Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Manure Management Plans for NPDES Permitted Feedlots Guidance

NPDES/SDS Permit Program
Feedlot Program

Doc Type: Permit Application

Instructions on how to complete an MMP on page 2.

Manure Management Plan (MMP) requirements changed in 2010 for National Pollutant Discharge Elimination System (NPDES) permitted feedlots. This guidance describes: what is the same; what is new; what is needed in your permit application, and Attachments that can be used for completing the new MMP requirements.

What is the same?

1. The basic standards for developing a MMP have remained the same.
2. Crop nutrient rate requirements, sensitive feature setbacks, and required records are unchanged.
3. Requirements for transferred ownership of manure are unchanged.

What is different?

New MMP requirements for NPDES permits are as follows (pertains to non-transferred ownership of manure):

1. Manure management plans are required for the length of the permit (five years).
   A. Field specific plans are still required for the first cropping year (same as before).
   B. To explain how manure will be managed in the succeeding cropping years, MMPs must include a "Methodology" (Attachment 1, page 3)
      - How manure/nutrient application rates will be determined
      - All anticipated fields for spreading manure
      - Potential crops and methods/timing of manure application for each field
2. New process when modifying MMP
   A. If changes are made to the MMP after you get your new permit, complete and submit a MMP modifications form to indicate the type of changes proposed (found on the Minnesota Pollution Control Agency (MCPA) Web site).
   B. Changes must be reviewed and approved by MPCA before they can be implemented.
   C. Some types of changes require a 30-day public notice process before they can be implemented (see MMP modifications form on MPCA Web site).
3. Winter application of manure has new requirements
   A. Liquid manure shall not be surface-applied after Dec. 1, unless soil is unfrozen and without snow. Exceptions are allowed in the permit for emergencies beyond the control of the permittee.
   B. All MMPs for liquid manure shall identify fields for emergency applications during winter (Attachment 2, page 8).
   C. Solid manure may be applied during winter if fields are identified in MMP (Attachment 2, page 8). All permit conditions must be met (e.g., low phosphorus index rating, slopes, etc.).
4. Annual reports require additional information
   A. Specific manure application records for the preceding cropping year are now required.
   B. Submit with annual report. Due each year by March 1.

Keep a copy of all pages for your records.

How do I complete an MMP when manure ownership is not transferred?

Include the following to ensure that your plan is complete:

1. **Detailed MMP same as required for previous permits**

   The following required components of an MMP have not changed:

   - ✓ Description of manure storage/handling and testing;
   - ✓ Field locations, acreage, and maps or aerial photos;
   - ✓ First-year field-specific nutrient management plans that include manure application rates, timing and methods of application; and
   - ✓ sensitive areas management.

   See MPCA fact sheet Wq-f8-07 for information on software.

2. **Fields and Methodology for all five years**

   Form in Attachment 1 may be used (page 3 - Manure Management Plan Methodology).

   - ✓ Describe how N and P rates will be determined throughout the duration of the permit.
   - ✓ List all fields that could be used throughout the duration of the permit.
   - ✓ For each field include the possible crops, season for spreading, and method of application.

3. **Winter application information**

   Form in Attachment 2 may be used (page 8 - Winter Application of Manure).

   - ✓ List required information for fields that will receive non-emergency applications of solid manure during winter
   - ✓ List field information for fields to be used for potential emergency winter applications of liquid manure

4. **Checklist**

   The checklist in Attachment 3 (page 10) may be used to ensure that everything required in 1-3 above is included.

   - ✓ Double check to make sure that the MMP is entirely complete.

How do I complete an MMP when manure ownership is transferred?

See MPCA guidance "Manure Management Plan Requirements When Ownership of Manure is Transferred"

- ✓ MPCA Web site http://www.pca.state.mn.us/publications/wq-f8-12.doc.

Keep a copy of all pages for your records.

Attachment 1 – Manure Management Plan Methodology

(Attach to all MMPs completed for NPDES Permitted Feedlot Facilities)

Facility name: _____ Owner name: _____

Federal regulations and those listed in the general permit Part II. B. 3.require that NPDES permit holders submit a methodology used to calculate the amount of nutrients to be land applied. The following methodology consists of three components that must be covered in the MMP. They include nitrogen management, phosphorus management, and field specific information. Each of these are necessary to calculate manure and fertilizer application rates. Select one option under the Nitrogen Management section and one option under the Phosphorus Management section. These selections indicate how your nutrient application rates will be calculated. Under the field specific information section, additional information on crops, and application methods and timing is required to help determine manure application rates.

