

Wellhead PROTECTION

Mississippi depends on groundwater for its water resources. More than 71,000 wells are in the state – 47,000 are private, 3,400 are community water systems, and 13,000 are irrigation/aquaculture wells.

Because of the importance of groundwater to Mississippi, protecting the underground water supplies, or aquifers, is critically important. Wellhead protection, or well protection, is also important to all well owners in the state.

Proper construction of wells is only one aspect of groundwater protection that is monitored and should be insisted on by the public. The Mississippi Department of Environmental Quality (MDEQ) and the Mississippi State Department of Health (MSDH) regulate construction of many types of wells in the state. MDEQ regulates wells that are not used for drinking water supplies, while MSDH regulates wells, public and private, that supply drinking water. Additional standards apply for other types of wells, including municipal supply wells.

The following general regulations and guidelines govern the correct construction of wells in Mississippi. For more complete information, contact the appropriate regulatory agency listed on the back cover.

2. Protect all wells from contaminants. If the casing is not covered with a continuous recorder box or pump housing, it must have a locked, overlapping cover to keep contaminants from getting into the well.

3. Fill the space between the drilled hole and the casing pipe with a nonpermeable material called grout (see number 8). All wells located within 100 feet of a potential pollution source (for example, sewers, septic tanks, landfills, waste piles, and other pollution sources) must be grouted. The grout must be from a depth of at least 50 feet below the land surface, except as specified in number 7 below. For private wells, the MSDH requires only 10 feet of cement grout below the land surface.

The MSDH also requires a 4-inch slab to be poured, starting at the edge of the casing pipe and extending 2 feet to the edge of the slab. The grout and the slab need to be a continuous pour of concrete without any joints to prevent leakage.

In addition, a 50-foot spacing is required between the well and a septic tank, aerobic treatment plant, sewage-holding tank, animal-holding pen with a concrete floor, and a non-potable (nondrinking) well.

There is also a 100-foot spacing requirement between the well and a subsurface injection field, the edge of surface discharge effluent, pesticide or fertilizer storage, and manure storage.

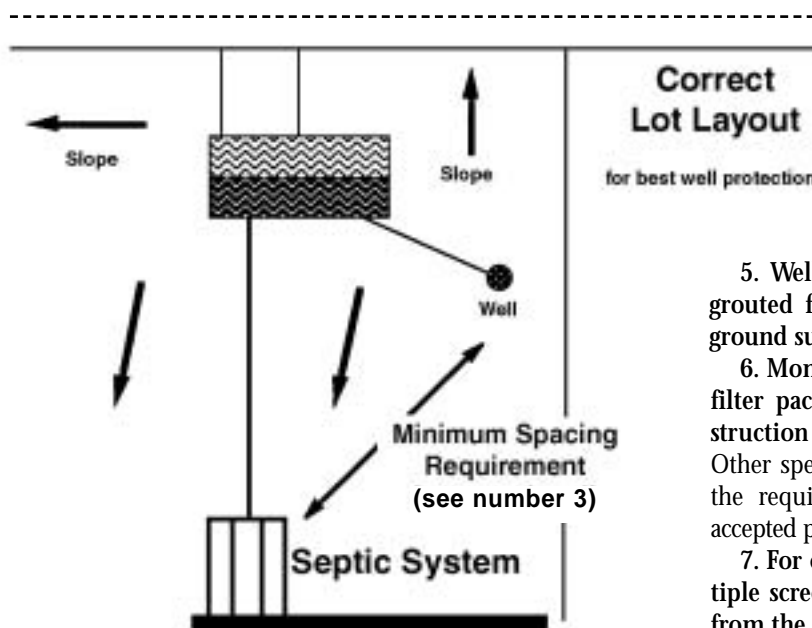
4. Any wells located within one-quarter mile (horizontally) of a known existing area of contaminated aquifer must be grouted from the top of the filter pack or sealed to the surface (except as specified in number 7).

5. Wells serving public water supply systems must be grouted from the top of the filter pack or sealed to the ground surface.

