

NRCS 590 Nutrient Management Standard Team

MEETING NOTES

Thursday, January 25, 2024 ▲ 9:00am – 2:30pm ▲

Columbia Co. Administration Building, 112 East Edgewater Street, Portage, WI 53901 ▲ Rooms 113/114 ▲

9:00 Welcome (Kate, Team)

9:05 Notes Review (Kate, Team)

9:10 Rescue N (Aaron, Kyle and Carl) - Review updated standard language related to rescue N.

10:15 Break

10:30 Nitrogen Budgeting Tool (Kevin Masarik) - Review and discuss the N budgeting calculator application and limitations.

12:00 Lunch, provided

12:30 Nitrogen Leaching (Mike, Travis, Andrew, and Sara) - Review updated standard language related to nitrogen and groundwater protection.

Break as needed

1:30 Continue to Review Existing Standard (Mike) - Review and discuss components of current WI standard to carry forward into the next draft standard, focusing on Sections A. Criteria for Surface and Groundwater Resources and B. Criteria to Minimize Entry of Nutrients to Groundwater.

2:00 Meeting Review (Kate)

2:30 End

9:00 Welcome (Kate, Team)

Goal: Attendance and review the meeting objective.

Attendance: Kate Brunner, Mike Stanek, Daniel Smith, Kyle Much, Eric Hurley, Sara Walling, Morgan Kepler, Carl Hahn, Travis Engels, Aaron O'Rourke, Cody Calkins, Andrea Topper, Andrew Craig, Matt Ruark.

Absent: None

Guests: Kevin Masarik of UW Stevens Point (10:15-2:30)

Please keep in mind this team process and these meetings are to work through ideas together. Let's allow for "first drafts" and growth in this team work. Throw out your ideas.

9:05 Notes Review (Kate, Team)

Goal: Review and approve previous meeting notes.

Draft meeting notes from the 11/30 meeting were emailed around to the team. Team reviewed some resources that will inform the discussions today. Some open action items—a few topics will be discussed in-meeting today and some Kate will continue to track as longer term items:

presentations and input from Laura Good and some edits to the standard related to the use of book value.

No comments or questions on the notes. Kate will finalize and post Nov notes online for public.

9:10 Rescue N (Aaron, Kyle and Carl)

Goal: Review updated standard language related to rescue N.

At the last meeting the team started discussing the concept of “rescue N” after rain. **Aaron, Kyle and Carl** presented recommendations for team input before they move on to writing standard language. They also got feedback from a few other agronomists for more variety, especially in the sands. Key points of the recommendations and team discussion:

- 1) Standard will limit N overapplications to only N losses due to excessive rain events
 - a) Excessive rain events will be defined.
 - b) No other instance acceptable for N overapplication besides rain/weather events OR due to research purposes.
- 2) Adaptive management
 - a) Adaptive management resulting in N over UW recs would **only** be in a research setting.
 - b) Adaptive management is based on updated UW research, which should be addressed through UW guidance if it is appropriate. Team discusses options for referencing guidance (like A2809); in most situations needs to cite a specific document and not leave vague (like “current UW application recommendations”).
 - c) Team discussed possibly removing this from the standard, but decided to keep as a Consideration, for research purposes. Standard will maintain the ability to do research as Consideration.
- 3) The standard will keep the 46 lbs of additional N (if N is lost due to an excessive rain event)
 - a) 46 lbs is the minimum application amount you can practically apply using dry commercial fertilizer.
 - b) Liquid fertilizer rates can go lower, however that is not always available to the farm.
 - c) No need to differentiate between liquid and solid since we are putting a cap on the application amount.
- 4) Documentation and analysis
 - a) Clarify documentation of the rainfall event that led to loss of N.
 - b) Standard should better define “excessive rain events”, including soil conditions.
 - c) Must document a split application procedure, including spacing between applications.
 - i) Split application procedure should be defined. Previously used terminology for commercial based fertilizer will be kept, and a different term (like post planting application or similar) will be used for other variations.

