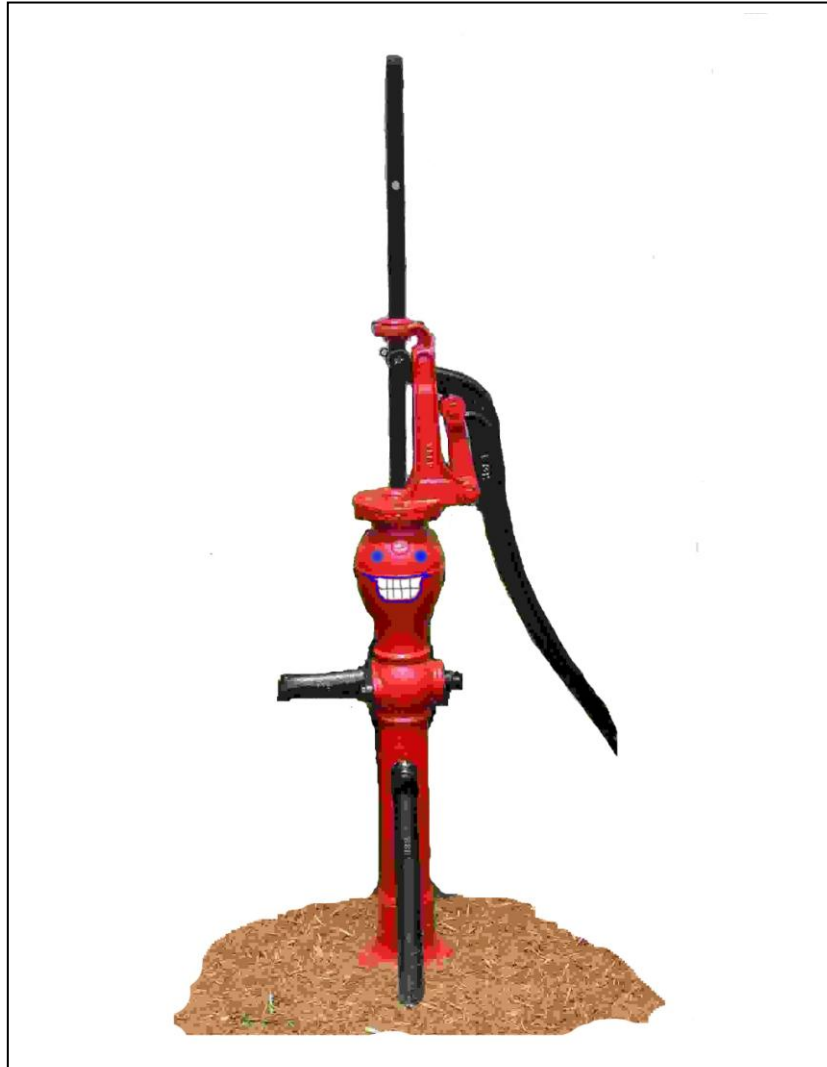


Tennessee Healthy Well Manual



HEALTHY WELL MANUAL

Steps You Should Take to Protect Your Well or Spring

Many Tennesseans still rely on private wells and springs. The first line of defense for these wells and springs is the homeowner - the state does not periodically test private wells or springs as it would be a monumental and extremely costly task. Wells can become contaminated through improper construction, maintenance or poor “housekeeping” practices around the well. Springs are particularly vulnerable to contamination. There are certain steps you can take to ensure you have a “healthy well” and safe drinking water. Things that you can do to protect the well or spring include, but are not limited to:

1. Don't store chemicals dangerous to water supplies near the well or spring or allow any to be poured out near the well or spring. Such chemicals would include gasoline, fertilizers, pesticides and solvents.
2. Be sure your well casing extends high enough above ground to prevent surface water from entering your well. The well casing should extend 24 inches above the level of the 100 year flood level of record. There should be a positive sealing of the annulus between the borehole and the outside of the well casing to prevent seepage of surface water vertically along the outside pipe into the well. Grouting will provide positive sealing of the space between the borehole and the outside of the well casing. Slabs of concrete poured around the top of the well casing will also help to protect the well. All wells should have a sanitary seal or cap to prevent insects or animals from entering the well. Pitless adapters should be used with submersible pumps. Be sure that your spring has a spring box that is designed to keep out animals, insects and surface water.
3. Don't drill wells near obvious sources of contamination such as septic tanks or field lines, animal feed lots, chicken houses, etc.

The following distances of separation are required by regulation:

Potential Sources of Contamination
Minimum Distances

Sewage Lagoons; Leaching Pits	200 feet
Animal Pens; Feed Lots	100 feet
Sludge; Septage Disposal Sites	100 feet
Pit Privies	75 feet
Sewer Lines	50 feet
Septic Tanks; Drain Fields	50 feet
House To Septic Tank Connections (Tightline)	10 feet

4. Don't allow anything to be dumped in nearby sinkholes.
5. Properly plug and abandon any abandoned wells on your property and encourage adjacent property owners to do the same. Sinkholes and abandoned wells provide a direct conduit for contaminants into the ground water.
6. Fence animals away from your well casing or spring. Cattle should be kept at least 100 feet from the well.
7. Landscape or trench surface water away from well casing and springs to prevent surface water entry into the well or spring.
8. Install a filtration system installed to protect you from the harmful bacteria and other pathogens common to surface water if your well or spring muddies up after a rain.
9. After making repairs to pipes and pumps be sure that the pumps or pipes are disinfected before being placed back into use.

