



## MONTGOMERY COUNTY HEALTH DEPARTMENT HOME HEALTH AGENCY

400 Sallsbury Street • Montgomery City, MO 63361  
Phone: 573 564-2495 • Fax 573 564-5059 • Web: [www.montgomerycountyhealth.org](http://www.montgomerycountyhealth.org)



Public Health  
Prevent. Promote. Protect.

### COUNTY REAL ESTATE TAXES MUST BE PAID BEFORE PERMIT APPLICATION WILL BE APPROVED!

Please read the important information below and on the back of this page **BEFORE** completing the on-site sewage system permit application.

1. The role of the Environmental Services as the assigned administrator of County Sewer Ordinance is to provide:
  - a. Information
  - b. Permit application review
  - c. A preliminary on-site inspection to verify the permit application information and compliance with local regulations
  - d. A final installation inspection.For registered contractors a **TWENTY-FOUR**-hour notice is required before backfilling trenches. Non-registered contractors must give a **FORTY-EIGHT**-hour notice before backfilling trenches. Please contact the Environmental Health Program to arrange an inspection of your sewage system.
2. The permit fee is one hundred sixty-five dollars (\$165.00 cash, check or Credit or Debit (There is a 3% processing fee for credit or debit cards)), please make payable to the Montgomery County Health Department. The application will not be reviewed unless the permit fee is received. The permit fee covers the services mentioned in statement one. Any person requesting additional inspections or consultation after the permit is approved will be charged at the rate of twenty-five dollars per hour (\$25.00/hour) or any portion of an hour thereof including travel time.
3. The Environmental Services does not design on-site sewage systems. Home owners may install their own system if they attend and pass the OWTS classes. Alternative systems are required to be designed by a licensed professional engineer. The Montgomery County Health Department does not warranty or guarantee the installed system.
4. THE APPLICANT IS RESPONSIBLE FOR FULLY COMPLETING THE PERMIT APPLICATION AND PROVIDING ANY DOCUMENTATION REQUESTED BY THE ENVIRONMENTAL SERVICES. ALL INFORMATION MUST BE ACCURATE. ANY PERMIT APPLICATION WHICH IS INCOMPLETE OR INACCURATE SHALL NOT BE APPROVED.  
The application must include: the diagram of the system location (complete with distances to structures, water sources and property lines), and the application must be signed by the owner or agent of the owner.
5. Undeveloped lots must meet all the minimum setback acreage requirements. There shall be no exceptions. Developed lots existing prior to January 1, 1996 may be granted variances by the Montgomery County Board of Review.
6. If you have questions, contact this office at 573-564-2495 to set up an appointment with the Environmental Public Health Specialist. You may drop off the application during the health department's normal business hours or send it by mail.

SEE BACK OF THIS PAGE FOR MORE INFORMATION!

Specifications:

1. All new buildings, private or commercial, where people live, work, or assemble are required by County Ordinance to obtain a permit for all septic system installations. Before the occupation of said buildings a permitted, to code, septic system shall be installed and in operating condition. Commercial business wishing to install a lagoon must apply to the Missouri Department of Natural Resources in Jefferson City, MO for a construction permit – call 573-751-2729. A list of registered installers is available at <http://health.mo.gov/living/environment/onsite/ose/Montgomery.php>.
2. All permitted systems (including lagoons) shall have either a percolation test or a soil morphology examination performed by a person or persons registered with the State of Missouri. Results of these tests must be submitted with the permit application. A list of registered soil scientists is available at <http://health.mo.gov/living/environment/onsite/counties/index.php>.
3. Diagram specifications for sites plans:
  - A. Plans for absorption field showing the following:
    1. Field locations with slope(s) indicated or with contour lines based on field measurement. If field areas are essentially flat or of uniform grade, spot elevations will be required for alternate systems.
    2. Field layout, length spacing connection, pipe sizes and cleanouts details, invert elevations of flow distribution devices and laterals, valves and appurtenances (accessory);
    3. Trench plan and profile drawings and flow distribution device details;
    4. Location and design of associated surface and groundwater drainage systems;
    5. Name, address and telephone number of the person(s) drafting the plans; and
    6. Any other information required by the administrative authority.
  - B. Alternative systems whether specifically described in this rule must have:
    1. Engineer diagram required.
4. Any person planning on building in Montgomery County must apply for a building permit from the office of Planning and Zoning – located across 4<sup>th</sup> Street from the health department at 310 Salisbury, Suite D, Montgomery City, MO 63361 or call 573-564-2142.



## Montgomery County Health Department MO

### Montgomery County Missouri On-Site Wastewater Treatment System Property Owner Installation and Repair

Please check with your local Environmental Public Health Specialist (EPHS) and the "Missouri Laws for On-Site Sewage Systems" Sections 701.025 through 701.059 and 19 CSR 20-3.060 for more In-depth help.

#### Definitions:

**Department-** Montgomery County Health Department (MCHD). This department is overseen and partnered with the Department of Health and Senior Services of the State of Missouri.

**Environmental Public Health Specialist (EPHS)** - Performs professional work involving the protection and promotion of public health and the environment by ensuring compliance with Federal, State and County laws, rules and regulations related to the elimination and/or prevention of environmental health, environmental impact, and occupational health hazards.

**Property Owner** – Person(s) whose name is legally on the title of said legally 'Recorded' Real Estate, with the Montgomery County Recorder of Deeds.

**Existing System-** An on-site sewage disposal system in operation prior to September 1, 1995 – and being of continued use.

**Minor Repairs** – Minor Repairs are allowed to be done without a permit. Examples of minor repairs would be, but not limited to:

- *Replacing no more than one length of broken or collapsed pipe due to heavy equipment travelling over pipe; ( maximum length of 20ft. per onsite system )*
- *Replacing broken/missing clean-outs;*
- *Installing risers on tanks to bring the manhole closer to final grade;*
- *Replace baffles inside tanks;*
- *Pumping of tanks;*
- *Adjustment of distribution devices;*
- *Replacement of pumps, floats, or control panels and;*
- *Performing routine maintenance of system.*
- *Grading for surface water diversion.*
- *If there is question of it being a Minor or Major repair; Call your Local EPHS to get the correct understanding of this repair*

**MONTGOMERY COUNTY HEALTH DEPARTMENT  
SEPTIC SYSTEM APPLICATION RECEIPT**

**COUNTY REAL ESTATE TAXES MUST BE PAID BEFORE PERMIT APPLICATION WILL BE APPROVED!**

Permit # \_\_\_\_\_  
Receipt # \_\_\_\_\_

Received   /  /    
Expires   /  /  

Property Owner/ Agent \_\_\_\_\_ Phone \_\_\_\_\_

Mailing Address \_\_\_\_\_

Site Address \_\_\_\_\_

Email Address \_\_\_\_\_

Directions to Site \_\_\_\_\_

Please fill out all information on this form. **NO** work may begin on the septic system until a completed application form accompanied by a copy of the soil test is turned into the office of Environmental Services, and the local sanitarian has conducted an on-site evaluation of the proposed system and has given approval of the proposed plans. Further instructions can be found on the cover page of the permit packet, please read these instructions completely. *This receipt is proof that the permit fee has been paid*

Signature of Owner/Agent: \_\_\_\_\_ Date \_\_\_\_\_

**MONTGOMERY COUNTY ENVIRONMENTAL SANITATION ON-SITE  
SEWAGE DISPOSAL SYSTEM PERMIT APPLICATION**

**OFFICE USE ONLY**

Received \_\_\_/\_\_\_/\_\_\_      Approved \_\_\_/\_\_\_/\_\_\_      Paid \$165 on \_\_\_/\_\_\_/\_\_\_  
 Expires \_\_\_/\_\_\_/\_\_\_      Reviewed by: \_\_\_\_\_ TAXES PD \_\_\_\_\_      Permit # \_\_\_\_\_

**COUNTY PROPERTY TAXES MUST BE PAID BEFORE APPLICATION WILL BE APPROVED!**

1. Property Owner/Agent _____	Home Phone (____) _____
Mailing Address _____	Work Phone (____) _____
_____	Email: _____
Site Address _____	Lot # _____ Lot Size _____
_____	
Directions to Site (From Montgomery City):	Parcel ID # _____
_____	
Legal Description : Section _____ Township _____ Range _____	

2. Type on Installation:	<input type="checkbox"/> New	<input type="checkbox"/> Modification/Repair
Type of Building:	<input type="checkbox"/> Single-Family	<input type="checkbox"/> Multi-Family <input type="checkbox"/> Business
Number of Bedrooms:	_____	
Water Supply:	<input type="checkbox"/> Public	<input type="checkbox"/> Private

3. Soil Information:	<input type="checkbox"/> Percolation Test	<input type="checkbox"/> Soil Morphology/Evaluation
----------------------	---	---

**\* Percolation tests and/or soil evaluations must be performed by a qualified person prior to design of designing of the system. Include the results with the completed application and \$165.00 permit fee.**

4. Proposed System (Complete only pertinent information)
4A. <input type="checkbox"/> Waste Stabilization Pond (Lagoon)
Dimensions (length x width or diameter): _____
Total Water Surface Area (square feet): _____
Working Depth: _____
Distance of: Overflow to property line _____
Nearest property line _____
Nearest neighboring residence _____
Setbacks from residence _____

4B. <input type="checkbox"/> Sewage Tank	
Type of Tank: <input type="checkbox"/> Conventional Tank <input type="checkbox"/> Aeration Unit	
Manufacturer: _____	
Material: <input type="checkbox"/> Concrete <input type="checkbox"/> Plastic <input type="checkbox"/> Fiberglass <input type="checkbox"/> Metal <input type="checkbox"/> Other	
Volume (gallons): _____	
Absorption Field: Total Absorption Area _____	
# If Trenches _____ Trench Width _____ Trench Depth _____	
Distance of:	Tank to well _____ Tank to residence _____
	Field to well _____ Field to residence _____
	Field to property line _____ Field to stream or lake _____
	Field to water lines _____

4C.  Alternative System

Low Pressure Pipe System     Single Pass Sand Filter     Wellands

Mound System     Drip Irrigation     Other (Specify) \_\_\_\_\_

**Include engineer design and other supporting information**

5. Installer

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Registered:  Yes     No

**\*All information contained in and with this application is true and accurate to the best of my knowledge.**

6. Signature of Owner or Agent: \_\_\_\_\_

Date: \_\_\_/\_\_\_/\_\_\_

7. Site Layout

1. Show property lines and dimensions to reflect the shape and size of the property.
2. Diagram proposed system. Show appropriate elevations to indicate proper fall for system.
3. Show distances to house, well, water lines, property lines, geological features such as sinkholes, rock outcrops, lakes, ponds, creeks, etc.
4. Show distances to neighbors wells, homes, etc.
5. Show locations of all percolation test holes or soil evaluation test pits.
6. Indicate any known easements that exist for utilities, roads, private driveways, or other easements.