- (1) This could be a split between at planting N and sidedress N OR a delayed application to side dress N or possibly even a Fall manure application with a planting starter?
- (2) Agronomists are rarely going over UW recs when split applications/spoon feeding N is taking place.
- ii) If N was front loaded at planting and N was lost due to rain event, additional N is prohibited.
 - (1) Some growers are still applying Fall NH₃ - sometimes applied as a split application with some going on in Fall and then another application after planting in Spring/Summer
 - (2) Some growers are still applying Spring NH₃ up to UW recs (front loading it)
- d) PSNT tests are the only viable testing method for documenting additional N need due to loss from excessive rain events.
 - i) We should state this in the standard with a caveat that says, “Unless new UW research comes out.”
 - ii) PSNT and all other methods laid out in the current technote are not used and/or are not viable or useful for what we are recommending.
 - (1) Nobody seems to be using PPNT testing
 - (2) Only other tests that are being taken are tissue tests but they are usually coupled up with PSNT.

iii) After PSNT tests are taken, the results should be interpreted using yield data AND A3588 for recs on how much additional N to apply. See A3588 Table 11-3 corn nitrogen recs based on PSNT.

(1) A3588 could be referenced in the standard though there can be contradictions and issues related to A2809 (e.g. maxes out at 12” corn). <https://soilsextension.webhosting.cals.wisc.edu/wp-content/uploads/sites/68/2014/02/A3588.pdf> A3588 is old and uses some outdated yield information. This is a good reference but A2809 preferred.

(2) If relying on A3588, should be updated OR additional guidance from UW.

e) Would MRTN affect the UW recs and if so does this give a farm enough flexibility where they won’t feel backed in a corner by their

limitations on yield due to N pricing?

5) Sandy soils need completely different criteria.

- a) PSNT testing does not work on sandy soils.
- b) We do not have any recommendations for sandy soils.
- c) Updated N recommendations within the standard may give us more insight on what to do on sandy soils.

Table 11-3. Corn nitrogen recommendations based on the pre-sidedress soil nitrate test (PSNT).

PSNT result —N (ppm)—	Soil yield potential ^a	
	Very high/high	Medium/low
—N application rate (lb/a)—		
21	0	0
20–18	60	40
17–15	100	40
14–13	125	80
12–11	150	80
< 10	160 ^b	120 ^b

^a To determine a soil's yield potential, consult University of Wisconsin-Extension publication Soil Test Recommendations for Field, Vegetable and Fruit Crops (A2809).

^b No adjustment made to corn recommendations.

- d) Potential that N applications over UW recs is not allowable on sandy soils even if N is lost due to excessive rainfall. A2809 has sidedress recs specific to sands and standard language will be updated for consistency with A2809.
 - i) Combination of PSNT and tissue testing is being used by agronomists in the sands. Producers on sands are typically spoon feeding fertilizer with multiple applications.
 - ii) What about no-till fields in the sand with higher %OM? P soils don't include OM.
 - (1) Should recs be changed based on this since higher %OM could change the holding capacity of N when heavy rain hits?
 - (2) There is not adequate support data to change overall recs based on %OM?
- 6) Other feedback
 - a) What is excess? 20 pounds over MRTN, though doesn't flag in SnapPlus until over the HIGH end.
 - b) Cover crop research shows more N may be needed above current recs (e.g. additional fall application coupled with cover crop planting).
 - c) Some years are rainier and need lots of rescue N and some years this is rarely needed. If a farm needs rescue N several years in a row, there could be specific action to review/adjust NM rates.
 - d) What about demonstrating an economic yield response to additional N?
 - e) What about manure situations: ex. A farmer applies 120 lbs of fall or spring manure. The farmer then applies 2x2 starter fertilizer that has 50 lbs of nitrogen in it. Technically this would be all nitrogen front loaded. The grain farmer would be able to do the same starter fertilizer but still be able to apply more nitrogen. This manure aspect wouldn't go in the standard but may fit in Tech Note; also should be part of outreach and training to agronomists.

Next steps – This subgroup (**Aaron, Kyle and Carl**) further clarify the items they recommended need further definition (e.g. excessive rain events including soil conditions, split application. **Andrea** can support related to consistencies with SnapPlus. If changes to SnapPlus may be necessary, document separately and team will relay to Laura Ward Good.

10:15 Break**10:30 Nitrogen Budgeting Tool (Kevin Masarik)**

Goal: Review and discuss the N budgeting calculator application and limitations.

