Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

NUTRIENT MANAGEMENT

CODE 590

(ac)

DEFINITION

Manage rate, source, placement, and timing of *plant nutrients and soil amendments* while reducing environmental impacts.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Improve plant health and productivity.
- Reduce excess nutrients in surface and ground water.
- Reduce emissions of objectionable odors.
- Reduce emissions of particulate matter (PM) and PM precursors.
- Reduce emissions of greenhouse gases (GHG).
- Reduce emissions of ozone precursors.
- Reduce the risk of potential pathogens from *manure*, *municipal and industrial biosolids*, or *compost* application from reaching surface and ground water.
- Improve or maintain soil organic matter.

CONDITIONS WHERE PRACTICE APPLIES

All *fields*, including pastures, where plant nutrients and soil amendments are applied. Does not apply to one-time nutrient applications at the establishment of *permanent vegetation*.

CRITERIA

General Criteria Applicable to All Purposes

Develop an annual, field-specific nutrient management plan for nitrogen (N), phosphorus (P), and potassium (K), accounting for all known measurable N, P, and K nutrient sources and removals. In this standard, the abbreviations P and K refer to plant available phosphorus (P_2O_5) and plant available K (K_2O), respectively. Refer to Wisconsin 590 guidance documents and University of Wisconsin-Madison (UW) publications, including University of Wisconsin-Madison, Division of Extension(UW) Publication A2809, “Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin”. For crops not listed in Extension Publication A2809, use published Land Grant University nutrient recommendations from the Midwest/Great Lakes region.

Nutrient sources include, but are not limited to, commercial fertilizers (including in-furrow and pop-up *starter fertilizer*), animal manure (including manures deposited during *gleaning* and/or *pasturing)*, *organic by-products* (including non-manure farm leachates and compost, waste milk, and municipal and industrial biosolids*)*, legumes grown as cash and/or forage crops, legume *cover crops* and/or *green manures*, plant or crop residues, *irrigation water*, and soil test-estimated plant available soil nutrients.

Base nutrient application rates and nutrient removal estimates on yield goals consistent with multi-year (3 to 5 years) *documented yields* for the field. If historic yield data does not exist, use a yield goal attainable under average local growing conditions and average yields for similar soils and crop management systems until a field-specific, multi-year crop yield can be established.

Follow all applicable Federal, Tribal, State, and local requirements and regulations when applying nutrients, including, but not limited to: Wisconsin ATCP 50, NR 151 and NR 243, where applicable.

Soil, irrigation water, and tissue testing and analysis

Sample and test soils within a nutrient management plan, at minimum, for pH, P, K, and soil organic matter once every four years. Soil testing must be conducted at a Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP)-certified laboratory using the analysis methodologies and interpretations outlined in Extension Publication A2809.

Develop and implement a soil sampling strategy ensuring a single composite soil sample represents no more than five acres within a field. To determine the minimum number of soil samples required for an individual field, divide the cropped area of the field (acres) by five and round the quotient to the nearest whole number. Individual strips within a *stripcropped* field may be combined and sampled together if strips have the same management history and the aggregated total area for the combined strips does not exceed five acres.

For new plantings of perennial fruit and nut crops, use soil test nutrient recommendations outlined in Extension Publication A2809. Base applications of N, P, and/or K to established plantings of perennial fruit and nut crops on current plant tissue tests. Follow UW recommendations for plant tissue sampling, analysis, and interpretation. For crops not listed in Extension Publication A2809, use published Land Grant University nutrient recommendations from the Midwest/Great Lakes region.

Follow soil sampling and soil test interpretation guidance in Extension Publication A2809 when using pre-sidedress nitrate tests (PSNT) to guide in-season N applications in corn.

Collect, prepare, store, and ship or deliver all soil, water, and plant tissue samples following UW guidance or industry practice recognized by UW.

Manure and organic by-product testing and analysis

Test all mechanically-applied manures and organic by-products, at minimum, for total N, total or plant available P, total or plant available K, and percent solids. Ensure manure is analyzed at a laboratory certified by the Minnesota Department of Agriculture Manure Analysis Proficiency (MAP) Program.

Sample and test all mechanically-applied *manure types* and organic by-products individually and credit nutrients for each type. Follow sampling and crediting guidelines outlined in Extension Publication A3769, “Recommended Methods of Manure Analysis” and Extension Publication A2809.

Establish first-year nutrient credits for mechanically-applied manure and/or organic by-products in accordance with the following:

- Collect and analyze manure and/or organic by-product samples annually for three consecutive years to establish an average *representative baseline* nutrient content for each manure type and/or organic by-product. Once established, use representative baseline nutrient concentrations for each manure type and/or organic by-product in nutrient management planning. While establishing a representative baseline nutrient content, use the most recent year's test results for each manure type and/or organic by-product.

- Collect and analyze samples from each manure type and/or organic by-product, at minimum, every other year once a representative baseline nutrient content is established unless Federal, Tribal, State, or local regulations require more frequent sampling. Use test results to maintain a three sample, running average representative baseline nutrient concentration consisting of the most recent and two previous manure analyses for each manure type and/or organic by-product.

- If changes occur to the farm operation (e.g. herd composition, herd size (+/- 10% change in *animal unit*s), etc) and/or conditions impacting manure type and/or organic by-product nutrient concentrations (e.g. feed management, manure handling, manure storage, etc), collect manure and/or organic by-product samples from each impacted manure type and/or organic by-product, at minimum, annually. Use the most recent test results for nutrient crediting until a new baseline nutrient concentration is established.

- After a representative baseline nutrient content is established, sample uncovered, stored manure types and/or organic by-products during years when a 20% or greater deviation in annual precipitation occurs. Use those test results for nutrient crediting in the crop year in which the impacted manure type or organic by-product is land applied rather than the representative baseline nutrient content. Do not include the manure or organic by-product analysis results from 20% or greater deviation in annual precipitation years in the calculation of the three sample, running average representative baseline nutrient concentration. Resume the established sampling timeline and representative baseline maintenance for impacted manure type(s) and/or organic by-product(s).

Use the estimated first-year available manure nutrient content "book values" in Extension Publication A2809 only during the first year of planning for a new livestock operation. After year one, analyze each manure type to establish operation-specific nutrient values using the criteria for establishing a representative baseline outlined above.

When estimating nutrient contributions of gleaning and/or pasturing animals, use "as excreted" manure book values outlined in Table 6 in Midwest Plan Service Engineers, Livestock Waste Facilities Handbook, Third Edition.

Standard manure and/or organic by-product testing methodologies may not be appropriate for samples with expected low nutrient concentrations (e.g. feed leachate samples). Defer to laboratory expertise for appropriate laboratory analysis methods. Credit nutrients appropriately following UW or other Land Grant University guidance.

Review and interpret test results for organic by-products in accordance with applicable regulations, including restrictions on heavy metal and pathogen content, vector attraction reduction, mandatory separation distances, and *land application* rates. Applications of organic by-products must also comply with requirements of this standard.

Collect, prepare, store, and ship all manure and organic by-product samples following UW guidance or industry practice recognized by UW.

