

## Water quality questions asked at the Open House Public Hearing in West Point on Thursday, March 25, 2021

**Q:** How much nitrogen is applied to the lawns in the average city or town?

**A:** While we do not currently have any rules or regulations for lawns, whether they are in a city, town or on a rural acreage, that would require us to obtain that information, I will try and give some perspective as to why we do not regulate them.

Grasses used in lawns, unlike corn, are perennial grasses that have extensive root systems, and are generally highly efficient at utilizing and scavenging nitrogen sources. Many of these grasses are actively growing and using nitrogen for 6-9 months each year. Corn on the other hand, is an annual plant that can also utilize large amounts of nitrogen, but the demand curve from the plant follows a much different trend, peaking at the late vegetative and early reproductive phases. And as you are also aware, once grain fill reaches maturity the plant's demand for nitrogen drops off significantly and terminates when the plant dies with a killing frost.

Lawn care professionals, as well as many homeowners, typically use a 3 or 4 step fertilizing plan for their lawns. When following recommended application rates, less nitrogen is applied per acre than an average irrigated field, and it also promotes split applications. This is one of the main objectives of the Phase 2 Area requirements. The LENRD wants to encourage split applications so that the corn can get the nitrogen when it needs it, and not just applying most of it at once and hoping it is still available come July or August. While we appreciate and recognize your concern about the need to manage and apply nitrogen in a responsible manner, regardless of the location, the amount of nitrogen fertilizer that is applied to lawns is a small portion of the total nitrogen use in the district, and on a per acre basis, when compared to the amount applied to agricultural fields.

**Q:** Is there a difference in test results (nitrate concentrations) between wells constructed 50 years ago and newer wells?

**A:** As well construction methods have evolved over the years and those changes were enacted to help prevent contamination from near the surface, or through preferential

pathways (example: an ag chemical spill near a wellhead, or a poorly constructed septic system). However, as the groundwater nitrate data was reviewed, there does not seem to be a correlation between well construction date and nitrate concentrations. Wells were grouped by the decade that they were constructed for this analysis, and although wells constructed prior to 1970 did have higher nitrate levels than later constructed wells, the wells constructed in the 2000's had higher nitrate results than those constructed in the 1980's/1990's. I have included a graph of average nitrate values for each decade of well construction. To add additional context to this issue, the age of the well is not a contingent factor when considering the establishment of a groundwater management area for protection of water quality. The district has had triggers that identify the parameters which define the conditions that must exist to consider the delineation of a management area for protection of water quality and/or water quantity. The frequency of available data is less when reviewing the data-sets back to the 1980's (for example) but as additional data has been acquired, the analysis reveals that the nitrate concentrations occur at frequencies that warrant the delineation of the management area.

**Q/C:** Manure application cannot be a solution option during the winter months.

**A:** The proposed Phase 2 requirements of the Lower Elkhorn NRD's Groundwater Management Plan ONLY apply to commercial forms of nitrogen and subsequently no additional restrictions are being considered regarding application of manure on lands within the proposed management area boundaries. However, the Nebraska Department of Environment and Energy (NDEE) does regulate manure application, and some facilities are required to have nutrient management plans that they follow. NDEE also has general rules regarding manure application to ensure that pollution does not occur.

**Q:** Can the phase restrictions be based upon soil type/location vs a blanket approach to the entire area?

**A:** To be considered for delineation as a Phase 2 area in the LENRD, there are several thresholds that must first be met. Management areas must be larger than 9 square miles, and

Phase 2 areas require 20% of the wells in a proposed area to contain at least 5 ppm nitrates or greater. These conditions have been met in the proposed area in Cuming, Colfax, and Dodge Counties, even in areas that are comprised of fine textured soils. Currently, LENRD rules do not allow for a prescriptive regulatory approach that is dependent on soil type as most fields in the district vary by soil type. Management of application rates by soil type may cause numerous different application rates on just one field which would be challenging for the district to monitor.