Kevin Masarik of UW Stevens Point presented on N budgeting. Kevin is groundwater educator and has done research on N. He was also on the last 590 team, and understands nuances of what's good for both N and P. Some key points of the presentation and team discussion:

- Background: WI groundwater more connected to rivers and streams and has higher base flow index relative to neighboring states. WI groundwater also used for both public and private water supplies. Nitrates move easily through soil to groundwater.

- Nitrate drinking water std is 10 mg/L, with <1 mg/l desirable. Most private wells with concentrations >10 are only slightly above and are more susceptible to correction. Public water system nitrate levels are trending up.
- There is a correlation of ag land to nitrate in groundwater, though exceptions for some soil types like in SE part of state. The correlation is greater in areas of sandy soils and areas with shallow carbonate rock aquifers.
- Kevin has created county-specific predictive nitrate risk models with inputs for land use, soils, and nitrate in groundwater data.
- Online resource: UWSP Center for Watershed Science and Education has an interactive map of [Nitrate-Nitrogen Concentrations in Wisconsin's Drinking Water](#)
- Fertilizer response curve – at some point there is not additional gains (i.e. profit) to additional application. The curves also vary across soil types and for different rainfall. There is no *environmental* optimum for N. MRTN and A2809 do not include external costs and issues associated with overapplication and N pollution (e.g. homeowners and municipal systems treating their drinking water).
- Conventional vs no-till doesn't show good correlation for nitrate leaching losses.
- Vegetation type is important—potatoes and corn are higher nitrate leachers, soybean a lower leacher. Research is limited and some crops are less researched, or variations aren't (e.g. fertilized vs unfertilized, termination, etc.)
- Estimating nitrogen leaching potential consisted of simple mass balance. His research indicates leaching can continue after harvest, some crops more than others. The tool compared to actual lysimeter data showed good prediction for 3 or 4 years. Longer term data sets and ground truthing would help refine the tool.
- He developed a [Nitrate Leaching Calculator](#) to develop a customized nitrogen budget – Tool is based largely based on data in central sands area fields so results are good in the sands. This tool helps evaluate what happened during the year and is a good education tool to test and demonstrate how changing a variable or two can result in changes to nitrate leaching but the tool is not as good as a predictor.
- There are improvements to the tool planned or in the works. Some tool limitations: This tool includes some book values and assumptions (some specific to sands) and could be improved with more, newer data for variety of soil types. For example, SnapPlus data set could be mined, especially if both predicted yield and actual yield are input for the field. Manure is in the tool, but doesn't allow for N variations or include 2nd or 3rd yr credit. Tool is specific to leaching, not things like Nitrogen Use Efficiency nor costs.
- This tool would not be specifically referenced in the standard though there are possible applications for use along with the standard. It could be used:
 - To evaluate underperforming sections of fields.
 - To evaluate benefits of shifting to a different crop that has less leaching for their soil type.
 - As a teaching tool to see how changes in one area effect N leaching.
- From an N leaching standpoint, the 2.2 lbs/acre/year total nitrogen is not achievable statewide, and is not realistic like on potato/vegetable fields unless these are only planted every few years.

- Fall applied manure/fertilizer doesn't have a plant need. Standard could address using manure as a needed fertilizer vs as a waste disposal mechanism. Current standard has restriction on fall applied fertilizer on specific soils:
 - To expand this restriction to manure, producers would then need to find a living crop so therefore cover crops would be encouraged. Also added costs would include cover crop seed, planting, and time.
 - Alternately, standard could identify a max rate with a nitrogen inhibitor. This is shorter term for a fall inhibitor would have minimal effect carrying forward.
 - 6-month emptying of manure storage pits is required so dairies need to spread, and also can't spread on frozen soils. The 590 standard drives the timing for storage so if the team thinks the 6-month storage time should change, then manure storage standard could be changed. Team thinks 13 months is excessive but maybe 9 months would be acceptable to allow flexibility, though this topic would require a lot more evaluation (distance to haul manure, quantity to move in short period of time, number of haulers). Producers could also be encouraged to organize the land base with greater crop variety so have more flexible spreading options. Topic of extending storage time is PARKED for later discussion.
 - Current 590 has a lot of room for error interpreting nuances of soil type, dry weight, date, etc. Instead, Team discusses option to simplify fall application to be something like: "...on a cover crop or soil <50 degrees (and trending stable or warmer)". Oct. 1 date was selected by previous team using data correlation. If no date, standard would need to be clear how/where to get soil temperature (4" depth is in the std but not the checklist). If a date used, then it needs updating based on more current data. Agronomically, soil temperature should be used though some farms like to have a known date to plan in advance.
 - Are fall applications taking place on sandy soils and are they using an inhibitor? 12 CAFOs in central sands – Aaron will ask colleagues at DNR and get answer to this. Morgan and Kyle will ask to get info on non-CAFO farms.
 - Subteam homework – simplify the language on soils, date, etc.
 - Dan and Kyle and Andrea will work on some shorter language from the current 590 section Criteria to Minimize Entry of Nutrients to Groundwater.
 - Soil temp data – Andrea will try to get the data set and will send to Kate – this may need to be updated but Team will look at data first. Mesonet is not yet up and running but may be soon and that could be referenced. Dan will check on Mesonet timing.
- No-till sites had less nitrate leaching than conventional tilling. There is not much quantified data on soil health related to groundwater and nitrate leaching. Notre Dame research showed positive soil health impacts on both nitrogen and phosphorus leaching.

