volume is a good estimate if this is not known. Most garbage cans hold 30 gallons or more, so that filling three clean cans with the solution is sufficient.

Note: When used as a biocide, chlorine is most effective at a pH below 6. However, chlorine products can raise the pH of the water, especially in hard water, to a level where the chlorine solution becomes ineffective as a biocide (pH>8). To counteract this effect, the pH may need to be adjusted with a Department-approved acid product. If pH must be controlled the Department recommends you hire a licensed professional to perform the shock chlorination.

2. Pour or pump the solution into the well in one rapid, continuous flow, avoiding electrical connections.
3. Open each faucet in your house, one at a time, until you detect a chlorine smell and then close them.
4. Attach a clean hose to a nearby faucet and place the other end of the hose into the top of the well. Open the faucet and recirculate the chlorinated water for one hour washing down the inside of the casing and the pump piping.
5. Allow the chlorine solution to remain in the well and plumbing system for at least 24 hours. Then flush the entire system until you can no longer smell chlorine. Run the chlorinated water outdoors, perhaps into a ditch, because it can disrupt a septic system and can kill grass and shrubs. Also, do not run it into a lake or stream because it can kill fish and other aquatic life.
6. The chlorination process may have to be repeated. For some difficult infestations, you should hire a licensed Well Driller or Pump Installer to scrub the well with a brush and agitate the chlorine and solution within the well, and then bail or flush the well following the chlorination process. Also, the chlorine concentration can be doubled but only if the pH is controlled.

Forcing hot water or steam into a well to disperse the slime and kill the bacteria can also be used. Contact your local contractor for more information on these procedures.

Increasing water heater temperature

Rotten egg odor is more common from a hot water tap than from a cold water tap because the hydrogen sulfide gas remains dissolved in cold water. As the temperature increases, the gas is released as the hot water exits the tap.

Since SRBs are killed at temperatures above 140°F, 60°C, (which is the medium setting on most home water heaters), you can increase the water heaters temperature to a setting of 160°F or 71°C for 8 hours and then drain the tank to temporarily reduce the odor problem. The water tank must have a pressure relief valve or this treatment can be dangerous. Also, remember to warn users and reduce the setting afterwards to prevent accidental scalding.

Water heaters usually contain a sacrificial magnesium anode rod that helps protect the tank by corroding more easily than the tank lining. As it corrodes, the magnesium rod gives off electrons that can nourish SRBs. Removing this rod can reduce the bacteria problem, but doing so can shorten the tank life, especially when the water is softened. Replacing a magnesium rod with a zinc rod will not totally eliminate SRBs, but can greatly reduce them.

Community water systems

Other prevention and treatment methods for sulfur bacteria are available to community water systems. Stagnant water conditions can be avoided by looping dead-end plumbing lines and periodically flushing low-flow lines.

Contact us

Customer Service Staff are here to assist you 7 days a week, 7 a.m. to 10 p.m.

Call Toll Free 1-888-WDNRINFo
(1-888-936-7463)

How may we help you?

Chat available from 7 a.m. to 9:45 p.m.

Call a representative 7 a.m. to 10 p.m.

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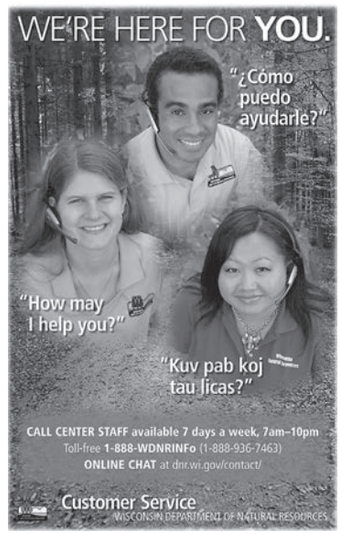