**Q:** What has the trend in Nitrate levels been over the last several years? Are levels going up or down?

**A:** While the three counties had not had extensive sampling done (like some other areas of the district), the LENRD does have sample results for some locations within Cuming, Colfax, and Dodge Counties from 1987 through 2017, with the results from that timeframe used as the basis for the decision to conduct more comprehensive monitoring of the tri-county area, beginning in 2018. The results from the 1987 - 2017 time-period clearly indicated that there were elevated groundwater nitrates in these areas, but additional data was necessary to accurately determine the geographic distribution of the issues. When comparing the older water quality data to the more recent information, the data shows that nitrate level trends are increasing.

**Q:** Any correlation between soil type (CEC level) to the nitrate levels?

**A:** At the present time, we have not done any studies correlating CEC to nitrate levels. The district does not have the CEC for each individual field sampled. To expand on the issue, it is often thought that cation exchange capacity (CEC) can be used as a “rule of thumb” for determining nitrogen application rates. The research on this subject is limited, and conflicting, but ultimately there are numerous locations within the proposed management area that reveal elevated levels of groundwater nitrate, even though the CEC factor is not considered low (for that area, and soil type).

**Q:** Any correlation between elevation and nitrate levels?

**A:** We have not studied the correlation between the elevation of the well relative to the nitrate concentrations in the well. However, we have studied the nitrate levels related to well depth, and the only wells that show significantly lower average nitrate levels (below 5ppm) are wells that are deeper than 250’.

**Q:** How many years’ worth of data has the LENRD gathered to determine nitrate trends?

**A:** The LENRD has what we call “state-wide network wells”. These wells are irrigation wells that are scattered across the LENRD district that have been sampled since the 1980’s. The goal of the district is to sample these wells every couple of years. The state-wide network wells located within the proposed Phase 2 Area of Cuming, Colfax, and Dodge Counties have data as far back as 1987. The trends for almost every well sampled in that area is showing that the nitrate levels are going up. These upward trends were one of the indicators that prompted the district to invest in the intensive, 3-year sampling schedule that yielded the results that you have seen. We recognize the fact that prior to 2018, 2019, and 2020 that water quality data is not geographically well distributed, and that there are time gaps that separate sampling events. However, when analyzing all the existing data, there are enough wells within several townships the exceed the threshold for nitrate concentration (as identified in the District’s Rules and Regulations) to justify the delineation of a Phase 2 Area.

**Q:** Why does the district focus its efforts on irrigation well samples?

**A:** The District focuses its efforts to collect samples from irrigation wells, since they will generally develop larger cones of depression than a domestic or livestock well, and this representation also gives the NRD a good general representation of the local groundwater quality. Samples are collected by licensed Groundwater Technicians, who are advised to check for evidence of fertigation at the well or injection point to ensure that if a sample is collected

while this practice is occurring, that the sampling point is UPSTREAM of any injection point. If the Technician is unable to locate a location that will allow them to collect the sample in this manner, then they do NOT collect a sample from the well. In addition to the water quality data that has been obtained by certified samplers employed by the LENRD, the Nebraska Department of Environment and Energy (previously the Nebraska Department of Environmental Quality) participated in a groundwater quality study during the 2011 irrigation pumping season. There were 30 irrigation wells sampled within Cuming County, and the nitrate data from that sampling event revealed portions of the county with elevated levels of nitrate in groundwater, and their conclusion was that the data met the district's triggers to warrant the establishment of a Phase 2 Groundwater Management Area for the protection of groundwater quality.

**Q:** How did the board decide on the 80 lb. per application amount?

**A:** The 80 pound per application amount was derived on the basis that since most growers will need to apply at least 150 actual pounds of nitrogen per acre (based on actual production history) that this would force growers into using split applications of nitrogen, which is proven to benefit the growers yield, and bottom-line; as well as providing an extra level of protection to groundwater from leaching of nitrogen.