ADV.	Orf, Jr.	Billy	N/A	5/31/2023	Billy Orf & Sons	26450 Pike 323	Bowling Green	MO	63334	(573) 470- 6269	Lincoln, Audrain, Warren, Pike, Ralls, Montgomery
ADV.	Orf, Jr.	Les	N/A	5/31/2025	Orf Construction	15181 Pike 313	Bowling Green	MO	63334	(573) 324- 3552	Lincoln, Audrain, Warren, Pike, Ralls, Montgomery
ADV.	Page	Frank	R	6/30/2024	J-L Page Excavation	32151 Hwy 94	Hermann	MO	65041	(573) 690- 0326	Gasconade, Montgomery, Warren, Franklin
ADV.	Schneider	Duane	A	06/30/2025	A & S Septic & Utilities	PO Box 280	New Melle	MO	63365	(636) 398- 6176	St. Charles, Lincoln, Warren, Montgomery
	Smith	David	L	11/30/2025	Smith Septic	126 Porter Rd	Montgomery City	MO	63361	636-359- 6346	Montgomery, Callaway, Audrain, Pike
ADV.	Starks	Rick	L	11/30/2025	Rick Starks Excavating	22232 Shelton Rd	Warrenton	MO	63383	(636) 456- 3718	Warren, Lincoln, St. Charles, Montgomery
ADV.	Turpin	Mitchell		02/28/2023	M. Turpin Services	PO Box 321	Wright City	Mo	63390	636-262- 6230	Montgomery, Gasconade, Warren, Franklin
ADV.	Weber	Justin	K	5/31/2025	Jakes Backhoe & Construction	337 W. 10th St.	Hermann	MO	65041	(573) 619- 9703	Montgomery, Gasconade, Warren, Franklin
	Whalen	Scott	E	09/30/2025	Whalen Services, LLC	6932 State Rd T	Auxvasse	Mo	65231	573-386- 5748	Callaway, Audrain, Montgomery



## Onsite Soil Evaluators List

Complete list available at:

<http://health.mo.gov/living/environment/onsite/ose/index.php>

Montgomery County (March 25, 2022)

Last Name	First Name	MI	Date of Expiration	Business	Address	City	State	Zip Code	Business Phone
Bauer	John	H	10/31/2022	On-site Soils, Inc	4077 N. Saint Peters Pkway, Suite 110	St Peters	MO	63304	(888) 878-1461
Meinert	Dennis	M	10/31/2022	Home & Farm Soil Consulting	835 Gerling Lane	New Haven	MO	63068	(573) 237-5081
Roth	Matt	W	3/31/2023	On-Site Soils	4077 N Saint Peters	St Peters	MO	63304	(888) 878-1461

**Major Modification and Repairs-** The redesigning, alteration, or expansion of an on-site system by relocation of the system or a part of the system; replacement of septic tank; or construction of a new absorption field.

Other definitions can be found in the booklet "Missouri Laws Accompanied by Department of Health and Senior Services Rules - Governing On-Site Sewage Systems"

### Self-Installation by the Property Owner

A property owner may install, add to, alter or repair their own on-site wastewater treatment system that serves their residence. Before beginning construction, they must obtain any and all permits that are required to conform to all state and county rules, regulations or ordinances. All construction and excavation must be done by the property owner. The property owner may contract out any or all parts of the construction to a Registered On-site Wastewater Treatment System (OWTS) Installer who is registered with the State of Missouri and Montgomery County, and is in good standing (not suspended or lapsed on certification). The property owner is required to meet all regulations and requirements for the Missouri Laws and the Montgomery County Ordinances for On-Site Sewage Systems. *Examples of these requirements include, but are not limited to:*

- Drawings/Designing of proposed work to be done
- Horizontal set-back distances
- Vertical separation distances
- Tank and absorption field sizing
- Lagoon sizing
- Inspection notifications and
- Proper minimum construction standards as found in 19 CSR 20-3.060.
- Obtain instruction/knowledge of proper installation

### Beginning 'Check Steps' to make your installation go a little easier:

- Meet with your local Environmental Public Health Specialist (EPHS) at the Montgomery County Health Department (MCHD) before starting your project. Your Local EPHS will be working closely with you throughout the planning, installation and inspection of the system.
- Read over this entire pamphlet to gain a general idea and plan of what you want to have upon completion of the On-Site Wastewater Treatment System job.
- Look over the definitions provided on page 1, and decide if this a minor repair or major repair to an existing system? If you are not sure, contact your local EPHS.
- If this is a major repair, it is required that you first notify the county EPHS at the Montgomery County Health Department before making any modifications or repairs to an existing on-site sewer system. Your local EPHS will provide technical assistance regarding the system's major repair or modification.
- Is this going to require the installation of a new On-Site Wastewater Treatment System? Your local EPHS will provide technical assistance regarding the type and location of the system to be installed when processing your application.

When a major repair to an existing system is needed, you may need to obtain a soil report; and with a new On-Site Sewage System you will definitely need a Soil Report. You can call your EPHS to get any answers; including a list of local Soil Evaluators that work within the Montgomery County area.

Are you going to perform the job yourself or contract out to a registered installer? Your local EPHS will help you review the rules for self-installation of On-site Sewage System Installation by property owners and help you with your plans. If you decide to contract out either part or the entire job; your local EPHS can supply you with a list of DHSS Registered Installers that are listed with Montgomery County. You can also find this list of DHSS Registered Installers on-line at: <http://health.mo.gov/living/environment/onsite/counties/Montgomery.php>  
Always contact the local EPHS to confirm that a listed individual can install systems within Montgomery County; as no person may construct, modify or repair an On-Site wastewater Treatment System in a manner which does not comply with the State/County standard.

### **Time to 'Check Step' for an appointment to meet with your local EPHS:**

Prepare to meet with your EPHS Inspector; find out what Permits are required for this project by preparing designs and drawings that you will need to present to your local EPHS Inspector.

Depending upon your sewer repair needs, or in case a new On-site Wastewater Treatment System is required, it may be time to purchase your permit: Permits cost \$165. Please remit payment to the MCHD office. This is a non-refundable fee.

Carefully read the instructions of the first page that is attached to the purchased On-site Sewage System Permit. Complete and present the application and return application to the MCHD office.

Knowing the rules of proper installation will make your job easier. By becoming properly schooled, you may choose to do any or all of the following before starting your project:

1) Attend the installer's training provided by the Department of Health and Senior Services (DHSS). You may view OWTS training schedules and gain more information listed on-line at: <http://health.mo.gov/living/environment/onsite/courses.php>

2) Go on-line to carefully review in-full the Missouri Laws for On-Site Sewage Systems at <http://health.mo.gov/living/environment/onsite/lawsregs.php>

3) Acquire the booklet provided by DHSS: "Missouri Laws Accompanied by Department of Health and Senior Services Rules Governing On-Site Sewage Systems" as a reference manual either through your local EPHS or on-line at: [http://health.mo.gov/living/environment/onsite/pdf/onsite\\_ref\\_book.pdf](http://health.mo.gov/living/environment/onsite/pdf/onsite_ref_book.pdf)

### **'Check Steps' for the rules that guide the Do-It-Yourself Installer:**

Did you call your local EPHS to do an inspection of the proposed planned site, before beginning your project? A recorded property ID number will be needed. This can be obtained from

the Montgomery County Assessor's office. The EPHS will need the name, address and telephone number of the person drafting the plans, as well as copies of all reports.

- Have you taken into consideration all areas of the project's requirements and needs for a successful plan? Plan your project carefully. The design, construction, operation and maintenance of the sewer system that you plan, will be your responsibility as the owner, developer, designer, installer and user of the system.
- Does the absorption field location in your plan indicate slopes with contour lines based on field measurement?
- In your plan, did you include in your field layout - its length, spacing, connection, pipe sizes and cleanout details?
- Did you include distribution devices, laterals, and valves for invert elevations to meet the need of flow through the system?
- Does your trench plan and profile drawings, which is vital to the success of the system, include the flow distribution device details?
- In determining the location of your field, did you include in your design an associated surface and ground water drainage system? Beware of the possibilities of surface water flooding or a shallow water table.
- Is the entire Onsite Wastewater Treatment system located on property owned and controlled by you, with unlimited use and access for inspection and maintenance, and is recorded with the Montgomery County Recorder of Deeds?
- Are 'Setbacks' being met to comply with State and County standards. How does the land lay, and will the system fit within the proposed area?
- Included with the above question concerning set-backs; did the soil test determine that the system will need to be moved to another location on the property?
- Did you take into consideration other areas of concern for set-backs? Examples may include: the locations of the proposed home-site or established dwelling, the location of property lines, roads or streets that would influence surface water and sub-surface flow of water on or near the proposed site. Also consider potential ground water contamination or a nearby stream or deep well. The answers to these questions are many, depending on your system's specifications and can be found in table 1, located in the booklet "Missouri Laws Accompanied by Department of Health and Senior Services Rules - Governing On-Site Sewage Systems".
- Did all the calculations in regards to the Sewage Flow Rates for the size of the home and number of people living in the home, get figured into the design and drawing for the project? The success of your completed On-Site Wastewater Treatment System is dependent upon this vital information, to secure years of optimal functionality of your system.
- Did the calculations for the soil permeability, as found on your soil test from your Soil Evaluator, get figured into the design and drawing for the project? Is compaction an issue?
- Are there any recorded easements or underground utilities within the site's plan? You must call Dig Rite before you dig. To place a locate request by phone call 1-800-344-7483 or call 811.

- Before advancing further, have you brought your proposed 'plan' to the local EPHS Inspector for approval? Your plan must meet specification set by law. If your plan is having difficulties meeting State/County requirements; don't be afraid to ask questions. Your local EPHS is experienced and may have suggestions that you can build from.
- Have you considered the labor intensity requirement of a job this size if it is to be done by you? All construction and excavation must be done by the property owner, or the property owner may contract any part of the construction or excavation to a registered On-site Wastewater Treatment System (OWTS) Installer for installation. Certain rules apply: Any owner who declares such license exemption, and has decided to perform the work their self, must in fact be the operator of any and all excavation equipment, backhoes, trenchers, and all other equipment utilized in such installation, modification or repair. Any person other than the property owner who performs work using excavation equipment, backhoes, trenchers, and all other equipment utilized in such installation or major modification must be a licensed On-site Wastewater Treatment System (OWTS) Installer listed with the State and County.
- Have you purchased the required permits and received approval to proceed with this project through your local EPHS? You must receive this approval before continuing.
- Do you have a time frame to start and complete your project? Weather is always a factor, especially when it comes to excavation. Rainy weather will cause smearing of the sides of the trenches - which is prohibited -- and can ultimately cause system failure.
- Sewer permits will expire after 1 year and will need to be renewed. Please contact the Montgomery County Health Department for a renewal before your sewer permit expires to request the possibility of obtaining an extension, certain fees may apply. Once the permit expires, a new permit will need to be purchased. No refunds granted on purchased permits.

