Missouri Laws Accompanied by Department of Health and Senior Services Rules

Governing On-Site Sewage Systems

Missouri Department of Health and Senior Services

Bureau of Environmental Health Services

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DEPARTMENT OF HEALTH AND SENIOR SERVICES RULES

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MISSOURI LAWS FOR ON-SITE DISPOSAL SYSTEMS

701.025. Definitions. — As used in sections 701.025 to 701.059, unless the context otherwise requires, the following terms mean:

(1) **"Department"**, the department of health and senior services of the state of Missouri;

(2) **"Director"**, the director of the department of health and senior services or the designee of the director;

(3) **"Existing system"**, an on-site sewage disposal system in operation prior to September 1, 1995;

(4) **"Human excreta"**, undigested food and by-products of metabolism which are passed out of the human body;

(5) **"Imminent health hazard"**, a condition which is likely to cause an immediate threat to life or a serious risk to the health, safety, and welfare of the public if immediate action is not taken;

(6) **"Major modification"** or **"major repair"**, the redesigning and alteration of an on-site sewage system by relocation of the system or a part of the system, replacement of the septic tank or construction of a new absorption field;

(7) **"Nuisance"**, sewage, human excreta or other human organic waste discharged or exposed on the owner's land or any other land from an on-site sewage disposal system in a manner that makes it a potential instrument or medium for the breeding of flies and mosquitoes, the production of odors, or the transmission of disease to or between a person or persons, or which contaminates surface waters* or groundwater;

(8) **"On-site sewage disposal system"**, any system handling or treatment facility receiving domestic sewage which discharges into a subsurface soil absorption system and discharges less than three thousand gallons per day;

(9) **"On-site sewage disposal system contractor"**, any person who constructs, alters, repairs, or extends an on-site sewage disposal system on behalf of, or under contract with, the property owner;

(10) **"Person"**, any individual, group of individuals, association, trust, partnership, corporation, person doing business under an assumed name, the state of Missouri or any department thereof, or any political subdivision of this state;

(11) **"Property owner"**, the person in whose name legal title to the real estate is recorded;

(12) **"Sewage"** or **"domestic sewage"**, human excreta and wastewater, including bath and toilet waste, residential laundry waste, residential kitchen waste and other similar waste from household or establishment appurtenances. Sewage and domestic sewage waste are further categorized as:

(a) **"Blackwater"**, waste carried off by toilets, urinals and kitchen drains;

(b) **"Graywater"**, all domestic waste not covered in paragraph (a) of this subdivision, including bath, lavatory, laundry, and sink waste;

(13) **"Subdivision"**, land divided or proposed to be divided for predominantly residential purposes into such parcels as required by local ordinances, or in the absence of local ordinances, **"subdivision"** means any land which is divided or proposed to be divided by a common owner or owners into three or more lots or parcels, any of which contains less than three acres, or into platted or unplatted units, any of which contains less than three acres, as a part of a uniform plan of development;

(14) "**Subsurface soil absorption system"**, a system for the final renovation of the sewage tank effluent and return of the renovated wastewater to the hydrologic cycle, including the lateral lines, the perforated pipes, the rock material and the absorption trenches. Included within the scope of this definition are: sewage tank absorption systems, privies, chemical toilets, single-family lagoons and other similar systems; except that a subsurface sewage disposal system does not include a sewage system regulated pursuant to chapter 644;

(15) **"Waste"**, sewage, human excreta or domestic sewage.

(L.1986 H.B. 1101§ 1, A.L. 1994 S.B. 446)

*Word "waters" does not appear in original rolls.

701.027. Scope of coverage. — Sections 701.025 to 701.059 pertains to maximum daily flows of sewage of three thousand gallons or less and to sewage treatment facilities that have a designed maximum daily flow or an actual maximum daily flow of three thousand gallons or less.

(L. 1986 H.B. 1101 § 2, A.L. 1994 S.B. 446)

701.029. Operation of on-site sewage disposal system, restrictions. — No person or property owner may operate an on-site sewage disposal system or transport and dispose of waste removed there from in such a manner that may result in the contamination of surface waters or groundwater or present a nuisance or imminent health hazard to any other person or property owner and that does not comply with the requirements of sections 701.025 to 701.059 and the on-site sewage disposal rules promulgated under sections 701.025 to 701.059 by the department.

(L. 1986 H.B. 1101 § 3, A.L. 1994 S.B. 446)

701.031. Disposal of sewage, who, how, exception. — Property owners of all buildings where people live, work or assemble shall provide for the sanitary disposal of all domestic sewage. Except as provided in this section, sewage and waste from such buildings shall be disposed of by discharging into a sewer system regulated pursuant to chapter 644, or shall be disposed of by discharging into an on-site sewage disposal system operated as defined by rules promulgated pursuant to sections 701.025 to 701.059. Any person installing on-site sewage disposal systems shall be registered to do so by the department of health and senior services. The owner of a single-family residence lot consisting of three acres or more, or the owner of a residential lot consisting of ten acres or more with no

single-family residence on-site sewage disposal system located within three hundred sixty feet of any other on-site sewage disposal system and no more than one single-family residence per each ten acres in the aggregate, except lots adjacent to lakes operated by the Corps of Engineers or by a public utility, shall be excluded from the provisions of sections 701.025 to 701.059 and the rules promulgated pursuant to sections 701.025 to 701.059, including provisions relating to the construction, operation, major modification and major repair of on-site disposal systems, when all points of the system are located in excess of ten feet from any adjoining property line and no effluent enters an adjoining property, contaminates surface waters or groundwater or creates a nuisance as determined by a readily available scientific method. Except as provided in this section, any construction, operation, major modification or major repair of an on-site sewage disposal system shall be in accordance with rules promulgated pursuant to sections 701.025 to 701.059, regardless of when the system was originally constructed. The provisions of subdivision (2) of subsection 1 of section 701.043 shall not apply to lots located in subdivisions under the jurisdiction of the department of natural resources which are required by a consent decree, in effect on or before May 15, 1984, to have class 1, National Sanitation Federation (NSF) aerated sewage disposal systems.

(L. 1986 H.B. 1101 § 4, A.L. 1994 S.B. 446, A.L. 1999 H.B. 216, A.L. 2004 H.B. 1433, A.L. 2005 H.B. 617)

*This section was contained in H.B. 617, 2005, but no changes were made.

701.033. Department of health and senior services — powers and duties — rules, procedure. — 1. The department shall have the power and duty to:

(1) Promulgate such rules and regulations as are necessary to carry out the provisions of sections 701.025 to 701.059;

(2) Cause investigations to be made when a violation of any provision of sections 701.025 to 701.059 or the on-site sewage disposal rules promulgated under sections

701.025 to 701.059 is reported to the department;

(3) Enter at reasonable times and determining probable cause that a violation exists, upon private or public property for the purpose of inspecting and investigating conditions relating to the administration and enforcement of sections 701.025 to 701.059 and the on-site sewage disposal rules promulgated under sections 701.025 to 701.059;

(4) Authorize the trial or experimental use of innovative systems for on-site sewage disposal, after consultation with the staff of the Missouri clean water commission, upon such conditions as the department may set;

(5) Provide technical assistance and guidance to any other administrative authority in the state on the regulation and enforcement of standards for individual on-site sewage disposal systems, at the request of such other administrative authority, or when the department determines that such assistance or guidance is necessary to prevent a violation of sections 701.025 to 701.059.

2. No rule or portion of a rule promulgated under the authority of sections 701.025 to 701.059 shall become effective unless it has been promulgated pursuant to the provisions of section 536.024.

(L. 1986 H.B. 1101 § 5, A.L. 1993 S.B. 52, A.L. 1994 S.B. 446, A.L. 1995 S.B. 3, A.L. 2004 H.B. 1433, A.L. 2011 H.B. 89) Effective 7-11-11

CROSS REFERENCE:

Nonseverability clause, 640.099

701.035. Local regulations and standards, requirements — private right to action not preempted. — Sections 701.025 to 701.059 shall not prohibit the enforcement of ordinances of political subdivisions establishing a system for the regulation and inspection of on-site sewage disposal con- tractors and a minimum code of standards for design, construction, materials, operation and maintenance of on-site sewage disposal systems, for the transportation and disposal of wastes there from and for on-site sewage disposal systems servicing equipment, provided such ordinance establishes a system at least equal to state regulation and inspection. Nor shall sections 701.025 to 701.059 be interpreted so as to preempt any private right of action which might otherwise exist. Nothing in sections 701.025 to 701.059 shall be construed to prohibit a political subdivision from enacting and enforcing standards which are more stringent than the provisions of sections 701.025 to 701.059 and rules promulgated pursuant thereto.

(L. 1986 H.B. 1101 § 6, A.L. 1994 S.B. 446)

701.037. Violations, notice of, contents, prosecuting attorney to institute proceedings, when — emergency situation, when. — 1. Whenever the director determines that there are reasonable grounds to believe that there has been violation of any provision of sections 701.025 to 701.059 or the rules promulgated under sections 701.025 to 701.059, the director shall give notice of such alleged violation to the person responsible, as herein provided. The notice shall:

(1) Be in writing;

(2) Include a statement of the reasons for the issuance of the notice;

(3) Allow reasonable time as determined by the director for the performance of any act it requires;

(4) Be served upon the owner, operator or contractor, as the case may require, provided that such notice or order shall be deemed to have been properly served upon such person when a copy thereof has been sent by registered or certified mail to the person's last known address, as listed in the local property tax records concerning such property, or when such person has been served with such notice by any other method authorized by the laws of this state;

(5) Contain an outline of remedial action which is

required to effect compliance with sections 701.025 to 701.059 and the rules promulgated under sections 701.025 to 701.059.

2. Existing systems, as defined in section 701.025, shall not be inspected, unless the director determines that there are reasonable grounds to believe that there has been a violation of any provision of sections 701.025 to 701.059.

3. If an aggrieved person files a written request for a hearing within ten days of the date of receipt of a notice, a hearing shall be held within twenty days from the date of the receipt of the notice, before the department director, to review the appropriateness of the remedial action. The director shall issue a written decision within thirty calendar days of the date of the hearing. Any final decision of the director may be appealed to the administrative hearing commission in the manner provided in chapter 621, or may at the option of the aggrieved person be appealed to the circuit court of the county wherein the offense is alleged to have occurred for a trial de novo on the merits. Any decision of the administrative hearing commission may be appealed as provided in sections 536.100 to 536.140.

4. Any city or county that has adopted the state standard, or the department, may require a property owner to abate a nuisance or repair a malfunctioning on-site sewage disposal system on the owner's property not later than the thirtieth day from which the owner receives notification from the city, county or department of the malfunctioning system or a final written order from the director, if a hearing or hearings were held pursuant to subsections 2 and 3 of this section. If weather conditions prevent the abatement of the nuisance or repair of the system within the thirty-day period or if the owner is unable, after reasonable effort, to obtain the services of a contractor or repair service within the thirty-day period, the abatement of the nuisance or repair of the system shall be made, weather permitting, no later than sixty days after notification. Such extension for abatement or repair shall be subject to approval by the city, county or department. The department may assess an administrative penalty on the property owner of no more than fifty dollars per day for each day that the on-site sewage disposal system remains unrepaired beyond the last day permitted by this section for the abatement or repair. All administrative penalties collected by the department under the provisions of this section shall be deposited in the state treasury to the credit of the general revenue fund.

5. The prosecuting attorney of the county in which any noncompliance or violation of sections 701.025 to 701.059 or any rule promulgated under sections 701.025 to 701.059 is occurring shall, at the request of the city, county or department, institute appropriate proceedings for correction in cases of noncompliance with or violation of the provisions of sections 701.025 to 701.059 and any rules promulgated under sections 701.025 to 701.059.

6. When it is determined by the department that an emergency exists which requires immediate action to protect the health and welfare of the public, the department is authorized to seek a temporary restraining order and injunction. Such action shall be brought at the request of the director of the department by the prosecuting attorney of the county in which the violation occurred. When such conditions are corrected and the health of the people of the state of Missouri is no longer threatened, the department shall request that such temporary restraining order and injunction be dissolved. For the purposes of this subsection, an **"emergency"** means any set of circumstances that constitute an imminent health hazard or the threat of an imminent health hazard as defined in section 701.025.

(L. 1986 H.B. 1101 § 7, A.L. 1994 S.B. 446, A.L. 2004 H.B. 1433)

701.038. Sewage complaints, investigation by department, when — right to inspect adjoining property, procedure requiring notice, exception. — 1. The department of health and senior services or any of its agents may not investigate a sewage complaint except when necessary as part of a communicable disease investigation unless the complaint is received from an aggrieved party or an adjacent landowner. The department of health and senior services or any of its agents may enter any adjoining property if necessary when they are making an inspection pursuant to this section. The necessity for entering such adjoining property shall be stated in writing and the owner of such property shall be notified before the department or any of its agents may enter, except that, if an imminent health hazard exists, such notification shall be attempted but is not required.

2. If the department or its agents make an investigation pursuant to a complaint as described in subsection 1 of this section and find that a nuisance does exist, the property owner shall comply with state and local standards when repairing or replacing the on-site sewage disposal system.

(L. 1994 S.B. 446, A.L. 2004 H.B. 1433, A.L. 2005 H.B. 58 merged with H.B. 617)

701.039. Clean water commission may take action, rules not to conflict. — Nothing in sections 701.025 to 701.059 shall be construed as prohibiting the clean water commission from taking appropriate action under chapter 644 on violations of that chapter or regulations promulgated under that chapter. The rules and regulations promulgated under sections 701.025 to 701.059 shall not conflict with rules and regulations promulgated under chapter 644.

(L. 1986 H.B. 1101 § 8, A.L. 1994 S.B. 446)

701.040. Standards for sewage tanks, lateral lines and operation of on-site sewage disposal systems, duties of department — rules authorized. — 1. The department of health and senior services shall:

(1) Develop by September 1, 1995, a state standard for the location, size of sewage tanks and length of lateral lines based on the percolation or permeability rate of the soil, construction, installation, and operation of on-site sewage disposal systems. Advice from the department of natural resources shall be considered. City or county governments may adopt, by order or ordinance, the state standard in accordance with the provisions of sections 701.025 to 701.059. In any jurisdiction where a city or county has not adopted the state standard, the department of health and senior services shall enforce the state standard until such time as the city or county adopts the standard;

(2) Define by rule a list of those persons who are qualified to perform the percolation tests or soils morphology tests required by the state standard. The list shall include the following:

(a) Persons trained and certified by either the department, which shall include on-site sewage disposal system contractors or a certified agent of the department;

(b) Licensed engineers as defined in section 327.011;

(c) Sanitarians meeting standards defined by the department;

(d) Qualified geologists as defined in section 256.501; and

(e) Soil scientists, defined as a person that has successfully completed at least fifteen semester credit hours of soils science course work, including at least three hours of course work in soil morphology and interpretations;

(3) Develop in accordance with sections 701.053 to 701.055 a voluntary registration program for on-site sewage disposal system contractors. Approved county programs shall implement the contractor registration program. In any area where a county has not adopted, by order or ordinance, the contractor registration program, the department shall implement the program until such time as the county adopts the registration program;

(4) Establish an education training program specifically developed for contractors and city and county employees. Contractors may be taught and allowed to perform percolation tests. Reasonable fees may be charged of the participants to cover the cost of the training and shall be deposited in the public health services fund created in section 192.900. The department shall provide, as a part of the education training program, an installation manual for on-site sewage disposal systems. The manual shall also be made available, at the cost of publication and distribution, to persons not participating in the education and training program;

*(5) Periodically review, but not more than annually, any county's or city's ordinance or order and enforcement record to assure that the state standard is being consistently and appropriately enforced. In its review the department shall assess the timeliness of the county's or city's inspections of on-site sewage systems, and county or city enforcement may be terminated if the department determines that the county or city is unable to provide prompt inspections. If the department determines that the standard is not being consistently or appropriately enforced in any city or county, the department shall notify the county or city of the department's intent to enforce the standard in that jurisdiction and after thirty days' notice hold a public hearing in such county or city to make a determination as to whether the state shall enforce the state standard. Any city or county aggrieved by a decision of the department may appeal a decision of the department to the state board of health established under section 191.400. Any city or county aggrieved by a decision of the state board of health may appeal that decision to the administrative hearing commission in the manner provided in section 621.120; and

(6) Promulgate such rules and regulations as are necessary to carry out the provisions of sections 701.025 to 701.059.

2. Subdivision (5) of this section shall be void and of no effect after January 1, 1998.

(L. 1994 S.B. 446)

*Subdivision (5) is void and of no effect after 1-1-98.

701.043. State standards, content. — 1. The state standard shall consist of the following:

(1) Site selection requirements;

(2) Minimum design standards and specifications for construction, installation, and size of sewage tanks and length of lateral lines;

(3) Permit requirements;

(4) Inspections of installations;

(5) Repairs to failing systems;

(6) Requiring an engineering design for areas with a percolation rate in excess of sixty minutes per inch; and

(7) Criteria for variances.

2. If a city, county or the department determines that an on-site sewage disposal system meets the requirements of the state standards, the city, county or department may not impose any additional requirement before such on-site sewage disposal system is approved for operation.

3. A city, county or the department shall inspect, in the aggregate, up to sixty percent of on-site sewage disposal systems constructed, modified or repaired by contractors registered under sections 701.053 to 701.055 and at least seventy-five percent of on-site sewage

disposal systems constructed, modified or repaired by persons not registered under sections 701.053 to 701.055 for which notice of construction, repair or modification is given under sections 701.046 to 701.048 and 701.050.

4. A city, county or the department may accept certification without on-site inspection under sections 701.046 to 701.048 and 701.050, from a registered contractor not required to provide a performance bond under section 701.052, that a system is properly designed and installed, modified or repaired pursuant to the state standard.

(L. 1994 S.B. 446)

701.046. Modification or major repair to on-site sewage disposal system, requirements — form — fee, how set — additional fee may be set for training contractors performing percolation tests. — Except as otherwise provided in section 701.031, no person may, on or after September 1, 1995, construct or make a major modification or major repair to an on-site sewage disposal system without first notifying the city, county or department and completing an application, upon a form provided by the department, and submitting a fee in the amount established by the city, county or department. The fee shall be set at an amount no greater than that necessary to cover the cost to implement the state standard for on-site sewage disposal systems and the registration of contractors. For areas of the state where the department is enforcing the state standard or registering contractors, the department shall establish the fee, by rule, at an amount not greater than ninety dollars. The department may charge an additional fee, as necessary, to cover the expenses of training those contractors electing to perform the percolation tests. The application form shall require such information necessary to show that the on-site sewage disposal system will comply with the state standard. Such fees, when collected by the department, shall be deposited in the state treasury to the credit of the Missouri public health services fund. The department shall provide technical assistance regarding the type and location of the system to be installed when processing applications received under sections 701.046 to 701.048 and 701.050. Fees collected by the department shall be deposited in the Missouri public health services fund created in section 192.900 and shall be used to implement sections 701.025 to 701.059 and for no other purpose.

(L. 1994 S.B. 446 § 701.046 subsec. 1)

701.047. City or county may adopt more restrictive standards. — Nothing in sections 701.025 to 701.059 shall be construed so as to prohibit any city or county from adopting minimum standards which are more restrictive than the standards adopted by the state pursuant to sections 701.025 to 701.059.

(L. 1994 S.B. 446 § 701.046 subsec. 2)

701.048. Modifying or repair of on-site sewage disposal system, noncompliance with standards prohibited. — Except as otherwise provided in section 701.031, no person may construct, modify or repair an on-site sewage disposal system in a manner which does not comply with the state standard established under sections 701.025 to 701.059.

(L. 1994 S.B. 446 § 701.046 subsec. 3)

701.049. Fees collected by department to be deposited in public health service fund, purpose. — 1. All moneys collected by the department pursuant to sections 701.025 to 701.059, except any administrative penalties, shall be deposited in the state treasury to be credited to the Missouri public health services fund, which is created in section 192.900, and used for the specific purposes authorized in sections 701.025 to 701.059, except as provided in subsection 2 of this section, including contracting with county governments and local health departments to accomplish the purposes of sections 701.025 to 701.059.

2. The director may, upon appropriations from the general assembly, use money from the Missouri public health services fund for development of innovative sewage systems and pilot programs.

(L. 1994 S.B. 446, A.L. 2005 S.B. 74 & 49)

Effective 6-29-05

701.050. Construction or repair notice — requirements and inspection — failure to comply with standards, effect. — No person required to provide notice and apply to the city, county or department under section 701.046 may complete the construction, major modification or major repair of an on-site sewage disposal system* without providing notice and an opportunity for inspection by the city, county or department as provided in this section. The person shall notify the city, county or department prior to 9:00 a.m. on the day preceding completion, in the case of contractors registered under sections 701.053 to 701.055, or prior to 9:00 a.m. on the second day preceding completion, in the case of persons not registered under sections 701.053 to 701.055, and the system shall be maintained in a condition which allows for a complete inspection, pursuant to the state standard, until 3:00 p.m. on the day of completion, unless the city, county or department provides confirmation that the system has been inspected and approved prior to that time. The system shall not be closed or completed if the city, county or department determines upon inspection that the system does not meet the state standard, and the city, county or department shall provide, at the time of inspection, a conspicuous marker or other form of notice indicating that the system does not meet the state standard. The city, county or department shall provide written confirmation of the

results of the inspection or confirmation that the department did not inspect the system to the property owner within three working days of the day of completion.

(L. 1994 S.B. 446 § 701.046 subsec. 4)

*Word "system" does not appear in original rolls.

701.051. Inspections by department, who may request — fee — department may license contractors to inspect. — The department of health and senior services may charge a fee of up to fifty dollars for an inspection of an on-site sewage disposal system conducted pursuant to a request from a lending institution, a prospective purchaser, the owner of the property, a real estate agent or a real estate broker. The fee for such inspection shall be paid by the requesting party. The fees collected by the department pursuant to this section shall be deposited in the Missouri public health services fund. The department of health and senior services may license and use private contractors to carry out the provisions of this section.

(L. 1994 S.B. 446, A.L. 1997 H.B. 402)

701.052. Violator found guilty not to begin construction for another person without bond or letter of credit — forfeiture when, effect — emergency repairs of — effect. — 1. A person who has, within the preceding twenty-four months, been found guilty or pleaded guilty to a violation of section 701.046, 701.047, 701.048 or 701.050 may not begin construction, major modification or major repair of an on-site sewage disposal system that is owned by another person unless the person constructing, modifying or repairing the system has provided to the department a performance bond or letter of credit as provided under this section.

2. The bond or letter shall be conditioned upon faithful compliance with the state standard for on-site sewage disposal systems established under sections 701.025 to 701.059 and shall be in the amount of five thousand dollars.

3. Such performance bond, placed on file with the department, shall be in one of the following forms:

(1) A performance bond, payable to the department and issued by an institution authorized to issue such bonds in this state; or

(2) An irrevocable letter of credit issued in favor of and payable to the department from a commercial bank or savings and loan having an office in the state of Missouri.

4. Upon a determination by the department that a person has failed to construct, modify or repair an on-site sewage disposal system in compliance with the state standard, the department shall notify the person that the bond or letter of credit shall be forfeited and the moneys placed in the Missouri public health services fund for remedial action, if that person does not bring the system up to the state standard established under sections 701.025 to 701.059 within thirty days after notice of such determination has been given.

5. If the system is not brought into compliance with the state standard within thirty days, the department shall, within thirty days of the expiration of the notice period, expend whatever portion of the bond or letter of credit is necessary to hire a registered on-site sewage disposal system contractor to bring the system into compliance with the state standard.

6. The requirement for a person to provide a performance bond or a letter of credit under this section shall cease for that person after two consecutive years in which the person has not been found guilty or pleaded guilty to a violation of section 701.046, 701.047, 701.048 or 701.050.

7. Emergency major modification or major repair of the on-site sewage disposal system made to relieve an imminent health hazard may be made without a permit, but the city, county or department shall be notified not later than the fifth working day after the date on which the repair is made, and the city, county or department shall establish an expedited review process for emergency major modifications or major repairs.

(L. 1994 S.B. 446)

701.053. Registered on-site disposal system contractor, form, qualifications — registration issued by county to be deemed state registration. — 1. A person may not represent himself as a registered on-site sewage disposal system contractor in this state unless the person is registered by a county or the department. A county or the department shall issue registration to a contractor if the contractor completes an application form that is in compliance with sections 701.025 to 701.059 and the rules and regulations adopted thereunder. A registration issued by a county in compliance with sections 701.053 to 701.055 shall be considered a state registration and valid in all political subdivisions of the state.

2. To qualify for registration, a contractor must successfully complete the educational training program provided by the department, or a county that offers on-site sewage disposal system contractor training that has been certified by the department and has an ordinance or regulation that mandates contractor training.