Any changes to this methodology must be submitted to MPCA for review on the form "Manure Management Plan Modification – Submittal Form".

I. Nitrogen Management

Select only one of the following three options under nitrogen management by checking a box.

☐ **Option 1 – Maximum N rates derived from University of Minnesota recommendations**

1. Based on the applicable crop rotation, manure application rates cannot exceed the maximum nitrogen need for non-legumes and nitrogen removal for legumes. Examples are listed in Table 1 below.

   A. Table 1 below is derived from the following University of Minnesota Extension Service publications: 1). "Fertilizing Corn in Minnesota" publication "FO-3790-C, Revised 2006", 2). "Fertilizer Recommendations for Agronomic Crops in Minnesota" publication "BU-06240-S, Revised 2001.", and 3). "Nutrient Management for Commercial Fruit & Vegetable Crops in Minnesota" publication BU-05886, Revised 2005.
   B. The corn and agronomic crop publications are listed at U of MN Extension Service Web site for corn production: http://www.extension.umn.edu/Corn/genfertility.html.
   The fruit & vegetable publication can be found at: http://www.extension.umn.edu/Vege&Fruit/.

2. Manure application rates will be calculated using the following factors:

   A. Not to exceed maximum nitrogen rates as described above.
   B. Manure analysis test results, the most recent or a running average.
   C. Soil test results, where applicable.
   D. First year nitrogen availability from manure will be based on animal species and method of application (See Table 2 below).
   E. If applicable, 2nd year manure credits or legume credits will be accounted for in the calculations (see Tables 1 and 2).
   F. If applicable, any fertilizer nitrogen will be accounted for in the calculations.

   Additional information about manure management can be found in: "Manure Management in Minnesota" Extension Service publication "WW-03553, Revised 2007". This publication can be found at the following Web site: http://www.extension.umn.edu/Corn/manure.html.

3. Deviations from maximum nitrogen applied will follow the standards allowed in Minn. R. 7020.2225, subp 3 (A)(2) and General Permit section II.B.3.a.2.

Keep a copy of all pages for your records.

Table 1 – Maximum Nitrogen Rates

Crop to be grown	Yield	Crop last year	Crop 2 years ago	Max N needs	Lbs of N removed per yield
Corn (grain and silage)	Any	Corn	No Alfalfa	180	---
Corn (grain and silage)	Any	Corn	Alfalfa: (2-3 plants/ft2)	130	---
Corn (grain and silage)	Any	Soybeans	No Alfalfa	140	---
Corn (grain and silage)	Any	Alfalfa: (2-3 plants/ft2)	Any	80	---
Corn (grain and silage)	Any	Alfalfa:(4 or more plants/ft2)	Any	30	---
Corn (grain and silage)	Any	Alfalfa:(1 or less plants/ft2)	Any	140	---
Corn (grain and silage)	Any	Grass legume hay	Any	105	---
Corn (grain and silage)	Any	Corn	Alfalfa:(4 or more plants/ft2)	105	---
Crops using yield based goals to determine N needs/use					
	10 tons	corn	No Alfalfa	170/140*	---
Sweet Corn	8-9 tons	Corn	No alfalfa	150/120*	
	80+bu	Corn	No Alfalfa	170/150*	---
Wheat	60-69 bu	Corn	No Alfalfa	130/110*	
	121+bu	Corn	No Alfalfa	120/110*	---
Oats	80-100 bu	Corn	No Alfalfa	80/70*	
Soybeans					3.5 lbs/bu
Grass/Legume				---	41.3 lbs/ton
Alfalfa				---	50.4 lbs/ton

*First number represents pounds of nitrogen required when soil organic matter is less than 3% second number represents pounds of nitrogen required when soil organic matter is 3% - 19%.

The nitrogen needs in this chart represent the upper-end of typical crop nitrogen needs and may not be the best nitrogen recommendation for every case. To obtain specific nitrogen recommendations, please refer to the applicable University of Minnesota publication(s).

