carried by the water in the soil into the groundwater.
Total nitrogen in lagoon leachate = 2,248.4 lbs per year* Earlier she references the UCDavis study which states nitrogen leachate at 1045 lbs per year. Of course, this completely misses the point of the impact of the nitrogen cycle. Nitrogen is not the issue. Nitrate is. Septic systems by design convert nitrogen to nitrate which then passes to groundwater. Lagoons prevent leakage and the small amount that may leak is mostly prevented from converting to nitrate and the nitrate there is mostly denitrified.	Total nitrogen in leachate from five drain fields = 11.2 lbs per person per year = 140 lbs per year Since most of the nitrogen in a drainfield is converted to nitrate, it should be referred as nitrate. The number she uses here is actually higher than what we used for nitrate-nitrogen from septics. We used 85 pounds from five septic systems, she uses 140 pounds using the higher range from the EPA manual. Comparing the 140 pounds of nitrate-nitrogen from septics to the 8.3 pounds of nitrate-nitrogen from a one acre manure lagoon shows what we provided earlier was very conservative.

*Total nitrogen in lagoon leachate:
800 mg/L = 6.66667 lbs per 1,000 gal

924 gal per day contains 6.666667 x .924 = 6.16 lbs per day
6.16 x 365 = 2248.4 lbs per year

4. The vimeo conclusion that manure lagoons leak 8.3 lbs of N per acre per year contradicts the results of comprehensive studies by professional scientists who have devoted their lives to this type of research. For example:

- *The University of California at Davis estimated manure lagoon leakage between 141 and 1,407 lbs N per lagoon acre per year* http://groundwaternitrate.ucdavis.edu/

Speaking of contradictions, Mendoza says in the last box of the chart above that lagoon leakage of nitrogen is twice what this UC Davis study says. But the real issue here is not nitrogen, but nitrate, and that is has already been discussed. Nitrogen is not nitrate. Septic systems produce nitrate from nitrogen in the material, lagoons mostly do not.

While Mendoza uses the UCDavis study to try to discredit our number of total nitrate-nitrogen from lagoons, she ignores the conclusions of this study that support our information on denitrification:

"We note that low nitrate (and ammonium) concentrations found in monitoring wells constructed in the Tulare Lake Basin adjacent to relatively old manure storage lagoons (Harter et al., 2013) suggests that, under conditions of deep water table (>20m below ground surface), either significant denitrification occurs or lateral movement across perching layers distributes the nitrogen across a larger recharge area."

- *The WA State Dept of Ecology studies in Whatcom County estimated lagoon leakage at 2,730 lbs per lagoon acre per year* https://fortress.wa.gov/ecy/publications/documents/1203026.pdf
- *The WSDA in the GWMA Report estimated manure lagoon leakage at 1,354 to 13,542 lbs per lagoon acre per year* http://www.yakimacounty.us/DocumentCenter/View/18948/GWMA-Volume-I-Clean

For Mendoza, leakage equals contamination. That is true of septics because of conversion of nitrogen to nitrate, not of lagoons as has been carefully and repeatedly explained.

Step by Step

SFF states:

The comparison in the video she was complaining about actually came from government technical experts, and was confirmed by a leading agricultural scientist at Washington State University.

Please name the government technical experts and the leading agricultural scientist at Washington State University

SFF states:

Washington State has some of the most stringent nutrient management laws in the nation, enforced through inspections, penalties and fines by the Washington State Department of Agriculture.

I disagree:

- For six years, from 2011 to 2017, Washington State relied on an expired NPDES permit for CAFOs because the Dept. of Ecology failed to write a new one asrequired by law.

Mendoza conveniently ignores the 1998 Nutrient Management Act which specifies very clearly how manure is to be managed. Following the decision in 2002 of the Department of Ecology to suspend its dairy inspection program, the dairy community went to the legislature to seek funding to continue the inspections and enforcement of this important law. That was secured through the Washington State Department of Agriculture. When the Department of Ecology issued the new Concentrated Animal Feeding Operation permit including the NPDES permit, a Memorandum of Understanding between Ecology and Agriculture departments provided close coordination, inspections and enforcement. It is deceptive of Mendoza to suggest that Washington did not have stringent regulations during the time period she indicates.

