United States Department of Agriculture

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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: **NRCS Comments - Lower Yakima Valley Nitrate Study**

Dear Ms. Harrison:

The Natural Resources Conservation Service (NRCS) is submitting comments for consideration regarding the Lower Yakima Valley Nitrate Study.

NRCS national discipline specialists for nutrient management and agricultural waste management have reviewed the study report and provided comments regarding the methodologies, procedures and findings in the study. Their comments are provided in attachments two and three.

In addition to our national discipline specialists comments, state staff have provide a few additional comments which are provided in attachment one.

NRCS hopes that these comments are helpful in finalizing the study. Please do not hesitate to call if you have any question.

Sincerely,

Bonda Habets
State Resource Conservationist

Lawrence A. Johnson, P.E.
State Conservation Engineer

Attachments (3)

cc: Roylene Rides-at-the-Door, State Conservationist

ATTACHMENT 1

Washington State NRCS comments:

The study does not accurately represent the likely discharge rate occurring from Dairy Waste Storage Ponds (WSP) identified in the report. The assessment utilized by EPA was based on limited site information. Assumed values were utilized for computing the specific discharge, as such the results and findings are erroneous and unreliable. We recommend that EPA take immediate steps to revise the findings taking into consideration the following:

1. Accurate estimates for computing the likely discharge amounts require site specific information of the WSP. The WSP wetted surface soil type and extent is required. If the WSP is lined the liner thickness is required and the seasonal fluctuation of the effluent level acting on the WSP wetted surface must be known. Utilizing the design guidance found in the NRCS Agricultural Waste Management Field Handbook (AWMFH), Appendix 10D, for computing the specific discharge rate from a WSP requires very detailed data. Given that the actual WSP data is not available for any of these calculations, all the estimates for specific discharge rates are erroneous and unreliable.

2. NRCS design methodology for computing WSP specific discharge rates are based on very accurate permeability rate determinations. The procedure for conducting the analysis is found in ASTM D-5084, "Standard test methods for Measurement of Hydraulic Conductivity of Saturated porous Materials using a Flexible Wall Permeameter". EPA should collect multiple undisturbed soils samples from each WSP within the wetted surface area that would be representative of the entire wetted surface of the WSP. The results should be used to revise the seepage rates based on the procedure in the AWFMH, Appendix 10D.

3. The EPA study assumption that the WSP is full year round is invalid for estimating and quantifying the discharge occurring from a WSP. The methodology should be revised to estimate the discharge over a full year as the WSP is being filled and then emptied. To assume a full WSP condition for specific discharge quantification is unrealistic and unfairly overestimates the discharge.

4. The maximum effluent depth over the liner is required for estimating specific discharge rates. EPA should conduct topographical surveys of each evaluated WSP to determine the WSP depth and effluent levels acting on the wetted surface area of the WSP.

5. NRCS recommends that greater consideration and focus be given to other nitrate sources that have a higher potential to impact groundwater than the WSP's. The organic and synthetic material used for fertilizer across all the crop acres if not applied at the right amount, the right time and the right place has a higher chance of impacting the groundwater quality than the WSP specified. NRCS is well equipped to provide technical and financial assistance for the development and implementation of a comprehensive nutrient management plan.

6. The EPA study mentioning a difference in human waste being treated and animal waste is not, is misleading in that treated human waste (biosolids) still poses a great threat for contamination of nitrates and heavy metals when discharged into the environment.

7. The EPA study claiming the amount of waste produced by the cluster was similar to a community of more than 2,827,000, dismissed the fact that 65% of the study area is land application, where the majority of the animal waste is utilized by crops with high nitrogen needs. Only some of the fields were noted in WSDA inspector reports to have elevated levels of nitrogen.

ATTACHMENT 2

Yakima Valley Nitrate Study

Comments/Input

The following is being provided in response to the USEPA report, EPA-910-R-12-003, entitled *Relation between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley, Washington.*

Introduction. This EPA study was generated primarily due to the concerns by many pertaining to the high levels of nitrate in water wells in the Lower Yakima Valley, WA. In an effort to determine the source of those high nitrates, dairy farms (along with other minor sources) located within proximity to the wells, were identified as potential sources, specifically dairy farms in operation there. The report concludes that dairy producer's facilities and their associated lands are the principal sources of high nitrates in the wells. To validate their claim, EPA collected much data and performed numerous tests attempting to pinpoint the source of the nitrates.