Follow policy in Natural Resources Conservation Service (NRCS) directive General Manual (GM) 190, Part 405, "Comprehensive Nutrient Management Plans" when developing nutrient management plans as

part of a comprehensive nutrient management plan (CNMP) for an *animal feeding operation* (AFO). Document all nutrient imports, exports, and on-farm transfers.

All N and P application rates specified in this standard are based on the first-year nutrient availability of all nutrient sources.

Assessing and Mitigating N and P Losses to Surface and Ground Waters

Mitigating N Loss Risk – Identifying and Managing Nutrients on *Nitrogen Restricted Soils*

Identify N Restricted Soils within all fields receiving nutrients. N Restricted Soils include:

- *High permeability soils* (P);
- *Shallow to bedrock soils (R); and*
- *Wet soils (W)*.

Use the crop-specific N rate recommendation from Extension Publication A2809 or rate specified for the applicable N Restricted Soil, whichever is less, for P, R, and/or W soils.

When a soil meets more than one of the N restriction classifications, use the most restrictive N Restricted Soil classification when determining the maximum crop-specific N application rate and required management practices.

Spring and/or Summer N Applications

When applying N on all N Restricted Soils during spring and/or summer (early season applications to non-frozen and non-snow-covered soils through post-crop harvest or September 1, whichever is earlier):

- Do not exceed N rate recommendations in Extension Publication A2809 when using commercial N fertilizer, manure, and/or organic by-products, unless the field meets rescue N and/or 100% non-commercial nutrient source criteria;
- Include one of the following practices when using commercial N fertilizer:
  - Split or delayed N application to apply > 50% of crop N after crop emergence; and/or
  - Use a *nitrification inhibitor* for spring pre-plant applications; and/or
  - Use *controlled release fertilizers* when applying ≥ 50% of crop N requirement before or at planting.

Fall N Applications

When applying N on N Restricted Soils and soils with less than 5 feet to any bedrock after crop harvest or after September 1, whichever is earlier, through soils becoming frozen and/or snow covered:

- For manure and organic by-products:
  - Do not exceed Extension Publication A2809 N rate recommendations for the subsequent spring production crop or 120 pounds of N per acre, whichever is less. Choose an application rate and method to prevent smothering and/or destruction of the fall crop.

- Applications while the 4-inch soil temperature is above 50˚ F must occur to a fall crop. For N Restricted Soils, a fall crop is defined as:
    - An established cover crop meeting the criteria for WI NRCS CPS Code 340, Cover Crops;
    - An overwintering annual or perennial crop; or
    - Planting of an overwintering cover crop meeting the criteria for WI NRCS CPS Code 340, Cover Crops within ten days of nutrient application and before October 15;
- For fall commercial *nitrogen fertilizer* applications:
    - When the 4-inch soil temperature is above 50˚ F, up to 36 pounds of N per acre can be applied as a commercial fertilizer for the establishment of a fall-seeded crop.
    - When the 4-inch soil temperature is at or below 50˚ F, up to 36 pounds of N per acre can be applied as a commercial compound fertilizer (e.g. monoammonium phosphate (MAP) or diammonium phosphate (DAP)), but only when the fertilizer is used to meet the phosphorus requirements of the following crop.

Total N applications from all sources cannot exceed the Extension Publication A2809 N rate recommendation for the subsequent spring production crop or 120 pounds of N per acre, whichever is less.

The balance of crop nutrient requirements for the fall and/or spring planted production crop can be applied during the spring and/or summer of the applicable growing season.

Credit late fall N applications to non-harvested cover crops and/or non-planted soils to the following spring production crop.

Mitigating P Loss Risk – Identifying and Managing Nutrients on Soils with High Soil Test P (STP) Levels

For each field in the nutrient management plan, compare the current average field STP level to the STP criteria in Table 1. Follow the P application rate and commercial P restrictions for the associated STP range.

Table 1. Soil Test P Levels and Associated Required P Loss Mitigation Strategies

Soil Test P Range	Allowable P Applications[2]	Commercial P Containing Fertilizer Restriction
<50 ppm	P applications greater than crop removal allowed.	Commercial P fertilizer allowed
50-100 ppm[1]	Less than or equal to cumulative crop P removal by mechanical harvest over the planned rotation	No commercial P fertilizer except for 20 lbs or less of P_2O_5 per acre applied as subsurface starter to corn
101-200 ppm	Less than or equal to 50% of the cumulative crop P removal by mechanical harvest over the planned crop rotation	
>200 ppm	No P applications from any source except for 20 lbs or less of P_2O_5 per acre applied as subsurface starter to corn	

1. Crop rotations with an optimum soil test classification with STP ≥ 50 ppm can maintain a soil test level up to the maximum STP identified in the optimum soil test level category in Extension Publication A2809 for the crop with the greatest P requirement and still be assessed as lower risk. Use published UW guidance or industry practice recognized by UW to establish STP soil test recommendations for crops not listed in Extension Publication A2809.

2. The annual manure application rate cannot exceed the crop's annual N requirement (non-legume crops). When applying manure to established alfalfa and/or red clover, soybeans, or all pasture types, apply no more than 200 lbs of N per acre annually. When applying manure to small grains for grain underseeded with alfalfa, apply no more than 150 lbs of N per acre during the alfalfa establishment year.

All fields, independent of STP level, must maintain an average Phosphorus Index (PI) of 6 or less over the planned crop rotation and 12 or less in any single year of the crop rotation or as required by Tribal, State or local regulation.

The 4Rs of nutrient stewardship

Manage nutrients based on the 4Rs of nutrient stewardship – apply the right nutrient source at the right rate at the right time and in the right place – to improve crop nutrient use efficiency and reduce potential nutrient losses.

Nutrient source

Choose nutrient sources compatible with application timing, tillage and planting system, soil properties, crop, crop rotation, soil organic content, and local weather patterns to minimize risk to the environment.

Verify spreadable cropland and/or pasture acres are available for the utilization of N, P, and K nutrients from manure and/or organic by-products produced or accepted by the farm. If an *adequate land base* is not available, document how excess nutrients from manure and/or organic by-products produced on or accepted by the farm are managed to meet the requirements of this standard.

Determine and credit the nutrient contribution of all N, P, and K nutrient sources prior to land application. Use first and second-year legume credits in nutrient management planning according to Extension Publication A2809.

Apply and manage nutrient sources according to the United States Department of Agriculture (USDA) National Organic Program (NOP) where required.

Nutrient rate

Determine nutrient application rates based on crop/cropping sequence, current soil test results, and crop yield potential according to Extension Publication A2809 and criteria within standard. For crops where Extension Publication A2809 guidance is unavailable, use published Land Grant University nutrient recommendations from the Midwest/Great Lakes region. Lower than UW recommended nutrient application rates are permissible.

Ensure applied nutrients do not run off the field or application site during or after land application. If the applied nutrients result in ponding, runoff, infiltration to subsurface drainage, or flow toward wells, direct conduits to groundwater or conduits to a navigable water implement the following activities as appropriate:

- Stop application;
- Take corrective action to prevent off-site movement;
- Collect contaminated runoff;
- Modify the application rate, method, depth of injection, and/or timing; and
- Notify the Wisconsin Department of Natural Resources (WDNR) if a spill or accidental release of any material or substance is required by the Agricultural Spill Law (s.289.11, Wis. Stats.) or the terms of a Wisconsin Pollutant Discharge Elimination System (WPDES) permit.

