

### 3.2. Manure Application Setback Distances

#### Minimum Setback Distances for the Application of Manure and Other Organic By Products <sup>5 & 6</sup>

Type of Sensitive - Setback Area	Setbacks Based on Methods of Manure Application		
	Surface Application	Emergency Winter Application Frozen or Snow Covered Soils <sup>7</sup>	Surface Incorporation W/I 24 Hours OR Direct Injection
Residences / Private Wells down slope from the application area.	100 ft.	200 ft.	100 ft.
Sinkholes	300 ft.	300 ft.	100 ft.
Pond or Lake	35ft. Vegetative Barrier <sup>1</sup> , with the remaining 100 ft. setback in non-vegetative Setback <sup>2</sup>	35ft. Vegetative Barrier <sup>1</sup> , with the remaining 200 ft. setback in non-vegetative Setback <sup>2</sup>	35ft. Vegetative Barrier <sup>1</sup>
Streams Ditches Surface Inlets	35ft. Vegetative Barrier <sup>1</sup> , OR 100 ft. setback in non-vegetative Setback OR 35 ft. in non-vegetative setback <sup>3</sup>	200 ft.	None
Grassed Waterway	35 ft.	200 ft.	None
Field Surface Drains	35 ft. <sup>4</sup>	200 ft.	None
Public Wells	300 ft.	300 ft.	100 ft.
Developed Springs	300 ft. upslope	300 ft. upslope	300 ft. upslope
Public Surface Drinking Water Intake	300 ft.	300 ft.	300 ft.

1 Permanent vegetation consisting of grass, grass/legume mix, trees/shrubs, or trees/shrubs and grass/legumes. Measured from top of bank.

2 Includes 100 ft. total setback. The setback must include a minimum of 35 ft. of vegetative cover from top of bank with the remainder of the 100 feet with no vegetative requirement. The setback is measured from the top of bank.

3 Applies if the manure application area has at least 50% vegetation/residue cover at the time of application.

4 No setback required for field surface drains if the Additional Criteria to Protect Water Quality, Item 5 is applied from this standard.

5 CAFO's must follow the setbacks defined in the Ohio Department of Agriculture (ODA) rules regarding manure application. See Table 5 – ODA Setbacks - Appendix A Table 1 of rule 901:10-1-14: Land Application Restrictions and Setbacks

6 Excludes sludge that is regulated by the Ohio Environmental Protection Agency (OEPA) and septage regulated by the Ohio Department of Health.

7 See Additional Criteria to Protect Water Quality, Item 7, for the special emergency manure application criteria on frozen and snow covered fields.

### 3.3 Nutrient Application Rate Criteria:

#### Available Water Holding Capacity (Application Criteria for Liquid Manure)

##### Available Water Capacity (AWC) Practical Soil Moisture Interpretations for Various Soils Textures and Conditions to Determine Liquid Waste Volume Applications Not to Exceed AWC

For liquid manure, the application rate is to be adjusted to the most limiting factor to avoid ponding, surface runoff, subsurface drainage (tile) discharge, the nutrient needs of the field, or the nitrogen or phosphorus risks for the field. The total application is not to exceed the field capacity of the upper 8 inches of soil. See the table below to determine AWC and the amount (volume) that can be applied to reach the AWC. The actual application rate shall be adjusted during application to avoid ponding or runoff. Bare/Crusted soils may require some tillage to improve infiltration. **Table 3 in NRCS Practice Standard (590) Nutrient Management-**

