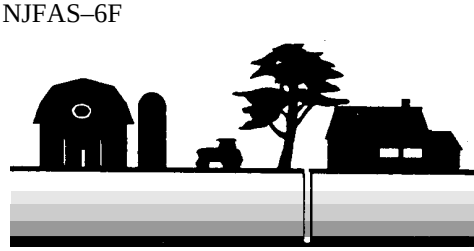

NEW JERSEY
FARM-A-SYST
A FARMSTEAD WATER QUALITY ASSESSMENT SYSTEM

#6 Fact Sheet: Reducing the Risk of Groundwater Contamination by Improving Household Wastewater Treatment

A properly installed and maintained system for treating and disposing of household wastewater will minimize the impact of that system on groundwater and surface water. State and local codes specify how wastewater systems must be designed, installed and maintained. For example, New Jersey Department of Environmental Protection's Standards for Individual Subsurface Sewage Disposal Systems (N.J.A.C. 7:9A-1 et. seq.) regulate private sewage systems.

At a minimum, follow the codes. But also consider whether the minimum requirement is sufficient for your site.

Septic tank/soil absorption system: The most common system

The most common form of onsite wastewater treatment is a septic tank/soil absorption system. In this system, wastewater flows from the household sewer into an underground septic tank.

- There the waste components separate—the heavier solids (sludge) settling to the bottom, and the grease and fatty solids (scum) floating to the top.
- Bacteria partially decompose and liquify the solids.
- Baffles are placed in the tank to provide maximum retention of solids and scum, prevent inlet and outlet plugging, and prevent rapid flow of wastewater through the tank.
- The more liquid portion (effluent) flows through an outlet to the soil absorption field.
- The absorption field is usually a series of parallel trenches (fingers), each containing a distribution pipe or tile embedded in drainfield gravel or rock.
- The effluent leaks out through holes in the pipe or seams between tile sections, then down through the drainfield gravel or rock and into the soil.
- The soil filters out remaining minute solids and pathogens (disease-producing microorganisms), and dissolved substances slowly percolate down to groundwater.

For glossary, see page 2 of Worksheet #6.

Figure 1 shows a typical household system for wastewater generation, collection, treatment and disposal. While systems for many farmsteads may be very similar (groundwater supply, septic tank, subsurface treatment and disposal), note the lists of options below each part of the diagram. You may wish to circle the parts found in your system. The "leakage," "overflow," "infiltration" and "clearwater" components represent possible problems with the system. Unfortunately, these problems are often difficult to recognize. Overflow from systems may be noticed as wet spots, odors and some changes in vegetation cover. Water entry (infiltration and clear water) will be more difficult to detect, involving tracing where floor drains, roof drains, foundation drains and sumps are directing waters that do not need treatment into the treatment system. Leakage from the collection and treatment system—as well as infiltration of water into the system through unsealed joints, access ports and cracks—can be very difficult to assess. The flow chart at the bottom of the box follows the flow of wastewaters and sludge through the treatment system.

