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## EC98-772 Farm\*A\*Syst Nebraska's System for Assessing Water Contamination Worksheet 8: Household Wastewater Treatment

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# Farm A Syst

WORKSHEET 8

## Nebraska's System for Assessing the Water Contamination Risk

### Household Wastewater Treatment

#### Why should I be concerned?

Virtually all farms and rural housing use a septic system or similar on-site wastewater treatment system. While these systems are generally economical and safe, household wastewater can contain contaminants that degrade water quality for uses such as drinking, pet and stock watering, food preparation, and cleaning.

Potential contaminants in household wastewater include disease-causing bacteria, infectious viruses, household chemicals, and excess nutrients, such as nitrate. Viruses can infect the liver, causing hepatitis. They can also infect the lining of the intestine, causing gastroenteritis (vomiting and diarrhea). If coliform organisms (a group of indicator bacteria) are found in your well water, they show that the water is potentially dangerous for drinking and food preparation. Your septic system is one potential source, along with livestock yards and others.

The quantity of wastewater can also present an environmental concern. Too much water entering the home treatment sys-

tem reduces the efficiency of the system and can shorten its life.

Your drinking water is least likely to be contaminated if you follow appropriate management procedures or dispose of wastewater in an appropriate location that is off the site. Proper off-site disposal practices are essential to avoid risking contamination that could affect the water supplies and health of others. If your system is connected to a home-based business (e.g., beautician, furniture refinishing, musical instrument cleaning, photo processing, taxidermy, etc.) or commercial enterprise, special restrictions and management methods may apply. Look in the contact and references section of this publication for agencies or organizations to contact if you are uncertain about your status.

**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 household

wastewater treatment practices.

- It will help you evaluate your activities according to how they might affect the groundwater that provides your drinking water.
- It will provide you with easy-to-understand "risk level scores" that will help you analyze the relative safety of your household wastewater treatment system and 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.

#### How do I complete the worksheet?

Follow the directions at the top of the chart on page 3. It should take you 15 to 30 minutes to complete this worksheet and determine your risk level.

Information derived from Farm\*A\*Syst worksheets is intended only to provide general information and recommendations to individuals regarding their own practices. It is not the intent of the educational program to keep records of individual results.



# Glossary

*These terms may help you make more accurate assessments when completing Worksheet 8. They may also help clarify some of the terms used in Fact Sheet 8.*

**Beneficial reuse site:** A site for land application of wastewater or septage that meets federal and state standards and does not represent a threat to human health, water resources, and the environment.

**Cesspool:** Covered excavation in the ground that receives sewage directly from a building's wastewater plumbing system. It is designed to retain the organic matter and solids and permit liquid to seep into soil cavities. Cesspools are prohibited in Nebraska because of the threat to human health and the environment.

**Clear water infiltration:** Entry of water that does not need treatment into a wastewater system. Examples are rain or tile drainage entering through unsealed joints, access ports, and cracks.

**Design capacity:** Maximum volume of liquid that can be treated in a particular wastewater treatment system. For systems that include a drainfield, capacity is also based on the soil's ability to accept and treat sewage effluent. In filling out the worksheet, if you don't know the design capacity of your system, use 150 gallons per bedroom per day as an estimate.

**Effluent:** Liquid discharged from a septic tank or other treatment tank.

**Holding tank:** An approved watertight receptacle for the collection and holding of sewage.

**Hydraulic loading rate:** The volume of wastewater discharged per unit area of soil treatment system per unit time.

**Off-site disposal:** Disposal of wastewater or septage off the homesite, for example, at a municipal treatment plant or beneficial reuse site.

**Scum:** Floatable solids, such as grease and fat.

**Seepage pit (dry well, leaching pit):** Underground receptacle constructed to dispose of septic tank effluent, treated wastes, or clear wastes by soil absorption through its bottom and walls. Seepage pits (dry wells, leaching pits) are prohibited in Nebraska because of the threat to human health and the environment.

**Septage:** Solids and liquids removed from a septic tank, holding tank, or portable toilet.

**Sludge:** Settleable, partially decomposed solids resulting from biological, chemical, or physical wastewater treatment.

**WHPA: Wellhead Protection Area.** A defined area surrounding a water supply well and which is designated for the purpose of protecting the water quality of that well.

