Protecting Your Private Well

Most of Mississippi's 55,000 private wells provide good, clean drinking water. But it is possible for pollutants to enter the groundwater supplying a well and affect the health of people and livestock. A contaminated drinking well can also affect a neighbor's water supply.

If a private well supplies your drinking water, it is your responsibility to make sure the water supply is free of harmful contaminants. This includes properly constructing a new well according to required standards, maintaining an existing well to keep out contaminants, and testing the water regularly for possible contaminants.

Properly constructed and maintained, your private well should provide clean, healthy, uninterrupted water for many years. It is important, though, to follow guidelines to reduce the chances of the well being contaminated by an improperly operating septic tank, animal wastes, a fuel or pesticide spill, or by other contamination sources.

Well Location Is Important

Proper location is important to water quality. Locating a well in a safe place takes careful planning and consideration of surface drainage and possible contamination sources. A well downhill of a livestock yard, a leaking fuel tank, or a failing septic system has a greater risk of contamination than a well uphill of these pollution sources.

Generally, the greater the distance a well is from a potential contamination source, the less likely the well will be contaminated directly by that source. The Mississippi State Department of Health requires that a new well be installed at least 50 feet from a septic tank and at least 100 feet from the septic system drain field. These are *minimum separation distances*, and you should install a well farther away from all pollution sources if possible. Also, check with your county health department for additional local well construction requirements.

It is important to protect the groundwater that supplies your well and the water in the well itself. Any pollution source likely to contaminate groundwater should be addressed, even if your well is far from the potential source. Contaminating groundwater violates Mississippi law, regardless of whether drinking water is affected.

Although separating your well from a contamination source reduces the chance of pollution, it does not guarantee the well is safe. Contaminated surface runoff water can carry bacteria from a septic system or animal wastes, fuel and oil products, pesticides, and other contaminants from one place to another. A well in the path of this polluted water may be contaminated if the well is not sealed properly. A well also may be contaminated by polluted groundwater in a recharge area far away from the well.

Constructing a New Well

Poor well design and construction can contaminate groundwater by allowing polluted surface water to reach the groundwater without filtering through soil. Wells constructed in pits or built without being sealed or without a cap may allow contaminated surface water to carry bacteria, nitrates, pesticides, fertilizer, or oil into the drinking water supply. Proper well design and construction reduce this risk by sealing the well from contaminants that might enter from the surface.

The following sections describe basic well design and construction requirements. A licensed well driller, the Mississippi State Department of Environmental Quality, your county health department, or the Mississippi State Department of Health can give more detailed information. See the last page of this publication for contact information to these agencies. Extension Publication 1815 *Wellhead Protection* also includes well construction information. Information on a well already constructed on your property may be available from the previous owner of the property, from the well driller, or from the Mississippi Department of Environmental Quality.

Basic Construction Guidelines

A new well is expensive, but it is a good investment. In order to get the most from your investment, you should locate the well away from contamination sources and practice proper maintenance.

Follow these basic guidelines when constructing a new well:

- Follow the recommended minimum required separation distances between a well and possible contamination sources. Try to locate a new well at least 100 feet from these sources, and farther away if possible. Contact your county health department or a licensed well driller for any additional local requirements.
- Locate a new well on ground higher than pollution sources, including fuel tanks, livestock yards and silos, septic systems, or pesticide storage and mixing areas. If necessary, build up soil around the well so all surface water drains away from it.
- Avoid installing a new well in areas likely to flood to reduce chances of polluted surface water entering the well.
- Make the well accessible for repair, cleaning, testing, and inspection.
- Hire a well driller licensed by the Mississippi Department of Environmental Quality. Have a written contract specifying that the work complies with state and local well construction regulations. The Mississippi Department of Environmental Quality has a list of licensed well drillers. Also, make sure the well is disinfected and tested for bacteria after drilling.

Other Well Construction Requirements

When a well is installed, the driller installs a steel or plastic pipe (called casing) to keep the borehole from collapsing. The space between the casing and the sides of the hole gives a direct channel for surface water and pollutants to reach the drinking water supply. To seal the channel, the driller fills the space with a cement and bentonite clay mixture called grout (**Figure 1**). The grout and casing keep pollutants from seeping into the well.

Figure 1. A cement and bentonite clay mixture around the well casing keeps surface water and pollutants from reaching the water supply.

If you have a new well installed, insist it be properly sealed and grouted. At a minimum, the upper 10 feet of all new wells must be grouted. If any contamination sources are within 100 feet of the well, the upper 50 feet of the well must be grouted.

To keep contaminated water from entering the well during a flood, the casing of a new well should extend above the 100-year flood level. Since this height may vary depending on the area, check with a licensed well driller, your county health department, or the Mississippi Department of Environmental Quality for a recommended casing height. A 4-by-4-foot concrete slab also is required around the base of the well to keep surface water from entering the well.