### **'Check Steps' for getting Assistance in working on the system:**

- Installation is a big project and you may need some help. With the property owner on site at all times, family and friends may be able to assist within certain limitations. Helpers may assist in areas of pipe carrying, holding pipe during the gluing process, shoveling dirt to secure pipe from movement, leveling, setting grade and measuring, and shoveling backfill. Operation of equipment is the sole responsibility of the property owner.
- The property owner is required to be on-site during the entire time while site work is in progress, (unless it is subcontracted to a registered installer). Property owners are also required to perform the majority of the work their self.

### **Let the work begin "Check Steps":**

- When ready to begin the actual physical installation part of your project, you must call your local EPHS to do an initial 'site inspection.' This inspection includes: A visit to the work site by the EPHS Inspector, presentation of your plan, the system's proposed layout and soil report.

- Call the EPHS during the actual work process. Do not cover any pipes, devices, tank or distribution devices, etc., before you have received clearance from your local EPHS Inspector. For example; the EPHS Inspector will need to inspect all of the following, but not limited to:
- 1.) The Installation of adequate clean-outs? One clean-out minimum and not exceeding 100' is required to be located between the dwelling and tank, and a minimum of one located every 100 feet after the tank. Is all your clean-outs above ground and properly capped?
  - 2.) Is the pipe between the tank and dwelling 4-in schedule 40 PVC pipe? This is preferred for proper strength and flow. It is required to have schedule 40, in and out of the tank, with at least 2' extended over onto virgin soil, with no couplers in the over dig area. It is also required to have water tight seals.
  - 3.) Grade will be checked for adequate flow. Are the pipes connected, sealed and glued?
  - 4.) Other area of inspection include: the level of the tank, its baffle system, inlets and outlets, the placement of sanitary tees, inspection ports, etc., will need to be visible to the inspector.
  - 5.) Absorption trenches were not installed while the soil was wet? This prevents 'smearing.' Are drains, terraces and other flow diversion methods utilized to minimize surface or ground water from loading the absorption field? Have the trenches been carefully constructed to size and depth according to your plan? Are trenches at least 18" wide and no more than 36 inches wide, with no 'one' trench longer than 100 feet? Are trenches placed a minimum of 5 feet on center apart. All of the above mentioned criteria may vary according to your plan's specifications.
  - 6.) If your system requires a Sewage Lagoon, special considerations will be evaluated and measured, such as: Was a tank properly installed between the dwelling and lagoon? Does the lagoon have a working water depth of 3 foot, with a minimum of 18" free-board on dam with proper slopes and a properly installed over-flow? Is the capacity appropriate for the size of the dwelling? Considering set-backs; were trees cleared, etc.? Splash pad installed in the bottom of the lagoon? The lagoon is not considered complete until there is a properly installed security fence.

Once your system is complete, call the EPHS Inspector for the 'final inspection.' The 'approval' of your system completes the goal of protecting public health, your family and the environment. Purposely ignoring the laws or unethical installation is dangerous and illegal.

Please check with your local Environmental Public Health Specialist (EPHS) and the "Missouri Laws for On-Site Sewage Systems" Sections 701.025 through 701.059 for more in-depth help. You may also find a PDF version of the booklet "Missouri Laws for On-Site Sewage Systems" Sections 701.025 through 701.059 and 19 CSR 20-3.060 on the web at: [http://health.mo.gov/living/environment/onsite/pdf/onsite\\_ref\\_book.pdf](http://health.mo.gov/living/environment/onsite/pdf/onsite_ref_book.pdf) or with convenient quick links at: <http://health.mo.gov/living/environment/onsite/lawsregs.php>

Contact your local EPHS at:

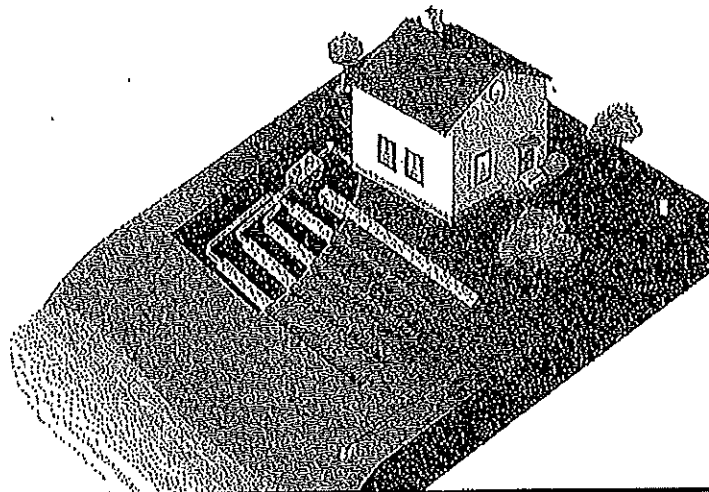
Montgomery County Health Department  
400 Salisbury St,  
Montgomery City, MO 63361  
Phone: 573-564-2495  
Fax: 573-564-5059



Missouri Department of  
Health and Senior Services

## An Onsite Wastewater Treatment System Owner's Manual

Recommended Guidelines for  
Operation and Maintenance



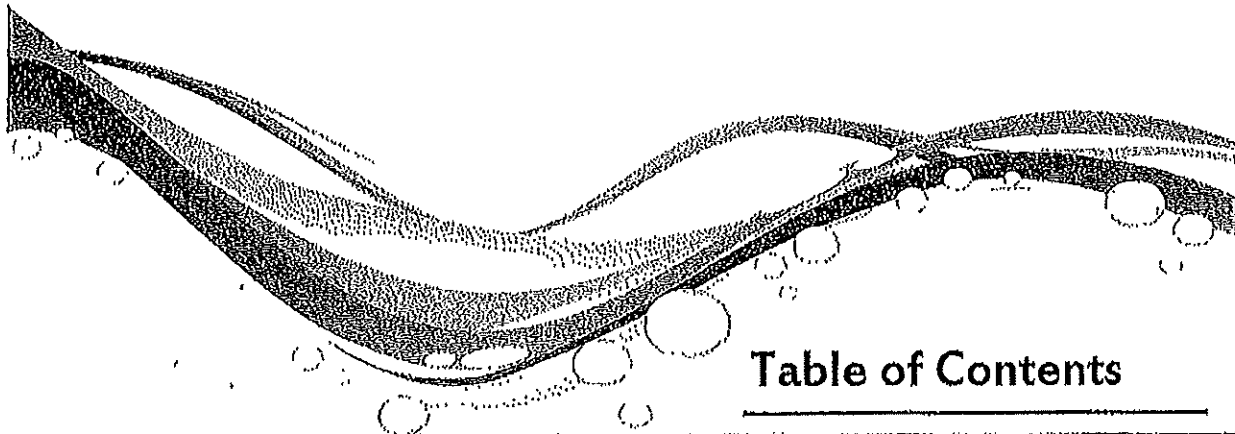
The complete OWTS Owner's Manual that includes all systems may be found online at:

<https://health.mo.gov/living/environment/onsite/pdf/SystemOwnersManual.pdf>

Or

You may also request a copy at the Montgomery County Health Department.

Version 2.0 Effective Date: January 1, 2018



## Table of Contents

### Table of Contents

Purpose, Scope, and Applicability

Introduction and How to Use the Guidelines

Reasons for Maintaining Your System

Chapter 1: Septic Tanks

Chapter 5 Lagoons

Resources

The complete OWTS Owner's Manual that includes all systems may be found online at:

<https://health.mo.gov/living/environment/onsite/pdf/SystemOwnersManual.pdf>

You may also request a copy at the Montgomery County Health Department.

Version 2.0 Effective Date: January 1, 2018



## Purpose

The purpose of these guidelines is to establish OPERATION and MAINTENANCE standards and to promote the effective management of decentralized (individual and cluster) wastewater treatment systems for the life of the systems. Effective management will ensure the level of treatment necessary to adequately protect public health and surface and groundwater quality.

## Scope

The following guidance document was developed to provide a comprehensive overview of the mechanics, design, OPERATION, and MAINTENANCE of common ONSITE WASTEWATER TREATMENT SYSTEM components utilized in Missouri. The technical standards for the OPERATION and MAINTENANCE of the various pretreatment components as well as the soil treatment systems found throughout these guidelines are highly recommended; however, they are not enforceable unless adopted by rule or local ordinance.

*Omission of or reference to a particular product, service, or manufacturer within these guidelines does not imply any denial or endorsement by the Missouri Department of Health and Senior Services.*

## Applicability

The following guidelines apply to any OWNER or user of an ONSITE WASTEWATER TREATMENT SYSTEM, REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONALS, qualified SERVICE PROVIDERS, and RESPONSIBLE MANAGEMENT ENTITIES (RME). The guidelines apply to the OPERATION and MAINTENANCE of ONSITE WASTEWATER TREATMENT SYSTEMS receiving a maximum flow of three thousand (3,000) gallons per day or less of DOMESTIC SEWAGE to include single-family residential lagoons.

ONSITE WASTEWATER TREATMENT SYSTEM (OWTS) or decentralized wastewater treatment system means a managed wastewater treatment system used to collect, treat, and disperse or reclaim WASTEWATER from individual homes, clusters of homes, establishments, or isolated communities at or near the point of waste generation.

- ♦ Individual wastewater treatment system means a system relying on natural processes and/or mechanical components to collect, treat, and disperse or reclaim WASTEWATER from a single dwelling or building.
- ♦ Cluster wastewater treatment system means a WASTEWATER collection and treatment system under some form of common ownership which collects WASTEWATER from two or more dwellings or buildings with multiple OWNERS and conveys it to a treatment and dispersal system located on a suitable site near the dwellings or buildings.