Table 2 – Manure Nitrogen Availability

	1st Year Nitrogen Availability Factor					**2nd Year**
	Broadcast incorporation timing			***Injection***		***Carry-Over N***
	>96 hours	*12 - 96 hours*	*<12 hours*	*Sweep*	*Knife*	*Available*
Beef	*25%*	*45%*	*60%*	*60%*	*50%*	*25%*
Dairy	*20%*	*40%*	*55%*	*55%*	*50%*	*25%*
Swine	*35%*	*55%*	*75%*	*80%*	*70%*	*15%*
Poultry	*45%*	*55%*	*70%*	*70%*	*70%*	*25%*

☐ **Option 2 – Neighboring state recommendations**

1. I will use nitrogen recommendations from a land grant college in a contiguous state where the neighboring state has similar soils and climatic conditions.
2. I have attached the methodology and relevant publications of the neighboring state that I will be using. (Note: If you choose to use methods from another state, you need to use their entire methodology, rather than selecting only parts of the methodology and blending with parts of the University of Minnesota's methodology.)

☐ **Option 3 – Other methodology**

I will use a different methodology than the above options 1 or 2 to calculate manure application rates. The maximum nitrogen application rates will not exceed those listed in the above option 1, except for allowable deviations. I am attaching the methodology I will use to calculate these application rates.

II. Phosphorus Management

Select only one of the following two options under phosphorus management by checking a box.

☐ **Option 1 – Minimum Phosphorus Management based on Minnesota Rule and Permit**

1. I will implement phosphorus management as required in table 3 below. When soil test levels indicate phosphorus management is required, I will use the following practices:
   A. The rate and frequency of manure applications will not allow soil phosphorus build-up over any six year period, as required in Part II. B. 3. B. 1 of the general permit
   B. Crop P_2O_5 removal rate (Table 4) will be used for the calculations to determine if soil phosphorus will build up over a six-year period. Crop yields per acre will be multiplied by corresponding P_2O_5 removal to determine P_2O_5 removal per acre.
   C. For all animal species and all methods of application, the availability factor for phosphorus is 80 percent.
   D. Where field average phosphorus soil test levels exceed 75 parts per million (ppm) Bray P1 or 60 ppm Olsen within 300 feet of an open tile intake, lake, stream, intermittent stream, drainage ditch without protective berms, or a public waters wetland, or exceed 150 ppm Bray P1 or 120 ppm Olsen on any other land, I will follow protocols listed in the general permit under Part II, B.3.b.2.
   E. Where winter-time manure application is approved, phosphorus management will follow rate restrictions listed in the general permit Part II.B.4.b.
   F. If applicable, any fertilizer P_2O_5 will be accounted for in the calculations.

Table 3 – Minimum P205 Requirements

Bray P-1 (ppm)	Less than 22	22-75	76-150	Greater than 150
Olsen (ppm)	Less than 17	17-60	61-120	Greater than 120
More than 300 feet from waters*	No phosphorus management requirements	No phosphorus management requirements	No phosphorus management requirements, unless within 300 feet of tile intakes***	Follow NPDES permit requirements***
Less than 300 feet waters*	No phosphorus management requirements	Prevent long-term build-up of soil P**	Follow NPDES permit requirements***	Follow NPDES permit requirements***

***** from lakes, streams, intermittent streams, protected wetlands, or unbermed drainage ditches
** rate and frequency of P_2O_5 applications must not allow soil P buildup over six-year period.
*** See NPDES General Permit Part II.B.3.b

The above phosphorus rate restrictions do not apply to fields that meet the vegetated buffer exemptions listed in the general permit, Part II.B.3.b

Table 4 – Crop P_2O_5 removal per unit yield (NRCS crop nutrient tool)

Crop	**Yield units**	**P_2O_5**
Alfalfa	Tons (air dry)	10.8
Barley (grain)	Bushels	0.41
Corn (grain)	Bushels	0.34
Corn (silage)	Tons (as fed)	3.8
Edible beans	Pounds	0.01
Grass hay or pasture	Tons (air dry)	8.9
Grass/Legume	Tons (air dry)	11.2
Oats (grain)	Bushels	0.25
Peas	Pounds	0.01
Red clover	Tons (air dry)	10.8
Rye (grain)	Bushels	0.44
Soybeans	Bushels	0.82
Sunflowers	Pounds	0.01
Sweet corn	Tons	11.0
Wheat (grain)	Bushels	0.53
Wheat (grain and straw)	Bushels	0.64

☐ **Option 2 – Crop phosphorus removal rates (over the rotation)**

All manure will be applied according to phosphorus based rates, so that the rate and frequency of P_2O_5 applications will not exceed the expected crop P_2O_5 removal over the course of the crop rotation. Crop available P_2O_5 rates, crop needs, and removal will be calculated based on Table 4 above.