6. Monitoring wells must be grouted from the top of the filter pack or sealed to the surface, unless alternate construction is mandated by the applicable regulatory program. Other specifics of monitoring well construction must follow the requirements of the applicable regulatory program or accepted professional practices.

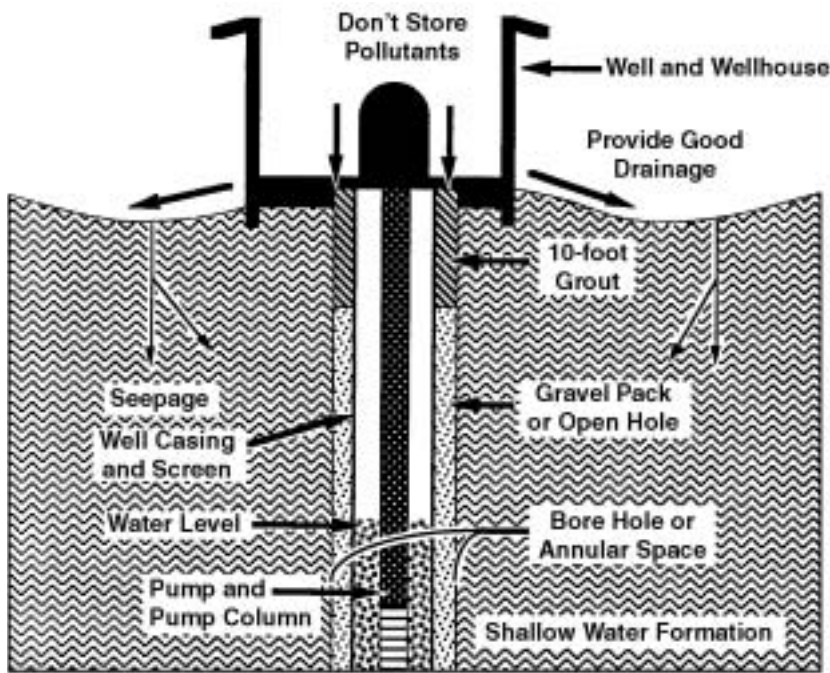
7. For continuous lengths of grout not separated by multiple screens, introduce grout in one continuous operation from the top of the filter pack or seal to the surface. A staged grouting operation may be used for deep wells, provided the completed grout is continuous from the top of the filter pack or sealed to the surface.

8. Grout on all holes should be comprised of neat cement, cement grout, cement-bentonite mixture (5-8 percent bentonite), or bentonite. Other ratios of cement/bentonite may be used for specific applications; all or most of the upper 25



Regulations/Guidelines

1. End the well casing above the 100-year flood level. However, if flood levels around the well routinely exceed a reasonable height for an extended casing, the well must be protected against floodwaters entering the casing.



feet of the well must be grouted with one of the previously listed grouts. Use pure bentonite grout as a surface seal only when the annular space is grouted to a depth of at least 25 feet. Bentonite pellets may be added under free-fall conditions for depths not exceeding 25 feet. Granulated or pelleted bentonite may be placed to greater depths if introduced through a tremie pipe. Free-fall addition of other types of grout from the surface is prohibited.

9. Chlorinate all drilling and development water used in the construction. If the water is obtained from a local public water supply distribution system, it need not have additional chlorine added, except that which is necessary to properly disinfect the well, supply lines, and storage tank.

10. Use metal casing in all wells (regardless of size) drilled through or into aquifers containing chloride concentrations in excess of 250 milligrams per liter and/or total dissolved solids (TDS) concentrations in excess of 1,000 milligrams per liter. In addition, all such wells will be completed using only the casing method of grouting (Halliburton Method) to thoroughly grout the open space from the bottom of the casing to ground surface. These requirements may be waived if water from such wells will be beneficially used for domestic, municipal, or water association supply, and it can be shown that conditions detrimental to the freshwater aquifers will not result from construction or use of such wells.