## Introduction

The performance of onsite and clustered wastewater treatment systems is a local, state, and national issue and a great concern to the Missouri Department of Health and Senior Services. Decentralized systems are used by an estimated twenty-five percent of homeowners in Missouri and are permanent components of our state's WASTEWATER infrastructure. Decentralized systems, defined for the purposes of these guidelines, shall mean managed individual onsite, or clustered, wastewater treatment systems (commonly referred to as ONSITE WASTEWATER TREATMENT SYSTEMS) used to collect, treat, and disperse WASTEWATER from individual dwellings, businesses, or small communities. Unfortunately, many of the systems in use are improperly managed and do not provide the level of treatment necessary to adequately protect public health and groundwater and

surface water quality.

Proper management of decentralized systems involves a comprehensive set of measures that encompass several elements in addition to proper OPERATION and MAINTENANCE. The U.S. Environmental Protection Agency's Voluntary National Guidelines for Management of Onsite and Clustered Wastewater Treatment Systems provides five management models for decentralized systems that address education, performance, evaluation, design, construction, OPERATION and MAINTENANCE, and corrective actions essential for a more complete MANAGEMENT PROGRAM. For more information see MANAGEMENT MODEL I, II, III, IV or V at Voluntary National Guidelines for Management of Onsite and Clustered Wastewater Treatment Systems.

## How to Use the Guidelines

Every wastewater system requires care and oversight. ONSITE WASTEWATER TREATMENT SYSTEMS do not last forever, however, following the recommendations within these guidelines can significantly extend the life of your onsite or cluster system.

The guidelines consist of various sections to assist in your understanding of the OPERATION and MAINTENANCE of an ONSITE WASTEWATER TREATMENT SYSTEM. Each chapter focuses on one component within the most common ONSITE WASTEWATER TREATMENT SYSTEMS. This was done so that a homeowner, REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONAL, or qualified SERVICE PROVIDER can custom design a user's manual specifically for your system.

*For example, if you have a septic tank with an EFFLUENT screen and gravity dispersal trenches, you should use Chapters 1, 7 and 8 of these guidelines*

*to gain an understanding of your system's OPERATION and MAINTENANCE requirements.*

In addition, defined terms are formatted in ALL CAPS. The glossary, a diagram of a system, a record keeping log, and resources are located at the end of these guidelines for additional information.

### Wastewater Treatment System Owners and Users

To achieve the best performance from your system, it is essential to know what type of ONSITE WASTEWATER TREATMENT SYSTEM you have, where it is located, and its basic OPERATION and MAINTENANCE requirements. Upon installing the system, a REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONAL may have provided an owner's manual tailored to your system that answers these questions and provides a specific service schedule. If no information about your system

## How to Use the Guidelines, continued

is available, a Diagram of System page is located at the end of these guidelines to sketch the location of any visible or known parts of your system. To assist your search, look for inspection ports, tank or valve access, and control/alarm panels. A good place to start is down slope from the house; however, if there is a pump in the system, some components may be up slope. It may be necessary to seek the expertise of a REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONAL to locate and identify the components of your system. Use the information in the following chapters to help determine which components make up your system.

Once you know what type of system you have, review the information in the appropriate chapters. Note the Do's and Don'ts and the

Warning Signs. Use the MAINTENANCE section(s) to schedule or contract with a wastewater professional to perform regular INSPECTIONS and service as needed. Always keep records of routine service and repairs. Remember to check with the local onsite WASTEWATER ADMINISTRATIVE AUTHORITY about whether a permit is necessary for any system repair.

### Wastewater System Professionals

You should give system OWNERS a detailed 'as-built' drawing of their wastewater system and any manufacturer provided owner's manual or other OPERATION and MAINTENANCE information. In addition, the appropriate sections of these guidelines should be used to support or supplement OPERATION and MAINTENANCE information for the OWNER'S specific system.

## Homeowner Responsibilities

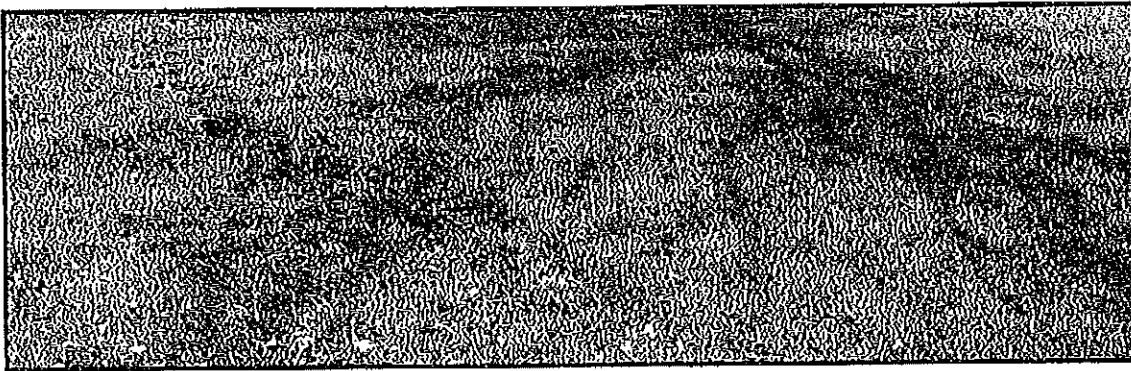
- ♦ The OPERATION and MAINTENANCE of an ONSITE WASTEWATER TREATMENT SYSTEM is the responsibility of the OWNER and user of the system.
- ♦ A permit is usually needed before a system is installed or repaired on your property. Applications are available from your local public health agency or other local onsite WASTEWATER ADMINISTRATIVE AUTHORITY.
- ♦ All ONSITE WASTEWATER TREATMENT SYSTEMS must be installed and OPERATED in accordance with the requirements specified in 19 CSR 20-3.060, Minimum Construction Standards for On-Site Wastewater Treatment Systems, and 19 CSR 20-3.015, Operation of Onsite Wastewater Treatment Systems, the manufacturer's specifications, and the designer's OPERATION and MAINTENANCE manual.
- ♦ In accordance with Missouri law, ONSITE WASTEWATER TREATMENT SYSTEMS must be OPERATED and MAINTAINED to prevent the production of odors, the creation of a habitat for insect breeding, contamination of surface water or groundwater, or creation of a nuisance or health hazard.
- ♦ In accordance with Missouri law, MALFUNCTIONING ONSITE WASTEWATER TREATMENT SYSTEMS must be remediated, repaired, and/or replaced in accordance with the requirements specified in 19 CSR 20-3.060 Minimum Construction Standards for On-Site Wastewater Treatment Systems.

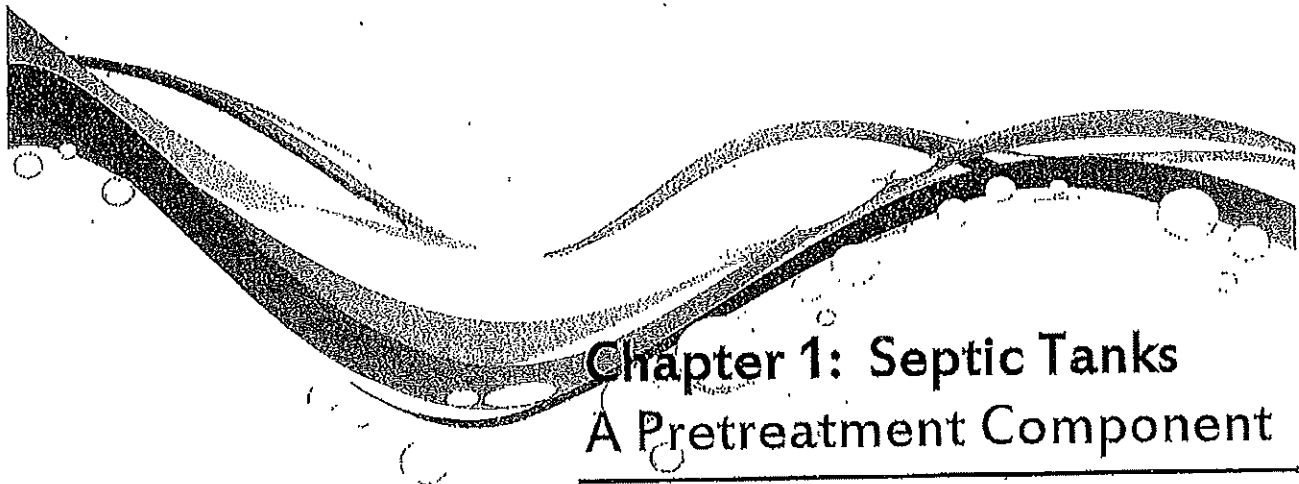
## Reasons for Maintaining Your System

For many homeowners their ONSITE WASTEWATER TREATMENT SYSTEM may easily be the most overlooked and undervalued utility in the home. If you are like many homeowners, not much thought is given to what happens to the waste that goes down the drain. Yet if you rely on an onsite system to treat and disperse your household WASTEWATER, proper OPERATION and MAINTENANCE of your system can have a significant impact on how well it works and how long it lasts.

There are three main reasons why ONSITE WASTEWATER TREATMENT SYSTEM MAINTENANCE is so important-

- ♦ The first reason is protecting your HEALTH, the health of your family, and the environment. Household WASTEWATER is loaded with disease-causing bacteria and viruses, as well as, high levels of nitrogen and phosphorus. When onsite systems fail, inadequately treated household WASTEWATER is released into the environment and can contaminate nearby wells, groundwater, and surface waters. Any contact with untreated human waste can pose a significant health risk.
- ♦ The second reason is MONEY. MALFUNCTIONING onsite systems are expensive to repair or replace, and neglected MAINTENANCE by homeowners is a common cause of early system failure. The minimal amount of preventative MAINTENANCE that onsite systems require costs very little in comparison to the cost of a new system. For example, it can easily cost more than \$10,000 to replace a failing onsite system, compared to \$200 - \$500 average per year costs to have a system routinely inspected, serviced or pumped.
- ♦ The third reason is to protect your PROPERTY VALUE. An unusable onsite wastewater treatment system or one in disrepair can cause property values to decline. It can also make it difficult to sell the property; in cases when a property transfer INSPECTION is mandated, the property sale may be delayed if the ONSITE WASTEWATER TREATMENT SYSTEM is not operating properly. In addition, building or occupancy permits may be denied for these properties. MALFUNCTIONING onsite systems can reduce property values in the area if they contribute to the pollution of local rivers and lakes that your community uses for commercial or recreational activities,





# Chapter 1: Septic Tanks

## A Pretreatment Component

### Chapter 1

Homes not served by public sewers rely on individual onsite or cluster wastewater treatment systems to treat and disperse household WASTEWATER. Household WASTEWATER includes both GRAYWATER and BLACKWATER. GRAYWATER is defined as water captured from nonfood preparation sinks, showers, baths, and clothes washing machines while BLACKWATER is that portion of WASTEWATER that originates from toilet fixtures, dishwashers, and food preparation sinks.

