CAFO Applications and Phosphorus-based Nutrient Management Plans

NOTE: This document generally explains some of the requirements of s. NR 243.14, Wis. Adm. Code, and is for informational purposes only. Please review your WPDES permit and s. NR 243.14 for all applicable requirements.

Controlling Phosphorus Delivery

NR 243 and WPDES permits issued to CAFOs include a number of requirements to minimize phosphorus (P) delivery to surface waters [see NR 243.14(5)]. Controlling P delivery is based on NRCS Standard 590 and, in most cases, allows operations to use either the Soil Test Phosphorus Strategy or the PI Strategy on a field-by-field basis.

There are areas where WPDES permits require additional practices to minimize P delivery that are more stringent than NRCS Standard 590, primarily by using the P-Index. Whereas NRCS Standard 590 allows operations to not use the P-Index if they plan to only use the Soil Test Phosphorus Strategy, CAFOs are required to use the P-Index in the following circumstances:

- For fields with soil test P levels less than 50 ppm and not at optimum P levels for the highest P demanding crop (according to A2809) that are adjacent to or that the Department determines have a high potential to deliver phosphorus to impaired, outstanding or exceptional resources waters, CAFOs may not increase soil test phosphorus levels over a rotation without Department approval. The Department may approve increases in soil P levels over a rotation up to optimum levels in these fields, if the operation can demonstrate that phosphorus deliverability will not increase due to a rise in soil phosphorus levels. It is assumed that this demonstration will be made via the P-Index.

- For fields with soil test P levels between 100 and 200 ppm, manure and process wastewater applications are limited to 50% of the cumulative annual crop P-need over the rotation or next four years, whichever is less. In addition, the applications may not result in a P-Index value over 6 averaged over the rotation or next four years, whichever is less.

- For fields with soil test P levels of 200 ppm or more, the permittee may not apply manure or process wastewater to these fields without prior Department approval. The Department may only approve applications on these fields if:

1. Manure and process wastewater applications are limited to 50% of the cumulative annual crop P-need over the rotation or next four years, whichever is less,
2. The applications do not result in a P-Index value over 6 averaged over the rotation or next four years, whichever is less, and
3. The P-index increases by less than 1 or applications to the field result in overall decreases in P deliverability to area wetlands or surface waters by reducing applications to fields with higher deliverability.

How does this impact my Nutrient Management Plan?

Nutrient Management Plans (NMP) must outline on a field-by-field basis, the Phosphorus Strategy that the operation is using as well as any relevant calculations where use of the P-Index is required or chosen.

CAFO Applications
When Ground is Frozen, Snow-Covered or Saturated

NOTE: This document generally explains some of the requirements of s. NR 243.14, Wis. Adm. Code, and is for informational purposes only. Please review your WPDES permit and s. NR 243.14 for all applicable requirements.

Properly timing applications of manure and process wastewater

Operations should always recognize the potential increased risk of runoff whenever applying manure on ground that is saturated, frozen, or snow-covered or when rain is forecasted. WPDES permits require that CAFOs time their applications of manure and process wastewater and implement practices designed to avoid potential runoff events associated with these conditions.

Saturated Ground and Predicted Precipitation

CAFOs are prohibited from applying manure and process wastewater to saturated soils, those soils that are so moist as to prevent proper infiltration of applied materials. In addition, manure or process wastewater may not be surface applied when precipitation capable of producing runoff is forecast within 24 hours of the time of the planned application. Permittees should include information on how they plan on addressing forecasted precipitation as part of their Nutrient Management Plan (NMP). [see s. NR 243.14(2)(b)5. and 13.]

Frozen or Snow-Covered Ground

The winter spreading restrictions in s. NR 243.14 are intended to address potential water supply well impacts, fish kills and runoff events. Manure and process wastewater may not be applied when snow is actively melting and water is flowing off of a field. In addition, manure and process wastewater may not be applied on frozen or snow-covered fields with five feet or less of soil to fractured bedrock. [see s. NR 243.14(2)(b)10. and 11.]

Applications of manure that can be properly injected or immediately incorporated do not need to follow the winter spreading restrictions s. NR 243.14(6)-(8). The Department does not consider incorporation of manure on areas with more than 4" of snow as proper incorporation and is prohibited.

Except for liquid manure applications during February and March, manure applied on ground frozen in the first ½" or less of soil (or unfrozen in the first 8" of soil) and that has less than 1" of snow is not considered frozen or snow-covered and does not need to comply with winter spreading restrictions s. NR 243.14(6)-(8). These winter conditions account for reduced runoff potential associated with ephemeral frost and dustings of snow.

