Vermont
Farm*A*Syst

Worksheet #10
Assessing the Risk of Groundwater Contamination from

Milkhouse Wastewater Treatment

Why should I be concerned?

Dairy wastewater is usually considered a dairy sanitation problem. If not carefully managed, however, dairy wastewater can contaminate both groundwater and surface water.

The amount of wastewater generated varies with milking preparation, equipment used and the number of cows. A 100-cow free-stall operation may use anywhere from 100 to 1000 gallons of water per day in the milking center alone.

Milking center wastewater is contaminated with organic matter, nutrients, chemicals and microorganisms. Poorly designed or mismanaged waste disposal systems can contaminate water with ammonia, nitrate, phosphorus, detergents and disease-causing organisms. If not managed properly, these contaminants can be carried directly to a well or cause groundwater or surface water contamination. Surface water can also be affected by manure, milk solids, ammonia, phosphorus and detergents.

The goal of Farm·A·Syst is to help you protect the groundwater that supplies your drinking water.

How will this worksheet help me protect my drinking water?

·It will take you step by step through your milking center wastewater treatment practices.
·It will rank your activities according to how they might affect the groundwater that provides your drinking water supplies.
·It will provide you with easy-to-understand rankings that will help you analyze the "risk level" of your livestock waste storage practices.
·It will help you determine which of your practices are reasonably safe and effective, and which practices might require modification to better protect your drinking water.

Glossary
Milkhouse Wastewater Treatment

These terms may help you make more accurate assessments when completing Worksheet #10. They may also help clarify some of the terms used in Fact Sheet #10.

Below-ground absorption field: A wastewater treatment system that applies septic tank effluent to the soil through a trench, bed or pit.

Field application: Application of wastewater to croplands and pastures by irrigation equipment or a liquid manure spreader.

Slow surface infiltration: Application of wastewater at one end of a gently sloping grass filter strip or terrace, so that it is treated as it slowly moves through the plant-soil system. A portion of the flow percolates to groundwater, and some is used by vegetation.

Soil permeability: The quality that enables the soil to transmit water or air. Slowly permeable soils have fine-textured materials, like clays, that permit only slow water movement. Moderately or highly permeable soils have coarse-textured materials, like sands, that permit rapid water movement.

Surface (overland) flow: The process of allowing wastewater to run slowly in a uniform layer over a grass-covered slope with relatively impervious clay soil. There is little percolation into the soil with this method because of the impervious soil. Water eventually flows into runoff collection ditches (for subsequent discharge).

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Milking Center Wastewater Treatment

Resource Concern	Rank 4	Rank 3	Rank 2	Rank 1	Your Rank Ranking Number ☐
NO DISCHARGE METHODS					
All wastewater to manure storage with waste applied to fields*	Wastewater delivered directly to liquid manure storage. No discharge expected.			Wastewater delivered to undersized or leaking manure storage.	☐
PRETREATMENT (Before discharge to soil absorption bed/field					
Milking cleanup practices	First pipeline rinse captured and added to barn manure. Waste milk never poured down drain. Manure and excess feed removed from parlor before wash-down.	Waste milk poured down drain 10% of the time. Manure and excess feed usually removed before washdown.	Waste milk poured down drain 50% of the time. Manure and excess feed often washed down drain.	All waste milk poured down drain. Manure and excess feed frequently washed down drain.	☐
Storage / settling tank liner	Properly sized concrete or plastic tank. Baffles in working order.	Clay lined storage or undersized concrete, plastic, or metal tank. Baffles not working.	Cracked or porous liner or leaking tank with no baffles.	No tank or liner to prevent seepage.	☐
Settling tank cleanout	Tank cleaned out every 3-4 months	Tank cleaned every 6 months	Annual cleaning	Tank never cleaned.	☐
Liquid storage period following settling	9-12 months	1 week to 9 months	Less than 1 week	No storage/settling. Wastewater discharged directly to soil as generated.	☐

* If using this practice, do not complete the rest of this worksheet. Put ranking for above section in the “total” box at the end of this chart.

LOCATION OF DISCHARGE					
Distance from drinking water well	More than 200 feet downslope from well	More than 300 feet upslope from well	Less than 200 feet downslope from well.	Less than 300 feet upslope from well	☐
DISCHARGE METHODS*					
Field application	Applied to growing crops at 27,000 gallons per acre or less per week. Vegetation removed regularly.	Applied to uncropped fields at less than 27,000 gallons per acre per week. Vegetation removed occasionally.	Applied to cropped or uncropped fields at 27,000-54,000 gallons per acre per week. Vegetation never removed.	Applied consistently to same area at more than 54,000 gallons peracre per week. Vegetation never removed.	☐
Surface flow	Applied in sheet flow to slowly permeable soil.* Vegetation regularly removed. Greater than 3 feet to bedrock or water table. OR applied to properly designed constructed wetland.	Applied in sheet flow to slowly permeable soil.* Vegetation sometimes removed. Less than 3 feet to bedrock or water table.	Applied in sheet flow to moderately or highly permeable soils or soils that have bedrock or water table within 3 feet.	Applied in concentrated flow.	☐
Below-ground absorption field	Discharge into properly installed and maintained organic matter bed. Located on slowly permeable soils with over 3 feet to bedrock or water table.	Discharged into properly constructed conventional wastewater treatment system used only for dairy waste.	Discharge into domestic wastewater treatment system.	Discharge into a dry well or cesspool.	☐

* Note: Although surface application to slowly permeable soil poses a low risk to ground water, it can lead to surface water contamination. Direct discharge into a waterbody is a concern for surface water quality and requires a discharge permit. Concentrated flow also has a high potential to contaminate surface water in violation of state water quality standards.

What do I do with these rankings?

Step 1: Begin by determining your overall well management risk ranking. Total the rankings for the categories you completed and divide by the number of categories you ranked:

_____ divided by _____ equals *	
Rankings total from previous page	number of risk ranking categories ranked (11 if ranked all)

*Carry your answer out to one decimal place.

Example:
26 ÷11 = 2.36
Use 2.4.

Risk Ranking Description

3.6 - 4.0 = low risk
2.6 - 3.5 = low to moderate risk
1.6 - 2.5 = moderate to high risk
1.0 - 1.5 = high risk

This ranking gives you an idea of how your well condition, **as a whole**, might be affecting your drinking water. This ranking should serve only as a **very general guide, not a precise diagnosis.** Because it represents an **averaging** of many individual rankings, it can overlook any **individual** rankings (such as 1's or 2's) that should be of concern. (Step 2 will focus on individually ranked activities of concern.)

Enter your boxed well condition ranking in the appropriate place in the table on the front of Worksheet #12. Later you will compare this risk ranking with other farmstead management rankings. Worksheet #11 will help you determine your farmstead's site conditions (soil type, soil depth, and bedrock characteristics), and worksheet #12 will show you how these site conditions affect your risk rankings.

Step 2: Look over your rankings for individual activities.

- **4's - Best:** low-risk practices
- **3's - Provide reasonable groundwater protection:** low- to moderate-risk prac-tices
- **2's - Possibly inadequate protection:** moderate- to high-risk practices

1's - Inadequate protection with relatively high groundwater contamination risk: high-risk practices

Regardless of your overall risk ranking, any individual rankings of "1" require immediate attention. You can take care of some of the concerns right away; others could be major or costly projects, requiring planning and prioritizing before you take action.

Find any activities that you identified as 1's and list them under "High-Risk Activities"on Worksheet #12.

Step 3: Read Fact Sheet #7, "*Improving Milkhouse Wastewater Treatment*" and give some thought to how you might modify your farmstead practices to better protect your drinking water.

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