

## Level 2 Land Application of Manure Records Inspection

**General Information:** Date of Inspection: \_\_\_\_\_ Inspector Name: \_\_\_\_\_  
 Facility Name: \_\_\_\_\_ Number of Animal Units: \_\_\_\_  
 Facility Representative: \_\_\_\_\_

Available records and plans	
<b>1. Is MMP available for the next crop year?</b> (see back part 1a)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not required
<b>2. Recent manure analyses?</b> (see back part 2a)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not required
<b>3. For transferred ownership of manure – Do records include:</b> a) manure amount transferred, b) dates transferred, c) recipient names/addresses, d) field I.D. and e) rates of application? (see manure recipient for 4, 6, 7, 9-15 below)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>4. Non-transferred – do records include:</b> a) field I.D. and acreage, b) manure rates per acre, and c) dates of application?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>5. Are records available for all manure applications?</b> Is total amount of manure applied in-line with expected amounts available at farm?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not determined
Minimizing nitrogen leaching	
<b>6. Is the total N from 1<sup>st</sup> yr manure + carry-over N + fertilizer N less than or equal to limits in 7020 rules?</b> (see back part 6a)	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>7. Is manure application during June, July, or August only to fields with cover crops?</b> (required if facility is required to have MMP)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>8. NPDES sites only – Is manure applied to sandy soils only after mid-October?</b> (or after soil temps less than 50 F)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
Phosphorus management	
<b>9. Soil phosphorus test results available and less than 4 years old?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>Special protection areas:</b> (<300 ft lake, stream, int. stream, wetland >10 acres, unbermed ditch)	
<b>10. On soils over 21 ppm Bray or 16 Olsen, is P applied during the rotation (6 yrs) less than P removed?</b> (see back - part 10a)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>11. Is manure incorporated within 24 hours?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>12. Is approved P strategy (under permit) followed for manure applied on soils over 75 ppm Bray or 60 Olsen?</b> (300+ AU)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>300 feet from tile intakes</b>	
<b>13. Is manure incorporated within 24 hours?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>14. Is approved P strategy (under permit) followed for manure applied on soils over 75 ppm Bray or 60 Olsen?</b> (300+ AU)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>All other land</b>	
<b>15. Is approved P strategy (under permit) followed for manure applied on soils over 150 ppm Bray or 120 Olsen?</b> (300+ AU)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>Winter applications at approved fields</b>	
<b>17. NPDES sites only – using only fields approved by MPCA?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable
<b>18. Non-NPDES sites where MMPs are required – using only those fields listed in MMP?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not applicable

Inspector: in box below - Explain any "No" answers and actions taken by the inspector.

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**1a. MMP is not required in the following three cases:**

1. less than 100 animal units;
2. 100-299 AU, unless applying for permit; and
3. 300+ AU (non-NPDES) and ALL manure applied by certified applicator.

**2a.** Manure testing not required if 100 AU or less contribute to the manure storage area or stockpile.  
Annual sampling required at CAFOs; at least once every four years at other sites.

Note range of N and P<sub>2</sub>O<sub>5</sub> content in last four years of testing:

MANURE SOURCE	NITROGEN RANGE	P <sub>2</sub> O <sub>5</sub> RANGE
List below each source where nutrients were tested	Lowest to Highest (lbs)	Lowest to Highest (lbs)

**6a.** Check “No” if total rates Exceed University of Minnesota rates by either a) >20% and are not shown to be based on recommendations from a neighboring state; or b) >5% and no justification based on unique soil conditions, cool weather, or evidence of additional N needed based on past history.

