Wisconsin Department of Natural Resources

Nutrient Management Planning

State Requirements Related to Nitrogen Management

NR 151 Technical Advisory Committee

Joe Baeten

April 23, 2020

Outline

- Nutrient Management Planning
  - What is a NMP
  - Who is required to have a NMP
  - What is contained in a NMP
- NMP Nitrogen Management requirements
  - General nutrient requirements
  - Groundwater specific requirements
  - Other considerations

Nutrient Management Plans

- A nutrient management plan (NMP) is a tool for a farmer or producer to manage the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.
  - SnapPlus, free tool provided for NMP development

Nutrient Management Plans

- NR 151.07 Nutrient Management. (1): All crop producers and livestock producers that apply manure or other nutrients directly or through contract to agricultural fields shall comply with this section.
  - NR 151.07(2): Does not apply to the application of industrial waste and byproducts (NR 214), municipal sludge (NR 204), and septage (NR 113) unless commingled with manure prior to application.
    - ACTP 50.04(3)(g) – landowner not required to have NMP if primarily industrial waste
  - NR 151.07(3): Manure, commercial fertilizer and other nutrients shall be applied in conformance with a nutrient management plan.

- ATCP 50.04 Farm conservation Practices. (3): The plan shall comply with the NRCS technical guide nutrient management standard 590 (December 2015), *some exceptions*, and shall also comply with the Wisconsin Conservation Planning Technical Note WI-1 (February 2016).

Nutrient Management Plans

NMPs consist of:

- Maps or aerial photos identifying field features (restricted and prohibited areas)
- Fields tolerable soil loss and calculated soil loss
- Soil test and other analysis results
- Current and planned crops and yield goals
- Planned and actual nutrient applications
- '*For supplemental nitrogen application, documentation of weather conditions; soil conditions; crop growth stage; and photographs, soil/tissue testing, crop canopy reflectance sensing, or nitrogen management models*'
- Records management
- P calculations

Nutrient Management Plans

- Other management activities
- Narrative
- Tile information (inlets, outlets, lines, etc.)
- Winter spreading plan
- Certification of person writing plan

A nutrient management plan developed for a farm with a WPDES permit has similar requirements but must also include the restrictions and prohibitions in NR 243.14, Wis. Adm. Code.

Nutrient Management Plans

Other considerations:

- NMPs start out as a planning tool to help producers meet local, state and federal rules as well as to ensure maximum economic return.
  - Plans are later revised to include actual information to show the producer is or is not meeting all applicable rules.
- NMPs are constantly changing and need frequent maintenance.
  - Planned crops or rotations change
  - Yields vary year to year
  - Restricted and prohibited areas can change
  - Nutrient sources change
  - Etc.

General Nutrient Criteria

Nitrogen specific requirements are primarily contained in NRCS's 590 Standard.

- NMP consistent with nutrient application guidelines A2809

			Nitrogen:Wheat price ratio			
			0.05	0.075	0.1	0.125
Soil group	Previous crop	PPNT (lb NO_3-N/a)	total lb N/a to apply[a]			
Loamy						
	Corn	< 50[b] or no PPNT	**75** 65--------85	**70** 55--------80	**60** 50--------70	**55** 40 -------- 65
		51 to 100	**45** 35--------55	**40** 30--------50	**35** 25--------40	**30** 20 -------- 35
		> 100	**0** 0--------0	**0** 0--------0	**0** 0--------0	**0** 0 -------- 0
	Soybean, small grain	All[c]	**55** 45--------65	**50** 40--------60	**45** 35--------50	**40** 35 -------- 45
Sandy						
	All	—[d]	**105** 95--------115	**100** 95--------110	**90** 80--------100	**85** 70 -------- 95

General Nutrient Criteria

Nitrogen specific requirements are primarily contained in NRCS's 590 Standard.

- NMP consistent with nutrient application guidelines A2809.

Crop	Yield range per acre	Soil organic matter content (%)			
		< 2.0	2.0–9.9	10.0–20.0	> 20.0
		lb N/a to apply[a]			
Alfalfa, seeding	1.0–2.5 ton	30	0	0	0
Alfalfa, established	2.6–9.5 ton	0	0	0	0
Apple, establishment[b]	—	2	2	2	2
Asparagus	2,000–4,000 lb	80	60	40	20
Barley[c]	25–100 bu	70	50	30	15
Bean, dry (kidney, navy)	10–40 cwt	40	30	20	10
Bean, lima	2,000–5,000 lb	60	40	20	10
Bean, snap	1.5–6.5 ton	60	40	20	0
Beet, table	5–20 ton	120	100	80	30
Blueberry, establishment[d]	—	30	30	30	30
Brassica, forage	2–3 ton	120	100	80	40
Broccoli	4–6 ton	100	80	60	25
Brussels sprouts	4–6 ton	100	80	60	25
Buckwheat	1,200–2,000 lb	50	30	20	0
Cabbage	8–30 ton	180	140	100	40
Canola	30–50 bu	80	60	40	20
Carrot	20–30 ton	120	100	80	40
Cauliflower	6–8 ton	120	100	80	40
Celery	25–35 ton	140	120	100	50

General Nutrient Criteria

- NMP consistent with nutrient application guidelines A2809.
  - Commercial fertilizers = total nitrogen
  - Manure = first year available nitrogen