Bacteria can enter a well from the handling of the pump and pipe as well as from the drilling equipment. A strong chlorine solution will kill most bacteria in a well if allowed to remain for at least twelve (12) hours. The Water Well Construction standards require both the driller and pump installer to disinfect the well.

- To disinfect the well, pour into the well one (1) gallon of chlorine bleach or one (1) ounce HTH super chlorinated solution for every fifty (50) feet of well depth.
- Once the chlorine is in the well, the faucets in the home should run until a chlorine odor is noticed. The water is then turned off and allowed to remain in the well and pipes for at least twelve (12) hours.
- After twelve (12) hours, the water should be pumped out of the well until the chlorine odor is gone. Do not run heavily chlorinated wastewater through a septic tank system or discharge into a surface water body.

The disinfection procedure should be repeated each time the well, pump or pipes are serviced.

10. Limit public access to your spring or well to prevent vandalism.
11. Have your well or spring tested every two years for bacteria. If it tests positive, shock chlorinate the well using chlorine bleach and have it re-tested after 2 or 3 weeks (see #9 above). If it tests positive again, a disinfection system needs to be installed (chlorination is the most common but ultraviolet light is also being used).
12. Ensure no chemicals are applied within 100 foot (minimum) of the well or spring through written agreements with other property owners, if necessary. Other pesticide applications can also be a concern, particularly from pest control applicators. There have been documented cases in Tennessee where applicators have accidentally injected pesticides for termites into wells that were cut off below ground.

13. Limit the use of onsite septic system to septic waste. Ground water is frequently contaminated with bacteria, viruses, nitrates, detergents, oils, and chemicals by septic systems that are improperly sited, designed or constructed or maintained. Certain Middle Tennessee counties at one time allowed the blasting in of field lines, which is the equivalent of pouring sewage down a well. Commercially available septic system cleaners containing synthetic organic chemicals (such as 1,1,1-trichloroethane or methylene chloride) have contaminated drinking water wells. Many chemicals should not be disposed of in household septic systems, including oils (e.g., cooking, motor), lawn and garden chemicals, paints and paint thinners, disinfectants, medicines, photographic chemicals, and swimming pool chemicals. These chemicals will kill the bacteria necessary for the breakdown of the septic waste.

14. If you are using a hand dug well, you should strongly consider having a chlorinator installed. Hand dug wells are actually a surface water drain rather than an actual ground water draw and are extremely susceptible to contamination. If you are using a spring, you should also consider a treatment system -- springs can be very susceptible to contamination as well. It would actually be best if you were to have a well drilled by a licensed driller using proper construction techniques.

Well improvement

For help identifying contamination sources and recommending improvements/ treatment for your well, contact Water well program staff within the Division of Water Supply at your nearest Department of Environment and Conservation regional office.

Central Tennessee (Nashville): (615) 687-7000
Southern Central Tennessee (Columbia): (931) 380-3371
Eastern Central Tennessee (Cookeville): (931) 432-4015
West Tennessee (Jackson): (731) 512-1300
Southeastern Tennessee (Chattanooga): (423) 634-5745
East Tennessee (Knoxville): (865) 594-6035
Northeast Tennessee (Johnson City): (423) 854-5400

If you are calling from the county where your well or spring is located, calling 1-888-891-8332 (1-888-891-TDEC) will automatically route you to the appropriate field office.

Well drillers, pump installers and treatment device installers are licensed by the State. Contact the Division of Water Supply's Nashville Central Office Water Well Program staff at (615) 532-0191 or 1-800-523-4873 for licensed operators in your area. They can also provide you with a list of certified laboratories for the testing of your well.

Well construction and inspection

Water well staff from the regional field office inspect a percentage of water wells drilled yearly. When having a new well drilled, ask for driller's registration number and be sure well log is filed with the state. You may request the field office individually inspect your well. Backfilling of the well should include a drilling mud (bentonite clay) and the well should be drilled with potable water. The driller should also be concerned about leaks and spills from his drill rig in the drilling process. The Division of Water Supply's Water Well Program should have a copy of your well log on file if drilled since 1967. Reports filed with the state are available from the Division of Water Supply, 401 Church Street - 6th Floor L & C Tower, Nashville, Tennessee 37243-1539, (615) 532-0191 or 1-800-523-4873. You need to provide homeowners name at time of drilling, approximate location & county, drillers name and/or date drilled is also helpful (if known).