**Q:** Is it true that there were several wells sampled that showed little to no evidence of nitrate?

**A:** It is true that there were many wells that contained low, or no evidence of nitrate in the groundwater, which are also included in the proposed management area. The justification for inclusion of those parcels of land into a management area is due to the nature of the land-use (if it is also in crop production, there is still a level of contamination risk), and due to the thresholds in place that relate to the percentage of wells in a particular area that must contain at least 20% of the maximum contaminant level for nitrate (which is 10 ppm).

**Q:** Why is the district considering imposing more regulations?

**A:** The District would be remiss in its duty to protect groundwater if we failed to address the problem for what it is, and to adhere to its own framework (which has been in place for

decades) which outlines the triggers and thresholds for groundwater monitoring (both for quality and quantity). Waiting for a problem to become an acute issue would not be an effective means to remediate the issue. Proactive measures enacted now will prevent the implementation of more aggressive measures later.

**Q:** is there cost-share available for deep soil sampling?

**A:** In the proposed Phase 2 Area in parts of Cuming, Colfax, and Dodge Counties, deep soil sampling would only be required on fields that are in continuous corn each year (corn on corn). The current LENRD Phase 2 Area requirement for deep soil samples requires a minimum depth of 24 inches, and producers are required to have one sample for every 80 acres of farmed ground. The proposed changes include an amendment to the minimum depth, changing it to 36 inches, which is the recommended minimum depth for deep soil nitrate testing by the University of Nebraska Lincoln (UNL). The LENRD currently offers 50% cost-share for this requirement. The maximum payment rate is \$28.00 per sample, with a limit of one sample per 25 acres that is eligible for cost-share. The district's payment total must total at least \$100.00 to qualify.

**Q:** Is the NRD using information and results that are accurate?

**A:** The LENRD currently utilizes its own employees to collect groundwater samples and to perform other field activities. Our Groundwater Technicians are trained, and licensed, by the State of Nebraska. They follow standard operating procedures when collecting groundwater samples including triple rinsing of sampling containers, obtaining samples when chemigation is not occurring, preserving of the samples in the field, and cooling the samples to required holding temperatures. While in the field; duplicate, triplicate, and field blank samples are obtained so that we may perform quality assurance. For example, duplicate and triplicate sample results need to match the original sample results, and field blanks need to be non-detect of nitrates to ensure sample quality. A field blank sample is a water sample that contains deionized or purified water and is submitted to the laboratory with a numerically sequenced sample number so that it cannot be distinguished from any other sample. In

addition, the LENRD utilizes a private laboratory to analyze water samples, which is Midwest Laboratories located in Omaha, NE. As an additional reminder, technicians are trained to ONLY collect a sample from the wellhead, and at a location that is located UPSTREAM of any chemigation injection location. The NRD has been conducting groundwater monitoring in these areas since 1987, but as many people are aware the bulk of the data is more recent (2018 - 2020) data. It is also worth noting that the Nebraska Department of Environment and Energy (then Nebraska Department of Environmental Quality) conducted a groundwater quality study in Cuming County during 2011. Their results correlate with the conclusions of the LENRD, which state that the current state of the groundwater quality conditions warrant the establishment of a Phase 2 Area (due to elevated levels of nitrate in groundwater). The reason that the district follows a particular set of protocol when collecting and handling groundwater samples, is because this data can be used for regulatory purposes, and therefore to ensure quality and confidence throughout the entire process we utilize a procedure that eliminates the potential for bias in the scientific process.

**Q:** There are a lot of different soil types & CECs in the proposed area. It is very concerning that the NRD would give a recommendation for everyone?