After reading the report and reviewing the numerous data and conclusions derived from it, I am highly skeptical of their conclusions based on their testing methods, procedures, and interpretations of these recorded throughout the report. The report is filled with considerable errors in calculations and interpretations that, based on the performed tests, methods and interpretations, cannot be scientifically defended to derive at the stated conclusions. I want to acknowledge that high nitrate levels in water wells are a documented health hazard. However, the source and extent of those nitrates must be accurately identified before corrective measures can be implemented or a course of action, pineal or otherwise, is undertaken.

Comments/Input. The study design itself is flawed in that it fully acknowledges that identification of the extent and sources of nitrates did not take into account any losses of nitrates from biological, physical, or chemical processes and also did not account for crop utilization (ref. page 16, Phase 3 Study Results). The conclusions pertaining to the dairies are based on data that does not properly represent the sources or the extent of nitrates. In essence, the study simply collects data on particular sites at particular times and finds nitrogen of various forms and concludes that all these are the cause of the well water contamination or substantially contribute to it.

Anytime animal wastes and fertilizers are utilized to provide the required nutrients for crops and forages, a minimum set of information must be considered to properly provide a management system that simultaneously provides needed plant nutrients as well as protects surface and subsurface waters. To accurately determine what the needs of the crop are consideration *must* be given as to the proper rate, proper timing, the proper source, and the proper place of nutrient applications including fertilizers and manures. Lack of consideration to any of these will lead to potential production and or environmental problems. Additionally, ignoring any of these while diagnosing an environmental or production problem will also result in less than accurate conclusions. In attempting to determine the source and extent of the nitrate problem in the Lower Yakima Valley, this report ignored or misinterpreted vital data and information to derive at their conclusions.

1. The report does not utilize actual design parameters of the waste storage pond for any of their calculations for all the estimates of specific discharge. The only dimension that was measured is the top surface area of the waste storage pond. The size of the top of this pond was measured at 6.175 acres, which is a significant structure.

   By NRCS design criteria, written in the Waste Storage Facility, CPS 313 (2004), the storage ponds would have a designed specific discharge as little as 0.07 inches and is equivalent less than 1% of the total annual depth of precipitation in this part of the state.

   Given that the basis of concern stated in the EPA report is groundwater quality, there conclusions that the ponds are causing considerable leaching of nitrates into the groundwater is incorrect. Proper calculations would conclude that the ponds are **not** likely the source of nitrates in the wells. This also would suggest that there may be other nitrate sources that have a higher potential to impact groundwater than the waste storage ponds as stated.

2. The EPA report suggests that irrigated cropland is expected to be a likely source of nitrates in drinking water wells (ref. page ES-9). However, the only pathway that nitrate contaminants can enter well water is through either:

   1). Leaching through the soil profile past the crop/forage rooting zone into ground water and subsequent movement underground to a well, or

   2). through surface water flow off of the field and directly into a recharge area that feeds the well itself.

   In consideration of leaching, the report attempts to identify that the soils on a majority of the fields that are receiving manures and commercial fertilizer are considered "well drained" and that they have "saturated

hydraulic conductivity" characteristics that is considered high (ref. EPA-910-R-12-003, surface soils, page 35 and Appendix B). The report cites the USDA NRCS soil survey and reports generated from the survey to characterize the fields.

Saturated Hydraulic Conductivity. According to the definition that USDA NRCS uses to describe and characterize saturated hydraulic conductivity (Soil Survey Manual, Ag Handbook 18) saturated flow occurs only *when the soil water pressure is positive; that is, when the soil matric potential is zero (satiated wet condition).* This situation takes place when about 95% of the total pore space is filled with water (5% is air). If the soil remains saturated for a prolonged period (several months or longer) the percent of total pore space filled with water may approach 100 percent. "Saturated hydraulic conductivity CANNOT be used to describe water movement under unsaturated conditions" (ref. USDA Soil Survey Manual, Soil Survey Division Staff, Agriculture handbook 18, October 1993, page 103).

Because irrigation water management details were not collected from the producers nor was data collected in the field that measured soil saturation or duration, there is no data that can substantiate that the simple classification of hydraulic conductivity precludes leaching. Therefore, the data that EPA draws upon in this report to suggest the fields were leaching is circumstantial and cannot be used to conclude that leaching is attributed to the land treatment fields where manures and fertilizers were applied.

