



Minnesota  
Pollution  
Control  
Agency

Regional  
Environmental  
Management

Feedlot Program

# Land Application of Manure: Minimum State Requirements

Wq-f8-11 Revised September 2004

This document provides information about the minimum state requirements for the land application of manure or process wastewater from livestock and poultry operations (Minn. R. part 7020.2225). This is based on the revisions to state rules governing feedlots and the storage and use of manure effective October 23, 2000.

MPCA manure application requirements are summarized in Table 1 for different sizes of facilities. When ownership of manure is transferred, the manure application requirements must correspond with requirements for the number of animal units at the farm where the manure was produced.

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## MPCA Area Offices:

### Rochester area:

507/285-7343

### Mankato area:

507/389-5977

### Marshall area:

507/537-7146

### Willmar area:

320/214-3786

### Detroit Lakes area:

218/847-1519

### Brainerd area:

218/828-2492

### Duluth area:

218/723-4660

### Metro area:

651/296-6300

### Toll-Free Number:

800/657-3864

### Feedlot Service Center:

877/333-3508

Requirements	Required for under 100 AU?	Required for 100 to 299 AU?	Required for 300 to 999 AU?	Required for 1000 or more AU
Manage manure to prevent pollution of waters	Yes	Yes	Yes	Yes
Follow maximum nutrient rate limits	Yes	Yes	Yes	Yes
Maintain setbacks from sensitive features	Yes	Yes	Yes	Yes
Test manure for nitrogen and phosphorus content	No	Where stored manure is from over 100 AU	Where stored manure is from over 100 AU	Yes
Test soils for phosphorus	No	No	Yes	Yes
Develop and maintain a manure management plan	No	If permit is required	If permit is required, or if applied by non-certified person after Jan. 1, 2006	Yes
Keep land application records	No	Yes	Yes	Yes

Table 1. Summary of manure application requirements

## In General

Manure and process wastewater must be applied to land in a manner that will **not** result in a discharge to waters of the state during the application process. Also, manure and process wastewater must **not** be applied using practices known to cause water pollution from manure-contaminated runoff during rainfall or snowmelt events.





### Nutrient Application Rate Standards

Maximum manure application rates are limited by crop-available nitrogen on all land. Phosphorus-based rate requirements must also be considered in certain sensitive situations as summarized in Table 2 and further discussed on pages 3-5.

**Table 2: Summary of nutrient application rate requirements for manure**

Nitrogen (N)	a) Cannot exceed crop N needs for non-legumes b) Cannot exceed crop N removal for legumes
Phosphorus (P)	a) No long-term soil P build-up near waters b) Manure management plan with P management strategy required if applying to extremely high P soils and facility is over 300 AU
Potassium	No restrictions in rule

On all land receiving manure and/or process wastewater, application rates must be limited so that the estimated plant-available nitrogen from *all nitrogen sources* does not exceed a) expected crop nitrogen needs for non-legume crops and b) expected nitrogen removal for legumes.

*All nitrogen sources* to be considered include:

- Commercial fertilizer nitrogen
- Manure applied for current and previous year
- Soil organic matter
- Irrigation water
- Legumes grown during previous years
- Biosolids and process wastewater (e.g. septage, milkhouse waste, silage leachate, etc.)

Determinations of crop nitrogen needs, removal rates, and the amount of nitrogen available from manure or legumes must be based on published recommendations of the University of Minnesota Extension Service or another land grant college in a contiguous state, with the following exceptions:

- Estimated plant-available nitrogen from organic nitrogen sources, including manure, may deviate up to 20 percent from University of Minnesota recommendations if management history, soil

conditions or cool weather warrants additional nitrogen application.

- When crop nitrogen deficiencies are visible or measured, nitrogen applications above the 20 percent deviation can be made.

For most situations, there should not be a need to deviate from University recommendations since the University has already factored uncertainties about the conversion of manure nitrogen to plant-available forms of nitrogen.

To determine University of Minnesota Extension Service published recommendations for crop nutrient needs, please contact your County Extension Office or call 1-800-876-8636 to obtain a copy of the publication “Fertilizer Recommendations for Agronomic Crops in Minnesota” revised in 2001 and/or “Fertilizing Corn in Minnesota” revised in 2000.