**A:** It is true that there is variability amongst the soil types in the proposed management area, and it is frequently mentioned that the LENRD should be integrating soil texture and cation exchange capacity (CEC) into its recommended controls. It is also often mentioned that the CEC should also be used as a “rule of thumb” value for prescription of nitrogen application rates. However, the scientific research to back up this claim is very limited, or conflicting, and seasonal and/or climactic factors can influence the role of CEC in preventing the loss of nitrate to groundwater. In addition, the CEC values have likely not changed much since the advent of commercial nitrogen fertilizers and if the “rule of thumb” factor should have armored the aquifer from contamination, then how did the nitrate reach the aquifer? The fact of the matter is this: there are many locations within the Lower Elkhorn NRD where there are wells with elevated levels of nitrates (>10 ppm) that have fine textured soils (clay) that have CEC values in the twenties (20’s). Nitrogen is a leaky element and there are many factors to consider when considering how it ends up in our groundwater. Currently, LENRD rules do not allow for specific rules dependent on soil type as each field in the district may have numerous soil types. Management of application rates by soil type may cause numerous different application rates on just one field which would be challenging to monitor.

**Q:** Is good science being used, or is the NRD on some sort of mission?

**A:** Please see the response for the 1<sup>st</sup> question on the science/methods being used. There are 12 responsibilities of the NRDs (missions). The #5 and #6 responsibilities are: Water supply for any beneficial uses, and the development, management, utilization and conservation of groundwater and surface water. These responsibilities are delegated to the local NRDs by the State of Nebraska under the Nebraska Groundwater Management and Protection Act, which outlines the responsibilities the district must carry out to monitor the quantity and quality of the resource. You can use the term “mission”, or you can use the term “responsibility” - regardless of the term used, the NRDs are units of local government with a major responsibility – groundwater management. It is the district’s responsibility to observe its statutory duties, or we risk intrusion by the State or Federal Government which will undermine or remove the local control that we all endear.

**Q/C:** Rules are generally applied to too large of areas / Manure being treated the same.

**A:** At the current time, the LENRD’s proposed phase areas based on nitrate results in an area. Management areas must be larger than 9 square miles, and Phase 2 areas require 20% of the wells in a proposed area to test at 5 ppm nitrates or greater. The area proposed meets the threshold for the LENRD’s rules for a Phase 2 area.

Currently, there are no rules proposed regarding application of manure by the LENRD. However, the Nebraska Department of Environment and Energy (NDEE) does regulate manure application, and some facilities are required to have nutrient management plans that they follow. NDEE also has general rules regarding manure application to ensure pollution does not occur.



**Q:** Why couldn't inhibitors be mandated, and testing continued to see if that change would be able to help solve problem without broad restrictions?

**A:** Phase 2 requires the use of inhibitors if greater than 50 lbs. of N are applied at one time. In the past, Phase areas have been continued to be sampled to see if nitrate concentrations are being lowered. Ideally, nitrate levels will be reduced after introduction of a Phase area, and it can eventually be discontinued.

**Q:** Why not prohibit based on soil types instead of such broad areas?

**A:** Currently, LENRD rules do not allow specific rules dependent on soil type as each field in the district may have numerous soil types. Management of application rates by soil type may cause numerous different application rates on just one field which would be impossible to manage.

**Q:** Can the phase restrictions be based upon soil type/location vs a blanket approach to the entire area?

**A:** To be considered for delineation as a Phase 2 area in the LENRD, there are several thresholds that must first be met. Management areas must be larger than 9 square miles, and Phase 2 areas require 20% of the wells in a proposed area to contain at least 5 ppm nitrates or greater. These conditions have been met in the proposed area, even in areas that are comprised of fine textured soils. Currently, LENRD rules do not allow for a prescriptive regulatory approach that is dependent on soil type as most fields in the district vary by soil type. Management of application rates by soil type may cause numerous different application rates on just one field which would be challenging for the district to monitor.

***The LENRD appreciates you taking time out of your schedule to attend the meeting, and thanks you for your input. If you have any further questions or comments, please don't hesitate to contact us.***