- Under the recently released NPDES CAFO General Permit:
    - If fall soil sampling in Eastern Washington finds between 111 and 165 lbs of nitrate per acre, the landowner must adjust land application timing to correspond to peak crop uptake, stop land application after peak crop uptake and test soil to the three foot level at the end of the next crop year.
    - If fall soil sampling continues in the 111 to 165 lbs/acre range for three years then the landowner has two more years to reduce nutrient application to the field and hire a professional/consultant to develop yearly nutrient budgets and application rates.
    - It appears that this can go on for a long time without meaningful corrections.
    - See Ecology NPDES General Permit for CAFOs at https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Concentrated-animal-feeding-operation

  According to Ecology's Permitting and Reporting Information System (PARIS) only 15 Washington State CAFO's currently have NPDES permits. See Ecology at https://apps.ecology.wa.gov/paris/PermitLookup.aspx

  Mendoza fails to mention that the CAFO permit largely duplicates the existing laws and regulations (see immediately below) and that CAFO permits are required only in situations of demonstrated pollution which most farms do not have.

-

- WSDA has administered a Dairy Nutrient Management Program since the late 1990's. Under that program dairies must have a nutrient management plan (NMP) but they are not required to follow the plan.

  Those farmers subject to enforcement action by the Department would take strong exception to the claim that there are laws without the requirement to follow them.

  See WSDA Nutrient Management Report to the Legislature 2017 at https://agr.wa.gov/FP/Pubs/docs/634- DNMP2017LegReport.pdf

- The dairies in the Lower Yakima Valley Dairy Cluster were receiving high grades from the WSDA inspectors while simultaneously over applying manure at egregious rates to their cropland. See Documents in CARE and Center for Food Safety versus Cow Palace at http://charlietebbutt.com/cases.html This is not stringent

Mr. Tebbutt is hardly a credible source for information about dairies and pollution

evidenced by the Pollution Control Hearing Board rejecting each and everyone of his contentions about dairy pollution in 2018. However, it is clear that Ms. Mendoza gets most of her information about dairy pollution from this source which is severely lacking in credibility. This helps explain her errors that have been identified here and in our previous document.

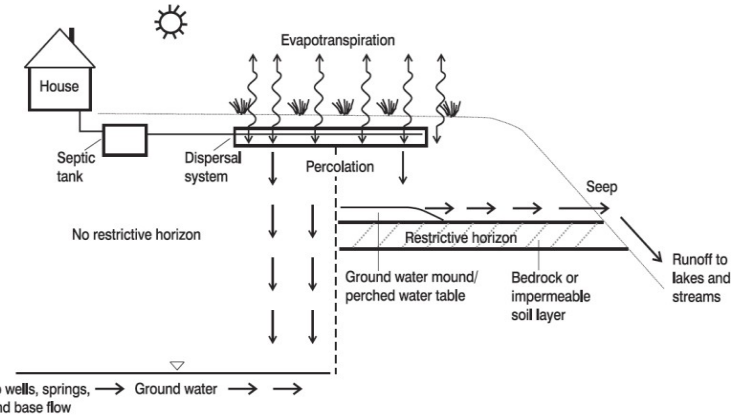
The source for factual information about compliance is not Mr. Tebbutt's website, but rather the Washington State Department of Agriculture. For more information:
https://agr.wa.gov/FoodAnimal/Livestock-Nutrient/Inspections.aspx

SFF states on page 2/23:

Septic systems are designed to distribute all their contents, including the total nitrogen (nitrogen in various forms) in the human excrement, to the soil and from there into groundwater.

I disagree. See the diagram below from page 1-7 of the 2002 USEPA Onsite Wastewater Treatment Systems Manual, available at
https://www.epa.gov/sites/production/files/2015-06/documents/2004_07_07_septics_septic_2002_osdm_all.pdf

Figure 1-4. Fate of water discharged to onsite wastewater treatment systems.



Source: Adapted from Venhuizen, 1995.

- Nitrogen is lost from Onsite Septic Systems through evapotranspiration and runoff
- Experts recommend a grass cover that takes up nitrate in the same way that crops feed on fertilizer.
- The LYV GWMA estimated that between 10% and 20% of nitrogen in septic systems is lost to denitrification and that septic tanks in Yakima County are pumped every 3 to 10 years. (See LYV GWMA Nitrogen Availability Assessment, page 54, at www.yakimacounty.us/DocumentCenter/View/17514/June-2018-Final-Nitrogen-Availability-Assessment-)

