Minnesota Pollution Control Agency

Land Application of Manure: Minimum State Requirements

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. 7020.2225). This is based on the revisions to state rules governing feedlots and the storage and use of manure effective October 23, 2000.

The Minnesota Pollution Control Agency (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.

Table 1. Summary of manure application requirements in general

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	Yes
Keep land application records	No	Yes	Yes	Yes

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. However, phosphorus-based rate requirements must also be met 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

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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 most recently published documents titled *Fertilizer Recommendations for Agronomic Crops in Minnesota, Fertilizing Corn in Minnesota,* and *Manure Management in Minnesota*.

To determine maximum manure-application rates, use nutrient planning aids that incorporate University of Minnesota recommendations (or those of a land grant college in Wisconsin, Iowa, North Dakota or South Dakota). The following websites provide University of Minnesota recommendations:

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

Manure Nutrient Testing

Manure from all storage areas storing manure produced by more than 100 animal units must be tested by the feedlot owner for nitrogen and phosphorus content at least once every four years, given the following requirements have been met:

1. For feedlots with 300 or more animal units that are not required to have an National Pollutant Discharge Elimination System (NPDES) permit, three years of annual testing have been conducted in the past and the results have been consistent.
2. Additional samples are taken and manure tested whenever there are changes in manure nutrient content due to unusual climatic conditions or changes in manure storage and handling, livestock types, or feed.

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.

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 at the MDA website.

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 found at: 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, Department of Natural Resources (DNR)-protected wetlands, unbermed drainage ditches and open tile intakes.
- 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

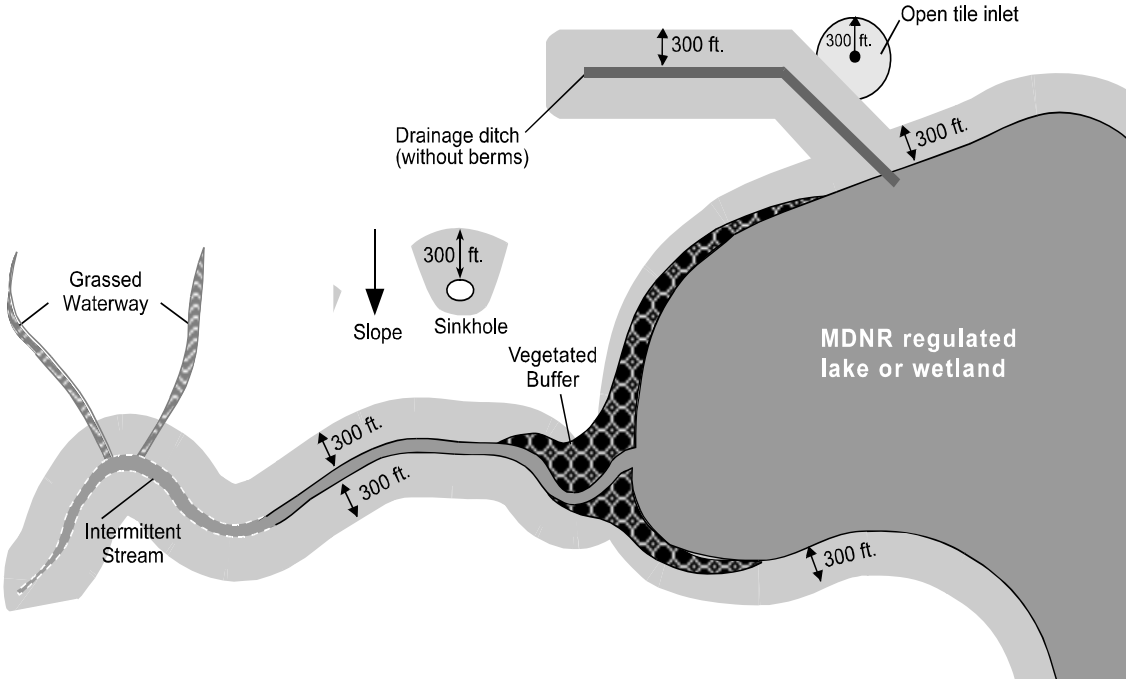

Table 3. Minimum manure application setbacks (in feet) near sensitive features

	Winter frozen or snow-covered soils	**Non-Winter** with immediate incorporation (<24 hours)		**Non-Winter** not incorporated within 24 hours	
		With phos. mgmt.	No phos. mgmt.	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.

**Wetland setbacks pertain to all protected wetlands identified on DNR 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).

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 as follows:

1. 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 result in long-term soil phosphorus build-up (e.g. over any six-year period) on soils with phosphorus test levels exceeding 21 ppm Bray P1 or 16 ppm Olsen. Crop removal rates of phosphorus can be used as a guide for limiting phosphorus rates until subsequent soil testing results are available to determine if phosphorus build-up is occurring.
2. 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, 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: All manure and process wastewater must be injected or immediately incorporated when applied within 300 feet of an open tile intake.

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 groundwater 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, State Disposal System (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 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 at least once a 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?

Feedlot capacity and permitting situation	Is a MMP required?	Does the MMP need to be submitted to the MPCA or County Feedlot Officer?
Under 100 AU	No	No plan required
100 to 299 AU - No permit required	No	No plan required
100 to 299 AU - Interim permit needed*	Yes	Yes, with permit application
Non-CAFO w/300 or more AU - No permit needed and manure is applied by certified applicator**and manure is not transferred NPDES permitted site****	No	No plan required
Non-CAFO w/300 or more AU - No permit needed and manure is NOT applied by certified applicator **	Yes	Not unless requested by MPCA or CFO
Non-CAFO w/300 or more AU - Construction short form permit needed	Yes	Not unless requested by MPCA or CFO
Non-CAFO w/300 or more AU - Interim***, SDS, or NPDES permit needed	Yes	Yes, with permit application
1000 or more AU or defined as CAFO - NPDES permit is required	Yes	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.

**Note: For more information on certification programs for commercial or applicators, please contact the Minnesota Department of Agriculture.

***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 (>six percent) 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.

**** When ownership of manure is transferred from NDPES site, a 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), unless the site has a complete manure management plan. 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.

Required parts of a plan: The specific items required in a manure management plan are listed in Minn. R. 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 content
- soil-nutrient content
- 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) unless the site generating the manure has a complete manure management plan. 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, the manager of the cropland where manure is applied and the feedlot owner must keep records 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, and for commercial applicators when applying transferred manure. Required records are denoted by an "X." Additional records may be required in permits (e.g. NPDES permits).

Records	*100 to 299 AU Feedlot/Cropland manager records	300 or more AU Feedlot/Cropland manager records	Transferred manure - commercial applicator keeps and submits these records to feedlot within 60 days
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 testing 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 fact sheet.

Minnesota Pollution Control Area Offices

Rochester area:	507-285-7373
Mankato area:	507-389-5977
Marshall area:	507-537-7146
Willmar area:	320-214-1519
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