Where field average phosphorus soil test levels exceed 75 ppm Bray P1 or 60 ppm Olsen within 300 feet of an open tile intake, lake, stream, intermittent stream, drainage ditch without protective berms, or a public waters wetland, or exceed 150 ppm Bray P1 or 120 ppm Olsen on any other land, I will follow protocols listed in the general permit under Part II, B.3.b.2.

Where winter-time manure application is approved, phosphorus management will follow rate restrictions listed in the general permit Part II.B.4.b.

III. Field Specific Information

List all fields that could potentially receive manure during the permit period, except those fields where manure ownership will be transferred. For each field listed, provide the following additional information:

1. Check and/or write in all crops that could be grown over the duration of the permit;
2. Check the probable manure application methods that will be employed on the field; and
3. Check the probable timing of application that those method(s) will be used.

Maximum nutrient application rates, for each of the crops listed cannot exceed those determined in the above Nitrogen and Phosphorus Management sections of this methodology.

1. If the above Nitrogen Management option 1 was selected, the nutrient application rates cannot exceed those listed in table 1 and/or those listed in the above publications.
2. If the above Nitrogen Management option 2 was selected, the nutrient application rates cannot exceed those listed in the relevant publications of the neighboring state.

Each field listed must be identified on a map or aerial photograph as required in the general permit Part II.B.1.a. Field location information should be listed on these maps and include the county and township names and the township's section number. The maps provided for the first year plan satisfy this requirement. For fields listed but not used in the first year plan, maps must still be provided.

III. Field Specific Information for Manure Management Plan (attach additional sheets as necessary)

List all fields that could receive non-transferred manure.	*Check or write in all crops that will likely be grown during the permit period.*															*Check all timings and methods of applications that could occur*					
																Timing			Application method		
Field ID	corn for grain	corn for silage	sweet corn	soybeans	alfalfa	grass/legume hay	oats	wheat	edible beans	potatoes	rye	sugar beets	other_____	other_____	other_____	Fall or spring	Winter (**solid** manure only*)	Summer	Immediate incorp (within 24 hrs and before rainfall)	Incorporation delayed and will follow all setbacks	No incorporation and will follow all setbacks

*Liquid manure applications during the winter are allowed only in emergencies. Use "Winter Application of Manure" form to list required field information.
* Submit P index for Solid Winter Application Fields.

Attachment 2 – Winter Application of Manure

Facility name: _____ Owner name: _____

The feedlot general permit for 2011 – 2016 allows solid manure spreading during the winter in limited situations, while prohibiting most winter applications of liquid manure. Solid manure is defined as any manure that consists of 15 percent or more solids, and is handled as a solid. While winter application of solid manure is permitted, it should be avoided or minimized to the extent possible. Liquid manure can not be applied to frozen or snow-covered soils from December 1st until soils are no longer frozen or snow-covered, with certain exceptions. Liquid manure can be land-applied during these periods when: 1) emergency situations occur where no other alternatives are possible; 2) where it is authorized in an individual permit, or 3) where manure ownership is transferred.

Complete part I. below if the permit holder needs to apply **solid manure** during the winter. All general permit holders generating **liquid manure** must complete part II.

I. Solid Manure

Any general permit holder that needs to land apply solid manure during the winter must provide in the manure management plan information on the slope, proximity to sensitive features, and the conservation methods for each site proposed for winter application. The plan must indicate why winter application is necessary and why other alternatives are not feasible, such as stockpiling and/or timing applications during non-winter periods only.

Reason(s) why winter applications of solid manure is necessary:

_____

_____

_____

_____

Field specific information must be submitted as follows:

Field ID	Slope	Phosphorus Index rating*	Type of sensitive feature(s)**	Distance between spread manure and Sensitive feature(s)	Conservation practices***

(Attach additional sheets as necessary.)