Combining annual P nutrient applications for up to three crop years into a single application is allowed if the average field STP is less than 50 ppm and the single application is equal to or less than the total amount P required for the targeted crop years. Applications must meet all single year nutrient application restrictions for N.

When applying manure to established legume or legume-mix crops to meet crop P and/or K requirements, apply no more than 200 lbs of N per acre annually to established alfalfa and/or red clover, soybeans, and all pasture types. Apply no more than 150 lbs of N per acre to small grains for grain underseeded with alfalfa during the alfalfa establishment year. Do not apply commercial N to legume or legume-mix crops with no N requirement unless the nitrogen is an unavoidable component of a fertilizer required to meet the crop's P need (e.g. MAP or DAP).

When nutrient sources other than commercial fertilizers are used to meet 100% of the N requirement, an additional 20 pounds per acre of commercial N may be applied above the total N recommendation specified in Extension Publication A2809.

When an unexpected *crop N deficiency* is likely*,* up to 46 pounds of N per acre of in-season *rescue nitrogen* may be applied above the total N recommendation specified in Extension Publication A2809, but only as commercial fertilizer and only if *split applications* or pre- and post-planting applications of N were planned to occur.

Rescue N applications must meet the following criteria:

- Total N, including rescue N applications, cannot exceed Extension Publication A2809 crop nutrient recommendations on Highly Permeable (P) soils. Follow all applicable N application guidelines for P soils outlined in this standard.

- Applications of rescue N are limited to 46 pounds over Extension Publication A2809 recommendations on non-P soils, even when higher application rates are recommended by soil and/or plant analyses.
- Document the need for a rescue N application for each impacted field in the farm narrative, using one of the following: 1) identify the date range in which the soils were susceptible to N losses due to unexpected weather/soil conditions, and/or 2) provide soil and/or plant test or spectral imaging data supporting the need for a rescue N application.

Nutrient timing

Consider the nutrient source, management and production system limitations, soil properties, weather conditions, drainage system, and nutrient risk assessments to time nutrient applications to reduce potential loss, including timing: N applications as closely as practical with plant and crop uptake and P surface applications when runoff potential is low.

Do not mechanically apply nutrients from any source to *saturated soils*. Saturated soils may comprise only a portion of a field and therefore, the prohibition may not apply to the entire field. Verify soil saturation using the in-field procedure outlined in the USDA-NRCS “Estimating Soil Moisture by Feel and Appearance”.

Do not mechanically surface apply nutrients from any source if there is a risk of runoff at or within 24 hours before and after the time of application. Observe specific field conditions and consult local weather forecasts and/or the *Runoff Risk Advisory Forecast (RRAF)* before application.

Do not apply commercial fertilizers containing N and P to *frozen soils* or *snow-covered soils*.

Do not mechanically apply manure or organic by-products to frozen soil*s or* snow-covered *soils* unless limited storage capacity necessitates application. If mechanical manure and/or organic by-product applications must occur on frozen soils or snow-covered soils, follow all application requirements outlined in a *Winter Spreading Plan* (see section “Winter Spreading Plan Requirements”).

Nutrient placement

Do not apply nutrients from any source to:

- Surface water; areas of active snowmelt where water is flowing; *concentrated flow channels*; and created surficial drainage ditches;
- Areas outside of field boundaries or where vegetation is not removed mechanically or by pasturing, except to provide nutrients for establishment and/or maintenance of a conservation practice, including permanent vegetation in a concentrated flow channel, *filter strip*s, and/or non-harvested *vegetative buffers*;
- Non-farmed wetlands;
- Prohibition areas delineated by local county ordinances;
- Areas within 100 feet of all wells and/or direct conduits to groundwater. Based on well placement and actual site conditions, additional setbacks may be needed to protect wells from nutrient runoff and leaching; and
- Fields exceeding *tolerable soil loss* (T) over the implemented crop rotation.

Do not mechanically-apply manure or organic by-products within:

- 100 feet of a *non-community potable water well*.
- 1,000 feet of a *community potable water well*.

Do not mechanically apply nutrients from any source on fields with reoccurring *ephemeral erosion*, unless:

- Perennial vegetative cover is established in all areas of *gully erosion*;

AND one or more of the following practices are applied to the fields:

- *Contour farming*;
- Established *contour buffer strips*;
- Established *stripcropping* system;
- *Reduced till*, *no-till*, and/or crop rotation adjustments, to maintain 30% or greater crop residue or vegetative cover on the soil surface after production crop planting; and/or
- Established cover crop to achieve 30% or greater combined crop residue and/or vegetative cover on the soil surface over the winter and after production crop planting.

Do not apply commercial fertilizer within a SWQMA unless one or more of the following conditions are met:

- Maintain 30% or greater crop residue and/or vegetative cover on the soil surface after nutrient application;
- Effectively incorporate nutrients within 72 hours of application, leaving adequate crop residue to meet tolerable soil loss;
- If field is long-term no-till and less than 30% residue is present on the soil surface after nutrient application, apply nutrients within seven days of planting.

Do not mechanically-apply manure and/or organic by-products within a SWQMA unless all specified tillage, residue, and manure/organic by-product application requirements within a singular management option outlined in Table 2 is followed.

Table 2. Manure and/or Organic By-Product Application Options and Requirements within SWQMAs

Application Option #	Manure and/or Organic By-product Application Requirements		Tillage and Residue Management Requirements within Remaining SWQMA Area
	Areas Adjacent to Identified Surface Waters and/or Direct Conduits to Surface Waters[1]	Remaining SWQMA Area	
One	No manure applications within 25 feet	Injection and/or immediate incorporation of liquid or solid manure Application rate: as allowed[2]	None
Two	No manure applications within 25 feet	Surface application of liquid or solid manure Application rate: Liquid manure – as allowed[2] or 12,000 gallons per acre, whichever is less Solid manure – as allowed[2]	All manure applications: Long-term no-till; AND ≥ 30% crop residue at the time of application
Three	Establish 35-foot-wide vegetative buffer, AND No manure applications to vegetative buffer	Surface application of liquid or solid manure Application rate: Liquid manure - as allowed[2] or 12,000 gallons per acre, whichever is less Solid manure – as allowed[2] Injection and/or immediate incorporation of liquid or solid manure Application rate: as allowed[2]	Surface application: ≥ 30% crop residue at the time of application Injection or immediate Incorporation: None
Four	Establish 21-foot-wide filter strip, AND No manure applications to filter strip	Surface application of liquid or solid manure Application rate: Liquid manure - as allowed[2] or 12,000 gallons per acre, whichever is less Solid manure – as allowed[2] Injection and/or immediate incorporation of liquid or solid manure Application rate: as allowed[2]	Surface application: ≥ 30% crop residue at the time of application Injection or immediate Incorporation: None
Five	No manure applications within 100 feet	Surface application of liquid or solid manure Application rate: Liquid manure - as allowed[2] or 12,000 gallons per acre, whichever is less Solid manure – as allowed[2]	None

1. Identified surface waters and conduits to surface water include navigable waters, conduit to a navigable water, and/or wetlands.

