

Incorporation of manure can pose risks to groundwater contamination on:

- sandy soils.
- soils that have fractured bedrock.
- soils that have preferential flow pathways such as root channels and wormholes.
- wet or cracked soils that are tile drained.

Ammoniacal nitrogen in manure, which is converted to nitrate, is available for plant uptake but may be leached into the subsoil or groundwater. Parasitic pathogens in manure, such as *Cryptosporidium* and *Giardia*, can be transported to ground or surface water through preferential flow pathways in the soil.

Considerations for Timing of Manure applications in relation to plant growth.

Manure applications will be most effective as nutrients if made close to the time of plant growth. Potential for nutrient losses is greater for fall and winter applications because nutrients are not being used for plant growth and frozen ground restricts infiltration. If manure applications need to be made in the fall and winter, apply manure to fields that will be planted to winter grains or cover crops or fields containing vegetation or crop residues. Apply manure only to fields that have a low potential for flooding, saturation, or runoff.

Hydrological conditions of the field and rainfall following manure application.

Saturated field conditions increase the risk that nutrients and parasitic pathogens in manure will be transported through runoff or subsurface flows to lakes and rivers. Intense or high-accumulation rainfall following manure applications increases the risk of runoff and transport of manure to surface waters. Heavy rainfall can also increase risks of nutrient or pathogen leaching or transport through the soil into groundwater.

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 is 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 NMP and in the producer records. If winter application is 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.
- Applications are to be made on land with at least 90% 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 setback distance may need to be further increased due to local conditions.
- Livestock waste shall not be applied on frozen and snow-covered ground if the waste applied will result in runoff.
- If livestock waste needs to be applied to frozen and snow covered ground it will be limited to flat croplands.

Manure Application on Fields Subject to Flooding

Fields Subject to Flooding:

No Fields where manure applications are planned are subject to flooding in this Nutrient Plan. Manure is not to be land-applied on soils that are frequently flooded during the period when flooding is expected unless incorporated immediately.