Plugging Abandoned Wells

The procedures for plugging or sealing an abandoned well may vary depending on the location in the state. Following are general requirements for plugging an abandoned well in Mississippi. For more specific information, refer to Extension Publication 1994 *Plugging Abandoned Wells* available at your county

Extension office. To find out if you qualify for financial assistance to plug an abandoned well, contact the Natural Resources Conservation Service or Farm Services Agency office in your county.

1. Grout should consist of neat cement, cement grout, cement-bentonite mixture (5-8 percent bentonite), or bentonite. Bentonite pellets may be added under free-fall conditions for depths not exceeding 25 feet if pellets are tamped into place after addition. Granulated or pelleted bentonite may be placed to greater depths if introduced through a tremie pipe. Free-fall addition of other types of grout from the surface is prohibited.

2. Remove obstructions from the well casing.

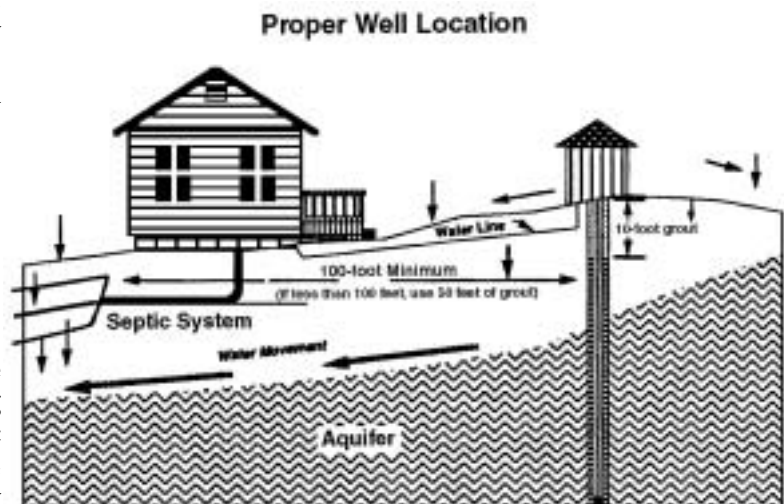
3. Pull or ream the casing. If the casing cannot be removed, pierce holes in it, unless the annular space was grouted during construction. Grout is forced into the annular space under pressure during the sealing operation. In farming areas, cut off the casing a minimum of 3 feet below land surface. After plugging, fill the excavation with compacted soil. In other areas, cut off the casing at or below the ground surface.

4. Seal abandoned wells or holes from the bottom of the hole to the ground surface. Use grout as described in number 1 of this section.

Proper Well Location/Maintenance

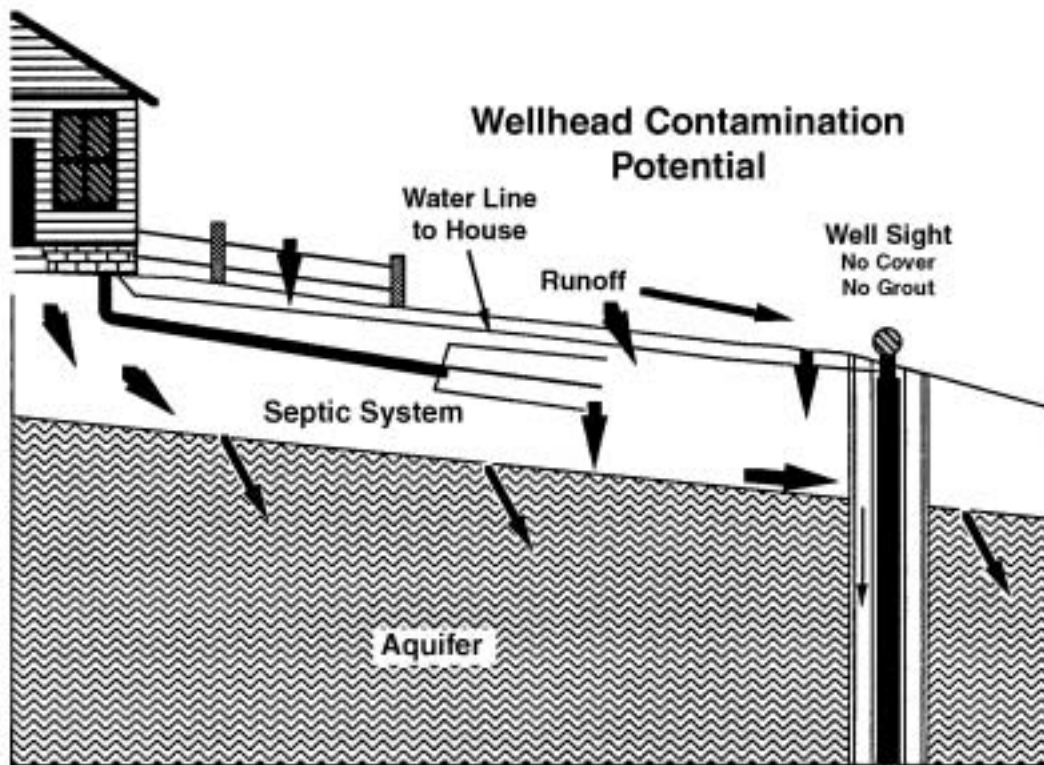
Proper well construction is not the only precaution to take when installing a well. Selecting a good site is also important. Choose well-drained areas where the water runs away from the well site and not toward it. Keep the site location a safe distance away from septic tank fields, livestock and livestock confinements, chemical storage, or any other potentially hazardous area on the same property (or adjacent property).