(L. 1994 S.B. 446 § 701.053 subsecs. 1, 2, A.L. 2005 H.B. 58 merged with H.B. 617)

701.054. Registration of contractor may be denied, suspended or revoked, procedure, appeal — re-registration application may be made when — official roster of contractors published by department, content. — 1. A contractor's registration may be denied, suspended or revoked by the department if the contractor violates sections 701.025 to 701.059 or any rule or regulation adopted thereunder. The contractor may appeal to the department within thirty days of the notice of denial, suspension or revocation by requesting a hearing or written review of the decision. After the hearing or written review, the department shall issue a final decision which the contractor may appeal as provided by sections 536.100 to 536.140, RSMo. If the department's decision to revoke, suspend or deny is upheld or not appealed, the contractor may reapply for registration one year after the date of the departmental action.

2. Each contractor shall furnish proof of valid registration if requested by any person or a city, county or department.

3. The department shall publish an official roster of registered contractors. The department shall also publish a list of the names of the contractors who have had their registration revoked, suspended or denied pursuant to sections 701.025 to 701.059.

(L. 1994 S.B. 446 § 701.053 subsecs. 3, 4, 5)

701.055. Property owners may install, modify or clean their own on-site sewage disposal system in compliance with requirements, no permit required for cleaning. — 1. Nothing in sections 701.053 to 701.055 shall preclude property owners from installing, modifying or repairing their own on-site sewage disposal system as long as they comply with the provisions of sections 701.025 to 701.059.

2. Nothing in sections 701.025 to 701.059 shall be construed so as to require a property owner to obtain a permit or to obtain registration as an on-site sewage disposal system contractor in order to clean that property owner's on-site sewage disposal system.

(L. 1994 S.B. 446 § 701.053 subsecs. 6, 7)

701.057. Violations, penalties and fines. — 1. Any violation of section 701.052, 701.053, 701.054 or 701.055 is a class A misdemeanor.

2. Any violation of section 701.046, 701.047, 701.048 or 701.050 is a class C misdemeanor.

3. Any violation of section 701.029 or 701.031 is an infraction, except that a persistent violation after notification by the state or county is a class C misdemeanor.

(L. 1994 S.B. 446 § 701.055 subsecs. 1, 2, 3)

701.058. Stakeholder meetings, permits and inspections of systems — report. — 1. The department of natural resources and the department of health and senior services shall jointly hold stakeholder meetings for the purpose of gathering data and information regarding permits and inspections for on-site sewage disposal systems. The departments shall evaluate the data and information obtained and present their findings and recommendations in a report to be submitted to the general assembly by December 31, 2011

(L 2011 H.B. 89)

Effective 7-11-11

CROSS REFERENCE

Nonseverability clause, 640.099

701.059. Creation of a nuisance on certain residential property is an infraction — sewage disposal system in violation, statute of limitations starts to run, when. — 1. Any person or property owner who creates a nuisance or imminent health hazard as defined in section 701.025 on any single-family residence lot of three acres or more is guilty of an infraction.

2. For the purposes of section 516.120, the statute of limitations begins to run when an owner knows or should have known that an on-site sewage disposal system contractor had installed a defective system, a system which was inappropriate for the site or had installed a system incorrectly.

(L. 1994 S.B. 446 § 701.055 subsecs. 4, 5)

Title 19–DEPARTMENT OF HEALTH
Division 20–Environmental Health & Epidemiology
Chapter 3–General Sanitation

19 CSR 20-3.060 Minimum Construction Standards for On-Site Sewage Disposal Systems

PURPOSE: This rule establishes minimum construction standards for on-site sewage disposal systems. In accordance with the authority granted in section 701.040, RSMo, this rule establishes the minimum standards and criteria for the design, location, installation and repair of individual on-site sewage disposal systems to promote the public health and general welfare and to protect the surface and ground waters of the state.

Editor's Note: The secretary of state has determined that the publication of this rule in its entirety would be unduly cumbersome or expensive. The entire text of the material referenced has been filed with the secretary of state. This material may be found at the Office of the Secretary of State or at the headquarters of the agency and is available to any interested person at a cost established by state law.

(1) General.

(A) Definitions. Definitions as set forth in Chapter 701, RSMo, On-Site Sewage Disposal Law shall apply to those terms when used in this rule unless the context clearly requires otherwise or as noted in this subsection. For the purposes of these standards, certain terms or words used here shall be interpreted as follows. The word shall is mandatory and the words should and may are permissive. All distances, unless otherwise specified, shall be measured horizontally:

1. Administrative authority–The governing body which may include, but is not limited to, county health departments, planning and zoning commissions, county building departments, county public works department, sewer districts, municipalities and the Missouri Department of Health which has, as authorized by statute, charter or other form of enabling authority, adopted these standards for individual on-site sewage disposal systems;

2. Aeration unit–Any sewage tank which utilizes the principle of oxidation in the decomposition of sewage by the introduction of air into the sewage;

3. Alluvium–Soil parent material which was transported and deposited in a running water setting;

4. Alternative–An individual sewage disposal system employing methods and devices as presented in section (6) of this rule;

5. Approved–Considered acceptable by the administrative authority;

6. Baffle–A device installed in a septic tank for proper operation of the tank and to provide maximum retention of solids. This includes vented sanitary tees and submerged pipes in addition to those devices normally called baffles;

7. Bedrock–That layer of geologic material which is consolidated;

8. Bedroom–Any room within a dwelling that might reasonably be used as a sleeping room. The number of bedrooms in a residence as given by an appraiser will be used in determining volumes in the sizing of on-site sewage disposal systems;

9. Black water–Liquid-carried waste from a dwelling or other establishment, which contains organic wastes, including excreta or other body wastes, blood or other body fluids, and garbage;

10. Building sewer–That part of the drainage system which extends from the end of the building drain and conveys its discharge to an on-site sewage disposal system;

11. Capacity–The liquid volume of a sewage tank using inside dimensions below the outlet;

12. Color–The moist color of the soil based on the Munsell soil color system;

13. Distribution pipes–Perforated rigid pipes that are used to distribute sewage tank effluent in a soil treatment system;

14. Dosing chamber (or pump pit or wet well)–A tank or separate compartment following the sewage tank which serves as a reservoir for the dosing device;

15. Dosing device–A pump, siphon or other device that discharges sewage tank effluent from the dosing chamber to the soil treatment system;

16. Dwelling–Any building or place used or intended to be used by human occupants as a residential unit(s);

17. Effluent–The liquid discharge of a septic tank or other sewage treatment device;

18. Gravelless system–An absorption system recognized by the administrative authority as an acceptable method of subsurface disposal of sewage without the required use of gravel. The following are examples:

A. Large diameter, eight inch (8") and ten inch (10") corrugated, perforated plastic pipe, wrapped in a sheath of spun-bonded filter wrap;

B. Chamber system; and

C. Drip irrigation;

19. Gray water–Liquid waste, specifically excluding toilet, hazardous, culinary and oily wastes, from a dwelling or other establishment which is produced by bathing, laundry, or discharges from floor drains;

20. Grease trap–A device designed and installed so as to separate and retain oils and fats from normal wastes while permitting normal sewage or wastes to discharge into the drainage system by gravity;

21. Ground absorption sewage treatment and disposal system–A system that utilizes the soil for the subsurface disposal of partially treated or treated sewage effluent. The following are examples:

A. Chamber system–A system that uses an open bottom structure which forms an underground chamber over the soil's infiltrative surface. The wastewater is discharged into the chamber through a central weir, trough or splash plate and is allowed to flow over the infiltrative surface in any direction;

B. Conventional soil absorption system–A system that distributes effluent by gravity flow from the septic or other treatment tank and applies effluent to the soil through the use of a seepage trench or bed;

C. Dosing soil absorption system–A system that distributes effluent by a pump or automatic siphon to elevate or distribute effluent to the soil through the use of a seepage trench or bed.

D. Drip soil absorption system–An experimental system that distributes effluent through drip lines in a grid pattern (also known as trickle irrigation); and

E. Pressure distribution system–A soil absorption system that distributes effluent by a pump and smaller diameter distribution piping with small diameter perforations to distribute effluent;

22. Hazardous waste–Any waste or combination of wastes, as determined by the Hazardous Waste Commission by rules, which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness, or pose a present or potential threat to the health of humans or the environment;

23. High ground water–Zones of soil saturation which include: perched water tables, shallow regional ground water tables or aquifers, or zones that are seasonally, periodically or permanently saturated;

24. High-water level–The highest known flood water elevation of any lake, stream, pond or flowage or the regional flood elevation established by a state or federal agency;

25. Holding tank–A watertight tank for temporary storage of sewage until it can be transported to a point of approved treatment and disposal;

26. Horizon–A layer of soil, approximately parallel to the surface, that has distinct characteristics relative to adjacent layers;

27. Individual sewage disposal system–A sewage disposal system, or part of a system, serving a dwelling(s) or other establishment(s), which utilizes subsurface soil treatment and disposal;

28. Intermittent sand filters–Intermittent sand filters are beds of granular materials twenty-four to thirty-six inches (24-36") thick underlain by graded gravel and collecting pipe. Waste water is applied intermittently to the surface of the bed through distribution pipes or troughs and the bed is underdrained to collect and discharge the final effluent. Uniform distribution is normally obtained by dosing so as to flood the entire surface of the bed. Filters may be designed to provide free access (open filters) or may be buried in the ground (buried filters or subsurface sand filters);

29. Matrix color–The dominant color of a soil material;

30. Mottling–Spots or splotches of color interspersed in the dominant (or matrix color) of a soil material. Mottles may be of a wide variety of colors;

31. Mound system–A system where the soil treatment area is built above the ground to overcome limits imposed by proximity to water table or bedrock or by rapidly or slowly permeable soils;

32. Non-ground absorption sewage disposal system–A facility for waste treatment designed not to discharge to the soil, land surface, or surface waters, including, but not limited to, incinerating toilets, mechanical toilets, composting toilets and recycling systems;

33. Other establishment–Any public or private structure other than a dwelling which generates sewage;

34. Pan–A soil horizon compacted, hard or very high in clay content. These horizons are usually very slowly permeable. Common pans in Missouri are claypans and fragipans;

35. Perched water table–A saturated zone above and separated from the water table by a horizon which is unsaturated;

36. Percolation rate–The time rate of drop of a water surface in a test hole as specified in subsection (2)(C) of this rule and expressed in minutes per inch;

37. Permeability–The ease with which liquids and gases move within the soil or rock;

38. Plastic limit–A soil moisture content below which the soil may be manipulated for purposes of installing a soil treatment system and above which manipulation will cause compaction, puddling and smearing, as determined by the administrative authority. This is not to be confused with plastic limit as used or defined in the Unified Soil Classification System;

39. Privy–An outhouse or structure used for receiving human excrement in a container or vault beneath the structure;

40. Registered geologist–A person who meets the requirements of Chapter 256, RSMo;

41. Restrictive horizon–A soil horizon that is capable of perching ground water or sewage effluent and that is brittle and strongly compacted or strongly cemented with iron, aluminum, silica, organic matter or other compounds. Restrictive horizons may occur as fragipans, iron pans or organic pans and are recognized by their resistance in excavation or in use of a soil auger;

42. Rock fragments–The percentage by volume of rock fragments in a soil that are greater than two millimeters (2 mm) in diameter or retained on a No. 10 sieve which may

include, but is not restricted to, chert, sandstone, shale, limestone or dolomite;

43. Sanitarian–A person registered either as a sanitarian or environmental health professional by the National Environmental Health Association or the Missouri Board of Certification for Environmental Health Professionals or employed as a sanitarian or environmental health professional by the administrative authority;

44. Seepage bed–An excavated area larger than three feet (3') in width which contains a bedding of aggregate and has more than one (1) distribution line;

45. Seepage trench–An area excavated one to three feet (1–3') in width which contains a bedding of aggregate and a single distribution line;

46. Septage–Those solids and liquids removed during periodic maintenance of a septic or aeration unit tank or those solids and liquids removed from a holding tank;

47. Septic tank–Any watertight, covered receptacle designed and constructed to receive the discharge of sewage from a building sewer, separate solids from liquid, digest organic matter, store liquids through a period of detention and allow the clarified liquids to discharge to a soil treatment system;

48. Setback–A separation distance measured horizontally;

49. Severe geological limitations–Site-specific geologic conditions which are indicative of rapid recharge of an aquifer and likely groundwater contamination. Locations with significant groundwater contamination potential should be investigated by a registered geologist to determine if the site has severe geological limitations. Standardized criteria for determination of severe geological limitations are available in the form *Assessment of Individual On-Site Waste Disposal Geological Limitations* from the Department of Natural Resources, Division of Geology and Land Survey;

50. Sewage–Any water-carried domestic waste, exclusive of footings and roof drainage. Domestic waste includes, but is not limited to, liquid waste produced by bathing, laundry, culinary operations, liquid wastes from toilets and floor drains and specifically excludes animal waste and commercial process water. Also known as wastewater;

51. Sewage flow–Flow as determined by measurement of actual water use or, if actual measurements are unavailable, as estimated by the best available data provided by Table 2A in subsection (1)(E) of this rule;

52. Sewage tank–A watertight tank used in the treatment of sewage which includes, but is not limited to, septic tanks and aeration units;

53. Sewage tank effluent–That liquid which flows from a septic tank or aeration unit under normal operation;

54. Significant groundwater contamination potential–Any condition which would cause or indicate rapid recharge of an aquifer. This includes, but is not limited to, the following conditions or parameters: a water sample from an on-site well which exceeds drinking water standards with respect to fecal coliform; a hydrologic connection is established between the on-site waste disposal system and any well; a disposal field to be placed in Class V soils or soils with a percolation rate less than ten minutes per inch (10 min./in.); a disposal field within one hundred feet (100') of the topographic drainage of a sinkhole; or a sewage tank with fifty feet (50') of the topographic drainage of a sinkhole;

55. Sinkhole–A land surface depression that is hydraulically connected with a subterranean passage developed by a solution or collapse into the underlying bedrock, or both;

56. Site–The area bounded by the dimensions required for the proper location of the soil treatment system;

57. Slope–The ratio of vertical rise or fall to horizontal distance;

58. Soil–The naturally occurring, unconsolidated mineral or organic material of the land surface developed from rock or other parent material and consisting of sand, silt and clay-sized particles and variable amount of organic materials;

59. Soil characteristics, limiting–Those soil characteristics which preclude the installation of a standard system, including, but not limited to, evidence of water table or bedrock closer than three feet (3') to the ground surface and percolation rates slower than one hundred twenty minutes per inch (120 min./in.);

60. Soil saturation–The condition that occurs when all the pores in a soil are filled with water;

61. Soil scientist–An individual who has a minimum of fifteen (15) semester credit hours of soils course work including a minimum of three (3) hours in the area of soil morphology and interpretations, and has a minimum of two (2) years of field experience;

62. Soil textural classification–Soil particle sizes or textures specified in this rule refer to the soil textural classification in the *Soil Survey Manual Handbook No. 18*, U.S. Department of Agriculture, 1993;

63. Soil treatment area–That area of trench or bed bottom which is in direct contact with the trench rock of the soil treatment system;

64. Soil treatment system–A system where sewage tank effluent is treated and disposed of below ground surface by filtration and percolation through the soil. It includes those systems commonly known as seepage bed, trench, drainfield, disposal field and includes mound and low pressure pipe systems;

65. Standard system–An individual sewage disposal system employing a building sewer, sewage tank and the soil treatment system commonly known as seepage bed or trenches, drainfield or leachfield;

66. Toilet waste–Fecal matter, urine, toilet paper and any water used for flushing;

67. Trench rock–Clean rock, washed creek gravel or similar insoluble, durable and decay-resistant material free from dust, sand, silt or clay. The size shall range from one inch to two and one-half inches (1"–2 1/2"). If limestone, dolomite or other crushed white rock is used, it shall be washed and be a minimum size of one and one-half inches (1 1/2");

68. Valve box–Any device which can stop sewage tank effluent from flowing to a portion of the soil treatment area. This includes, but is not limited to, caps or plugs on distribution or drop box outlets, divider boards, butterfly valves, gate valves or other mechanisms;

69. Very slowly permeable–Soils, bedrock and soil horizon or layer having a vertical permeability less than one inch (1") in twenty-four (24) hours;

70. Wastewater–same as sewage as defined in paragraph (1)(A)50. of this rule;

71. Wastewater stabilization pond–A sealed earthen basin which uses the natural unaided biological processes to stabilize wastewater (also known as a sewage lagoon);

72. Water table–The highest elevation in the soil or rock where all voids are filled with water, as evidenced by presence of water or soil mottling or other information. This includes perched water tables or perched zones of saturation; and

73. Watertight–Constructed so that no water can get in or out below the level of the outlet.

(B) Applicability. For this rule, on-site wastewater treatment and disposal system means all equipment and devices necessary for proper conduction, collection, storage, treatment and disposal of wastewater from a dwelling or other facility producing sewage of three thousand gallons (3000 gals.) or less per day. Included within the scope of this rule are building sewers, septic tanks, subsurface absorption systems, mound systems, intermittent sand filters, gravelless systems, aeration unit wastewater treatment systems and single family wastewater stabilization ponds. Commercial or industrial facilities and developers of subdivisions must first contact the Department of Natural Resources concerning compliance with the Missouri Clean Water Law and Regulations before applying for any approvals or permits under this rule.

(C) Responsibilities.

1. The design, construction, operation and maintenance of sewage treatment and disposal systems, whether septic tank systems, privies or alternative systems, shall be the responsibility of the designer, owner, developer, installer or user of the system.

2. Actions of representatives of the administrative authority engaged in the evaluation and determination of measures required to effect compliance with the provisions of this rule shall in no way be taken as a guarantee or warranty that sewage treatment and disposal systems approved and permitted will function in a satisfactory manner for any given period of time. Due to the development of clogging mats, which adversely impact the life expectancy of normally functioning ground absorption sewage treatment and disposal systems and variables influencing system function which are beyond the scope of this rule, no guarantee or warranty is implied or given that a sewage treatment and disposal system will function in a satisfactory manner for any specific period of time.

3. Prior to the issuance of a permit to install or effect major repair of an on-site sewage disposal system as regulated by Chapter 701, RSMo, plans and specifications shall be required for review. Approval by the administrative authority shall be required for–

A. Plans for absorption field showing the following:

(I) 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.

(II) Field layout, length, spacing, connection, pipe sizes and cleanout details, invert elevations of flow distribution devices and laterals, valves and appurtenances;

(III) Trench plan and profile drawings and flow distribution device details;

(IV) Location and design of associated surface and groundwater drainage systems;

(V) Name, address and telephone number of the person(s) drafting the plans; and

(VI) Any other information required by the administrative authority; and

B. Alternative systems whether or not specifically described in this rule.

4. The entire sanitary sewage system shall be on property owned or controlled by the person owning or controlling the system. Necessary easements shall be obtained permitting the use and unlimited access for inspection and maintenance of all portions of the system to which the owner and operator do not hold undisputed title. Easements shall remain valid as long as the system is required and shall be recorded with the county recorder of deeds.

(D) Minimum Set-Back Distances. All on-site wastewater treatment and disposal systems shall be located in accordance with the distances shown in Table 1.

(E) Sewage Flow Rates. Table 2A or 2B shall be used to determine the minimum design daily flow of sewage required in calculating the design volume of sanitary sewage systems to serve selected types of establishments. The minimum design volume of sewage from any establishment shall be one hundred gallons (100 gals.) per day. Design of sewage treatment and disposal systems for establishments not identified in this rule shall be determined using available flow data, water-using fixtures, occupancy or operation patterns and other measured data.

1. Volume determination. In determining the volume of sewage from single family dwellings, the minimum flow rate shall be one hundred twenty gallons (120 gals.) per day per bedroom. The minimum volume of sewage from each single family dwelling shall be two hundred forty gallons (240 gals.) per day. When the occupancy of a single family dwelling exceeds two (2) persons per bedroom, the volume of sewage shall be determined by the maximum occupancy at a rate of sixty gallons (60 gals.) per person per day.

Table 1–Minimum Set-Back Distances

Minimum Distance From	Sewage Tank[1]	Disposal Area [2]	Lagoons
Private water supply well [3]	(feet) 50	(feet) 100	(feet) 100
Public water supply well	300	300	300
Cistern	25	25	25
Spring	50	100	100
Classified stream, lake or impoundment*	50	50	50
Stream or open ditch [4]	25	25	25
Property lines	10	10**	75
Building foundation	5	15	15
Basement	15	25	25
Swimming pool	15	15	15
Water line under pressure	10	10	10
Suction water line	50	100	100
Upslope interceptor drains	-	10	10
Downslope interceptor drains	-	25	25
Top of slope of embankments or cuts of two feet (2') or more vertical height	-	20	20
Edge of surficial sink holes	50	100	500
Other soil absorption system except repair area	-	20	20

*A classified stream is any stream that maintains permanent flow or permanent pools during drought periods and supports aquatic life.

**Recommend twenty-five feet (25') of downslope property line initially, but repair may be allowed to ten feet (10') of downslope property line.

[1] Includes sewage tanks, intermittent sand filters and dosing chambers.

[2] Includes all systems (sand filter, wetland and the like) except wastewater stabilization ponds.

[3] Unplugged abandoned wells or wells with less than eighty feet (< 80') of casing depth shall have one-hundred-fifty feet (150') minimum distance from all above.

[4] Sewage tanks and soil absorption systems should never be located in the drainage area of a sinkhole.

TABLE 2A–Quantities of Domestic Sewage Flows

Type of Establishment[1]	Flow
Residential Units	(gallons per day per unit unless otherwise indicated)
Single Family Dwelling	120/bedroom
Multiple Family Dwelling (with laundry capabilities)	120/bedroom
Multiple Family Dwelling (without laundry capabilities cottages)	95/bedroom 50/person (in excess of 2 persons/bedroom)
Mobile Home Parks	300/home*
Commercial Facilities	
Transportation terminals (airports, bus stops, railroad stations and the like)	5/passengers
Laundromats	580/machine
Beauty Shops (Style Shops)	125/chair
Bowling Lanes	50/lane
Business (other than those listed elsewhere in this table)	25/employee
Factories (exclusive of industrial waste)	25/person/shift
add for showers	10/person/shift
Marinas	10/boat slip
with bathhouse	30/boat slip
Motels/Hotels	120/room
with cooking facilities	175/person
Offices (per shift)	25/person
Service Stations	250/water closet or urinal
24-hour Service Stations	325/water closet
Theaters: Movies	5/seat
Drive-in	15/vehicle space
Warehouses	30/employee
Public parks (toilets only)	5/user
Public parks with bath house	15–25/user
Camps	
Construction or Work Camps	60/person 40/person (with chemical toilets)
Summer Camps	60/person
Campgrounds–with Comfort Station (without water and sewer hookups)	100/campsites
Travel Trailer/Recreational Vehicle Park (with water and sewer hookups)	120/space
Assembly & Mercantile	
Retail Stores	120/ 1000 sq. ft. of retail sales area
Stadium, Auditorium, Theater, Drive-in	5/seat or space
Swimming Pools, Spas, and Bathhouses	10/person
Churches (Not including a Kitchen, Food Service Facility, Day Care or Camp)	3/seat
Churches (With a Kitchen but not including a Food Service Facility, Day Care or Camp)	5/seat
Country Club	20/member

TABLE 2A–Quantities of Domestic Sewage Flows (continued)

Type of Establishment[1]	Flow
Food or Drink Establishment**	
Bar (not serving food)	20/seat
Restaurants	40/seat or 40/15 sq. ft. of dining area, whichever is greater
24-hour Restaurant	75/seat
Food Stands	
1) per 100 square feet of food stand floor space	50 gal.
2) add per food employee	25 gal.
Other food service facilities	5/meal
Meat Markets	
1) per 100 square feet of market floor space	50 gal.
2) add per market employee	25 gal.
Institutional**	
Hospitals	300/bed
Day Care Facilities	15/person
Residential Care Facilities	60/person
Rest Homes and Nursing Homes	
with laundry	120/bed
without laundry	60/bed
Day Schools	
with cafeteria, gym, and showers	15/student
with cafeteria only	12/student
with neither cafeteria nor showers	10/student
Boarding Schools	60/person

[1] Establishments with flows greater than three thousand gallons per day (3,000 gpd) shall be regulated under Chapter 644, RSMo, administered by the Department of Natural Resources.

* Must consider flow into the soil absorption system from mobile homes where taps are allowed to run to prevent freezing.

** Establishments processing food may be required to provide grease interceptors in an accessible location prior to the sewage treatment system.

Note: Gallons per person per unit includes normal infiltration for residential systems.

