



PHASE II & III NEWSLETTER

INSIDE THIS ISSUE

- Phase II & III Rules.....1
- Training Dates.....1
- Vadose Zone Study.....2
- Producers Survey.....3
- Project GROW Winter Workshop4
- Online Reporting.....5
- Interseeder Research5
- Management Area Requirements.....6
- Groundwater Quality Sampling Schedule.....7
- Irrigation Water Sampling and Analysis.....8
- On-Farm Research.....8



Nitrogen Management Certification Training

Upper Big Blue NRD Trainings

- Dec. 3 | Holthus Convention Center | York | *Project GROW Winter Workshop* | 9 a.m.-3 p.m.
- Dec. 16 | Leadership Center | Aurora | *N Use Efficiency (Aurora Co-op)* | 9:00-11:00 a.m.
- Jan. 20 | Polk County Fairgrounds | Osceola | *N Use Efficiency & How To Read a Soil Test (Central Valley Ag)* | 9:00-11:00 a.m.
- Feb. 10 | Holthus Convention Center | York *How N Moves Through Soil & Increasing N Efficiency (UNL)* | 9:00-11:00 a.m.
- Hamilton County Ag Day*
- UNL On-Farm Research Annual Meeting*
*Dates/Times TBA

Little Blue NRD Trainings

- (9 a.m.-12 p.m.)
- Dec. 10 | Nelson Auditorium | Nelson
 - Jan. 19 | Jefferson County Fairgrounds | Fairbury
 - Jan. 22 | Davenport Community Center | Davenport

We will follow directed health measure guidelines for the area on social distancing and wearing masks at all trainings.

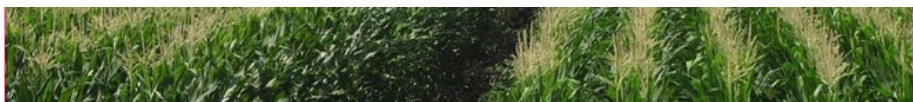
New Options Available to Growers in Zone 5

The Upper Big Blue NRD Board of Directors approved changes to Rule 5 – Groundwater Management Area #1 and #2 at their regular board meeting on August 20, 2020. The changes provide a definition for nitrification inhibitors that includes products with the following active ingredients: Nitropyrin, Pronitridine, and Dicyandiamide.

“This change will give producers in our Phase III Management Area more flexibility to comply with the district’s rules and

regulations,” said Roger Houdersheldt, Upper Big Blue NRD board chairman.

Another change requires a copy of the receipt as proof of purchase for the nitrification inhibitor to accompany annual Phase II/III Management Area reports. This rule change will take effect on November 1, 2020, in time for fall anhydrous applications in the six townships in and around York known as Zone 5 (see map on page 7). These rule changes do not apply to other management zones in the district. ♦♦♦



Hastings Vadose Zone Study



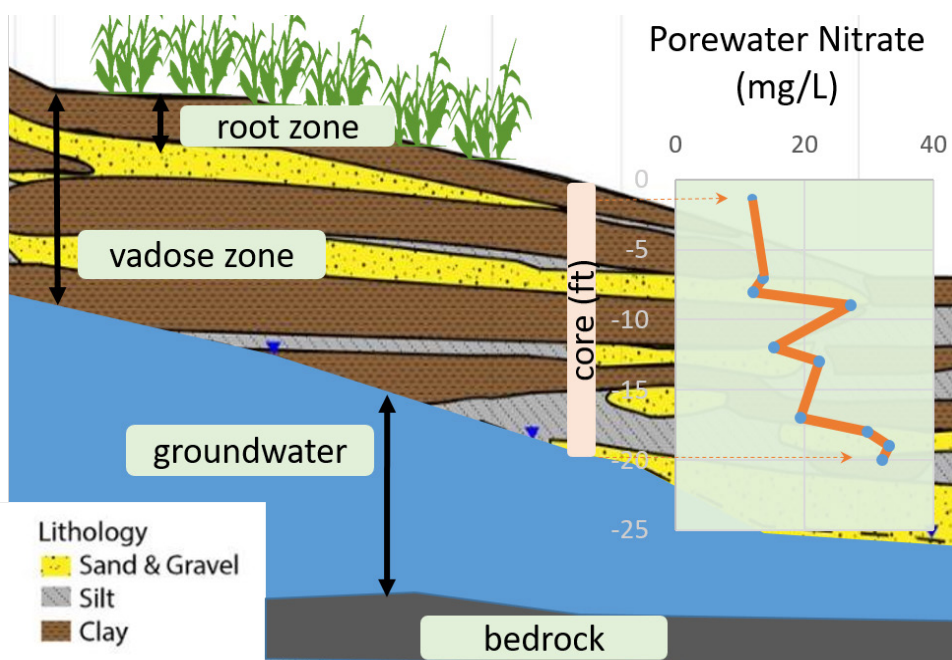
Dr. Dan Snow, Research Professor
Nebraska Water Center, UNL