# Household Wastewater Treatment: 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 site, read across to the right and circle the statement that best describes conditions on your site. (Skip and leave blank any categories that don't apply to your site.)
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 household wastewater treatment practices.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
<b>Wastewater Treatment</b> (evaluate only the system/s you use)					
<b>Cesspool</b>					
Cesspool	<i>Any cesspool or direct discharge of water.</i>	_____	_____	_____	
<b>Holding Tank</b>					
Horizontal distance from tank to private drinking water well	<i>Less than 50 feet from well.</i>	50 to 100 feet from well. Groundwater flows from tank toward well.	50 to 100 feet from well. Groundwater flows from tank away from well.	More than 100 feet from well.	
Tank leakage or overflow losses	<i>Frequent leakage or overflow losses occur. No tank overflow alarm.</i>	<i>Occasional overflow or leakage occurs.</i> Tank overflow alarm is not tested.	_____	Excess capacity for pumping interval. Tank checked. No overflow occurs. No leakage occurs. Tank overflow alarm tested and works.	
Land application of holding tank septage	Agricultural fields, or <i>surface drainage system; OR outlet pipe or holes in holding tank.</i>	Frequent spreading. <i>No stabilization, injection, or incorporation.</i> Beneficial reuse site.	Sufficient storage to accommodate best application time. Stabilized, injected, or incorporated. Beneficial reuse site.	Proper off-site disposal following all federal, state and local regulations and with concern for beneficial reuse.	
Horizontal distance of land application site from private drinking water well	Surface disposal in a WHPA or less than 200 feet from a well.	_____	Surface disposal 200 feet or more from a well and not in a WHPA.	Proper off-site disposal following all federal, state and local regulations and with concern for beneficial reuse.	

**Bold Italic type:** Besides representing a higher risk, this design, practice or installation also violates Nebraska law.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
<b>Holding Tank (continued)</b>					
Land application rate of holding tank septage	Application rate more than the appropriate agronomic rate for the given soil type and crop production.	Vegetation harvested. Nitrogen application exceeds plant uptake and harvesting.	Vegetation harvested. Nitrogen application does not exceed plant uptake and harvesting.	Proper off-site disposal following all federal, state and local regulations and with concern for beneficial reuse.	
<b>Septic System or Packaged Aerobic System</b>					
Water usage quantity	Excessive water use (greater than 120 gallons per person per day). Leaking fixtures. No water-conserving fixtures. Whole-house use frequently exceeds design capacity.* No water meter.	High water use (60 - 120 gallons per person per day). Poor maintenance of fixtures. Water softener recharges more than twice a week. Whole-house use occasionally exceeds design capacity.*	Moderate water use (20-60 gallons per person per day). Fair maintenance of fixtures. Some water-conserving fixtures. Water softener recharges twice a week or less. Whole-house use is near design capacity.*	Conservative water use (less than 20 gallons per person per day). Good maintenance of water-conserving fixtures. Whole-house use is less than design capacity.*	
Water usage pattern	High volume of water often used in a short period of time (such as 5 or more laundry loads done in one day every week)	High volume of water sometimes used in a short period of time. (such as 5 or more laundry loads done in one day occasionally)	Moderate volume of water often used in a short period of time. (such as 3 to 5 laundry loads done in one day every week)	Volume of water used is spread out evenly over time, with a low volume of water used at any given time. (such as 1 laundry load done per day over a period of time)	
Settleable solids in wastewater	Daily use of garbage disposal unit.	Moderate use of garbage disposal unit (3 - 5 times per week).	Minimal use of garbage disposal unit (1 - 2 times per week).	No use of garbage disposal unit in kitchen sink.	
Dissolved solids in wastewater	High to moderate use of household chemicals (gallons to quarts per week). Moderate disposal of household solvents and toxic cleaning agents such as toilet bowl cleaners.	Moderate to careful use of household chemicals (pints per week). Minimal disposal of household solvents and toxic cleaning agents. Water softener used.	Careful use of household chemicals (cups per week). Minimal disposal of household solvents and toxic cleaning agents. Water softener used.	Minimal use of household chemicals (less than a cup per week). No disposal of solvents and toxic cleaning agents. No water softener used.	