Table 2B–Sewage Works Population/Design Table

Unit	Persons/unit
Apartments or Condominiums	
(1 bedroom)	2.0
(2 bedroom)	3.0
(3 bedroom)	3.7
Camper trailers with sewer hookup	3.0
Camper trailers without sewer hookup	2.5
Mobile Homes	3.0–3.7
Motels	3.0
Residences	3.7

2. Other establishments. For establishments or housing developments other than a single family residence, either Table 2A shall be used to estimate the sewage flow rate or actual measured flow rate for existing systems may be used. Values for estimated sewage flow for establishments having food service operations shall be increased by a factor of one and one-half (1.5) to compensate for the high organic strength. Grease traps shall be required at food service facilities, meat markets and other places of business where the accumulation of grease or oils can cause premature failure of a soil absorption system. The following design criteria shall be met:

A. The grease trap shall conform to Plumbing & Drainage Institute Standard PDI-G101 or equivalent;

B. The grease trap shall be plumbed to receive all wastes associated with food handling and no toilet wastes;

C. The grease trap liquid capacity shall be sufficient to provide for at least five gallons (5 gals.) of storage per meal served per day, at least two-thirds (2/3) of the required septic tank liquid capacity, or a capacity as determined in accordance with the following:

$$LC = D \times GL \times ST \times HR/2 \times LF$$

where LC = grease trap liquid capacity (gallons)
D = number of seats in dining area
GL = gallons of wastewater per meal (1.5 single-service; 2.5 full-service)
ST = storage capacity factor = 2.5
HR = number of hours open
LF = loading factor = (1.25 interstate highway
= 1.0 other highways and recreational areas
= 0.8 secondary roads);

D. Two (2) or more chambers must be provided, with total length-to-width ratio at least two to one (2:1). Chamber opening and outlet sanitary tee must extend down at least fifty percent (50%) of the liquid depth;

E. Access manholes, with a minimum diameter of twenty-four inches (24"), shall be provided over each chamber and sanitary tee. The access manholes shall extend at least to finished grade and be designed and maintained to prevent surface water infiltration. The manholes shall also have readily removable covers to facilitate inspection and grease removal; and

F. Where it has been demonstrated that specially designed grease interceptors will provide improved performance, the grease trap liquid capacity may be reduced by up to fifty percent (50%).

3. Population to be served. Unless satisfactory justification can be given for using lower per-unit occupancies, the figures in Table 2B shall be used in determining the population for which to design the sewage works:

4. Reduction in sewage flow. Reductions in design sewage flow rates may be allowed by the administrative authority on a case-by-case basis depending upon water conservation plans. Sewage flow rates may be reduced up to forty percent (40%) for gray water systems where the toilet wastes are discharged to a holding tank and disposed of off site or where waterless toilets are utilized.

(2) Site Evaluation.

(A) All proposed sites for on-site sewage treatment and disposal systems shall be evaluated for the following:

1. Either percolation tests or soil conditions, properties and permeability as determined by a soil morphology examination; a profile pit shall be required for all new installations in order to conduct soil morphology examination;

2. Slope;

3. The existence of lowlands, local surface depressions, rock outcrops and sinkholes;

4. All required setback distances as required in subsection (1)(D) of this rule;

5. Surface water flooding probability and depth to water table;

6. Location of easements and underground utilities;

7. Amount of available area for the installation of the system and an area for replacement;

8. Location of homesite or dwelling as well as management of surface runoff water from those buildings;

9. Any other cultural feature, such as roads, streets and the like in the surrounding areas which influences surface and subterrainal flow of water on or near the proposed site; and

10. Any significant groundwater contamination potential.

(B) Preliminary Soils Information. During a site evaluation reference may be made of county soil survey reports which are available from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) for a majority of the counties in Missouri. NRCS soil survey reports should not be used as sole final determination for a specific site, but only as a guide to which soils are expected in a given area.

(C) Soil Permeability and Soil Percolation. Soil permeability and soil percolation are two (2) different soil features with no direct correlation.

1. Soil permeability is that quality that enables soil to transmit water or air. It can be measured quantitatively in terms of rate of flow of water through a unit cross section of saturated soil in unit time under specified temperature and hydraulic conditions.

2. Soil percolation rate is based on a standard method which includes a twenty-four (24)-hour presoak in a six to eight inch (6–8") diameter hole to the depth of the proposed absorption field. After the presoak, water is poured into the hole to a level of eight inches (8") above the bottom. The drop in water level is then measured at thirty (30)-minute intervals until a stabilized rate is

obtained. Results are recorded as minutes per inch (min./in.) for the water level to drop.

(D) Procedures for Percolation Tests and Profile Holes. Two (2) types of site evaluations are acceptable. Each type depends upon the technical expertise of the individual conducting the evaluations. When percolation tests are slower than sixty minutes per inch (60 min./in.), the design must be drafted and signed by a registered engineer unless site suitability and system sizing has been determined by soil evaluation in accordance with section (7) of this rule. This would apply to all systems except for lagoons or other systems that do not use the soil for treatment. When percolation tests are slower than one hundred and twenty minutes per inch (120 min./in.), on-site sewage disposal systems shall not be permitted, except for lagoons or other systems designed in accordance with sections (6) and (7) of this rule. The administrative authority will determine which method(s) is to be used. The types of site evaluations are described as follows:

1. Percolation tests only. This type of site evaluation is where site suitability and sizing of the soil absorption system is made by percolation tests and there is no other evaluation of soil characteristics. This type of site evaluation can be used only for siting and sizing standard systems in areas which are not classified as having significant groundwater contamination potential. When using this type of evaluation, only percolation rates between ten minutes and sixty minutes per inch (10–60 min./in.) will be acceptable. Percolation tests shall be conducted by an engineer, sanitarian, registered geologist, soil scientist or a person who has been trained and certified by the Department of Health in accordance with section 701.040(2), RSMo. These tests shall be performed in accordance with the following procedure:

A. A minimum of four (4) percolation test holes are required with three (3) of the holes around the periphery within the proposed soil absorption site and one (1) in the middle of the proposed soil absorption site;

B. Each test hole shall be six to eight inches (6–8") in diameter, have vertical side walls and be bored or dug to a depth of the bottom of the proposed soil absorption system;

C. The bottom and sides of the hole shall be carefully scratched to remove any smearing and to provide a natural soil surface into which water may penetrate. All loose material shall be removed from the bottom of the test hole and two inches (2") of one-fourth to three-fourths inch (1/4–3/4") washed gravel shall be added to protect the bottom from scouring;

D. The hole shall be carefully filled with clear water to a minimum of twelve inches (12") over the soil bottom of the test hole and maintained for no less than four (4) hours. The hole shall then be allowed to swell for at least twenty-four (24) hours. In sandy soils, the saturation and swelling procedure shall not be required and the test may proceed if one (1) filling of the hole has seeped away in less than ten (10) minutes;

E. In sandy soils, the water depth shall be adjusted to eight inches (8") over the soil bottom of the test hole. From a fixed reference point, the drop in water level shall be measured in inches to the nearest one-eighth inch (1/8") at approximately ten (10)-minute intervals. A measurement can also be made by determining the time it takes for the water level to drop one inch (1") from an eight-inch (8") reference point. If eight inches (8") of water seeps away in less than ten (10) minutes, a shorter interval between measurements shall be used but in no case shall the water depth exceed eight inches (8"). The test shall continue until three (3) consecutive percolation rate measurements vary by a range of no more than ten percent (10%);

F. In other soils, the water depth shall be adjusted to eight inches (8") over the soil at the bottom of the test hole. From a fixed reference point, the drop in water level shall be measured in inches to the nearest one-eighth inch (1/8") at approximately thirty (30)-minute intervals, refilling between measurements to maintain an eight-inch (8") starting head. The test shall continue until three (3) consecutive percolation rate measurements vary by a range of no more than ten percent (10%). The percolation rate can also be made by observing the time it takes the water level to drop one inch (1") from an eight-inch (8") reference point if a constant water depth of at least eight inches (8") has been maintained for at least four (4) hours prior to the measurement;

G. Percolation rate shall be calculated as follows:

(I) The time interval shall be divided by the drop in water level to obtain the percolation rate in minutes per inch;

(II) The slowest percolation rate of the four (4) tests shall be used to determine the final soil treatment system design. Where the slowest percolation rate varies by more than twenty minutes per inch (20 min./in.) from the other tests, a detailed soils morphology evaluation must be conducted to justify a design based upon the average percolation rate; and

(III) For reporting the percolation rate, worksheets showing all calculations and measurements shall be submitted; and

H. Depth to bedrock or other restrictive layer shall be determined in areas where it is known that bedrock may exist at depths less than ten feet (10'); and

2. Soil Morphology. This evaluation shall be conducted by a soil scientist unless an engineer, registered geologist or sanitarian has had special training and field experience to determine the required soil characteristics. This type of evaluation is recommended for sites that are classified as having significant groundwater contamination potential, severe geological limitations or severe limitations relating to restrictive layers. Section (7) of this rule contains criteria for this type of site evaluation. Since this type of soil analysis pertains to the factors that relate

directly to permeability, no percolation test is required, however the administrative authority may retain the option of requiring percolation tests for additional information in determining site suitability.

(3) Building Sewers.
Building sewers used to conduct wastewater from a building to an on-site wastewater treatment and disposal system shall be constructed of material meeting the minimum requirements of American Society for Testing and Materials (ASTM) Standards and listed by that agency for such use. Suitable materials meeting ASTM standards include: Acrylonitrile, butadiene styrene (ABS), cast iron pipe, concrete pipe, copper or copper-alloy tubing, polyvinyl chloride (PVC) or vitrified clay pipe. Although listed by ASTM, asbestos cement pipe will not be accepted due to potential health hazards to installers. Building sewer specifications are as follows:

(A) Size. Building sewers shall not be less than four inches (4") in diameter;

(B) Slope. Building sewers shall be laid to the following minimum slope:

1. Four-inch (4") sewer–twelve inches (12") per one hundred feet (100'); and
2. Six-inch (6") sewer–eight inches (8") per one hundred feet (100');

(C) Cleanouts. A cleanout shall be provided at least every one hundred feet (100') and at every change in direction or slope if the change exceeds forty-five degrees (45°). A cleanout should be provided between house and tank; and

(D) Connection to sewage tank. The pipe going into and out of the sewage tank shall be schedule 40 PVC or cast iron and shall extend a minimum of two feet (2') beyond the hole of excavation for the sewage tank.

(4) Sewage Tanks.

(A) General. All liquid waste and washwater with the following exceptions shall discharge into the sewage tank. Roof, garage, footing, surface water, drainage, cooling water discharges and hazardous wastes shall be excluded from the sewage tank. Backwash from water softeners and swimming pool filtration systems may be excluded from the sewage tank. In such event of excluding swimming pool filter backwash, the Department of Natural Resources shall be contacted for applicability of a discharge permit. All sewage tank effluent shall be discharged to a soil absorption system that is designed to retain the effluent upon the property from which it originated. All tanks regardless of material or method of construction shall-

1. Be watertight and designed and constructed to withstand all lateral earth pressures under saturated soil conditions with the tank empty;
2. Be designed and constructed to withstand a minimum of two feet (2') of saturated earth cover above the tank top; and
3. Not be subject to excessive corrosion or decay. Metal sewage tanks shall not be used unless specifically allowed by the administrative authority on a case-by-case basis. The tank shall be thoroughly coated inside and out with a bituminous or other suitable coating. Any damage to the bituminous coating shall be repaired by recoating.

Table 3–Tank Capacity

Tank Design and Capacity		Minimum guage thickness	Minimum Diameter
		(guage)	(inches)
Vertical cylindrical			
500 thru 1000 gallons	bottom and sidewalls	14	None
	cover	12	
	baffle	12	
1001 thru 1250 gallons	complete tank	10	None
1251 thur 1500 gallons	complete tank	7	None
Horizonital cylindrical			
500 thru 1000 gallons	complete tank	13	54
1001 thru 1500 gallons	complete tank	12	64
1501 thru 2500 gallons	complete tank	10	76
2501 thru 6000 gallons	complete tank	7	76

Additionally, plastic sanitary tees shall be used for the inlet and outlet for the sewage tank. The administrative authority shall use Table 3 regarding minimum gauge thickness for metal sewage tanks.

(B) Septic Tanks. Septic tanks, regardless of material or method of construction, shall conform to the following criteria:

1. The liquid depth of any septic tank or its compartment shall be not less than thirty-six inches (36"). A liquid depth greater than six and one-half feet (6 1/2') shall not be considered in determining tank capacity;

2. No tank or compartment shall have an inside horizontal dimension less than twenty-four inches (24");

3. Inlet and outlet connections of the tank shall be protected by baffles or sanitary tees as defined in paragraph (4)(B)6. of this rule;

4. The space in the tank between the liquid surface and the top of the inlet and outlet baffles shall not be less than twenty percent (20%) of the total required capacity, except that in horizontal cylindrical tanks, this space shall be not less than fifteen percent (15%) of the total required liquid capacity;

5. Inlet and outlet baffles shall be constructed of acid-resistant concrete, acid-resistant fiberglass or plastic;

6. Sanitary tees shall be affixed to the inlet or outlet pipes with a permanent waterproof adhesive. Baffles shall be integrally cast with the tank, affixed with a permanent waterproof adhesive or with stainless steel connectors top and bottom;

7. The inlet baffle shall extend at least six inches (6") but no more than twenty percent (20%) of the total liquid depth below the liquid surface and at least one inch (1") above the crown of the inlet sewer;

8. The outlet baffle and the baffles between compartments shall extend below the liquid surface a distance equal to forty percent (40%) of the liquid depth, except that the penetration of the indicated baffles or sanitary tees for horizontal cylindrical tanks shall be thirty-five percent (35%) of the total liquid depth. They also shall extend above the liquid surface as required in paragraph (4)(B)4. of this rule. In no case shall they extend less than six inches (6") above the liquid surface;

9. There shall be at least one inch (1") between the underside of the top of the tank and the highest point of the inlet and outlet devices;

10. The inlet shall be not less than three inches (3") above the outlet;

11. The inlet and outlet shall be located opposite each other along the axis of maximum dimension. The horizontal distance between the nearest points of the inlet and outlet devices shall be at least four feet (4');

12. Sanitary tees shall be at least four inches (4") in diameter. Inlet baffles shall be no less than six inches (6") or no more than twelve inches (12") measured from the end of the inlet pipe to the nearest point on the baffle. Outlet baffles shall be six inches (6") measured from beginning of the outlet pipe to the nearest point on the baffle;

13. Access to the septic tank shall be as follows:

A. Manholes. Access shall be provided over both the inlet and outlet devices and to each tank compartment by means of either a removable cover or a manhole. Where the top of the tank is located more than eighteen inches (18") below the finished grade, manholes and inspection holes shall extend to approximately eight inches (8") below the finished grade. The extension can be made using riser of approved material and fitted with tight covers of heavy metal or concrete. Proper attention must be given to the accident hazard involved when manholes are extended close to the ground surface. Manhole risers are not required when the top of the tank is within eighteen inches (18") of final grade. All manhole openings must be provided with a substantial, fitted, water-tight cover of concrete, cast iron or other approved material. All manhole covers which terminate below grade shall be covered with at least six inches (6") of earth. Manhole covers which terminate above grade shall have either an effective locking device or otherwise be adequately sealed in a manner to prevent accidental access; and

B. A six-inch (6") inspection port shall be provided over the inlet and outlet baffles of each tank and terminate at or above grade. An inspection port shall not be used as a pumpout access. A manhole cover at or above grade may also serve in place of inspection ports;

14. Compartmentation of single tanks shall be in accordance with the following:

A. Septic tanks larger than fifteen hundred gallons (1500 gals.) and fabricated as a single unit shall be divided into two (2) or more compartments;

B. When a septic tank is divided into two (2) compartments, not less than one-half (1/2), nor more than two-thirds (2/3), of the total volume shall be in the first compartment;

C. When a septic tank is divided into three (3) or more compartments, one-half (1/2) of the total volume shall be in the first compartment and the other half equally divided in the other compartments;

D. Connections between compartments shall be baffled so as to obtain effective retention of scum and sludge. The submergence of the inlet and outlet baffles of each compartment shall be as specified in paragraphs (4)(B)7. and 8. of this rule;

E. Adequate venting shall be provided between compartments by baffles or by an opening of at least fifty (50) square inches near the top of the compartment wall; and

F. Adequate access to each compartment shall be provided by one (1) or more manholes with a minimum opening twenty inches (20") square or in diameter and located within six feet (6') of all walls of the tank;

15. The use of multiple tanks shall conform with the following:

A. Where more than one (1) tank is used to obtain the required liquid volume, the tanks shall be connected in series;

B. Each tank shall comply with all other provisions of this section;

C. No more than three (3) tanks in series can be used to obtain the required liquid volume; and

D. The first tank shall be no smaller than any subsequent tanks in series;

16. The liquid capacity of a septic tank serving a dwelling shall be based upon the number of bedrooms contemplated in the dwelling served and shall be at least as large as the capacities given in Table 4.

Table 4—Dwelling Septic Tank Capacity*

Number of Bedrooms	Minimum Liquid Capacity
	(gallons)
1–3	1000
4	1250
5	1500

* These figures provide for use of garbage grinders, automatic clothes washers and other household appliances. Garbage grinders are not recommended due to introduction of fats.

A. For six (6) or more bedrooms, the septic tank shall be sized on the basis similar to an establishment. See paragraph (4)(B)17. of this rule.

B. No tank shall be designed to retain less than two (2) days' , forty-eight (48) hours' flow; and

17. Individual residences with more than five (5) bedrooms, multiple-family residences, individual septic tank systems serving two (2) or more residences or any place of business or public assembly where the design sewage flow is greater than one thousand gallons per day (1000 gpd), the liquid capacity of the septic tank shall be designed in accordance with the following:

$$V = 1.5Q + 500$$

where V = the liquid capacity of the septic tank
and Q = the design daily sewage flow.

The minimum liquid capacity of a septic tank serving two (2) or more residences shall be fifteen hundred gallons (1500 gals.).

(C) Location. Location of the sewage tank shall include the following:

1. The sewage tank shall be placed so that it is accessible for the removal of liquids and accumulated solids;

2. The sewage tank shall be placed on firm and settled soil capable of bearing the weight of the tank and its contents; and

3. The sewage tanks shall be set back as specified in subsection (1)(D) of this rule.

(D) Solids Removal. The owner of any septic tank or his/her agent shall regularly inspect and arrange for the removal and sanitary disposal of septage from the tank whenever the top of the sludge layer is less than twelve inches (12") below the bottom of the outlet baffle or whenever the bottom of the scum layer is less than three inches (3") above the bottom of the outlet baffle. Yearly inspections of septic tanks are recommended and tanks shall be pumped whenever the bottom of the scum layer is within three inches (3") of the bottom of the outlet device or the sludge level is within eight inches (8") of the bottom of the outlet device.

(E) Aeration Units. An aeration unit wastewater treatment plant utilizes the principle of oxidation in the decomposition of sewage by the introduction of air into the sewage. An aeration unit may be used as the primary treatment unit instead of a septic tank except where special local conditions may limit their use. All aeration unit type treatment systems shall comply with the general requirements for sewage tanks set forth in subsection (4)(A) of this rule and with the following:

1. Limitations. Special conditions where aeration units should not be used may include, but not be limited to, the following:

A. Where intermittent use (interruptions allowing more than five (5) days without continuous flow) will adversely affect the functioning of the plant; and

B. Where local ordinances restrict their use;

2. General. The aeration unit shall be located where it is readily accessible for inspection and maintenance. Set-back distances for aeration units shall be in accordance with subsection (1)(D) of this rule;

3. Design. All aeration units shall comply with National Sanitation Foundation Standard No. 40 or as required by the administrative authority. In addition, all aeration unit treatment plants shall comply with the requirements stipulated in this section. The aeration unit shall have a minimum treatment capacity of one hundred twenty gallons per bedroom per day (120 gals./pbd) or five hundred gallons (500 gals.), whichever is greater;

4. Effluent disposal. Effluent from an aeration unit shall be discharged into a soil absorption system or other final treatment system in accordance with section (6) of this rule. No reductions in the area of soil absorption systems or other final treatment systems shall be permitted because of the use of an aeration unit instead of a septic tank; and

5. Operation and maintenance. Where aeration units are used in institutional or administrative arrangements to

control their use, operation and maintenance are recommended. Aeration units should be inspected at least one (1) time each year and pumped when mixed liquor solids concentrations result in excessive clarifier loading.

(5) Absorption Systems.
The common design of absorption systems is the use of absorption trenches, each separate from the other and each containing a distribution pipe. This type system should be used whenever practical. Other types of absorption systems may be used as alternatives where the site conditions meet the specific design requirements of the alternative systems. Installation shall not be made while the soil is wet or moist. This is to prevent smearing and destroying the structure of the soil. All absorption systems should have curtain drains, terraces or use of other flow diversion methods to minimize surface or ground water from loading the absorption field.

(A) Absorption Trenches. The absorption trench gives additional treatment to the sewage from the treatment tank. Regardless of its appearance of clarity or transparency, the outflow or effluent from a sewage tank is a dangerous source of contamination. The satisfactory operation of the sewage disposal system is largely dependent upon the proper site selection, design and construction of the absorption trench.

1. Absorption trenches should not be constructed in soils having a percolation rate slower than sixty minutes per inch (60 min./in.) and in no case shall absorption trenches be constructed in soils with percolation rates slower than one hundred twenty minutes per inch (120 min./in.) or where rapid percolation may result in contamination of water-bearing formations or surface waters.

2. The absorption trench shall be located on the property to maximize the vertical separation distance from the bottom of the absorption trench to the seasonal high groundwater level, as determined by the presence of mottling, bedrock or other limiting layer. The vertical separation between the bottom of the absorption trench and limiting layer or seasonal high water table shall be no less than one foot (1') for standard systems. Greater vertical separation may be required where water-bearing formations are in danger of contamination.

3. Absorption trenches shall not be constructed in unstabilized fill or ground which has become severely compacted due to construction equipment.

4. The minimum area in any absorption trench system shall be in accordance with Table 5. Absorption trenches in these highly permeable soils shall have a minimum vertical separation of four feet (4') between the absorption trench bottom and seasonal high groundwater table or bedrock. Cherty clays may have percolation rates between zero (0) and sixty (60) minutes per inch. Cherty clay soils located in areas of severe geological limitations shall have less than fifty percent (50%) rock fragments and a vertical separation distance of four feet (4') or more between the absorption trench bottom and bedrock. Unlined absorption trenches shall not be installed in cherty clays when the field evaluation indicated the presence of large voids. Regardless of the percolation rate, absorption trenches installed in areas of severe geological limitations with cherty clays should be designed for a maximum loading rate of forty-five hundredths gallons per square foot (0.45 gals/sq. ft.) or a minimum of two hundred sixty-five square feet per bedroom (265 sq. ft./bedroom).

Table 5–Minimum Absorption Area

Percolation Rate	Absorption Loading Area	Loading Rate
(min./in.)	(sq.ft./bedroom)	(gal./sq. ft.)*
≤10**	150	1.0
11–30	200	0.8
31–45	265	0.45
46–60***	300	0.4
61–120***Æ	600	0.2

* Gallons of sewage tank effluent per day per square foot of trench bottom.

** Soils with percolation rates of one to ten minutes per inch (1–10 min./in.) or less shall either be evaluated for severe geological limitations by a registered geologist or a soil morphology examination shall be required.

*** Note: When percolation rate is greater than forty-five minutes per inch (45 min./in.), backfill above infiltration barrier shall be sand, loamy sand or sandy loam, when available. Two to four inches (2–4") of loamy soil shall be used to cap the sandy backfill. This is to keep rainwater from entering the system.

Æ Must be designed and approved by a Missouri registered engineer.

5. Each absorption trench system shall have a minimum of two (2) trenches with no one (1) trench longer than one hundred feet (100') unless approved by the administrative authority on a case-by-case basis. The absorption trenches shall be located not less than three (3) times the trench width on centers with a minimum spacing of five feet (5') on centers.

6. Absorption trenches shall be at least eighteen inches (18") wide and no more than thirty-six inches (36") wide. Thirty-six inch (36") wide trenches should not be utilized in soils with percolation rates slower than forty-five minutes per inch (45 min./in.). The bottom of standard absorption trenches shall be at least eighteen inches (18") and no more than thirty inches (30") below the finished grade except as approved by the administrative authority.

7. The pipe used between the sewage tank and the absorption system shall be a minimum of four-inch (4") inside diameter equivalent to the pipe used for the building sewer as set forth in section (3) of this rule. The pipe shall have a minimum fall of not less than one-eighth inch

(1/8") per foot. All joints shall be of watertight construction.

8. Gravity-fed absorption field distribution lines should be at least four inches (4") in diameter. Perforated distribution line shall have holes at least one-half inch (1/2") and no more than three-fourths inch (3/4") in diameter.

A. Pipe used for distribution lines shall meet the appropriate ASTM standard or those of an equivalent testing laboratory. Fittings used in the absorption field shall be compatible with the materials used in the distribution lines.

B. When four inch (4")- or six inch (6")-diameter corrugated plastic tubing is used for distribution lines, it shall be certified as complying with applicable ASTM standards. The corrugated tubing shall have either two (2) or three (3) rows of holes, each hole between one-half inch (1/2") and three-fourths inch (3/4") in diameter and spaced longitudinally approximately four inches (4") on centers. ***Coiled tubing shall not be used.***

9. The absorption trenches shall be constructed as level as possible, but in no case shall the fall in a single trench bottom exceed one-fourth inch (1/4") in ten feet (10'). The ends of distribution lines should be capped or plugged, or when they are at equal elevations, they shall be connected.

