

1998

EC98-770 Farm*A*Syst Nebraska's System for Assessing Water Contamination Worksheet 5: Fertilizer Storage and Handling

Robert Grisso
University of Nebraska at Lincoln

DeLynn Hay
University of Nebraska at Lincoln, dhay@unlnotes.unl.edu


Paul J. Jasa
University of Nebraska at Lincoln, pjasa1@unl.edu

Richard K. Koelsch
University of Nebraska - Lincoln, rkoelsch1@unl.edu

Sharon Skipton
University of Nebraska-Lincoln, sskipton1@unl.edu

See next page for additional authors

Follow this and additional works at: <http://digitalcommons.unl.edu/extensionhist>

 Part of the [Agriculture Commons](#), and the [Curriculum and Instruction Commons](#)

Grisso, Robert; Hay, DeLynn; Jasa, Paul J.; Koelsch, Richard K.; Skipton, Sharon; and Woldt, Wayne, "EC98-770 Farm*A*Syst Nebraska's System for Assessing Water Contamination Worksheet 5: Fertilizer Storage and Handling" (1998). *Historical Materials from University of Nebraska-Lincoln Extension*. 1468.
<http://digitalcommons.unl.edu/extensionhist/1468>

This Article is brought to you for free and open access by the Extension at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Historical Materials from University of Nebraska-Lincoln Extension by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Authors

Robert Grisso, DeLynn Hay, Paul J. Jasa, Richard K. Koelsch, Sharon Skipton, and Wayne Woldt

Farm A Syst

WORKSHEET 5

Nebraska's Farm Assessment System for Assessing the Risk of Water Contamination

Fertilizer Storage and Handling

Why should I be concerned?

Fertilizers play a vital role in agriculture. Over the years, fertilizers have increased farm production dramatically. Commercial fertilizer is, however, a major source of nitrate. Nitrate-nitrogen (NO_3) levels exceeding the public health standard of 10 milligrams per liter (mg/l; equivalent to parts per million for water measure) have been found in many drinking water wells. The other major components of commercial fertilizer, phosphorus and potassium, are not generally a groundwater contamination concern but can be damaging to wildlife when found in surface waters.

Nitrate levels in drinking water above federal and state drinking water standards of 10 mg/l nitrate-nitrogen can pose a risk to infants. Infants under six months of age are particularly susceptible to health problems from high nitrate-nitrogen levels, including the condition

known as methemoglobinemia (blue baby syndrome). Nitrate can also affect adults, but the evidence is much less certain.

Young livestock are also particularly susceptible to health problems from high nitrate-nitrogen levels. While livestock may be able to tolerate several times the 10 mg/l nitrate-nitrogen level, levels of 20-40 mg/l may prove harmful, especially in combination with high levels (1,000 ppm) of nitrate-nitrogen from feed sources.

Handling fertilizers on the farm can affect groundwater by allowing materials containing nitrogen to seep through the ground after a leak or spill. Other potential farm sources of nitrate are septic systems, livestock yards, livestock waste storage facilities, and silage storage. Information concerning these sources can be found in other Farm*A*Syst fact sheets noted in the Farm*A*Syst introduction.

Your drinking water is least likely to be contaminated if you follow appropriate management procedures or dispose of wastes

off the farm site. However, proper offsite disposal practices are essential to avoid risking contamination that could affect the water supplies and health of others.

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

How will this worksheet help me protect my drinking water?

- It will take you step-by-step through your fertilizer handling, storage, and disposal practices.
- It will evaluate your activities according to how they might affect the groundwater that provides your drinking water supplies.
- It will provide you with easy-to-understand "risk level scores" that will help you analyze the relative safety of your fertilizer handling, storage, and disposal practices.





<ul style="list-style-type: none"> • 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. 	<p>How do I complete the worksheet?</p> <p>Follow the directions at the top of the chart on the next page. It should take you 15 to 30</p>	<p>minutes to complete this worksheet and determine your risk level.</p> <p>Information derived from Farm*A*Syst worksheets is intended only to provide general information and recommendations to farmers regarding their own farm practices. It is not the intent of this educational program to keep records of individual results.</p>
---	---	--