Toll free hotlines

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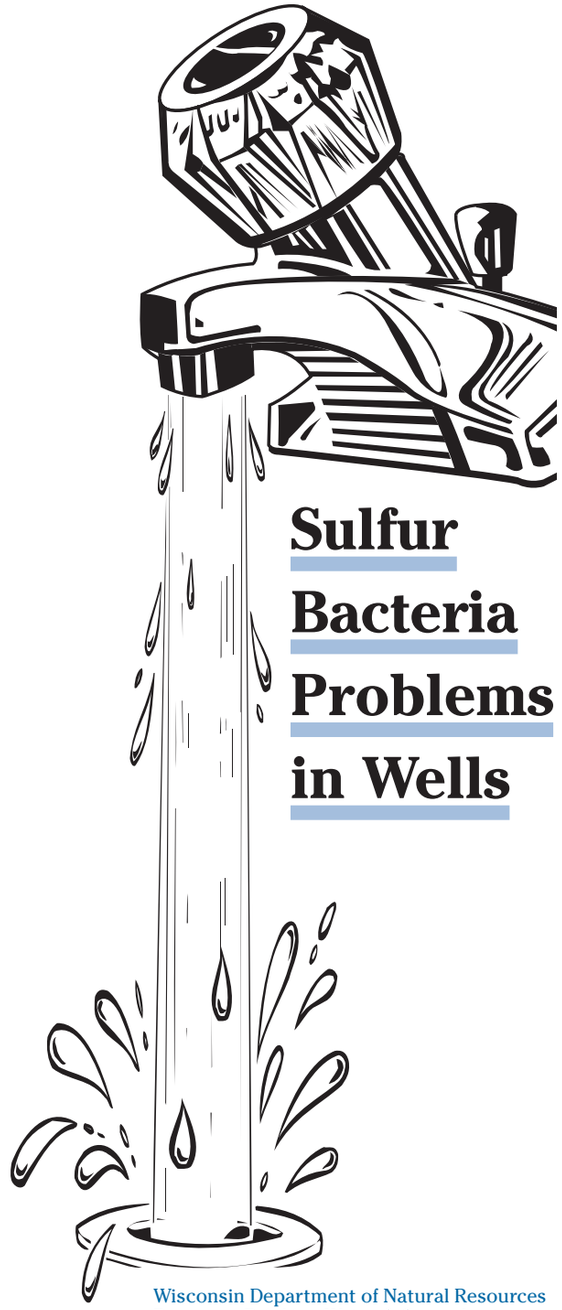


Sulfur Bacteria Problems in Wells

Wisconsin Department of Natural Resources
Bureau of Drinking Water & Groundwater

Well owners sometimes complain that their water has a “rotten egg” smell. This is usually caused by the presence of hydrogen sulfide gas. Although this gas can occur naturally in bedrock formations in some areas, it can also be produced by sulfur bacteria. Hydrogen sulfide gas can be harmful to humans, but the amounts produced by bacteria in wells is usually not a health concern. However, the bacteria, and the gas they produce, are obvious nuisances.

Sulfur bacteria can also cause more serious problems than an unpleasant smell. Hydrogen sulfide gas is highly corrosive and can damage plumbing connections and metal piping, including well casing. In addition, some sulfur bacteria form deposits that can clog a well screen and pump piping.

This brochure will explain common sulfur bacteria problems and what you can do to avoid or control them. You may also wish to consult the DNR brochure on the more common problem of iron bacteria, since the causes and remedies for either infestation are similar.

What are sulfur bacteria?

Sulfur is a very common element in the environment, and sulfur-reducing bacteria are found in almost every geographical area. They exist in soil and many geological formations, and therefore occur naturally in some aquifers. Sulfur bacteria can also be introduced into groundwater by drilling equipment that is contaminated with bacteria or by earthen well drilling mud circulation pits.

There are two distinct forms of bacteria that interact with sulfur compounds to cause problems:

Sulfur-oxidizing bacteria

These bacteria live only in environments containing oxygen. As part of their metabolic activities, they convert sulfide into elemental sulfur. They excrete a slime that can clog wells, plumbing, and irrigation systems.

Sulfate-reducing bacteria (SRBs)

Sulfate-reducing bacteria live where there is little or no oxygen. They convert sulfur compounds into hydrogen sulfide (among other by-products) that produces a foul smell and can corrode metal, concrete, and other materials. SRBs are often found inside thick iron bacteria slime where they form a complex ecological relationship with the iron bacteria organisms.

Detecting sulfur bacteria

A rotten egg smell in a well can indicate a problem with sulfate-reducing bacteria. However, it can also indicate an iron bacteria problem. Some people notice the smell only after a period of non-use of their well. Sometimes continuous use of the well may keep the problem from getting too bad. If the odor occurs only with the use of hot water, SRBs may have colonized the water heater. However the smell can also be caused by the heater’s sacrificial magnesium anode. Sometimes an early sign of SRBs is a blackening of the water by the sulfides.

