

APPENDIX G

Guidance Information

Air Quality AND Pathogen Management Considerations

It may not be practical or feasible to eliminate all odor emissions from the operation, but it is possible to manage or mitigate the odor. Some variables that effect odor are:

* Type of operation	* Building design
* Ventilation method	* Animal numbers
* Animal diets	* Manure treatment systems
* Season	* Topography
* Management skill or effort	*

1. Animal Cleanliness

- a. Clean, dry, and healthy animals are less odorous. Dirty, manure-covered animals promote accelerated bacterial growth and the production of odorous gases.
- b. Animal stress can also be correlated to an increase in odor production. Ventilation and environmental controls for the buildings must be properly designed and maintained to keep the animals healthy.

2. Minimize Dust

- a. It has been established that there is a correlation between dust and odor emission. Dust particles absorb and concentrate odorous compounds. As the dust particles are carried by the wind, so is the odor.
- b. Therefore, minimizing dust will reduce odor. Most farm dust comes from feed, fecal matter and, in the case of poultry, from feathers and litter. Dust also comes from animal skin, insects, and other sources.
- c. Buildings should be cleaned of all dust between batches of animals (including fans, shutters, and screens.)

3. **Waste Storage Facility** – to reduce emissions of greenhouse gases, ammonia, volatile organic compounds, and odor:

Consider alternatives and additional practices including covered anaerobic digesters (365), and composting facilities (317).

Adjusting pH below 7 may reduce ammonia emissions from the waste storage facility but may increase odor when waste is surface applied.

Consideration should be also given to the separation of the solids from the waste mixture. This will dilute the liquid waste product being treated in the lagoon and cause less odor. The solid separated material can be composted and sold or land applied.

4. **Animal diets** can also be manipulated to produce less manure production and odors from the manure. Much of the odors from manure are from nitrogen, sulfur, and carbohydrate containing volatile compounds. Balancing the diet with proper amounts and forms of protein and reducing excess protein in the diet will reduce nitrogen excretion and odor emissions from the manure.
5. **Proper Disposal of Mortality** – Normal mortality for the animal feeding operation *must* be properly handled for both odor control and biological security of the operation. Composting, incineration, and rendering are acceptable methods for mortality disposal.
6. **Good Fly and Rodent Control Programs** – These programs must be a continuous process on the farm. When feed and waste products are properly handled, these problems are minimized.
7. **Utilize Trees** – While trees should not grow directly adjacent to facilities, wind breaks of trees correctly positioned near the facility not only create a visual barrier but can also provide a large filtration surface for dust and odorous compound removal. Trees can absorb odorous compounds and create turbulence that enhances odor dispersion and dilution. Trees also can create a cooler microclimate around the facility, which can reduce odors.

Pathogen Management

Many of the same conservation practices used to prevent nutrient movement from this animal feeding operation, such as runoff and erosion control are likely to minimize the movement of pathogens. Pathogenic organisms occur naturally in animal wastes. Exposure to some pathogens can cause illness to humans and animals, especially for immune-deficient populations.

Land Application Operation and Maintains

Land Application

- a. Note wind direction and avoid spreading when the wind is blowing toward populated areas.
- b. Avoid spreading on weekend/holidays when people are likely to be engaged in nearby outdoor and recreational activities.

- c. Spread in the morning when air begins to warm and is rising, rather than in the afternoon.
- d. Use available weather information to best advantage. Turbulent breezes will dissipate and dilute odors. Hot and humid weather tends to concentrate and intensify odors, particularly in the absence of breezes. Rain will remove the odor from the atmosphere.
- e. Use natural vegetation barriers, such as woodlots or windbreaks, to help dissipate and filter odors.
- f. Establish vegetated air filters in the field border area by planting conifers and shrubs as windbreaks and visual screens between cropland and residential developments.