The level of nitrate and other elements associated with negative health outcomes are rising in the soil in the Hastings Wellhead Protection Area, according to a study from Dr. Dan Snow, research professor with the Nebraska Water Center. In 20-30 years, Snow estimates that these compounds will reach the groundwater, causing additional drinking water contamination.

Key Takeaways

- Nitrate concentrations beneath irrigated cropland increased by about 30% between 2011 and 2016 indicating that nitrogen fertilizer continues to be lost below the root zone
- The largest amount of nitrate was measured beneath furrow irrigated cropland.
- Fields changing from furrow to sprinkler irrigation reduced nitrate loss.
- Nitrate moves from surface to groundwater in the Hastings area in less than 20 to 30 years.

Nitrate concentrations in the Hastings, Nebraska public supply wells have been increasing over the past 20 years, forcing the city to implement a very costly treatment system to comply with safe drinking water regulations. Two studies conducted by the University of Nebraska over the past 10 years have looked at nitrate storage and movement in the soils around the city's wells to help understand how changing land use can also reduce contaminant loading to these wells. This soil, called the vadose zone, or area between the land surface and the groundwater table, serves as a dynamic reservoir for water, nitrogen and other chemicals seeping past the root zone.



What is the Vadose Zone?

Also known as the unsaturated zone, the vadose zone is the soil layer between the crop root zone (5 to 6 ft) and the water table. In the Hastings area, the vadose zone tends to range from 60 to 100 feet in depth. The type of soil present in the vadose zone varies across the district. Soil type and depth to water impact how quickly contaminants reach the groundwater.



The most recent study compared five-year changes between 2011 and 2016 in stored nitrate under the same fields sampled during the first study and estimated the differences under specific land uses. Some cropland sites showed increases in vadose nitrate while others showed a reduction, though overall the average amount of vadose zone nitrate beneath irrigated cropland increased by about 30% in the top 60 feet of the profile. This means nitrogen fertilizer continues to be lost below the root zone despite changing managing practices. The largest amount of nitrate was measured beneath furrow irrigated cropland. Nitrate beneath fields that changed from furrow to water-conserving sprinkler irrigation tend to have lower vadose zone nitrate and supports the idea that reducing agricultural water use also reduces nitrate leaching.

The study found significant differences between ammonia and uranium concentrations by irrigation method, and that almost two-thirds of vadose zone inorganic nitrogen was in the form of ammonia. Ammonia may be leached

directly from the surface or derived from leached nitrate. Nitrate isotope testing in the vadose zone and groundwater suggest that livestock manure may contribute to nitrate loading under some areas, though the major source is commercial fertilizer nitrogen. Groundwater age-dating, and simulation of nitrification and recharge, suggests that water and nitrate production and movement through the vadose zone in the Hastings area occurs in less than 20 to 30 years.

