



# Rural Wellhead Protection Fact Sheet

## SEPTIC SYSTEMS

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### INTRODUCTION

In rural areas and on the outskirts of every town in Wyoming people depend upon private septic systems to dispose of domestic wastewater. Despite efforts to regulate their design, placement, and use, septic systems are still the largest reported cause of groundwater contamination resulting in disease outbreaks in the U.S. (Center for Disease Control). Homeowners are responsible for operating and maintaining their systems, and for any pollution a poorly functioning system might cause.

### SEPTIC SYSTEM DESIGN

It is the homeowner's responsibility to assure that septic system installers comply with proper design and siting requirements. A homeowner should obtain cost estimates and verify that their system is built according to the design. As identified in the *Contacts* section, Wyoming Water Quality Division offices or your local county office needs to be contacted to determine the permitting and inspection requirements for your septic system. A properly installed and operated septic system will help the homeowner by enhancing their property values and by protecting their drinking water supply.

The basic components of a septic system are shown in **Figure 1** and **Figure 2**. The system typically consists of a sewer line, a septic tank, a leach field, and connecting piping. A septic tank temporarily holds the domestic wastewater, allowing for gravity separation of water borne wastes. The clarified wastewater overflows from the septic tank to the leach field. The leach field consists of a set of buried, perforated pipes or drains that distribute the wastewater over an area of soil. Leach fields are also commonly referred to as drain fields or soil absorption fields.

Septic systems are designed to prevent surface ponding of wastewater, and to provide adequate filtration treatment of wastewater as it flows downward from the bottom of the leach field to groundwater or bedrock. When septic systems are properly designed, installed, operated, and maintained, harmful contamination in wastewater can be adequately removed. It is important to realize that septic systems are designed to treat domestic sewage, and will not treat all contaminants that may be placed in the system. Therefore, care must be taken not to dispose of chemicals by pouring them down drains leading to septic systems.