	N			P_2O_5	K_2O	S
	Time to incorporation					
	> 72 hours or not incorporated	1 to 72 hours	< 1 hour or injected			
First-year availability	% of total					
Beef: liquid (≤ 11.0% DM)[2]	30	40	50	80	80	55
Beef: solid (> 11.0% DM)	25	30	35	80	80	55
Dairy: liquid (≤ 11.0% DM)[2]	30	40	50	80	80	55
Dairy: solid (> 11.0% DM)	25	30	35	80	80	55
Goat	25	30	35	80	80	55
Horse	25	30	35	80	80	55
Poultry (chicken, duck, and turkey)	50	55	60	80	80	55
Sheep	25	30	35	80	80	55
Swine	40	50	65	80	80	55
Veal calf	30	40	50	80	80	55
Second-year availability	% of total					
All species	10	10	10	0	0	10
Third-year availability	% of total					
All species	5	5	5	0	0	5

General Nutrient Criteria

- All N fertilizer shall be credited against crop needs (based on crop to be grown)
- An additional 20 lbs/acre of commercial N may be applied as a starter when utilizing 100% organic N (e.g. manure) to meet crop needs.
- N applied to a legume crop shall not exceed the N requirement or N removal of crop(s).

General Nutrient Criteria

- Where excessive rainfall has caused N deficiency, up to 46 lbs/acre of in-season supplemental N may be applied.
  - May apply more than 46 lbs/acre if two different methods are used in Technical Note WI-1, Appendix 3.
- First and second-year legume N credits must be applied.
- Nutrient application setback requirements.

Groundwater Criteria

- *N restricted soils* include*:*
  - High Permeability Soils (P): hydrologic group A soils
    - Permeability = 6 in/hr or more in all parts of the upper 20 inches AND
    - Permeability = 0.6 in/hr or more in all parts of the upper 40 inches
  - Wet Soils (W): soils with an apparent water table within 12 inches of the surface at any time of the year.
  - Rock Soils (R): soils having less than or equal to 20 inches to bedrock.
  - Area within 1,000 feet draining to a community potable water well.
  - Area identified as having soil depth of 5 feet or less over bedrock.

Groundwater Criteria

- For commercial N fertilizer applications:
  - (all N restricted soils) No late summer or fall applications except where needed for establishment of fall seeded crops or blended commercial fertilizer needed to meet A2809 guidelines.
  - (P soils only) When commercial N is applied for full season crops in the spring and summer, apply one of the following:
    - Split or delayed N application to apply after crop establishment.
    - Use a nitrification inhibitor with ammonium forms of N.
    - Use slow and controlled release fertilizer applied near planting.

Groundwater Criteria

- For late summer and fall applications of manure and/or organic by-products:
  - (W soils only) Use rates that will not smother these crops and limit N rates to A2809 or 120 lbs/acre of available N, whichever is less.
  - (P & R soils only) When a crop is growing, use rates that will not smother these crops and limit N rates to those in A2809 or 120 lbs/acre, whichever is less.
  - (P & R soils only) For annual crops that will be planted the following spring or summer, delay application until soil temperatures are less than 50°F or October 1, whichever occurs first AND limit N rates to A2809 or 90 lbs/acre of available N, whichever is less.

Groundwater Criteria

- For late summer and fall applications of manure and/or organic by-products with = 4.0% DM:
  - (W Soils Only) Reduce applications to 90 lbs/acre of available N OR apply no more than 120 lbs/acre of available N and use one of the following practices:
    - Use a nitrification inhibitor
    - Apply to an established cover crop
    - Establish a cover crop within 14 days of application
    - Surface apply and do not incorporate for at least 3 days
    - Delay application until October 1st or soil temps are less than 50°F
  - (P and R Soils Only) Delay applications until soil temps are less than 50°F or October 1, whichever occurs first AND use a nitrification inhibitor OR surface apply and do not incorporate for at least 3 days.
    - Application rates are limited to those on previous slide.

Considerations

- Use additional management practices found in the Technical Note W-1, Part III to improve N use efficiency.
  - https://datcp.wi.gov/Documents/NM590TechNoteApp23.pdf
  - Use variable-rate nitrogen application rates
  - Develop site-specific yield maps using a yield monitoring system
- To minimize N leaching on medium and fine-textured soils, avoid fall commercial N applications for crops to be seeded the following spring. If applied, use ammonium forms of N and delay N application until soil temperatures drop below 50°F. Use of a nitrification inhibitor with fall-applied N is recommended.
- For liquid and slurry manure, consider using a nitrification inhibitor to limit the potential risk for N loss.

Considerations

- Use irrigation strategies to minimize N leaching losses.
- Where residual nitrate carryover is probable, the preplant soil nitrate test is recommended to adjust N application rates for corn.
- To improve N use efficiency of wheat, the preplant soil nitrate test is recommended to adjust the N application rate.
- Where cropland with less than 50’ soil depth overlays Silurian Carbonate Bedrock, identify karst land features that are direct conduits to groundwater and use management practices to minimize N loss to groundwater.
- Use the Wisconsin NRCS recognized Nitrogen Leaching Index to evaluate N pathway loss via leaching.

Conclusion

- All crop and livestock producers are required to have a nutrient management plan.
- Nutrient management plans offer different options to producers to manage nutrients and to maintain compliance with local, state and federal rules.
- Nitrogen management requirements primarily consist of those in NRCS's Nutrient Management 590 standard.

Questions

Joe Baeten
Northeast Watershed Management Team Supervisor
(920) 366-2072
Joseph.Baeten@wi.gov