Slowing the buildup of nitrate in the vadose zone and in Hasting groundwater will require long term cooperative efforts between producers and natural resources districts to reduce water and nitrogen losses from fertilized crops. Cooperation is even more critical now as other drinking water contaminants such as uranium found in the Hastings area groundwater may also be linked to irrigation water and fertilizer use.



More info on this topic at
[www.upperbigblue.org/
vadosestudy](http://www.upperbigblue.org/vadosestudy)

GWMA #2 Producer Survey

Operators of wells within our Groundwater Monitoring Well Network should have received a land practice survey along with their nitrate results this year. The purpose of this survey is to help producers, staff, and other district residents understand what is going on at the land surface and how it relates to the quality of the groundwater we all use.

The survey focuses on nitrogen application as well as irrigation usage. We plan to collect several years' worth of this type of data in order to create a clearer picture of how nitrates move through the soil in our district. The data collected will not be used to single anyone out over their land practices,

but rather will show trends over the entire district.

Completing this survey with accurate and timely data will be an important contribution for every producer in this area, as these responses will be invaluable as we work together to find solutions to water quality management issues in our district.

Paper copies of the survey can be returned by mail to our office. You can also complete the survey online at www.upperbigblue.org/gwmasurvey. You will need to know your well registration number to unlock the survey. Your well registration number can be found on the results letter. ◆◆◆

Improving Soils to Improve Harvests

Project GROW Winter Workshop 2020

What drives soil health? What are the costs and benefits of improving your soil? These questions and more will be explored at the upcoming Project GROW Winter Workshop, December 3.

The third annual Winter Workshop will feature Dr. Jill Clapperton, owner and principal scientist at Rhizoterra, Inc. Other speakers will include Dan Leininger, NRD water conservationist, and Al Dutcher, associate state climatologist with UNL.

All are invited to attend this free educational event, which will be held from 9 a.m. to 3 p.m. at the Holthus Convention Center (3130 Holen Avenue). You can register for the Project GROW Winter Workshop online or call (402) 362-6601 by November 25.

Attending the workshop will be of added benefit to producers in need of nitrogen management certification, as it fulfills the training requirement for recertification. In past years, this option was only open to those who had previously certified and needed to renew their certification. This year, even those producers who are certifying for the first time will be able to receive the requisite training credits by attending this event, plus a short meeting after the event.

Dr. Clapperton is a well-known international speaker on topics relating to creating

and managing healthy and productive soils, crop rotation, and cover crops. She is working to develop and adapt technologies for improved on-farm decision-making based on science. Her work focuses on how improving soil health drives increases in productivity as well as the nutrient density of the food produced. In short, healthier soils produce healthier foods.

Prior to founding Rhizoterra, Clapperton was the rhizosphere ecologist at Agriculture and Agri-Food Canada's Lethbridge Research Centre in Lethbridge, Alberta, for 16 years. In addition to her work with Rhizoterra, she ranches in the Bitterroot Valley of western Montana. She is often seen during the growing season on the Rhizoterra Experimental farm north of Reardan, Washington. She travels extensively as a speaker on soil health topics and a consultant for agricultural systems.

Dan Leininger has been with the Upper Big Blue NRD since 2004, working to educate local producers on soil health and water conservation. At the Winter Workshop, he will present an update on the



Project GROW demonstration fields in York, where many soil health practices have been implemented to restore soils on the city's wellhead area.

Al Dutcher will return to the Project GROW winter workshop again this year to provide insight on 2020 weather patterns and present a 2021 agricultural forecast.

An added bonus to this year's event will be a soil health activity for area high school students the day before the Winter Workshop. "We wanted to take full advantage of Dr. Clapperton's visit and offer something extra for students," said Leininger, who is one of the event's organizers. "The youth portion of the workshop will be hands-on, with stations set up to keep students engaged and learning." Details for this event are still being coordinated. ♦♦♦



Online Reporting



The UBBNRD will continue to offer online water use and Phase II/III Management Area reporting in 2020-21. A link from www.upperbigblue.org takes you to the Beehive Online Reporting Portal. If you reported either water use or Phase II/III Management Area reports in 2019-20, use your existing username and password to access the portal.