To determine maximum manure-application rates, use nutrient planning aids that incorporate University of Minnesota recommendations (or those of a land grant college in WI, IA, ND or SD). The following websites provide University of Minnesota recommendations:

- [www.manure.umn.edu](http://www.manure.umn.edu)
- [www.pca.state.mn.us/hot/feedlots.html](http://www.pca.state.mn.us/hot/feedlots.html)
- [www.nrcs.usda.gov/technical/nutrient.html](http://www.nrcs.usda.gov/technical/nutrient.html)





## Manure Nutrient Testing

Manure in storage areas produced by more than 100 animal units must be tested by the feedlot facility owner for nitrogen and phosphorus content.

- Only the individual storage areas that hold manure from more than 100 animal units must be tested. For example, testing is not required for each small stockpile generated by less than 100 animal units.
- Feedlots with 300 or more animal units must test manure annually. Feedlots not required to operate under an NPDES permit can reduce sampling frequency to once every four years if results from the first three years are generally consistent.
- Manure from feedlots with less than 300 animal units must be tested for nutrients at least once every four years (where testing is required).
- Additional testing is required when the manure nutrient content may have changed from previous results due to climatic conditions, changes in manure storage and handling, livestock types or feed.
- Laboratories certified by the Minnesota Department of Agriculture (MDA) or MPCA-approved on-farm sampling and analysis must be used. A list of laboratories providing manure testing services can be obtained by the Minnesota Department of Agriculture Web site [www.mda.state.mn.us/appd/manurelabs.htm](http://www.mda.state.mn.us/appd/manurelabs.htm)
- A representative sample must be obtained. See University of Minnesota Extension Service recommended procedures in “Livestock Manure Sampling” FO-6423-GO, which can be obtained through your county extension agent, calling 1-800-876-8636, or via Extension Service on-line publications catalog <http://www.extension.umn.edu/units/dc/>

## Soil Phosphorus Testing (300 or more AU)

For land receiving manure from a facility with 300 or more animal units, soil samples from the upper six inches must be collected at least once every four years and analyzed for phosphorus using the Bray P1 or Olsen test. Bray P1 tests are typically used when soil pH is less than 7.4, and the Olsen test can be used with a broad range of soil pH.

The owner of a feedlot with 300 or more animal units must apply for an interim permit and submit a manure management plan if manure is to be applied onto soils where:

- Soil phosphorus levels exceed 75 ppm (Bray P1) or 60 ppm (Olsen) within 300 feet of lakes, streams, intermittent streams, DNR-protected wetlands, unbermed drainage ditches and open tile intakes, **or**
- Soil phosphorus levels exceed 150 ppm (Bray P1) or 120 ppm (Olsen) outside of the 300-foot zones noted above.

If the producer continues manure applications onto soils exceeding the above thresholds, then the manure management plan must include a description of how phosphorus is to be managed to minimize risks to surface waters. The plan should provide sufficient details so that the MPCA or delegated county feedlot officer can evaluate it to make sure that continued manure applications will not lead to water pollution.