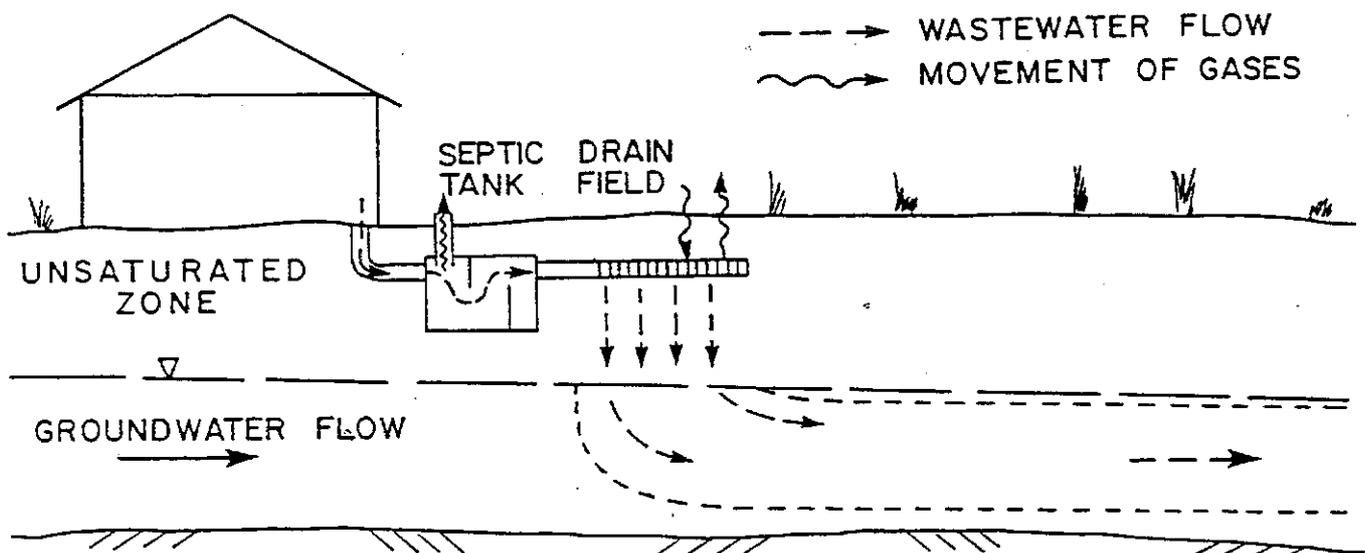


Figure 1. Profile View of Typical Septic System

## SEPTIC SYSTEM PLACEMENT

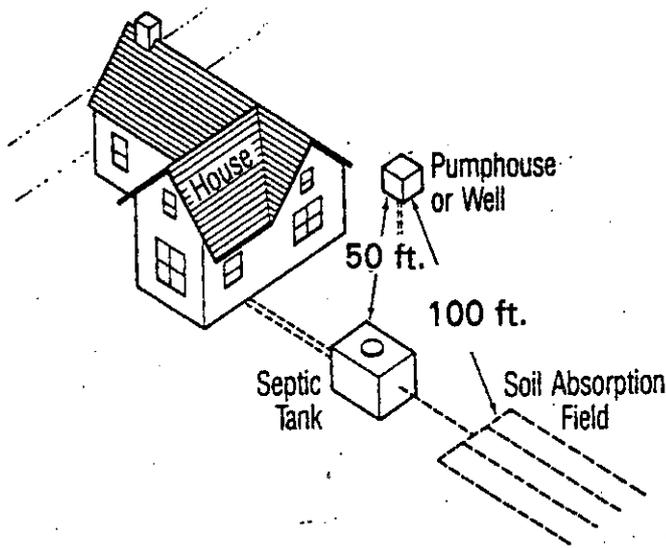


Figure 2. Minimum Setback Distances of Septic System

State regulations require that a septic tank and leach field are located a minimum distance away from water supply wells which includes both your well and your neighbor's well. The Wyoming State Engineer's siting requirements and WDEQ/WQD Chapter 11, Part D, set minimum setback distances for the siting septic systems away from wells, surface bodies of water, building foundations, and potable water lines. As described in the *Water Well Setback Distances Fact Sheet* and shown in Figure 2, septic tanks must be at least 50 feet (ft) from a wellhead and the leach field must be at least 100 ft. away. The septic tank and leach field must also be at least 50 ft. away from streams or bodies of water (including seasonal and intermittent).

State regulations require that during times of seasonally high groundwater, the groundwater mound that forms below the leach field shall not rise within a distance of less than three feet from the bottom of the leach field. However, it is highly recommended that a minimum vertical distance of six feet be maintained. It is also recommended that the unsaturated soils beneath the leach field contain medium to fine textured soils. Soils with percolation rates that are one minute per inch or less are too permeable and less permeable fill material is required. Highly permeable soils pose a serious potential of groundwater contamination because wastewater can move quickly into groundwater from the leach field. In such cases, there is no indication from the ground surface of the potential for groundwater pollution.

### Are septic system separation distances always adequate?

The minimum distance that a leach field is located away from a water supply well may not always be sufficient. Also, the vertical distance from the leach field piping to bedrock or groundwater may not always be adequate. In areas of Wyoming where the soil is highly permeable; such as, where gravels and large grained sands are present, and the depth to groundwater is fairly shallow (less than 25 - 40 feet) or where a thin layer of soil overlies bedrock or fractured consolidated aquifers, recommended separation distances may not be adequate.

Highly permeable soils are present in alluvial valleys in Wyoming, such as, in the North Platte River Valley and Salt Creek River (Star) Valley. Alluvial valleys in Wyoming were formed by streams and rivers that deposited gravels, pebbles and coarse sands over millions of years. Fractured bedrock and faulting conditions are present in various shallow aquifers throughout Wyoming. Fractures and fault zones are present in the Casper Formation on the east side of the City of Laramie.

Septic systems may not function properly in areas with highly permeable soils. The domestic wastewater leaving the leach field may not be adequately filtered in permeable sands and gravels or in thin soils above shallow bed-rock before infiltrating to the groundwater. In such areas a separation distance of greater than six feet is recommended.

Contaminated groundwater can move very quickly in highly permeable formations or in fractured bedrock (for example, 1 - 10 ft. per day or 100's of ft. per day along fault zones). Both viruses and bacteria from septic systems have been reported to travel over ½ mile in groundwater. Typically, contaminants in groundwater are diluted as they move slowly through the subsurface. Groundwater contamination may not be significantly diluted within the minimum setback distance in highly permeable or fractured bedrock areas; therefore, greater setback distances are needed in such areas.

### CARE & MAINTENANCE

Solid wastes settle out in a septic tank due to gravitational separation; eventually these settled solids will fill the tank and overflow into the leach field if not removed. To prevent health problems and prevent solids from clogging the leach field, septic tanks should be pumped at regular intervals at least every two or three years. The depth of the accumulated sludge can be measured to determine when the tanks needs to be cleaned. If proper maintenance is performed, the conventional life of a septic system is generally on the order of ten to twenty years.