First time users will receive an 'Activation Key' to set up an online account. The only

requirements to create the online account is an active e-mail address and a minimum of eight-character password. If you have more than one entity, you will need a different e-mail for each entity or the same e-mail using mix case (Example: Entity #1: johndoe@gmail.com & Entity #2: Johndoe@gmail.com).

Producers without an active e-mail address will be required to continue to turn in hardcopy reports. If you have any difficulty with logging in, questions, or corrections to your report, please give us a call! We have technical support ready to assist you during normal business hours (M-F), 8 AM to 5 PM, (closed from 12-1 PM) at (402) 362-6601. You can also e-mail us through the online portal using the "Contact" button on the left-hand side of the screen. ◆◆◆

Interseeder On-Farm Research

Interseeding cover crops has become popular among innovative farmers to protect soil from erosion, take up excess nitrates in spring and fall, and provide grazing for livestock.

Traditional methods for planting cover crops usually involve drilling the seed after the cash crop has been harvested or seeding cover crops with an airplane into standing crops in late summer or early fall. Waiting to drill cover crops after corn is harvested means cover crops might not have enough heat units to get established before a hard freeze. Seeding cover crops with an airplane into standing crops is more expensive and the seed can get hung up in plant leaves with no chance of germination. Also, rain or irrigation with a pivot might be needed to make this method successful.



There is another option however, and that is drilling cover crops into standing corn at the V-4 to V-7 growth

stage. The idea is to drill the cover crops between the rows of small corn where the cover crops will germinate and grow until the corn canopy shades the ground and the cover crops will go dormant for lack of sunshine. In early fall as the corn starts to mature, sunlight will be able to reach the cover crop plants and they will grow until a hard freeze or terminated with herbicide the next spring.

The Upper Big Blue NRD has developed a partnership with The Nature Conservancy and University of Nebraska Extension to test this practice. The Nature Conservancy has provided the NRD with a specially designed drill able to plant a mix of cover crops into standing corn.

Ten corn producers in the Upper Big Blue NRD signed on as partners to try this concept on some of their acres for three years, starting in 2020. Soil tests, biomass samples and yield checks are being done this fall and first-year results will be available in the near future. ◆◆◆



Photos: (top) Bruce Hudson, who farms in Polk and York, was a cooperating producer on this project. (left) Interseeded cover crop mix with the corn canopy closed over the top (credit: Dean Krull, UNL)

Phase II & III Management Areas

Phase I Requirements –

All operators within the district are subject to the requirements of Phase I.

- 1. Fall Applied Anhydrous Ammonia**
Application of fall anhydrous ammonia before November 1 is prohibited.
- 2. Pre-Plant Liquid or Dry Nitrogen Formulations**
Pre-plant nitrogen applications in liquid or dry forms are prohibited before March 1.
- 3. Exemptions to Items 1 & 2**
The application of nitrogen fertilizer for any purpose other than fertilizing spring planted crops.
 - The application of nitrogen fertilizer for spring planted small grains such as barley, oats and rye.
 - The application of fertilizer that is not considered a “nitrogen fertilizer” as defined in Rule 5 of the District Ground Water Management Rules and Regulations.
 - The spreading of manure, sewage and other by-products conducted in compliance with state laws and regulations.

Phase II Requirements –

All operators of land within district Management Zones 2, 3, 5, 6 and 11 are subject to the requirements of Phase II. Refer to the map on page 7 for Phase II areas. Phase II operators are required to follow all Phase I requirements in addition to the following:

- 1. Nitrogen Certification Training**
Farm operators must attend a nitrogen certification training once every 4 years.