##### Determining the Most Limiting Manure Application Rates.

Available Moisture in the Soil	Sands and Loamy Sands	Sandy Loam and Fine Sandy Loam	Very Fine Sandy Loam, Loam, Silt Loam, Silty Clay Loam, Clay Loam, Sandy Clay Loam	Sandy Clay, Silty Clay, Clay
< 25% Soil Moisture  Amount to Reach AWC	Dry, loose and single-grained; flows through fingers.  20,000 gallons/ac	Dry and loose; flows through fingers.  27,000 gallons/ac	Powdery dry; in some places slightly crusted but breaks down easily into powder.  40,000 gallons/ac	Hard, baked and cracked; has loose crumbs on surface in some places.  27,000 gallons/ac
25-50% or Less Soil Moisture  Amount to Reach AWC	Appears to be dry; does not form a ball under pressure.  15,000 gallons/ac	Appears to be dry; does not form a ball under pressure.  20,000 gallons/ac	Somewhat crumbly but holds together under pressure.  30,000 gallons/ac	Somewhat pliable; balls under pressure.  20,000 gallons/ac
50 - 75 % Soil Moisture  Amount to Reach AWC	Appears to be dry; does not form a ball under pressure.  10,000 gallons/ac	Balls under pressure but seldom holds together.  13,000 gallons/ac	Forms a ball under pressure; somewhat plastic; slicks slightly under pressure.  20,000 gallons/ac	Forms a ball; ribbons out between thumb and forefinger.  13,000 gallons/ac
75% to Field Capacity  Amount to Reach AWC	Sticks together slightly; may form a weak ball under pressure.  5,000 gallons/ac	Forms a weak ball that breaks easily, does not stick.  7,000 gallons/ac	Forms ball; very pliable; slicks readily if relatively high in clay.  11,000 gallons/ac	Ribbons out between fingers easily; has a slick feeling.  7,000 gallons/ac
100% Field Capacity	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.	On squeezing, no free water appears on soil, but wet outline of ball on hand.
Above Field Capacity	Free water appears when soil is bounced in hand.	Free water is released with kneading.	Free water can be squeezed out.	Puddles: free water forms on surface

## Determining the Most Limiting Manure Application Rates (Subsurface Drained or High N Leaching Potential)

<b>Select the Most Limiting Application Rate Based on the Following Criteria</b>					
Field Situation & Time of Year	Limiting Application Rate Criteria				
	Nitrogen	P2O5 <sup>4/</sup>	K2O	Tons/Ac	AWC
<b>Part 1. Subsurface Drained (Tiled) Fields</b>					
<b>(April - June)</b> Subsurface Drained or High N Leaching Potential	<b>1/</b> Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	13,000 gal.	Upper 8"
<b>(April - June)</b> <b>Pasture &gt; 20% or Cropland &gt; 15%</b> Subsurfaced Drained or High N Leaching Potential	Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	<b>5/</b> 10 wet tons 5,000 gal. - unless contoured strips or incorporated immediately	Upper 8"
<b>(July - Sept.)</b> <b>No Growing Crop</b> Subsurface Drained or High N Leaching Potential	<b>2/</b> 50 lbs/ac as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	13,000 gal.	Upper 8"
<b>(July - Sept.)</b> <b>With a Growing Cover Crop</b> Subsurface Drained or High N Leaching Potential	<b>3/</b> Next year's crop needs as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	13,000 gal.	Upper 8"
<b>(July - Sept.)</b> <b>No Growing Crop</b> <b>Cropland &gt; 15%</b> Subsurfaced Drained or High N Leaching Potential	<b>2/</b> 50 lbs/ac as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	<b>5/</b> 10 wet tons or, 13,000 gal.	Upper 8"
<b>(Oct. - March)</b> Subsurface Drained or High N Leaching Potential	<b>3/</b> Next year's crop needs as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	13,000 gal.	Upper 8"
<b>(Oct. - March)</b> <b>Pasture &gt; 20% or Cropland &gt; 15%</b> Subsurfaced Drained or High N Leaching Potential	<b>3/</b> Next year's crop needs as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	<b>5/</b> 10 wet tons 5,000 gal. - unless contoured strips or incorporated immediately	Upper 8"
<sup>6/</sup> <b>Frozen or Snow Covered application (Emergency)</b> Subsurface Drained or High N Leaching Potential	<b>3/</b> Next year's crop needs as applied N	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	<b>5/</b> 10 wet tons <50% Solids; 5 wet tons > 50% solids; Liquid Manure 5000 gallons/acre	