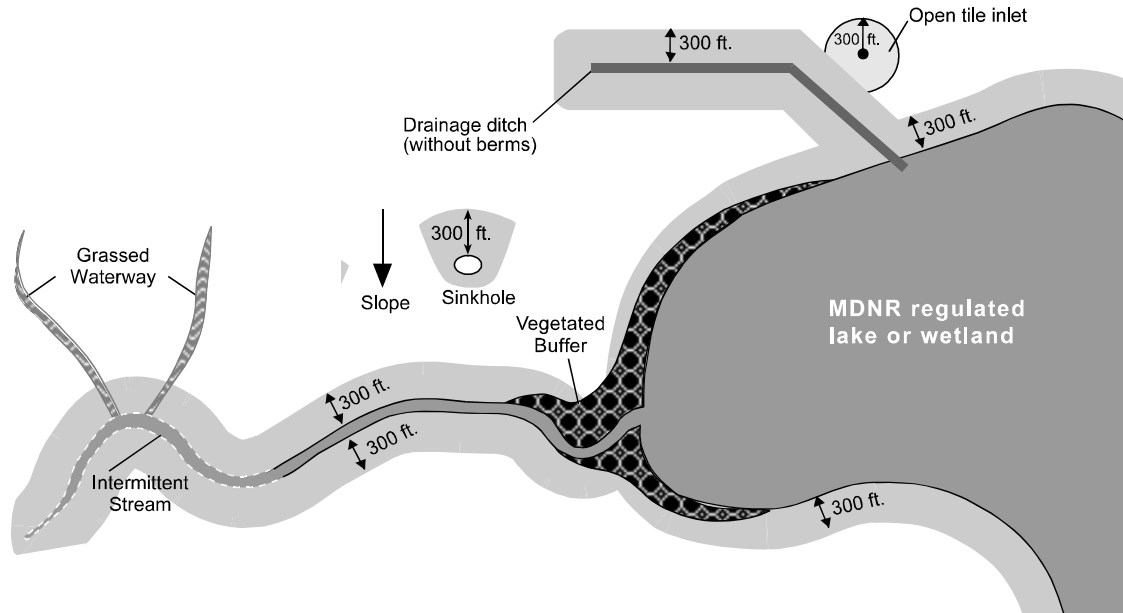
## Manure Application Near Sensitive Features

Protective measures are required for application near sensitive features, as summarized in Table 3. Further information can be found in the publication “Applying manure in sensitive areas” or the MPCA website found on page 8. Additional requirements may also apply when NPDES permit conditions are more restrictive than minimum state requirements.





### Management Zones Around Sensitive Features



**Table 3: Minimum manure application setbacks (in feet) near sensitive features**

	WINTER frozen or snow-covered soils	NON-WINTER with immediate incorporation (<24 hrs.)		NON-WINTER not incorporated within 24 hours	
		With phos. mgmt.	No phos. mgmt.	With vegetated buffer	Inadequate vegetated buffer
Lake, stream	300	25	300	100	300
Intermittent stream,* DNR protected wetland,** drainage ditch w/o berms*	300	25	300	50	300
Open tile intake***	300	0	0	300	300
Well, mine or quarry	50	50	50	50	50
Sinkhole with no diversion berm	Downslope 50' Upslope 300'	50	50	Downslope 50' Upslope 300'	Downslope 50' Upslope 300'

\*Intermittent streams and ditches pertain to those identified on United States Geological Survey (U.S.G.S.) quadrangle maps, excluding drainage ditches with berms that protect from runoff into the ditch and segments of intermittent streams which are grassed waterways. U.S.G.S. quadrangle maps can be found at County Soil and Water Conservation District Offices or can be viewed on the internet at <http://terraserver.microsoft.com/default.asp>. (Type in nearest town and state click "go." Then select "U.S.G.S. topo map.")

\*\*Wetland setbacks pertain to all protected wetlands identified on Department of Natural Resources protected waters and wetlands maps (these maps are often located in County Soil and Water Conservation District offices and typically include all wetlands over 10 acres).

\*\*\*The open-tile intake setbacks do not take effect for solid manure applications until the year 2005.



**Surface Waters:** A 300-foot setback from surface waters applies to all manure spread onto frozen or snow-covered soils. The non-winter setbacks for manure application in special protection areas (within 300 feet of lakes, streams, intermittent streams, public waters wetlands and unbermed drainage ditches) depend on application methods, vegetated buffer widths, and phosphorus management practices.

Non-winter setbacks can be reduced from 300 feet to 25 feet, if the manure is immediately incorporated and the rate and frequency of manure application will not allow long-term soil phosphorus build-up (e.g. over any six-year period). For example, single-year application rates can be based on crop nitrogen needs. However, if manure is applied at nitrogen-based rates to soils with phosphorus test levels exceeding 21 ppm Bray P1 or 16 ppm Olsen, then there can be no additional manure applications until phosphorus supplied by the manure has been removed by subsequent crops.