2. "As allowed" application rate is the rate specified in this standard or in Extension Publication A2809, whichever is less.

Do not mechanically surface apply manure and/or organic by-products in a SWQMA when potential flooding is expected within 7 days and/or during *peak flood periods.*

Sequential nutrient applications to meet desired nutrient additions consistent with this standard are allowed within the SWQMA. Allow, at minimum, seven days to elapse between sequential applications.

Winter Spreading Plan Requirements

Develop a Winter Spreading Plan for farms mechanically-applying manure and/or organic by-products during any time of the year, even if no winter mechanical applications of manure and/or organic by-products are planned.

Winter spreading criteria do not apply to manure deposited by pasturing or gleaning animals when the outwintering activities are included in an NRCS-approved grazing management plan or when outwintering activities follow setback and grazing timing recommendations outlined in Extension Publication “Grazing to Protect Surface Water: Considering Critical and Sensitive Areas”.

Identify within the Winter Spreading Plan:

- Available on-farm storage capacity for each mechanically-applied manure type and/or organic by-product produced and/or accepted by the farm;
- Quantity of each manure type and/or organic by-product produced and/or accepted by the farm from December 1st through March 31st; and
- For farms without sufficient permanent storage capacity for generated and/or accepted manure and/or organic by-products containing 16% dry matter or greater, identify potential locations and size of locations available for temporary stacking. Refer to current WI NRCS CPS Code 318, Short Term Storage of Animal Waste and By-products, to identify potential stacking sites.

Ensure all mechanically-applied, winter spread manure and/or organic by-products meet the following criteria.

Do not mechanically-apply manure or organic by-products to/within:

- *Surface Water Quality Management Areas* (SWQMA);
- 300 ft of direct conduits to groundwater; and
- 200 feet of any concentrated flow channel.

Do not mechanically surface apply manure and/or organic by-products containing less than 16% DM during the *High Runoff Risk Period* (February 1-March 31) and all other times when there is a risk of runoff at or within 24 hours before and after the time of application. Evaluate risk of runoff by observing specific field conditions and consulting local weather forecasts and/or the *RRAF* before application.

When mechanically-applying manure and/or organic by-products to any field with concentrated flow channels, ensure one or more of the following conditions apply to the entire field:

- Established contour buffer strips;

- Established stripcropping system;
- In *long-term no-till* and all crop residues are maintained (no residue removed for feed/silage or bedding);
- Established grass and/or legume hay vegetation and greater than 4” crop residue stubble height remains at the time of application;
- Fall tillage is completed on the *contour* on slopes less than 6%. No tillage allowed on slopes between 6% and less than 12% slope.
- Applications occur in intermittent strips on no more than 50% of the winter spreadable acres during a single application. Sequential applications can occur within the field if:
    - Sum of all applications occur on no more than 100% of the winter spreadable acres; and
    - Multiple applications do not occur on the same areas within the winter spreadable acres.

Do not mechanically-apply manure and/or organic by-products on slopes between 6% and less than 12%, except when the Winter Spreading Plan documents no other fields available for winter spreading. If winter spreading must occur on a field with slopes between 6% and less than 12%:

- Apply only manure and/or organic by-products with 16% or greater DM. Manure or organic by-products containing less than 16% DM are prohibited;

AND ensure two or more of the following conditions apply to the field:

- Established contour buffer strips;
- Established stripcropping system;
- All crop residue is maintained (no residue removed for feed/silage or bedding) and no fall tillage occurred;
- Established grass and/or legume hay vegetation and greater than 4” crop residue stubble height remains at the time of application;
- Applications occur in intermittent strips on no more than 50% of the winter spreadable acres during a single application. Sequential applications can occur within the field if:
    - Sum of all applications occur on no more than 100% of the winter spreadable acres; and
    - Multiple applications do not occur on the same areas within the winter spreadable acres.

Mechanically apply manure and/or organic by-products meeting the definition of winter spreading at rates not to exceed those listed in Table 3 or to match the P removal of the following growing season’s crop, whichever is less.

Table 3. Winter Spread Manure and/or Organic By-Product Application Rates by Dry Matter Content and *Predominant Field Slope*.

	Total Maximum Winter Spread Manure and/or Organic By-Product Application Rate per Acre	
Predominant Field Slope	**Less than 16% DM[1,2]**	**16% DM or Greater**
0 - < 2%	60 pounds of P_2O_5 per acre or 7,000 gallons, whichever is less	60 pounds of P_2O_5 per acre
2 - < 6%	30 pounds of P_2O_5 per acre or 3,500 gallons, whichever is less	60 pounds of P_2O_5 per acre
6 - < 12%	No application	30 pounds of P_2O_5 per acre[3]
≥ 12%	No application	No application

1. No surface applications of manure or organic by-products with less than 16% DM between February 1 and March 31.
2. Includes any manure and/or organic by-product applied as a liquid, regardless of DM concentration.
3. Applications only allowed when the Winter Spreading Plan documents no other accessible fields available for winter spreading.

If winter applications occur, the balance of required crop nutrients may be applied when soils are not frozen and not snow-covered, following the criteria of this standard.

Ensure all mechanical-applications of manure and/or organic by-products to frozen soils or snow-covered soils follow all winter spreading and non-winter spreading criteria within this standard, whichever are the most restrictive.

CONSIDERATIONS

General Considerations

The following statements are optional management considerations and are not required practices.

Maintain soil pH within a range to maintain plant or crop nutrient availability and utilization. Refer to Extension Publication A2809 or other UW publications for guidance.

Use second-year N credit in nutrient management planning as outlined in Extension Publication A2809 on fields receiving manure applications in consecutive years.

When winter spreading manure and/or organic by-products is a regular practice, develop a long-term plan for increasing manure storage capacity and/or implementing other management changes, such as headland stacking, to reduce or eliminate the need for mechanical spreading of manure and/or organic by-products to frozen soils and/or snow-covered soils.

Seed and stabilize all reoccurring concentrated flow channels.

Install and maintain vegetative filter strips, riparian buffers, and other buffer areas adjacent to surface water and wetlands, in conjunction with other conservation practices, to reduce the sediment and nutrients from reaching surface water and/or groundwater.

Use *adaptive nutrient management* to improve nutrient use efficiency through nutrient rate, timing, form, and placement modifications. Adaptive Nutrient Management shall use multiple years of field data collected and evaluated utilizing methods recognized by the University of Wisconsin and/or USDA-NRCS Agronomy Technical Note 7 “Adaptive Nutrient Management Process”.

Modify animal diets to reduce P content of manure following NRCS, UW, and published research recommendations.

Alter crop rotations to increase opportunities to apply manure to actively growing crops during the summer crop growing season.

If nutrients were applied to a field and environmental conditions prevented planting of the field, plant a crop or cover crop when soil conditions allow. If additional N is needed to support the later planted crop, follow the rescue N recommendations.

Use the preplant soil nitrate test (PPNT) to adjust N application rates for wheat and/or in corn when nitrate carryover is likely. Collect soil samples and interpret PPNT results based Extension Publication A2809.

Evaluate the potential for nitrogen crediting of irrigation water by testing irrigation wells annually at the beginning of the growing season for nitrate-nitrogen.