Solid Manure [see s. NR 243.14(6)]
Generally, CAFOs **may** surface apply **solid** manure on frozen or snow-covered ground **except** during February and March. Beginning Jan. 1, 2008, CAFOs **may not** surface apply **solid** manure during February and March on areas of fields frozen anywhere between the first ½" and 8" of soil or on areas that have 1" or more of snow.

Liquid Manure [see s. NR 243.14(7)]
Except for liquid manure that is frozen and cannot be transferred to storage, CAFOs **may not** surface apply **liquid** manure at any time during February and March regardless of soil conditions.

In addition, CAFOs **may not** surface apply **liquid** manure during other winter months when the ground is frozen or snow covered, with the following exceptions:

- CAFOs permitted as of July 1, 2007 and CAFOs constructed prior to April 14, 2003, that do not already have 180-days of liquid manure storage, may surface apply liquid manure. These CAFOs have until January 1, 2010, to install six months storage for liquid manure.
- Liquid manure that is frozen and cannot be transferred to storage may be surface applied on frozen or snow-covered ground. [NOTE: as stated above, only this frozen liquid manure may be surface applied during February and March]
- CAFOs permitted as of July 1, 2007 that already have 180-day liquid manure storage and CAFOs that were constructed on or after April 14, 2003, may surface apply liquid manure only on an emergency basis.

Any allowed surface applications of manure must comply with the applicable restrictions and setbacks in NR 243.15(6)-(8) and Tables 4 (solid manure) and 5 (liquid manure). In addition, all surface applications of manure or process wastewater must

meet a winter acute loss index value of 4 or less using the Wisconsin Phosphorus Index.

Whenever a permittee surface applies manure or process wastewater on frozen or snow-covered ground, it must inspect the application site during and shortly after the application and report whether any applied materials ran off the application site.

What qualifies as an allowable "emergency application" of liquid manure?

Operations that have 180-day storage, may surface apply liquid manure on an emergency basis provided the following conditions are met:

- The liquid manure storage facility has been properly maintained and operated to provide for 180-days of storage.
- The surface application is necessitated by the exceedance or expected exceedance of the storage facility's margin of safety.
- The margin of safety exceedance is the result of unavoidable or unforeseen circumstances beyond the control of the permittee, such as unusual weather conditions or equipment failure.
- The permittee follows appropriate notification and reporting requirements regarding the emergency application.

Margin of safety exceedances at operations with 180-day storage that result from the failure of the permittee to properly design or maintain storage capacity do not qualify as the basis for emergency applications allowed as part of a WPDES permit. [see NR 243.14(7)(d)]

What restrictions apply to applications of frozen liquid manure?

Frozen liquid manure that cannot be transported to a manure storage facility may be surface applied on frozen or snow-covered ground in accordance with Table 5. Prohibitions on liquid manure surface applications during February and March do not apply to frozen liquid manure. [see NR 243.14(7)(f)]

What restrictions apply to process wastewater applications on frozen or snow-covered ground?

WPDES permits conditions that regulate the land application of process wastewaters (e.g., milking center wastes, egg wash water) to frozen or snow-covered ground are based on restrictions for industrial wastes contained in ch. NR 214, Wis. Adm. Code. These restrictions include:

- A 500' setback from inhabited dwelling which may be reduced to 200' if the wastewater is incorporated and written consent is received from the affected occupants.
- A 1000' setback from municipal water supplies and 250' from all other potable water supplies.
- A 200' setback from surface waters
- Fields must have a 2% slope or less. The Department may approve applications on fields with up to 6% slopes.
- The maximum hydraulic application loading rate is 6,800 gallons/acre/day.

All other requirements in NR 243 and CAFO WPDES permits (e.g., phosphorus-based nutrient management, application restrictions within the SWQMA) apply to applications of process wastewater.
[see s. NR 243.14 for references to process wastewater]

How do restrictions on the timing of manure and process wastewater applications impact my Nutrient Management Plan?

In order to comply with the winter spreading restrictions, CAFOs must create a winter spreading plan that is part of their Nutrient Management Plan (NMP) that addresses the following areas:

- Restriction/hazard area maps for cropped fields showing applicable setbacks and prohibition areas (for example, setbacks in Tables 4 and 5 and fields with 5' or less of soil over fractured bedrock).
- Identification of an adequate number of fields and acreage that meet the restrictions in Table 4 and 5 as well as allowable application rates on these fields that would result in a winter acute loss index value of 4 or less. Operations with 180-days of liquid manure storage must also identify fields to address potential emergency applications of liquid manure.
- Should a permittee choose to stack solid manure to avoid applications in February and March, the permittee must submit stacking sites for approval as part of the NMP. Stacking criteria and requirements are contained in s. NR 243.141.

