This file is for historical purposes only and may not reflect current practices. For current recommendations, contact K-State Research and Extension.

K-STATE Kansas State University

**FARM•A•SYST**
*Farmstead Assessment System*

## Worksheet 6

### *Assessing the Risk of Groundwater Contamination from*
# Household Wastewater Treatment

## Why should I be concerned?

Virtually all farms use a septic system or similar onsite wastewater treatment system. While these systems are generally economical and safe, household wastewater can contain contaminants that degrade water quality for domestic and livestock uses.

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. Some organisms can also infect the lining of the intestine, causing gastroenteritis (vomiting and diarrhea). Coliform bacteria found in your well water indicate that the water is potentially dangerous for drinking and food preparation. Your wastewater treatment system is one potential source, along with livestock facilities and poor well construction.

The quantity of wastewater can also present an environmental concern. Too much water entering the home treatment system 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 and dispose of wastewater at least 400 feet downslope of your water source. Even with large separation distances, proper 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 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 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 household wastewater treatment 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 the next page. It should take you about 15–30 minutes to complete this worksheet and figure out your ranking.

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

This file is for historical purposes only and may not reflect current practices. For current recommendations, contact K-State Research and Extension.

# Glossary

## *Household Wastewater Treatment*

*These terms may help you make more accurate assessments when completing Worksheet 6. They may also help clarify some of the terms used in Fact Sheet 6.*

**Aerobic tank:** An aerated tank which produces a high-quality effluent similar to that of a municipal treatment system.

**Approved disposal site:** A site for land application of wastewater or septage that meets local requirements and is approved by the local health department.

**Cesspool:** Covered excavation in the ground that receives sewage directly from a building's sewer system. It is designed to retain the organic matter and solids, and permit liquid to seep into soil cavities. **Cesspools are prohibited in Kansas** and are a high risk for groundwater contamination.

**Clear water infiltration:** Entry of water that does not need treatment—such as rainfall or tile drainage through direct plumbing, unsealed joints, access ports and cracks—into a wastewater treatment system.

**Design capacity:** Maximum volume of liquid a particular wastewater treatment system is designed to handle. For systems that include subsurface wastewater disposal, capacity is affected by system maintenance and 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 process.

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

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

**Off-site disposal:** Disposal of wastewater or septage over 1,200 feet from the farmstead or off the farm, such as at a municipal treatment plant or approved disposal site.

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

**Seepage pit (dry well):** Underground receptacle constructed to permit disposal of septic tank effluent, treated wastes or clear wastes by soil absorption through its bottom and walls. This is the least desirable soil treatment system.

**Septage**: Settled, partially decomposed solids resulting from wastewater treatment in a septic tank.

**Soil absorption:** Use of soil contact in treating effluent to minimize its contamination potential. Can be done through use of a conventional lateral field (trenches); shallow-in-ground, at-grade or mound absorption field; or by using a seepage pit (see above).

**Wastewater lagoon:** A shallow pond of uniform depth used for treatment of domestic sewage.

## Worksheet 6

# *Household Wastewater Treatment: Assessing Drinking Water Contamination Risk*

1. Use a pencil. You may want to make changes.
2. 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.)
3. 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."
4. Directions on overall scoring appear at the end of the worksheet.
5. Allow about 15–30 minutes to complete the worksheet and figure out your risk rank for household wastewater treatment practices.