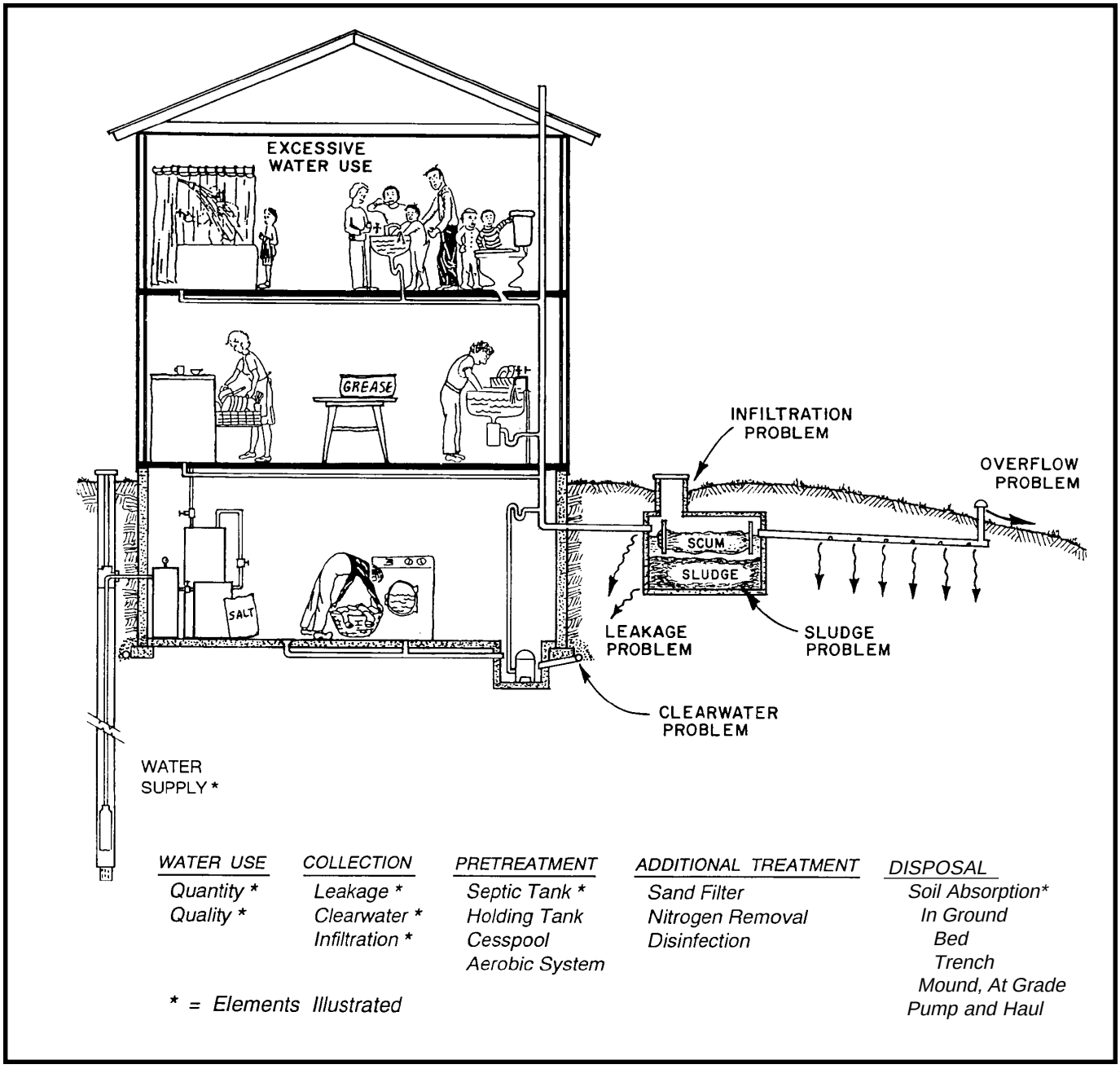

Figure 1: Typical household wastewater treatment system with problems. *Illustration by Andy Hopfensperger, University of Wisconsin-Madison Department of Agricultural Engineering.*

1. Quantity of wastewater

Strategy: Minimize the volume of household wastewater.

Reducing the volume of wastewater entering the treatment system is important because less flow (volume) means better treatment, longer system life and less chance of overflow. For holding tanks, less volume reduces costs by reducing the number of times the tank has to be emptied.

The quantity of water used depends upon the number of people using the dwelling, how water is used, and maintenance of the water supply system. Average water use in a single family home is 75 gallons per person per day. With low-use fixtures and individual awareness and concern, a reduction to fewer than 25 gallons per person per day is possible. However, even conservative use by several people may exceed the capacity of the wastewater treatment system.

Reducing the volume of water entering the system will improve the treatment by increasing the time the waste spends in the system, thus providing more time for settling, aeration and more soil contact.

Consider the following ways to minimize water use:

- Eliminate non-functional uses, such as flushing toilets to dispose of tissues or other wastes that should be handled as solid waste. Turn off water between uses, fix plumbing fixture leaks, and try to eliminate sources of clear water and infiltration into the system. (For example, divert roof drains away from the soil absorption field.)

- Consider which actions use the most water. Toilet flushing usually ranks highest. Low-flow models could decrease water use by more than half. In the United States, 35-40 percent of the population has plumbing codes that require 1.5-gallon-or-less toilets on all new construction. Composting toilets allow even greater reductions, but they can present other waste disposal challenges.

- Bathing and clothes washing are next in order of water use. For bathing, consider such reduction options as installing low-flow or controlled-flow showerheads, which give good cleansing with less water; taking shorter showers; and taking "wet-down-soap-up-without-water-then-rinse" showers.

- For clothes washing, use a suds saver and run full loads. Front-loading washers use much less water. When running small loads, be sure to use the reduced water level setting.

- Modern efficient plumbing fixtures, including 0.5 to 1.5-gallon toilets, 0.5-2.0 gallons per minute (gpm) showerheads, faucets of 1.5 gpm or less, and front-loading washing machines of 20 to 27 gallons per 10-to-12 pound dry load, offer the potential of substantial reduction in residential water use and wastewater generation. These reductions have commonly amounted to between 30 and 70 percent of total in-house water use. (See Figure 2.)

