Confederated Tribes and Bands
Of the Yakama Nation

Established by the
Treaty of June 9, 1855

November 21, 2012

Office of Environmental Assessment (OEA)
Attn: Carol Harrison
U.S. EPA, Region 10
1200 Sixth Avenue, Suite 900
Mail code: OEA-095
Seattle, WA 98101

Re: Review of EPA's Lower Yakima Valley Nitrate Study

Dear Ms. Harrison:

The Yakama Nation greatly appreciates the strenuous effort on behalf of EPA and the residents of the Lower Yakima Valley towards identifying the sources of groundwater contamination and we thank you for the opportunity to provide input regarding EPA's recently published study, "*Relation between nitrate in water wells and potential sources in the Lower Yakima Valley*".

After a thorough review, we feel that this study may have helped to further define the scope and likely sources of the problem, and is a significant step towards a solution. However, the EPA needs to continue its efforts to more definitively identify the sources and status of the situation to work towards a long term solution. We need to establish trend and determine if current reduction strategies are working, and if not we need to reinvent best management practices that will work in today's environment.

Please see the attached technical assessment of the study. We submit these comments to you with the intent to participate in continued research and development of a more thorough and definitive study.

Thank you for your time and consideration. If you have any questions, please contact Kristina Proszek, Environmental Review Coordinator at kris@yakama.com or Joanne Cornwall, Water Quality Specialist at littlejoe@yakama.com.

Sincerely,

Philip Rigdon
DNR Deputy Director
Yakama Nation

CC: Tom Eaton, Director, EPA Washington Operations

The recent release of the EPA report titled, "*Relation between nitrate in water wells and potential sources in the Lower Yakima Valley*" has created a considerable amount of confusion amongst effected communities and parties. The report, at best, is inconclusive partly because of documented limitations to the study, and partly due to the unexpected lack of bacteria detections. This eliminated the microbial source tracking (MST) element from the study. That portion of the study would have determined, more specifically the sources of contamination. MST testing differentiates between human or ruminant sources of bacterial contamination, clarifying whether the source of bacteria was from septic systems, dairy manure applications, or another mono-gastric animal source. This distinction would have huge implications when coupled with the isotope testing, which cannot differentiate human from any other animal species. Without the MST component of the study no clear line of evidence towards any one source exists. The assumption that the dairies are the most "likely" sources of the contaminants is not definitive enough. "Likely" is not legally defensible verbiage and cannot be interpreted any stronger than potential or possible sources. There is no clear line of evidence here. It is very unfortunate that the MST portion of the study could not be performed.

Study Limitations

The report does acknowledge that the study lacked some important information which would have been helpful to clarify the situation. Of primary importance was the lack of well data. That information is crucial to determining the source water of the wells and if in fact the up gradient and down gradient well locations are accurate. This well data was unavailable for more than just a few wells; in fact it was unavailable for the majority of the wells. Two thirds of the sampled well locations were at indeterminate depths, ages and construction. It may have been possible to get an approximate depth by using a simple range finder. It has been documented that poorly sealed well casing can create a "co-mingling" effect where water drawn from two different aquifers can mix through the casing and cross contaminate or cause one source to dry up.

The other limitations noted were the lack of information provided to the EPA from the dairies in the study, and the inability to locate distinct crop field locations separate from areas that use manure as a fertilizer. This diffusion of fertilizer sources made it impossible to draw conclusions on the effects of commercial fertilizer applications. Conversely, it is just as difficult to clearly define to what extent the surrounding orchards and fertigation stations affected the results from the dairy samples. It is obvious that the area surrounding the "Dairy Cluster" and the Haak Dairy is dominated by orchards in the assumed up gradient locations. These orchards are interspersed with fertigation stations at irrigation water ponds where the fertilizer is injected into the water lines for application. For illustration purposes, a dozen or more were located and marked on "Google Earth" surrounding the "Dairy Cluster" location.