Drainage Class. Natural drainage class refers to the frequency and duration of wet periods under conditions similar to those under which the soil developed. Alterations of the water regime by man, either drainage or irrigation, is NOT considered unless the alterations have significantly changed the morphology of the soil (ref. USDA Soil Survey Manual, Soil Survey Division Staff, Agriculture handbook 18, October 1993, page 98).

The USDA Soil Survey manual describes "well drained" as *water is removed from the soil readily but not rapidly. Internal free water occurrence commonly is deep or very deep; annual duration is not specified. Water is available to plants throughout most of the growing season in humid regions. Wetness does not inhibit growth of roots for significant periods during most of the growing seasons* (ref. USDA Soil Survey Manual, Soil Survey Division Staff, Agriculture handbook 18, October 1993, page 98).

The EPA report misinterprets the definition of "well drained" tying nitrate leaching to the natural drainage classification of the soil. Again, there is no documentation of any kind that would lead to the conclusion that, based on the natural drainage classification of a soil, leaching or subsurface water contamination occurred in the Lower Yakima Valley.

3. The report makes substantial conclusions pertaining to the potential for nitrate leaching and runoff based on soil tests that were derived from the top 1 inch of soil (Table ES-1, footnote b). The top 1-3 inches of soil contains a large majority of the soil profile's organic matter, where large amounts of organic matter and mineralization occur. Additionally, depending upon when soil samples were collected and how and when any manures or fertilizers were applied, it is not uncommon to see high quantities of N near the soil surface for certain periods of the year. For example, if manure was broadcast on the soil surface and not incorporated, higher quantities of N-P-and K would be apparent until such time as the manures of fertilizers were incorporated or volatilized. Management techniques have a great deal to do with the location and quantities of nutrients in the soil profile depending upon the characteristics of the nutrient and the management practices utilized.

To accurately ascertain if nitrates were moving through the soil profile, deep soil tests (36-60 inches) should have been collected from fields above gradient and below gradient of affected wells. If nitrates were found below the rooting zone of the crops grown, this may have been an indicator of potential nitrate movement to ground water. A 1 inch soil sample has limited applicability if any.

4. Some of the testing interpretations are also questionable as to their applicability. For example, on page 20 of the report, EPA states that they tested for nitrate, nitrite, ammonia, and TKN. *"Total nitrogen concentration was calculated bu summing concentration of nitrate, nitrite, and TKN".* The TKN test is used to determine what the potential total of various forms of N are. A TKN test is the measure of organic N (nitrate and nitrite), ammonia N (NH3) and ammonium N (NH4). By adding nitrite and nitrate to the TKN, you essentially are adding quantities of nitrate and nitrite twice, substantially increasing the total. Nitrate and nitrite are ion specific. Additionally, TKN tests include N that has not been mineralized (as nitrates) and assumptions that they will be are erroneous. The nitrogen cycle, as shown in the report, includes mineralization, denitrification, volatilization, etc. Not all nitrite will be nitrate. Not all nitrate will be remain nitrate (denitrification) especially under wet or saturated soil conditions. Summarily, the results of the improper (depth) soil test data is being misinterpreted and cannot be used to draw conclusion as to the source of nitrates in the wells.

Summary. Due to the fact that specific data pertaining to crop management and tillage systems, manure management, irrigation water management, nutrient management, and pest management were not collected or were not available to EPA, utilizing gross or generalized characteristics or data pertaining to soils within the Lower Yakima Valley for purposes of identifying sources of nitrates in well water is not accurate or conclusive.

It is my suggestion that this report be retracted and data collection begin in earnest including the above listed management information and the appropriate tests using proper data collection methods and testing techniques. The results of which should be independently analyzed by non-affected parties to enable proper conclusions as to the source of nitrates in water wells in the Lower Yakima Valley.

ATTACHMENT 3

Thank you for the opportunity to provide comments on the EPA- Relation Between Nitrate in Water Wells and Potential Sources in the Lower Yakima Valley, Washington study.