Studies have shown that a slug loading (all at once) of normal household products such as 1.3 gallons of bleach, 2.5 gallons of cleaners or disinfectants, or 0.065 ounces of drain cleaners in a 1,000 gallon septic tank can destroy bacteria and reduce the system's effectiveness. It takes time for the bacteria in the system to rejuvenate. Moderation should be the rule when soaps, detergents, bleaches or other household cleaners are disposed in septic systems. The use of excessive amounts of drain cleaners is strongly discouraged because the septic system can be rendered ineffective for a long period of time.

Certain household products and wastes that contain harmful compounds should never be dumped down drains leading to septic systems because these products can directly contaminate groundwater. Excessive amounts of grease should never be disposed in a septic system. Paints or solvents contain volatile hydrocarbon contaminants that will pollute groundwater. Petroleum products, flammable liquids, paint strippers and other volatile cleaners also contain harmful contaminants. Commercially available septic system cleaners containing organic cleaners or active agents, such as sodium hydroxide (lye) or potassium hydroxide, can disrupt the operation of the system and cause groundwater pollution. The addition of chemicals or bacteria or enzymes to a septic tank is not recommended.

The use of garbage grinders or garbage disposals is not recommended. Solids from garbage grinders or disposals build up in the septic tank more rapidly; requiring more frequent pumping of the septic tank and reducing the life expectancy of the system. Cigarettes, paper towels, sanitary napkins and tampons, newspapers, disposable diapers, and rags will not readily decompose in the septic tank and will lead to increased solids accumulation and leach field clogging.

## CONTAMINANTS

Septic systems can be sources of nitrate and bacteriological contamination if they are improperly designed, operated, and/or maintained. Nitrate ( $\text{NO}_3$ ) is a form of nitrogen combined with oxygen. When nitrates are consumed in drinking water, nitrites ( $\text{NO}_2$ ) can be formed in the body. Nitrites can cause a blood disorder known as methemoglobinemia (blue baby syndrome), which primarily affects infants. Methemoglobinemia can be fatal; in 1986, an infant death in South Dakota was linked to nitrate poisoning caused by excessive amounts of nitrate in the drinking water. Elderly people may also be affected, and nitrates

can be harmful to adults of any age if consumed in excessive amounts.

The U.S. Environmental Protection Agency (EPA) has established a level of 10 milligrams per liter (mg/L) as the drinking water standard for nitrate for public water systems. Nitrate levels in private water supplies also should be below 10 mg/L.

Various illnesses and diseases have been attributed to bacteria and viruses associated with water contaminated by septic systems. Gastrointestinal illnesses are the common types of diseases associated with bacterial contaminated drinking water from untreated or inadequately treated septic effluent. Bacteriological quality of a water supply is most often determined by sampling and analyzing for coliform bacteria. The coliform group of organisms is used as an indicator of dangerous contaminant levels because humans and animals excrete up to 400 billion coliform bacteria a day. The presence of coliform indicates other pathogenic bacteria may be present. Coliform bacteria can easily be studied because they are nonpathogenic (non-disease causing), do not multiply outside the human body, and are easily identified and counted. Current standards specify that drinking water must not contain more than 1 coliform colony in 100 ml of water after undergoing a standardized laboratory procedure. If 1 or more coliform colonies are measured, a second sample should be tested to verify the results.

## REGULATIONS

The Water Quality Division (WDEQ/WQD) Rules & Regulations that pertain to the installation of septic systems are presented in Chapter 11, Part D. WDEQ/WQD in Cheyenne can be contacted to obtain a copy of these regulations (307)777-7781.

The regulations of your local county office may be stricter than WDEQ/WQD's Rules & Regulations. City and county governments have zoning ordinances specifying where small wastewater systems can be installed and the required minimum lot sizes. You can request a copy of small wastewater system regulations from your local county office.

**What government office administers my septic system?** WDEQ/WQD offices issue permits for septic systems in the following counties in Wyoming: Big Horn, Carbon, Crook, Hot Springs, Niobrara, Platte, Washakie, and Weston. In other counties, county health departments or the county planner, sanitarian, or engineer administers the small wastewater system permitting program. You

need to contact your local county office when installing a septic system in counties other than those listed above.

The Cheyenne-Laramie County Health Department requires small wastewater system contractors, installers, and cleaners to be licensed. The Natrona County Health Department also licenses small wastewater system contractors and installers.

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***Contacts***

Contact the respective WDEQ/WQD office listed below for questions about permitting septic systems in the following counties in Wyoming:

Big Horn, Hot Springs, and Washakie County - Lander DEQ/WQD office (307) 332-3144.

Crook and Weston County - Sheridan DEQ/WQD office (307) 672-6457.

Niobrara, Carbon, and Platte County - Cheyenne DEQ/WQD office (307) 777-7781.