10. Rock used in soil absorption systems shall be clean gravel or crushed stone, and graded or sized between one and one-half and three inches (1 1/2-3") with no more than ten percent (10%) material to pass through a one-half inch (1/2") screen. The rock shall be placed a minimum of twelve inches (12") deep with at least six inches (6") below the pipe and two inches (2") over the pipe and distributed uniformly across the trench bottom and over the pipe. Limestone and dolomite shall be avoided when possible. Before placing soil backfill over the trenches, the gravel shall be covered with one (1) of the following:

A. Unfaced, rolled, three and one-half inch (3-1/2") thick fiberglass insulation;

B. Untreated building paper;

C. Synthetic drainage fabric; or

D. Other material approved by the administrative authority laid as to separate the gravel from the backfill.

11. Complex slope patterns and slopes dissected by gullies shall not be considered for installation of absorption trenches. Uniform slopes under fifteen percent (15%) shall be considered suitable slope for installation of absorption trenches. When slopes are less than two percent (2%), provisions shall be made to insure adequate surface drainage. When slopes are greater than four percent (4%), the absorption trenches shall follow the contour of the ground. Uniform slopes between fifteen percent (15%) and thirty percent (30%) should not be used for installation of absorption trenches unless the soils are three feet (3') or more below the trench bottom. Slopes within this range may require installation of interceptor drains upslope from the soil absorption system to remove all excess water that might be moving laterally through the soil during wet periods. Usable areas larger than minimum are ordinarily required in this slope range. Slopes greater than thirty percent (30%) shall not be utilized for installation of absorption trenches unless the following requirements can be met and approval is obtained from the administrative authority:

A. The slope can be terraced or otherwise graded or the absorption trenches can be located in naturally occurring soil so as to maintain a minimum ten foot (10') horizontal distance from the absorption trench and the top edge of the fill embankment;

B. The soil is permeable and no restrictive layers or water tables occur at a depth within two feet (2') of the trench bottom;

C. Surface water runoff is diverted around the absorption trench field so that there will be no scouring or erosion of the soil over the field or to allow surface runoff onto the field;

D. If necessary, groundwater flow from heavy rainfall is intercepted and diverted to prevent that water from running into or saturating the soil absorption system; and

E. There is sufficient ground area available to install the absorption trench system with these modifications.

12. Effluent distribution devices, including distribution boxes, flow dividers and flow diversion devices, shall be of sound construction, watertight, not subject to excessive corrosion and of adequate design as approved by the administrative authority. Effluent distribution devices shall be separated from the sewage tank by a minimum of two feet (2') of undisturbed or compacted soil and shall be placed level on a solid foundation of soil, gravel or concrete to prevent differential settlement of the device. Distribution boxes provided with flow equalizers are recommended.

A. Each distribution line shall connect individually to the distribution box and shall be watertight.

B. The pipe connecting the distribution box to the distribution line shall be of a watertight construction laid on undisturbed earth.

C. No more than four (4) distribution lines should be connected to a distribution box receiving gravity flow unless the ground surface elevation of the lowest trench is above the flow line elevation of the distribution box.

13. Stepdowns or drop boxes may be used where topography prohibits the placement of absorption trenches on level grade. Serial distribution systems should be limited to a separation of at least three feet (3') between the bottom of the absorption trenches and the limiting condition such as slow permeability or zone of seasonal saturation as evidenced by mottling. Whenever the design sewage flow rate requires more than seven hundred and fifty lineal feet (750 lin. ft.) of distribution line in a stepdown or drop-box type system, the absorption field

shall be divided into two (2) or more equal portions. Stepdowns shall be constructed of two feet (2') of undisturbed soil and constructed to a height level with the top of the upper distribution line. The inlet to a trench should be placed either in the center or as far as practical from the outlet (overflow) from the same trench. Drop boxes shall be constructed so that the inlet supply pipe is one inch (1") above the invert of the outlet supply pipe which is connected to the next lower drop box. The top of the trench outlet laterals, which allow effluent to move to the distribution lines, shall be two inches (2") below the invert of the outlet supply line. It is recommended that drop boxes be designed to close off the trench outlets to provide for periods of resting when the absorption trench becomes saturated.

14. Dosing is recommended for all systems except serial distribution systems and shall be provided when the design sewage flow requires more than five hundred lineal feet (500 lin. ft.) of distribution line. When the design sewage flow requires more than one thousand lineal feet (1000 lin. ft.) of distribution line, the absorption field shall be divided into two (2) equal portions and each half dosed alternatively, not more than four (4) times per day. Dosing may be accomplished by the use of a pump. Each side of the system shall be dosed not more than four (4) times per day. The volume of each dose shall be the greater of the daily sewage volume divided by the daily dosing frequency, or an amount equal to approximately three-fourths (3/4) of the internal volume of the distribution lines being dosed (approximately one-half gallon per lineal foot (1/2 gal./lin. ft.) of four-inch (4") pipe). Whenever dosed distribution box systems are utilized, the separation distance between the absorption trench bottom and limiting condition should be at least two feet (2').

15. Gravelless subsurface absorption systems may be used as an alternative to conventional four-inch (4") pipe placed in gravel filled trenches, however they cannot be used in areas where conventional systems would not be allowed due to poor permeability, high groundwater or insufficient depth to bedrock. Design approval for these systems may be required from the administrative authority prior to installation and all manufacturing specifications and installation procedures shall be closely adhered to. Gravelless trench systems using fabric wrapped tubing shall not be used, however, where wastes contain high amounts of grease and oil, such as in restaurants.

A. The eight (8)-, ten (10)-, and twelve (12)-inch (inner diameter) corrugated polyethylene tubing used in gravelless systems shall meet the requirements of ASTM F667, Standard Specification for Large Diameter Corrugated Polyethylene Tubing. For purpose of calculation, the eight-inch (8") pipe may be considered equal to eighteen inches (18") in width of a standard absorption trench. The ten-inch (10") pipe may be considered equal to twenty-five inches (25") in width of a standard absorption trench.

B. Two (2) rows of perforations shall be provided located one hundred twenty degrees (120°) apart along the bottom half of the tubing, each sixty degrees (60°) from the bottom centerline. The tubing shall be marked with a visible top location indicator one hundred twenty degrees (120°) away from each row of holes. Perforations shall be cleanly cut and uniformly spaced along the length of the tubing and should be staggered so that there is only one (1) hole in each corrugation. The tubing shall be marked with a visible top location indicator. All gravelless drainfield pipe shall be encased at the point of manufacture with a filter wrap of spun-bonded nylon, spun-bonded polypropylene or other substantially equivalent material approved by the administrative authority.

C. Rigid corrugated tubing shall be covered with filter wrap at the factory and each joint shall be immediately encased in a protective wrap that will prevent ultraviolet light penetration which shall continue to encase the large diameter pipe and wrap until just prior to installation in the trench. Filter wrap encasing the tubing shall not be exposed to sunlight (ultraviolet radiation) for extended periods. Rocks and large soil clumps shall be removed from backfill material prior to being used. Clayey soils (soil group IV) shall not be used for backfill. The near end of the large diameter pipe shall have an offset adapter (small end opening at top) suitable for receiving the pipe from the septic tank or distribution device and making a mechanical joint in the trench.

D. The trench for the gravelless system shall be dug with a level bottom. On sloping ground, the trench should follow the contour of the ground to maintain a level trench bottom and to ensure a minimum backfill of six inches (6"). It is recommended that the minimum trench width for the gravelless system be eighteen inches (18") in friable soils to ensure proper backfill around the bottom half of the pipe. In cohesive soils, the minimum width of excavation should be twenty-four inches (24"). In clay soils, it is recommended that the trench be backfilled with sandy material, sandy loam, loam, clay loam, silt loam or silty clay loam. The gravelless system may be installed at a trench bottom depth of eighteen inches (18") minimum to thirty inches (30") maximum, but a more shallow trench bottom depth of eighteen to twenty-four inches (18-24") is recommended. To promote equal effluent and suspended solids distribution, the slope of the drain pipe should be from zero to one-half inch per one hundred feet (0–1/2 in./100 ft.).

E. A gravelless chamber may be installed based on bottom absorption area utilizing a reduction of up to twenty-five percent (25%) in the size of a standard gravel absorption area based upon a soil morphology evaluation indicating the feasibility of a reduction. However, as described in Table 6, the maximum loading rate provided for any particular soil group must not be exceeded when sizing for the thirty-four inch (34") chamber. For this purpose, the fifteen inch (15") chamber may be considered

equal to twenty-four inches (24") in width of a standard absorption trench. The twenty-two inch (22") chamber may be considered equal to twenty-eight inches (28") in width of a standard absorption trench. The thirty-four inch (34") chamber may be considered equal to forty-two inches (42") in width of a standard absorption trench.

F. Installation of the chamber system shall be in accordance with this rule except:

(I) The installation shall be made in accordance with the manufacturer's specifications;

(II) The side walls of trenches placed in Group IVa soils shall be raked to open pores which were damaged or sealed during excavation; and

(III) Chambers utilizing maximum sidewall absorption features shall be installed per the manufacturer's recommendations to maximize the use of upper soil horizons; and

G. A reduction of up to twenty-five percent (25%) in the size of the absorption field may be allowed based upon a soil morphology evaluation indicating the feasibility of a reduction. However, as described in Table 6, the maximum loading rate provided for any particular soil group must not be exceeded.

Table 6–Loading Rate for Chamber Systems*

Soil Group	Range for Chambers
	(gpd/sq. ft.)
I	1.0–1.2
II	0.7–0.8
III	0.5–0.6
IVa	0.3–0.4
IVb	Unsuitable
V**	0.4–0.6

* Note: All application rates are for area of trench bottoms only.
** Note: No reduction is allowed for chamber systems in Group V soils.

16. Dosing/alternating systems are encouraged, especially in slowly permeable soil conditions.

17. The administrative authority may permit the use of a bed system on sites where the minimum soil permeability is a percolation rate of forty-five minutes per inch (45 min./in.) and essentially meeting the other requirements of this section, and only on lots which are limited by topography, space or other site planning considerations. In such cases the number of square feet of bottom area needed shall be increased by fifty percent (50%) over what would be required for a trench system. Distribution lines shall be at least eighteen inches (18") from the side of the bed and shall have lines on three-foot (3') centers and care must be taken to divert surface water away from the bed. When the design volume of sewage exceeds six hundred gallons (600 gals.) per day, adequate space shall be provided to accommodate a trench system for the absorption field. There shall be no less than a two-foot (2') separation between the bed bottom and the limiting layer or seasonal high water table.

(B) Possible modifications to standard absorption systems which may be utilized to overcome selected soil and site limitations and must be approved by the administrative authority include the following:

1. Shallow placement of absorption trenches shall be utilized where insufficient depth to seasonally high or perched water table or where insufficient soil thickness prevents the placement of conventional distribution lines in accordance with this section. Shallow trenches shall be designed and constructed to provide a minimum of two feet (2') of natural soil separation between the trench bottom and the uppermost elevation of the seasonally high or perched water table and rock. Shallow trenches may be constructed by placing the top of the gravel at original ground level and covering the absorption field with loamy soil, (sandy loam, loam, clay loam, silt loam or silty clay loam) to a depth of eight to twelve inches (8-12") at the center. The cover over the absorption field shall extend at least five feet (5') beyond the edge of any trench and have a turf grass cover established immediately after construction. If an area is to be filled and the trenches constructed in the fill with the bottom of the trenches in at least six inches (6") of natural soil, the following procedures must be followed:

A. The fill material should be of a sandy texture with a maximum clay content of twenty percent (20%). The fill material should not be hauled or worked wet. The area to be filled must be protected from traffic and small brush and trees removed prior to placement;

B. The soil surface must be loosened with a cultivator or garden plow. This work must be done when the soil is dry;

C. The fill is moved onto the site without driving on the loosened soil. The fill material is then tilled into the natural soil to create a gradual boundary between the two (2). The remaining fill is then added in layers until the desired height is obtained with each layer being tilled into the preceding layer; and

D. The site is then shaped to shed water and fill all low spots before the absorption system is installed. After installation of the absorption system, the site must have a turf grass cover established as soon as possible;

2. Alternating dual field absorption systems may be utilized where soils are limited by high clogging potentials, percolation rates slower than sixty minutes per inch (60 min./in.) or high shrink/swell potential soils and where the potential for malfunction and need for immediate repair is required. Alternating dual field absorption systems shall be designed with two (2) complete absorption fields, each sized a minimum of

seventy-five percent (75%) of the total area required for a single field and separated by an effluent flow diversion valve. The diversion valve shall be constructed to resist five hundred pounds (500 lbs.) crushing strength, structurally sound and shall be resistant to corrosion. A valve placed below ground level shall be constructed so that it may be operated from the ground surface; and

3. Sand-lined trenches may be used in areas where the soil has greater than fifty percent (50%) rock fragments and there are severe geological limitations. For a maximum loading rate of forty-five hundredths gallons per day per square foot (.45 gpd/sq. ft.) or a minimum of two hundred sixty-five square feet per bedroom (265 sq. ft./bedroom), the sand is not required to meet the requirements for intermittent sand filters. The material must be natural or manufactured sand and have no more than fifteen percent (15%) clay content. Manufactured sand shall be chat, fines manufactured from igneous rocks or chert gravel or manufactured from crushed glass. **Crushed limestone is not acceptable.** For higher loading rates, the sand must meet the requirements for an intermittent sand filter.

A. In standard four-inch (4") pipe and gravel trenches, the depth of liner material must be twelve inches (12") below the gravel and at least six inches (6") on the sides of the gravel up to the top of the gravel. To place sand on the sides of the trenches, the trench walls must be excavated on a slope instead of vertically. The side slopes should be two horizontal to one vertical (2:1) and in no case steeper than one horizontal to one vertical (1:1).

B. In gravelless pipe systems the minimum thickness of liner material is six inches (6") around the pipe.

C. The effluent to sand-lined systems in areas of potential groundwater contamination should be equally distributed as much as practically possible. Serial and drop-box systems shall not be used. As a minimum, a distribution box shall be used to evenly distribute the effluent to the trenches. Dosing is recommended in order to more positively assure even distribution.

D. The sand-lined trenches may be used, with the approval of the administrative authority, where the percentage of rock fragments is less than seventy percent (70%) for at least four feet (4') below the trench bottom. For sand-lined trenches to function properly, the permeability of the natural material should be similar to the permeability of the liner material. Sand-lined trenches must not be used over fragipans or other restrictive layers which have potential to perch water tables and could cause saturation of the liner material.

(6) Alternative Systems.

(A) General. The intent of this section is to provide minimum standards for the design, location, installation, use and maintenance of alternative sewage disposal systems in areas of limiting soil characteristics, where a standard system cannot be installed or a standard system is not the most suitable treatment. Where these systems are employed, they shall comply with all local codes and ordinances and should be subject to timely inspections to assure adherence to specifications. These systems, except for wastewater stabilization ponds, shall be designed and stamped by a licensed engineer. All absorption systems should have curtain drains, terraces or use of other flow diversion methods to minimize surface or ground water from loading the absorption field.

(B) Adoption and Use. Where this rule is administered by an administrative authority, those administrative authorities may adopt this section in whole or in part as part of a local code or ordinance. Further, nothing in this rule or section shall require any administrative authority to allow the installation of any system in this section.

(C) Low Pressure Pipe (LPP) System. A low pressure, two- to four-foot (2–4') pressure head, pipe system may be utilized where soil and site conditions prohibit the installation of a conventional or modified septic tank system due to the presence of shallow soil conditions, seasonally high water table conditions and slow soil permeability. The administrative authority may permit the use of a LPP system where there are cherty clay soils, severe geological limitations or both. The separation distance in these areas of concern for groundwater between the trench bottoms and bedrock shall be at least four feet (4') or more. The administrative authority may require that the hydraulic design of LPP systems be designed by an engineer. The administrative authority may also require the LPP trenches to be sand-lined if the soils have severely diminished treatment capability due to excessive rock content. The amount of rock fragments shall be less than fifty percent (50%) and in no case more than seventy percent (70%), unless the trenches are lined with sand.

1. The LPP shall consist of the following basic components:

A. A network of one- to two-inch (1–2") diameter perforated PVC, one hundred sixty pounds per square inch (160 lbs./sq. in.) pipe or equivalent placed in natural soil at shallow depths, generally no more than twelve inches (12"), in narrow trenches not less than eight inches (8") in width and spaced not less than five feet (5') on center. Trenches shall include at least five inches (5") of pea gravel, if available; or if necessary, no less than three-quarter inch (3/4") crushed stone below the pipe and two inches (2") above the pipe; and four inches (4") of soil cover. The holes in the perforated pipe should be spaced from two feet (2') to no more than eight feet (8'). The minimum hole size is five thirty-seconds inch (5/32");

B. A properly designed, two (2)-compartment septic tank or other approved pretreatment system and a pumping or dosing tank. The pumping or dosing tank shall be a minimum of five hundred gallons (500 gals.) or have the capacity to store one (1) day’s flow above the pump on

level, whichever is greater. The tank shall be provided with a filter or screen capable of preventing the passage of suspended solids to the soil absorption system;

C. A submersible sewage effluent pump (*not* a sump pump) with appropriate on/off controls for controlled dosing and a high water alarm or other approved pressure dosing and distribution system; and

D. A watertight supply manifold pipe for conveying effluent from the pump to the low pressure network.

2. The soil and site criteria for low pressure pipe systems shall meet the following minimum requirements:

A. LPP absorption fields shall not be installed on slopes in excess of ten percent (10%). LPP absorption fields may be installed on slopes greater than ten percent (10%), but require special design procedures to assure proper distribution of effluent over the absorption field;

B. There shall be at least twenty-four inches (24") of separation between the naturally occurring soil surface and bedrock, water-impeding formation, seasonally high water table or evidence of chroma 2 mottles. This twenty-four-inch (24") depth shall consist of permeable soils with percolation rates less than or equal to sixty minutes per inch (60 min./in.) or be classified as SUITABLE or PROVISIONALLY SUITABLE in accordance with section (7) of this rule. The bottom of percolation test holes must be dug or bored to the bottom of the proposed trenches. The bottom of the proposed trenches must be located a minimum of one foot (1') above rock, water-impeding formation, seasonally high water table or where there is evidence of chroma 2 mottles. In areas where there are severe geological limitations and the soils have a high chert content, the bottom of the proposed trenches shall be at least four feet (4') above bedrock unless an evaluation by a registered geologist determines that the separation distance may be reduced;

C. Components of the LPP shall not be located in depressions or areas subject to frequent flooding. Surface water, perched ground water and other subsurface lateral water movement shall be intercepted or diverted away from all components of the LPP. Final shape of the LPP distribution field shall be such that rainwater or runoff is shed;

D. Location of the septic tank, pumping or dosing chamber and LPP absorption field is subject to the same horizontal setbacks specified in subsection (1)(D) of this rule. Horizontal setback distances in Table 1 shall be measured in the LPP absorption field from a margin of two and one-half feet (2 1/2') beyond the lateral and manifold pipes;

E. An area that is at least equal in size to the LPP distribution field area plus a two and one-half foot (2 1/2') margin beyond the lateral and manifold pipes and which meets all other site and soil criteria shall be set aside for a replacement field; and

F. There shall be no soil disturbance to an approved site for an LPP system except the minimum required for installation.

3. The following application rates shall be used in determining the maximum application rate for low pressure pipe systems:

A. In calculating the number of square feet for the absorption field (not square footage of trench bottom), the design sewage flow shall be divided by the application rate from Table 7. The lateral lines shall have a minimum spacing of five feet (5') on centers within the areas calculated for the absorption field area; and

Table 7–Loading Rates

Percolation Rate	Loading Rates Absorption Area	Loading Rate*
(min.in.)	(sq. ft./bedroom)	(gal./sq. ft.)
≤10**	200	0.6
11-30	300	0.4
31-45	400	0.3
46-60	600	0.2

* Gallons of sewage tank effluent per day per square foot of total area.

** In areas where there are severe geological limitations and the soils consist of very gravelly soils of thirty-five or greater percent (≥ 35%) gravels by volume, the loading rate of two-tenths gallons per day per square foot (0.2 gpd/sq. ft.) should be used even when the percolation rate would indicate a higher loading.

B. The systems shall be designed so that the discharge from any one (1) lateral line does not vary more than ten percent (10%) from the other laterals. All laterals shall have an envelope of trench rock surrounding the pipe. The trench rock shall be placed to a minimum depth of four inches (4") below the pipe and two inches (2") above the pipe.

4. Design of the LPP shall comply with accepted practices and be specifically approved by the administrative authority. The system shall be designed and bear the seal of a Missouri registered engineer.

(D) Wastewater Stabilization Ponds (Lagoon). A waste stabilization pond can provide satisfactory sewage disposal in rural areas where soils are not suited for absorption systems. Single residence wastewater stabilization ponds are not generally suitable in subdivisions with lots less than three (3) acres in size. No more than one (1) single family residence will be allowed on one (1) stabilization pond.

1. The following minimum separation distances may be modified as necessary to accommodate site requirements or local codes:

A. The pond shall be located a minimum of seventy-five feet (75') from property lines as measured from the adjoining pond shoreline. However, this distance must be increased where necessary to be sure that all effluent is disposed upon the property from which it originated;

B. The pond shall be located a minimum of two hundred feet (200') from the nearest existing residence and a minimum of one hundred feet (100') from the residence that it serves;

C. The pond shall be located at least one hundred feet (100') from a potable water supply or pump suction line; and

D. The pond shall be located at least fifty feet (50') from a stream, water course, lake or impoundment.

2. Ponds may be utilized when there are no significant limitations related to groundwater from their use and the soils have been demonstrated to be very slowly permeable such as percolation rates slower than one hundred twenty minutes per inch (120 min./in.). There shall be either a minimum separation distance between the pond bottom and creviced bedrock of three feet (3') or installation of a clay liner with a minimum thickness of one foot (1') or a synthetic liner, either of which must be acceptable to the administrative authority. Percolation losses from the pond shall not exceed one-eighth inch (1/8") per day to prevent groundwater contamination or nuisance conditions. Site modifications may be accomplished to provide these soil requirements. In areas of severe geological limitations, restrictive layers such as fragipans shall be a minimum of twelve inches (12") thick and shall not be breached during construction.

3. Steeply sloping areas should be avoided.

4. Selection of the pond site should consider a clear sweep of the surrounding area by prevailing winds. Heavy timber should be removed for a distance of fifty feet (50') from the water's edge to enhance wind action and prevent shading.

5. The administrative authority may require that a properly sized and constructed septic tank or aeration unit precede the pond. If irrigation of the effluent is required to maintain the wastewater on the property from which it originated, a septic tank or aeration unit should precede the pond. The use of a septic tank or aeration unit should not be used as a basis for reduction of the set-back distances as set forth in subparagraphs (6)(D)1.A.–D. of this rule.

6. The pond shall be designed on the basis of four hundred forty square feet (440 sq. ft.) of water surface area per bedroom at the three-foot (3') operating level. This square footage may be reduced by a maximum of twenty percent (20%) if a septic tank, aeration unit or other pretreatment device precedes the pond. The minimum water surface area at the three-foot (3') level shall be nine hundred square feet (900 sq. ft.).

7. A single cell is generally acceptable for single residence pond systems. If multiple cells are used for further polishing or storing of the effluent, the secondary cell should be one-half (1/2) the size of the primary cell.

8. The minimum embankment top width shall be four feet (4'). The embankment slopes shall not be steeper than three to one (3:1) on the inner and outer slopes. Inner embankment slopes shall not be flatter than four to one (4:1). Outer embankment slopes shall be sufficient to prevent the entrance of surface water into the pond. Freeboard shall be at least eighteen inches (18") and preferably twenty-four inches (24"). Additional freeboard may be provided.

9. To minimize erosion and facilitate weed control, embankments shall be seeded with a locally hardy grass from the outside toe to one foot (1') above the water line. Alfalfa or similar long-rooted crops which might interfere with the structure of the embankment shall not be used. Rip rap may be necessary under unusual conditions to provide protection of embankments from erosion.

10. The influent line shall be of a sound, durable material of watertight construction of SDR 35 or greater. The line shall have a minimum diameter of four inches (4") and be laid on a firm foundation at a minimum grade of one-eighth inch (1/8") per foot from the point of entry into the pond. The influent line shall discharge as far as practical from the possible outlet side of the pond. A cleanout or manhole should be provided in the influent line near the pond embankment. From this point the line shall either be laid to the inner toe of the embankment and then on the bottom of the pond to the terminus point or the line shall be supported and secured every five feet (5'). A concrete splash pad three feet (3') square should be placed under the terminus of the pipe. The elevation of the cleanout or manhole bottom should be a minimum of six inches (6") above the high water level in the pond.