Adjust manure application rate, placement, and/or timing to reduce potential groundwater contamination with nutrients and/or pathogens, particularly in Silurian Dolomite Soils.

Incorporate nutrient applications in flood prone areas of a field to prevent nutrient losses to surface water. Time manure or nutrient applications to avoid peak flood period(s).

Within US-EPA approved TMDL watersheds impaired from total phosphorus pollution, consider using P loss mitigation strategies in addition to those listed in Table One to maintain an average crop rotation P Index below three. Achieving an average crop rotation P Index greater than three may not meet water quality standards within TMDL watersheds impaired by total phosphorus.

Use overwintering grass cover crops to scavenge residual N after the cash crop growing season.

Use variable-rate N, P, and K application rates based on site-specific variability in crop yield, soil characteristics, soil test values, and other soil productivity factors. Application rates must not exceed recommendations in this standard or Extension Publication A2809, whichever is less.

Apply nutrients not specifically addressed by this standard (i.e., secondary and micronutrients) based on recommendations found in Extension Publication A2809.

PLANS AND SPECIFICATIONS

Use the most current version of UW’s SnapPlus software (https://snapplus.wisc.edu/) to develop and submit a nutrient management plan. Use alternative WI NRCS-approved documentation methods for non-SnapPlus supported crop types (e.g. cranberries) or management systems (e.g. small-scale agriculture practices, etc).

In the nutrient management plan, for each field receiving nutrients document –

- Aerial site photograph(s), imagery, topography, or site map(s) showing field or field management unit (where application) locations, field boundaries, acres, field identification numbers, Public Land Survey System information, and a North directional arrow if north is not oriented at the top of the page;
- Soil survey maps;

- Soils information including: soil types, surface textures, drainage classes, permeabilities, available water capacities, depth to water table, restrictive features, and flooding and ponding frequencies;
- Locations of designated sensitive areas, including direct conduits to groundwater, conduits to a navigable water, SWQMAs, and associated nutrient application prohibitions, restrictions, and/or setbacks.
- Regulated water sources including private potable water wells, community potable water wells, non-community potable water wells, and irrigation wells and associated restrictions or prohibition areas;
- Areas prohibited from receiving nutrient applications, including: surface water, concentrated flow channels, created surficial drainage ditches, area where established vegetation is not removed, non-farmed wetlands, delineated areas contributing runoff to direct conduits to groundwater, conduits to a navigable water, prohibition areas delineated by local Land Conservation Committees (where applicable), and fields exceeding tolerable soil loss (T) for sheet and rill erosion over the planned crop rotation;
- Areas prohibited from receiving nutrient applications to frozen or snow-covered soil;
- N restricted soils;
- Areas of ephemeral and gully erosion;
- Identify, to the maximum extent practical, the location and depth of subsurface drainage systems, including tile lines and inlets and outlets;
- Annual quantity of manure and/or organic by-products generated on-farm by manure/product type.
- Cropland and/or pasture acreage available for application of on-farm generated manure and/or organic by-products. If an adequate land base is NOT present, document strategy to store and utilize remaining manure and/or organic by-products;
- Amount and type of manure and/or organic by-products sold and/or used off farm and the individual and/or farm receiving the manure and/or organic by-products, where applicable;
- All nutrient imports to the farm, exports off the farm, and onsite transfers, when nutrient management plan is developed as a component of a comprehensive nutrient management plan for an AFO;
- All available test results (soil, irrigation water, compost, manure, organic by-product, and plant tissue sample analysis results) used to develop the farm nutrient budget and nutrient management plan. Including those used to establish representative baseline nutrient contents by each manure type;
- Crops and cover crops grown and tillage operations in the planned crop rotation;
- *Realistic yield* goals for all crops in the planned crop rotation;
- Results of approved risk assessment tools for N and P;
- Tolerable and calculated soil losses by sheet and rill erosion for the planned crop rotation;
- Planned nutrient source, rate, timing and method for all products contributing N, P, or K for future crops in the planned crop rotation. When grouping fields for nutrient application purposes, N, P, and K application rates shall match individual field recommendations as closely as possible;

- Actual nutrient source, rate, timing and method for all products contributing N, P, or K for all past crops in the planned crop rotation. Revise the nutrient management plan after the growing season to reflect any changes in crops, yields, tillage, management, and soil or manure analyses different from the planned management.
- When expanding livestock numbers and/or type, use a planned crop rotation for four years post-livestock expansion, including all planned manure applications and changes to soil test P-ppm, P balance calculations, and P index levels;
- For rescue N applications, document dates of soil saturation and/or soil and/or plant data used to justify N application in the farm narrative;
- Second year legume and/or manure credits, where applicable;
- Soil test P-ppm, P balance calculations, and/or P Index level, where applicable;
- If P is applied in excess of crop requirement, document application site presents a low risk for P transport to local water;
- Guidance for implementation, operation and maintenance, and on-farm recordkeeping;
- Other nutrient management activities required by regulation, program requirements, and/or producer goals.

Develop a Winter Spreading Plan to include:

- Quantity of manure and/or organic by-products generated and/or accepted by the farm between December 1st and March 31st;
- Storage capacity for each manure type and/or organic by-product generated and/or accepted by the farm;
    - When permanent storage for manure and/or organic by-products with ≥ 16% DM generated or accepted on farm between December 1st and March 31st is insufficient, potential locations and land area available for stacking. Refer to WI NRCS CPS 318, Short Term Storage of Animal Waste and Byproducts, to locate potential stacking sites;
- Winter Manure Spreading Plan implementation maps identifying:
    - Fields or areas of fields available for potential spreading to frozen or snow-covered soil;
    - Fields or areas of fields with slopes 6% to less than 12% where spreading of manure with 16% DM or greater that may be utilized if no other fields are accessible.

In fields with STP levels greater than 50 ppm document:

- Soil test P drawdown strategy over the planned crop rotation and over the long-term;
- P loss mitigation strategies used to reduce the potential for P transport and loss; and
- For AFOs, a quantification of manure produced in excess of crop nutrient requirements.

For variable rate (VR) nutrient management plans:

- Include geo-referenced field boundary and data collected, processed and analyzed as a GIS layer or layers to generate nutrient (N, P, and/or K) “as planned” soil amendment recommendations per field management zone. Must include site-specific maps of product application rates by field management zones (application maps must also identify WI NRCS 590 nutrient prohibition and/or restricted zones), soil sampling points and associated soil test results,

and any additional soil and/or crop data used to inform product application rates (i.e. crop yield maps, hyperspectral imagery, etc.);

- Include a narrative of soil testing methods, method for precision rate calculations, including the process to develop the GIS layers, and nutrient recommendations, indicating range of soil test values, and summary of all nutrient applications per field, including non-variable rate applied nutrient products.
- Enter VR nutrient applications into SnapPlus using the mathematical weighted average of the VR application rate(s) for each VR applied nutrient and field.

Ensure all included maps are scaled to adequately show field boundaries and soils, application and/or restriction information.

Persons who review or approve plans for nutrient management shall be certified through any certification program acceptable to the NRCS (NRCS General Manual, Title 180, Part 409.9, NRCS TechReg) or other appropriate agencies within the state.

Industrial waste, municipal sludge and some organic by-products are regulated by the WDNR and must be spread in accordance with a WPDES permit.