Although the type and depth of well construction varies with location, there are several important things to be aware of concerning the construction of a well:

- The outside diameter of most private, domestic water wells is 6 5/8 inches in Middle and East TN, and 4 inches in West TN.
- New black or galvanized steel casing is required when drilling and completing a well in bedrock. Most wells in Middle and East Tennessee require steel casing.
- Wells developed in sand or other loose material may be cased with plastic pipe approved by the National Sanitation Foundation (NSF) with a minimum stress design rating Standard Dimension Ratio (SDR) 26.
- Watertight casing should extend at least six (6) inches above ground level; a minimum of two (2) feet for areas subject to flooding.

- Wells constructed in bedrock should have watertight casing down to nineteen (19) feet or five (5) feet into the top of bedrock, whichever is greater.
- Wells constructed in unconsolidated material such as sand or gravel should have watertight casing down to nineteen (19) feet or to the top of the aquifer, whichever is greater.
- The well should be sealed at the top of the casing with a suitable cap or sanitary seal.
- The outside of the well casing should be backfilled with an impervious material such as cement grout or bentonite clay, from a minimum of three (3) feet to ten (10) feet below land surface to prevent surface water from entering the well. The remaining backfill material may consist of bentonite, cement, drill cuttings or a mix of cuttings and bentonite. The backfill should be free of cracks or any evidence of collapse.
- The size of the pump and storage tank needed depends upon the yield of the well and the number of persons in the household. Generally, a well which yields 3-5 gallons per minute or more will adequately serve a household of four (4) to six (6) people.
- Underground pipes leading from the well should be fitted with a pitless adaptor, which provides a watertight, frost-free connection.
- The driller is required to "develop" the well after the drilling is completed to remove any debris, sediment or cuttings from the well.
- Following development of the well, the driller should disinfect the well to kill any bacteria which may have been introduced into the well during drilling and/or pump installation.
- The driller is required to send a Tennessee Water Well Drillers Report (CN-0825) to the Division of Water Supply. The report must give the name and address of the owner, the location of the well, the date of completion and a description of the well's construction. The well owner should request a copy of this report from the driller. This report may be valuable to you or subsequent owners in the event of any problem with the well.

- The well casing should never be cut off by the owner after the well is completed. Not only is the well I.D. tag lost, but the well becomes more susceptible to surface water and bacterial contamination.
- The use and/or storage of chemicals, including pesticides, gasoline, paint thinner, solvents, etc., should not take place within a twenty (20) ft. radius of the well.
- Locate the well a safe distance from potential sources of contamination. The well site should not be subject to flooding. If site conditions make it necessary to construct a well in an area subject to flooding, the watertight casing should extend at least two (2) feet above the 100-year flood elevation.
- The well should be at least five (5) feet away from any overhanging rooftops or power lines.
- The well should not be constructed in pits, basements or in areas where future construction may take place. The ground should slope away from the top of the well. For a well on a hillside, the uphill side of the well should be designed to prevent runoff from entering the well.
- The well should not be located closer than ten (10) feet from a property line.

Well owner is responsible

The owners of private wells are responsible for protecting their well water because federal and state laws do not ensure water quality. As a private well owner, the testing of your well is your responsibility. Part of the cost paid in a municipal water bill covers the extensive testing required for public water systems. If you have reason to suspect that your well is contaminated by a chemical pollutant, contact a regional field office at 1-888-891-8332 to obtain a list of private labs certified for drinking water analysis.

Water testing

It is strongly recommended that you use laboratories certified by the state for the testing of drinking water. A list of certified laboratories is available from the Division of Water Supply at (615) 532-0191 or 1-800-523-4873. Laboratories test water samples for bacteria, nitrates, and atrazine. Water tests can also be performed for volatile organics (gasoline components, solvents and degreasers; which are very mobile in ground water), lead and other contaminants.

You should compare charges from different facilities. County environmentalists can also perform a dye trace on your septic tank system to see if it is impacting the well. Septic failure to ground water is a hidden problem and a leading cause of well contamination.

Interpreting well water test results

Contact Water Well staff at your nearest regional office or the Nashville central office for assistance in interpreting well water tests (see above).

Drinking water quality standards and health effects

U.S. Environmental Protection Agency's Safe-Drinking Water Hotline. Call toll free (800) 426-4791 from 8:30 A.M. to 5:00 P.M. Eastern time. The EPA Office of Ground Water and Drinking Water website also has valuable information at <http://www.epa.gov/OGWDW/>.

Approved water treatment devices

The Division of Water Supply's Water Well Program can provide information about particular devices at (615) 532-0191 or 1-800-523-4873; 401 Church Street - 6th Floor L & C Tower, Nashville, Tennessee 37243-1539.

Requirements for installation of treatment devices

Before installing treatment devices on water supplies contaminated with nitrate, heavy metals, volatile organic compounds (gasoline, degreasers and solvents), pesticides, microorganisms and other health related contaminants in excess of drinking water standards, it is recommended that you contact the Division of Water Supply, Water Well Program. This office can describe devices that treat particular contaminants and has a list of licensed treatment device installers.

Proper well abandonment

For information on state guidance for properly abandoning a well, contact the Division of Water Supply.