12:00 Lunch, provided

12:30 Nitrogen Leaching (Mike, Travis, and Andrew)

Goal: Review updated standard language related to nitrogen and groundwater protection.

A subteam took what the team had discussed and put together a few areas of updated standard language. Meeting time is short so detailed text is not yet reviewed, although team discusses that general intent of updated standard will be for the language to be broad and then guidance document will include specifics. The guidance document could be split up into multiple parts to

divide topics. Alphanumeric outlines no longer allowed by federal government to meet updated plain language and accessibility requirements.

Break as needed

1:30 Continue to Review Existing Standard (Mike)

Goal: Review and discuss components of current WI standard to carry forward into the next draft standard, focusing on Sections A. Criteria for Surface and Groundwater Resources and B. Criteria to Minimize Entry of Nutrients to Groundwater.

Some areas of current confusion and standard language updates are discussed throughout the meeting and documented elsewhere.

2:00 Meeting Review (Kate)

Goal: Review Action Items and prepare for the next meeting.

Next meeting date is Feb. 22. Kate is still looking for location – some options suggested by Team in central Wisconsin include Portage NRCS, Sauk County NRCS (via Mike) or Marquette County LCD (via Morgan). Kate will check on locations and options, updating calendar entries when confirmed.

There are several absences for the meeting scheduled for March 28, 2024. Team reschedules for **March 19, 2024**. Kate will update the calendar entry for the team.

Planning for upcoming meeting(s):

- February meeting is expected to shift focus to phosphorus and surface water. Laura Ward Good is scheduled to present (on P Index and SnapPlus). Kate will confirm with Laura and develop meeting agenda with Mike.
- March meeting – return to N discussion.
 - Rescue N (Aaron, Kyle and Carl) - Review and agree to updated standard language related to rescue N.
 - Nitrogen and Groundwater Protection (Mike, Travis, Andrew) - Review updated standard language related to nitrogen and groundwater protection.

Action Items developed today:

1. Carried forward from previous meeting:
 - a. **Mike** and **Kate** will prepare revised standard language to cover changes discussed related to the use of book value. Report back at future team meeting.
 - b. **Kate** will reach out to Laura Ward Good to confirm presentation to the team (on P) on February 22. [Note: Good presentation subsequently moved to 3/19]
2. **Aaron, Kyle and Carl** will identify specific changes to the standard and further clarify the items they recommended for further definition (e.g. excessive rain events including soil conditions, split application) related to rescue N and split applications. **Andrea** can support related to Snap Plus consistencies.
3. **Aaron** will ask colleagues at DNR and find out about whether central sands area CAFOs are spreading manure in fall and if they are using an inhibitor. **Morgan** and **Kyle** will ask their contacts to get same information on non-CAFO farms. Send to Mike and Kate.

4. **Dan, Kyle and Andrea** will work on some shorter language from the current 590 section Criteria to Minimize Entry of Nutrients to Groundwater. Will present to team for consensus.
5. **Andrea** is getting the existing soil temp data and will send to Dan and Kate.
6. **Kate** will prepare draft meeting notes for today then forward to full **Team** for review.
7. **Kate** will finalize notes from the Nov. 30 meeting and post on SOC team website.
8. **Kate and Mike** will prepare agenda for Feb. 22 meeting. Kate will send to the full team with preparation materials 1 week in advance.

2:30 End