Figure 1 depicts the "Dairy Cluster" surrounded by fertigation stations for the orchards. The report states that the nitrogen source was determined to be too diffuse to accurately assess any impacts from irrigated agriculture. While the report claims that this was due in part because most of the irrigated cropland is associated with dairies either directly or indirectly through the purchasing of organic fertilizers from the dairies, the photo clearly shows that there may be significant influence from fertigation stations. The locations of the stations coupled with the presence of Tetracycline in many wells would be indicative of current orchard management practices.

Study design and methodology

It is important to understand that the study as designed was a "targeted" study, which is very different from a "random" study. While the report does explain to the reader that the sampling locations were selected from the results of Phase I and II, it does not clearly define the differences between a targeted and randomly selected survey.

It is important to remember that EPA "combined information on land use with some simple calculations to estimate the amount of potential nitrogen available from several sources" as the first phase of the study and then selected wells to sample based on the likely hood that they would be impacted. "The objectives of Phase II were to: (1) evaluate nitrate contamination of groundwater at locations downgradient of the three types of sources identified in Phase I"; (2) assist in identifying sampling locations for Phase III sampling and (3) provide residents with information". Essentially the sites that were detected with high nitrate concentrations in Phase II, were the wells used as the downgradient well locations in Phase III. They were not selected randomly, but were targeted for the study because they were already determined to be impacted with high nitrate levels.

"The results of Phases I and II were used in Phase III to identify residential drinking water wells with high nitrate concentrations and potential upgradient sources of nitrogen." The report does touch upon this again on page 14 stating, "The percentage of homes with nitrate levels in wells above the MCL in this study were higher than the 12 percent from earlier studies because the homes sampled in Phase II were selected based on their proximity to likely sources. This method of selection would be expected to bias the results compared to a study where the sampling locations were selected randomly." This statement defines the study design as biased towards locating the impacted wells and should not be viewed as anything other than that.

It is questionable to sample a "cluster" of potential contributors when there is a need to clearly identify the sources of pollution. No positive determination of the responsible party in the "Dairy Cluster" was made. This will only make enforcement efforts more difficult.

There are also issues with the suite of veterinary pharmaceuticals selected. Many are used to treat multiple species, including livestock, humans, and even fruit, making their presence in any sample inconclusive. Specifically mentioned in the report were the several detections of Tetracycline. Tetracycline is an anti-biotic that is used extensively in the area on pears and apples. It is of such economic importance to pear producers that it is approved for broadcast application to certified organic pears.

Also troubling was that both upgradient and downgradient wells were sampled in the dairy areas, but no upgradient wells were sampled above irrigated crop fields or septic systems. This fact makes comparison impossible.

Well information

It may have been beneficial to stratify the study by well depths, types and by soil type. This would have been considerably more work; either requiring a great deal of information gathering or by actually drilling some new wells. If new wells had been established, they could be used over time to establish trend and long term monitoring. This is important as different soils have different characteristics relating to lateral groundwater movement and aquifer recharge.


Fertilizer
Fertilizer
Upgradient well for Dairy Cluster
Fertilizer
Feedlot
Fertilizer
Fertilizer
Fertilizer
Fertilizer
Fertilizer
Fertilizer?
WW15 30 ppm
WW17 22.7 ppm
WW10 ND
Fertilizer
Fertilizer
WW14 43.4ppm
WW13 44.4 ppm
WW11 23 ppm
Google earth

Figure 1

Sampling design and methodology

The text on page 16 of the report is not clear as to whether or not multiple upgradient wells were sampled for each of the dairy locations, "In addition one upgradient well was sampled in each dairy area." This statement would indicate that only one well upgradient was sampled, however we know from previous text that the downgradient wells used in Phase III were selected from a larger sampling effort in Phase II as having tested positive for elevated nitrates. It is not clear if the upgradient wells used in Phase III were also selected from a previous sampling effort as having been below the MCL.

Upon further research and personal communications with EPA staff Mike Cox and Tom Eaton it was clarified that two other wells upgradient of the "dairy cluster" were in fact sampled and the results reported in the executive summary as having been below the MCL as well. They are both reported as having been analyzed with only the field test strips and found to be at 5mg/l. A reading of 5, while still well below the MCL of 10 mg/l, would be considered elevated and well above the level found in the upgradient well used in the report, which was reported as 0.73. Statistically speaking, two thirds of the upgradient wells sampled above the dairy cluster were considered elevated above the expected natural nitrate levels. This seems to be indicating that there are definitely some additional sources of nitrate above the "dairy cluster".