11. The pond shall be shaped so there are no narrow or elongated portions. Round, square or rectangular cells are considered most desirable. Rectangular cells shall have a length not exceeding three (3) times the width. No islands, peninsulas or coves shall be permitted. Embankments should be rounded at corners to minimize accumulation of floating materials.

12. The floor of the pond shall be stripped of vegetation and leveled to the proper elevation. Organic material removed from the pond area shall not be used in embankment construction. The wetted area of the pond must be sealed to prevent excessive exfiltration. Seals consisting of soils must be adequately compacted by the construction equipment.

13. Embankments shall be constructed of impervious materials and compacted sufficiently to form a stable structure with very little settlement.

14. Any effluent should be withdrawn from six inches (6") below the water surface. This can be accomplished by placing a tee on the inlet end of the pipe

or by placing the outlet pipe eight to ten inches (8-10") lower on the inlet end than the outlet end of the pipe.

15. The pond area shall be enclosed with a fence conforming to the following conditions:

A. The fence shall be at least four feet (4') in height;

B. The fence shall be welded, woven or chain link material with no smaller than fourteen gauge (14 ga.) wire. Cattle or hog panels can be substituted with a tee post being used for a line post;

C. Fence posts shall be pressure-treated wood, galvanized and/or painted steel. Fence posts shall be driven, tamped or set in concrete. Line posts should be at least eighteen inches (18") deep and shall be spaced no more than ten feet (10') apart. Corner posts should be at least twenty-four inches (24") deep and shall be properly braced;

D. The fence shall be of sound construction with no gaps or openings along the bottom;

E. The fence shall be no closer than the center of the berm to the water's edge at the three-foot (3') deep operating level. Fence set-backs should not exceed thirty feet (30') from the water's edge;

F. A properly hinged four foot (4') high gate or comparable materials shall be installed and provided with an effective latching device. The gate should be thirty-six to forty-eight inches (36-48") in width to accommodate maintenance and mowing equipment; and

G. The fence must be completed prior to occupancy of the dwelling.

16. Effluent from a pond must be disposed of on the property from which it originated. This may be accomplished by locating the outlet as far as practical from the property line and out of any natural drainage ditches or swales. The minimum distance from the outlet to a property line shall be one hundred feet (100'). Another method is to construct a terraced swale with a minimum length of one hundred fifty feet (150'). If these methods are unsuccessful, or whenever there is less than twelve inches (12") of permeable soil over a restrictive layer, controlled surface irrigation must be used. To utilize controlled surface irrigation, the pond must be capable of operating up to five feet (5') deep with one foot (1') of freeboard or have a second cell for storage. The administrative authority shall approve the method of effluent disposal.

17. It may be necessary to introduce water into the pond to facilitate start-up of the biological processes, however, there shall be no permanent connection of any roof drain, footing drain or any source of rainwater to the wastewater stabilization pond.

18. Odor problems caused by spring turnover of water, temporary overloading, ice cover, atmospheric conditions or anaerobic conditions 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 (2 lbs.) per day until the odor dissipates.

(E) Elevated Sand Mounds. Elevated sand mounds may be considered whenever site conditions preclude the use of absorption trenches. The construction of a mound shall be initiated only after a site evaluation has been made and landscaping, dwelling placement, effect on surface drainage and general topography have been considered. Due to the nature of this alternative system,
actual selection of mound location, size of mound and construction techniques must be carefully considered and the criteria established in this rule implicitly followed. A set-back distance of fifty feet (50') from the downslope property line is recommended.

1. Elevated sand mounds shall not be utilized on soils where the high ground water level as evidenced by mottling, bedrock or other strata having a percolation rate slower than one hundred twenty minutes per inch (120 min./in.) occurs within twenty-four inches (24") of natural grade. Up to four feet (4') of soil thickness over bedrock may be required in areas where there is a significant potential for groundwater contamination. Mounds shall be constructed only upon undisturbed naturally occurring soils.

2. Elevated sand mounds are subject to the setback distances required in subsection (1)(D) of this rule.

3. The fill material from the natural soil plowed surface to the top of the rock-filled bed shall be sand, loamy sand or sandy loam. Loading rates on the sand fill shall not exceed the values in Table 8.

Table 8–Recommended Loading Rates for Soil Textures Suited to Use as Fill in a Mound System

Texture	Loading Rate (gal./sq. ft./day)
Medium to coarse sand	1.2
Fine sand	1.0
Loamy sand	0.8
Sandy loam	0.6

Note: Rock fragments larger than one-sixteenth inch (1/16") shall not exceed fifteen percent (15%) by volume of the material used for sandy fill.

4. There shall be a minimum of one foot (1') of fill material and two feet (2') of naturally occurring soils between the bottom of the trench rock and the highest elevation of the limiting conditions as defined in paragraph (6)(E)1. of this rule.

5. Whenever possible, mounds should be located on flat areas or crests of slopes. Mounds should not be located on natural slopes of more than six percent (6%) if the percolation rate is slower than sixty minutes per inch (60 min./in.) to a depth of at least twenty-four inches (24")

below the sand layer. Mounds may be located on slopes up to a maximum of twelve percent (12%) if the soil percolation rate is faster than sixty minutes per inch (60 min./in.) to a depth of twenty-four inches (24") below the sand layer.

6. In no case shall the width of the trench rock in a single bed exceed ten feet (10').

7. The required bottom area of the trenches or bed and the effective basal area of the mound shall be based on one hundred twenty gallons per bedroom per day (120 gals./pbd). The basal area of the mound shall have the minimum area as shown in Table 9.

Table 9–Loading Rate

Percolation Rate	Loading Rate of Basal Area
(min./in.)	(gpd/sq. ft.)
1–30	1.2
31–45	0.75
46–60	0.5
61–120	0.25

8. The area of sand fill shall extend beyond the basal area and the sides shaped to a three to one (3:1) or four to one (4:1) slope. The sand fill shall be covered with six inches (6") of fine textured soil and a final cap of six inches (6") of good topsoil applied. Also the mound shall be seeded with a hardy grass to establish a turf grass cover as soon as possible. No shrubs shall be planted on the top of the mound. Shrubs may be placed at the foot and side slopes of the mound.

9. The land area fifty feet (50') down slope of the elevated sand mound is the effluent dispersal area and the soil in this area may not be removed or disturbed.

10. Dosing shall be required for all elevated sand mounds. The mound shall be dosed not more than two (2) times per day. The size of the dosing pump shall be selected to maintain a minimum pressure of one pound per square inch (1 psi), two and three-tenths feet (2.3') of head, at the end of each distribution line.

A. Perforation holes and hole spacing shall be determined to insure equal distribution of the effluent throughout the bed or trenches.

B. The perforated pipe laterals shall be connected to a two-inch (2") diameter manifold pipe with the ends capped. The laterals shall be spaced no farther than forty inches (40") on center and no farther than twenty inches (20") from the edge of the trench rock. The perforated pipe laterals shall be installed level with the perforations downward. There shall be a minimum of nine inches (9") of trench rock below the laterals and two inches (2") above the laterals. The material used to cover the trench rock shall be untreated building paper, six inches (6") of compacted straw and three and one-half inch (3 1/2") unbacked fiberglass insulation or a geotextile.

C. The manifold pipe shall be connected to the supply pipe from the pump. The manifold shall be sloped toward the supply pipe from the pump. Antibackflow valves are prohibited in the pump discharge line. The pump discharge line shall be graded to permit gravity flow to the absorption area or back to the dosing tank. Proper air relief and anti-siphon devices shall be installed in the piping to prevent siphoning of effluent from the dosing tank or from the mound.

11. Prior to preparing the area selected for the mound, above ground vegetation must be closely cut and removed from the ground surface. Prior to plowing, the dosing pump discharge line shall be installed from the pump chamber to the point of connection with the distribution manifold. The area shall then be plowed to a depth of seven to eight inches (7–8") parallel to the land contour with the plow throwing the soil upslope to provide a proper interface between the fill and natural soils. A rubber-tired tractor may be used for plowing but in no case shall a rubber-tired tractor be used after the surface preparation is completed. Tree stumps should be cut flush with the surface and the roots should not be pulled. The soil shall be plowed only when the moisture content of a fragment eight inches (8") below the surface is below the plastic limit.

12. Mound construction shall proceed immediately after surface preparation is completed.

A. A minimum of twelve inches (12") of sand fill shall be placed where the trench rock is to be located. A crawler tractor with a blade shall be used to move the sand into place. At least six inches (6") of sand shall be kept beneath equipment to minimize compaction of the plowed layer. The sand layer upon which the trench rock is to be placed shall be level.

B. After hand leveling of the trench rock, the distribution system shall be placed and the pipes covered with two inches (2") of rock. After installation of the distribution system, the entire mound is to be covered with topsoil native to the area. The entire mound shall be crowned by providing twelve inches (12") of topsoil on the side slopes with a minimum of eighteen inches (18") over the center of the mound. The entire mound shall then have a turf grass cover established to assure stability of the installation.

C. The area surrounding the elevated sand mound shall be graded to provide diversion of surface runoff waters.

(F) Holding Tanks. The use of holding tanks is generally discouraged and their interim use should be limited to situations where construction of satisfactory sewage treatment and disposal systems will occur within one (1) year. Use of a holding tank must be specifically approved by the administrative authority on a case-by-case

basis which may require stipulations in a signed agreement regarding the use and the length of time for use of the holding tank.

1. A holding tank shall be constructed of the materials and by the same procedures as those specified for watertight septic tanks.

2. A cleanout pipe of at least six inches (6") diameter shall extend to the ground surface and be provided with seals to prevent odor and exclude insects and vermin. A manhole of at least twenty inches (20") least dimension shall extend through the cover to a point within twelve inches (12") but no closer than six inches (6") below finished grade. The manhole cover shall be covered with at least six inches (6") of earth.

3. The tank shall be protected against flotation under high water table conditions. This shall be achieved by weight of the tank, earth anchors or shallow bury depths.

4. For a residence, the size shall be one thousand gallons (1000 gals.) or four hundred gallons (400 gals.) times the number of bedrooms, whichever is greater. For permanent structures, other than residences, the capacity shall be based on measured flow rates or estimated flow rates. The tank capacity shall be at least five (5) times the daily flow rate.

5. Holding tanks shall be located as follows:

A. In an area readily accessible to the pump truck under all weather conditions;

B. As specified for septic tanks in Table 1 set forth in subsection (1)(D) of this rule; and

C. Where accidental spillage during pumpage will not create a nuisance.

6. A contract for disposal and treatment of the sewage wastes shall be maintained by the owner with a pumper, municipality, agency or firm which possesses a current and valid permit issued by the Department of Natural Resources for such activity.

7. Holding tanks shall be monitored to minimize the chance of accidental sewage overflows. Techniques such as visual observation, warning lights or bells, or regularly scheduled pumping shall be used. For commercial establishments, a positive warning system shall be installed which allows twenty-five percent (25%) reserve capacity after actuation.

8. Holding tanks used in conjunction with permanent black water/gray water systems must conform to the requirements of this section except that the minimum size tank is one thousand gallons (1000 gals.). In these situations, the holding tank is to receive toilet wastes only.

(G) Sand Filters. Septic tanks or aeration units and sand filters may be used along with soil absorption systems in soils with percolation rates between sixty and one hundred twenty minutes per inch (60–120 min./in.). These systems must be specifically approved by the administrative authority.

1. The septic tank and aeration units must be in accordance with section (4) of this rule. Setback distances as shown in Table 1 and as specified in subsection (1)(D) of this rule shall apply except that the minimum distance to the downslope property line should be fifty feet (50').

2. The following shall apply to gravity flow sand filter systems:

A. All piping in a sand filter shall be four inch (4") polyvinyl chloride (PVC). Perforated pipe should be used for distribution and collection lines;

B. All sand filters shall be dosed at two (2) times per day. Dosing shall provide uniform distribution of wastewater throughout the filter cross-section and allow time for reaeration of the pore spaces to occur. Dosing may be accomplished by either pumps or siphons;

C. Effluent from filter underdrains must be collected and disposed of properly. Effluent shall not discharge off the owner's property;

D. Buried sand filters shall be in conformance with Table 10 of this rule. One (1) collector line shall be provided for every six feet (6') of bed width, with a minimum of two (2) collector lines per bed. The collector lines shall have a minimum grade of one percent (1%).

(I) Distribution lines shall be level and spaced a maximum of three feet (3') apart. Each distribution line must be vented (downstream end) or connected to a common vent. Vents should extend at least twelve inches (12") above the ground surface with the outlet screened or capped (perforated).

(II) Septic tank effluent shall be applied to the filter through a distribution box. Buried filters shall be dosed with a pump or siphon. The dosing volume shall be sufficient to fill the pore spaces in the gravel to a depth of four inches (4"). For single bed filters receiving septic tank effluent, the hydraulic loading rate shall not exceed one gallon per day per square foot (1 gpd/sq. ft.) with a maximum organic loading of one and three-fourths pounds (1 3/4 lbs.) of biological oxygen demand (BOD) per day per one thousand square feet (1000 sq. ft.) of surface area. Total surface area shall not be less than two hundred square feet (200 sq. ft.); and

E. Open sand filters are similar to buried filters with the exception that no soil backfill or gravel is used on the top of the sand and the filter must be enclosed within concrete walls or other substantially equivalent material. Open sand filters shall be in conformance with Table 10.

Table 10 - Design Guidelines for Intermittent Sand Filters

Parameter	Buried Filters	Open Filters
Pretreatment	Septic Tank	Septic Tank
Setback Distance Residences Water Supplies	 50 ft. 100 ft.	 200 ft. 100 ft.
Backfill Depths	12-inch minimum	
Distribution Gravel Pipe Venting Dosing Frequency Hydraulic Loading Barrier Material	 6" (3/4"–2–1/2") 4" PVC Perforated Down stream end ≥2 per day 1.0 gpd/sq. ft. 3–1/2 fiberglass; untreated building paper (4060 lb.); synthetic fabric; 8" straw	 None PVC or equivalent ≥2 per day 2–5 gpd/sq. ft. None
Sand Effective size Uniformity coefficient Fines (<0.13 mm) Depth	 0.3-1.22 mm <3.5 ≤1% (by wt.) 24–36"	 0.3-1.22 mm <3.5 <1% (by wt.) 24–36"
Collector Lines Minimum Number Slope Gravel Pea Gravel Pipe	 2/bed, 1 line per 6' width 1% minimum 4" overpipe; 3/4–2 1/2") 3" (1/83/8") 4" PVC Perforated	 2/bed; 1 line per 6' width 1% minimum 4" overpipe (3/4–2 1/2") 3" (1/83/8") 4" PVC Perforated

(I) Distribution of wastewater shall be applied by pipes directly over the sand surface at the center of the bed or at the four corners. Splash plates beneath points of discharge must be used to prevent erosion of the sand. Curbs around the splash plates or large stones placed around the periphery of the plate will help prevent scouring. All exposed pipes shall slope to drain.

(II) Filter walls shall be concrete, masonry, compacted clay, high density polyethylene plastic with a minimum thickness of thirty (30) mil, or other material acceptable to the administrative authority; and extend six inches (6") above the sand and six inches (6") above the adjacent ground level.

(III) Dosing shall flood the bed to a depth of two inches (2") with a hydraulic loading of two to five gallons per day per square foot (2–5 gpd/sq. ft.) (septic tank effluent). Maximum organic loading is five and thirteen-hundredths pounds (5.13 lbs.) of BOD per day per one thousand square feet (1000 sq. ft.) of surface area.

(IV) The filter may be covered to provide protection against severe weather, prevent growth of weeds and to keep children and animals out of the filter. Such cover may include six inches (6") of clean one to two inch (1-2") gravel, if so designed by an engineer as part of the system. In such event, a vent for the system would not be required if so determined by the engineer.

3. The following shall apply to pressure dosed sand filter systems:

A. Conventional pressure dosed sand filters use an intermittent filter with two feet (2') or more of medium sand designed to filter and biologically treat sewage tank effluent from a pressure distribution system at an application rate not to exceed one and twenty-five hundreths gallons per square foot (1.25 gals./sq. ft.) sand surface area per day, applied at a dose not to exceed one-half gallon (1/2 gal.) per orifice per dose. These sand filters may be buried or open.

B. Recirculating pressure dosed sand filters use a recirculating filter with two feet (2') or more of medium filter media designed to filter and biologically treat sewage tank effluent from a pressure distribution system at an application rate not to exceed five gallons per square foot (5 gals./sq. ft.) filter surface per day, applied at a dose not to exceed two gallons (2 gals.) per orifice per dose. These sand filters shall be uncovered and open to the surface.

C. Minimum filter area for these filters shall be as follows:

(I) Conventional pressure dosed sand filters for single family residences shall be a minimum of three hundred and sixty square feet (360 sq. ft.) in surface area with a design sewage flow not to exceed six hundred gallons (600 gals.). If sand filter design flows exceed an average of four hundred and fifty gallons per day (450 gpd), the minimum sand surface will be based on one and twenty-five hundredths gallons per day per square foot (1.25 gpd/sq. ft.); and

(II) Pressure dosed sand filters for commercial facilities shall be sized on the basis of projected daily sewage flow. If the waste strength is proposed to be greater than residential strength waste, pretreatment shall be required which will reduce the biological oxygen demand to levels not to exceed three hundred (300), total suspended solids to levels not to exceed one hundred-fifty (150), and oil and grease to levels not to exceed twenty-five (25). The minimum sand surface will be based on two to five gallons per day per square foot (2-5 gpd/sq. ft.).

D. Design criteria shall include the following:

(I) Sewage tanks shall be in accordance with section (4) of this rule. Set-back distances as shown in Table 1 of subsection (1)(D) and as specified in subsection (1)(E) of this rule shall apply, unless a variance has been allowed by the administrative authority. Tanks shall be watertight and tested in the field. The test shall be performed by filling the tank two inches (2") above the riser inlet. At the end of the first twenty-four (24)-hour period, the tank water level should be refilled. After another twenty-four (24)-hour period, no more than one inch (1") of water should have dropped from the original reading. All sewage and pump tanks will be supplied with vandal-proof access risers to grade over the pump units. Risers should have a waterproof epoxy seal between the tank and riser;

(II) Pumping systems for a pressure dosed sand filter system should provide pumping apparatus that is capable of filtering gross solids larger than one-eighth inch (1/8") and draw from the clear zone near the outlet side of the sewage tank. This zone is described as the layer of effluent between the sludge and scum layers of the sewage tank. Pumps should be able to deliver adequate head pressure to control orifice plugging. Pumps should be made of a corrosive resistant material such as Type 316 stainless steel, suitable plastic, or 85-5-5-5 bronze. Screens should have at least ten square feet (10 sq. ft.) of surface area, with one-eighth inch (1/8") openings;

(III) Operation controls should be on a timer dose that distributes the average daily flow over an eighteen (18)-hour period. Recirculating filters will be set to recirculate five (5) times the average daily flow over a twenty-four (24)-hour period. Systems should be designed with a high water alarm and light signal. Control panels should be located on an exterior location. Control operations should be located in an area available for maintenance;

(IV) Intermittent filter media shall be a mixture of sand or durable inert particles with one hundred percent (100%) passing the three-eighths inch (3/8") sieve; ninety to one hundred percent (90-100%) passing the No. 4 sieve; sixty-two to one hundred percent (62-100%) passing the No. 10 sieve; forty-five to eighty-two percent (45-82%) passing the No. 16 sieve; twenty-five to fifty-five percent (25-55%) passing the No. 30 sieve; ten percent (10%) or less passing the No. 60 sieve; four percent (4%) or less passing the No. 100 sieve; or sand meeting the ASTM-C 33

concrete sand specification minus four percent (4%) or less passing the No. 100 sieve. All drainage rock should be a river washed, hardened and weathered rock. The treatment media will be two inches (2") deep and of a coarse media with an effective size of one and one-half to three millimeters (1 1/2-3 mm) and a uniformity coefficient of less than two (2). Limestone or dolomite is not acceptable for drainage rock;

(V) Recirculating filter media shall be a mixture of sand or durable inert particles with one hundred percent (100%) passing the three-eighths inch (3/8") sieve; seventy-nine to one hundred percent (79-100%) passing the No. 4 sieve; eight to ninety-two percent (8-92%) passing the No. 8 sieve; zero to fifteen percent (0-15%) passing the No. 30 sieve; zero to one percent (0-1%) passing the No. 50 sieve. All drainage rock should be a river washed, hardened and weathered rock. The treatment media will be two inches (2") deep and of a coarse media with an effective size of one and one-half to three millimeters (1 1/2-3 mm) and a uniformity coefficient of less than two (2). Limestone or dolomite is not acceptable for drainage rock; and

(VI) Container designs may be concrete containers consisting of watertight walls and floors to prevent groundwater from infiltrating or effluent from exfiltrating from the filter. All penetrations through the walls shall be water-tight. Containers may also consist of a thirty (30) mil polyvinyl chloride liner covering the sand filter bottom and side wall areas. Polyvinyl chloride liners should be supplied with repair kits and boots for passage through the liner wall. The bottom area of the liner should be bedded in two inches (2") of leveling sand. The liner should be constructed to form a waterproof membrance between the trench bottom and trench walls. The polyvinyl liner should incorporate all seams to be a chemically or heat bonded waterproof seam.

E. The filter design criteria shall include the following:

(I) The interior base of the filter container shall be level or constructed at a grade of one percent (1%) or less to the underdrain pipe elevation;

(II) The underdrain piping shall consist of a pipe with one-fourth inch (1/4") grooves cut every four inches (4") along the pipe length to a depth of one-half (1/2) of the pipe diameter. The bottom of the filter container shall be covered with a minimum of six inches (6") of drain media. The underdrain pipe shall be enveloped in an amount and depth of drainage rock to prevent migration of the underdrain media into the pipe perforations;

(III) A minimum of twenty-four inches (24") of approved filter media shall be installed over the underdrain media. The media shall be damp at the time of installation to insure compaction of the media. The top surface of the media shall be level;

(IV) There shall be a minimum of three inches (3") of clean drain media below the distribution laterals, and sufficient media above the laterals equal to or covering the orifice shields and/or pipe;

(V) Distribution laterals shall be evenly spaced on minimum, thirty inch (30") centers. Orifices shall be placed such that there is one (1) orifice or more on average per six square feet (6 sq. ft.) of sand surface. Orifice holes shall be one-eighth inch (1/8") in diameter. The diameter of the piping manifold and lateral shall be no less than one-half inch (1/2"). The ends of the distribution laterals should be constructed with a means to perform flushing of the piping, collectively or individually, through the operation of a flushing valve. The flushed effluent may be discharged to the sand filter;

(VI) The top of the intermittent media in which the pressure distribution system is installed shall be covered with a breathable nylon or polypropylene spun filter fabric rated at eighty-five hundredths ounce per square yard (0.85 oz./sq. yd.) to eliminate soil intrusion into the filter media. Recirculating filters shall be open-topped;

(VII) The top of the intermittent sand filter area shall be backfilled with a soil cover, free of rocks, vegetation, wood waste, etc. The soil cover shall have a textural class of loamy sand. The soil cover shall have a minimum depth of six inches (6") and a maximum depth of twelve inches (12"). Intermittent sand filters designs may delete soil cover and incorporate three to six inches (3-6") of a quality cypress or cedar mulch over the entire filter area;

(VIII) Where the effluent from a sand filter is to be discharged via a pump, the pump and related apparatus shall be housed in a vandal resistant vault designed to withstand the stresses placed upon it and not allow the migration of drain media, sand or underdrain media to its interior. The vault shall have a durable, affixed floor. The vault shall provide watertight access to the finished grade with a diameter equal to that of a gravity discharge sand filter. The depth of the underdrain and the operational level of the pump cycle and alarm shall not allow effluent to come within two inches (2") of the bottom of the sand filter media. The pump off level shall be no lower than the invert of the perforations of the underdrain piping. The internal sand filter pump shall be electrically linked to the sand filter dosing apparatus in such a manner as to prevent effluent from entering the sand filter in event the internal sand filter pump fails; and

(IX) Other sand filters which vary in design from those described in this rule may be authorized by the administrative authority if they can be demonstrated to produce a comparable effluent quality.

F. Effluent from these sand filters may discharge to the ground surface, provided the effluent is maintained on the owner’s property and the following separation distances are maintained:

(I) The discharge shall be a minimum of one hundred feet (100') from private water supply wells; one hundred-fifty feet (150') from unplugged abandoned wells

or wells with less than eighty feet (80') of casing; and three hundred feet (300') from public water supply wells;

(II) The discharge shall be a minimum of one hundred feet (100') from springs; five hundred feet (500') from the edge of surficial sink holes; fifty feet (50') from a classified stream; and twenty-five feet (25') from a stream or open ditch; and

(III) The discharge shall be a minimum of seventy-five feet (75') from property lines.