In the previous information we provided we showed that some of the nitrogen in septics may be denitrified depending on the soil conditions. That requires a lack of oxygen as oxygen is needed to convert nitrogen to nitrate. However, if the drainfield lacks oxygen it won't "perc" therefore creating a failed septic system. This is why it is correct to say that septic systems by design contribute nitrate to groundwater. If all the nitrate was taken up by grass that would mimic the legal requirements of application of manure. The fact is, there is far too little grass connected to a drainfield to take up all the nitrate so the majority leaks into groundwater. The fact that grass near the drainfield thrives shows that it is nitrate that is leaching since nitrate is the form of nitrogen plants need to grow. Mendoza again takes selected information from the EPA manual failing to also include the information in that manual (which we provided) that shows the potential contamination from septic systems particularly if a number are located close to each other (density) as they are in the Outlook cluster.

SFF states on page 4/23:

3. Table 3-29 in this manual (USEPA Onsite Wastewater Treatment Systems Manual) provides an assessment of nitrogen loading values from OSS compared to other sources of nitrogen in one area. It shows that each person contributes 6.72 pounds of nitrogen per year. With an average of two and a half persons per residential OSS, that means that five residential septic

systems contributes 84 pounds of nitrogen per yea

Other information in the EPA manual suggests that the 6.72 pounds of nitrogen per person per year may be quite low. This table below shows that concentrations of Nitrogen (N) in septic tank effluent (STE) ranges from 40 to 100 mg/L which means that the range of nitrogen from OSS would be from 6.72 pounds per person per year to 16.8 pounds per person per year. This would mean that five systems with 12.5 people could contribute up to 210 pounds per year according to EPA data.

In order to "prove" that people could contribute up to 210 pounds per year, SFF resorted to some fancy math.

Sorry, but if Mendoza wants to accuse us of "fancy math" she will have to take that up with the EPA. We used the lower EPA figure which comes to 85 pounds per person per year. In her chart above we noted that she used a higher EPA number of 140 pounds per year. But we note that EPA's numbers on leachate from lagoons per person ranges from 40 to 100 mg/L resulting in the wide range of possible nitrate contribution.

SFF took the concentration of nitrogen from low output septic systems in which more of the effluent comes from toilets and applied that N concentration (100 mg/L) to high output septic systems that have lots of gray water from showers, dishwashers, clothes washers and other appliances (40 mg/L). Gray water has much lower levels of nitrogen. See the charts from *USEPA Onsite Wastewater Treatment Systems Manual, page 3-5* below.

Table 3-3. Residential water use by fixture or appliance[a,b]

Fixture/use	Gal/use: Average range	Uses/person/day: Average range	Gal/person/ day: Average range[c]	% Total: Average range
Toilet	3.5 2.9–3.9	5.05 4.5–5.6	18.5 15.7–22.9	26.7 22.6–30.6
Shower	17.2[d] 14.9–18.6	0.75[d] 0.6–0.9	11.6 8.3–15.1	16.8 11.8–20.2
Bath	See shower	See shower	1.2 0.5–1.9	1.7 0.9–2.7
Clothes washer	40.5 —	0.37 0.30–0.42	15.0 12.0–17.1	21.7 17.8–28.0
Dishwasher	10.0 9.3–10.6	0.10 0.06–0.13	1.0 0.6–1.4	1.4 0.9–2.2
Faucets	1.4[e] —	8.1[f] 6.7–9.4	10.9 8.7–12.3	15.7 12.4–18.5
Leaks	NA	NA	9.5 3.4–17.6	13.7 5.3–21.6
Other Domestic	NA	NA	1.6 0.0–6.0	2.3 0.0–8.5
Total	NA	NA	69.3 57.1–83.5	100

This is a sleight of hand and data manipulation that has no place in honest scientific work.

Mendoza argues here that we are attempting to deceive by not considering the differences in septic systems, specifically how much gray water there is. We refer her and the reader to pages 5 and 6 of our response document. We included the charts from the EPA manual that referred to the amount of nitrogen from septic systems. The chart on page 5 (page 114 of the EPA manual) says that the nitrogen in STE (septic tank effluent) ranges from 40 to 100 milligrams per liter. The translation of this mg/L to pounds is provided in the next EPA chart shown on page 6. There is says that the loading rate of 40 mg/L is 6.72 pounds per person per year of nitrogen. So according to EPA, the amount of nitrogen coming through the septic system per person per year varies from 6.72 pounds to over 15 pounds.