Develop plans for nutrient management in accordance with policy requirements of the NRCS General Manual Title 450 Part 401.03 and Title 190, Part 402, the contents of this standard, the procedures contained in the National Planning Procedures Handbook, and NRCS National Agronomy Manual, Section 503. Nutrient management plans used as an element in a Comprehensive Nutrient Management Plan (CNMP) plan shall be compatible with the requirements of a CNMP. A CNMP will require use of all the applicable criteria in this technical standard along with the additional criteria located in NRCS National Planning Procedures Handbook, Subpart B, Part 600.54.

OPERATION AND MAINTENANCE

Inspect fields for evidence of concentrated flow channels, ephemeral erosion, and gully erosion. Maintain permanent vegetation in concentrated flow channels where gully erosion has/will occur.

Review or revise plans annually, or more frequently as needed, to address changes in crop yield, manure management, volume or analysis, plants and crops, and/or plant and crop management and to reflect agronomic management and/or conservation practice changes to address soil and/or nutrient loss.

Initiate required manure sampling when significant changes in animal numbers, management, and feed management and/or manure handling and storage require additional manure analyses to establish a revised representative baseline nutrient content.

Calibrate application equipment to ensure accurate distribution of material at planned rates. For products too dangerous to calibrate on farm, follow UW or equipment manufacturer guidance on proper equipment design, plumbing, and maintenance.

Protect workers from and avoid unnecessary contact with nutrient sources. Take extra caution when handling anhydrous ammonia or when managing organic wastes stored in unventilated tanks, impoundments, or other enclosures. Minimize operator exposure to potentially toxic gases associated with manure, organic by-products, and chemical fertilizers, particularly in enclosed areas. Wear personal protective equipment appropriate to the material being handled.

Collect, store, and use material generated from cleaning nutrient application equipment in an agronomic and environmentally safe manner. Always avoid cleaning equipment near high runoff areas, ponds, lakes,

streams, and other water bodies. Extreme care must be exercised to avoid contaminating potable drinking water wells.

Recycle or dispose of nutrient containers in compliance with Federal, Tribal, State and local guidelines or regulations.

Protect commercial fertilizer from the weather. Protect agricultural nutrient storage facilities from accidental leakage or spillage. See Wisconsin administrative rules and county or local ordinances concerning regulations on siting, design, operation, and maintenance of these facilities.

Temporary placement or storage of manure shall be in accordance with the criteria for temporary unconfined stacks of manure contained in WI NRCS CPS 318, Short Term Storage of Animal Waste and Byproducts.

Maintain annual nutrient management plan data for, at minimum, the current and previous two cropping seasons (or designated length to meet program requirements) to document plan implementation and maintenance. Records must include:

- All test results (soil, water, compost, manure, organic by-product, and plant tissue sample analyses) upon which the nutrient management plan is based;
- Listing and quantification of all nutrient sources used/planned for use and documentation of all nutrient imports, exports and onsite transfers;
- Date(s), method(s), and location(s) of all nutrient applications;
- Plants and crops planted, planting and harvest dates, yields, and plant or crop residues removed;
- Dates of plan review, name of reviewer, and recommended adjustments resulting from the review.
- For VR nutrient applications, “as applied” maps identifying the variable application location, source, timing, amount, and placement of all plant and crop nutrients applied.

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GLOSSARY

Adaptive Nutrient Management – Process utilizing on-farm research data to refine nutrient management strategies based on site specific crop production conditions. Implementation of Adaptive Nutrient Management shall use multiple years of field data collected and evaluated utilizing methods recognized by the University of Wisconsin and/or as outlined in NRCS Agronomy Technical Note 6 “Adaptive Nutrient Management”.

Adequate Land Base – Land area required for application of all manure and/or organic by-products generated and/or accepted by a farm over the implemented crop rotation.

Agronomic Need – Nutrient requirement of a crop or series of crops in a rotation to optimize plant yield or productivity.

Animal Feeding Operation – Farm or facility raising animals in confined areas for 45 days or more annually and where vegetation is not sustained during the growing season.

Animal Unit – Standard unit used to measure the feed requirements of domestic animals, typically based on the forage consumption of a 1,000 lb mature cow.

Apparent Water Table – Continuous saturated zone in the soil to a depth of at least 6 feet without an unsaturated zone below it.

Appreciable Snow – Depth of snow necessary to create a visible, continuous layer > 0.5 inches in thickness.

Areas Contributing Runoff – Land area generating surface runoff during precipitation and/or snow and/or ice melting periods that flows toward and eventually reaches a water feature of interest/concern.

Community Potable Water Well – Public water system, regulated under NR 811, with at least 15 service connections and used by at least 25 residents for at least 6 months per year. Any water system serving 7 or more single family homes, 10 or more mobile homes, 10 or more apartment units, 10 or more duplex living units or 10 or more condominium units is considered a community water system unless information is provided by the owner indicating less than 25 year-round residents will be served.

Compost – Material resulting from the biological degradation and transformation of organic solid waste under controlled conditions designed to promote aerobic decomposition to the extent the material will not significantly reheat due to action of microorganisms when subjected to optimum oxygen, moisture, nutrients, and thermal conditions

Compound Fertilizer – Fertilizer containing two or more essential plant nutrients within each granule. Examples include diammonium and monoammonium phosphate.

Concentrated Flow Channel – Naturally occurring or constructed channel where overland waterflow becomes concentrated. Includes vegetated and non-vegetated channels caused by ephemeral erosion, drainage ditches, and drainage ends.

Conduits to a Navigable Water – Natural or man-made areas or structures discharging to a navigable water via channelized flow. Includes open tile line intake structures, open vent pipes, sinkholes, agricultural well heads, drainage ditches discharging to navigable waters and grassed waterways draining directly to a navigable water.

Contaminated Runoff – Manure, organic by-products, process wastewater, leachate, and/or other wastes or raw materials mixed with precipitation or snow melt which transports pollutants such as organic matter, suspended solids, nutrients, and/or pathogens outside of applied field boundaries and/or to surface water, groundwater, and/or other sensitive areas.

Contour – Along lines of consistent elevation. See Contour Farming.

Contour Buffer Strip – Narrow strips of permanent, herbaceous vegetative cover established around the hill slope and alternated down the slope with wider crop strips farmed on the contour. See WI NRCS CPS Code 332, Contour Buffer Strip.

Contour Farming – Aligning ridges, furrows, and roughness formed by tillage, planting, and other field operations at grade near the contour to alter the velocity or direction of water flow. See WI NRCS CPS Code 330, Contour Farming.

Controlled Release Fertilizers – Specialized fertilizers coated with a semipermeable membrane designed to release nutrients into the soil gradually over a period of time, rather than immediately after application. An example a of controlled release fertilizer is polymer coated urea.

Cover Crop – Grasses, legumes, forbs or other herbaceous plants established for seasonal cover and conservation purposes. Cover crops cannot be harvested for seed. See WI NRCS CPS Code 340, Cover Crops.

Crop N Deficiency – Condition where plant tissue concentrations of N are low enough to limit crop growth and development). An unexpected crop N deficiency may occur via denitrification or leaching losses due to excessively wet weather (e.g. soil is saturated for 10 days or more when soil temperatures are above 55 degrees after an in-season application of commercial fertilizer, excessive rainfall post-N application results in leaching, etc).