At the request of NRCS Washington State leadership, NRCS National Science and Technology staff has reviewed the report and submits the following comments and observations:

1) The use of generalized recommendations contained in the NRCS Animal Waste Management Field Handbook (AWMFH) to predict the seepage loss contribution from individual farms is misleading. AWMFH recommendations and data are well supported by research and field experience throughout the US. However, they are generalized recommendations that typically get adjusted to accommodate site conditions during the planning and/or installation phases of storage facility construction. Site specific testing and on-site evaluations are usually necessary to assure adequate design for a given site. Planning for an adequate structure requires detailed information about anticipated manure volumes, manure type and consistency, climate, and production area runoff, etc.

2) The generalized AWMFH seepage rates should not be used to predict leakage losses from multiple dairies distributed randomly in a major watershed. Generalized seepage rates are used by planners/installers to anticipate the potential for loss and the need for additional conservation practices that will provide adequate protection of local water quality. Recent Mississippi River Basin and Chesapeake Bay Watershed CEAP studies have established the effectiveness of installed NRCS conservation practices at protecting water quality. Practices were most effective when they were coordinated as a suite of practices designed to deal with a site-specific water quality issue.

3) NRCS funded waste storage structures must be constructed following engineering conservation practice standards that are maintained by state-based NRCS technical experts. To receive USDA funding, producers must sign a contract that requires compliance with design, oversight/maintenance, and other criteria established by the practice standard. The contract is permanently tied to the state's official practice standard when the contract was signed by the producer, i.e., lagoons built 15-20 years ago are not associated with contracts that enforce criteria for the current official practice standard.

4) EPA's restricted access to important sites or data made it difficult to estimate the pollution contribution from individual farms. Farm specific information would have helped the researchers isolate site/management issues contributing contaminants to the environment.

5) The use of aerial photography to determine storage volumes can grossly over estimate each operation's manure storage capacity and therefore your estimate of seepage losses.

6) A storage facility is typically designed following rigid engineering standards, and local code usually requires routine monitoring for failure. EPA does not know if the structures were designed per code or if competent engineers were involved in the work. There are many factors that could lead to a leaking storage facility. Targeting all operations upgrade of a contaminated well may unfairly focus attention on well managed operations.

7) EPA does not know if the operations have storage facilities that were designed to handle the number of animals confined. If not, the lagoons may lack sufficient capacity to accommodate the manure/wastewater volumes generated, making them vulnerable to discharge. Has a nutrient management plan been followed to assure adequate facilities to handle mortality, spoiled feed, contaminated runoff, medical wastes, etc? Are animals fenced out of streams; are nutrient being applied too near unbuffered streams? These factors were not considered by the study.

8) Every AFO deals with a unique set of circumstances that define how to best manage large volumes of potentially polluting materials. Site factors, e.g., soil, topography, climate, animal type/number, period of confinement, confinement facility type, field hydrology, storage design/volume, spreadable acres available, and management styles change significantly from farm to farm. A leaking lagoon may not always be the principal problem, and oftentimes additional conservation practices, or better management of installed practices, may significantly reduce losses.

9) It appears that the high levels of nitrate found in drinking water wells in the Yakima Valley are coming from multiple sources. More information is needed to help focus attention on site/management issues contributing pollutants.

10) NRCS acknowledges the need to encourage producers to install sufficient conservation measures to minimize the movement of potential contaminants off-site. Accordingly, NRCS manages approximately 190 conservation standards that can be used to protect air, soil and water quality. Structural practices are available to help the producer keep air and water clean in the confinement (production) area, and land treatment practices (cropland, hayland, pasture) help growers minimize non-point source losses associated with erosion, leaching, volatilization, denitrification and surface flow.

11) Livestock growers enrolled in USDA programs are strongly encouraged to manage their manure handling, storage and field allocation activities following a Comprehensive Nutrient Management Plan (CNMP). The CNMP is developed based on site conditions and is designed to help farmers safely apply stored manure to their available land base.

12) The NRCS Nutrient Management Conservation Practice Standard (CPS 590) provides the minimum nutrient management planning criteria for the application of nutrients (synthetic or organic) to agricultural lands enrolled in USDA programs.

13) In January 2012, NRCS released a revised nutrient management policy and CPS 590. The new policy encourages improved nitrogen and phosphorus risk assessment tools, precision and enhanced efficiency fertilizer technologies, suites of coordinated conservation practices, and adaptive nutrient management strategies. Improved nutrient use efficiency saves the producer money and also reduces the potential for loss to the environment.

14) NRCS is committed to working with farmers to help them minimize the impact that farming operations can have on local water quality, including drinking water.