Maine Farm-A-Syst

Farmstead Assessment System Worksheet 9

Assessing the Risk of Groundwater Contamination from Silage Storage

Why should I be concerned?

When properly harvested and stored, silage poses little or no pollution threat, but improper handling can lead to a significant flow of silage juices (or leachate) from the silo.

Silage is an essential feed for livestock-based agriculture. Leachate is an organic liquid that results from pressure in the silo or from extra water entering the silo. It is usually a problem only when silage is fresh, or just after storage. This loss of leachate represents a major loss of nutrient value from the silage. Canning company wastes, which are often used for silage, frequently contain excess moisture which increases the potential for leachate to cause groundwater contamination.

Silage liquid is often highly acidic and can be corrosive to concrete and steel. If it enters a stream, its high organic content feeds bacteria that rob the water of oxygen. Groundwater contaminated with silage juices has a disagreeable odor and shows increased levels of acidity, ammonia, nitrates and iron.

Leachate from 300 tons of high-moisture silage has been compared to the sewage generated daily by a city of 80,000 people.

Along with the pollutants found in silage leachate, an even greater potential threat is that the low pH created by the presence of acids in silage leachate can free up and release naturally occurring metals in the soil and aquifer, which can increase their concentrations in groundwater.

Nitrate is the most important potential contaminant to consider. Levels of 20-40 milligrams per liter (mg/l equivalent to parts per million in water measure) **can cause livestock problems**, especially if feed contains more than 1,000 ppm nitrate-nitrogen. Water with levels over 100 mg/l nitrate-nitrogen should not be used for livestock. Water with over 10 mg/l nitrate-nitrogen exceeds the U.S. E.P.A. drinking water standard and should not be used.

The goal of Farm-A-Syst is to help you protect the groundwater that supplies the drinking water for you, your neighbors, and the public. It is <u>not</u> used for, nor is it related to, any type of enforcement action from any agency.

How will this worksheet help me protect my drinking water?

- It will take you step by step through your drinking water well condition and management practices.
- It will rank your activities according to how they might affect the groundwater that provides your drinking water supplies.

- 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.

How do you fill out the worksheets?

Focus on the well that provides drinking water for your home or farm. If you have more than one drinking water well on your farmstead, fill out a worksheet for each one.

- Use a pencil. You may want to make changes.
- For each category listed on the left that is appropriate to your farmstead, read across to the right and circle the statement that best describes conditions on your farmstead. (skip and leave blank any categories that don't apply to your farmstead.)
- Then look above the description you circled to find your "Rank number" (4, 3, 2, or 1) and enter that number in the blank under "Your Rank."
- Directions on overall scoring are explained in the next section "What do you do with the rankings?"
- Allow between 20-45 minutes to complete the worksheet to figure out your risk ranking for management practices and complete the Farmstead Improvement Action Plan.

What do you do with the rankings?

Step 1: Look over your rankings for individual activities:

- Low-risk practices (4's): ideal; should be your goal despite cost and effort
- Low-to-moderate-risk practices (3's): provide reasonable groundwater protection
- Moderate-to-high-risk practices (2's): inadequate protection in many circumstances
- High-risk practices (1's): inadequate; pose a high risk of polluting groundwater

Any individual rankings of "1" require immediate attention. Some concerns you can take care of 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 & 2's and list them under "High Risk and Medium-High Risk Practices" in the Farmstead Improvement Action Plan section following the worksheet.

Step 2: Read Fact Sheet # 9, Silo Storage, and consider how you might modify your farmstead practices to better protect the publics and your drinking water. This may help with filling out the Farmstead Improvement action Plan.

Step 3: Fill out the Farmstead Improvement Action Plan (FIAP). Contact your local Soil and Water Conservation District for technical assistance and help with the FIAP if needed.

Step 4: Implement the FIAP- Contact NRCS for possible designs and/or funding for practices. Funding availability depends on the practice installed and the current USDA farm programs.

Worksheet # 9

Silage Storage: Assessing Drinking Water Contamination Risk

	Low Risk (Rank 4)	Low-Mod Risk (Rank 3)	Mod-High Risk (Rank 2)	High Risk (Rank 1)	Your Rank
9.1 Silage moisture content*	Below 65%	Between 65% and 70%	Between 71% and 85%	Over 85%	_____
9.2 Silage storage location	At least 100 feet downslope from well (bunker, silos, glass lined feed storage, plastic tubes). At least 300 feet downslope (earthen trench). Water drains away from storage to field or pasture.	At least 50 feet downslope from well (bunker, silos, glass lined feed storage, plastic tubes). At least 250 feet downslope (earthen trench). Water drains away from storage to field or pasture.	Within 100 feet upslope of well (bunker, silos, glass-lined feed storage, plastic tubes). Within 500 feet upslope (earthen trench). Water pools or stands near storage.	Within 50 feet of well (bunker, silos, glass-lined feed storage). Within 250 feet (earthen trench). Water pools on soil surface.	_____
9.3 Silage storage floor or surface condition	Properly designed upright silo with concrete or asphalt surface. No cracks	Concrete or asphalt surface has some cracks.	Compacted earthen floor.	Earthen floor on or near exposed ledge.	_____
9.4 Silage storage cover condition	Constructed tight fitting cover. No leaks.	Constructed tight fitting cover. Minor leaks repaired.	Plastic cover, but many large leaks not repaired.	No Cover.	_____

9.5 Leachate collection system	Designed system in place and maintained, and on soil of low permeability*. Greater than 3 feet to water table and bedrock.	Designed system in place and on low permeability* soil, but not maintained. Greater than 3 feet to water table and bedrock.	No system in place, soil of low permeability*, and greater than 3 feet to water table and bedrock.	No system in place, soil of high permeability*, and less than 3 feet to water table and bedrock.	_____

* Low permeability soils, like clay, allow water to flow through slowly. High permeability soils, like sand and gravel, allow much faster water movement.

Farmstead Improvement Action Plan

Here is where you will use the numbers under the "Your Rank" column of the worksheet. Everything that was marked with a 1 or 2 should have an action plan to come up with an alternative low risk practice. There is an example provided in the first row below.

Worksheet Section #	List High Risk and Med-High Risk practice(s)	Alternative Low Risk practice (Include potential sources of technical and financial assistance.)	Action Plan	
			Planned completion date	Indicate date when completed

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I understand that this farmstead assessment (Farm-A-Syst) and corresponding Farmstead Improvement Action Plan were developed on the basis that I have disclosed, to the best of my knowledge, all information pertaining to my farmstead operations.

Farmstead address:

Street ____

City ________________________ ME, Zip code _________

Watershed name: _________________________________

___ Aerial map with farmstead boundaries is attached

Producer's signature _______________________________________

Date ____/____/________

Farm-A-Syst conducted by:

Name ____

Title _____________________________ Date ____/____/_______

Acknowledgments
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