G. If effluent can not meet the minimum separation distances as described in subparagraph (6)(G)2.F., then the effluent must be disposed of into a soil absorption system. The required footage of the soil absorption system may be reduced by up to one-third (1/3) of that required for a conventional soil absorption system. Shallow bury designs should be utilized whenever possible to achieve the best absorption rates.

(H) Drip Soil Absorption. Drip soil absorption also known as trickle irrigation may be approved by the administrative authority in accordance with section (6) of this rule. Due to the various pretreatment methods and appurtenances and lack of extensive experience, drip soil absorption systems must be viewed as experimental, and back-up design for another system shall be approved in case of failure of the drip soil absorption system.

1. Drip lines shall be placed two feet (2') apart in a parallel arrangement. Emitters shall be placed in the drip lines every two feet (2') so there will be a two-foot by two-foot (2'x2') grid pattern. Other configurations and spacings of the drip line and emitters may be used; however, each emitter will be considered to cover four square feet (4 sq. ft.)of absorption area.

2. The application rate shall not exceed the values as shown in Table 7 for low pressure pipe systems in subparagraph (6)(C)3.A of this rule.

3. Drip soil absorption systems may be allowed at sites where the soil is classified as being in group IVb. A minimum separation distance of twelve inches (12") shall be maintained between the drip lines and emitters and a high ground water table or other limiting condition. The maximum application rate for IVb soils shall be from five-hundredths to one-tenth gallons per day per square foot (0.05–0.10 gpd/sq. ft.) of absorption field.

(I) Wetlands. Constructed wetlands provide secondary levels of treatment, which means that some form of pretreatment (septic tank, aeration tank, lagoon, etc.) must be used prior to the wetland, as wetlands cannot withstand large influxes of suspended solids. The pretreatment used must be capable of removing a large portion of these solids. Effluent from wetlands must be contained on the owner's property with the same set-back distances as required for lagoons in Table 1, located in subsection (1)(D) of this rule.

1. Free water surface wetlands are shallow beds or channels with a depth less than twenty-four inches (24") and filled with emergent aquatic plants. This type of wetland shall not be allowed.

2. Submerged flow wetlands are similar to free water surface wetlands except that the channels are filled with shallow depths of rock, gravel or sand. The depth of the porous media is usually less than eighteen inches (18"). The porous media supports the root systems of the emergent aquatic vegetation. The water level is to be maintained below the top of the porous media so that there is no open water surface.

3. The surface area of wetlands shall be determined by using the following equation:

$$A_S = [Q(\text{in } C_o - \text{In } C_e)]/(k_T \text{ x } f \text{ x } d)$$

where: A_S = wetland surface area, sq. ft.
Q = daily flow rate to wetland, cu. ft./day ([gallons/day] ÷ 7.5);
C_o = influent BOD_5 concentration, mg/L;
C_e = effluent BOD_5 concentration, mg/L;
k_T = temperature dependent rate constant, per day;
d = water depth in wetland, ft; and
f = void fraction of rock media, decimal.

4. After a surface area has been determined, a cross-sectional area shall be calculated against hydraulic loading by using the following equation:

$$A_h = Q/(K_h \text{ x } S)$$

where: A_h = cross-sectional area (hydraulic loading), sq. ft.;
K_h = hydraulic conductivity of rock media, ft./day*; and
S = slope of wetland bottom, decimal.**

*A value of eight hundred feet per day (800 ft./day) may be used for the hydraulic conductivity for rock of one inch (1") diameter.

** Values for slope should range between twenty-five hundredths and one percent (0.25–1%).

5. After the hydraulic loading has been determined, an organic loading shall be calculated using the following equation:

$$A_o = OGL/0.05$$

where: A_o = cross-sectional area (organic loading), sq. ft.; and
OGL = organic loading, lbs BOD_5/day.

6. The larger of the two (2) calculations, the hydraulic loading or the organic loading, shall be used to determine the wetland dimensions. Wetlands should not be long and narrow.

7. The width of the wetland shall be calculated by dividing the larger cross-sectional area by the water depth. The calculated width should not be less than one-third (1/3) of the length (a length:width ratio of three to one (3:1)).

Should it be necessary to construct a wetland with a ratio greater than three to one (3:1), step-loading along the length of the wetland shall be considered.

8. The configuration of a wetland for an individual home can be a one (1) cell or two (2) cells in series, depending upon the soil properties at the site. Larger systems may consist of multiple cells in parallel or series in order to provide more management options.

A. Single cells may be used where there will be no percolation of water through the bottom of the wetland. Water movement properties of the soil at the wetland construction site must be determined either by use of properly performed percolation tests or a thorough soil profile analysis performed by a qualified person meeting the criteria of 19 CSR 20.3.080.

B. For soils with percolation rates of sixty minutes per inch (60 min./in.) or less and where geological limitations are not severe, a two (2)-cell wetland may be used. The first cell shall be lined, allowing no percolation. The second cell may be unlined and filled with sand (not rock) to promote some percolation from the bottom of the wetland. The second cell shall not be larger than the first cell.

9. Crushed limestone or other rock with sharp edges shall not be used for a porous media as this type of rock will compact with time. Rock with rounded edges, such as creek gravel, shall be used. Rock must be thoroughly washed to remove fines which may cause plugging. Rock substrate size should be one inch (1") diameter, while rock to be used around inlet and outlet pipes may be two to four inches (2-4") diameter to reduce potential clogging. A three to four inch (3-4") layer of washed pea gravel may be used on top of the one inch (1") substrate for decorative purposes.

10. All piping shall be SDR 35 sewer pipe, Schedule 40 polyvinyl chloride (PVC) DWV pipe, or material of equivalent or stronger construction. Piping shall be a four inch (4") diameter.

11. Influent shall be distributed and effluent collected by header pipes running the width of the wetland. Perforated sewer pipe can be used for the headers. For unperforated pipe, a one and one-half inch (1 1/2") hole shall be drilled every twelve inches (12") along the header. Headers shall be placed at the bottom of the wetland on a bed of rock and covered with two to four inch (2-4") rock. A cleanout shall be placed before the influent header.

A. If effluent from the septic tank flows to the wetland by gravity and there are parallel cells in the wetland, a distribution box shall be placed ahead of the wetland so that flow can be controlled to individual cells.

B. If effluent is pumped, the pumping rate shall not exceed twenty-five gallons per minute (25 gpm) and no more than one-third (1/3) of the daily design flow shall be pumped at one (1) time.

12. Water level in a wetland shall be controllable. The range of control shall be from two inches (2") above the surface of the rock to complete draining of the wetland. Maximum water level in the wetland shall be a minimum of twelve inches (12") below the outlet of the septic tank so that water does not back up into the septic tank.

A. To conveniently check the water level relative to the gravel surface, a four inch (4") diameter perforated pipe may be placed in the bottom of the wetland, through the channel embankment, and then elbowed up to the elevation of the top of the channel.

B. Water level control may be obtained by use of swivel standpipes or collapsible tubing.

13. Surface water shall be kept out of the wetland. This may be accomplished by diverting runoff away from the wetland or constructing an earthen berm around the wetland. Berms shall be a minimum of six inches (6") above the surface of the porous media.

14. Emergent plants shall be selected by the ability of the plants to: root and grow in the wastewater-rock environment, treat wastewater to acceptable levels, produce biomass in amounts that can be controlled and aesthetics. Reference may be made to Tables 11 and 12 in selecting desired plants.

Table 11 - Plant Growth Data after one growing season

Plant Species	Wet Weight	Dry Weight	Top Dry	Root Dry	Top/Root	Root Depth
Softstem Bulrush (*Scirpus validus)*	(lbs./sq. ft.) 9.74	(lbs./sq. ft.) 4.20	3.20	1.00	3.20	(inches) 7.0
Horsetail *(Equisetum hyemale)*	1.90	0.55	0.20	0.35	0.57	11.0
Water Iris *(Iris pseudacorus)*	3.28	0.66	0.31	0.35	0.90	8.0
Pickerel Rush *(Pontederia cordata)*	6.24	1.30	0.50	0.80	0.63	15.0
Arrowhead *(Sagittaria latifolia)*	2.25	0.35	0.17	0.18	0.94	10.0
Cattails *(Typha latifolia)*	7.89	3.00	1.90	1.10	1.73	8.0
Soft Rush *(Juncus effusus)*	3.00	1.05	0.65	0.40	1.62	18.0
Flowering Rush *(Butomus umbellatus)*	0.30	0.07	0.01	0.06	0.18	12.0

Table 12 - Characteristics of Emergent Aquatic Plants

Plant Species	Bloom Date	Type of Bloom	Bloom Color	Plant Height	Growth Pattern	Initial Spacing
Softstem Bulrush *(Scirpus validus)*	June–July	Oblong Spikelets	Gray	(inches) 40–60	Spreading	(feet) 3
Horsetail *(Equisetum hyemale)*	July–Aug.	Oblong Spikelets	Brown	30–40	Spreading	3
Water Iris *(Iris pseudacorus)*	May–Aug.	Flower	White-Lt. Blue	10–18	Bunches	2–3
Pickerel Rush *(Pontederia cordata)*	July–Sept.	Flower	Purple	10–18	Bunches	2
Arrowhead *(Sagittaria latifolia)*	June–July	Hanging Bulbs	Green-White	6–10	Spreading	2–3
Cattails *(Typha latifolia)*	May–June	Oblong Spike	Brown	48–72	Spreading	3
Soft Rush *(Juncus effusus)*	June–July	Flower	Brown	18–30	Bunches	2

(J) Privy. A privy will be allowed only under limited conditions and will not be recognized as a method of sewage disposal for a continuously occupied dwelling, business or other structure. A privy will only be considered for remote areas not served by a piped water source. Examples of these areas may be a rural cemetery, a rural church with a small congregation and where hand-washing facilities are available, or a river access point provided by the Department of Conservation. Plans and construction of a privy will need to meet the approval of the administrative authority.

1. The privy shall be used to receive only human excreta and toilet paper. The privy shall not be used as a depository for other wastes.

2. A pit shall be provided for the privy. The sides of the pit shall be curbed to prevent cave-in. If the pit has an earth bottom, the bottom shall be at least three feet (3') above saturated soil conditions. If this separation distance cannot be achieved in the location of the privy, then the pit shall be liquid tight.

3. The pit shall be periodically pumped out by someone who services septic tank systems. At no time shall the pit contents be allowed to accumulate to within one foot (1') of the pit top. The pit contents shall then be transported and disposed into a community sewer system that is in compliance with Chapter 644, RSMo.

4. Both the pit and the privy shall be vented. Insect-proof openings shall be placed in the walls, below the seat. A vent shall extend from the underside of the seat board through the roof or up to a horizontal vent open to the sides of the toilet. This vent must be flush with the underside of the seat board and shall not extend down into the pit. All vent openings to the outside shall be properly screened to keep out insects. The top of the privy shall have a screened opening on each side. It is preferable the opening be all the way around the top of the privy in order to allow air to pass through and to carry away any odors which may seep into the upper part of the structure. If a crescent-shaped opening is cut into the door or wall of the privy, it shall also be screened.

5. The inside of the privy shall be of durable, smooth, non-absorbent material. If wood is used, the inside of the structure shall be coated with a polyurethane-type coating so as to minimize the penetration of liquids and odors into the wood.

6. A tight-fitting door, preferably with a self-closing feature, such as a door spring, shall be used.

7. A privy shall be set back from surface waters, buildings, property lines and water supply wells the same distance as required for soil treatment areas. This information may be found in subsection (1)(D), Table 1 of this rule.

8. The privy shall be of sufficient capacity for the facility it serves, but shall have at least fifty cubic feet (50 cu. ft.) of capacity.

9. Abandoned pits shall have the contents removed, transported and disposed into a community sewer system that is in compliance with Chapter 644, RSMo. This activity shall be performed by someone who services septic tank systems. The pit shall then be filled with clean earth and slightly mounded to allow for settling.

(K) Other Systems. Where unusual conditions exist, special systems of treatment and disposal, other than those specifically mentioned in this rule, may be employed provided–

1. Reasonable assurance of performance of the system is presented to the administrative authority;

2. The engineering design of the system is first approved by the administrative authority;

3. Adequate substantiating data indicate that the effluent will not contaminate any drinking water supply, groundwater used for drinking water or any surface water;

4. Treatment and disposal of the wastes will not deteriorate the public health and general welfare;

5. Discharge of effluent, if any, shall be within set-back distances as described in Table 1, located in subsection (1)(D) of this rule; and

6. These systems comply with all applicable requirements of this rule, with all local codes and ordinances, and all applicable requirements of sections 701.025-701.055 and Chapter 644, RSMo.

(L) Variances. Variances may be considered and granted by the administrative authority concerning repair to on-site sewage disposal systems existing prior to January 1, 1996 with site limitations or for property platted prior to January 1, 1996 with site limitations. Where variances have been allowed from the standards, the administrative authority may require that a higher level of pretreatment than that of a septic tank be provided. At the discretion of the administrative authority and with relative assurance for protection of the public health and preservation of the quality of surface and ground waters, variances may be allowed for the following:

1. Setbacks as specified in Table 1, located in subsection (1)(D) of this rule;

2. Minimum distance between the infiltrative surface and restrictive feature or bedrock;

3. Minimum areas for infiltrative surfaces as shown in Table 5 (see (5)(A)4.), Table 6 (see (5)(A)16.C.), Table 7 (see (6)(C)3.A.), Table 8 (see (6)(E)3.), Table 9 (see (6)(E)7.) and Tables 13 and 14 (see (7)(M)) of this rule;

4. A written application for a variance shall be provided to the administrative authority and shall provide the following:

A. An explicit description explaining why the requirements of this rule cannot be complied with, including a description of specific sections of this rule for which a variance is being requested;

B. A design of the proposed system. The design shall show that as much soil absorption as is practically possible will be installed;

C. The existing and maximum occupancy pattern and the existing water usage records, if any;

D. Potential impact, if any, on neighboring property owners and the names and mailing addresses of these property owners; and

E. Adequate substantiating data to indicate that the effluent will not contaminate any drinking water supply, groundwater used for drinking water or any surface water;

5. These systems shall comply with all applicable requirements of these standards except where variances have been granted;

6. No variance will be granted for any system that would result in noncompliance with Chapter 644, RSMo, Missouri Clean Water law and subsequent rules. On-site sewage disposal systems with a discharge, other than a system serving a single family residence lot, must be referred to the Department of Natural Resources and comply with Chapter 644, RSMo, Missouri Clean Water law and subsequent rules;

7. If effluent can not meet the minimum separation distances as described in Table 1 of subsection (1)(D), then the effluent must be disposed of into a soil absorption system. Set-back distances for lagoons will be considered applicable to alternative systems. The required footage of the soil absorption system following alternative systems may be reduced by up to one-third (1/3) of that required for a conventional soil absorption system. Shallow bury designs should be utilized whenever possible to achieve the best absorption rates;

8. All adjacent and/or affected property owners shall be notified in writing by the administrative authority whenever consideration for granting a variance is likely to result in effluent crossing property lines. The party requesting the variance shall be responsible for supplying the names and addresses of all adjacent and/or affected property owners to the administrative authority. Adjacent and/or affected property owners shall be allowed thirty (30) days from the date of the written notification to contact the administrative authority to express comments concerning the consideration of granting a variance; and

9. In cases of complaint abatement, where effluent cannot be maintained on the owner's property, within the required set-back distances and presents a nuisance or threat to public health or surface or ground water quality, the administrative authority may require a holding tank be placed at the optimum location within the sewage system, in order to abate the complaint. The owner shall be responsible for assuring the holding tank is pumped as needed, with the contents being disposed of in a Department of Natural Resources permitted facility.

(7) Detailed Soils Evaluation.

(A) General. The intent of this section is to provide minimum standards for site evaluations based upon evaluation of the soil characteristics, namely texture, color, structure, drainage and depth. Criteria are also given for sizing standard systems and some alternative systems.

(B) Adoption and Use. Where this rule is administered by an administrative authority, those administrative authorities may adopt this section, in whole or in part, as part of a local code or ordinance. Nothing in this rule or section shall require any administrative authority to allow an installation based upon the criteria contained in this section. The administrative authority may require percolation tests in addition to evaluation of soil characteristics. Whenever percolation tests and these criteria are used, the size of the proposed system or suitability of a site should be based upon which criteria produce the most conservative system. This type evaluation should be conducted by a professional soil scientist, engineer, sanitarian or registered geologist with special training in determining soil morphological characteristics in the field.

(C) Site Evaluation. An investigation of a proposed soil absorption site shall consider the following factors:

1. Topography and landscape position;

2. Soil characteristics (morphology) which includes texture, structure, porosity, consistence, color and other physical, mineral and biological properties of various horizons, and the thickness and arrangement of the horizons in the soil profile;

3. Soil drainage, which includes both external (surface) and internal (soil);

4. Soil depth;

5. Restrictive horizons; and

6. Available space.

(D) Site evaluations shall be made in accordance with subsections (7)(E)–(M) of this rule. Based on this evaluation, each of the factors listed in subsection (7)(C) of this rule shall be classified as Suitable, Provisionally Suitable or Unsuitable.

(E) Topography and Landscape Position. Uniform slopes under fifteen percent (15%) shall be considered suitable with respect to topography. When slopes are less than two percent (2%), provisions shall be made to insure adequate surface drainage. When slopes are greater than four percent (4%), the absorption lines shall follow the contour of the ground.

1. Uniform slopes between fifteen percent (15%) and thirty percent (30%) shall be considered provisionally suitable with respect to topography, if the soils are thirty-six inches (36") or more thick. Slopes within this range may require installation of interceptor drains upslope from the soil absorption system to remove all excess water that might be moving laterally through the soil during wet period. Usable areas larger than minimum are ordinarily required in this slope range.

2. Slopes greater than thirty percent (30%) shall be considered unsuitable except when a thorough study of the soil characteristics indicates that a soil absorption system will function satisfactorily and sufficient ground area is available to properly install such a system. Slopes greater

than thirty percent (30%) may be classified as provisionally suitable when all of the following conditions are met:

A. The slope can be terraced or otherwise graded or the absorption lines located in naturally occurring soil to maintain a minimum ten-foot (10') horizontal distance from the absorption trench and the top edge of the fill embankment;

B. The soil characteristics can be classified as suitable or provisionally suitable to a depth of at least one foot (1') below the bottom of the absorption trench;

C. Surface water runoff is diverted around the absorption field so that there will be no scouring or erosion of the soil over the field;

D. If necessary, groundwater flow is intercepted and diverted to prevent the water from running into or saturating the soil absorption system; and

E. There is sufficient ground area available to install the septic tank system with these modifications.

3. Complex slope patterns and slopes dissected by gullies and ravines shall be considered unsuitable to topography.

4. Areas subject to frequent flooding shall be considered unsuitable to landscape positions.

5. Depressions shall be considered unsuitable with respect to landscape positions except when the site complies essentially with the requirements of this section and is specifically approved by the administrative authority.

6. If directed by the administrative authority, the surface area on or around a ground absorption system sewage treatment and disposal system shall be landscaped to provide adequate drainage. The interception of perched or lateral groundwater movement shall be provided where necessary to prevent soil saturation on or around the ground absorption sewage treatment and disposal system.

(F) Soil Characteristics (Morphology). Soil borings or pits shall be taken at the site to be used for soil absorption systems. These borings shall be taken to a depth of forty-eight inches (48") or as required to determine the soil characteristics. Soil borings or pits and core samples shall be evaluated and a determination made on the suitability of the soil to treat and absorb septic tank effluent. The important soil characteristics which shall be reviewed by the administrative authority are as follows:

1. The relative amounts of the different sizes of mineral particles in a soil are referred to as soil texture. All mineral soils are composed of sand, two to five hundredths milimeters (2–.05 mm) in size; silt, which includes intermediate-sized particles that cannot be seen with the naked eye but feel like flour when pressed between the fingers, five hundredths to two thousandths millimeter (0.05-0.002 mm) in size; or clay, which is extremely small in size and is the mineral particle that gives cohesion to a soil, less than two thousandths millimeters (0.002 mm) in size or a combination of these. The texture of the different horizons of soils may be classified into five (5) general groups and shall be used for determining the application rates shown in Tables 6 and 7 of this rule.

A. Soil Group I. Sandy texture soils contain more than seventy percent (70%) sand-sized particles in the soil mass. These soils do not have enough clay to be cohesive. Sandy soils have favorable sewage application rates, but may have a low filtering capacity leading to malfunction due to contamination of groundwater. The sandy group includes the sand and loamy sand soil textural classes and shall generally be considered suitable in texture.

(I) Sand. Sand has a gritty feel, does not stain the fingers and does not form a ribbon or ball when wet or moist.

(II) Loamy sand. Loamy sand has a gritty feel, stains the fingers (silt and clay), forms a weak ball and cannot be handled without breaking.

B. Soil group II. Coarse loamy texture soils contain more than thirty percent (30%) sand-sized particles and fewer than twenty percent (20%) clay-sized particles in the soil mass. They exhibit slight or no stickiness. The coarse loamy group includes sandy loam and loam soil textural classes and shall generally be considered suitable in texture.

(I) Sandy loam. Sandy loam feels gritty and forms a ball that can be picked up with the fingers and handled with care without breaking.

(II) Loam. Loam may feel slightly gritty but does not show a fingerprint and forms only short ribbons ranging from twenty-five hundredths to fifty hundredths inch (.25-.50") in length. Loam will form a ball that can be handled without breaking.

C. Soil group III. These fine loamy texture soils contain fewer than forty percent (40%) clay-sized particles and not more than thirty percent (30%) sand-sized particles in a soil mass. Also this group is limited to less than thirty-five percent (35%) clay when the clay minerals exhibit high shrink/swell characteristic and exhibit slight to moderate stickiness. The fine loamy group includes sandy clay loam, silt loam, clay loam and silty clay loam textural classes and shall generally be considered provisionally suitable in texture.

(I) Silt loam. Silt loam feels floury when moist and will show a fingerprint but will not ribbon and forms only a weak ball.

(II) Silt. Silt has a floury feel when moist and sticky when wet but will not ribbon and forms a ball that will tolerate some handling.

(III) Sandy clay loam. Sandy clay loam feels gritty but contains enough clay to form a firm ball and may ribbon to form seventy-five hundredths to one-inch (.75-1") pieces.

(IV) Silty clay loam. Silty clay loam is sticky when moist and will ribbon from one to two inches (1-2"). Rubbing silty clay loam with the thumbnail produces a moderate sheen. Silty clay loam produces a distinct fingerprint.

(V) Clay loam. Clay loam is sticky when moist. Clay loam forms a thin ribbon of one to two inches (1-2") in length and produces a slight sheen when rubbed

with the thumbnail. Clay loam produces a non-distinct fingerprint.

D. Soil group IV. These clayey texture soils contain forty percent (40%) or more clay-sized particles and include sandy clay, silty clay and clay. This group may also include clay loam and silty clay loam when the clay fraction is greater than thirty-five percent (35%) and of a high shrink/swell nature. There are two (2) major types of clays–non-expandable and expandable. The non-expandable clays, when wet, are slightly sticky to sticky; when moist, are friable to firm; and when dry, they are slightly hard to hard. The non-expandable clays (Group IVa) shall generally be considered provisionally suitable in texture. The expandable clays, when wet, are very sticky and very plastic and when moist, these clays are very firm to extremely firm and when dry, are very hard to extremely hard. The expandable clays (Group IVb) shall be considered unsuitable in texture.

(I) Sandy clay. Sandy clay is plastic, gritty and sticky when moist and forms a firm ball and produces a thin ribbon to over two inches (2") in length.

(II) Silty clay. Silty clay is both plastic and sticky when moist and lacks any gritty feeling. Silty clay forms a firm ball and readily ribbons to over two inches (2") in length.

(III) Clay. Clay is both sticky and plastic when moist, produces a thin ribbon over two inches (2") in length, produces a high sheen when rubbed with the thumbnail and forms a strong ball resistant to breaking.

E. Soil group V. This soil group may be of any texture, however, the most predominant are cherty and very cherty clays, silt loams and silty clay loams. The amount of rock fragments in these soils is of a concern in areas of residual soils overlying highly permeable bedrock where groundwater could become contaminated. In general, soils with less than fifty percent (50%) rock fragments will be considered suitable. In general, soils with greater than fifty percent (50%) rock fragments over highly permeable bedrock will be considered unsuitable. Soils with greater than fifty percent (50%) rock fragments will be considered provisionally suitable if geological limitations are not severe.

F. The soil texture shall be estimated by field testing; and

2. Soil consistency. Soil consistency is comprised of the attributes of soil material, typically clay, that are expressed by the degree and kind of cohesion and adhesion or by the resistance to deformation or rupture.