Direct Conduit to Groundwater – Wells; sinkholes; swallets (a sinkhole or rock hole intercepting a stream, diverting all or a portion of it to the groundwater); fractured bedrock at the surface, mine shafts; non-metallic mines; tile inlets discharging to groundwater, quarries, or depressional groundwater recharge areas over shallow fractured bedrock.

Documented Yield – Actual crop production yields documented on a field-by-field basis for, at minimum, three consecutive growing seasons used to determine crop nutrient requirements and removals. Yield documentation may include measurements of harvested crop weight, volume, or the use of calibrated yield-monitors.

Effective Incorporation – Mixing of nutrients with surface soil so at least 80% of applied material is covered with soil or subsurface placement of nutrients 4 to 12 inches below the soil surface by such means as injector, disc, sweep, mold-board plow, chisel plow, or other tillage/incorporation method. Nutrient applications will not result in ponding, runoff, or infiltrate to subsurface drainage during application.

Ephemeral Erosion – Shallow erosional channels forming in concentrated flow areas during runoff events. Ephemeral erosion channels are shallow enough to be filled in by typical tillage operations. Reoccurring ephemeral erosion occurs when shallow erosional channels reform and/or increase in size in the same location within the field with subsequent rainfall(s).

Field – Single nutrient management unit or group of like-managed nutrient management units meeting the following conditions: similar soil types, similar cropping history, same point in crop rotation (i.e., second year corn fields, established alfalfa), similar nutrient requirements, and close geographical proximity. Examples of like-managed nutrient management units include: alternate strips in a contour stripcropping system; during winter spreading, all strips/fields within the slope entirety; subdivisions (paddocks) within a pasture; variable rate nutrient application management units; and other management units where grouping facilitates implementation of the nutrient management plan.

Filter Strip – Strip or area of herbaceous vegetation used to remove contaminates, including nutrients, from runoff. See WI NRCS CPS 393, Filter Strip.

Frozen Soil – Soil frozen anywhere between the first ½ inch and 8 inches of soil as measured from the ground surface; soil frozen to a depth of ½ inch or less, as measured from the ground surface, is *not* considered frozen soil.

Gleaning – Livestock management practice where animals use crop residues remaining in the field after crop harvest as forage material. Gleaning often requires feed supplementation to meet the animals' complete nutritional needs.

Green Manure – Cover crops grown specifically to be incorporated into the soil for nutrient or soil organic matter enhancement.

Gully Erosion – Reoccurring erosional channels forming and/or reforming in naturally occurring concentrated flow areas which cannot be filled in or smoothed by typical tillage operations. (In contrast, ephemeral erosion channels are small enough to be filled in by typical tillage operations).

High Permeability Soils (P) – Equivalent to drained soil hydrologic group A, meeting both of the following criteria:

1. Permeability = 6 inches/hour or more in all parts of the upper 20 inches and
2. Permeability = 0.6 inches/hour or more in all parts of the upper 40 inches.

The lowest permeability listed for each soil layer should be considered. For a multi-component map unit (complex), evaluate each soil component separately. If an individual soil component(s) meets the high permeability criteria and cannot be managed separately from the other soil components, the entire map unit should be considered as high permeability.

High Runoff Risk Period – Period from February 1-March 31 when surface applications of all manure and/or organic by-products with less than 16% DM to frozen soils and/or snow-covered soils are prohibited.

Implemented Crop Rotation – Series of different crops growing in the same area across a sequence of growing seasons, commonly known as a crop rotation. For this standard, an implemented crop rotation may repeat within a planned crop rotation. For example, when alternating growing corn and soybeans, the implemented crop rotation is "corn-soybeans", while the planned crop rotation, to meet the minimum 3-year planning requirement, could be "corn-soy-corn-soy".

Injection – Placement of nutrients by mechanical means between 4" and 12" below the soil surface at a rate which allows nutrients to be incorporated into the soil, i.e. does not pool below the soil surface.

Irrigation Water – Artificial application of surface water or groundwater to crops or plants to promote growth. For this standard, treated animal manure or wastewater applied through an irrigation system is subject to manure testing and application requirements.

Land Application – Surface application, injection or incorporation of manure, organic by-products or other nutrient containing materials on soil.

Long-Term No-Till – No tillage or significant soil disturbance activity has occurred for a minimum of three consecutive years immediately prior to the current year.

Manure – Livestock excreta. Manure includes the following when intermingled with excreta in normal farming operations: debris including bedding, water, soil, hair, and feathers; processing derivatives including separated sand, separated manure solids, precipitated manure sludges, supernatants, digested liquids, composted biosolids, and process water; and runoff collected from barnyards, animal lots, and feed storage areas.

Manure Types – Manure streams of differing moisture content and/or nutrient profile warranting differential application strategies and/or rates. Manure types likely result from differences in livestock

source and/or management and/or differing manure storage and/or handling protocols. Manure extracted from individual pits within a multiple manure pit system may constitute different manure types if manures vary significantly in moisture and/or nutrient content.

Municipal and Industrial Biosolids – Nutrient-rich, semi-solid to solid materials resulting from the treatment of sewage, wastewater, and/or industrial processes.

Nitrification Inhibitor – Compound temporarily blocking the activity of nitrifying bacteria, thereby slowing the conversion of ammonium to nitrate. Use nitrification inhibitors whose efficacy is recognized by UW or other Land Grant Universities.

Nitrogen Restricted Soils – Soils defined as Highly Permeable (P), Shallow to Bedrock (R) and/or Wet (W) soils.

No-Till – Farming practice utilizing no tillage or significant soil disturbance activities to maintain crop residue at the soil surface. See WI NRCS CPS Code 329, Residue and Tillage Management, No-Till.

Non-Community Potable Water Well – Public water system, regulated under NR 812, which serves at least 25 or more people for 6 months or more per year. Well users may be non-transient (same 25 people) or transient. Non-Community potable wells include schools, restaurants, or churches.

Nutrient Budget – Quantification of on-farm soil nutrient balance by field, including soil nutrient inputs, nutrient credits, and nutrients removed up by crop harvest over the planned crop rotation. A nutrient budget estimates the total amount of nutrients generated and/or imported on farm as manure and/or organic by-products and documents their intended on-farm use or export.

Organic By-products – Carbon-based materials produced as an amendment of an industrial or agricultural process which can be land applied as a source of nutrients. Examples include *compost* not containing animal manure, paunch, food or crop production wastes, *waste milk*, process wastewater, feed leachates, and municipal and industrial biosolids, wastewater, and sludges, if land applied. This definition does not include hazardous and/or inorganic industrial waste or manufactured nutrient sources. Use of the term “organic” refers to carbon-based materials and is not intended as a reference to the certification criteria of the USDA National Organic Program.