Non-winter setbacks can also be reduced along waters where permanent vegetative buffers are established. Where vegetated buffers are at least 100 feet wide along lakes and streams and 50 feet wide along wetlands, intermittent streams, and unbermed drainage ditches, then the setbacks can be reduced to 100 and 50 feet, respectively.

The surface water setback for manure applied by a traveling gun or other irrigation equipment is 300 feet.

**Open Tile Intakes:** Liquid manure and process wastewater must be injected or immediately incorporated when applied within 300 feet of an open tile intake. Solid manure must be immediately incorporated when applied within 300 feet of an open tile intake after October 1, 2005.

**Sinkholes:** Do not apply manure to land within 50 feet of a sinkhole. Inject or immediately incorporate when applying manure from 50 to 300 feet on the upslope side of a sinkhole.

**Mines, Wells and Quarries:** Do not apply to land within 50 feet of a mine, well or quarry.

**Road Ditches:** The feedlot rules specifically prohibit manure application into road ditches.

### Manure Management Plan Requirements

A manure management plan is a written description of how manure generated at the facility is going to be utilized during the upcoming cropping year(s) in a way that protects surface-water and ground-water quality, while also being beneficial from an agronomic and economic standpoint.

Some planning is needed prior to applying manure to ensure that the manure application standards are not exceeded and that the benefits from manure are maximized. The MPCA *recommends* that a manure management plan be developed for all livestock operations. However, the MPCA does not require MPCA-approved manure management plans at all facilities. Manure management plans are required when:

- An NPDES, SDS, interim or construction short form permit application is submitted from an operation with 100 or more animal units, or
- No permit is required, but manure from a feedlot capable of holding 300 or more animal units will be applied after January 1, 2006, by someone other than a certified commercial animal-waste technician or certified private manure applicator.

Table 4 further describes when a manure management plan is required. Once a manure management plan is required for a facility, an updated plan must be retained on file at the animal feedlot or manure storage facility and reviewed each year. Plans must be modified to include changes in cropping rotations, manure amounts, manure nutrient levels, fields for application, or other practices that affect the available nutrient amounts or crop nutrient needs.



**Table 4: Who is required to develop a manure management plan (MMP) that meets MPCA requirements?**

<b>FEEDLOT CAPACITY AND PERMITTING SITUATION</b>	<b>IS A MMP REQUIRED?</b>	<b>Does the MMP need to be submitted to the MPCA or County Feedlot Officer?</b>
<b>Under 100 AU</b>	<b>No</b>	No plan required
<b>100 to 299 AU - No permit required</b>	<b>No</b>	No plan required
<b>100 to 299 AU - Interim permit needed*</b>	<b>Yes</b>	Yes, with permit application
<b>Non-CAFO w/ 300 or more AU</b> - No permit needed and manure is applied by certified applicator**	<b>No</b>	No plan required
<b>Non-CAFO w/ 300 or more AU</b> - No permit needed and manure is NOT applied by certified applicator **	<b>Yes (by Jan. 2006)</b>	Not unless requested by MPCA or CFO
<b>Non-CAFO w/ 300 or more AU</b> - Construction short form permit needed	<b>Yes</b>	Not unless requested by MPCA or CFO
<b>Non-CAFO w/ 300 or more AU</b> - Interim***, SDS, or NPDES permit needed	<b>Yes</b>	Yes, with permit application
<b>1000 or more AU - NPDES permit is required or defined as CAFO</b>	<b>Yes</b>	Yes, with permit application

\*Note: Interim permits and associated manure management plans are needed for all facilities with more than 100 animal units that have a pollution hazard not covered under a signed 2005/2010 Open Lot Certification.

\*\*Note: For more information on certification programs for commercial or applicators, please contact the Minnesota Department of Agriculture at [www.mda.state.mn.us/appd/cawt/default.htm](http://www.mda.state.mn.us/appd/cawt/default.htm)

\*\*\*At feedlots with 300 or more animal units, an interim permit and associated manure management plan is required where a) manure is to be applied on steeply sloping soils (>6%) in special protection areas; b) manure is to be applied in drinking water supply management areas where the aquifer is vulnerable; c) manure is to be applied onto land with phosphorus levels exceeding 150 ppm Bray P1 or 120 ppm Olsen outside of special protection areas or half these levels within special protection areas; or d) a pollution hazard exists at the feedlot.