<p>These terms may help you make more accurate assessments when completing <i>Worksheet 5</i>. They may also help clarify some of the terms used in <i>Fact Sheet 5</i>.</p> <p>Air gap: An air space (open space) between the hose or faucet and water level, representing one way to prevent backflow of liquids into a well or water supply.</p> <p>Anti-backflow (anti-backsiphoning) device: A check valve or other mechanical device to prevent the unwanted reverse flow of liquids back through a water supply pipe into a well.</p> <p>Backflow: The unwanted reverse flow of liquids in a piping system or well.</p>	<h2 style="text-align: center;">Glossary</h2> <p>Backflow prevention device: (See anti-backflow device.)</p> <p>Backsiphonage: Backflow caused by formation of a vacuum in a water supply pipe or hose.</p> <p>Closed handling system: A system for transferring pesticides or fertilizers directly from storage container to applicator equipment (through a hose, for example), so that humans and the environment are not inadvertently exposed to the chemicals.</p> <p>Cross-connection: A link or channel between pipes, wells, fixtures, or tanks carrying contaminated water and those carrying potable (safe for drinking) water. Contaminated water, if at higher pressure, can enter the potable water system.</p> <p>Fertilizer: Solid, liquid, or gaseous material containing one or more nutrients essential to plant growth in a form that is or will be available for use by plants.</p>	<p>Milligrams per liter (mg/l): The metric weight of a substance measured in milligrams contained in one liter. It is equivalent to 1 part per million in water measure.</p> <p>Parts per million (ppm): A measurement of concentration of one unit of material dispersed in one million units of another material.</p> <p>Rinsate: Rinse water from pesticide or fertilizer tank and hose cleaning.</p> <p>Secondary containment: Impermeable floor and walls around a chemical storage area to prevent chemicals from seeping into the ground from a spill or leak.</p>
---	---	---

Fertilizer Storage and Handling: Assessing the Risk of Surface Water and Groundwater Contamination

1. Use a pencil. You may want to make \changes.
2. For each category listed on the left that is appropriate to your farm, read across to the right and circle or mark the statement that best describes practices or conditions on your farm. (Skip and leave blank any categories that don't apply to your farm.)
3. Then look above the description you circled to find your "risk number" (1, 2, 3, or 4) and enter that number in the blank under "YOUR RISK."
4. Allow about 15-30 minutes to complete the worksheet and figure out your risk for fertilizer storage and handling practices.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
FERTILIZER STORAGE* DRY FORMULATION					
Dry formulation					
Amount stored	More than 20 tons.	Between 1 and 20 tons.	Less than 1 ton.	None stored at any time.	
Type of storage	No cover. Sandy soils. Spills not collected.	Partial cover. Loam soils. Spills not collected.	Covered. Clay soil. Spills not collected.	Covered on impermeable surface (such as concrete or asphalt). Spills are collected.	
FERTILIZER STORAGE* LIQUID FORMULATION					
Liquid formulation					
Amount stored	More than 2,000 gallons.	Between 55 and 2,000 gallons.	Less than 55 gallons.	None stored at any time.	
Type of storage	Close proximity to groundwater (high water table). Permeable soils (sand). No secondary containment. Spills contaminate soil.	Somewhat permeable soils (loam). No secondary containment. Most of spill cannot be recovered.	<i>Clay-lined secondary containment.</i> Most of spill can be recovered.	Concrete or other impermeable secondary containment does not allow spill to contaminate soils.	
Containers	Containers that allow fertilizers to leak. No labels.	Old containers in good repair. Metal containers showing signs of rusting.	Original containers are old. Labels partially missing or hard to read.	Original containers clearly labeled. No holes, tears, or weak seams. Lids fit tight.	
Length of storage	Carry-over from last year.	Used in growing season.	Less than two weeks.	No storage	
Security	Open access to theft, vandalism, and children.	Open to work activities that could damage containers or spill fertilizer.	Fenced area separate from most other activities.	Fenced or locked area separate from all other activities, or locks on valves.	

Italic Boldface Type: Although these practices can be used for fertilizers in Nebraska, they are illegal for pesticides.

*The same area cannot be used for secondary containment for both pesticides and fertilizer handling.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
MIXING AND LOADING PRACTICES*					
Location of well in relation to mixing/loading area with no curbed and impermeable containment area	Within 10 feet downslope or 100 feet upslope from well.**	10 to 50 feet down-slope,** or 100 to 500 feet upslope.	50 to 100 feet downslope from well.**	100 or more feet downslope from well.	
ADDITIONAL MIXING AND LOADING PRACTICES FOR LIQUID FERTILIZER*					
Mixing and loading pad (spill containment)	No mixing/loading pad. Permeable soil (sand). Spills soak into ground.	Concrete pad with some cracks keeps some spills contained. No curb or sump.	Concrete pad with curb keeps spills contained. No sump.	Concrete pad with curb keeps spills contained. Sump allows collection and transfer to storage or done in field.	
Water source	Directly obtained from well.	Hydrant near well.	Hydrant away from well.	Separate water tank.	
Backflow prevention on water supply	No anti-backflow device. Hose in tank below water line.	No anti-backflow device. Hose in tank above waterline.	Anti-backflow device installed. Hose in tank above waterline.	Anti-backflow device installed or 6-inch air gap maintained above sprayer tank or done in field.	
Filling and mixing supervision	Seldom or never	Occasional	Frequent	Constant	
Mixing system	All liquids hand poured. Sprayer fill port hard to reach.	All liquids hand poured. Sprayer fill port easy to reach.	Closed system for most liquids. Some liquids hand poured. Sprayer fill port easy to reach.	Closed system for all liquid product transfers or done in field.	
CLEANUP AND DISPOSAL PRACTICES					
Sprayer cleaning and rinsate (rinse water) disposal	Sprayer washed out at farm. Rinsate dumped at farm or in nearby field.	Sprayer washed out at farm. Rinsate sprayed on an area less than 100 feet from well.	Sprayer washed out on pad at farm. Rinsate used in next load and applied to labeled crop.	Sprayer washed out in field. Rinsate used in next load and applied to labeled crop.	

