

OKLAHOMA
Farm & Ranch *A* Syst

Fact Sheet 6

Reducing the Risk of Ground Water Contamination by Improving Household Wastewater Treatment

A properly installed and maintained system for treating and disposing of household wastewater can minimize the impact of that system on ground water and surface water. A poorly sited septic tank drainfield, or other system, is one of the more likely sources of contamination of domestic water wells. State and local codes specify how wastewater systems must be designed, installed, and maintained (see DEQ Bulletin No. 600). Generally, the Department of Environmental Quality encourages local governments and homeowner associations to construct approved community wastewater collection and treatment facilities instead of private septic tanks.

Always follow the codes, but also consider whether the minimum requirement is sufficient for your site.

Septic Tank/Soil Absorption Systems

The most common form of home wastewater treatment is a septic tank/soil absorption system (see Figure 1). In this system, wastewater flows from the household plumbing into an underground septic tank. In the septic tank, bacteria action decomposes and liquefies much of the solids. Some of the solids cannot be decomposed. The heavier solids settle to the bottom of the tank, forming sludge, while the grease and fatty solids float to the top, forming scum. The wastes contain nitrogen, and some of it is released as a gas through the vent pipes. The rest remains in the solids and the wastewater. Baffles in the tank retain the large solids, while the

liquid portion flows out to the soil absorption field through the distribution box.

The absorption field consists of a series of parallel trenches, each containing a perforated distribution pipe embedded in gravel or rock. Wastewater and dissolved substances (nitrogen) and remaining pathogens (disease-producing microorganisms) slowly percolate to ground water. If the time required for the wastewater to percolate from the drainfield to the ground water is long

enough, the soil will filter out nearly all of the remaining minute solids and pathogens, and some of the nitrogen.

Minimize the Volume of Household Wastewater

Reducing the volume of wastewater entering the treatment system is important because less flow (volume) means more time for treatment, longer system life, and less chance of overflow. The amount of water used depends upon the

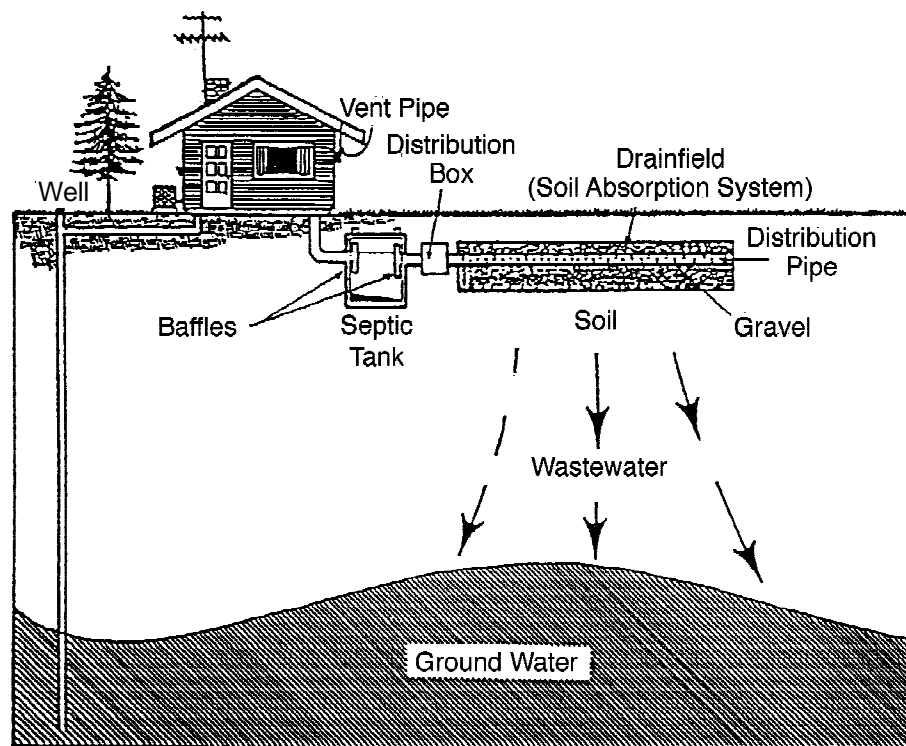


Figure 1. A typical household wastewater treatment system.

