



## Technical Bulletin

### **SULFUR BACTERIA**

Well owners sometimes complain that their water has a “rotten egg” smell. This is usually caused by the presence of sulfur bacteria that produces hydrogen sulfide gas. Although hydrogen sulfide gas can be harmful to humans, the amounts found in most wells are not a health concern. However, they obviously are a nuisance.

Sulfur bacteria can also lead to more serious problems than an unpleasant smell. Hydrogen sulfide gas is highly corrosive and can eat away plumbing connections and metal piping, including your well casing. In addition, some sulfur bacteria form deposits that can clog your well screen and pipes.

This technical bulletin will explain common sulfur bacteria problems and what you can do to avoid or control them.

#### **WHAT ARE SULFUR BACTERIA?**

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

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

#### **SULFUR OXIDIZERS**

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

#### **SULFATE REDUCERS (SRBs)**

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

## DETECTING SULFUR BACTERIA

The rotten egg smell indicates you may have a problem with sulfate reducing bacteria. However, it could also indicate an iron bacteria problem, and well owners should be cautious about assuming they have an SRB infestation. Some people notice the smell only after a period of non-use; its disappearance after water is run may keep the problem from being detected for a period. If the odor occurs only when you use hot water, it suggests SRBs may be building up in the water heater—although it could also be due to the heater's sacrificial element. Sometimes an earlier sign of SRBs is a blackening of 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 and/or odors in your well, plumbing, toilet tank, etc. are an indication of a bacteria problem and should not be ignored.

## PREVENTING SULFUR BACTERIA

If you have reason to suspect a sulfur bacteria problem, you may wish to try shock chlorinating the well as described below. A second step, also described below, is to increase the temperature in the water heater.

The rotten egg odor is more common with hot water than with cold. This is because hydrogen sulfide gas resulting from SRBs dissolves in cold water. As the temperature increases, the gas is expelled when hot water is released from the tap. The following short-term and more permanent treatment steps may help remedy the problem.

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

Water heaters usually contain a sacrificial rod (or “anode”) made of magnesium that helps protect the tank by corroding instead of the tank lining. As it corrodes, the magnesium gives off electrons that will nourish SRBs if they are present. Although simply removing this rod is a possibility, it can shorten tank life. Replacing the magnesium rod with a unit made of zinc will not totally eliminate SRBs, but can greatly reduce them.

## SHOCK CHLORINATION

Follow the procedure for shock chlorinating the well and entire plumbing system. If a “rotten egg” odor returns almost immediately, and on-site tests prove the presence of hydrogen sulfide, additional treatment will be required. Contact the factory.