- In hard water areas, the water softener may be a significant user of water. Proper adjustment and timing of the softener's regeneration mechanism can reduce excessive water use.

- Keep in mind that your awareness of your family's water use and how each of you can reduce it is as important as the use of water conservation devices.

Figure 2: Water Use by Conventional Fixtures and Water-Saving Fixtures and Devices

Conventional fixture	Gal. used	Water-saving fixture/device*	Gal. used
Toilet	4-6/flush	Air-assisted toilet	0.5/flush
Shower head	4-6/min.	Low-flow shower head	2.0/min.
Faucets: Bathroom and kitchen	4-6/min.	Faucet-flow-control aerators: Bathroom Kitchen	0.5/min. 1.5/min.
Top-loading clothes washer	40-55/load	Front-loading clothes washer	22-33/load

*Installation of all these water-saving devices could reduce water use by about 35%.

Source: Penn State Cooperative Extension Circular 302

2. Quality of wastewater

Strategy: Minimize the amount and complexity of contaminants in the waste water.

The quality of water refers to what is in the water, not to the water itself. Even wastewater is more than "99.44% pure" water. Wastewater usually contains relatively small amounts of contaminants—but they make a big difference in the usefulness of the water.

Contaminants found in wastewater include:

- **Bacteria and viruses**, some of which can cause disease in humans. These microorganisms are large enough to be removed by settling, or through filtration in beds or soil. Many will die from the adverse conditions or aging in the system.
- **Suspended solids**, particles which are more dense (sludge) or less dense (scum) than water. Most can be separated from liquid waste by allowing enough time in a relatively calm tank. Grease and fats are a part of the suspended solids. Filtration beds and absorption systems can be clogged by wastewater high in suspended solids.
- **Oxygen demand**. The microorganisms that decompose organic wastes use oxygen. The amount of oxygen required to "stabilize" wastewater is typically measured as biochemical and chemical "oxygen demand." Wastes such as blood, milk residues, food wastes (vegetable or fruit skins or pulp, pro duce) and garbage grindings have high oxygen demand. Aeration and digestion processes, in the presence of oxygen and organisms, produce stable, low-odor wastewater when given enough time. Wastewater with excess oxygen demand can cause problems for soil absorption fields, groundwater, streams and lakes by reducing levels of oxygen.

- **Organic solvents** from cleaning agents and fuels may not be degraded or removed through treatment and can pass along with the wastewater back into the water supply. In addition to these chemicals being illegal in septic systems, they can have significant impact upon septic tank performance by damaging its microbial flora.

- **Nutrients**. Nitrogen from human wastes and phosphorus from machine dishwashing detergents and some chemical water conditioners are the most notable. Nitrate-nitrogen is a common groundwater contaminant, and phosphorus overfertilizes surface water.

Consider the following ways to improve wastewater quality:

- Minimize use of the garbage disposal unit. Garbage disposal use contributes a large load of suspended solids and organic matter to wastewater, as well as using additional water.

- Do not put items down drains that may clog septic tanks (fats, grease, coffee grounds, paper towels, sanitary napkins, tampons, disposable diapers).

- Do not put toxic substances in drains that might end up in the groundwater, such as solvents, degreasers, acids, oils, paints, disinfectants and pesticides. (This does not include using bleach to disinfect laundry or to wash clothing worn for pesticide applications.)

- Do not use chemicals to clean or "sweeten" your system. They may interfere with the biological action in the tank, clog the drain field by flushing sludge and scum into the field or add toxic chemicals to groundwater.

3. Collection of wastewater

Strategy: Collect all wastes that need treatment. Minimize loss of untreated waste. Exclude from the treatment system water that doesn't need treatment or disposal.

Leaking piping or treatment tanks ("leakage losses") can allow wastewater to return to the local water supply without adequate treatment. Infiltration of clear water overloads the system and dilutes the wastes. Don't allow water that doesn't need treatment (basement floor drain sumps, foundation drains, infiltration of rain water, roof drainage) to add to your waste volume. Divert clear water, which doesn't require treatment, away from house, well and wastewater treatment system.

4. Pretreatment system

Strategy: Make wastewater more suitable for further treatment or disposal.

Septic tanks retain most of the suspended solids (sludge and scum) from wastewater. In the tank, bacteria digest and compact the sludge. The partially treated water moves on to additional treatment or disposal (for example, in a soil absorption field.)

Design and construction of septic tanks influence their water tightness and effectiveness of retaining sludge and scum. Multiple tanks or chambers in series can improve sludge and scum removal. Gas deflectors and filter screens or inclined-plate settling units help to minimize solids carryover. Tanks should be sized to accommodate at least 24 hours of wastewater flow, while still allowing for sludge and scum retention. For a three-bedroom home, a 1,000-gallon-capacity septic tank is required. For a four-bedroom home, a 1,250-gallon tank is required. Pumping the tank before it is more than one-third filled with scum and sludge improves functioning of the system. When the tank is pumped, you should also have the baffles checked and check for tank leaks.