Household WASTEWATER contains human waste, dirt, food, toilet paper, soap, detergents, and cleaning products; which includes dissolved nutrients, microorganisms, and solid particles. Improperly maintained wastewater treatment

systems can allow these substances to contaminate groundwater and/or surface water and pose a health hazard.

A typical ONSITE WASTEWATER TREATMENT SYSTEM has four main components: a sewer line from the house, a septic tank, a soil treatment system, and the soil under and around the treatment system. The septic tank is a buried, watertight tank designed and constructed to receive all household WASTEWATER and provide primary treatment. After receiving limited treatment in the septic tank, WASTEWATER is distributed and dispersed into the soil for final treatment. Then clean water, filtered by the soil, recharges streams, lakes, and groundwater in the area.

#### What's Ahead...

- ◆ How a Septic Tank Works
- ◆ Design and Construction
- ◆ Maintenance
- ◆ Warning Signs
- ◆ Do's and Don'ts
- ◆ Glossary
- ◆ Resources

#### How a Septic Tank Works

Primary treatment means the septic tank provides short-term storage and time for the WASTEWATER to separate into layers. Tees, or baffles, provided at the septic tank's inlet and outlet are essential to the function of the tank. When raw WASTEWATER enters the tank the inlet tee slows the incoming waste, reducing turbulence so that heavier solids can settle to the bottom of the tank and form a SLUDGE layer. Lighter solids, such as grease and paper, float to the surface and form a SCUM layer. The outlet tee keeps the SLUDGE and SCUM in the tank. During this storage period bacteria digest organic material in the WASTEWATER and reduce the volume of solids that are present.

## How a Septic Tank Works continued

As new WASTEWATER enters the tank through the inlet tee, an equal amount of clarified WASTEWATER is pushed out of the tank through the outlet tee. The WASTEWATER that leaves the tank has been partially treated but still contains disease causing bacteria and other pollutants and receives further treatment in the soil treatment area. The SCUM and SLUDGE layers retained and stored in the tank accumulate over time and eventually must be pumped out.

Septic tanks provide reliable, but limited treatment of WASTEWATER. The United States Environmental Protection Agency has established five management models with progressively increasing management controls as sensitivity of the environment and/or treatment system complexity increases. MANAGEMENT MODEL I specifies appropriate program elements and activities where treatment systems are owned and operated by individual PROPERTY OWNERS in

areas of low environmental sensitivity.

The objective of this model is to ensure that-

- ◆ Conventional systems are designed and installed in accordance with appropriate state and local regulations;
- ◆ Homeowners are knowledgeable of their particular system and provide routine MAINTENANCE (INSPECTIONS and pumping) necessary for the system to operate properly, and, if needed;
- ◆ Homeowners ensure a MALFUNCTIONING system is repaired in accordance with Missouri law.

This model is generally appropriate for septic tank systems. In some sensitive environments, septic tanks can also be used as a component of a more advanced system for which MANAGEMENT MODELS II, III, or IV may be recommended.

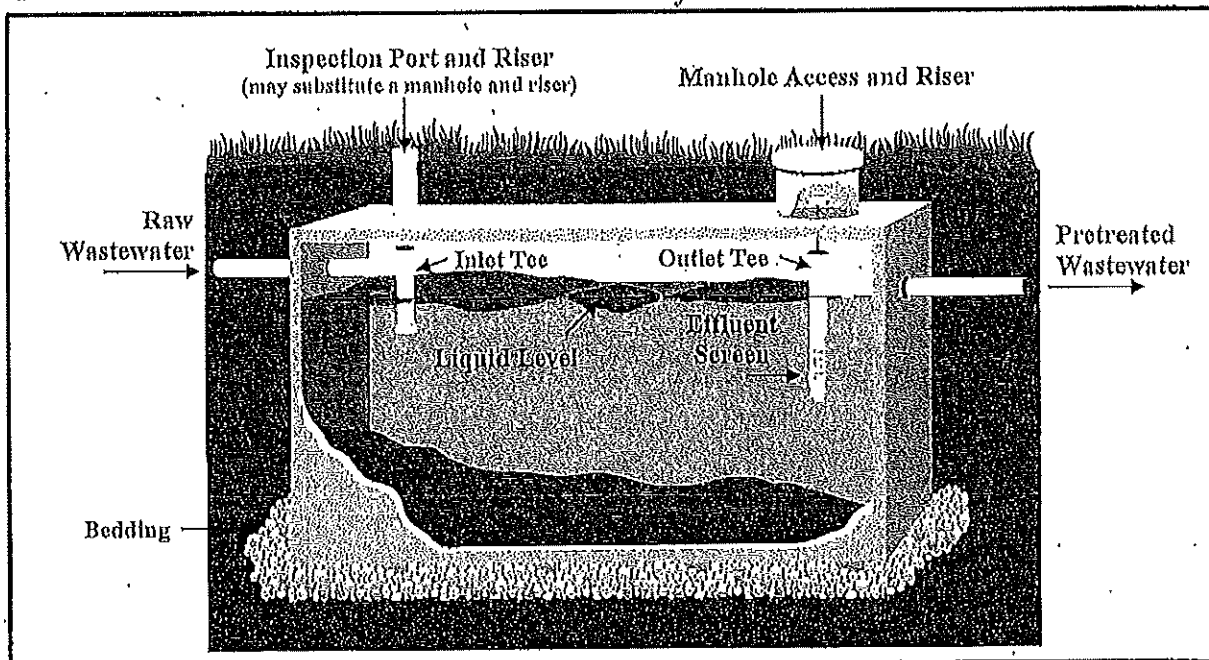


Figure 1: Septic Tank. A septic tank provides primary treatment of WASTEWATER; solids are separated from liquid and some ANAEROBIC digestion occurs.

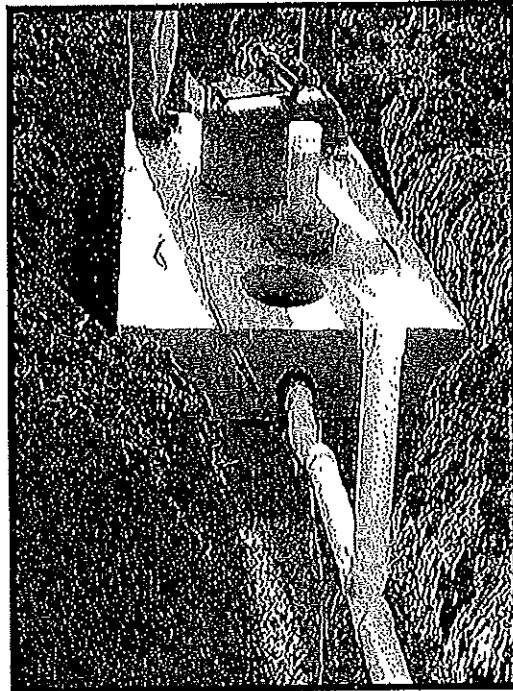
## Design and Construction

Septic tanks are typically made of concrete, fiberglass, or plastic. Installation of metal septic tanks is no longer allowed.

Septic tanks must be located:

- ♦ On firm bedding material capable of bearing the weight of the tank and its contents;
- ♦ In an area easily accessible for the removal of liquids and accumulated solids; and
- ♦ To meet the set back distances specified in 19 CSR 20-3.060 Minimum Construction Standards for Onsite Systems.

The size or liquid capacity of a septic tank is important for WASTEWATER separation and storage. For a single-family house, the liquid capacity is based upon the number of bedrooms with a minimum capacity of 1,000 gallons.



Installation of a 1,000 gallon concrete septic tank.

### DID YOU KNOW!

Bacteria and other microorganisms, which are naturally present in all septic tanks, are responsible for the beginning phase of digesting and treating WASTEWATER generated in your house. Therefore, it is important to understand how detergents, chemicals and other substances can impact the health of your septic tank system.

#### SAFE - IN MODERATION

Most detergents are intended to be mixed with water and may remain suspended in the WASTEWATER until it reaches the soil treatment area. However, if used in accordance with manufacturer's label, detergents break down over time in a properly functioning ONSITE WASTEWATER TREATMENT SYSTEM and do not impact surface or groundwater.

Diluted, normal use amounts of hand soap, bar soap, dish detergent, shampoo, multi-surface cleaners and laundry detergent are examples that are safe for ONSITE WASTEWATER TREATMENT SYSTEMS.

Disinfectants and antimicrobials such as bleach, pine cleaners, quaternary ammonium-based products, and alcohol-based products are generally safe for ONSITE WASTEWATER TREATMENT SYSTEMS if used in moderation and in accordance with manufacturer's label.

#### NOT-SAFE

In general, drain cleaners, concentrated cleaners/disinfectants, degreasers, and specialty cleaners such as oven cleaner are not safe to use with ONSITE WASTEWATER TREATMENT SYSTEMS. They can disrupt the bacteria and other microorganisms in the system that break down nutrients and eliminate pathogens.



**DID YOU KNOW!**

In order to ensure individuals are properly trained, the Missouri Department of Health and Senior Services registers several types of ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONALS. For more information about installers, onsite soil evaluators, onsite system inspectors/evaluators, and percolation testers please go to Wastewater Professionals at <http://health.mo.gov/living/environment/onsite/professionals.php>

Regular MAINTENANCE is essential for getting the best performance from your septic tank system. If too much SLUDGE and SCUM are allowed to accumulate in the tank, the incoming WASTEWATER does not have adequate time to settle, causing solids to flow into the soil treatment system and clog dispersal trenches. If clogging occurs, WASTEWATER can overflow onto the ground surface or backup into the house, where it exposes people and animals to disease-causing organisms. To prevent this from happening, it is important to inspect your tank regularly and have it serviced when needed. Septic tanks should have INSPECTION access over the inlet and outlet tees/baffles. All tanks have manholes for inspecting and pumping; minor excavation work may be needed to uncover the manhole.

Inspections

Septic tanks must be inspected at least every two years. If the system has an EFFLUENT screen or the system serves a non-residential establishment, the tank should initially be inspected at least annually. The INSPECTION may be conducted by the homeowner, a REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONAL, or other qualified SERVICE PROVIDER. The INSPECTION should include assuring:

- ♦ The septic tank is structurally sound with no corrosion, cracking, or missing parts;
- ♦ There are no signs of water intrusion;

- ♦ The septic tank, risers, manhole, access ports, lids, and covers are watertight;
- ♦ Lids and covers are locked or otherwise secured to prevent accidental entry;
- ♦ The inlet and outlet tees or baffles are in good condition and functioning properly;
- ♦ If present, EFFLUENT screens are in good condition and not clogged; and
- ♦ The SCUM and SLUDGE layers are at an acceptable thickness.