| | LOW RISK (rank 4) | LOW-MOD RISK (rank 3) | MOD-HIGH RISK (rank 2) | HIGH RISK (rank 1) | YOUR RANK |
|---|---|---|---|---|---|
| **QUANTITY** | | | | | |
| **1. Water use** | Have water-saving fixtures, good maintenance of fixture leaks, and follow most water conservation recommendations. | Have some water-saving fixtures, fair maintenance of fixture leaks, and follow some water conservation recommendations. | No water-saving fixtures, poor maintenance of fixture leaks, but follow some water conservation recommendations. | No water-saving fixtures, poor maintenance of fixture leaks, and don't follow any water conservation recommendations. | ____ |
| **2. Collection of wastewater** | Watertight collection system for all wastewater needing treatment. Little or no clear water infiltration. No settling of soil near tank or collection system. Collection system pipe more than 50 feet from well. | Watertight collection system for all wastewater needing treatment. No leakage loss of water needing treatment. Some clear water infiltration or settling near tank. Collection pipe more than 50 feet from well. | Some leakage of water that should be treated. Some clear water infiltration or settling near tank. Collection pipe more than 50 feet from well. | Leakage loss of water that should be treated. Settling near tank or collection system. Clear water infiltration. ***Collection system pipe less than 50 feet from well.**** | ____ |

***Boldface type:*** Besides representing a higher-risk choice, this practice also violates Kansas law.
*Illegal for new well installation. Existing wells must meet separation requirements in effect at time of construction.

This file is for historical purposes only and may not reflect current practices. For current recommendations, contact K-State Research and Extension.

| | LOW RISK (rank 4) | LOW-MOD RISK (rank 3) | MOD-HIGH RISK (rank 2) | HIGH RISK (rank 1) | YOUR RANK |
|---|---|---|---|---|---|
| **QUALITY** | | | | | |
| **3. Settleable solids** | No use of garbage disposal unit in kitchen sink. No disposal of bulky items (disposable diapers, sanitary napkins) in toilet. | Minimal use of garbage disposal unit (less than 3 times per week) and no disposal of bulky items in system. | Moderate use of garbage disposal unit (3–7 times per week) and little disposal of bulky items in system. | Frequent use of garbage disposal unit (more than once per day) or disposal of bulky items in system. | _____ |
| **4. Dissolved solids (chemicals)** | Minimal disposal of diluted household chemicals (few cups per week). No water softener, or not recharged on site. | Careful disposal of diluted household chemicals (few pints per week). Water softener used, recharged on site. | Moderate disposal of diluted household chemicals (few quarts per week). | Extensive disposal of diluted household chemicals (gallons per week). Any disposal of concentrated/undiluted household chemicals. | _____ |
| **5. Floatable solids** | No disposal of grease or oils into sewer. Oil and grease wiped from cooking utensils before washing. | Occasional disposal of grease or oils. Some attempt made to reduce disposal of grease and oil from household, with little generated. | Routine disposal of grease or oils. No attempt to reduce disposal of grease and oil from household, but little generated. | Extensive disposal of grease or oils in household sewer. | _____ |
| **TREATMENT AND DISPOSAL** | | | | | |
| **6. Horizontal separation of wastewater disposal site from water supply** | Disposal in municipal treatment facility. On-farm disposal more than 400 feet downslope from well. | Disposal 200–400 feet downslope from well. | Disposal 50–200 feet downslope from well. | Disposal upslope from well, or downslope ***less than 50 feet from well.**** | _____ |

***Boldface type:*** Besides representing a higher-risk choice, this practice also violates Kansas law.
*Local ordinances may require greater than 50 feet of separation distance.

This file is for historical purposes only and may not reflect current practices. For current recommendations, contact K-State Research and Extension.