Aerobic (oxygen-using) biological systems (packaged systems) provide more extensive treatment of wastewater than the typical anaerobic (no oxygen) septic units, improving solids separation, releasing volatile chemicals and reducing sludge volume. These systems are, however, more expensive to operate and maintain and are more subject to problems caused by changes in wastewater quality or environmental conditions.

Holding tanks collect and hold the entire wastewater flow. Use of holding tanks in New Jersey is only approved as a temporary means of waste disposal, for a period not to exceed 180 days, when an existing system is being repaired. Permanent use of a holding tank must be permitted by NJDEP. Disposal is generally done by a licensed contractor who hauls the waste to a municipal waste treatment facility. When pumped, the tank should be checked for leaks.

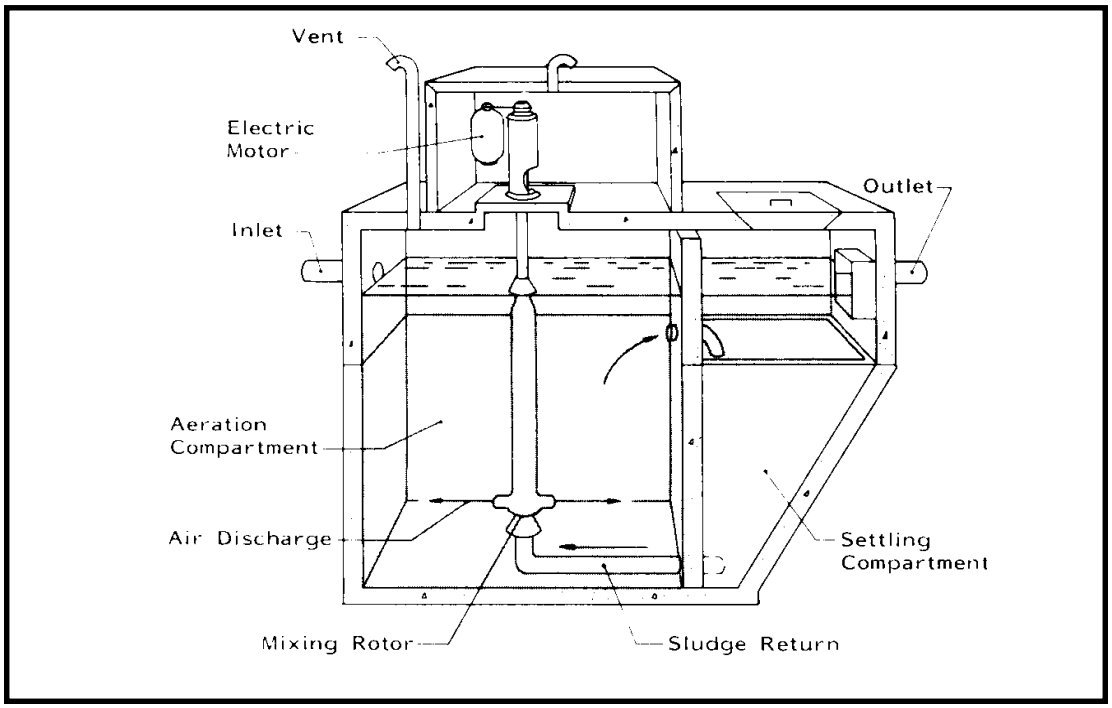

Figure 3: Aeration tank of a household aerobic treatment system. *Source: Onsite Domestic Sewage Disposal Handbook, MWPS-24, Midwest Plan Service, 1982.*

5. Additional treatment

Strategy: Reduce concentration and amount of contaminants in the wastewater to expand options for appropriate disposal.

Aerobic systems, described in the previous section, may be used for additional treatment of septic tank effluent, yielding a better quality effluent suitable for more disposal options.

Sand filters improve the quality of wastewater after septic tank pretreatment. Effective treatment involves aerobic biochemical activity as well as physical filtration. Filters consist of 2 to 5 feet of sand (or other media) in a bed equipped with a distribution and collection system. Wastewater is applied by dosing, and it may be recirculated to improve treatment.

> Wastewater treated in such systems is generally lower in bacteria, nitrogen, phosphorus, oxygen demand, suspended solids and organic matter. The amount of reduction depends on design of the system.