What Mendoza calls “sleight of hand” and “data manipulation” is our accurate but conservative estimate of nitrogen from septic systems drawn directly from the EPa manual.

SFF states on page 8/23:

Nitrogen is not retained in the tank and directly passes into the soil.

I disagree. Table 2.2 in *Characteristics of Septage Conventional Parameters (EPA, 1994 https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=124828)* reports that the average Kjeldahl nitrogen in septage (the solid contents of septic tanks) is 588 mg/L with a range from 66 mg/L to 1060 mg/L. When septic tanks are pumped this nitrogen is removed.

On page 8/23 SFF quotes the EPA:

Therefore, it is has been assumed that all the nitrogen applied to infiltration fields ultimately leaches to ground water.

SFF misleads the public by taking this quote out of context and conveniently leaving out the next sentence:

However, several studies indicate that denitrification can be significant. Jenssen and Siegrist (1990) found in their review of several laboratory and field studies that approximately 20 percent of nitrogen is lost from wastewater percolating through soil.

Apparently Mendoza missed seeing our direct quotation of this reference on page 9 of our paper. It is not SFF that is misleading.

On page 10/23, SFF talks about the amount of water that leaches through a one acre manure lagoon. – Current lagoon design requirements accept 924 gallons of infiltration per day per acre of lagoon. Anything more is not allowed, but no one is monitoring. Only one lagoon in forty meets these criteria. (Expert testimony, David Erickson from Water & Environmental Technologies, PC in Butte, Montana)

No one is monitoring? Is Darcy's Law supposed to be monitored? It is a law of physics that, like gravity, is not subject to change. So, if a lagoon is built to NRCS standards it has been determined to protect water. Also, this is part of Washington state laws, regulations and permits. We have also shown in our document on this topic, that even if lagoons pre-date the current NRCS standards it does not mean they do not protect water.

We remind Ms. Mendoza that despite the very best effort of her attorney, Charlie Tebbutt, to build a case for lagoon pollution in front of three Inslee-appointed attorneys in the Pollution Control Hearings Board, they soundly rejected all his arguments. Referring to David Erickson's testimony as proof is hardly serious as the Pollution Control Hearings Board also determined. Mr. Erickson, despite being Mr. Tebbutt's star witness, has little to no expertise in manure lagoons as his specialty is toxic waste storage. No evidence is presented to support the "one in forty" statement.

SFF states that leakage of 924 gallons per day per acre equates to *less than the width of a single sheet of printer paper*

In fact this equates to 1.035 acre feet of water per year.

SFF states on page 14/23:

To clear up a misunderstanding of Ms. Mendoza about Darcy's Law it is important to understand that Darcy's Law applies to saturated conditions.

*C*onsult the professional hydrogeologists. Darcy's Law has been adapted to unsaturated conditions. See Nimo et al, (1987) at https://wwwrcamnl.wr.usgs.gov/uzf/abs_pubs/papers/WRR.23.1.pdf

On page 15/23 SFF presents a picture of one boring beneath an abandoned lagoon and implies that this proves no nitrate leaching beneath all manure lagoons.

In fact, 2018 EPA research in Yakima County found:

- In one abandoned lagoon nitrogen levels at one foot were < 45 ppm on three sides and the lagoon bottom. However, the readings were 59.5 ppm on the north side of the lagoon. The protocol then required deeper testing in that area. Tests found 287.8 ppm at 1 to 2 feet, and 315.1 ppm at 2 to 3 feet. Water and nitrate follow preferential pathways
- In another lagoon the nitrogen levels at 1 foot were 180.3 ppm on the bottom, 261.7 ppm on the south side, 366.1 ppm on the east side, 468.2 ppm on the west side, and 165.2 ppm on the north side.
- (See ftp://ftp.epa.gov/reg10ftp/sites/yakima/Consent_Order_Deliverables/)

Dairy farmers and agricultural science experts have no confidence in EPA's data on nitrates, nitrogen and dairy farms for reasons we have explained on easternwashingtonfamilyfarmers.org in detail. We strongly encourage those interested in this important topic to read the reports from more than fifteen science experts who found the EPA data and conclusions seriously flawed. As we pointed out in our paper, actual leakage from lagoons can vary significantly if they are not constructed to NRCS standards. However, we also pointed out that older lagoons built prior to current standards are not necessarily failing if they were built properly. See our paper for more details on the testing of lagoon leakage conducted for the WSDA.