The soil samples were reportedly taken from application fields at a depth of one inch. While this may serve to indicate which, if any, pharmaceuticals and chemicals persisted in the environment once removed from the dairy production area, it will not tell us if any nitrate has leached beyond the root zone of the plants and is migrating towards the groundwater. This indication of leaching is imperative to locating the problem application sites and the responsible parties. Without knowing what crops are to be planted and expected yields, nitrogen levels in the top one inch of soil are not an accurate measure of potential to pollute.

Analysis of data

While there is relative certainty that Monensin would be indicative of livestock feeding, it is troubling that, according to the EPA report, it was discovered in higher concentrations in the upgradient well. Upon further review of the data it was determined that the hits for Monensin in the upgradient well were barely above the detection limits of the laboratory methods. In personal communications with EPA's Mike Cox, he has stated that in fact, the chemist that performed the data analysis was slightly hesitant at calling this detection in the first place. The limits of detection for Monensin are at 0.02 ug and the test results were at 0.027ug, seven hundredths' of a microgram different. Not that any chemical in any amount is acceptable, but it needs to be expressed in a manner relative to the risk.

Lagoon seepage applicability

In calculating the range of animal waste lagoon leakage for the Yakima Valley, this report used rates and estimates derived by numerous studies conducted by J.M. Ham and T.M. DeSutter. While these studies signify the forefront of research in nutrient travel associated with animal waste lagoons, concerns reside with the fact that all studies cited in this EPA report were carried out in the Great Plains region.

In the 2002 Ham study, Seepage Losses from Animal Waste Lagoons: A Summary of a four-year investigation in Kansas, which is where this EPA report acquired its applied Seepage Rate Range, the

author states, "Lagoons in other regions of the Great Plains probably have similar seepage". In another study cited in this EPA report (Ham, J.M., and DeSutter, T.M., 2000) Toward site-specific design standards for animal waste lagoons, the authors state "This report argues that lagoon design should be site specific… factors such as soil properties, chemistry of the waste, and depth of water table are used to arrive at lagoon performance standards" and "The framework presented here is most appropriate for the Great Plains". Applying studies to the Yakima Valley in which the authors openly state that the research presented is intended to apply specifically to the region in which it was conducted and that their own research shows that lagoon efficiency should be judged on a site specific basis is not only disconcerting but borderline reckless. That is not to say that research conducted on the Great Plains is completely invalid here, but rather before it is applied to this area it should be scientifically confirmed that it applicably transfers to the local environment before it is used in an attempt to identify individual polluters. That confirmation should be researched and stated within this EPA report.

Conclusion

If government agencies are concerned with protecting human health, holding responsible parties accountable, and protecting the environment, then a long term, more definitive study needs to be initiated. Shallow monitoring wells should be installed downgradient of the lagoons to detect and document the presence or absence of large plumes of lagoon leakage. Additionally, all wells sampled need to be paired with an upgradient control sample.

Most importantly, this study was merely a snapshot in time and does not establish trend. Trend is extremely important in this case because of the potential enforcement activities. It is not known for certain if the nitrate issue in the Lower Yakima Valley is a legacy problem and decreasing under current best management practices or if it is an on-going problem. A long term monitoring effort is required to establish this trend, not only because of temporal variation, but because of hydrological shifts both seasonal and anthropogenic.

While the intent of the study is clearly to draw a direct correlation to the dairies, based upon the findings in the earlier phases of the study, it failed to do so. This was possibly because expectations clouded thorough scientific methodology. In other words; the study was dependent on finding some wells with high bacteria in order to accurately determine the source through microbial source tracking. When the results failed to detect any bacteria in the samples, this MST portion was dropped, leaving gaps in the knowledge obtained. Based upon the absence of bacteria in any of the downgradient well samples, one would have to consider that there may be more influence from chemical fertilizers than expected. Any enforcement capabilities based upon the findings of this report appear to be compromised.