| | LOW RISK (rank 4) | LOW-MOD RISK (rank 3) | MOD-HIGH RISK (rank 2) | HIGH RISK (rank 1) | YOUR RANK |
|---|---|---|---|---|---|
| **TREATMENT AND DISPOSAL** | | | | | |
| *Select the wastewater treatment and disposal components that apply to your site (continued on page 6).* | | | | | |
| **7. Septic tank** ***(A disposal component, such as soil absorption, should also be used as part of your system.)*** | Multiple compartment tank or tanks in series. No leakage. Inspected every 1–2 years and pumped as needed. Baffles in place. Good maintenance. | Single compartment tank. No leakage. Checked at least every 3–5 years and pumped as needed. Baffles in place. Good maintenance. | Single compartment tank. No known leakage. Delayed maintenance schedule or tank in poor repair. | Leakage losses. Tank not pumped and maintenance not performed until problems develop. | _____ |
| **8. Wastewater lagoon** | Well maintained lagoon* loaded at less than design capacity.** | Well maintained lagoon* loaded at or near design capacity.** | Well maintained lagoon.* Load may exceed design capacity.** | Poorly maintained lagoon.* Excessive leakage or ***frequent overflows.*** Load exceeds design capacity.** | _____ |
| **9. Soil absorption (lateral, mound, bed, seepage pit or drywell, or surface disposal) after septic tank or other treatment system** | Well maintained lateral or mound system*** loaded below design capacity.** Medium- to fine-textured soils (silt loam, loam, clay loam, clay) with more than 4 feet to saturated soil, bedrock or other limitation. | Well maintained lateral or mound system*** on coarse-textured soils (sandy loam, sand) with more than 4 feet (or drywell with more than 50 feet) to saturated soil or limiting layer. Loaded below design capacity.** | Lateral or mound system with less than 4 feet (or drywell with 10–50 feet) to saturated soil or limiting layer. Loaded near design capacity.** | Pipe to surface. Field or silo tile drainage system. Drywell with less than 10 feet to groundwater or limiting layer. Poorly maintained or failed lateral or mound system. System loaded above design capacity.** | _____ |
| **10. Packaged aerobic system** ***(Soil absorption or a wastewater lagoon is needed for disposal of effluent from this system.)*** | Maintenance program followed with solids removed as needed. Backup power supply available. System loaded at less than design capacity.** | Maintenance program followed with solids removed as needed. Reliable power supply, but no backup supply. Loaded near design capacity.** | Poor maintenance. Aeration failures or power outages annually. | Maintenance lacking. System failure or power outages at least quarterly. Load exceeds design capacity.** | _____ |

***Boldface type:*** Besides representing a higher-risk choice, this practice also violates Kansas law.
*See page 8 of Fact Sheet 6 for description of a well maintained lagoon.
** If design capacity of your treatment system is unknown, estimate at 150 gallons per bedroom per day.
***See page 6 of Fact Sheet 6 for description of a well maintained soil absorption system.

This file is for historical purposes only and may not reflect current practices. For current recommendations, contact K-State Research and Extension.

| | LOW RISK (rank 4) | LOW-MOD RISK (rank 3) | MOD-HIGH RISK (rank 2) | HIGH RISK (rank 1) | YOUR RANK |
|---|---|---|---|---|---|
| **TREATMENT AND DISPOSAL (continued)** | | | | | |
| *Select the wastewater treatment and disposal components that apply to your site (continued from page 5).* | | | | | |
| **11. Holding tank** | Excess capacity for usual pumping interval. Tanks checked regularly. No leakage. | Sufficient storage to accommodate best application time. Tanks checked regularly. No leakage. | Holding tank may overflow at times or has minimal leakage losses; not checked regularly. Frequent pumping needed. | Leakage losses. Tank in need of repair or replacement. | _____ |
| **12. Cesspool** | _____ | _____ | _____ | ***Any cesspool or surface discharge of wastewater.*** | _____ |
| **SEPTAGE AND HOLDING TANK PUMPAGE DISPOSAL** | | | | | |
| **13. Septage pumping and disposal** | Approved septage hauler. Disposal at municipal treatment facility. | Approved septage hauler. Land application at approved site with pumping planned for best application time. Incorporated within 24 hours.* Less than 30,000 gal/acre/yr. | Approved septage hauler. Land application at approved site with no incorporation.* Less than 30,000 gal/acre/yr. | Non-approved septage hauler. Disposal at non-approved site or through outlet pipe to surface drainage system. Frozen, snow-covered or saturated soil at site. More than 30,000 gal/acre/yr. | _____ |
| **14. Soils, separation distance and depth to groundwater** | Disposal at municipal treatment facility. | Application to soil at least 400 feet downslope from any well or surface water body. Medium- or fine-textured soils (silt loam, loam, clay loam, clays) with more than 6 feet to saturated soil or limiting layer. | Application 300–400 feet downslope from water source. Coarse-textured soils (sandy loam, sands). More than 4 feet to saturated soil or limiting layer. | Application upslope or less than 200 feet from water supply well or surface water body.** Less than 4 feet to saturated soil or limiting layer. | _____ |

*Local ordinances may require incorporation of wastes applied to the land surface.
**Check local ordinances for required separation distance.