## Determining the Most Limiting Manure Application Rates (Not Subsurface Drained)

<b>Select the Most Limiting Application Rate Based on the Following Criteria</b>					
<b>Field Situation &amp; Time of</b>	<b>Limiting Application Rate Criteria</b>				
	<b>Nitrogen</b>	<b>P2O5 <sup>4/</sup></b>	<b>K2O</b>	<b>Tons/Ac</b>	<b>AWC</b>
<b>Part 2. Fields NOT Subsurface Drained (Tiled)</b>					
<b>(April - June)</b> Not Subsurface Drained	<b>1/</b> Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac		Upper 8"
<b>(April - June)</b> Not Subsurface Drained Pasture > 20% or Cropland > 15%	<b>1/</b> Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	<b>5/</b> 10 wet tons 5,000 gal. - unless contoured strips or incorporate	Upper 8"
<b>(July - Sept.)</b> Not Subsurface Drained	<b>1/</b> Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac		Upper 8"
<b>(July - Sept.)</b> Not Subsurface Drained Pasture > 20% or Cropland >15%	<b>1/</b> Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac		Upper 8"
<b>(Oct. - March)</b> Not Subsurface Drained	<b>1/</b> Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac		Upper 8"
<b>(Oct. - March)</b> Not Subsurface Drained Pasture > 20% or Cropland >15%	<b>1/</b> Crop Needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	<b>5/</b> 10 wet tons 5,000 gal. - unless contoured strips or incorporate immediately	Upper 8"
<b><sup>6/</sup> Frozen or Snow Covered application (Emergency)</b> Not Subsurface Drained	<b>1/</b> Next year's crop needs factoring N losses	Crop Needs or Crop Removal < 250 Lbs/ac	Crop Needs or Crop Removal < 500 Lbs/ac	<b>5/</b> 10 wet tons < 50% Solids; 5 wet tons > 50% solids; Liquid Manure 5000 gallons/acre	
<b>1/</b> Crop Needs factoring N losses - Maximum total nitrogen applied to meet the succeeding crop's recommended NITROGEN requirements for non-legume crops or 150 lbs/ac NITROGEN for the succeeding legume crop.					
<b>2/</b> 50 lbs/ac as applied N - Nitrogen application limited to 50 lbs/ac based on the addition of the NH <sub>4</sub> or NH <sub>3</sub> (ammonium/ammonia) content of the manure + 1/3 of the organic nitrogen content the manure as applied.					
<b>3/</b> Next year's crop needs as applied N - Maximum total nitrogen applied to meet the succeeding crop's recommended NITROGEN requirements for non-legume crops or 150 lbs/ac NITROGEN for the succeeding legume crop. <b>Considers no losses due to application method or time of year.</b>					
<b>4/</b> Under special conditions and criteria the rate of P2O5 application can be increased to 500 lbs./acre see (Nutrient					
<b>5/</b> Wet tons refers to the weight of the manure as it is applied – include solids and moisture weight.					
<b>6/</b> If manure surface application becomes necessary on frozen or snow covered soils, only limited quantities of manure shall be applied to address waste storage limitations until non frozen soils are available for manure application. These situations need to be documented in the CNMP and in the producer records until the instillation of the needed conservation practices that will increase the storage capacity to facilitate non-emergency spreading. In the 24 counties of the WLEB surface applications can only be to a growing crop (Ohio Senate Bill1).					

### 3.4. Nutrient Application Timing & Placement: Special Application Criteria

#### General Nutrient Application Timing & Placement

Timing and placement of all nutrients (commercial fertilizer and/or manure) must correspond as closely as practical with plant nutrient uptake (utilization by crops or cover crops). Nutrients from any source must not be surface-applied if nutrient losses offsite are likely. This precludes surface applications on fallow fields if frozen and/or snow covered, when the top two inches are saturated and when there is a greater than 50% chance of rainfall of more than ½ inch within 24 hours. In the 24 counties of the WLEB surface applications cannot be made if the local weather forecast calls for a greater than 50 percent chance of precipitation exceeding one inch in a 12-hour period for fertilizer and one-half inch in a 24-hour period for manure (Ohio Senate Bill1). Additionally, Ohio Senate bill 150 requires anyone applying commercial fertilizer on more than 50 acres for the purposes of growing crops to obtain a fertilizer applicator certification. The implementation of this conservation plan must be done in such a way that all applicable state and local laws are met.

#### Winter Application

##### **Application of manure to frozen and snow covered soil.**

Timing and placement of all nutrients (commercial fertilizer and/or manure) must correspond as closely as practical with plant nutrient uptake (utilization by crops or cover crops). Nutrients from any source must not be surface-applied if nutrient losses offsite are likely. This precludes surface applications on fallow fields if frozen and/or snow covered. As an alternative it can be injected, banded or lightly tilled into the soil using an AerWay, Phoenix, or similar implement that incorporates the nutrients but does not destroy the soil structure below 5 inches. An alternative would be NOT to apply manure during the winter months (December 1st to March 1st).

