Battling Bacteria With Chlorine

By Marianne Metzger

Procedures for chlorinating a private residential well

Homeowners with a private well as their primary drinking water source are responsible for ensuring the safety of their water. According to the U.S. Environmental Protection Agency (EPA), well owners should test their water at least once a year for bacteria, nitrates, total dissolved solids, pH and any other suspected contaminants. Additional testing should be considered if there have been any repairs to the well, the wellhead gets flooded, there are recurring gastrointestinal problems in the household, or there are any noticeable changes in color, odor or taste.

Bacteria in wells are a major concern and should be addressed promptly and properly as they can cause immediate illness. There are several methods for treating bacteria in wells, including chlorination, ozonation, ultraviolet light and ultrafiltration. This article will focus on how to properly chlorinate a well.

Chlorine Calculations

In order to add the correct amount of chlorine or other disinfectant to a well, you must calculate how much water you will be treating. First, determine the depth of the well and the water level. For example, if the well is 100 ft deep and the water line is at 50 ft, there are 50 ft of water in the well.

Then, calculate the volume of water based on the diameter of the well casing. Table 1 compares the estimated volume of water per foot based on well casing diameter. Using the example of 50 ft of water with a 6-in.-diameter casing, the calculation for the volume that needs to be treated is as follows: 50 ft x 1.47 gal per ft of water = 73.5 gal of water in the well to be treated.

Table 1. Well Casing Diameter & Water Volume

Well Casing Diameter (in.)	Volume of Water Per Foot (gal)*
4	0.65
6	1.47
8	2.61
10	4.08
12	5.88
18	13.22
24	23.50

**Volume of water is calculated as the volume of a cylinder multiplied by 7.48 gal per cu ft.*

Also consider the water that is in household pipes, water tanks and/or pressure tanks. A good rule of thumb is about 50 gal for the water within the pipes, plus the volume of any tanks containing water. Continuing with the example, if we have a 30-gal hot water tank and a 30-gal pressure tank, add 110 gal (50 gal in the pipes plus the 30-gal hot water tank plus the 30-gal pressure tank) to the 73.5 gal in the well. Based on this calculation, the total volume needing treatment is 183.5 gal of water.

You also need to consider the presence of contaminants that react with chlorine, such as iron, manganese and hydrogen sulfide. Every part of iron requires about 0.5 to 1 ppm of chlorine, and every part of manganese requires 1.7 to 2 ppm of chlorine. Hydrogen sulfide has a high chlorine demand, so every part requires 2 to 3 ppm of chlorine.

When shock disinfecting a well, aim for a solution of 200 ppm of chlorine. There are many forms of disinfectants in varying solution strengths available. Table 2 compares some of the most commonly used disinfectants and their solution strengths.

Treatment Procedure

Once you have determined the amount of chlorine needed, it is time to introduce the chlorine to the well. Mix the chlorine with water in a clean 5-gal bucket and mix well, especially if using a powdered disinfectant, so that it is completely dissolved. Pour the mixture into the well, trying to splash the solution against the casing. Turn the water on and use a hose to recirculate the chlorinated water back into the well. This will ensure the solution mixes with the water.

After mixing the solution back through the well, turn on faucets in the home until a strong chlorine smell is present at the tap. Once you smell chlorine, turn off the tap and move to the next one until all taps have been opened. If you do not smell chlorine, add more to the well. The system should remain unused for at least two to three hours, and preferably overnight.

Once the well has been fully chlorinated, flush the chlorine out of the system. Do this by attaching a hose and running water to a non-grassy area so the chlorine can dissipate. Do not

flush the chlorine into a septic system or any area where plants or aquatic life might be affected. Once you have fully disinfected the well, it is important to retest for bacteria to ensure the chlorination was successful. *wqp*

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Table 2. Commonly Used Disinfectants & Solution Strengths

Product	Solution Strength	Amount Needed for 200-ppm Solution (per 100 gal)	Pros	Cons
Household Bleach (Sodium Hypochlorite)	2.5% - 5%	3 pints	Inexpensive and readily obtainable	Unstable (loses strength quickly, so use within three months of manufacture date); must be stored away from light and heat; contains trace amount of copper and nickel.
Commercial-Strength Bleach	12% - 17%	1 pint	Stronger solutions	Not readily available to consumers; unstable.
Chlorinated Lime (Bleaching Powder)	30%	11 oz	Powder form	Unstable; sunlight, moisture and temperature readily diminish the strength.
Calcium Hypochlorite	65% - 70%	4 oz	Powder form is stable	May be more difficult to source for contact with drinking water, as it is commonly used for pool and spa disinfection.