***** Phosphorus index: The Minnesota phosphorus index (P index) can be found at the Website http://www.mnpi.umn.edu. To validate the P index values, either include a copy of the P index input and outputs, **or** provide fall tillage practices, rate of application in pounds of P2O5 per acre for each field, and county on the form found at http://www.mnpi.umn.edu/downloadfiles/DataCollectionSheet.pdf. Fall tillage options include no tillage, small disk, chisel or heavy disk, and moldboard plow.

******Sensitive features include: Lakes, streams, intermittent streams, drainage ditches without berms, open tile intakes, wells, wetlands, and sinkholes. Only include those features within 300 feet from the edge of the field.

***Conservation practices may include but are not limited to terracing, chisel tillage with residue, and contour buffer strips.

General permit requirements that specifically apply to the winter application of solid manure are summarized below. The general permit should be checked for specific criteria http://www.pca.state.mn.us/publications/wq-f3-38.pdf.

- More than 300 foot setbacks from sensitive features identified in the permit .
- No active snowmelt that can result in runoff during application.
- No application can occur when rainfall is likely within 24 hours (see permit).
- Slope restriction of less than or equal to six percent.
- Water/ice can not completely fill tillage furrows or depressional areas.
- All fields meet a low to very low relative phosphorus loss risk index level (2 or less on average).

Only fields identified in the manure management plan can be used as land application sites. Any changes in fields must be approved by the MPCA.

II. Liquid Manure

All general permit holders that generate liquid manure must include in their manure management plan a proposed action plan for removing manure from liquid manure storage areas in case emergencies occur that necessitate winter manure spreading. Emergencies include land application necessary to prevent Manure storage overflows at a site designed, constructed and managed to contain Manure during the winter, and where other options for additional temporary storage are not feasible. Emergencies are considered only those situations that are beyond the control of the permittee, such as unusual weather or unavoidable equipment failure (Part II.B.4.b.2)a) of the general permit).

Action plan must first consider alternatives that do not include land application. Identify management alternatives that will be used to prevent and minimize needed emergency applications during the winter. Check all that apply:

- ☐ Transfer manure to other liquid manure storage at my facility.
- ☐ Transfer manure to other liquid manure storage not at my facility.
- ☐ Manure storage area will be pumped in fall to maximize capacity entering the winter season.
- ☐ Only the minimum amount of manure will be applied to alleviate the emergency situation; remaining manure will be applied after spring thaw.
- ☐ Other (describe): _____

Emergency applications of liquid manure can only occur if no other alternative is available. In the event that land application during the winter is necessary, the permit holder must identify fields in the manure management plan that meet setback, and slope requirements as included below. **All fields used for emergency application must be pre-approved by MPCA.** Any fields approved for manure application for non-winter periods can be designated to be used in emergency winter applications, as long as all the permit conditions are met. **In the event of an emergency you are required to call both the duty officer (800-422-0798) and the MPCA within 24 hours of an emergency action**. To avoid the need to make MMP modifications at the time of an emergency, you are required to identify the fields you would use in the event of an emergency. Information must be submitted as follows:

Field ID and location	Slope	Type of sensitive feature(s)*	Distance between spread manure and sensitive feature(s)

* Sensitive features include: Lakes, streams, intermittent streams, drainage ditches without berms, open tile intakes, wells, wetlands, and sinkholes. Only include those features within 300 feet from the edge of the field.

General permit requirements that specifically apply to emergency application of liquid manure are summarized below. The general permit should be checked for specific criteria http://www.pca.state.mn.us/publications/wq-f3-38.pdf.

- More than 300 foot setbacks from sensitive features identified in the permit.
- Slope restriction of less than or equal to four percent.
- Application rate restrictions of 3500 gallons/acre/winter season not to exceed 60 pounds of P2O5/acre/winter season.
- Prevention of ponding or runoff during the application process.

The general permit should be checked for specific restrictions http://www.pca.state.mn.us/publications/wq-f3-38.pdf. Only fields identified in the manure management plan can be used as emergency land application sites. **Any changes in fields must be approved by the MPCA**. Also, check the permit for notification and reporting requirements in the event that emergency removal of liquid manure from storage areas is necessary.