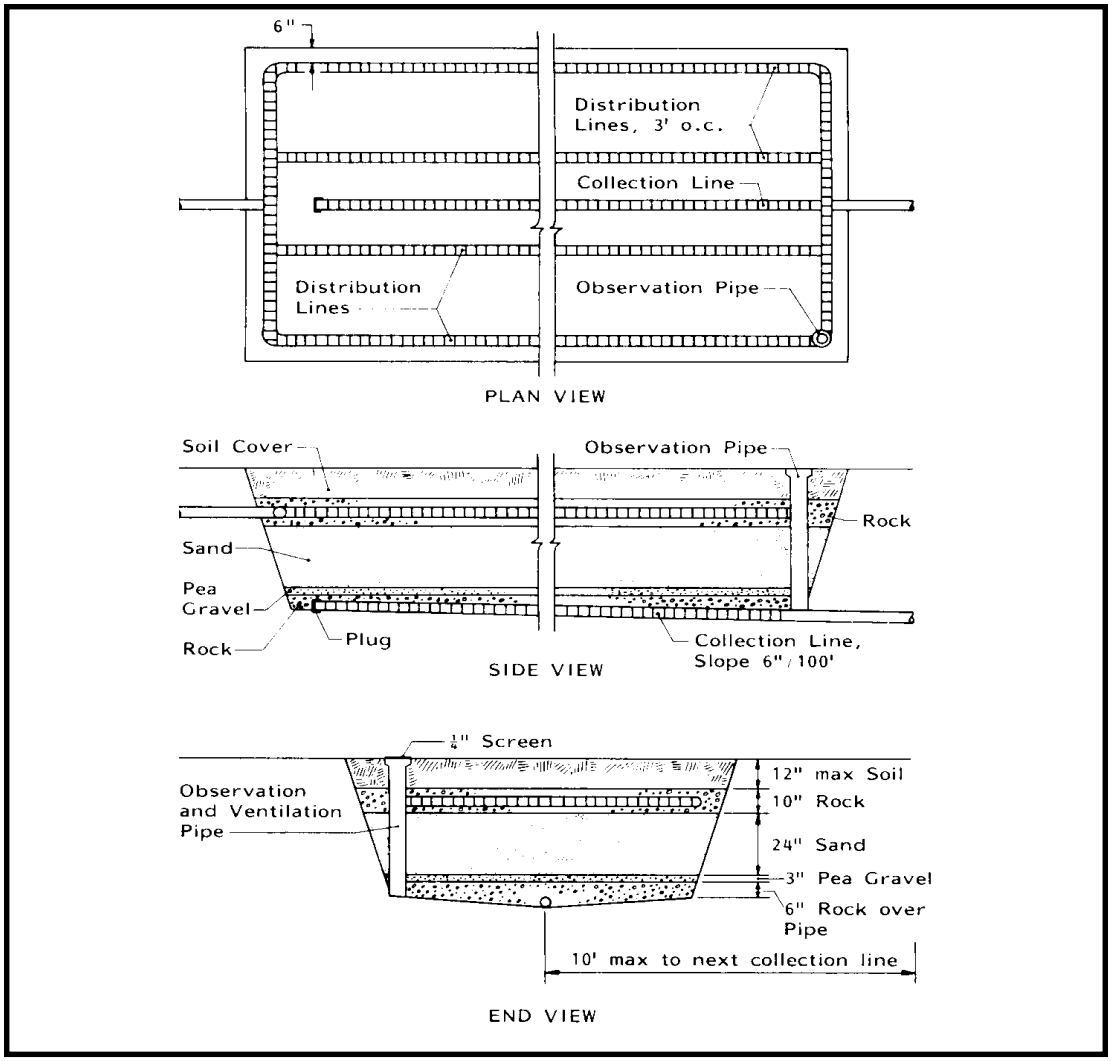

Figure 4: Buried sand filter. *Source: Onsite Domestic Sewage Handbook, MWPS-24, Midwest Plan Service, 1982.*

Pretreatment and quality of wastewater, hydraulic loading rate, depth and type of filter media, dosing frequency, temperature and distribution, and collection systems are all important considerations in designing filters. Maintenance includes resting, occasional raking, removal of clogged and crusted surface media, filter media replacement and attention to dosing equipment.

Nitrogen removal can be achieved through denitrification (conversion of nitrate to nitrogen gas) or ion exchange. Denitrification requires anaerobic conditions in the presence of more decomposable organic matter for bacteria to reduce nitrate to nitrogen gas for removal from wastewater. Denitrification and ion exchange processes are not used extensively at this time, as they are quite expensive to install, operate and maintain.

Disinfection systems kill disease-causing microorganisms in wastewater and are used where discharge to surface water is permitted. Chlorine, iodine, ozone and ultraviolet light systems are available for treatment of good quality effluents, such as those from properly functioning aerobic units and sand filters.