Livestock Management Facilities Act Waste Application Provisions

- a) Waste applied within 1320' (1/4 mile) of any residence not owned by the facility shall be injected or incorporated on the day of application.
- b) Waste shall not be applied within:
 - 1. 200' of surface water unless the water is up-gradient or there is adequate diking to prevent runoff, and
 - 2. 150' of a potable water supply well.
- c) Waste shall not be applied in a 10-year flood plain unless the injection or incorporation method of application is used.
- d) Livestock waste shall not be applied in waterways.
- e) Waste that is spread on frozen or snow-covered land shall be limited to areas which:
 - 1. Land slope is 5% or less, or
 - 2. Adequate erosion control practices exist
- f) The certified livestock manager shall inspect all berm tops, exterior sides, non-submerged interior sides for evidence of erosion, burrowing animal activity, and other indications of berm degradation at least every two weeks and keep an inspection log.
- g) Livestock waste shall not be applied during a rainfall or to saturated soil and conservative application rates shall be used in the case of a high water table or shallow earth cover to fractured bedrock. Caution shall be exercised in applying livestock waste, particularly on porous soils, so as not to cause nitrate or bacteria contamination of the groundwater.

CAFO Application Provisions

- 1. Livestock waste applied within ¼ mile of any residence not part of the facility shall be injected or incorporated on the day of application. However, livestock management facilities and livestock waste handling facilities that have irrigation systems in operation prior to May 21, 1996, or existing facilities applying waste to frozen ground are not subject to this.

2. Livestock waste may not be applied within 200 feet of surface water unless the water is upgrade or there is adequate diking and waste will not be applied within 150 feet of potable water supply wells.
3. Livestock waste may not be applied in a 10-year flood plain unless the injection or incorporation method of application is used.
4. Livestock waste may not be applied in waterways. For the purpose of this Part, a grassed area serving as a waterway may receive livestock waste through an irrigation system if there is no runoff, the distance from applied livestock waste to surface water is greater than 200 feet, the distance from applied waste to potable water supply wells is greater than 150 feet; the distance from applied livestock waste to a non-potable, an abandoned or plugged well, a drainage well, or an injection well is greater than 100 feet; and precipitation is not expected within 24 hours.
5. Livestock waste may not be applied during a rainfall or to saturated soil, and a conservative waste-loading rate will be used in the case of high water table or shallow earth cover to fractured bedrock. Caution should be exercised in applying livestock wastes, particularly on porous soils, so as not to cause nitrate or bacteria contamination of groundwater.
6. Livestock waste shall not be applied within 100 feet of down gradient (slope) open subsurface drainage intakes, agricultural drainage wells, sinkholes, waterways or other conduits to surface waters, unless a 35-foot vegetative buffer exists between the land application area and the waterways, open subsurface drainage intakes, agricultural drainage wells, sinkholes or other conduits to surface water. NOTE: The NRCS standards 590 and 633 or the waste management plan provisions of 8 Ill. Adm. Code 255, Subpart H: Waste Management Plan may have provisions that are more restrictive.

Winter Application

Application of wastes to frozen and snow covered soil. Application on frozen and snow covered soil is not recommended. However, if manure 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. If winter application becomes necessary, applications are to be applied only if ALL the following criteria are met:

Application rate is limited to 10 wet tons/acre for solid manure more than 50% moisture and 5 wet tons for manure less than 50% moisture. For Liquid manure the application rate is limited to 50% of the planned agronomic rate for that field.

Applications are to be made on land with at least 50% surface residue cover (e.g. good quality hay or pasture field, all corn grain residue remaining after harvest, all wheat residue cover remaining after harvest).

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.

Additional winter application criteria for fields with significant slopes more than 5% (fields exceeding 5% 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.

Manure Application on Steep Fields

Steep Fields

Wastes are not to be applied to cropland over 15% slopes or to pastures/hayland over 20% slopes unless one of the following precautions is taken:

Immediate incorporation or injection with operations done on the contour, UNLESS the field has 80% ground cover (residue and/or canopy).

1. Applications are timed during periods of lower runoff and/or rainfall (Late May to Mid-October).
2. Apply low rates through split applications (separated by rainfall events). Apply no more than 10 wet tons/acre for solid manure/wastes; or 5000 gallons/acre for liquid manure/wastes.
3. The field is established and managed in contour strips with alternate strips in grass or legume.

Manure Application on Fields Subject to Flooding

Fields Subject to Flooding

Manure is not to be land-applied on soils that are frequently flooded unless incorporated immediately on the day of application.