- 2. Irrigation Scheduling**

Irrigation scheduling equipment is required in at least one field in a Phase II area. The equipment should be installed in the largest field you operate. Examples of irrigation scheduling equipment are:

- Capacitance Probes
- Resistance Blocks
- Other methods approved by the District

- 3. Soil Sampling Requirements**

Soil samples are required in years when corn or sorghum will be grown following a non-legume crop and/or when livestock, municipal or industrial waste has been applied within the last 12 months.

A minimum of:

- 1 composite 0-8” sample per field analyzed for organic matter and residual nitrogen, and
- 1 composite 8-24” sample per field analyzed for residual nitrogen are required.

For soil sampling purposes, a field is defined as one where the crop and irrigation practices are the same.

- 4. University of Nebraska Recommended Nitrogen Fertilizer Application Rate**

Prior to applying nitrogen fertilizers, the operator must calculate the recommended application rate based on the University of Nebraska’s nitrogen fertilizer recommendation equation. The UNL nitrogen recommendation equation takes into account the residual soil nitrogen from your soil analysis and other nitrogen credits.

- 5. Reporting Requirement**

An annual report is required for all dryland and irrigated fields by April 1. The report steps you through the University’s Nitrogen Recommendation Equation. A copy of your soil analysis must accompany the report.



Phase III Requirements –

All operators of land within district Management Zone 5 are subject to the requirements of Phase III. Phase III operators are required to follow all Phase I and II requirements in addition to the following.

1. *Soil Sampling Requirements*

Soil samples are required in years when corn or sorghum will be grown following a non-legume crop and/or when livestock, municipal or industrial waste have been applied within the last 12 months. A minimum of:

- 1 composite 0-8” sample per 40 acres or any portion thereof, analyzed for organic matter and residual nitrogen
- 1 composite 8-24” sample per 40 acres or any portion thereof, analyzed for residual nitrogen are required.

2. *Irrigation Water Sampling*

All irrigation wells must be sampled and tested for nitrate once every 3 years. You are free to use any lab you wish, but the NRD offers nitrate testing free of charge. For more information about sampling protocol see the “Irrigation Water Nitrate Analysis” article on the back page of this newsletter.

Fall and Winter Application of Anhydrous Ammonia

All anhydrous ammonia applied between the dates of November 1 and February 29 must be applied with a district approved nitrification inhibitor. Active ingredients include: Nitropyrin, Pronitridine, and Dicyandiamide. A receipt as proof of purchase must accompany your annual report. ♦♦♦

Groundwater Quality Sampling Schedule

The Upper Big Blue NRD is divided into twelve groundwater quality Management Zones. The median nitrate value for that zone determines the phase of management and therefore, rules and regulations.

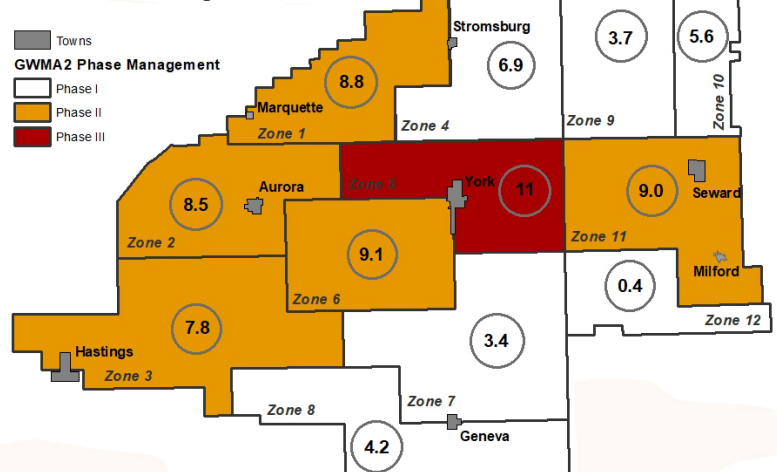
Taking a step back, the median nitrate value for a zone is the product of water samples collected from a specific network of wells. These wells are selected based on construction and geology. A well that provides accurate results is screened in one portion of the aquifer only, and does not have multiple screens. The screen also does not transect geological confining units such as clay layers, which could mix shallow and deep water.

