

# AGRICULTURAL ENGINEERING INFORMATION SERIES

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## CAPTURING LAND-APPLIED MANURE IN THE ROOT ZONE<sup>1</sup> PART 2: TILE-DRAINED LAND

**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.** The idea of capturing manure in the root zone is quite simple, but in practice it can be quite challenging as weather, soil and site-specific field conditions change. **The challenge for a livestock producer is to apply the manure in a way that is labor efficient, cost effective, and environmentally responsible. When liquid manure is spread on tile drained land it can move within minutes to the tile lines through worm holes, root channels, cracks in the soil, and other macropores.** High application rates and highly flowable liquids such as parlor wash water generally cause more problems than thicker slurries with a high solids content. Spreading on tile drained land requires special efforts to prevent manure loss through subsurface drains.

**The single most important tool in preventing manure nutrient and contaminant loss to the environment is *your* knowledge of *your* fields.** When manure is applied on tile drained land, the tile outlets should be monitored before and after spreading. **The best land application plans are those which are custom designed on a field-by-field basis.** These plans are drawn 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.

### EVALUATE THE RISK OF A TILE LINE

#### DISCHARGE:

- The first step in creating a field-by-field land application plan is to evaluate each field. Any field where subsurface drains discharge into ditches that flow to surface water should be considered a high risk field and monitored carefully before and after land application.
- Although a discharge could happen in any field, farmers report that problems are more likely with high application rates and highly flowable liquids such as parlor wash water.
- High application rates increase the probability of a discharge.
- No-till fields often have more worm holes and root channels than more conventionally tilled fields. An abundance of such large pores increases the likelihood of manure loss through tile lines.
- Clay soils (soil management groups 0, 1, 1.5 and 2.5) tend to shrink and crack. Soil cracks may provide a direct route to subsurface drains.
- Slurry injection is a not sure solution. Manure has been found in tile lines within minutes of injection with sweep injectors.

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## GAAMP'S HELPFUL IN PREVENTING A TILE LINE DISCHARGE

This is a brief summary of some of the GAAMP's that will be helpful in reducing a tile line discharge. 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 rates should be based on the ability of the soil to accept and store water and the ability of plants to utilize nutrients.
- Manure should be uniformly applied and the amount applied should be known.
- Liquid manures should be applied in a manner that will not result in ponding or runoff to adjacent property, drainage ditches, or surface water.
- Records should be kept of manure analysis, soil test reports, and rates of manure application for individual fields.

## ACTIONS TO PREVENT A TILE DISCHARGE

- Excessive application rates increase the chance of runoff and a tile line discharge. 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 some fields, the right rate may be considerably less than the allowable rate based on manure nutrient content.*
- Use soil and water conservation practices such as crop residue management, and grassed waterways that prevent local ponding and overland flow. Local ponding can funnel waste water to tile lines through macropores.

- Use surface tillage to disrupt the continuity of worm holes, macropores and root channels and reduce the risk of manure reaching tile lines
- Do not apply manure to tile drained fields when the tiles are flowing.
- Manure with a high solids content is less likely to move off-site. Separate lot runoff, parlor wash water and other water sources from the herd manure stream and handle them separately.
- **Apply, observe and monitor tile outlets, evaluate the results, and make adjustments as needed to develop a site-specific land application plan.** Match the manure application rate with soil infiltration rates and water holding capacity.
- Make more frequent, lower rate applications rather than a single heavy application.
- Should a discharge occur, have a plan for dealing with manure that may reach tile lines, such as blocking outlets or blocking the flow once it reaches the ditch.
- Surface applications with rapid incorporation may be the best choice on land with subsurface drainage. Conservation tillage before spreading will create a rough, permeable surface. Injection may actually increase problems by placing the manure closer to the tile lines.
- Decrease the manure application rate, and avoid spreading in the rain or when rain is in the forecast.
- 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.

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