Table 1. Water use by conventional fixtures and water-savings fixtures and devices.

Conventional fixture	Gallons used	Water-saving fixture/device*	Gallons used
Toilet	4-6/flush	Air-assisted toilet	0.5/flush
Shower head	4-6/min.	Low-flow	2.0/min.
Faucets:		Faucet-flow-control aerators:	
Bathroom and kitchen	4-6/min.	Bathroom	0.5/min.
		Kitchen	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 Coop. Ext. Circ. 302.

number of people in the home, how they use water, and maintenance of the plumbing system. Average water use in rural households is 40 to 50 gallons per person per day. With low-flow fixtures and individual attention, a reduction to fewer than 25 gallons per person per day is possible (See Table 1).

Consider the following ways to reduce water use:

- * Handle waste as solids. Eliminate nonfunctional uses, such as flushing toilets to dispose of tissues or other wastes that should be handled as solid waste. Turn off water between uses. Compost food waste rather than using the garbage disposal.
- * Fix and maintain plumbing.
- * Use low-flow fixtures (see Table 1 for water saving comparison).
- * Consider using the new composting toilets. For more information, call the National Small Flows Clearinghouse (see the Contacts and References section).
- * Use a suds saver for washing clothes.
- * Do not connect foundation drains or down spouts to the septic system.

Divert clear water away from the house, well, and wastewater treatment

system. Don't allow water that doesn't need treatment to add to your waste volume.

Use a sensor-controlled water softener. Water softeners may be significant users of water. Sensor control systems save water wasted by unnecessary regeneration cycling.

Contaminants in Wastewater

Contaminants found in wastewater include:

- * Bacteria and viruses. Some organisms can cause disease in humans. Most microorganisms are removed by settling and filtration through the soil. In coarse, sandy soils, viruses may travel long distances.
- * Organic solvents. Cleaning agents and fuels may not be completely degraded or removed through treatment. The remaining solvents can pass with the wastewater into the ground water supply.
- * Nutrients. The most notable include nitrogen from human wastes, phosphorus from detergents, and some chemical water conditioners. Nitrate-nitrogen is the most common ground water contaminant.

Consider the following ways to improve wastewater quality:

- * Do not put items such as fats, grease, coffee grounds, and paper towels down drains because they may clog septic tanks.
- * Avoid putting toxic substances (such as acids, oils, paints, disinfectants, and pesticides) down the drain. Normal use of chlorine bleach and cleaners is acceptable.
- * Do not use chemicals to clean or "sweeten" your system. They may interfere with the biological action in the septic tank, clog the drain field by flushing sludge and scum into the lateral lines, or add toxic chemicals to ground water.

Disposal of Wastewater and Pumpage

Proper off-site disposal of wastewater can help protect the local farmstead water supply. This is done by connecting to a municipal sewage system, hauling to a municipal treatment facility, or land spreading. 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.

Holding tanks collect and hold the entire wastewater flow. Disposal is generally done by a licensed contractor who spreads the waste on the land (at an approved site), or hauls it to a municipal waste treatment facility. Tank size should allow for ample capacity to accommodate pumpage and disposal at convenient and appropriate times, especially for land spreading. The tank should be checked for leaks when it is pumped.

Disposal of pumpage from septic tanks and other treatment systems. Disposal of treatment system pumpage should follow similar rules as for wastewater. Sludges are more concentrated than treated wastewater, so lower application rates are recommended. Land application of wastewater and sludge must be done only on sites permitted by the Solid Waste Manage-

ment Service of the Department of Environmental Quality (DEQ). Land applied-solid waste and sludge must meet specific requirements, including soil type, depth to ground water or bedrock, slope, and distance from well and residence. Matching nutrient applications to crop nutrient needs is critical. Contact your county Cooperative Extension agent or private crop consultant for assistance in developing a waste utilization plan.