Although not required by law, the casing of a new well should extend below the water level in the well. This reduces the risk of groundwater contamination and makes sure all potentially contaminated surface water is filtered through soil before entering the well.

Depending on your well's construction, you may be able to visually inspect the condition of your well casing for holes or cracks. If you can move the casing around by pushing against it, your well casing is suspect and may not keep out contaminants.

To keep contaminants from flowing down inside the well casing, the driller installs a well cap to keep out insects, small animals, and surface water (**Figure 2**). The cap should be a locking type and have a screened vent so air can enter the well. Check the cap often to make sure it is in place and tightly secured. A cap is required for all private wells in Mississippi, but some may have pumping equipment attached and not require a cap since the equipment serves as a seal.

Figure 2. A vented well cap over the casing protects the water supply from surface water and other contaminants.

Well Age

A well's age can be an important indicator of its ability to keep out contaminants. A well more than 70 years old is more likely to be shallower, located at the center of the farm or homestead, and surrounded by many potential contamination sources. Older well pumps are more likely to leak lubricating oils into the well. Older wells also are more likely to have a thinner casing that may be corroded and allow contaminants in. Even wells 30 to 40 years old may be subject to corrosion. If you have an older well, you may want to have it inspected by a qualified well driller.

Well Type

The type of well can influence its ability to keep out contaminants. Private wells include the following types:

Dug wells have the highest risk of drinking water contamination because they are shallow and often poorly protected from surface water. A dug well is a large hole, usually more than 2 feet wide and often constructed by hand.

Driven-point (sand point) wells have a moderate to high risk of drinking water contamination and are constructed by driving assembled lengths of pipe into the ground. These wells usually are smaller in diameter (2 inches or less) and less than 50 feet deep. They should be installed only in areas with loose soils, such as sand.

Drilled wells cover all other types of wells, including those constructed by a combination of jetting and driving. Drilled wells for home or farm use are commonly 4 to 8 inches in diameter and, properly constructed, have a relatively low risk for groundwater contamination.

Well Depth

Shallow wells draw from the groundwater nearest the land surface and may be directly affected by activities around your home or farm. Pollutants may enter these wells as surface water soaks into the soil, depending on how deeply the well casing extends into the groundwater.

Local soil conditions determine how long it takes for surface water to filter down to groundwater. In some areas with shallow, sandy soils, this process may happen quickly and make the well more likely to be contaminated.

On the other hand, thick clay soils do not allow contaminants to reach the groundwater as quickly. If your well is in clay soil and several hundred feet below the water table, the groundwater supplying your well may have traveled a considerable distance underground over a long time, giving more protection from contamination.

Maintaining an Existing Well

Good well maintenance means testing your water at least once a year, keeping the well area clean and accessible, keeping all pollutants as far away as possible, and having a licensed well driller or pump installer check the well if problems are suspected. Keep your septic system in good operating condition to keep it from possibly contaminating your water supply.

Most existing wells were located according to traditional practice or regulations in place at the time of construction. Although these wells are legal, you may want to consider how your well conforms to more current standards. These standards are available from a licensed well driller or the Mississippi Department of Environmental Quality.

To protect your well from possible contamination, you may want to change some practices around your home or farm. Some changes may be expensive, while others may be within your reach financially.

For example, you can upgrade or better manage your septic system, or change the way you use and dispose of hazardous wastes in your home or on your farm. You also might want to move activities like pesticide mixing, tank rinsing, or gasoline storage farther from your well. Other options include upgrading your well, getting rid of any well pits or abandoned wells, installing a well cap, or extending your well casing.

If a livestock yard or silo is near your well, consider installing concrete curbs or a similar system to collect or direct runoff away from your well. Stored animal wastes may contaminate your well and also may produce sanitation problems. Temporarily store these wastes on clay soil away from your well—or better, use a concrete slab to reduce the chance of polluting your drinking water. Protect animal wastes from rain and apply them to land for the nutrient benefits and to avoid sanitation problems.

Preventing Backflow Contamination

Backflow, or back-siphoning, may allow chemicals in pesticide mixing tanks to flow back into the well through a hose, much like sucking water through a drinking straw. To prevent backflow when filling pesticide sprayer tanks, keep an air gap between the end of the hose and water in the tank. If you do not have this device, you can still prevent backflow by using an inexpensive backflow prevention device or check valve, available from irrigation or spray equipment dealers.

As added protection, consider buying an inexpensive plastic nurse tank to mix pesticides. A nurse tank is filled with clean water at the well and then used to fill the pesticide sprayer away from your home and your well.

Backflow problems are also possible in your home. Consider installing backflow prevention devices on all faucets with hose connections in and outside your home. Otherwise, contaminated water from a laundry tub, sink, washing machine, pressure washer, outside hydrant, or a swimming pool could flow back through plumbing to contaminate your drinking water supply. Also, consider eliminating any cross-connections between drinking and nondrinking water supplies, since water not intended for drink-

ing could enter your drinking water supply through these cross-connections. Contact your Mississippi State University Extension Service county office for more information on backflow.