A SERVICE PROVIDER may use a tool, such as the Sludge Judge® which is a long, hollow, plastic pole marked in one foot increments to show the solids and liquid levels within a septic tank. This provides the service provider information to determine if it is time to pump the tank.



## Maintenance - Pumping

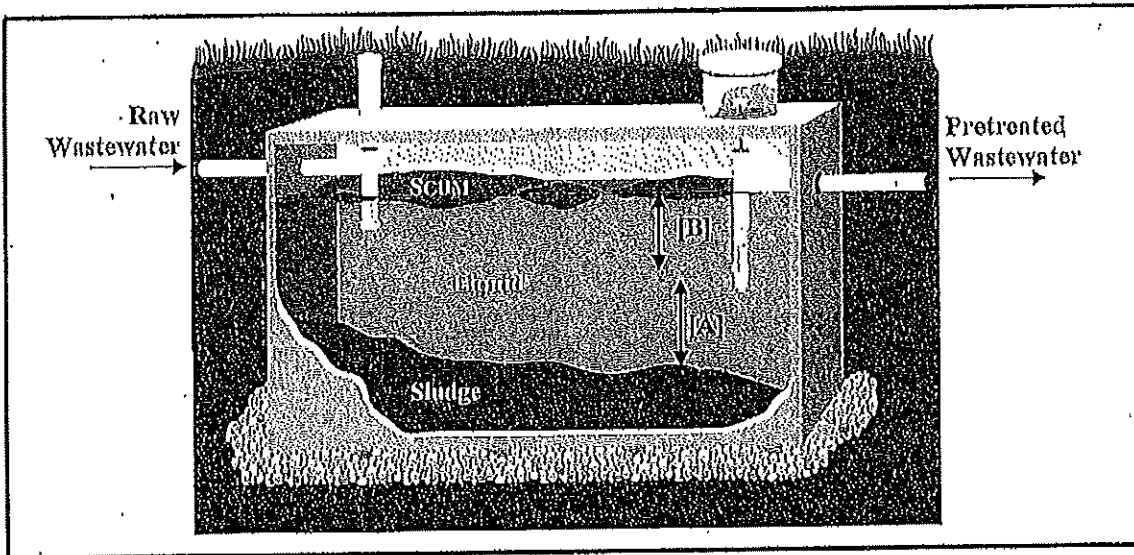


Figure 2: Septic Tank. Contract for removal of solids from the septic tank when SLUDGE is 12 inches or less from bottom of outlet [A] or when SCUM is 3 inches or less from bottom of outlet [B].

Correctly sized septic tanks are designed to accumulate solids for several years under normal conditions. As solids fill up the tank, WASTEWATER has less time to separate properly and solid particles could flow out of the tank into the dispersal trenches. If the tank is not periodically pumped out, these solids will enter the soil treatment system; clogging the system to a point that a new soil treatment area may be needed.

It is the responsibility of the homeowner or user of the septic tank system to contract with a REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONAL or other qualified SERVICE PROVIDER for the removal of the septic tank contents when needed. There are three main factors which determine the frequency at which a septic tank must be pumped:

- ♦ The liquid capacity of the tank;
- ♦ How much water flows through the system, usually related to the number of people in the household; and

- ♦ The volume of solids in the WASTEWATER, usually related to the use of a garbage disposal.

A septic tank must be pumped when the top of the SLUDGE layer is no closer than twelve inches below the bottom of the outlet tee or when the bottom of the SCUM layer is no closer than three inches above the bottom of the outlet tee. A typical 1,000 gallon septic tank serving a three bedroom home may need to be pumped roughly every two to five years; if the home has a garbage disposal, the tank generally needs to be pumped twice as often.

A REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONAL or other qualified SERVICE PROVIDER is responsible for the proper treatment and disposal of all hauled WASTEWATER by transporting to a municipal sewage treatment plant capable of receiving the waste; transporting to a sludge handling facility which possesses a current and valid permit issued for such activity; or land applying under a current and valid permit for such activity.

## Final Treatment and Dispersal

Although properly operated and maintained septic tanks are effective at providing primary treatment, the treatment is limited and WASTEWATER leaving the tank must receive further treatment before it is ready to be returned to the environment. Methods for final treatment and dispersal include discharge to a soil treatment system or a lagoon.

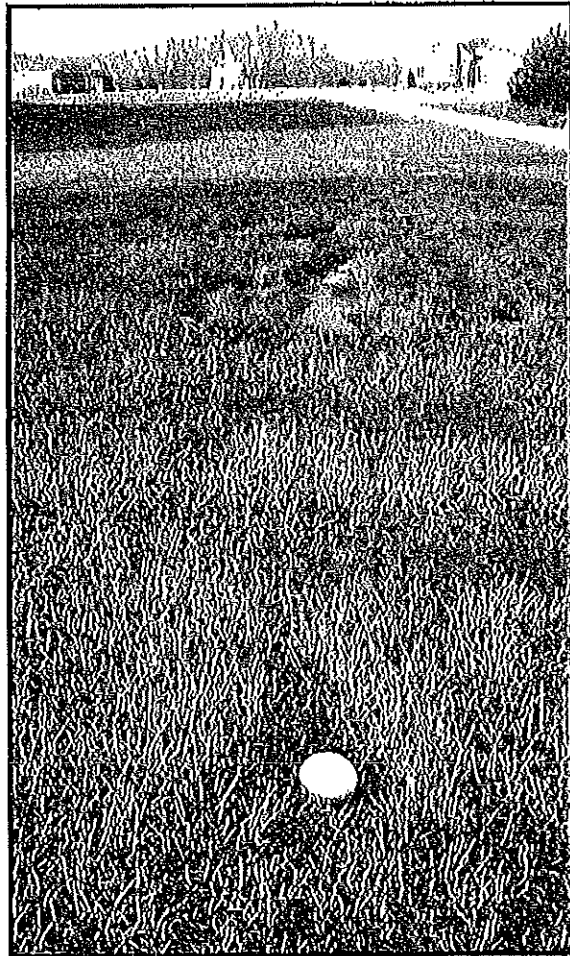
### ADDITIVES

At some point, most system OWNERS consider the use of septic tank additives. However, sufficient bacteria for WASTEWATER treatment are naturally present in a septic tank and studies do not show a benefit to the use of additives. In fact, some additives may actually harm your system or pollute groundwater.

## Warning Signs of System Malfunctioning

While proper use, INSPECTIONS, and MAINTENANCE should prevent most septic tank problems, it is still important to be aware of changes in your septic tank system and to act quickly if you suspect the system is MALFUNCTIONING. The most obvious onsite system failures are easy to spot.

- ♦ Surfacing SEWAGE, pooling water or muddy soil around your sewage tank, soil treatment system, or in your basement;
- ♦ Plumbing or septic tank backups;
- ♦ Slow draining fixtures;
- ♦ Gurgling sounds in the plumbing system;
- ♦ SEWAGE odors in the house or yard;
- ♦ Localized overgrowth of lush green grass in or near the soil treatment area; and/or
- ♦ Tests show the presence of bacteria in well water.



Surfacing WASTEWATER

Onsite systems fail when partially treated WASTEWATER comes into contact with groundwater. This type of failure is not easy to detect, but can result in the pollution of wells, nearby streams, or other bodies of water.

If you notice any of these signs, or you suspect your septic tank system may be having problems, contact a qualified SERVICE PROVIDER or the local onsite WASTEWATER ADMINISTRATIVE AUTHORITY for assistance.

## Septic Tank Do's and Don'ts

Proper OPERATION and MAINTENANCE of an onsite system can prevent costly repairs or replacement and can protect your property value. Observing the following recommendations will help to keep your system operating properly.

### Do's

- ◆ Obtain the necessary permits from the appropriate ADMINISTRATIVE AUTHORITY before making any repairs.
- ◆ Use REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONALS and qualified SERVICE PROVIDERS.
- ◆ Conserve water to avoid overloading the onsite system, use high-efficiency fixtures and promptly repair any leaky faucets or toilets.
- ◆ Have your septic tank inspected annually if it has an EFFLUENT screen or every two years if it does not.
- ◆ Have your septic tank pumped routinely. Pumping your septic tank when needed may be the single most important thing you can do to protect your soil treatment system and your investment.
- ◆ Contact a qualified SERVICE PROVIDER if you experience problems with your system, such as surfacing WASTEWATER in your yard or other warning signs the system may be MALFUNCTIONING.
- ◆ Keep detailed records regarding the system, its location, make/model, contract service agreement, service visits, and MAINTENANCE performed.
- ◆ Use commercial bathroom cleaners and laundry detergents in moderation and only according to manufacturer's directions.
- ◆ Keep your septic tank accessible for INSPECTIONS and pumping; yet locked or otherwise secured to prevent accidental entry.
- ◆ Have your private water well tested periodically or if you experience any warning signs of the system MALFUNCTIONING (contact your local public health agency).

### Don'ts

- ◆ Don't enter a septic tank. Poisonous gasses or a lack of oxygen can be fatal.
- ◆ Your septic tank system is not a trash can. Don't put dental floss, feminine hygiene products, flushable wipes, condoms, diapers, cotton swabs, cigarette butts, coffee grounds, cat litter, paper towels, paint, pesticides, or other hazardous chemicals into your system.
- ◆ Don't use caustic drain openers for a clogged drain. Instead, use boiling water or a drain snake to open clogs.
- ◆ Don't drive or park vehicles or allow livestock on any part of your septic tank system. Doing so can compact the soil in your soil treatment area or damage the pipes, tank, or other onsite system components.
- ◆ Don't build over any part of your septic tank system; this includes patios, carports, and other structures.
- ◆ Don't attempt to pump your own septic tank; use the services of a qualified SERVICE PROVIDER.

## How a Lagoon Works, continued

The ANAEROBIC zone is the layer at the bottom of a lagoon where little oxygen is present. This area includes a layer of SLUDGE, which forms from the solids that settle out of the WASTEWATER. Here ANAEROBIC bacteria and other organisms provide treatment to reduce the overall organic strength of the WASTEWATER and to slow the accumulation of SLUDGE.