A. Soil consistency when wet shall be considered as follows:

(I) Stickiness. Stickiness is the quality of adhesion to other objects. For field evaluation of stickiness, wet soil material is pressed between thumb and finger and its adherence noted. Degrees of stickiness are described as follows:

(a) Slightly sticky. After pressure, soil material adheres to both thumb and finger but comes off one or the other cleanly. It is not appreciably stretched when the digits are separated;

(b) Sticky. After pressure, soil material adheres to both thumb and finger and tends to stretch somewhat and pull apart rather than pulling free from either digit; and

(c) Very sticky. After pressure, soil material adheres to both thumb and finger and is decidedly stretched when they are separated; and

(II) Plasticity. Plasticity is the ability to change shape continuously under the influence of an applied stress and to retain the impressed shape on removal of the stress. For field determination of plasticity, the soil material shall be rolled between the thumb and finger to observe whether or not a wire or thin rod of soil can be formed. Degree of resistance to deformation at or slightly above field capacity is as follows:

(a) Slightly plastic. Wire formable but soil mass easily deformable;

(b) Plastic. Wire formable and moderate pressure required for deformation of the soil mass; and

(c) Very plastic. Wire formable and much pressure required for deformation of the soil mass.

B. Soil consistency when moist. Consistence when moist is determined at a moisture content approximately midway between air dry and field capacity. At this moisture content, most soil materials exhibit a form of consistency characterized by– tendency to break into smaller masses rather than into powder; some deformation prior to rupture; absence of brittleness; and ability of the material after disturbance to cohere again when pressed together. To evaluate this consistency, a mass that appears slightly moist shall be selected and attempt made to crush in the hand.

(I) Friable. Soil material crushes easily under gentle to moderate pressure between thumb and finger, and coheres when pressed together.

(II) Firm. Soil material crushes under moderate pressure between thumb and finger but resistance is distinctly noticeable.

(III) Very firm. Soil material crushes under strong pressure; barely crushable between thumb and finger.

(IV) Extremely firm. Soil material crushes only under very strong pressure; cannot be crushed between thumb and finger and must be broken apart bit by bit.

C. Soil consistency when dry. The consistency of soil materials when dry is characterized by rigidity, brittleness, maximum resistance to pressure, more or less tendency to crush to a powder or to fragments with rather sharp edges, and inability of crushed material to cohere again when pressed together. For evaluation, the air-dry mass shall be selected and broken in the hand.

(I) Slightly hard. Weakly resistant to pressure, easily broken between thumb and finger.

(II) Hard. Moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between thumb and finger.

(III) Very hard. Very resistant to pressure; can be broken in the hands only with difficulty; not breakable between thumb and finger.

(IV) Extremely hard. Extremely resistant to pressure; cannot be broken in the hands.

3. Soil structure. In many soils, the sand, silt and clay particles tend to cling or stick to one another to form a ped or a clump of soil. This is known as soil structure. Soil structure may have a significant effect on the movement of effluent through a soil. Structure is usually not important in soil groups I and II, and these types of soils shall generally be considered suitable as to structure. The three (3) kinds of soil structure that are most significant in movement of sewage effluent through groups III and IV soils are block-like, platy and the absence of soil structure or massive conditions. These kinds of soil structure are described as follows:

A. Block-like soil structure. In groups III and IV soils, if the soil exhibits many peds of angular and subangular peds, then the soils have block-like structure. The sewage effluent may move between the cracks of these types of peds. Block-like structure in groups III and IV soils is frequently destroyed by mechanical excavating equipment manipulating the soil when it is too wet. Trenches for absorption lines being placed in groups III and IV soils with block-like structure should only be dug when the soils are moist or dry. Block-like soil structure in groups III and IV soils shall be considered provisionally suitable;

B. Platy soil structure. If groups III and IV soils fall out into plate-like sheets, then the soil would have platy structure. Water or effluent movement through these soils would be extremely slow, and the structure shall be considered unsuitable; and

C. Absence of soil structure. Some groups II, III and IV soils are massive and exhibit no structural aggregates. In these kinds of soils, water or effluent movement would be negligible. This structure shall be considered unsuitable.

(G) Soil Drainage. Soils with seasonally high water tables are of major concern in evaluating sites for sewage effluent disposal. These are the soil areas that give good sewage absorption rates during dry seasons of the year but force sewage effluent to the surface during the wetter seasons.

1. The depth of the seasonal high water table can commonly be recognized by those examining soil profiles. The criterion for recognition of high water tables is that of soil color. Subsurface horizons that are in colors of reds, yellows and browns generally indicate good soil aeration and drainage throughout the year. Subsurface horizons that are in colors of gray, olive or bluish colors indicate poor aeration and poor soil drainage. These dull or grayish colors may occur as a solid mass of soil or may be in mottles of localized spots. The volume of grayish color is indicative of the length of time that free water stands in that soil profile. There are soils that have light-colored mottles which are relic from the light-colored rock from which the soils have weathered. These soils would not have high water tables, so one must distinguish between a true soil composed of sand, silts and clays, or the rock material that may still exist in the soil profile. Similarly, there are also some soils with surface or subsurface eluvial horizons with light colors which can be unrelated to drainage conditions.

2. Any soil profile that has the grayish colors of chroma 2 or less (Munsell color chart) indicative of high water tables, or is either subject to periodic high water, within twenty-four inches (24") of the surface, or is less than twelve inches (12") between the proposed trench bottom and the high water table, shall be considered unsuitable as to drainage. Soils where the seasonally high water table is less than forty-eight inches (48") and more than twenty-four inches (24") below the naturally occurring surface shall be considered provisionally suitable for soil drainage, provided there remains at least twelve inches (12") of soil between the proposed trench bottom and the seasonally high water table. Soils where the seasonally high water table is greater than forty-eight inches (48") below the naturally occurring surface shall be considered suitable for soil drainage. Drainage systems installed for groundwater lowering shall be maintained so that a minimum separation of one foot (1') occurs between the absorption trench bottom and the seasonally high water table. For extensive drainage systems, such as groundwater lowering in subdivisions, easements shall be recorded and shall have adequate width for reasonable egress and ingress for maintenance.

(H) Soil Thickness. The thickness of soils to rock which are classified as suitable or provisionally suitable in texture and structure shall be at least forty-eight inches (48") when conventional soil absorption systems at conventional depths are to be utilized. Soil thickness greater than forty-eight inches (48") shall be considered as suitable as to soil thickness. Soil thickness less than forty-eight inches (48") and greater than thirty-six inches (36") shall be considered provisionally suitable. Where special design and installation modifications can be made to provide at least two feet (2') of naturally occurring soil below the bottom of the absorption trench, these soils may be reclassified as provisionally suitable in thickness.

(I) Restrictive Horizons. Restrictive horizons in soils are recognized by their apparent resistance in excavation or in the use of a soil auger. Restrictive horizons may occur as fragipans or claypans. The fragipan is a layer that owes its hardness mainly to extreme density or compactness as opposed to high clay content or cementation. The layer is typically dense and brittle. Although fragments are friable when removed, when in place the material is so dense that water moves through it very slowly. Unlike fragipans, the claypan is a compact, slowly permeable layer in the subsoil having a much higher clay content than the overlying material. A sharply defined boundary exists between the

claypan and the overlying material. Claypans are typically hard when dry and plastic and sticky when wet.

1. Restrictive horizons that are greater than six inches (6") thick severely restrict the movement of water and sewage effluent and do not adequately respond to groundwater lowering drainage systems. Where these horizons are less than six inches (6") thick, they do not severely restrict the movement of water and sewage effluent, but rather indicate the presence of a seasonally high water table and may be modified after special investigation.

2. Soils in which restrictive horizons are six inches (6") or more in thickness and at depths greater than forty-eight inches (48") below the ground surface shall be considered suitable as to depth to restrictive horizons. Restrictive horizons six inches(6") or more in thickness and at depths between forty-eight inches and twenty-four inches (48–24") shall be considered provisionally suitable as to depth to restrictive horizons. Restrictive horizons six inches (6") or more in thickness encountered at depths less than twenty-four inches (24") below the ground surface shall be considered unsuitable as to depth to restrictive horizons.

(J) Other Applicable Factors. The site evaluation should include consideration of any other applicable factors involving environmental principles including:

1. The potential environmental hazard of possible failures of soil absorption systems involving large quantities of sewage, which would dictate larger separation distances than the minimums specified in subsection (1)(D) of this rule; and

2. The potential environmental and health hazard of possible massive failures of soil absorption systems proposed to serve large numbers of residences, as in residential subdivisions or mobile home parks.

(K) Determination of Overall Site Suitability. All of the criteria in subsections (7)(E)-(J) of this rule shall be determined to be suitable, provisionally suitable or unsuitable as indicated. If all criteria are classified the same, that classification shall prevail. Where there is a variation in classification of the several criteria, the following shall be used in making the overall site classification. The lowest of the uncorrectable characteristics will determine the overall site classification. The administrative authority shall make this determination–

1. If the topography is classified as unsuitable, it may be reclassified provisionally suitable under the conditions outlined in subsection (7)(E) of this rule;

2. If the soil texture is classified as unsuitable, the overall classification will be unsuitable regardless of the other criteria unless the provisions of subsection (6)(K) of this rule are met;

3. If the soil structure is classified as unsuitable, the overall classification will be unsuitable regardless of the other criteria unless the provisions of subsection (6)(K) of this rule are met;

4. When soil thickness is classified as unsuitable, it may be reclassified as provisionally suitable under the conditions outlined in subsection (7)(H) of this rule;

5. When the restrictive horizon is classified unsuitable, it may be reclassified as provisionally suitable under the conditions outlined in subsection (6)(K) of this rule; and

6. When drainage (groundwater level) is unsuitable, it may be reclassified as provisionally suitable under the conditions outlined in subsection (7)(G) of this rule.

(L) Site Classification. Sites classified as suitable may be utilized for a ground absorption sewage treatment and disposal system consistent with this rule. A suitable classification generally indicates soil and site conditions favorable for the operation of a ground absorption sewage treatment and disposal system or have slight limitations that are readily overcome by proper design and installation.

1. Sites classified as provisionally suitable may be utilized for a ground absorption sewage treatment and disposal system consistent with this rule but with moderate limitations. Sites classified provisionally suitable require some modifications and careful planning, design and installation for a ground absorption sewage treatment and disposal system to function satisfactorily.

2. Sites originally classified as unsuitable may be used for soil absorption disposal systems, provided engineering, hydrogeologic and soil studies indicate to the administrative authority that a suitable septic tank system or a suitable alternate system can reasonably be expected to function satisfactorily. These sites may be reclassified as provisionally suitable upon submission to the administrative authority and meeting the department's requirements in subsection (6)(K) of this rule.

(M) Design Criteria. Tables 13 and 14 shall be used when determining application rates for the appropriate sewage disposal system design.

1. Table 13 shall be used when determining the application rate for septic tank systems of conventional design when using the site evaluation criteria in this rule.

2. The construction of any conventional or LPP system must meet the other applicable requirements as set forth in section (6) of this rule. Soils for LPP systems must be classified as suitable or provisionally suitable to a depth of two feet (2') from the original ground surface. Table 14 shall be used when determining the application rate when using the site evaluation criteria in this rule.

Auth: sections 701.040(1) and 701.043.1, RSMo (1994). Emergency rule filed April 17, 1995, terminated April 26, 1995. Original rule filed April 17, 1995, effective Dec. 30, 1995.*

**Original authority 1994.*

Table 13 - Application Rates by Soil Groups for Conventional Systems

Soil Group	Soil Texture	Soil Structure/Color	Application Rate
I	Sand, Loamy sand	Any striation/Brown (No gray)	(gpd./sq.ft.) (conventional) 1.2 - 0.8
II	Sandy loam, Loam Sandy loam, Loam	Granular, fine and medium subangular blocky Prismatic; coarse, subangular, and angular blocky	0.9 - 0.7 0.7 - 0.5
III	Silt loam, Clay loam, Sandy clay loam, Silty clay loam Silt loam, Clay loam, Sandy clay loam, Silty clay loam	Granular, fine, and medium subangular blocky Prismatic, coarse subangular and angular blocky	0.6 - 0.4 0.4 - 0.3
IVa	Sandy clay, Silty clay, Clay (low to moderate shrink/swell) Sandy clay, Clay, Silty clay (low-moderate shrink/swell)	Granular, fine, and medium subangular blocky Prismatic; coarse subangular or angular blocky	0.4 - 0.2 0.3 - 0.1
IVb	Sandy clay, Clay, Silty clay loam, Silty clay (high shrink/swell potential)	Subangular, Angular blocky, or Prismatic	Not suitable
V	Skeletal (less than 50% coarse fragments), Silt loam, Silty clay loam, Clay, Silty clay	Anything but platy or massive	0.4 - 0.2

Table 14 - Application Rates by Soil Group

Soil Group	Soil Texture	Classes	Application Rate (Low Pressure Pipe)
			(gpd/sq. ft.)
I	Sand, Loamy Sand	No structure (Brown colors)	0.5–0.4
II	Sandy loam, Loam	Granular; fine and medium subangular blocky	0.4–0.35
	Sandy loam, Loam	Prismatic; coarse subangular and angular blocky	0.3–0.2
III	Silt loam, Clay loam Sandy clay loam, Silty clay loam	Granular; fine and medium subangular blocky	0.3–0.2
	Silt loam, Clay loam, Sandy clay loam, Silty clay loam	Prismatic; coarse subangular and angular blocky	0.20–0.15
IVa	Sandy clay, Silty clay, Clay (low to moderate shrink/swell)	Granular; fine and medium subangular blocky	0.2–0.1
	Sandy clay, Clay, Silty clay	Prismatic; coarse subangular or angular blocky	0.1–0.05
IVb	Clay, Sandy clay, Silty clay loam, Clay loam, Silty clay (high shrink/ swell potential)	Subangular, Angular blocky, or Prismatic	Not suitable
V	Skeletal (less than 50%), Silt loam, Silty clay loam, Clay, Silty clay	Anything but platy or massive	0.3–0.15

19 CSR 20-3.070 Requirements for On-Site Waste water Treatment System Inspectors/Evaluators

PURPOSE: This rule establishes criteria for inclusion on the lists of those individuals licensed to inspect or evaluate on-site wastewater treatment systems for the purposes of real estate transactions.

PUBLISHER'S NOTE: The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of this rule would be unduly cumbersome or expensive. This material as incorporated by reference in this rule shall be maintained by the agency at its headquarters and shall be made available to the public for inspection and copying at no more than the actual cost of reproduction. This note applies only to the reference material. The entire text of the rule is printed here.

(1) Applicability. The requirements and procedures included in this rule apply to individuals qualified to perform inspections and/or evaluations of existing on-site wastewater treatment systems upon a request from a lending institution, a prospective purchaser, the owner of the property, a real estate agent, or a real estate broker.

(2) Definitions.

(A) "Administrative authority" shall mean the department or local public health agencies, planning and zoning commissions, county building departments, county public works departments, sewer districts, and/or municipalities that have authority to govern on-site wastewater treatment systems.

(B) "Department" shall mean the Missouri Department of Health and Senior Services.

C) "Lending institution" shall mean a bank, savings and loan association, credit union, consumer credit lender, mortgage banker, or any other association or institution, which makes real estate loans.

(D) "Licensed individual" shall mean any person, including staff of local administrative authorities, licensed by the department, to inspect or evaluate an existing on-site wastewater treatment system for the purposes of a real estate transaction.

(E) "On-site wastewater treatment system (OWTS)" shall mean any system handling, or treatment facility receiving, domestic sewage which discharges three thousand (3,000) gallons per day or less into a subsurface soil absorption system or a single-family residence lagoon.

(F) "Property owner" shall mean the person with the legal right to possession of real estate.

(G) "Requesting party" shall mean a lending institution, a prospective purchaser, the property owner, a real estate agent, or a real estate broker who requests an inspection or evaluation of an OWTS serving a property that is the subject of a real estate transaction.

(3) An individual must be licensed with the department to inspect or evaluate an existing OWTS upon the request from a lending institution, which is providing either a government loan or conventional loan, or from another requesting party in connection with a real estate transaction. If the inspection or evaluation determines that the OWTS does not meet department standards, any new construction, major modification, or major repair must be conducted according to the standards set forth in sections 701.025 through 701.059, RSMo, and any rules promulgated thereunder or applicable local OWTS ordinance.

(4) As deemed necessary by the department, an inspection or evaluation of an OWTS will include a microbiological test and other examination(s) of the private water supply intended for potable use serving the same property as the OWTS. In addition, the inspection or evaluation will include an inspection of any visible portion of the water supply construction, from the source to the storage vessel, and may include review of the well drilling reports.

(5) If it is necessary to enter any adjoining property in the course of an inspection or evaluation to properly make a determination regarding the OWTS inspection/evaluation, a licensed individual shall notify the owner of the adjoining property and obtain permission before entry is made.

(6) An individual must be licensed with the department to perform inspections and evaluations of existing OWTS for the purposes of a real estate transaction. To be licensed with the department, an individual shall:

(A) Complete a basic installer training course conducted by or approved by the department with a score of seventy percent (70%) or higher;

(B) Complete a licensed inspector training course conducted by or approved by the department with a score of seventy percent (70%) or higher; and

(C) Complete the department's licensing process described in section (7) of this rule.

(7) Department's Licensing Process.

(A) The license shall be issued to only one (1) individual person and not to a company, firm, association, or other group. The license is not transferable.

(B) To obtain a license from the department, an individual must submit a completed application packet to the department for approval. Completed application packets shall be mailed to the Missouri Department of Health and Senior Services, Attention: Fee Receipts, PO Box 570, Jefferson City, MO 65102-0570.

(C) The application packet shall include the following:

1. The completed application form, Mo Form #1 (6-08), Application for Licensure, is incorporated by reference in this rule and is available on the Internet at www.dhss.mo.gov/Onsite or by contacting the department

at PO Box 570, Jefferson City, MO 65102-0570, (573) 751-6095. This rule does not incorporate any subsequent amendments or additions;

2. Documentation of the successful completion of both the basic installers training course and licensed inspector training course; and

3. A check or money order made payable to the Missouri Department of Health and Senior Services for the nonrefundable-processing fee of ninety dollars ($90). The processing fee may be waived for the staff of a local administrative authority that has enacted local ordinances, which include requirements for inspections of existing OWTS that are at least equal to department standards.

(8) Department's Renewal Licensing Process. An individual's license with the department shall expire thirty-six (36) months from the month of issuance unless the license has been revoked or surrendered.

(A) To renew their license with the department, an individual must submit a renewal application packet to the department for approval. Completed application packets shall be mailed to the Missouri Department of Health and Senior Services, Attention: Fee Receipts, PO Box 570, Jefferson City, MO 65102-0570.

(B) The renewal application packet shall include:

1. The completed application form, Mo Form #2 (6-08), Application for Licensure Renewal, is incorporated by reference in this rule and is available on the Internet at www.dhss.mo.gov/Onsite or by contacting the department at PO Box 570, Jefferson City, MO 65102-0570, (573) 751-6095. This rule does not incorporate any subsequent amendments or additions;

2. A check or money order made payable to the Missouri Department of Health and Senior Services for the nonrefundable-processing fee of ninety dollars ($90). The processing fee may be waived for the staff of a local administrative authority that has enacted local ordinances, which include requirements for inspections of existing OWTS that are at least equal to department standards; and

3. Documentation of the applicant's successful completion, within the previous thirty-six (36) months of the following minimum continuing education:

A. For individuals who are renewing their license for the first time, at least twenty (20) hours of department-approved continuing education units of which at least eight (8) continuing education units shall meet select department criteria; or

B. For individuals who are renewing their license for the second or subsequent time, at least twelve (12) hours of department-approved continuing education units of which at least eight (8) continuing education units shall meet select department criteria.

(C) Individuals submitting a renewal application more than fifteen (15) calendar days after the previous license expires shall pay a late charge of ten dollars ($10) in addition to the ninety-dollar ($90) processing fee.

(D) License renewal applications will not be accepted if received by the department more than forty-five (45) calendar days after the previous license expires. Individuals submitting license renewal applications more than forty-five (45) calendar days after the expiration of their license will be required to complete the initial licensing process, including any department training requirements for an initial license.

(9) A fifteen-dollar ($15) processing fee will be assessed for duplicate and/or replacement license identification cards.

(10) Standards of Practice for Licensed Individuals.

(A) A licensed individual shall:

1. Possess a current license with the department before conducting any inspection or evaluation of an OWTS;

2. Inspect or evaluate only those OWTS for which requests have been made for the purposes of real estate transactions. Investigations of complaints or alleged violations of Chapter 701, RSMo, may only be made by the department or a local administrative authority;

3. As part of an OWTS inspection or evaluation, collect a water sample from a private water supply for microbiological testing and inspect any visible portion of the water supply construction, from the source to the storage vessel;

4. Record their license number on all bids, proposals, contracts, invoices, inspection reports, evaluation reports, and other correspondence with the requesting party or the department;

5. Apply department standards for all inspections and evaluations of OWTS using the correct procedures and forms to complete the inspection or the evaluation. Combining inspection and evaluation procedures or forms is not acceptable;

6. Document inspections and evaluations accurately in writing on department-approved forms;

7. Clearly state any defect(s), if the OWTS is found to be malfunctioning or otherwise not meeting department standards;

8. Retain one (1) copy of the completed documentation of the inspection or evaluation for at least three (3) years and submit a copy to the department, the local administrative authority, if applicable, the requesting party, and the property owner;

9. Submit completed inspection/evaluation reports to the department within thirty (30) calendar days of completion, including water sample results if applicable; and

10. Notify the property owner that he/she is not obligated to contract for repair or re-inspection services with the initial licensed individual if the OWTS has been found to be malfunctioning or otherwise not meeting department standards. However, this paragraph does not

preclude the licensed individual from offering these services to the owner.

(11) The department may audit the work of a licensed individual at any time to determine whether the standards of practice, as defined by this rule, are being met. Failure to adhere to department standards may be cause for placement on probation, suspension, or revocation of the license, or for mandatory successful completion of a training course and/or testing as described in section (6) of this rule. The audit may be an unannounced visit to the property inspected or evaluated, or a visit during an inspection or evaluation with or without prior appointment with the licensed individual.

(12) A licensed individual may have his/her license placed on probation, suspended, or revoked if the individual:

(A) Fails an audit or refuses to participate in an audit;

(B) Fails to submit reports, submits false reports, or allows another individual to use his/her license;

(C) Is convicted of a violation of any provisions of sections 701.025 through 701.059, RSMo, or any rules promulgated under these statutes;

(D) Has pled guilty or has been found guilty of an infraction, misdemeanor, or felony involving misrepresentation, fraud, or other crime relating to activities of inspecting, evaluating, installing, repairing, or otherwise associated with an OWTS;

(E) Directs or allows an unlicensed individual to conduct any part of an inspection or evaluation of an OWTS; or

(F) Fails to comply with the standards of practice established in this rule.

(13) The suspension or revocation of an individual's license shall be served in writing by certified mail or personal service to the affected individual or his/her representative. The decision of the department may be appealed to the Administrative Hearing Commission as provided in Chapters 536 and 621, RSMo.

(14) Any individual whose license has been revoked may not reapply for a license for at least one (1) year from date of revocation, must complete the department's training requirements for licensure described in section (6) of this rule, and complete the department's licensing process as described in section (7) of this rule.

(15) An individual may be permanently barred from reapplying for a license if the individual:

(A) Has pled guilty or has been found guilty of an infraction, misdemeanor, or felony involving misrepresentation, fraud, or other crime relating to activities associated with an OWTS; or

(B) Has his/her license revoked a second time within five (5) years.

(16) No person without a valid license may conduct any part of an inspection or evaluation of an OWTS, whether on his/her own or under supervision of a person with a valid license. Persons conducting inspections or evaluations without the required license, or representing themselves as licensed, are considered in violation of section 701.053, RSMo, which is a class A misdemeanor.

AUTHORITY: section 701.033, RSMo Supp. 2008 and sections 701.046 and 701.051, RSMo 2000. Emergency rule filed April 17, 1995, terminated April 26, 1995. Original rule filed April 17, 1995, effective Dec. 30, 1995. Rescinded and readopted: Filed Oct. 22, 2008, effective May 30, 2009.*

**Original authority: 701.033, RSMo 1986, amended 1993, 1994, 1995, 2004; 701.046, RSMo 1994; and 701.051, RSMo 1994, amended 1997.*

19 CSR 20-3.080 Requirements for Percolation Testers, On-Site Soils Evaluators and Registered On-Site Wastewater Treatment System Installers

PURPOSE: This rule establishes the criteria for inclusion on the lists of those individuals qualified to perform percolation tests and/or soils morphology evaluations in determining soil properties for on-site wastewater treatment systems and for inclusion on the registered on-site wastewater system installers list in accordance with sections 701.025 through 701.059, RSMo.

PUBLISHER'S NOTE: The secretary of state has determined that the publication of the entire text of the material which is incorporated by reference as a portion of the rule would be unduly cumbersome or expensive. This material as incorporated by reference in this rule shall be maintained by the agency at its headquarters and shall be made available to the public for inspection and copying at no more than the actual cost of the reproduction. This note applies only to the reference material. The entire text of the rule is printed here.