\*If design capacity of your treatment system is unknown, estimate 150 gallons per bedroom per day.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
<b>Septic System or Packaged Aerobic System (continued)</b>					
Floatable solids in wastewater	Extensive disposal of grease or oils. <b><i>Shop drain attached to the system.</i></b>	Moderate disposal of grease or oils. No attempt to reduce disposal of grease and oil from household, but little generated.	Minimal disposal of grease or oils. Oil and grease wiped from cooking utensils before washing.	No disposal of grease or oils into system.	
Collection of wastewater	Clear water infiltration, introduction of water from sources such as rainwater. Leakage loss of wastewater that should be treated. <b><i>Collection system (pipe) less than 50 feet from well.</i></b>	Some wastewater diverted, or some leakage of water that should be treated, and clean water infiltration.	All wastewater collected for treatment. Some clear water collected. No leakage loss of water that should be treated.	All wastewater collected for treatment. No clear water collected. No leakage loss of water that should be treated. No settling of soil near tank or collection system. Collection system (pipe) more than 50 feet from well.	
Tank leakage losses	Some tank leakage losses occur.	_____	_____	No tank leakage occurs.	
Horizontal distance from tank to private drinking water well	<b><i>Less than 50 feet from well.</i></b>	_____	50 feet or more from well. Groundwater flows from tank toward well.	50 feet or more from well. Groundwater flows from tank away from well.	
Vertical distance from tank to groundwater or bedrock	Less than 4 feet from groundwater or bedrock.	_____	_____	4 feet or more from groundwater or bedrock.	
Horizontal distance from tank to surface water	<b><i>Less than 50 feet from surface water.</i></b>	_____	_____	50 feet or more from surface water.	
Tank design capacity	Frequent system failure. Load exceeds design capacity.	Occasional failures.	No failures. Loaded near design capacity.	Maintenance program followed. No failures. Loaded at less than design capacity.	

**Bold Italic type:** Besides representing a higher risk, this design, practice or installation also violates Nebraska law.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
<b>Septic System or Packaged Aerobic System (continued)</b>					
Subsurface application	<b><i>Field or silo tile drainage system OR pipe to surface.</i></b>	<b><i>Seepage pit.</i></b>	_____	Pressure or gravity-fed distribution to trench system.	
Horizontal separation of drainfield from private drinking water supply	<b><i>Drainfield less than 100 feet from well</i></b> and upslope from well.	<b><i>Drainfield less than 100 feet from well</i></b> and downslope from well.	Drainfield 100 feet or more from well and upslope from well.	Drainfield 100 feet or more from well and downslope from well.	
Vertical separation of drainfield from groundwater	<b><i>Less than 4 feet to groundwater or bedrock.</i></b>	4 feet or more to groundwater or bedrock. Sandy soil.	_____	4 feet or more to groundwater or bedrock. Loam soil.	
Horizontal distance of drainfield to surface water	<b><i>Less than 50 feet</i></b> and upslope from surface water.	<b><i>Less than 50 feet</i></b> and downslope from surface water.	50 feet or more and upslope from surface water.	50 feet or more and downslope from surface water.	
Application rate of septic tank effluent to drainfield	Above design capacity. Soil is sometimes wet or spongy in the drainfield area.	_____	At design capacity. Soil over the drainfield is firm and dry.	Below design capacity. Soil over the drainfield is firm and dry.	
Drainfield soils	Very coarse sands or gravel.	Medium- to coarse-textured soils (sandy loam, sands)	_____	Medium- or fine-textured soils (silt loam, loam, clay loams, clays).	
Use of drainfield area	Vehicles, livestock, heavy objects, or other disturbances occur in the drainfield area.	_____	_____	Vehicles and other heavy objects or activities are kept from the drainfield area.	
Tank pumping intervals	Tank seldom pumped out (greater than 7-year interval).	Tank pumped at 4 - 6 year intervals.	Tank pumped at 3 - 4 year intervals.	Tank pumped at least every 3 years and maintained. Baffles and tank checked.	

**Bold Italic type:** Besides representing a higher risk, this design, practice or installation also violates Nebraska law.