**TOTAL** ☐

*Use this total to calculate risk ranking on back page of worksheet.*

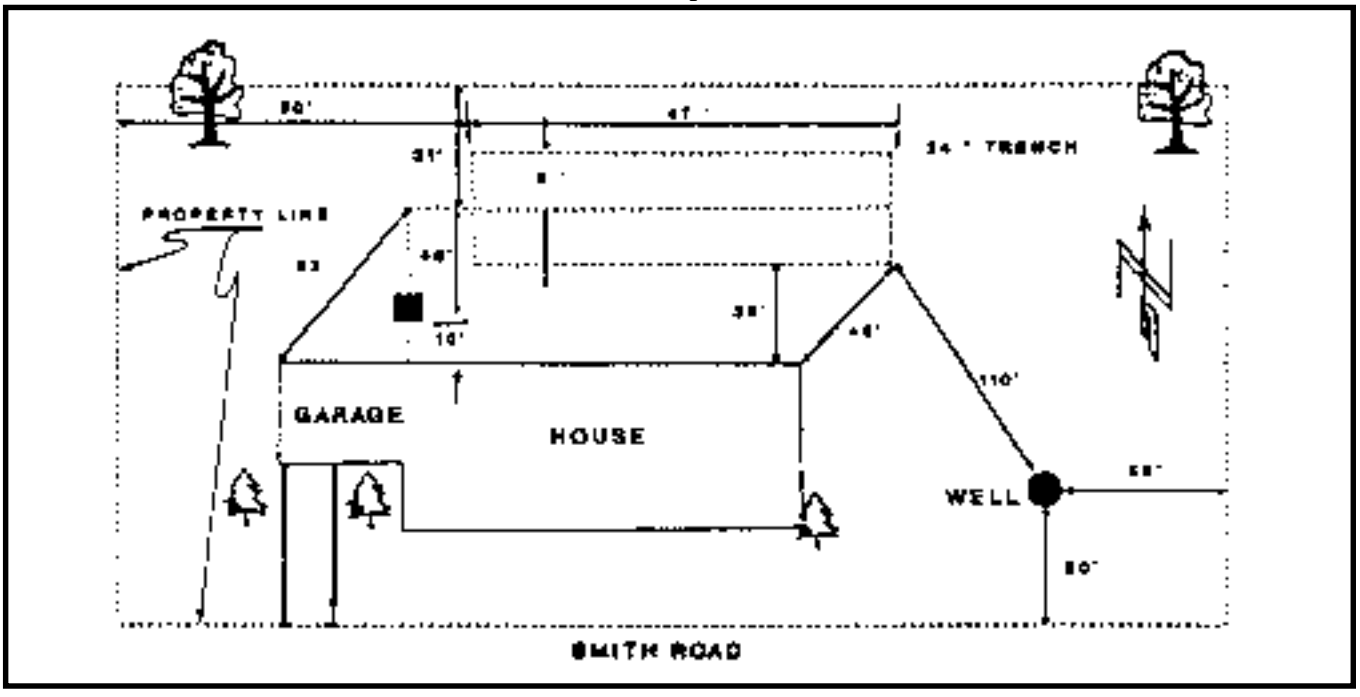
This file is for historical purposes only and may not reflect current practices. For current recommendations, contact K-State Research and Extension.

This file is for historical purposes only and may not reflect current practices. For current recommendations, contact K-State Research and Extension.