(1) Applicability. The requirements and procedures included in this rule apply to individuals qualified to perform percolation tests and/or soil morphology evaluations and installers who are seeking inclusion on the department's on-site wastewater treatment systems professionals registry.

(2) Definitions.

(A) "Administrative authority" shall mean the department or local public health agencies, planning and zoning commissions, county building departments, county public works departments, sewer districts, and/or municipalities that have authority to govern individual on-site wastewater treatment systems.

(B) "Advanced on-site wastewater treatment system (OWTS) installer" shall mean an individual registered by the department to install advanced OWTS as listed by the department.

(C) "Basic on-site wastewater treatment system (OWTS) installer" shall mean an individual registered by the department to install basic OWTS as listed by the department.

(D) "Department" shall mean the Missouri Department of Health and Senior Services.

(E) "Installer" shall mean any individual, other than a homeowner, who installs a system for their own personal use, who alters, extends, repairs, or constructs an OWTS, including but not limited to, excavating or earthmoving work connected with the construction of an OWTS on behalf of, or under contract with, the property owner.

(F) "Licensed professional engineer" shall mean any person authorized pursuant to the provisions of Chapter 327, RSMo, to practice as a professional engineer in Missouri, as the practice of engineering is defined in section 327.181, RSMo.

(G) "On-site soil evaluator" shall mean individuals including soil scientists, licensed professional engineers, and registered geologists meeting the requirements of this rule.

(H) "On-site wastewater treatment system (OWTS)" shall mean any system handling, or treatment facility receiving, domestic sewage which discharges three thousand (3,000) gallons per day or less into a subsurface soil absorption system or a single-family residence lagoon.

(I) "Registered geologist" shall mean any person authorized pursuant to the provisions of Chapter 256, RSMo, to practice as a registered geologist in Missouri, as defined in section 256.453(10), RSMo.

(J) "Soil morphology evaluation" shall mean the method of testing or evaluating absorption qualities of the soil by physical examination of the soil's color, mottling, texture, structure, topography, and hill-slope position.

(K) "Soil scientist" shall mean a person that has successfully completed at least fifteen (15) semester credit hours of soils science course work, including at least three (3) hours of course work in soil morphology and interpretations.

(3) An individual must be registered with the department to conduct any part of a percolation test or soil morphology evaluation in which results are intended for use in the design or installation of an OWTS according to the standards set forth in sections 701.025 through 701.059, RSMo, and 19 CSR 20-3.060.

(A) Percolation Tests. To register with the department to conduct percolation tests, an individual shall:

1. Successfully complete a training course conducted by or approved by the department, which shall include, at a minimum, course work, field work, a written examination, and a practical examination; or

2. Meet the definition of an on-site soil evaluator, licensed professional engineer, or registered geologist; and

3. Complete the department's registration process described in section (5) of this rule.

(B) Soil Morphology Evaluations. To register with the department to perform soils morphology evaluations, an individual shall:

1. Meet the definition of a soil scientist with at least fifteen (15) semester credit hours of soils science course work, including at least three (3) hours of course work in soil morphology and interpretations; or

2. Meet the definition of a licensed professional engineer or registered geologist with at least ten (10) semester credit hours of soils science course work, including at least three (3) hours of course work in soil morphology and interpretations; and

3. Complete a written and field test conducted by or approved by the department with a score of seventy percent (70%) or higher on all sections of each examination; and

4. Complete the department's registration process

described in section (5) of this rule.

(4) An individual must be registered with the department, with the exception of a homeowner meeting the requirements of section 701.055, RSMo, to install an OWTS. Only installers registered as advanced OWTS installers shall install systems listed by the department as advanced OWTS.

(A) Basic OWTS Installer. To register with the department as a basic OWTS installer, an individual shall:

1. Complete a basic installer training course conducted by or approved by the department with a score of seventy percent (70%) or higher; and

2. Complete the department's registration process described in section (5) of this rule.

(B) Advanced OWTS Installer. To register with the department as an advanced OWTS installer, an individual shall:

1. Possess a basic OWTS installer's registration in good standing;

2. Complete an advanced OWTS installer training course conducted by or approved by the department with a score of seventy percent (70%) or higher; and

3. Complete the department's registration process described in section (5) of this rule.

(5) Department's Registration Process.

(A) To register with the department, an individual must submit a completed application packet to the department for approval. Completed application packets shall be mailed to the Missouri Department of Health and Senior Services, Attention: Fee Receipts, PO Box 570, Jefferson City, MO 65102-0570.

(B) The application packet shall include the following:

1. The completed application form, Mo Form #1 (6-08), Application for Registration, which is incorporated by reference in this rule and is available on the Internet at www.dhss.mo.gov/Onsite or by contacting the department at PO Box 570, Jefferson City, MO 65102-0570, (573) 751-6095. This rule does not incorporate any subsequent amendments or additions;

2. For on-site soil evaluators, mail an original transcript from the college or university attended directly from the registrar to the Missouri Department of Health and Senior Services, Attention: Bureau of Environmental Regulation and Licensure, PO Box 570, Jefferson City, MO 65102-0570. If requested, provide course descriptions from the college or university attended to verify the nature of the course work;

3. For percolation testers and on-site soil evaluators, provide proof of licensure as a professional engineer or certificate of registration by the Board of Geologist Registration indicating the registrant is in good standing, if applicable; and

4. A check or money order made payable to the Missouri Department of Health and Senior Services for the nonrefundable-processing fee of ninety dollars ($90).

(6) Department's Temporary and Probationary Registration Process.

(A) Upon completion of the department's registration process described in section (5) of this rule, the department may issue a one (1)-time temporary basic OWTS installer registration, valid for no more than one hundred eighty (180) calendar days for work in a specific county or counties. The temporary basic OWTS registration will be converted to a basic OWTS installer registration upon completion of a training course conducted by or approved by the department. Failure to complete the training or the department's registration process will result in termination of the individual's temporary basic OWTS installer registration.

(B) The department may issue a probationary basic OWTS installer registration for work in a specific county or counties. This registration will be valid for a specific period of time, as determined by the department, and will be dependent on the registered individual meeting and maintaining specific requirements as established by the department and completing the department's registration process as described in section (5) of this rule.

(7) Department's Renewal Registration Process. An individual's registration with the department shall expire thirty-six (36) months from its effective date unless the registration has been revoked or surrendered.

(A) To renew his or her registration with the department, an individual must submit a renewal application packet to the department for approval. Completed application packets shall be mailed to the Missouri Department of Health and Senior Services, Attention: Fee Receipts, PO Box 570, Jefferson City, MO 65102-0570.

(B) The renewal application packet shall include:

1. The completed application form, Mo Form #2A (6-08), Application for Registration Renewal, which is incorporated by reference in this rule and is available on the Internet at www.dhss.mo.gov/Onsite or by contacting the department at PO Box 570, Jefferson City, MO 65102-0570, (573) 751-6095. This rule does not incorporate any subsequent amendments or additions;

2. A check or money order made payable to the Missouri Department of Health and Senior Services for the nonrefundable-processing fee of ninety dollars ($90); and

3. Documentation of the applicant's successful completion, within the previous thirty-six (36) months, of the following minimum continuing education:

A. For on-site soil evaluators, percolation testers, and basic and advanced OWTS installers who are renewing their registration for the first time, at least twenty (20) hours of department-approved continuing education units of which at least eight (8) continuing education units shall meet select department criteria;

B. For on-site soil evaluators and advanced OWTS installers who are renewing their registration for the second or subsequent time, at least twelve (12) hours of department-approved continuing education units of which at least eight (8) continuing education units shall meet select department criteria related to their OWTS profession; or

C. For basic OWTS installers and percolation testers who are renewing their registration for the second or subsequent time, at least eight (8) hours of department-approved continuing education units.

(C) Individuals submitting a renewal application more than fifteen (15) calendar days after the previous registration expires shall pay a late charge of ten dollars ($10) in addition to the ninety dollar ($90) registration-processing fee.

(D) Registration renewal applications will not be accepted if received by the department more than forty-five (45) calendar days after the previous registration expires. Individuals submitting registration renewal applications more than forty-five (45) calendar days after expiration of their registration will be required to complete the initial registration process, including any department training requirements for an initial registration.

(8) A fifteen-dollar ($15) processing fee will be assessed for duplicate and/or replacement registration identification cards.

(9) Standards of Practice for Percolation Testers, On-Site Soil Evaluators, and OWTS Installers.

(A) A percolation tester or on-site soil evaluator shall:

1. Possess a current registration with the department before performing any activities related to a percolation test or soil morphology evaluation;

2. Record their registration number on all bids, proposals, contracts, invoices, percolation test reports, soil morphology evaluation reports, and other correspondence with the property owner or administrative authority;

3. Provide true and accurate information on any application, percolation test report, soil morphology evaluation report, and any other OWTS documentation;

4. Maintain a current address and phone number with the department and submit any address or phone number changes to the department in writing within thirty (30) calendar days of the change taking place;

5. Conduct percolation tests in accordance with section (2) of 19 CSR 20-3.060; and

6. Conduct site/soil morphology evaluations in accordance with the standards detailed in sections (2) and (7) of 19 CSR 20-3.060. Specifically, the on-site soil evaluator shall:

A. Evaluate the nine (9) items listed in paragraphs (2)(A)2. through 10. of 19 CSR 20-3.060;

B. Evaluate and classify six (6) site factors listed in subsection (7)(C) of 19 CSR 20-3.060, as suitable, provisionally suitable, or unsuitable according to subsections (7)(E) through (L) of 19 CSR 20-3.060;

C. Include a diagram showing location and extent of the area(s) evaluated;

D. Make recommendations regarding the use and effectiveness of water lowering systems when there is evidence of a high water table; and

E. Based on subsection (7)(M) and Tables 13 and 14 of 19 CSR 20-3.060, for horizons that are not classified as unsuitable, assign a conventional soil loading rate for each horizon and assign an alternative soil loading rate for each horizon to a depth of at least twelve inches (12") below the likely depth of an alternative system.

(B) A registered basic OWTS installer or a registered advanced OWTS installer shall:

1. Possess a current basic OWTS installer registration or advanced OWTS installer registration with the department before beginning construction of any OWTS;

2. Record their registration number on all bids, proposals, contracts, invoices, permit application construction drawings, and other correspondence with the property owner or administrative authority;

3. Provide true and accurate information on any application and any other OWTS documentation;

4. Notify the administrative authority if their involvement as the registered installer with the permit application and OWTS changes;

5. Begin the construction of an OWTS only after obtaining approval from the administrative authority, unless approval is not required;

6. Construct the OWTS meeting the construction standards and permit criteria required by sections 701.025 through 701.059, RSMo, and any rule adopted thereunder or the more stringent requirements of the administrative authority, if applicable;

7. Construct the OWTS that has been authorized by the administrative authority for the specific location identified in the application;

8. Be present at the construction site during construction and supervise all construction activities;

9. Provide required notice and an opportunity for inspection prior to completion of the OWTS installation as required by the administrative authority;

10. Submit complete and accurate “certification without on-site inspection form,” when requested;

11. Not create or increase a health or safety hazard, nuisance condition, or surface water or groundwater contamination when constructing, repairing, modifying, or troubleshooting an OWTS; and

12. Maintain a current address and phone number with the department and submit any address or phone number changes to the department in writing within thirty (30) calendar days of the change taking place.

(10) The department may audit the work of a percolation

tester, on-site soil evaluator, registered basic OWTS installer, or registered advanced OWTS installer at any time to determine whether the standards of practice, as defined by this rule, are being met. Failure to adhere to department standards may be cause for placement on probation, suspension, or revocation of the registration, or for mandatory successful completion of a training course and/or testing as described in sections (3) and (4) of this rule. The audit may be an unannounced visit to the property on which the percolation test, soil morphology examination, or OWTS installation was conducted, which may include an independent soil percolation test or soil morphology examination, or a visit within the period of a soil percolation test, soil morphology examination, or OWTS installation with or without prior appointment with the registered individual.

(11) A percolation tester, on-site soil evaluator, registered basic OWTS installer, or registered advanced OWTS installer may have their registration placed on probation, suspended, or revoked if the individual:

(A) Fails to maintain any professional license necessary for registration as a percolation tester or on-site soil evaluator;

(B) Fails an audit or refuses to participate in an audit;

(C) Fails to submit reports, submits false reports, or allows another individual to use his/her registration;

(D) Is convicted of a violation of any provisions of sections 701.025 through 701.059, RSMo, or any rules promulgated under these statutes;

(E) Has pled guilty or has been found guilty of an infraction, misdemeanor, or felony involving misrepresentation, fraud, or other crime relating to activities of percolation testing, soil morphology evaluations, installing, repairing, inspecting, or otherwise associated with an OWTS;

(F) Directs or allows an unregistered individual to conduct a percolation test or soil morphology examination;

(G) Directs or allows an unregistered individual to install an OWTS without direct supervision; or

(H) Fails to comply with the standards of practice established by this rule.

(12) The suspension or revocation of a percolation tester's, on-site soil evaluator's, or OWTS installer's registration shall be served in writing by certified mail or personal service to the affected individual or his/her representative. The decision of the department may be appealed to the Administrative Hearing Commission as provided in Chapters 536 and 621, RSMo.

(13) Any individual whose registration has been revoked may not reapply for registration for at least one (1) year from date of revocation, and must complete the department's training requirements for registration described in sections (3) and (4) of this rule and complete the department's registration process as described in section (5) of this rule.

(14) An individual may be permanently barred from reapplying for registration if the individual:

(A) Has pled guilty or has been found guilty of an infraction, misdemeanor, or felony involving misrepresentation, fraud, or other crime relating to activities associated with an OWTS; or

(B) Has his/her registration revoked a second time within five (5) years.

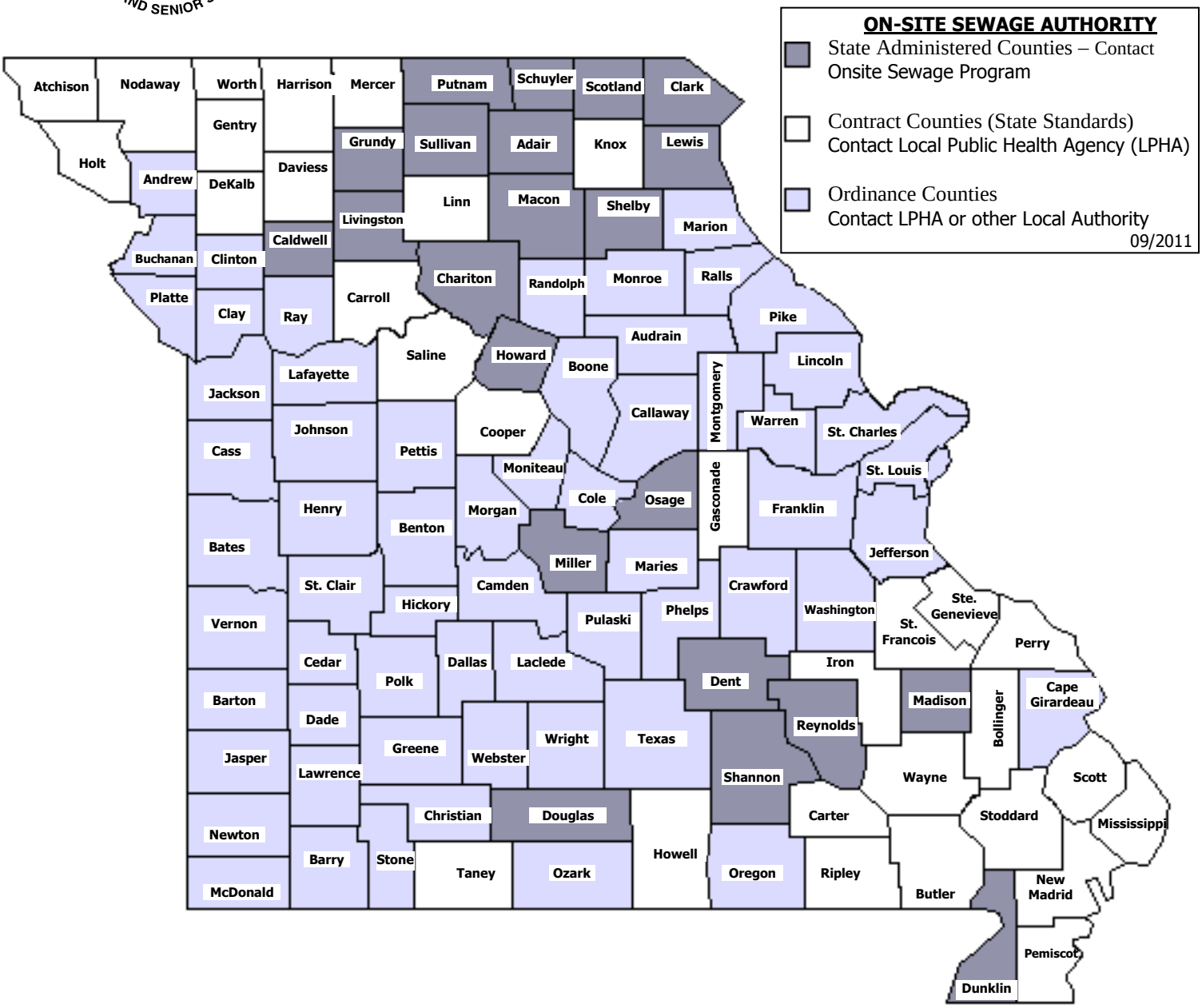
(15) No person without a valid registration may conduct any part of a percolation test or soil morphology evaluation for an OWTS, whether on their own or under supervision of a person with a valid registration. Persons conducting percolation tests or soil morphology evaluations without the required registration, or representing themselves as registered, are considered in violation of section 701.053, RSMo, which is a class A misdemeanor.

(16) No person as defined in section 701.025, RSMo, may authorize, permit, or knowingly allow a percolation test or soil morphology evaluation for an OWTS by an unregistered individual or the installation of an OWTS by an unregistered individual other than the homeowner.

AUTHORITY: section 701.033, RSMo Supp. 2008 and section 701.040, RSMo 2000. Emergency rule filed April 17, 1995, terminated April 26, 1995. Original rule filed April 17, 1995, effective Dec. 30, 1995. Emergency amendment filed Sept. 2, 2004, effective Sept. 12, 2004, expired March 10, 2005. Rescinded and readopted: Filed Sept. 2, 2004, effective Feb. 28, 2005. Amended: Filed Oct. 22, 2008, effective May 30, 2009.*

**Original authority: 701.033, RSMo 1986, amended 1993, 1994, 1995, 2004 and 701.040, RSMo 1994.*

Department of Health and Senior Services



Local Public Health Agency (LPHA) contact information:
http://health.mo.gov/living/lpha/lphas.php

In state administered counties contact:

Onsite Wastewater Treatment Program
930 Wildwood Dr.
Jefferson City, MO 65102
(573) 751-6095
(573) 526-7377 Fax

MISSOURI DEPARTMENT OF NATURAL RESOURCES
REGIONAL AND SATELLITE OFFICES

Kansas City Area

Kansas City Regional Office
500 NE Colbern Rd.
Lee's Summit, MO 64086-4710
816-622-7000
FAX: 816-622-7044

Northwest Missouri Satellite Office
Northwest Missouri State University
Environmental Services Building,
800 University Dr.
Maryville, MO 64468-6015
660-562-1876 or 660-562-1877
FAX: 660-562-1878

Truman Lake Satellite Office
Harry S Truman State Park
28761 State Park Road West
Warsaw, MO 65355
660-438-3039
FAX: 660-438-5271

Southwest Area

Southwest Regional Office
2040 W. Woodland
Springfield, MO 65807-5912
417-891-4300
FAX: 417-891-4399

Lake of the Ozarks Satellite Office
Camden County, 5570 Hwy. 54,
Osage Beach, MO 65065
2040 W. Woodland
Springfield, MO 65807-5912
573-348-2442
FAX: 573-348-2568

Newton County Satellite Office
Crowder College
601 Laclede, Smith Hall, Room 201
Neosho, MO 64850
417-455-5180 or 417-455-5158
FAX: 417-455-5157

Northeast Area

Northeast Regional Office
1709 Prospect Drive
Macon, MO 63552-2602
660-385-8000
FAX: 660-385-8090

Kirksville Satellite Office
Truman State University
Magruder Hall, Room 3068
100 E. Normal St.
Kirksville, MO 63501
660-785-4610

Department Central Offices
P.O. Box 176
Jefferson City, MO 65102-0176
573-751-3443
www.dnr.mo.gov/shared/map-jeffcity.htm

St. Louis Area

St. Louis Regional Office
7545 S. Lindbergh, Ste 210
St. Louis, MO 63125
314-416-2960
FAX: 314-416-2970

Franklin County Satellite Office
Meramec State Park
Hwy. 185 S.
Sullivan, MO 63080
573-860-4308
FAX: 573-468-5051

Jefferson County Satellite Office
Eastern District Parks Office
Hwy. 61
Festus, MO 63028
636-931-5200
FAX: 636-931-5204

Lincoln County Satellite Office
Cuivre River State Park
678 State Rt. 147
Troy, MO 63379
636-528-4779
FAX: 636-528-5817

Southeast Area

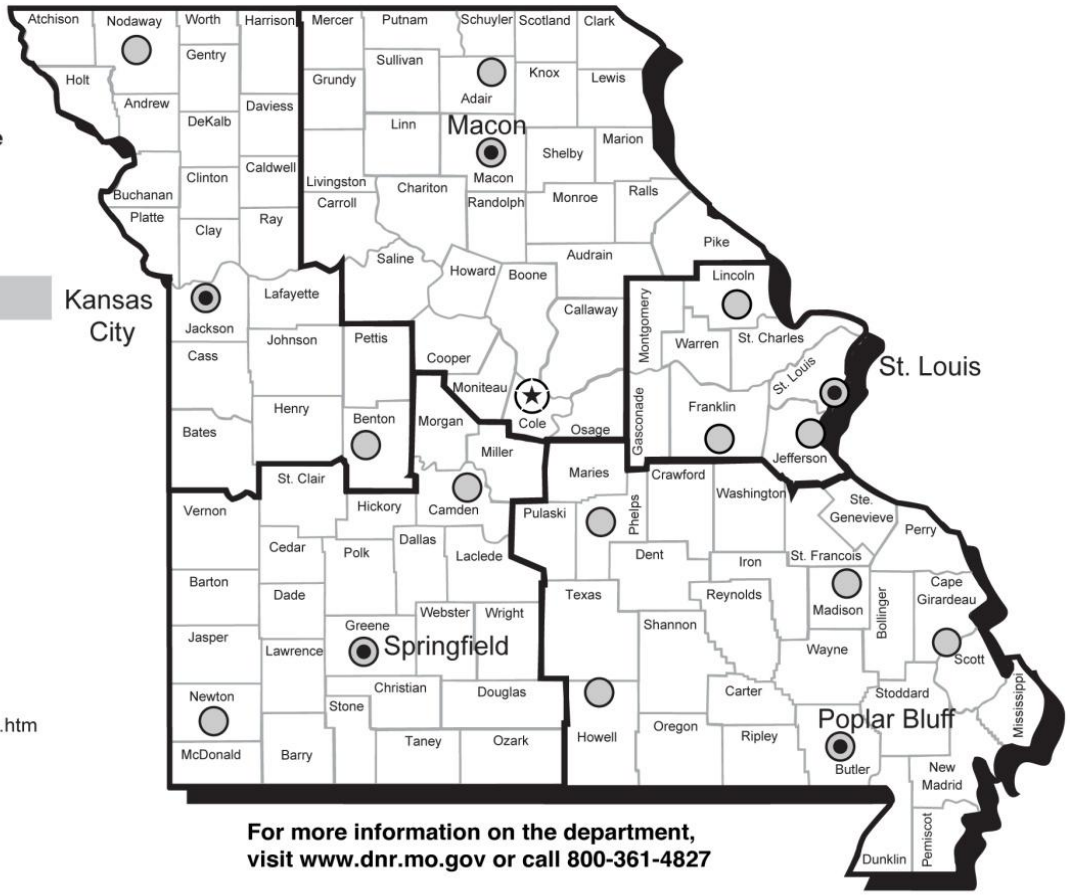
Southeast Regional Office
2155 North Westwood Blvd.
Poplar Bluff, MO 63901
573-840-9750
FAX: 573-840-9754

Cape Girardeau County Satellite Office
2007 Southern Expressway
Cape Girardeau, MO 63701
573-651-3008 (phone and FAX)

Howell County Satellite Office
700 W. Main St.
Willow Springs, MO 65793
417-469-0025 (phone and FAX)

Madison County Satellite Office
120 W. Main St.
Fredericktown, MO 63645
573-783-2385
FAX: 573-783-6294

Rolla Satellite Office
111 Fairgrounds Rd.
Rolla, MO 65402
573-368-3625
FAX: 573-368-3912



For more information on the department, visit www.dnr.mo.gov or call 800-361-4827

12/2011 www.dnr.mo.gov/regions/ro-map-bw.pdf