The 2011-2016 general permit can be found on the MPCA Web site. http://www.pca.state.mn.us/publications/wq-f3-38.pdf.

A manure management plan that meets state and federal requirements will include the items below. Where feedlot owners transfer manure ownership for application to fields that are not owned or leased by the feedlot owner, see MMP guidelines for transferred manure ownership.

1. Manure Storage, Handling, and Testing

1.1 Manure storage description
(7020.2225 subp. 4, item D(1))
- ☐ Type of storage areas are described.
- ☐ Storage capacity and number of months of storage.
- ☐ Type and number of animals contributing to each storage area are included.

1.2 Manure nutrient content
(7020.2225 subp. 4, item D(4) and subp. 2)
- ☐ Testing frequency shows testing at least once every four years and once per year for the first three years (annually for NPDES permits).
- ☐ Sampling procedures and protocol are described.
- ☐ Estimated nutrient content of manure(s) is listed and is based on past laboratory test results (or average book values for new facilities).

1.3 Amount of manure generated
(7020.2225 subp. 4, item D(1))
- ☐ Tons of solid manure and gallons of liquid manure to be land-applied from each storage area per year are listed (based on records of past few years).
- ☐ Annual amount of nitrogen available from all manure storage areas is listed (based on records of amount hauled in past years times the manure nutrient content).
- ☐ Annual amount of phosphorus available from all manure storage areas is listed.

1.4 Method of application
(7020.2225 subp. 4, item D(2))
- ☐ Method of application, including number of days between application and incorporation.
- ☐ Equipment calibration practices (if not using a certified commercial applicator).

1.5 Timing of application
(7020.2225 subp 4, item D(8)(13))
- ☐ Expected months of application are listed.
- ☐ For June, July or August applications, type of cover crop to be planted to harvested fields without actively growing crops is described.
- ☐ NPDES permits: manure is applied to *sandy* soils during spring or mid-to late fall (soils less than 50 degrees.)

2. Field locations and acreage

2.1 Maps or aerial photos
(7020.2225 subp. 4, item D(3)(10))
- ☐ Fields are shown on maps or aerial photos.
- ☐ Maps or aerial photos highlight planned setbacks.
- ☐ Winter application fields are identified on map(s).

2.2 Number of acres
(7020.2225 subp. 4, item D(3))
- ☐ Total number of acres for application is identified.
- ☐ Acreage excludes land not suitable for application (due to setbacks, wetlands, etc.).
- ☐ Identified acreage is sufficient to handle manure nitrogen.
- ☐ Identified acreage is sufficient to receive manure phosphorus (P) without extreme soil P build-up over time.

2.3 Winter application fields
(7020.2225 subp. 4, item D(10))
- ☐ Field locations for winter application are generally those farthest from waters and no applications will occur within 300 feet of waters (i.e. special protection areas).
- ☐ Slopes for winter application sites are listed in the plan and generally are the flattest land available.
- ☐ Conservation practices (e.g. contour tillage) are described for winter application sites.
- ☐ NPDES permits: Fields for emergency spreading of liquid manure in the winter are identified in the MMP and meet permit requirements.
- ☐ NPDES permits: winter application criteria for solid manure are met, as required in permit, including six percent slope restrictions and phosphorus index showing a low rating.

2.4 Soil conservation practices (CAFOs)
(40 CFR Part 122.42 (e) (1) (vi))
- ☐ NPDES permits: Soil conservation practices are described.

3. Field specific nutrient management

3.1 Crop rotations
(7020.2225 subp. 4, item D(5))
- ☐ Crop rotations are described and indicate which crops in the rotation will receive manure.
- ☐ NPDES permits: Likely alternative crop rotations.

3.2 Crop nutrient needs from manure
(7020.2225 subp. 4, item D(5) and subp. 3)
- ☐ Nitrogen (N) needs for non-legumes and N removal for legumes are described for fields receiving manure.
- ☐ Range of expected crop yields are listed and realistic.
- ☐ Crop N needs account for previous year legume N credits.
- ☐ Crop N needs account for N credits from alfalfa or red clover grown two years ago.
- ☐ Crop N needs are consistent with recommendations from the Univ. of Minnesota or from another University in IA, WI, ND, or SD.
- ☐ Plans for soil nitrate testing are described, where recommended by the University of Minnesota.
- ☐ N credits from the previous year manure applications are accounted for (i.e. continuous Corn).
- ☐ Crop phosphorus (P) needs are identified and based on soil phosphorus test results.
- ☐ NPDES permits: Methodology for determining crop N and P needs for specific manure application sites.