Keep the well house maintained and free of any chemicals, paints, fuels, or other potentially hazardous materials that could accidentally leak on the ground at the well location.



Use an anti-siphon device or back-flow prevention to prevent contamination when using a water supply or well for chemical mixing and application. Use a check valve or vacuum breaker valve when a well is used to fill chemical tanks or bottles. Do not leave the hose or fill device in the container. The hose should be at the top of the container, so if the water supply shuts off for some reason, the hose will not back-siphon into the water supply system. Chemical-filling practices should take place at the point of use (not the filling location) so the chemicals being handled are not near the well site. This practice prevents accidental spills that could eventually leach into the well casing or gravel pack and enter the groundwater supply. Using common sense is the best way to prevent a potentially dangerous situation at a well site. Swimming pools and lawn irrigation systems also may require back-flow prevention. Consult your local building codes for any requirements.

Contamination of groundwater could be a life-threatening situation if it is not detected soon enough. Many chemicals at low doses don't have a distinct taste or smell, making the chemical difficult to detect and extremely dangerous. These products include household chemicals and agricultural and industrial chemicals. In recent years, many shallow wells in Mississippi have been tested for pesticides. Only isolated instances of pesticide contamination have been reported, and almost all detections have been levels below the minimum level required for reporting. The best way to keep water supplies as contaminant-free as possible is to construct a well properly and develop good maintenance and protection habits.



Prevention is cheaper than the resulting contamination and cleanup.

For more information on well regulations, contact a certified well driller in your area or one of the following agencies:

Your local office of the Mississippi State University Extension Service

Mississippi Department of Environmental Quality
Office of Land and Water Resources
P. O. Box 10631
Jackson, MS 39289-0631
(601) 961-5200

Mississippi State Department of Health
P. O. Box 1700
Jackson, MS 39215-1700
(601) 576-7689

This publication was funded in part by USDA-CSREES agreement number 00-51130-9752 through the Texas Agricultural Extension Service, and in cooperation with the Mississippi Department of Environmental Quality and the Mississippi State Department of Health.

This document may be copied and distributed for nonprofit educational purposes provided that credit is given to the Mississippi State University Extension Service.



msucares.com

By **James G. Thomas**, Leader--Extension Agricultural Engineering, and **Dr. Jimmy Bonner**, Associate Specialist, Extension Agricultural Engineering .

Mississippi State University does not discriminate on the basis of race, color, religion, national origin, sex, age, disability, or veteran status.

Publication 1815

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. JOE H. MCGILBERRY, Director (rev-500-3-03)