Lagoons provide reliable and passive treatment of WASTEWATER. The US Environmental Protection Agency has established five management models with progressively increasing management controls as sensitivity of the environment and/or treatment system complexity increases. MANAGEMENT MODEL I specifies appropriate program elements and activities where treatment systems are owned and

operated by individual PROPERTY OWNERS in areas of low environmental sensitivity.

The objective of this model is to ensure that-

- ♦ Systems are designed and installed in accordance with appropriate state and local regulations;
- ♦ Homeowners are knowledgeable of their particular system and provide routine MAINTENANCE (INSPECTIONS and pumping) necessary for the system to operate properly, and, if needed;
- ♦ Homeowners ensure a MALFUNCTIONING system is repaired in accordance with Missouri law.

This model is generally appropriate for lagoon systems. However, in some sensitive environments, MANAGEMENT MODELS II or III may be recommended.

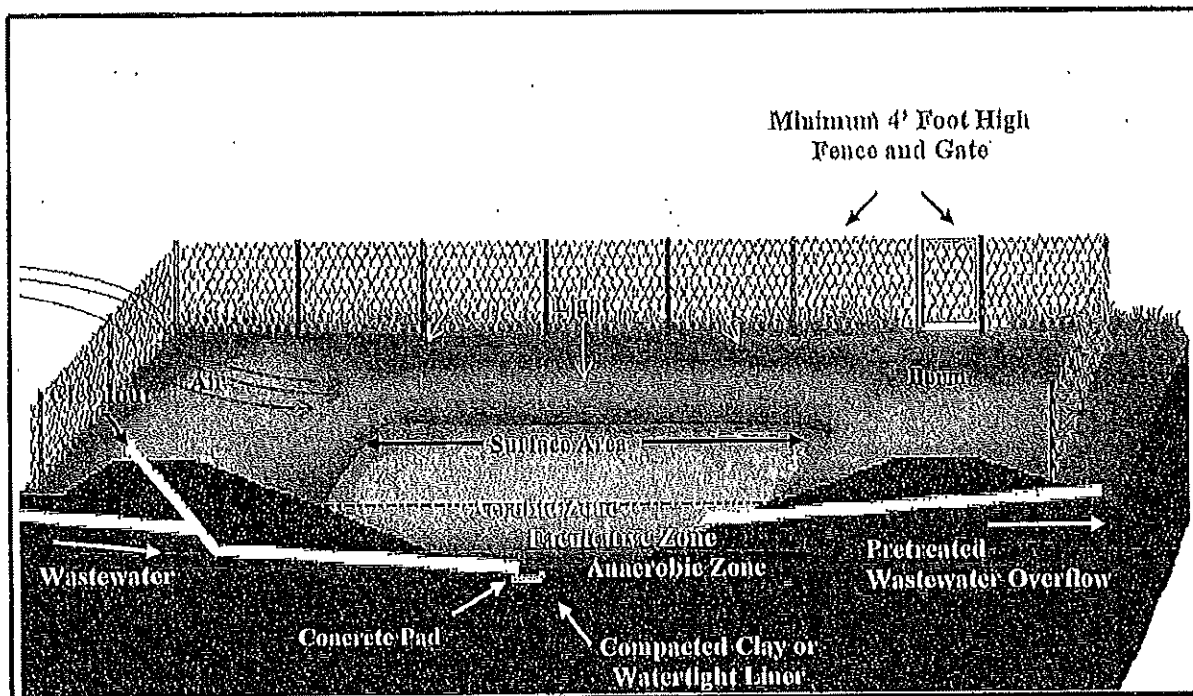


Figure 1: Lagoon. Lagoons hold WASTEWATER in a watertight basin where AEROBIC and ANAEROBIC processes help treat the water. A lagoon's large surface area and long retention time use sunlight, air movement and natural processes for WASTEWATER treatment.

## Design and Construction

In Missouri, lagoons may not be allowed on lots with less than two and one-half acres of usable land area. During the design and construction phase, the following standards need to be taken into account.

A properly sized and constructed septic tank or aeration treatment unit is recommended preceding the lagoon.

Lagoons should be located:

- ♦ On slopes of 12% or less.

Lagoons must be located:

- ♦ In an area open to prevailing winds with the water edge at least 50 feet from trees that could inhibit wind action or shade the water surface;
- ♦ Out of any natural drainage way; and
- ♦ To meet the set back distances specified in 19 CSR 20-2.060 Minimum Construction Standards for Onsite Systems.

The water surface area of the lagoon is based on the number of bedrooms (see Table 1: Size of Lagoon at the Three Foot Operating Level).

Storm water runoff should be directed away from the lagoon and the design of the berms must prevent entrance of surface water into the lagoon.

Any overflow from the lagoon must be kept out of natural drainage ditches and must be dispersed into the soils on the property from which it originated.

The lagoon area must be enclosed with a fence.

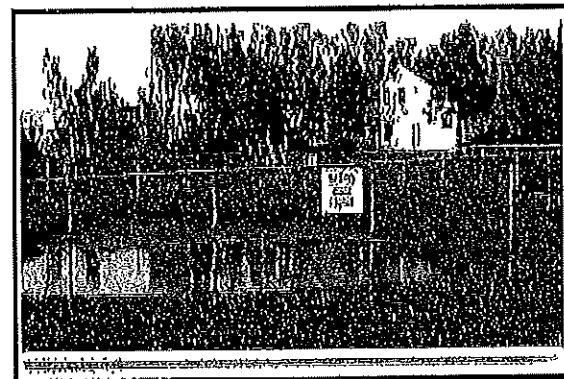
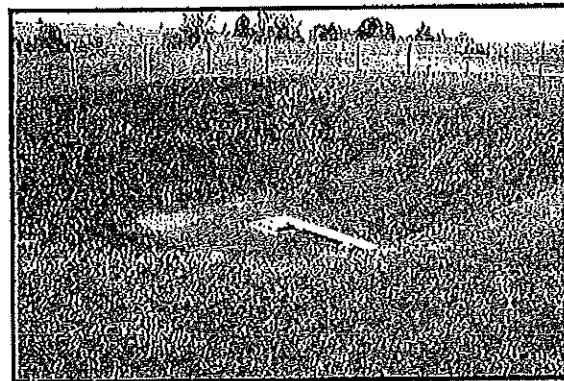
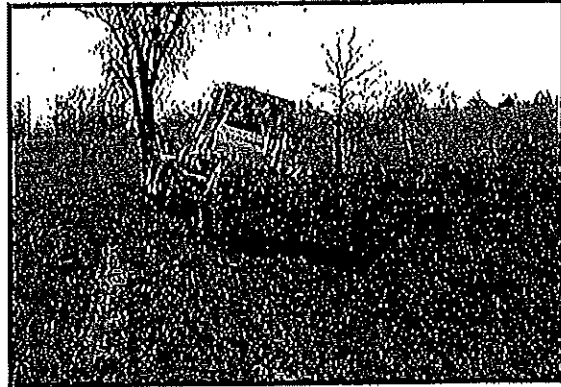


Table 1: Size of Lagoon at the Three Foot Operating Level

Number of Bedrooms	Water Surface Area (sq. ft.)
1-2	900
3	1320
4	1760
5	2200
Additional bedrooms above 5	2200 + 440 per bedroom

## Wastewater Management

WASTEWATER overflow from a lagoon must be dispersed into the soils on the property from which it originated. This may be accomplished by the following methods or as approved by the ADMINISTRATIVE AUTHORITY.

### Overflow Pipe

- ♦ The pipe should be located as far away from property lines as possible.
- ♦ Minimum distance from the outlet to the down slope property line is one hundred feet.
- ♦ The outlet pipe must be located out of any natural drainage ditches or swales. WASTEWATER cannot be concentrated; it should spread out and soak into the soil.

### Constructed Terrace Swale

- ♦ A swale can be used to lengthen the flow path, spread the WASTEWATER out, and help disperse it into the soil.
- ♦ If the distance to the down slope property line is less than 100 feet, a swale must be at least one hundred fifty feet long.

## Maintenance - Grounds Keeping

Although required lagoon MAINTENANCE is not complicated, regular upkeep of the lagoon area is important to ensure the system operates properly.

### Grounds keeping

Wind and sunlight at the water surface play important roles in the treatment of WASTEWATER in a lagoon. Surface agitation, of any kind, adds oxygen to the WASTEWATER. Therefore, vegetation around a lagoon should be maintained at least monthly in the spring and summer; lagoons need more frequent upkeep when grass and weeds grow more quickly. Mowing grass

Storage and Controlled Irrigation may be needed when there is less than twelve inches of permeable soil over a RESTRICTIVE LAYER.

- ♦ To utilize controlled surface irrigation, the pond must be capable of operating up to five feet (5') deep or have a second cell for storage.
- ♦ WASTEWATER cannot be irrigated when soils are frozen, covered with snow, or SATURATED.
- ♦ During and up to a month after irrigation, access to the application area must be restricted.
- ♦ Spray irrigation is not allowed.

### Detention/Infiltration Pond

- ♦ Detention/infiltration ponds can be used to temporarily store overflow for infiltration into the soil.
- ♦ The detention/infiltration pond must be enclosed by a fence.

### **DID YOU KNOW?**

Mowing the grass and weeding in and around your lagoon is one of the easiest and most important tasks in lagoon MAINTENANCE.

and controlling weed growth in and around the lagoon is one of the easiest and most important tasks in lagoon MAINTENANCE. Long grass and weeds block wind and provide breeding areas for flies, mosquitoes, and other insects. In addition, weeds can trap trash, grease, and SCUM, which create odors and attract insects, as well as, provides food for burrowing animals that can cause damage to banks and berms. Roots of woody shrubs and trees can create holes in the berm, which become paths for water to leak out of the lagoon.



## Maintenance - Inspections

The following should be inspected at least once per year to assure the lagoon is operating safely and properly:

- ♦ The fence and gate are in good repair and maintained in a manner that prevents the entrance of children and/or domesticated animals;
- ♦ The berm is in good condition, free from evidence of leakage, erosion, or animal burrows;
- ♦ The berm is covered with grass or other similar vegetation and maintained, within the fenced area, at a height that does not restrict adequate air movement over the lagoon;
- ♦ No trees or bushes are growing close

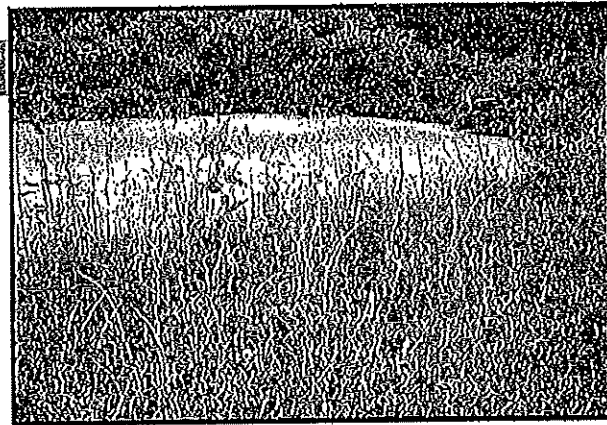
## Maintenance - Pumping

The depth of the SLUDGE layer in lagoons should be checked every two years or as needed. In lagoon systems, SLUDGE eventually accumulates to a point at which it must be removed. How often SLUDGE needs to be removed varies depending on the climate, lagoon design, use, and how well it is maintained. A properly maintained septic tank or aeration treatment unit preceding the lagoon significantly reduces SLUDGE build up in the lagoon.