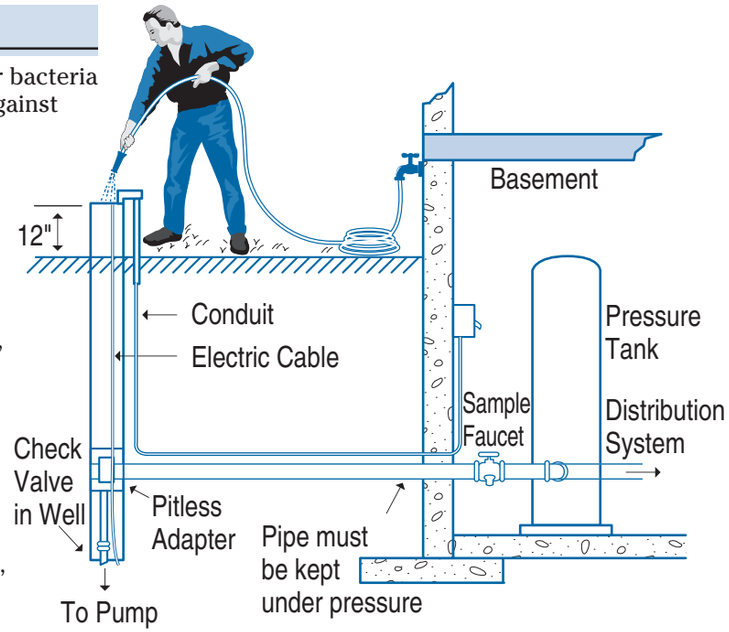
The presence of sulfur-oxidizing bacteria may be less apparent, since their effects are similar to those of iron bacteria. In any case, slimes in your well, plumbing, toilet tank, etc., are an indication of a bacteria problem and should not be ignored.

If you have reason to suspect a sulfur bacteria problem, you may wish to treat your water system, as described later, before having a water sample tested by a laboratory. Laboratory analysis can take 3 or 4 weeks and is often not necessary. Collecting and transporting water samples to be analyzed for sulfur bacteria is more complex than for iron bacteria. Homeowner help in finding a laboratory near you is available at **dnr.wi.gov**, Search: wells.

Preventing sulfur bacteria

As with iron bacteria, preventing sulfur bacteria in well systems is the best safeguard against subsequent problems.

For well drillers, prevention means disinfecting everything that goes into the ground with a chlorine solution. It is essential that sulfur bacteria are not introduced into any part of the well system during the drilling process. Drilling tools, casing, pumps, piping, and even the water used in drilling should be disinfected. The use of chlorinated drilling water is required by the State Well Code. A portable drilling mud tank should be used instead of digging an earthen mud put to help avoid contamination from soil. When the well is completed, it must again be chlorinated.



If your well has chronic sulfur bacteria problems, periodic chlorination may be the best method to control the problem. Owners can chlorinate a well annually as described in the next section, except using a weaker solution – 2 quarts of 5.25% chlorine bleach in 100 gallons of water (or 1.25 qts. of 10% chlorine bleach). Another possibility is to install a chlorination unit. There are two types of these units: one is installed on the well and uses chlorine pellets, the other is attached to the water line and uses liquid chlorine. Prior approval by DNR is required for the pellet chlorinator. Well owners considering them should contact their DNR drinking water staff for further information. For the name and contact information of DNR staff for your county, go to **dnr.wi.gov**, Search: Drinking Water Staff.

Treating sulfur bacteria problem

Shock chlorination

Sulfur-oxidizing and sulfate-reducing bacteria can often be controlled by a thorough batch shock chlorination. Doing one right away will eliminate the delay and expense of having a laboratory test confirm what a well owner suspects. For effective treatment, make sure a sufficient amount of chlorine and a proper contact time is provided.

Warning - There is an electrical shock hazard when working on a well. If you are not familiar with plumbing and electrical circuits you may want to hire a professional well driller or pump installer to shock chlorinate your well.

The following steps are recommended for a shock chlorination:

1. Prepare the chlorine solution.

   Approximately 2 gallons of 5.25% (or 5 qts. of 10%) chlorine bleach having no additives should be mixed with 100 gallons of water. Calcium hypochlorite products can also be used for chlorination however it should not be used in hard water conditions. It is best to prepare a volume more than the volume of water standing in the well. (For a 6-inch diameter there is 1.5 gallons for each foot of water standing in the well). A 100-gallon