P Loss Mitigation Strategies – Agronomic management techniques and conservation practices resulting in reduced risk of P transport to surface water bodies. Various strategies are outline in “The Phosphorus Cycle for General Cropping Systems in Wisconsin” (https://ipcm.wisc.edu/wp-content/uploads/sites/54/2024/02/UW-NPM-Phosphorus-Cycle.pdf) and on the UW Wisconsin Phosphorus Index webpage (https://wpindex.soils.wisc.edu/managing-runoff-p/)

Pasturing – Livestock management practice where animals acquire most of their nutritional need from the grazing of actively growing vegetative cover and/or through planned forage placement on croplands and/or pasturelands. Pasturing animals stocked at an average stocking rate of 1 animal unit or less per acre during the grazing season are exempt from inclusion in a nutrient management plan.

Peak Flood Periods – Time of the year when water levels in surface water bodies are often at or near their maximum levels, typically during or shortly after spring snowmelt.

Permanent Vegetation – Perennial plants used in an agricultural context, including perennial plantings for field borders, buffers, contour strips, perennial crops (e.g. fruit and nut trees, perennial pasture), and/or grassed waterways.

Phosphorus Index (PI) – Modeled potential risk for a given field to deliver P to surface water based upon calculated soil erosion, soil test P concentrations, estimated annual field rainfall and snowmelt runoff volume, runoff flow pathways, supplemental P additions, field soil map units and slope, field operations,

and planned crop rotation. The PI will be calculated using the most current version of the Wisconsin Phosphorus Index model or as required by Tribal, State, or local regulations.

Planned Crop Rotation – Past and future cropping and tillage practices, at minimum, over a 3-year period, with at least one year behind and one year ahead of the planning year. If the implemented crop rotation is longer than 3 years, the entire crop rotation, including all cropping and tillage practices already implemented and/or planned, must be reflected in the planned crop rotation. If a crop rotation is less than 3 years, repeat the crop sequence to achieve at least 3 implemented and/or planned years. When a farm has no previous nutrient management plan, no previous years are required in the planned crop rotation.

Plant Nutrients and Soil Amendments – Any material or product applied to the soil which adds plant essential nutrients regardless of source. Materials adding N, P, and/or K are subject to criteria and restrictions outlined in this standard.

Ponding – Pooling of liquid, including liquid manure, at the soil surface resulting from the rate of liquid inflow exceeding the rate of outflow.

Predominant Field Slope – Slope gradient (%) comprising a majority of the field. The predominant field slope is not the average slope of the field.

Realistic Yield Goal – Yield goal based upon documented, multi-year crop yields or yields attainable under average growing conditions, using soil productivity and local weather information.

Reduced Till – Managing the amount, orientation, and distribution of crop and other plant residue on the soil surface year-round while limiting soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting. See WI NRCS CPS Code 345, Residue and Tillage Management, Reduced Till.

Representative Baseline – Nutrient concentration of a manure type used in nutrient management planning based on, at minimum, a three-year running average of manure N, P, K, and dry matter content, as determined by laboratory testing.

Rescue Nitrogen – Application of supplemental N to a growing crop above the total crop-specific recommended rate in Extension Publication A2809 following a documented N deficiency.

Runoff Risk Advisory Forecast (RRAF) – Online tool providing a short-term forecast of runoff risk for Wisconsin. The tool uses projected meteorological data to predict precipitation, snow melt, soil moisture content and other factors impacting nutrient runoff likelihood. Runoff risk assessments are updated several times a day. https://www.manureadvisorysystem.wi.gov/runoffrisk/index .

Saturated Soils – Soils where all pore spaces are occupied by liquid and where any additional inputs of water or liquid wastes cannot infiltrate into the soil. For the purposes of this standard, soil is saturated if the top 2 inches are inundated with water/liquid. See NRCS publication “Estimating Soil Moisture by Feel and Appearance”.

Shallow to Bedrock Soils (R) – Areas with bedrock (lithic contact) within 24 inches of the land surface.

Silurian Dolomite Soils – Soils with a thickness of 20 feet or less and underlaid by Silurian dolomite. Areas where Silurian bedrock occurs in Wisconsin can be identified by the most current NRCS, Wisconsin Geological and Natural History Survey, Wisconsin Department of Agriculture, Trade and Consumer Protection, Wisconsin Department of Natural Resources, county maps, and/or infield bedrock verification methods.

Snow-Covered Soil – Soil continuously covered by an inch or more of snow.

Split Application – Division of annual nutrient management additions across multiple application events. At least one application must occur post-planting.

Starter Fertilizer – Commercial fertilizer applied at the time of planting and placed with or in a band near the seed.

Stripcropping – Growing planned rotations of erosion resistant and erosion-susceptible crops or fallow in a systematic arrangement of strips across a field. See WI NRCS CPS Code 585, Stripcropping.

Subsurface Drainage – Artificial conduit installed beneath the soil surface to collect and/or convey excess soil water (i.e. tile drainage).

Surface Water Quality Management Areas (SWQMA) – Areas within:

- 1,000 feet from the ordinary high-water mark of navigable waters that consist of a lake, pond or flowage.
- 1,000 feet from the high-water mark of navigable waters that consist of a glacial pothole lake.
- 300 feet from the ordinary high-water mark of navigable waters that consist of a river or stream or other non-lake navigable waters.
- 300 feet of conduits to a navigable water.

Tolerable Soil Loss (T) – Maximum rate of soil erosion via sheet and rill erosion established for each soil type that will permit crop productivity to be sustained economically and indefinitely. Erosion calculations shall be based on current NRCS approved erosion prediction technology.

Total Maximum Daily Load (TMDL) – Amount of a pollutant a waterbody can receive and still meet water quality standards. TMDLs are developed after a waterbody is identified as impaired for one or more pollutants and is placed on Wisconsin's Section 303(d) list of impaired waters.

Vegetative Buffer – Strip or area of perennial herbaceous vegetation situated between cropland, pastures, or disturbed land (including forest land) and environmentally sensitive areas to protect water quality and reduce erosion. See WI NRCS CPS Code332, Contour Buffer Strips; 391, Riparian Forest Buffer; 393, Filter Strip; and 601, Vegetative Barrier.

Waste Milk – Unsold and/or unutilized liquid whole milk. When land applying waste milk, include associated nutrients in crop nutrient budgeting.

Wet Soils (W) – Soils with an *Apparent Water Table* within 24 inches of the surface at any time of the year. The apparent water table is a continuous saturated zone in the soil to a depth of at least 6 feet without an unsaturated zone below it.

- Nutrient applications may occur on W soils, without the N restricted soil limitations, if water table depth is verified to be greater than 24 inches below the surface.
- To verify water table depth, excavate two soil pits within a W Soil area less than five acres in size to a depth of 30 inches. After one hour or more, observe if the water table is deeper than 24 inches from the soil surface. If both soil pits have water tables deeper than 24 inches from the soil surface, nutrient applications can occur, without the N restricted soil limitations, after the pits are refilled with soil. If one or both soil pits have water tables shallower than 24 inches, applications must follow the N restricted soil limitations. No applications can occur to saturated soils.
- For areas greater than 5 acres in size, locate and excavate additional soil pits to achieve a ratio of two pits for every 5 acres of W soils.

Winter Spreading – Mechanical application of manure and/or organic by-products to frozen and/or snow-covered soils when *effective incorporation* or injection is not possible. Surface applications to non-frozen and/or non-snow-covered soils and/or applications to frozen and/or snow-covered soils with effective incorporation or injection are not considered winter spreading, independent of the time of year.