> Disinfection of holding tank waste prior to land spreading has been studied, but it is not in common use. Disinfection with lime is feasible.

Many of the listed treatment units may require permitting by NJDEP and you should contact your local health official for guidance.

6. Disposal of wastewater and pumpage

Strategy: Disperse wastes, take advantage of additional treatment afforded by contact with soils, and minimize opportunity for waste to contaminate water supplies.

Off-site disposal of wastewater, by hauling to a municipal treatment facility, can help protect the local farmstead water supply. Discharging treated wastes to surface water from private systems is not permitted in New Jersey. Improper waste management off the farm site can endanger the health of others in your community. Also, it may eventually contribute to poor water quality at your well.

Subsurface treatment and disposal using soil absorption (trenches, beds, mounds, at-grade and gravelless) is the common practice for household wastewater after pretreatment in a septic tank or aerobic system. There are, however, sites where soil absorption systems are not acceptable because of high or low soil permeability, depth to bedrock or the saturated zone, or other factors. Deep, well-drained, well-developed, medium-textured soils (such as silt loam and loam) are desirable soil absorption sites.

Soils and separation from the water supply are important factors. Unsaturated soils allow movement of air, helping keep the wastewater aerobic. A minimum of four feet of unsaturated soils is required by New Jersey law for removal of bacteria. Loams, sandy loams, and sandy clay loams are the optimum soil texture for wastewater treatment and disposal. Disposal sites that are more distant and downslope from the well increase the isolation of your water supply from the contaminated wastewater.

7. Assistance with failing systems or new designs

If you suspect your household wastewater treatment system is backing up or your distribution system is clogged, first contact your plumber or treatment system installer, who may have suggestions for extending the life of your system. Your local health official is the person to see for permits to repair or replace your wastewater treatment system.

Do not use septic tank cleaners that contain degreasing solvents like TCE; they are illegal in New Jersey and can contaminate groundwater.

Do not place more soil over a surfacing soil absorption field; this does not fix the system, and it will soon surface again.

Do not just pipe the sewage to the road ditch, storm sewer, stream or farm drain tile; this is illegal in New Jersey, pollutes the water and creates a health hazard.

Do not run the sewage into a sink hole or drainage well; this is illegal in New Jersey and pollutes the groundwater.

Do not wait for the system to fail before pumping the septic tank. Once a system fails, it is too late to pump the tank.

A properly designed, constructed and maintained septic system can effectively treat wastewater for many years. For more information on septic systems, contact your local health department.

If you need advice on alternative wastewater treatment systems, such as mounds, at-grades, gravelless systems, sand filters and aerobic units, or if you would like to explore experimental systems, contact the National Small Flows Clearinghouse, at 1 (800) 624-8301.

CONTACTS AND REFERENCES

Who to call about...

General Contacts

See Introductory Sheet

Household wastewater treatment and local regulations

Your county health department.

Statewide regulation of private sewage systems

New Jersey Department of Environmental Protection, Division of Water Quality at (609) 292-4543.

Septic haulers and pumpers

New Jersey Department of Environmental Protection, Division of Solid and Hazardous Waste at (609) 530-8591.

Small and alternative wastewater treatment technologies

National Small Flows Clearinghouse, West Virginia University, P.O. Box 6064, Morgantown, West Virginia 26506-6064, or call 1 (800) 624-8301.

What to read about...

Publications are available from sources listed at the end of the reference section. (Refer to number in parentheses after each publication.)

Design, installation, use and maintenance of onsite sewage systems

Septic System Care. 1994. Rutgers Cooperative Extension, 16 pages. E-167. (1)

A Homeowner's Manual for Septic Systems. 1995. New Jersey Department of Environmental Protection, 14 pages. (5)

Design Manual: Onsite Wastewater Treatment and Disposal Systems. 1980. U.S. Environmental Protection Agency. EPA Technology Transfer 625/1-80-012. (2)
391 pages. Contains information on site evaluation procedures, wastewater characteristics, onsite treatment and disposal methods, and management of onsite systems.

Groundwater Protection Practices for Septic Systems, 1992. New Jersey Department of Environmental Protection Bureau of Water Supply Planning. (3)
40 pages. Includes information on septic tanks, soil absorption systems, site selection, distribution systems and such other systems as aerobic treatment and holding tanks.

Water-saving toilets and showerheads

"How To Save Water," *Consumer Reports*, July 1990, pages 465-473. (4)

Publications available from...