It is the responsibility of the homeowner or user of the lagoon to contract with a REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONAL or other qualified SERVICE PROVIDER for the periodic removal and treatment of the accumulated SLUDGE in the lagoon. The owner or user of the system must schedule for the removal and sanitary disposal of excess SLUDGE to manage the WASTEWATER level to prevent WASTEWATER from discharging from the lagoon and flowing off of the property; while maintaining at least eighteen inches of water above the SLUDGE layer.

enough to the lagoon to cause shading, organic loading or root damage;

- ♦ Floating vegetation growing in the lagoon is controlled, so as not to interfere with natural treatment processes;
- ♦ A minimum distance of 18" inches (24" inches recommended) is maintained between the highest level of WASTEWATER and the top of the berm;
- ♦ The depth of WASTEWATER is maintained at a working water level of at least 2' feet and no more than 5' feet. For most lagoons, 3' feet is normal; and
- ♦ WASTEWATER overflow is managed and dispersed into the soil on the site.



Lagoon MAINTENANCE includes cutting grass, weeds, and trees growing near the lagoon. The lagoon berm can be damaged when woody plants are allowed to grow. Duckweed growing on the water surface and grass or weeds growing over the water's edge can interfere with treatment and harbor mosquitoes.

The WASTEWATER TREATMENT SYSTEM PROFESSIONAL or other qualified SERVICE PROVIDER is responsible for the proper treatment and disposal of all hauled WASTEWATER by transporting to a municipal sewage treatment plant capable of receiving the waste; transporting to a SLUDGE handling facility which possesses a current and valid permit issued for such activity; or land applying under a current and valid permit for such activity.

## Warning Signs of System Malfunctioning

While proper use, INSPECTIONS, and MAINTENANCE should prevent most lagoon problems, it is still important to be aware of changes in your system and to act quickly if you suspect the system is MALFUNCTIONING. The most obvious lagoon issues are easy to spot.

- ♦ The presence of weeds and long grass along the berm. The berm must to be mowed and weeded regularly;
- ♦ The presence of duckweed, watermeal, or hyacinth growing on water surface. These plants should be physically removed;
- ♦ The presence of blue-green algae. This algae is stringy and can clump and block sunlight; it can dominate lagoons when conditions are poor, when pH is low, or when protozoa eat all of the green algae. Blue-green algae can be physically removed like duckweed;
- ♦ The presence of an algal bloom. This may occur after periods of cloudy weather or abrupt temperature changes. Matted algae on the surface can block sunlight and cause foul odors and should be broken up and dispersed;
- ♦ The presence of odors. Lagoons may occasionally have odors from algal blooms, ANAEROBIC conditions, SCUM, and turnover of the lagoon contents in spring or by temporary overloading, ice cover, or atmospheric conditions. These odors may be controlled by broadcasting sodium or ammonium nitrate over the surface of the pond. In general, the amount of sodium or ammonium nitrate should not exceed two pounds per day until the odor dissipates;
- ♦ The observation of short circuiting, or dead spots in the flow pattern, due to obstructions in the lagoon or to wind on the surface. This can cause WASTEWATER to leave the lagoon too quickly, resulting in inadequate treatment of the WASTEWATER;
- ♦ The presence of erosion. Controlling burrowing animals around the lagoon can help prevent erosion of berms;
- ♦ The presence of burrowing animals; muskrats and other burrowing animals can be discouraged by weeding and mowing the lagoon berms;
- ♦ The change of water color. Bright rich green color indicates good conditions; dull green or yellowish color can indicate an undesirable type of algae is becoming dominant in the lagoon; gray or black color can indicate ANAEROBIC conditions; and tan, brown or red color can indicate either soil in the water from berm erosion or the presence of algae with different pigmentation; and
- ♦ The presence of SLUDGE accumulation. SLUDGE in the bottom of lagoons should be measured at least once per year and removed as needed.

Onsite systems fail when partially treated WASTEWATER comes into contact with groundwater. This type of failure is not easy to detect, but can result in the pollution of wells, nearby streams, or other bodies of water.

If you notice any of these signs or you suspect your system may be having problems, contact a qualified SERVICE PROVIDER or the local onsite WASTEWATER ADMINISTRATIVE AUTHORITY for assistance.



### Lagoon Do's and Don'ts

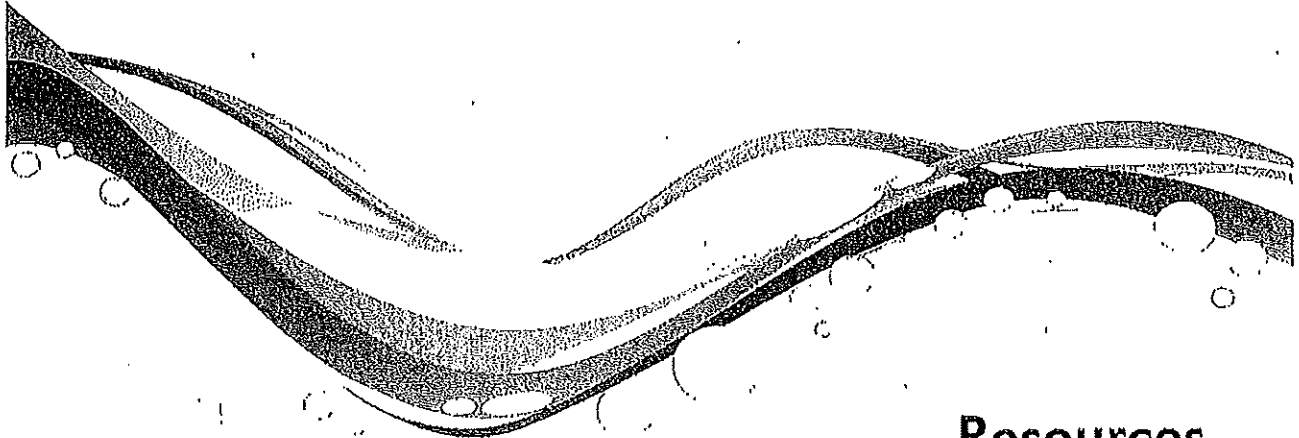
Proper OPERATION and MAINTENANCE of your onsite system can prevent costly repairs or replacement and can protect your property value. Observing the following recommendations will help to keep your system operating properly.

#### Do's

- ♦ Obtain the necessary permits from the appropriate ADMINISTRATIVE AUTHORITY before making any repairs.
- ♦ Use REGISTERED ONSITE WASTEWATER TREATMENT SYSTEM PROFESSIONALS and qualified SERVICE PROVIDERS.
- ♦ Keep the system accessible for INSPECTIONS and pumping; yet locked or otherwise secured to prevent accidental entry.
- ♦ Have your septic tank inspected annually if it has an EFFLUENT screen or every two years if it does not.
- ♦ Have your septic tank pumped routinely. Pumping your septic tank when needed may be the single most important thing you can do to protect your soil treatment system and your investment.
- ♦ Keep detailed records regarding the system, its location, contract service agreement, service visits, and MAINTENANCE performed.
- ♦ Conserve water to avoid overloading the onsite system, use high-efficiency fixtures and promptly repair any leaky faucets or toilets.
- ♦ Divert other sources of water, like roof drains, house footing drains, and sump pumps away from the soil treatment area.
- ♦ Have your private water well tested periodically or if you experience any warning signs of the system MALFUNCTIONING (contact your local public health agency).

#### Don'ts

- ♦ Don't enter a sewage tank. Poisonous gasses or a lack of oxygen can be fatal.
- ♦ Don't allow the overflow from the lagoon to leave your property, even during wet weather.
- ♦ Don't plant a garden, trees, or shrubbery near the lagoon. This could cause shading, SLUDGE build-up, and increase odor levels.
- ♦ Your sewage system is not a trash can. Don't put dental floss, feminine hygiene products, flushable wipes, condoms, diapers, cotton swabs, cigarette butts, coffee grounds, cat litter, paper towels, paint, pesticides, or other hazardous chemicals into your system.
- ♦ Don't allow children or pets to play in the lagoon; they could come into contact with WASTEWATER that could make them sick.
- ♦ Don't drive or park vehicles or allow livestock on any part of your sewage tank system. Doing so can compact the soil or damage the pipes, tank, or other onsite system components.
- ♦ Don't build over any part of your system; this includes patios, carports, and other structures.



## Resources

### General Resources - Missouri Department of Health and Senior Services

- ♦ [Onsite Wastewater Treatment](#)
- ♦ [19 CSR 20-3.060 Minimum Construction Standards for On-Site Sewage Disposal Systems](#)
- ♦ [19 CSR 20-3.015 The Operation of On-Site Sewage Treatment and Disposal Systems](#)
- ♦ [Local Public Health Agencies -- Map](#)
- ♦ [Local Public Health Agencies](#)

### Wastewater Professionals

- ♦ [Registered Onsite Wastewater Treatment System Installers List](#)
- ♦ [Onsite Soil Evaluators List](#)
- ♦ [Licensed Onsite System Inspectors/Evaluators Lists \(property transfer related\)](#)

### [A Homeowner's Guide to Evaluating Service Contracts](#)

### Septic Tanks

- ♦ [EPA SepticSmart](#)

### Aeration Treatment Units (ATU's)

- ♦ [ATUs](#)

### Bio-filters

- ♦ [Sand Filters](#)
- ♦ [Attached Growth Processes](#)

### Pumps and Pump Tanks

- ♦ [Sump and Sewage Pump Manufacturers Association Education](#)

### Gravity Distribution and Soil Dispersal Trenches

- ♦ [Use of Tire Chips in Onsite Wastewater Treatment Systems](#)

### Drip Dispersal

- ♦ [Wastewater Subsurface Drip Distribution](#)