In addition, permittees must identify how they plan on identifying storm events capable of producing runoff as part of their NMP.

Restriction Tables from ch. NR 243, Wis. Adm. Code

Table 4-Restrictions for Surface Applying Solid Manure on Frozen and Snow Covered Ground

Criteria	Restrictions for fields with 0-6% slopes	Restrictions for fields with slopes > 6% and up to 9%	Restrictions for fields with slopes greater than 9%
Required fall tillage practice prior to application	Chisel or moldboard plow, no-till or a department approved equivalent[A]	Chisel or moldboard plow, no-till or department approved equivalent[A]	Not allowed
Minimum % solids allowed	12%	> 20%	Not allowed
Application rate (cumulative per acre)	Not to exceed 60 lbs. P_2O_5 per winter season, the following growing season's crop P_2O_5 budget taking into account nutrients already applied, or phosphorus application restrictions specified in a department approved nutrient management plan, whichever is less	Not to exceed 60 lbs. P_2O_5 per winter season, the following growing season's crop P_2O_5 budget taking into account nutrients already applied, or phosphorus application restrictions specified in a department approved nutrient management plan, whichever is less	Not allowed
Setbacks from surface waters	No application allowed within SWQMA	No application allowed within 2.0 x SWQMA	Not allowed
Setbacks from downslope areas of channelized flow, vegetated buffers, and wetlands	200 feet	400 feet	Not allowed
Setbacks from direct conduits to groundwater	300 feet	600 feet	Not allowed

A – All tillage and farming practices shall be conducted in accordance with the following requirements; 0-2% slope = no contouring required, >2-6% slope tillage and practices conducted along the general contour, >6% slope = tillage and farming practices conducted along the contour. The department may approve alternative tillage practices on a case-by-case basis in situations where conducting practices along the contour is not possible. Allowances for application on no-till fields only apply to fields where no-till practices have been in place for a minimum of 3 years.

Table 5–Frozen and Snow Covered Ground Restrictions – Emergency Surface Applications of Liquid Manure

Criteria	Restrictions for fields with 0-2% slopes	Restrictions for fields with >2-6% slopes	Restrictions for fields with slopes greater than 6%
Required fall tillage practice prior to application	Chisel or moldboard plow or department approved equivalent[A]	Chisel or moldboard plow or department approved equivalent[A]	Not allowed
Application rate (cumulative per acre)	Maximum application volume of 7,000 gallons per acre per winter season, not to exceed 60 lbs. P_2O_5, the following growing season's crop P_2O_5 budget taking into account nutrients already applied or other phosphorus application restrictions specified in a department approved nutrient management plan, whichever is less	Maximum application volume of 3,500 gallons per acre per winter season, not to exceed 30 lbs. P_2O_5, the following growing season's crop P_2O_5 budget taking into account nutrients already applied, or other phosphorus application restrictions specified in a department approved nutrient management plan, whichever is less	Not allowed
Setbacks from surface waters	No application allowed within SWQMA	No application allowed within SWQMA	Not allowed
Setbacks from downslope areas of channelized flow, vegetated buffers, wetlands	200 feet	200 feet	Not allowed
Setbacks from direct conduits to groundwater	300 feet	300 feet	Not allowed

A – All tillage and farming practices shall be conducted along the contour in accordance with the following requirements; 0-2% slope = no contouring required, >2-6% slope = tillage and practices conducted along the general contour. The department may approve alternative tillage practices on a case-by-case basis in situations where conducting practices along the contour is not possible

CAFO Applications within Surface Water Quality Management Areas (SWQMA)

NOTE: This document generally explains some of the requirements of s. NR 243.14, Wis. Adm. Code, and is for informational purposes only. Please review your WPDES permit and s. NR 243.14 for all applicable requirements.

What is a SWQMA?

For the purposes of ch. NR 243 and WPDES permits issued to CAFOs, SWQMAs include the following areas:

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

SWQMA distances should be measured from the top of the channel for navigable waters and the middle of the channel for conduits to navigable waters.

The first question DNR staff often get is "how do I know a given stream, creek or channel is navigable?" Navigable waters have a defined bottom (bed) and side (bank), and enough water to float any boat, skiff, or canoe of the shallowest draft on a reoccurring basis. Clearly, lakes and perennial rivers and streams are navigable.