1. Your county office of Rutgers Cooperative Extension (found in the blue pages of your telephone book) or directly from Publications-Distribution Center, Cook College, Rutgers University, PO Box 231, New Brunswick, NJ 08903, (732) 932-9762.

2. U.S. Environmental Protection Agency, 401 M Street S.W., Washington, D.C., 20460.

3. New Jersey Department of Environmental Protection Bureau of Water Supply Planning, CN 029, Trenton, NJ 08625, (609) 633-1179.

4. Consumer Reports, 256 Washington St., Mount Vernon, NY, 10553, (914) 667-9400 or your local library.

5. New Jersey Department of Environmental Protection, Division of Water Quality, CN 029, Trenton, NJ, 08625, (609) 292-4543.

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The New Jersey Farmstead Assessment System is a cooperative project of the USDA Natural Resources Conservation Service, Rutgers Cooperative Extension, and New Jersey Department of Environmental Protection.

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NJFAS–6F *Reducing the Risk of Groundwater Contamination by Improving Household Wastewater Treatment* 12/95

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NEW JERSEY
FARM-A-SYST
A FARMSTEAD WATER QUALITY ASSESSMENT SYSTEM

#6 Worksheet: 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 such uses as drinking, 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 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 or dispose of wastewater in any location that is **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 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.

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.

Cesspool: Covered excavation in the ground that receives sewage directly from a building's sanitary drainage system. It is designed to retain the organic matter and solids and permit liquid to seep into soil cavities. New cesspools are prohibited in New Jersey. Existing cesspools which are not malfunctioning or not being expanded are legal.

Clear water infiltration: Entry of water into a system that does not need treatment, such as rainfall or tile drainage, 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 subsurface wastewater disposal and distribution, 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 designed for the collection and storage of sewage or septic tank effluent.

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

Off-site disposal: Disposal of wastewater or sludge off the farm, as at a municipal treatment plant or approved disposal site.

Scum: Floatable solids, such as grease and fat.

Seepage pit: Underground receptacle constructed to permit disposal of septic tank effluent, treated wastes or clear wastes by soil absorption through its bottom and walls.

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

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 to your farmstead.) For categories separated by "OR," choose only one category.
3. 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."
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 ranking 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 of wastewater	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.*	Moderate water use (20-60 gallons per person per day). Fair maintenance of fixtures. Some water conservation fixtures. Water softener recharges twice a week or less. Whole house use is near design capacity.*	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.*	Excessive water use (greater than 120 gallons per person per day). Leaking fixtures. No water-conserving fixtures. Whole house use frequently exceeds design capacity.*	_____
Quality of wastewater					
Settleable solids	No use of garbage disposal unit in kitchen sink.	Minimal use of garbage disposal unit (1-2 times per week).	Moderate use of garbage disposal unit (3-5 times per week).	Daily use of garbage disposal unit.	_____
Dissolved solids	Minimal use of household chemicals (cups per week). No disposal of solvents and toxic cleaning agents. No water softener, or not recharged on site.	Careful use of household chemicals (pints per week). Minimal disposal of solvents and toxic cleaning agents. Water softener used, recharged on site.	Moderate use of household chemicals (quarts per week). Moderate disposal of solvents and toxic cleaning agents.	Extensive use of household chemicals (gallons per week). Extensive disposal of solvents and toxic cleaning agents.	_____
Floatable solids	No disposal of grease or oils into sewer. Domestic wastes only.	Minimal disposal of grease or oils. Oil and grease wiped from cooking utensils before washing.	Moderate 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.	_____

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

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
Collection of wastewater	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.	All wastewater collected for treatment. Some clear water collected. No leakage loss of water that should be treated.	Some wastewater diverted, or some leakage of water that should be treated, and clean water infiltration.	Clear water infiltration. Leakage loss of water that should be treated. ***Collection system (pipe) less than 25 feet from well.*****	_____
Pretreatment system:					
Cesspool	_____	_____	_____	***Any cesspool or direct discharge of water.***	_____
OR					**OR**
Septic tank	_____	Serial tanks or added solids retention system. No leakage. Pumped at least every 3 years and maintained. Baffles checked. Tanks checked; no leakage.	Single tank. Pumped at 4-6 year intervals.	Leakage losses. Seldom pumped out (greater than 7-year interval). ***Less than 50 feet from well.***** Less than 3 feet from saturation or bedrock.	_____
OR					**OR**
Packaged aerobic system	Maintenance program followed. Loaded at less than design capacity.*	No mechanical failures. Loaded near design capacity.*	Occasional failures.	Frequent system failure. Load exceeds design capacity.*	_____
OR					**OR**
Holding tank	Excess capacity for usual pumping interval. More than 50 feet down- slope from well. Tanks checked; no leakage.	Excess capacity for pumping interval. More than 50 feet up- slope from well. Tanks checked; no leakage.	Occasional overflow or leakage.	***Less than 50 feet from well.***** Leakage losses. Upslope from well.	_____

Boldface type: Besides representing a higher-risk choice, this practice also violates New Jersey law.