Italic Boldface Type: Although these practices can be used for fertilizers in Nebraska, they are illegal for pesticides.

*The same area cannot be used for secondary containment for both pesticides and fertilizer handling.

**Illegal for new well construction. Existing wells must meet requirements in effect at time of construction.

Your groundwater vulnerability score from *Worksheet 2* was _____

Note: If the surface texture, subsurface texture, or depth to groundwater used to calculate this score are not characteristic of the site conditions present for the activities/practices discussed in this worksheet, calculate a new vulnerability score for this site.

If your groundwater vulnerability score is:

- 1 to 1.4: your site has a **LOW VULNERABILITY** to pollution reaching groundwater.
- 1.5 to 2.4: your site has a **MODERATE-LOW VULNERABILITY** to pollution reaching groundwater.
- 2.5 to 3.4: your site has a **HIGH-MODERATE VULNERABILITY** to pollution reaching groundwater.
- 3.5 to 4.0: your site has a **HIGH VULNERABILITY** to pollution reaching groundwater.

Your surface water vulnerability score from *Worksheet 2* was _____

Note: If the surface texture, slope toward surface water, or distance from surface water used to calculate this score are not characteristic of the site conditions present for the activities/practices discussed in this worksheet, calculate a new vulnerability score for this site.

If your surface water vulnerability score is:

- 1 to 1.4: your site has a **LOW VULNERABILITY** to pollution reaching surface water.
- 1.5 to 2.4: your site has a **MODERATE-LOW VULNERABILITY** to pollution reaching surface water.
- 2.5 to 3.4: your site has a **HIGH-MODERATE VULNERABILITY** to pollution reaching surface water.
- 3.5 to 4.0: your site has a **HIGH VULNERABILITY** to pollution reaching surface water.

Look over your worksheet scores for individual activities:

- **Low risk** practices (1's): are ideal and should be your goal regardless of your site's vulnerability to pollution reaching ground or surface water. Cost and other factors may make it difficult to achieve a low risk rating for all activities.
- **Moderate-low risk** practices (2's): provide reasonable water quality protection unless your site's vulnerability to pollution reaching ground or surface water is moderate-high or high.
- **High-moderate risk** practices (3's): do not provide adequate protection in many circumstances, especially if your site's vulnerability to pollution reaching ground or surface water is high or high-moderate. They may provide reasonable water quality protection if your site's vulnerability to pollution reaching ground or surface water is low to moderate-low.
- **High risk** practices (4's): pose a serious danger of polluting water, especially if your site's vulnerability to pollution reaching ground or surface water is high, high-moderate, or moderate-low. Some high risk activities may not immediately threaten water quality if your site's vulnerability to pollution reaching ground or surface water is low, but still pose a threat over time if not corrected.

Read ***Fact Sheet 5 Improving Fertilizer Storage and Handling*** and consider how you might modify your farm practices to better protect your drinking water supply and other ground and surface water supplies. Some concerns you can take care of right away; others could be major or costly projects requiring planning and prioritizing before you take action.

<p>Partial funding for materials, adaptation, and development was provided by the U.S. EPA, Region VII (Pollution Prevention Incentives for States and Nonpoint Source Programs) and USDA (Central Blue Valley Water Quality HUA). This project was coordinated at the Department of Biological Systems Engineering, Cooperative Extension Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.</p> <p>Nebraska Farm*A*Syst team members included: Robert Grisso, Extension Engineer, Ag Machinery; DeLynn Hay, Extension Specialist, Water Resources and Irrigation;</p>	<p>Paul Jasa, Extension Engineer; Richard Koelsch, Livestock Bio-environmental Engineer; Sharon Skipton, Extension Educator; and Wayne Woldt, Extension Bioenvironmental Engineer.</p> <p>This unit was modified by Robert Grisso.</p> <p>Editorial assistance was provided by Bob Midland, Nick Partsch and Sharon Skipton.</p> <p>Technical reviews provided by: Larry Schulze, UNL Extension Pesticide Coordinator; Gary Buttermore, Nebraska Department of Environmental Quality; Bob Klein, University of Nebraska Extension Cropping Systems Specialist; Gary Zoubek, University of Nebraska Extension</p>	<p>Educator; Gerald R. Bodman, Biological Systems Engineering; Rob Thompson, Pickrell Cooperative, Pickrell, NE Dave Clabaugh, Lower Big Blue Natural Resources District.</p> <p>The views expressed in this publication are those of the author and do not necessarily reflect the views of either the technical reviewers or the agencies they represent.</p> <p>Adapted for Nebraska from material prepared for the Wisconsin and Minnesota Farm*A*Syst programs, written by David Kammel, University of Wisconsin.</p> <p><i>Printed on recycled paper.</i></p>
--	--	---

NOTES