But what about those channels that have water in them only occasionally? While it may be a pleasant prospect, using a boat is rarely necessary to tell whether a stream or lake is navigable. Waterways can be presumed navigable if they appear on the USGS topographic map[1] as a perennial lake or stream. Intermittent streams are commonly navigable waterways as well if they appear on a topographic map. A final desktop source is permit applications for Department Waterway and Wetland permits (ch. 30) from 2000 to the present that are shown on maps available on DNR's web site via the Designated Waters Search[2].

[1] USGS topographic maps can be found at your local library, internet resources such as the Gazetteer (www.census.gov/cgi-bin/gazetteer), Google Earth (earth.google.com), and Topozone (topozone.com) or your county or city zoning department.

[2] http://maps.dnr.state.wi.us/imf/dnrimf.jsp?site=SurfaceWaterViewer.deswaters

The second question DNR staff often get is "what is a conduit to a navigable water?" For CAFO permits, a conduit to a navigable water means a natural or man-made area or structure that discharges to a navigable water via channelized flow. This includes open tile line intake structures, open vent pipes, sinkholes, agricultural well heads, and drainage ditches that discharge to navigable waters. The main channel of a grassed waterway is also a conduit if it discharges to navigable water. Side grassed waterways that discharge to a main channel of a grassed waterway are not considered direct conduits unless they are essentially two equal channels that end at the start of a main channel of a grassed waterway. Conduits to navigable waters do not include the components of a subsurface drainage system if they are not present at the soil surface.

What restrictions apply to CAFO applications within the SWQMA?

CAFO WPDES permits do not prohibit applications of manure and process wastewater within the SWQMA. However, CAFOs must take additional precautions when applying manure or process wastewater within the SWQMA. One option when applying manure within the SWQMA is to maintain a 100-foot setback from navigable waters and their conduits. CAFO may not apply manure or process wastewater within the setback.

Another option is to implement practices equal to or better than the 100-foot setback. Operations may submit their own equivalent practice for Department approval or follow one of the equivalent practices outlined in NR 243.14(4). These practices include establishing a 35-foot vegetated buffer or a filter strip designed in accordance with NRCS Standard 393 where no manure is applied and:

- Option #1: Inject/immediately incorporate applied materials in the remainder of the SWQMA
- Option #2: Surface apply materials within the remainder of the SWQMA provided the field has at least 30% residue and follow the application rate restrictions in the table below. On a given field within the SWQMA, additional manure and process wastewater may be applied to meet crop

nutrient needs provided at least 7 days have elapsed since the last application.

MAXIMUM RATES OF UNINCORPORATED LIQUID MANURE AND PROCESS WASTEWATER APPLIED WITHIN A SWQMA	
Surface Texture Class	**Max Application Rate (gallons/acre)**
Fine	5,000
Medium	7,500
Coarse	10,000
Fine – clay, silty clay, silty clay loam, clay loam. **Medium** – sandy clay, sandy clay loam, loam, silt loam, silt. **Coarse** – loamy sand, sandy loam, sand. This category includes peat and muck based on their infiltration capacity.	

An operation can also reduce the 100-foot setback to 25 feet on fields that have been in long-term no-till provided they follow option #1 or #2.

What SWQMA restrictions apply to wetlands?

For the purposes of implementing nutrient management requirements and WPDES permits, wetlands mean areas delineated on a hydric soils map that are dominated by hydrophytic vegetation. They do not include prior converted or farmed wetlands. When applying manure and process wastewater near wetlands that are connected to and run parallel to navigable waters, the landward edge of the wetland is considered to be the beginning of the SWQMA. Wetland features that are connected to and run perpendicular to that navigable waters are treated as conduits to navigable waters and the SWQMA begins at the landward edge of the wetland. For wetlands that are not connected to navigable waters, manure and process wastewater may not be applied within 25 feet of the wetland.

How does this impact my Nutrient Management Plan?

Nutrient Management Plans (NMP) must outline SWQMA areas on hazard/restriction area maps required as part of NMP submittal. In addition, the NMP narrative and hazard/restriction area maps must identify which practices the operation will be implementing on a field-by-field basis to comply with the SWQMA restrictions. For example, different types or colors of cross-hatching could represent a specific type of practice (e.g., blue cross-hatching represents a 25-foot separation with injection/incorporation, yellow cross-hatching represents a 25-foot separation with a 5,000 gallons/acre application rate.