## *Diagram of Wastewater Treatment System*

*Show the location of the elements of your wastewater treatment system. Be sure to indicate distances and special features of system to allow locating parts of the system which are underground, and any water supply wells or surface water bodies which are located nearby.*

*Example*



**This file is for historical purposes only and may not reflect current practices. For current recommendations, contact K-State Research and Extension.**

## What do I do with these rankings?

**Step 1:** Begin by determining your overall household wastewater risk rank. Total the rankings for the categories you completed and divide by the number of categories you ranked:

_____ divided by _____ equals [ ]*

total of rankings | # of categories ranked | risk rank

*Carry your answer out to one decimal place.

**3.6–4=low risk 2.6–3.5=low to moderate risk 1.6–2.5=moderate to high risk 1–1.5=high risk**

This rank gives you an idea of how your household wastewater practices **as a whole** might be affecting your drinking water. It should serve only as a **very general guide, not a precise diagnosis.** Because it represents an **average** of many individual rankings, it can mask any **individual** rank (such as 1's or 2's) that should be of concern (see Step 2).

**Enter your boxed household wastewater risk rank on page 1 of Worksheet 9.** Later you will compare this risk rank with other farmstead management rankings. Worksheet 8 will help you identify your farmstead's site conditions (soil type, soil depth and bedrock characteristics), and Worksheet 9 will show you how these site conditions affect your risk rankings.

**Step 2:** 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

Regardless of your overall risk rank, 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 and list them under "High-Risk Activities" on pages 6-7 of Worksheet 9.**

**Step 3:** Read Fact Sheet 6, *Improving Household Wastewater Treatment,* if you haven't already. Consider how you might modify your farmstead practices to better protect your drinking water.

**FARM•A•SYST**
**Farmstead Assessment System**

**The Farmstead Assessment System is a cooperative project of the Cooperative Extension Service, Kansas State University, and the Kansas Department of Health and Environment.**

Project coordinated at Department of Agricultural Engineering, Cooperative Extension Service, Kansas State University, Kevin Herbel, Coordinator.

**Farm•A•Syst** team members: **John S. Hickman,** Extension Specialist and Environmental Quality Coordinator; **Kevin L. Herbel,** Extension Assistant, Farmstead Assessment System; **Danny H. Rogers,** Extension Irrigation Engineer; and **G. Morgan Powell,** Extension Natural Resource Engineer.

**G. Morgan Powell**
Extension Natural Resouce Engineer
Kansas State University

**Julia M. Greene**
Health and Environmental Analyst
Department of Health and Environment

Adapted for Kansas from material prepared by Jim O. Peterson, Enviromental Resources Center, University of Wisconsin-Extension; and James C. Converse, Department of Agricultural Engineering, and Jerry E. Tyler, Department of Soil Science, University of Wisconsin-Madison, for the Wisconsin and Minnesota Farm•A•Syst programs. Kansas Farm•A•Syst development supported by the National Farmstead Assessment Program. Review provided by Diane K. Coe, District Hydrologist, SW Kansas GMD #3; Wichita/Sedgwick County Department of Community Health; Richard D. Black, Extension Agricultural Engineer, Kansas State University; and the Soil Conservation Service.

*This material is based upon work supported by the U.S. Department of Agriculture, Extension Service, under special project number 91-EWQI-1-9293.*

Publications from Kansas State University are available on the World Wide Web at: http://www.oznet.ksu.edu

Contents of this publication may be freely reproduced for educational purposes. All other rights reserved. In each case, credit G. Morgan Powell, Household Wastewater Treatment, Kansas State University, August 1998.

**Kansas State University Agricultural Experiment Station and Cooperative Extension Service**

EP-47 August 1998

It is the policy of Kansas State University Agricultural Experiment Station and Cooperative Extension Service that all persons shall have equal opportunity and access to its educational programs, services, activities, and materials without regard to race, color, religion, national origin, sex, age or disability. Kansas State University is an equal opportunity organization. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, as amended. Kansas State University, County Extension Councils, Extension Districts, and United States Department of Agriculture Cooperating, Marc A. Johnson, Director.