In addition to serious concerns about the EPA data, we note that this is once again referring to nitrogen, not nitrate. It may be that the data refers to nitrate, and that Mendoza has interpreted the findings incorrectly. If so, it shows again her confusion with nitrate and nitrogen. We also note that the testing was to 2-3 feet. The data we showed of soil testing beneath an abandoned lagoon in Sunnyside demonstrated that nitrate-nitrogen went to background levels starting at about two feet. This validates the denitrification in the soil beneath the lagoon. Since water, particularly in Eastern Washington, is typically far below the lagoon bottom using tests of 1-3 feet and suggesting this shows nitrate traveling to groundwater is deceptive.

There is much good information that supports our position in a science study published in 2002 by J. M Ham of Kansas State University. A summary stated: "In most cases, concentrations of nutrients in the soil returned to background levels about 3 m under the lagoons." It also showed a difference between an operating lagoon and a decommissioned one. When a lagoon is emptied, the residual nitrogen is exposed to air, water (rain) and microbes which supports conversion to nitrate. While this likely increases the nitrate-nitrogen found in shallow soil tests as suggested above, the denitrification process in the soil beneath the abandoned lagoon prevents the nitrate from traveling to deeper soil and groundwater.

On page 16/23 SFF copied and pasted a paragraph from research on nitrification/denitrification performed on a 60 cow dairy in Israel and published in 2012.

SFF uses this paper to support arguments that nitrification/denitrification removes nitrate beneath dairy lagoons. Careful reading of this research (Baram et al at http://wastatedairy.com/wp-content/uploads/2016/07/Shahar-Baram-Israel-lagoons.pdf) reveals that nitrate levels in the groundwater beneath the studied lagoon averaged 3.5 times higher than the regional groundwater nitrate concentrations – about 20 mg/L.

Even more careful reading of the research will reveal that the lagoon tested was exceptionally shallow and that wind caused manure to slosh over the sides contributing to much higher levels of nitrification and exposure to soil than normal lagoons.

On page 20/23 SFF quotes a study by Marilynn Yates and applies the conclusions to the area around Outlook, WA where many wells are unsafe for drinking due to nitrates. SFF says:

The Yates study on density concludes that septic systems are the major contributor to groundwater, that half of waterborne diseases are due to septics, and that density is the most important factor influencing contamination of groundwater.

This study was performed in 1985, before the concentration of cows in Outlook had reached levels that threaten public health. This study cannot be used to convict septic systems of contaminating an aquifer where thousands of animals poop and pee on the bare ground and the nitrogen compounds from animal waste gravitate downward to groundwater. The concentration of septic systems in Outlook is lower than it is in many other areas where nitrate pollution is not a problem.

Why does Mendoza think that a 1985 study showing the impact of density of septics directly affects the contamination levels? Do cows coming into the area somehow make a study conducted in an another area invalid?

Mendoza does not mention that the EPA also states that septic systems exceeding a density of 40 per square mile (one per 16 acres) to be areas of potential contamination. Comparing humans to cows and equating their potential to pollute misses the key point of the vast differences between lagoons and septic systems. If Mendoza is as concerned about nitrates and water quality as she claims, based on the evidence of contamination from concentrated septic installations as in the Outlook cluster, we wonder why she does not call for water quality testing down gradient of this cluster? What evidence does she provide that Outlook's concentration of septic

systems is lower than other areas without nitrate contamination? We'd be quite interested in that.

These are the facts.

I am angry. I have spent an entire weekend pouring through data regarding 1% of the nitrate problem, simply because Save Family Farming choses to improperly manipulate data.

Sincerely,

Jean Mendoza

Jean Mendoza is angry. She is angry because she considers responding to our criticism of her accusations of lies and stupidity to be a waste of time. So much better, she apparently believes, when she can make false claims about dairy pollution without challenge.

We welcome the interchange. We are grateful that because of her challenge of our presentation of the facts we can conduct an open and public discussion about nitrate contamination, sources and possible solutions. We don't think that would make someone serious about the facts and serious about solving water quality issues angry.

The bottom line is this: dairy farms can pollute and sometimes do pollute. But they are most certainly not the singular source of nitrate contamination that Mendoza and her friends have been led to believe. If Mendoza and her litigation partner, Charlie Tebbutt, believe that enforcement of those laws is insufficient, they should work with the agencies to address that concern. Instead, they use the courts and a continual stream of false accusations to attempt to destroy a valuable contributor to our communities, state and food consumers and in the process earn millions in legal fees.