

# Be safe ... Monitor tile outlets

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**H**ow can you be sure that your field tile drains are not carrying manure to surface waters if you don't monitor them? If there is a problem, you need to be the first to know. The peace of mind from knowing manure is staying in the field is priceless.

Under certain conditions, land-applied manure can quickly enter sub-surface drains by preferential flow through macropores—large, continuous openings in soil formed by plant roots, cracks, earthworms, and other natural processes.

Nutrients that escape from application sites through sub-surface drains are not recycled to crops. The resulting contaminants degrade surface waters by stimulating aquatic plant growth, decreasing water clarity, and destroying desirable fish habitat. In extreme cases, a fish kill may occur.

Recently, Jim Hoorman, Ohio State University Water Quality Educator, reviewed 98 manure violations in Ohio from 2000-03. About two-thirds occurred on wet ground or in rainy weather. Reported application rates ranged from 1,400 to 47,500 gallon/acre, but in cases where Soil and Water Conservation Districts were able to verify rates, operators had applied about twice the rate reported to investigators. Violations occurred most often because of: 1) excessive rain or saturated soil; 2) over-application; 3) poor management of storage facilities that left little flexibility in when hauling could occur; 4) ponding of surface applications or excessive irrigation; and, 5) tile lines already flowing at the time of application or a tile plug that failed.

## Beware of conditions that may signal potential problems:

- Manure reaching tile lines is more likely with a combination of high application rates and highly flowable liquids such as parlor wash water and flush systems.
- The agronomic manure rate may be too high for dilute slurry that is low in nutrients.
- 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 sub-surface drains.
- No-till fields often have more worm holes and root channels. An abundance of such large pores increases the likelihood of manure loss through tile lines.

## Keep it in the Root Zone

Soil moisture, weather conditions, and other factors that influence the ability of soil to retain manure in the root zone change continuously, so monitoring of tile outlets is essential when manure is applied on tile drained land. Some practices that are helpful include:

- Do not apply manure to tile drained fields when the tiles are flowing. Avoid spreading in the rain or when rain is forecast.
- Use surface tillage to disrupt the continuity of worm holes, macropores, and root channels.
- Injection places manure closer to the tile lines. Use injection tools with lots of tillage and mixing action, or drop manure behind rolling tines.
- Manure with high solids content is less likely to move off-site. Separate lot runoff, parlor wash water and other water sources from the manure stream and handle them separately.



Above all, monitor tile outlets **before, during, immediately after** manure applications, and **after the next rain event**. Keep records of the observations. Visit [www.rootzone.msu.edu](http://www.rootzone.msu.edu) for record keeping forms.

- Several applications at a lower rate will likely be safer than a single high application rate that exceeds the ability of the soil to hold and retain the manure.
- Monitor tile outlets and stop spreading if there is any indication of manure movement to tile lines.
- Flow control structures and tile plugs can sometimes be used for an added margin of safety, but should not be used in place of low rates and outlet monitoring.
- Should a discharge occur, have a plan for dealing with manure that may reach tile lines, such as blocking outlets or ditches. Large round bales are effective for temporarily blocking ditch flow. 🌾