General Liquid Manure Applications

LIQUID MANURE APPLICATIONS - For liquid wastes, 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 **Table 1. (Available Water Capacity (AWC) Practical Soil Moisture Interpretations for Various Soils Textures and Conditions to Determine Liquid Waste Volume Applications not to exceed AWC)** 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.

Liquid Manure Application – Tile Drained Fields

Fields or areas of fields that are subsurface (TILE) drained require additional precautions. When liquid wastes are applied to fields with subsurface (TILE) 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 (tile) drained if 1/3 or more of the field is subsurface (tiled) 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.

Do not apply application rates (volume) that would exceed the lesser of the AWC in the upper 8 inches or 13,000 gallons/acre per application.

Prior to manure application, use a tool (AERWAY tool or similar 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 wastes. 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.

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.

In addition to tillage prior to surface liquid waste 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.

Manure Application on Fields with “Systematic Surface Drainage”

Criteria for Systematic Surface Drained Fields:

Fields or areas of fields that have systematic “surface drainage” systems (e.g. shallow surface drains spaced 100 – 200 feet apart). These “internal” surface drains are considered concentrated flow areas. However, if special precautions are taken, manure can be applied in the surface drains with minimal risk of surface runoff. THIS DOES NOT APPLY TO THE COLLECTOR SURFACE DRAINS (mains) OR DRAINS BORDERING THE FIELDS. The following special manure application techniques shall be used:

Till the surface at least 3 to 5 inches deep prior to liquid manure surface application. For SOLID manure till either prior to application or incorporate within 24 hours. This can be done with a heavy disk, chisel plow, plow, field cultivator, AERWAY tool, or similar tool that can provide “full-width” soil disturbance to a depth of 3-5 inches.

Surface apply the liquid manure uniformly over the entire soil surface on the freshly tilled soil. The purpose of the surface application on the freshly tilled soil is to allow the liquid manure to be soaked/absorbed into the entire 3-5 inches of loose soil surface.

For fields that have no subsurface drainage, the liquid manure can be injected directly with no prior tillage.

Limit LIQUID application rates to 13,000 gallons per acre or less per application.

Minimum Ground Cover for Manure Applications

Medium Phosphorus Risk Fields

- ♦ The fields shall have at least 30% ground cover at the time of application or the manure or other organic by-products shall be incorporated within one week.

High Phosphorus Risk Field

- ♦ The field shall have at least 50% ground cover at the time of application unless the manure is incorporated within 24 hours on areas with < 50% cover.

Generalized Interpretation of the Nitrogen Leaching Risk Analysis:

- a. Fields with a rating of "LOW" or "MEDIUM" have a low/medium potential to leach nitrates below the root zone. These fields have more flexibility for timing of nitrogen application; however, care must be taken to limit loss of applied nitrogen through denitrification.
- b. Fields with a rating of "HIGH" have a high potential to leach nitrates below the root zone. Fields with systematic subsurface drains (tile) are rated "HIGH" potential to leach nitrates out of the root zone. These fields require management that applies the nitrogen closer to the time the crop can utilize the applied nitrogen.

Criteria for Nitrogen via Commercial Fertilizer Sources:

On fields with a "High Nitrogen Leaching Potential" apply the recommended nitrogen for spring planted crops prior to planting spring crops or split applications between pre-plant and a sidedress application. For perennial crops split the recommended application between two or three periods including early spring, early summer, or late summer. For fall planted crops apply 20-30 Lbs/Ac of the recommended amount in the fall and the remainder in the spring. Nitrogen may be fall applied for spring planted crops following the guidance in Table 1 of this standard.

Criteria for Nitrogen Application via Manure (during Summer and Fall Periods):

On fields with a "High Nitrogen Leaching Potential" and with no growing crop, manure and other organic by-products application is to be limited to 50 Lbs/ac of Nitrogen (Ammonium N + 1/3 of the Organic N) calculated at the time of application from June to October 1st to limit nitrogen leaching. When a grass or legume cover crop is growing or established immediately after waste application, manure or other organic by-products can be applied prior to October 1st at the recommended Nitrogen rate for the next non-legume crop or the nitrogen removal rate for the next legume (maximum 150 Lbs/ac) crop.