Note total N applied per acre on fields with highest total N rates (during the year which you are inspecting)

FIELD ID	N rates

**10a.** Note below pounds per acre P<sub>2</sub>O<sub>5</sub> applied in each of last six years (where available).

FIELD with special protection area	Last year	2 yrs ago	3 yrs ago	4 yrs ago	5 yrs ago	6 yrs ago	TOTAL

## Key tables for Level 2 inspections

### A. 2<sup>nd</sup> year N

Carry-Over Nitrogen (N) is N that becomes available for the second crop following manure application. It is also referred to as 2<sup>nd</sup> Year N. The following formula can be used to determine the carry-over N that is available:

$$\frac{\text{Carry-Over N (lb/ac)}}{\text{N (lb/ac)}} = \frac{\text{Last Year's App. Rate}^*}{\text{App. Rate}^*} \times \frac{\text{Last Year's N Content}}{\text{N Content}} \times \frac{\text{Carry-Over N Availability Factor}}{\text{Availability Factor}}$$

\*Application rate must be in tons/acre or 1000 gal/acre

Carry-Over N: Availability Factors

Poultry, Beef, Dairy	.25
Swine	.15

### B. 1<sup>st</sup> year N

This Year's Manure nitrogen (N) is the N available from the manure applied in the fall or spring prior to this year's crop. It can be calculated by using the following equation:

$$\frac{\text{Manure N This Year's}}{\text{This Year's}} = \frac{\text{App. Rate}^*}{\text{App. Rate}^*} \times \frac{\text{N Content}}{\text{N Content}} \times \frac{\text{This Year's N Availability Factor}}{\text{Availability Factor}}$$

\*Application rates must be in tons/acre or 1000 gal/acre

This Year's N Availability Factors

Method of application	Beef	Dairy	Swine	Poultry
Sweep injection	.60	.55	.80	NA
Knife injection	.50	.50	.70	NA
Broadcast – incorporate after 4 days	.25	.20	.35	.45
Broadcast – incorporate 12 hours to 4 days later	.45	.40	.55	.55
Broadcast – incorporate within 12 hours	.60	.55	.75	.70

### C. Crop N needs and removal

Crop	Yield	Crop last year	Crop 2 yrs ago	Red flag N rates*
Corn	NA	Corn	No alfalfa	180
Corn	NA	Soybeans	No alfalfa	140
Corn	NA	Corn	Alfalfa	130
Corn	NA	Alfalfa	NA	80
Soybean	50 bu	NA	NA	175
Alfalfa	4 ton	NA	NA	200
Corn silage	NA	Corn silage	Corn silage	180
Grass/legume	4 ton	NA	NA	175

\*High end rates in Univ. of MN guidelines for corn; recommended N rates vary with soil productivity and quality of previous alfalfa and economic considerations.

\*For legumes, the listed N rates refer to N removal amounts based on the noted crop yield.

**D. Soil P build-up:** To determine the number of times that manure should be applied during a six year period to prevent long-term soil P build-up follow the three steps below.

Step 1. Determine average P uptake during the crop rotation (multiply expected yields by the crops' P<sub>2</sub>O<sub>5</sub> removal rates as listed in the table below).

*Example:* Corn/soybean rotation with yields of 180 bushels of corn and 50 bushel beans

Corn – [180 \* 0.34] = 61 lbs P<sub>2</sub>O<sub>5</sub> removed per year

Soybeans [50 \* 0.82] = 41 lbs P<sub>2</sub>O<sub>5</sub> removed per year

Average = 51 lbs P<sub>2</sub>O<sub>5</sub> removed per year

Crop	Average Yield	Crop P <sub>2</sub> O <sub>5</sub> removal from table per unit yield	Annual phosphate removal lbs per acre
Example	160 (x)	0.34 =	54
Corn	(x)	0.34 =	
Soybeans	(x)	0.82 =	
Alfalfa	(x)	10.8 =	
	(x)	=	
	(x)	=	

Step 2. Determine the amount of P<sub>2</sub>O<sub>5</sub> that is typically applied in manure applications

(multiply rate times manure P<sub>2</sub>O<sub>5</sub> content times 80%).

*Example:* 4000 gals/ac \* 28 lbs P<sub>2</sub>O<sub>5</sub> /1000 gals \* 80%

P<sub>2</sub>O<sub>5</sub> applied = 4 \* 28 \* 0.8 = 90 lbs

Step 3. Divide result of step 2 by result of step 1.

*Example:* 90/45 = 2 (i.e. manure can be applied on average once every 2 years or three times in a 6 year rotation without expecting soil P build-up).

Crop P<sub>2</sub>O<sub>5</sub> removal per unit yield

Crop	Yield Units	P <sub>2</sub> O <sub>5</sub>
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