Testing Well Water

It is a good practice to test the water in your well at least once each year. Although it is not practical to test for every possible pollutant, basic tests can indicate if problems exist.

If you suspect a family illness is caused by contaminated water, contact the Mississippi State Department of Health Division of On-Site Wastewater, the Mississippi Well Owner Network, or a private lab for a bacteria test. For more information, including a price list, contact the laboratory at the physical address or web address on the last page of this publication. Your county health department may have information on approved private laboratories that test water.

At a minimum, test your water annually for nitrates and bacteria. These are important indicators of water quality. Depending on your location, you also may want to have other tests based on specific problems. Test for lead if you have lead pipes or soldered copper joints. Have your water tested if there has been a nearby use or spill of oil, pesticides, petroleum, solvent, or any other contaminants near your home or well. If you need help deciding what you should test for, contact your Mississippi State University Extension Service county office or county health department.

Before taking a water sample, contact the testing laboratory for instructions. Follow the instructions carefully to make sure the test results are accurate. Use only the container provided, and make sure to return samples promptly (**Figure 3**). Bacteria sample bottles are sterile and must be returned within the specified time limit.

Because bacteria, nitrates, and other possible contaminants are naturally present in minor amounts in groundwater or can vary seasonally, you may want to contact the laboratory for help interpreting test results before making decisions. If tests do show high nitrate or bacteria levels, you may want to consider further testing or have your well disinfected by a licensed well driller.

Test your water more frequently than once a year if there are unexplained illnesses in the family; if any family members are pregnant; if you notice a change in livestock or poultry performance; if you notice a change in water taste, odor, color, or clarity; or if you have a spill or backflow of chemicals or petroleum products near your well. Also, test more frequently if you apply chemicals or animal wastes to fields within 100 feet of your well.

Keep a record of all water quality test results and note any changes in your water quality over time. Keep details on well construction and dates and results of any well or pump maintenance. These records can help you better determine the source of any problem that develops in your drinking water.

Figure 3. Use only the container provided by the testing laboratory for taking well-water samples.

Sealing an Abandoned Well

Many farms or homesteads have abandoned or unused wells. The most obvious signs of these wells are pipes sticking out of the ground around an old home or farm or where one used to be. A depression in the ground also may indicate an old well. Wells were also drilled in basements of houses, under front steps, or near old cisterns.

If not properly filled and sealed, an abandoned well may give a direct route for contaminated surface water to enter the groundwater without being filtered through soil. An open well is a safety hazard to small children and animals. In fact, small children have fallen into abandoned well openings as small as a volleyball.

Although you can legally seal an abandoned well yourself, it is best to hire a licensed, registered well driller or pump installer. Sealing a well properly calls for experience with well construction materials and methods, as well as a working knowledge of the well site geology.

If you seal an abandoned well yourself, you must meet these minimum requirements of the Mississippi Department of Environmental Quality:

- Remove the pump, piping, and any other obstructions from the well.
- Seal the entire length of the well with cement, cement grout, bentonite, or other material approved by the Mississippi Department of Environmental Quality.
- File a written report with the Mississippi Department of Environmental Quality. Contact that agency for a copy of the report form and for more details on sealing an abandoned well.

Special equipment often is needed to remove old pumps and piping and to properly install sealing material inside the well. Using inappropriate materials and methods can lead to well settling, collapse, and continued groundwater contamination. If sealing materials are installed improperly, correcting the defective work is difficult and may be impossible.

The goal of proper well sealing is to restore as closely as possible the geologic conditions existing before the well was constructed. Sealing an abandoned well properly takes time and money, but it removes a safety concern and may keep your drinking water from being contaminated.

For More Information

Well distance regulations:
Mississippi Department of Environmental Quality
PO Box 2309
Jackson, MS 39225
(601) 961-5328

or
Mississippi State Department of Health
Office of Environmental Health
PO Box 1700
Jackson, MS 39215-1700
(601) 576-7690

Requirements for installing or sealing wells:
A licensed well driller

or

Mississippi Department of Environmental Quality
Office of Land and Water Resources
PO Box 2309
Jackson, MS 39225
(601) 961-5210

Water quality testing information:
Mississippi State Department of Health
Division of On-Site Wastewater
1-855-220-0192
www.healthyms.com/wwapply

or

Mississippi Well Owner Network
(662) 325-1788
http://extension.msstate.edu/natural-resources/water/mswon

or

A private water-testing laboratory certified by the Mississippi State Department of Health
http://msdh.ms.gov/msdhsite/_static/14,1112,188.html

For more information on maintaining a private well and protecting water quality, contact your Mississippi State University Extension Service county office.

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