**IN AN EMERGENCY:** If manure surface application becomes necessary on frozen or snow covered soils, only limited quantities of manure shall be applied to address waste storage limitations until non frozen soils are available for manure application. These situations need to be documented in the CNMP and in the producer records until the instillation of the needed conservation practices that will increase the storage capacity to facilitate non-emergency spreading. If winter application becomes necessary, applications are to be applied only if ALL the following criteria are met:

- Application rate is limited to 10 as applied tons/acre for solid manure more than 50% moisture and 5 as applied tons for manure less than 50% moisture.
- The application rate of liquid manure is limited to 5000 gallons/acre.
- Applications are to be made on land with at least 90% surface cover (e.g. growing crop, cover crop, good quality hay or pasture field, all corn grain residue remaining after harvest, all wheat residue cover remaining after harvest). In the 24 counties of the WLEB surface applications can only be to a growing crop (Ohio Senate Bill1).
- Manure shall not be applied on more than 20 contiguous acres. Contiguous areas for application are to be separated by a break of at least 200 feet.
- Utilize those areas for manure application that are furthest from streams, ditches, waterways, surface water, etc (areas that present the least runoff potential and are furthest from surface water).
- Increase the application setback distance to 200 feet “minimum” from all grassed waterways, surface drainage ditches, streams, surface inlets, water bodies. This distance may need to be further increased due to local conditions.
- The rate of application shall not exceed the rates specified in “Determining the Most Limiting Manure Application Rates” table in section 3.3 of this CNMP.
- All fields with more than 6% slope with emergency winter applications are to be identified in the CNMP. Manure shall be applied in alternating strips 60 to 200 feet wide generally on the contour, or in the case of contour strips on the alternating strips.

## Liquid Manure Application – Tile Drained Fields

Fields or areas of fields that are subsurface (tile) drained require additional precautions. When liquid manure is applied to fields with subsurface drains, the liquid can follow soil macropores directly to the tile drains creating a surface water pollution hazard from direct tile discharge. A field is considered subsurface drained if 1/3 or more of the field is subsurface drained; however, even a field with one subsurface drainage line may present a risk of manure/wastewater movement to subsurface drains and cause a direct discharge. Research has shown that the higher the solids content of liquid manures (>4% solids), the less likely it is to move to subsurface drainage systems. To reduce the risk of nutrients getting into the tile:

- Do not apply application rates (volume) that would exceed the lesser of the AWC in the upper 8 inches or ½ in per acre or approximately 13,500 gallons/acre per application.
- Surface apply the liquid manure uniformly onto a growing crop or cover crop. If the field is not established in a growing cover crop or cover crop, prior to manure application:
  - Use a vertical tillage tool that can disrupt/close (using horizontal fracturing) the preferential flow paths (worm holes, cracks, root channels) in the soil, or till the surface of the soil 3-5 inches deep to a condition that will absorb the liquid manure. The purpose is to have the surface soil act as a sponge to soak up the liquid manure and keep it out of preferential flow channels. This is especially important if shallow tile are present (< 2 feet deep). Any pre-application tillage should leave as much residue as possible on the soil surface. The adsorption of liquid manure by the soil in the root zone will minimize nitrogen loss and the manure/nutrient runoff potential. For perennial crops (hay or pasture), or continuous no till fields where tillage is not an option, all tile outlets from the application area are to be plugged prior to application. This criteria may be waived if the producer can verify there is no prior history of manure discharge via subsurface drains. However, if there is a discharge the producer is liable for damages.
  - If injection is used, inject only deep enough to cover the manure with soil. Till the soil at least 3 inches below the depth of injection prior to application, or all tile outlets from the application area are to be plugged prior to application. This criteria may be waived if the producer can verify there is no prior history of manure discharge via subsurface drains. However, if there is a discharge the producer is liable for damages.
  - In addition to tillage prior to surface liquid manure application or injection, install in-line tile flow control structures or inflatable tile plugs that can mechanically stop or regulate tile flow either prior to application, or have on site if needed to stop tile flow. Use caution not to back tile water where it may impair the functioning of an offsite subsurface drainage system. This criteria may be waived if the producer can verify there is no prior history of manure discharge via subsurface drains. However, if there is a discharge the producer is liable for damages.
  - Apply at very low rates (.2" per acre) to reduce liquid manure movement to tiles.
- Repair broken tile or blow holes prior to application.