**Required parts of a plan:** The specific items required in a manure management plan are listed in Minn. R. ch. 7020.2225, subp. 4 and the MPCA publication "Manure Management Plan Requirements." The types of required information include:

- Manure storage and application methods
- Field locations and acreage
- Amount of manure to be applied to each field
- Manure-nutrient testing plans
- Soil-nutrient testing plans
- Crop-nutrient needs and/or expected nutrient removal
- Protective measures when applying in environmentally sensitive areas
- Protective measures when applying during winter months



**Manure Management Plans for Transferred Manure:**

When ownership of manure is transferred, the manure management plan is partially completed by the facility where the manure is produced (general information) and partially completed by the manager of the fields where the manure is applied (field specific information). The manager of the cropland where the manure is applied must comply with all state feedlot rule requirements related to nutrient rates, setbacks and soil testing.

For further information about the specific requirements of a manure management plan and how to develop a plan, please see the fact sheet entitled "Manure Management Plan Requirements," available at the website on page 8.

**Record-keeping**

Keeping records of certain manure application practices is required for all feedlot facilities with 100 or more animal units, even when a manure management plan is not required. Forms and spreadsheets for keeping required records are available from the MPCA at the website on page 8. Good records are important to account for second-year nitrogen from manure applications. Records also

allow better estimates to be made of total manure nutrients generated at the farm, thus aiding in future planning efforts.

Manure application records must be kept for the most recent three years, except that records must be kept for six years at NPDES permitted feedlots and when manure is applied at any site within 300 feet of lakes, streams, intermittent streams, drainage ditches that are not protected by berms or DNR protected wetlands. The required record-keeping elements for various categories of feedlots are included in Table 5.

Where ownership of manure is transferred for application to fields not owned or leased by the feedlot owner, records must be kept by the manager of the cropland where manure is applied and the feedlot owner where the manure is produced.

Commercial applicators spreading manure onto land not owned or leased by the owner of the feedlot from which the manure is produced shall also keep a copy of the records. A copy of these records must be submitted to the owner of the animal feedlot or the manure storage area from which the manure is produced, no later than 60 days following land application.





**Table 5. Minimum record-keeping requirements for land application of manure when manure originates at feedlots with either 100 to 299 animal units or from a feedlot with 300 or more animal units. Required records are denoted by an “X.” Additional records may be required in permits (e.g. NPDES permits).**

Records	*100 to 299 AU	300 or more AU	Transferred manure ownership - records for feedlot owner & commercial applicator
	Cropland manager records	Cropland manager records	
1. Field acreage and location	X	X	X
2. Amount of manure applied (total amount and amount per acre)	X	X	X
3. Manure nutrient test results	X (when required)	X	X
4. Dates of manure application and incorporation		X	
5. Expected amounts of plant available nitrogen from manure and commercial fertilizer	X	X	
6. Expected amounts of plant available phosphorus from manure and commercial fertilizer		X	
7. Soil test results		X	
8. Any changes to the manure mgmt. plan		X	
9. Name and address of commercial hauler or applicator		X	X

\*Note: If a feedlot holding between 100 and 299 animal units is applying manure in a Drinking Water Supply Management Area where the aquifer is designated vulnerable to contamination, then the records must include the same elements as required for operations with 300 or more animal units. To determine whether land is located in a drinking water supply management area, please contact the manager of the nearest public water supply, or the Minnesota Department of Health at (651)215-0800 or (800) 818-9318 or on-line at <http://www.health.state.mn.us>.

### More Information

For more information about feedlot rules and requirements or to download a copy of the revised rule, feedlot fact sheets, forms, spreadsheets and other information, log onto the MPCA website at:

<http://www.pca.state.mn.us/hot/feedlots.html>.

Or call your area office listed on the first page of this factsheet and ask for the feedlot officer, or call the Feedlot Service Center toll-free at (877) 333-3508.