Currently, there are 287 wells in the water quality network. Most of the wells are irrigation, with some monitoring, domestic and public wells. To annually collect a water sample at each of these wells would be incredibly difficult given the sheer size of the District - over 1.2 million irrigated acres! Therefore, a rotation of zones below the Phase II trigger of 7.0 ppm

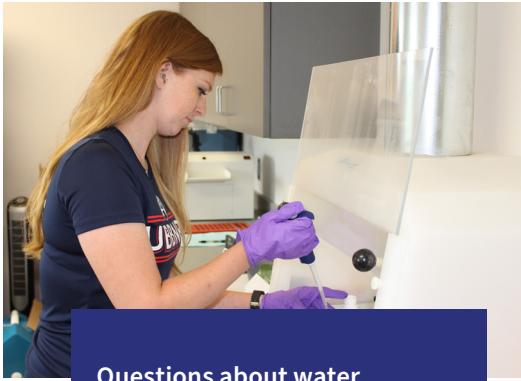
was created. This means that if the median nitrate value of a Zone is below 7.0 ppm, it will be sampled once every three years. If the median nitrate value is above 7.0 ppm, that Zone will be sampled annually.

In 2020, District staff sampled wells in Zones 1, 2, 3, 4, 5, 6, and 11. In 2021, District staff will sample wells in Zones 1, 2, 3, 5, 6, 7, 8, and 11. Thank you to all irrigation, domestic, and monitoring well owners for your continued cooperation. Protecting groundwater quality is an important task and your support is valuable.

Upper Big Blue NRD
Ground Water Quality Management Zones
Median Nitrate-Nitrogen Values - 2020



Irrigation Water Nitrate Analysis – Zone 5



Questions about water testing? Contact Erinn Wilkins, water resources technician, at erichert@upperbigblue.org or call (402) 362-6601.

Operators within a management zone that has been designated a Phase III Management Zone must have their irrigation water tested for nitrates at least once every three years. Presently, Zone 5 is the only management area in Phase III Management. Zone 5 includes Waco, New York, Lockridge, Bradshaw, Beaver, and Leroy townships.

be sampled again by April 1, 2023.

The Upper Big Blue NRD is now utilizing a new database software that will allow staff to better track reporting information, such as, phase reports, sensor reports, and water samples. During this next three-year period for Zone 5, wells that have not been sampled by April 1, 2023, will be found in violation of district rules and regulations. ♦♦♦

Irrigation wells in Zone 5 must

Important things to remember about your samples

- All active wells in Zone 5 must be sampled.
- Comingled wells need to be sampled individually.
- Follow sampling instructions found on our website or available at our office, especially the time frame for delivery (24 hours).
- If there are multiple wells per quarter, be specific when labeling – sub-quarter or physical location description is helpful to assign results and therefore, comply with rules and regulations.

NRD Continues Partnership with University of Nebraska Extension On-Farm Research

The Upper Big Blue NRD will continue to partner with local producers and University of Nebraska Extension in the On Farm Research Program in 2021 growing season. In 2020, the partnership, brought five groundwater quality centered on-farm research projects that helped volunteer producers answer questions about their operations. Projects included use of nitrification inhibitors, anhydrous timing versus rate comparison, and fall versus spring applied anhydrous with and without nitrification inhibitor.

Producers wishing to scientifically answer agronomic questions can work with University Extension to design trials and collect data

throughout the growing season to find answers to their questions. The Upper Big Blue NRD will provide technical resources along with financial assistance for volunteer producers to offset the cost of soil, water, and plant tissue analysis. Project results are published for other interested producers to review. Past years' results are available online at cropwatch.unl.edu/farmresearch/resultshome.

If you are interested in participating in the On Farm Research Program speak to your local University of Nebraska Extension Agent or visit www.upperbigblue.org/programs/water. Qualifying projects must be approved by the NRD before planting. ♦♦♦