Evapotranspiration. Application of wastewater near the soil surface provides an opportunity to recycle nutrients and to further reduce the contaminant content of wastewater in a safe manner. Evapotranspiration absorption systems must be located on one acre or more. Consider proper application time to minimize surfacing of wastewater, maximize plant uptake of nutrients, and further reduce microorganisms. When selecting a site, consider site characteristics, such as soil type, land use, hydrogeology, climate, slope, and distance from well and residence.

Lagoons. Plans for individual residential lagoons must be approved by the DEQ prior to construction. Total retention lagoons can be used on a lot of 2-1/2 acres or more and where the percolation rate exceeds 45 minutes per inch. The minimum lot size does not apply to plats filed prior to Jan. 1, 1974. However, any existing residence having a failing absorption field may be approved for a lagoon or alternative system when additional lateral lines cannot be installed or will not be effective.

Locate lagoons as far from the farm home as practical and where the prevailing winds will carry odors away from houses. If the lagoon is downhill from the source, gravity can transport the waste. Consult your agricultural Extension agent, your county soil conservationist, or the DEQ for regulations governing the location of lagoons relative to wells.

Aerobic (oxygen-using) biological systems yield a better quality effluent suitable for more disposal options. Aerobic tanks must have at least 1,000 gallon liquid capacity.

Assistance With Failing Systems or New Designs

Contact your plumber or treatment system installer if you suspect your household wastewater treatment system is backing up or your distribution system is clogged. Your county sanitarian is the person to see for permits to repair or replace your wastewater treatment system. Remember the following:

- * Do not use septic tank cleaners that contain degreasing solvents, such as TCE—they can contaminate ground water.
- * Do not place more soil over an absorption field when seepage oozes to the ground surface. This does not fix the system and seepage will surface again.
- * Do not pipe the sewage to the road ditch, storm sewer, stream, or farm drain tile. This pollutes water and creates a health hazard.
- * Do not run the sewage into a sink hole or drainage well.
- * 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.

To install a septic soil absorption system, a homeowner first must obtain the necessary permits from the local health department or the DEQ. Permits are required to ensure the system will be properly designed and installed.

For more information concerning applicable regulations and permit requirements, contact your county sanitarian through your county health department, or the Department of Environmental Quality.

Contacts and References

Who to call about...

Household Wastewater Treatment and Local Regulations—Contact your city or county health department.

A Statewide Regulation of Private Sewage Systems—Contact the Okla-

homa Department of Environmental Quality. (DEQ). 405-271-1400

Requirements for Land Application—Consult the Oklahoma Department of Environmental Quality. (DEQ). 405-271-1400

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.

Small Scale Waste Management Project, University of Wisconsin-Madison, 1450 Linden Drive, Madison, Wisconsin 53706, 608-262-0853 or 608-262-6968.

What to read about...

Design, Installation, Use and Maintenance of On-site Sewage Systems

Residential Sewage Disposal. Oklahoma State Department of Environmental Quality Bulletin 600.

Septic Tank Systems for Homes. Oklahoma State University Cooperative Extension Service, 4 pages. OSU Extension Facts F-1656.

Septic Tank Maintenance. Oklahoma State University Cooperative Extension Service. 2 pages. OSU Extension Facts F-1657.

Soil Facts—Septic Systems and Their Maintenance. 1990. The North Carolina Agricultural Extension Service. AG-439-13.

Soil Facts—Investigate Before You Invest. 1990. The North Carolina Agricultural Extension Service. AG-439-13.

Onsite Domestic Sewage Disposal Handbook. First Edition. 1982. Midwest Plan Service. MWPS-24. 40 pages. Includes information on septic tanks, soil absorption systems, site selection, distribution systems and other systems such as aerobic treatment and holding tanks.

Water-saving Toilets and Showerheads

“How To Save Water,” *Consumer Reports*, July 1990, pp. 465-473. *

The Oklahoma Cooperative Extension Service—Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources, and environment; home economics; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

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- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and based on factual information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

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