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

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

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
Additional treatment (all systems)	Aeration, denitrification, filtration and disinfection.	Aeration and/or denitrification.	Filtration and/or disinfection.	No additional treatment.	_____
Disposal of wastewater					
Subsurface application (septic system or other treatment systems)	Offsite disposal.	Pressure or gravity-fed distribution to trench system.	Bed or seepage pit.	***Field or silo tile drainage system. Pipe to surface.***	_____
OR					**OR**
Surface application (holding tank wastes)	Offsite disposal.	Sufficient storage to accommodate best application time. Incorporated. Approved disposal site.	Frequent application. No incorporation. Approved disposal site.	Pit, agricultural field or ***surface drainage system; or outlet pipe or holes in holding tank.***	_____
Horizontal separation of wastewater disposal site from water supply (subsurface or surface)	Offsite disposal.	Subsurface disposal downslope more than 50 feet from well. Surface disposal more than 200 feet from well.	***Subsurface disposal downslope less than 50 feet from well. Surface disposal less than 200 feet from well.***	Upslope from well.	_____
Vertical separation of wastewater disposal site from water supply (subsurface)	Offsite disposal.	More than 6 feet to saturated soil or bedrock.	More than 3 feet to saturated soil or bedrock.	***Less than 3 feet to saturated soil or bedrock.***	_____
Subsurface application rate (septic system or other treatment systems)	Offsite disposal.	_____	Below design capacity.	At or above design capacity.	_____
OR					**OR**
Surface application rate (holding tank wastes)	Offsite disposal.	Less than 170 gallons per acre per week. Vegetation harvested. Nitrogen application doesn't exceed plant uptake and harvesting.	Less than 170 gallons per acre per week. Vegetation harvested. Nitrogen application exceeds plant uptake and harvesting.	***More than 170 gallons per acre per week.*** No vegetation harvesting.	_____

Boldface type: Besides representing a higher-risk choice, this practice also violates Wisconsin law.

	LOW RISK (rank 4)	LOW-MOD RISK (rank 3)	MOD-HIGH RISK (rank 2)	HIGH RISK (rank 1)	YOUR RANK
Disposal of wastewater (continued)					
Soils	Offsite disposal.	Medium- or fine-textured soils (silt loam, loam, clay loams, clays).	Medium- to coarse-textured soils (sandy loam, sands).	Very coarse sands or gravel.	____
If you have only a holding tank for wastewater disposal, skip to the bottom of the page and total your score.					
Disposal of pumpage from septic tanks and other treatment systems, except holding tanks.					
Surface application	Offsite disposal.	Sufficient storage to accommodate best application time. Incorporated. Approved disposal site.	Frequent spreading. No incorporation. Approved disposal site.	***Non-approved site.***	____
Horizontal separation from water supply	Offsite disposal.	Downslope more than 200 feet.	***Downslope less than 200 feet.***	Upslope from water supply.	____
Vertical separation from water supply	Offsite disposal.	____	More than 3 feet to saturated soil or bedrock.	***Less than 3 feet to saturated soil or bedrock.***	____
Soils	Offsite disposal.	Medium- or fine-textured soils (silt loam, loam, clay loams, clays).	Medium- to coarse-textured soils (sandy loam, sands).	Very coarse sands or gravel.	____
Surface application rate	Offsite disposal.	Less than 85 gallons per acre per week. Vegetation harvested. Nitrogen application does not exceed plant uptake and harvesting.	Less than 250 gallons per acre per week. No vegetation harvested. Nitrogen application exceeds plant uptake and harvesting.	***More than 250 gallons per acre per week.*** No vegetation harvested.	____

Boldface type: Besides representing a higher-risk choice, this practice also violates Wisconsin law.

TOTAL ☐

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

What do I do with these rankings?

Step 1: Begin by determining your overall household wastewater risk ranking. 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 ranking

*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 ranking gives you an idea of how your household wastewater practices **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 mask any **individual** rankings (such as 1's or 2's) that should be of concern. (See Step 2.)

Enter your boxed household wastewater risk ranking on page 1 of Worksheet #12. Later you will compare this risk ranking with other farmstead management rankings. Worksheet #11 will help you identify 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:

- **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 ranking, 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 #12.

Step 3: Read Fact Sheet #6, *Improving Household Wastewater Treatment*, and consider how you might modify your farmstead practices to better protect your drinking water.

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