

# AGRICULTURAL ENGINEERING INFORMATION SERIES

670

18.7

February 2004

## CAPTURING LAND-APPLIED MANURE IN THE ROOT ZONE<sup>1</sup> PART 3: SPREADING ON FROZEN AND SNOW-COVERED GROUND

Land application of manure to frozen and snow-covered ground is a common practice in Michigan. The challenge for a livestock producer is to apply manure in a way that is labor efficient, cost effective, and environmentally responsible. **Management strategies that capture land-applied manure in the root zone will make the nutrients available for the next crop, improve soil quality, and prevent manure nutrient and contaminant loss to the environment.**

Extra precaution and care are needed in winter spreading because the fate of manure on frozen and snow-covered ground is not predictable. It is unpredictable because the infiltration rate of frozen soil is very low so any manure applied will be slow to enter the root zone. Because the snow insulates the soil surface, it helps keep the soil frozen. In most cases the ground will remain frozen until the snow cover is gone. **If there is a rapid snow melt, or if it rains on frozen ground where manure has been applied, the runoff will carry manure nutrients and contaminants.** Even gently sloping fields can produce considerable runoff when the ground is frozen, so manure should not be applied in areas of fields where runoff is possible.

**The best land application plans are those that are custom designed on a field-by-field basis.**

Field-specific land application plans should be developed within the context of established best management practices and fine-tuned for each field by using a process of *application*, careful *observation*, and *evaluation* of the results. *Apply* manure, *observe* what happens, and *evaluate* the effectiveness in capturing manure in the root zone where it will be a benefit to your cropping system rather than be a hazard to society. **The most important tools in preventing manure nutrient and contaminant loss to the environment are your knowledge of your fields, and your determination to prevent land applied wastes from leaving the site.**

### **EVALUATE THE RISK OF SURFACE RUNOFF FROM FROZEN AND SNOW-COVERED GROUND:**

- The first step in creating a field-by-field land application plan for winter spreading is to evaluate each field. **Any fields adjacent to surface water or to a ditch that flows to surface water, are high risk fields.** Do not use such fields for spreading on frozen and snow-covered ground.
- Although runoff can occur from most fields, problems are most likely on sloping fields and in fields where soil and water conservation practices are not used. These fields should be carefully monitored before and after land application.
- High application rates increase the likelihood of runoff from frozen and snow covered ground.
- The fate of manure applied on frozen ground is unpredictable because it is largely weather dependant. The ground may thaw slowly with little manure movement, or rain or a rapid snow melt may carry manure, sediment and unanchored debris to low-lying areas. Manure that is within the snow pack is likely to move with runoff water as soon as snow melt begins.

<sup>1</sup> The authors are Tim Harrigan and Bill Northcott, Biosystems and Agricultural Engineering Department, and Natalie Rector and Dann Bolinger, Extension Agricultural Agents, Michigan State University, East Lansing MI

## GAAMP'S HELPFUL IN PREVENTING SURFACE RUNOFF FROM FROZEN AND SNOW-COVERED FIELDS.

This is a brief summary of some of the GAAMP's that will be helpful in reducing runoff from frozen ground. You can download a printed copy of the GAAMP's with a more detailed explanation from the website at: <http://www.michigan.gov/mda> Click *Farming* and then click *GAAMP's*.

- Application to frozen or snow-covered soils should be avoided..., but when necessary provisions must be made to control runoff and erosion with soil and water conservation practices.
- Runoff from pasture feeding and watering areas should travel through a vegetated filter area to protect surface and groundwater.
- Manure should not be applied to soils within 150 feet of surface waters or to areas subject to flooding....
- Liquid manures should be applied in a manner that will not result in ponding or runoff to adjacent property, drainage ditches, or surface water.
- As land slope increases, the risk of runoff and erosion also increases. Soil and water conservation practices should be used which will control runoff and erosion for a particular site.
- Records should be kept of manure analysis, soil test reports, and rates of manure application for individual fields.

## ACTIONS TO PREVENT RUNOFF FROM FROZEN AND SNOW COVERED GROUND.

- Excessive application rates increase the chance of runoff from any field, frozen or thawed. Calibrate manure spreaders

and verify that the calibrated rate is the rate that is actually applied to the field.

- *Based on observation and evaluation, determine the right application rate for your fields. On frozen and snow-covered ground, the right rate will likely be considerably less than the allowable rate based on manure nutrient content.*
- Use soil and water conservation practices such as crop residue management, grassed waterways and buffer strips to help prevent local ponding and overland flow.
- Use spreading set-backs from ditches and streams in addition to soil and water conservation practices when manure will be spread on frozen ground.
- Do not apply manure on frozen ground that slopes toward surface water, or ditches that could flow to surface waters.
- Use conservation tillage in the fall to increase the surface roughness of fields where manure will be spread in the winter.
- Manure with high solids content is less likely to move off-site. Separate lot runoff, parlor wash water and other water sources from the herd manure and handle them separately.
- Read, understand and adopt the *Generally Accepted Agricultural and Management Practices for Manure Management and Utilization*. These will help build the foundation of your site-specific manure land-application plan.
- Should a discharge occur, have a plan for dealing with manure that may move off-site.

**In the event of a manure release to surface waters, call the Pollution Emergency Alerting System 1-800-292-4706.**