3.3 Planned rates of manure application
(ch. 7020.2225 subp. 4, item D(5) and subp. 3)

- ☐ Manure rates specific for each field or cropping situation are described.
- ☐ Rates are consistent with crop nutrient needs and expected manure nutrient content/availability.
- ☐ NPDES permits: Methodology for determining manure application rates based on N and P content.

3.4 Available nutrients from applied manure
(ch. 7020.2225 subp. 4, item D(7) and subp. 3)

- ☐ Amount of N and P available to the first crop following manure application are described (lbs/acre).
- ☐ The sum of all manure applied to individual fields approximately equals the expected amount of manure generated at the feedlot.

3.5 Total nutrients available to crops from all sources
(ch. 7020.2225 subp. 4, item D(6))

- ☐ Total N amounts per acre available to each crop are described (manure N + fertilizer N + other N).
- ☐ Added commercial fertilizer N does not result in total N additions that are above crop N needs.
- ☐ Total P amounts per acre are listed and include fertilizer P.
- ☐ Methodology for determining manure application rates taking into account other sources of N and P, if applicable.

3.6 Nitrogen carry-over into following year
(ch. 7020.2225 subp. 4, item D(7) and subp. 3)

- ☐ Manure and/or fertilizer additions during the year following manure application are reduced to account for second year N credits. The amount of carry-over N is incorporated into the plan.

4. Sensitive Areas Management

See local requirements, feedlot permit conditions, and the publication "Applying Manure in Sensitive Areas."

4.1 Special protection areas
(ch. 7020.2225 subp. 4, item D(9) and subp. 6)

Protective measures are described when applying manure within 300 feet of:

- ☐ Lakes;
- ☐ DNR protected wetlands (i.e. over 10 acres)
- ☐ Streams and intermittent streams; and
- ☐ Drainage ditches without protective berms.
- ☐ All protective measures for the above areas meet state and county requirements, and otherwise provide sufficient protection of waters.
- ☐ NPDES permits: alternatives to a 100' setback or 35-100' grassed buffer demonstrate equivalent or better protection of waters (see MPCA form).

4.2 Other avenues to surface water
(ch. 7020.2225 subp. 4, item D(9) and subp. 7)

Protective measures are described when applying:

- ☐ In flood plains.
- ☐ Within 300 feet of surface tile intakes, including, at a minimum, injection or incorporation within 24 hours.
- ☐ Within 300 feet of non-protected wetlands (e.g. less than 10 acres).
- ☐ All protective measures for the above areas meet state and county requirements, and otherwise provide sufficient protection of waters.

4.3 Groundwater protection
(ch. 7020.2225 subp. 4, item D(9))

Protective measures are described when applying:

- ☐ In a vulnerable drinking water supply mgmt area.
- ☐ Within 300 feet of sinkholes.
- ☐ On land with less than three feet of soil above bedrock.
- ☐ All protective measures for the above features meet state and county requirements, and otherwise provide sufficient protection of waters.

4.4 High phosphorus soils
(ch. 7020.2225 subp. 4, item D(11) and subp. 3, item C – requirements if over 300 AU)

- ☐ Soils are tested for P at least once every 4 years. Results are submitted, where testing has been required in previous years.
- ☐ Soil P is managed in special protection areas to prevent increasing P levels over any six-year period (where soil P levels are high enough to meet crop needs and a 50-100' buffer is not established).
- ☐ Manure application is avoided on soils exceeding 150 ppm Bray or 120 ppm Olsen in areas outside of special protection areas, or to soils exceeding 75 ppm Bray or 60 ppm Olsen in special protection areas (if not avoided, the plan includes a strategy to protect water quality, e.g. meet all NRCS standards for high P soils and prevent continued soil phosphorus build-up).
- ☐ NPDES permits: Methodology for describing how soil phosphorus test results will be used to comply with soil phosphorus requirements.