	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
<b>Septic System or Packaged Aerobic System (continued)</b>					
Land application of septic tank septage	Use of septic tank septage above beneficial rates for the given site. <b><i>Bulk application without stabilization, injection, or incorporation.</i></b>	<b><i>Spread with no stabilization, injection or incorporation.</i></b> Beneficial reuse site.	Spread and stabilized, injected, or incorporated. Beneficial reuse site.	Proper off-site disposal following all federal, state and local regulations and with concern for beneficial reuse.	
Horizontal distance of septic tank septage land application site from private drinking water well	Application to land within a WHPA or upslope and less than 200 feet from a private well.	Application to land downslope and less than 200 feet from a private well.	Application to land downslope and more than 200 feet from a private well.	Proper off-site disposal following all federal, state and local regulations and with concern for beneficial reuse.	
Vertical separation of septic tank septage land application site from water supply	Less than 4 feet to saturated soil or bedrock.	More than 4 feet to saturated soil or bedrock.	_____	Proper off-site disposal following all regulations and with concern for beneficial reuse.	
Septic tank septage land application site soils	Very coarse sands or gravel.	Medium- to coarse-textured soils (sandy loam, sands)	Medium- or fine-textured soils (silt loam, loam, clay loams, clays).	Proper off-site disposal following all regulations and with concern for beneficial reuse.	
Land application rate of septic tank septage	Application rate more than the appropriate agronomic rate for the given soil type and crop production. No vegetation harvested.	Vegetation harvested. Nitrogen application exceeds plant uptake and harvesting.	Vegetation harvested. Nitrogen application does not exceed plant uptake and harvesting.	Proper off-site disposal following all federal, state and local regulations and with concern for beneficial reuse.	

**Bold Italic type:** Besides representing a higher risk, this design, practice or installation also violates Nebraska law.

	HIGH RISK (risk 4)	HIGH-MODERATE RISK (risk 3)	MODERATE-LOW RISK (risk 2)	LOW RISK (risk 1)	YOUR RISK
<b>Lagoon</b>					
Horizontal distance from lagoon to private drinking water well	<b><i>Less than 100 feet.</i></b> Groundwater or surface water flows toward well.	<b><i>Less than 100 feet.</i></b> Groundwater or surface water flows away from well.	100 feet or more. Groundwater or surface water flows toward well.	100 feet or more. Groundwater or surface water flows away from well.	
Vertical distance from lagoon to groundwater	<b><i>Less than 2 feet above the highest expected groundwater level.</i></b>	2 - 25 feet above highest expected groundwater level.	25 - 50 feet above highest expected groundwater level.	50 feet or more above highest expected groundwater level.	
Horizontal distance from lagoon to surface water	<b><i>Less than 50 feet from surface water.</i></b>	_____	_____	50 feet or more from surface water.	
Lagoon leakage or overflow losses**	<b><i>Frequent leakage or overflow losses occur.</i></b>	<b><i>Occasional overflow or leakage occurs.</i></b>	No overflow occurs. No more than 1/8 inch per day of leakage occurs.	Overflow is prevented by proper off-site disposal following all federal, state and local regulations and with concern for beneficial reuse.	
Mixing action and addition of oxygen to system	<b><i>Wind obstructed. Trees, weeds, or brush higher than the top of the dike within 50 feet of the dike.</i></b>	_____	_____	Unobstructed wind permitted. No trees, weeds, or brush higher than the top of the dike within 50 feet of the dike.	
Minimum operating depth of lagoon	<b><i>A minimum depth of 2 feet is often not maintained.</i></b>	<b><i>A minimum depth of 2 feet is sometimes not maintained.</i></b>	_____	A minimum depth of 2 feet is maintained. Additional water is pumped into lagoon to offset evaporation during hot weather.	
Maximum operating depth of lagoon	<b><i>A maximum depth of 5 feet is often exceeded. The liquid level often comes within 1 foot of the top of the dike.</i></b>	<b><i>A maximum depth of 5 feet is sometimes exceeded. The liquid level sometimes comes within 1 foot of the top of the dike.</i></b>	_____	A maximum depth of 5 feet is maintained. The liquid level does not come within 1 foot of the top of the dike.	
Preventing soil erosion into lagoon	<b><i>Areas above the planned waterline are not seeded or sodded with short grasses. No vegetative stand exists.</i></b>	Areas above the planned waterline are seeded or sodded with short grasses. A thin, spotty vegetative stand exists.	_____	All areas above the planned waterline are seeded or sodded with short grasses. A thick vegetative stand exists.	

**Bold Italic type:** Besides representing a higher risk, this design, practice or installation also violates Nebraska law.

\*\*The maximum allowable seepage rate is 1/8 inch per day after sealing and compaction.

**Your groundwater vulnerability score from *Worksheet 2* was \_\_\_\_\_**

Note: If the surface texture, subsurface texture, or depth to groundwater used to calculate this score is 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 is 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 8 Improving Household Wastewater Treatment*** and consider how you might modify your 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.

## Summary Evaluation for Household Wastewater Treatment Worksheet

Summarize your potential high risk activities in the following table and consider the response options you can take to reduce the potential for water quality contamination.

[illegible]

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## NOTES