Shock Chlorination – Disinfecting Your Water Supply

Water Quality Protection District
LEWIS AND CLARK COUNTY, MT

1930 9th Ave
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February 2026

This guide outlines a recommended procedure for shock chlorinating a private well system using common household liquid chlorine bleach. *If you are not confident that you can safely and effectively shock your well, it is recommended to contact a licensed water well contractor to conduct the procedure.*

If you have questions about shock chlorination, water testing, well maintenance, or water treatment, contact the Water Quality Protection District at water@lccountymt.gov or (406) 457-8584.

What is shock chlorination?

Shock chlorination is a chemical treatment process for disinfecting a private water supply. For private wells, this is generally accomplished using common household bleach as a remedy for bacterial contamination.

When is shock chlorination needed?

Shock chlorination should be used to treat your well if you have received positive water testing results for bacteria. This may include either total coliform or nuisance bacteria.

⚠ Notes and Warnings

- Your water supply will not be drinkable during disinfection, so it is best to source your water elsewhere. You can store water from your private supply prior to treatment but will need to boil the water for at least 5 minutes before consumption. Only store water from your private supply if you are sure there are no other contaminants present. Boiling can increase the concentration of some contaminants such as heavy metals.
- CAUTION: Bleach can be hazardous! Liquid bleach can harm the eyes, skin, and clothing. It can also cause damage to parts of your water system (e.g., pump wiring, steel casing), so it is best to consult with manufacturers before treatment.
- If the source of bacteria to your well is not resolved before shock chlorinating your well, your well will likely become contaminated again after treatment.
- After treatment, there is a potential for your water to have a chlorine taste. In most cases, this taste will dissipate over time.
- The amount of chlorine needed to shock a well depends on the volume of water in the system and the level of the contamination. You must test your well water 3 to 5 days after treatment to be sure the contamination has been resolved.

Shock Chlorination Procedure

Materials:

- 5.25% liquid laundry bleach, unscented
- Eye protection
- Plastic five-gallon bucket
- Measuring cup
- Garden hose
- Rubber/nitrile gloves
- Towel or cloth

Step 1: Inspect Your Well

It is best to inspect your well prior to treatment to resolve any potential issues leading to contamination. Use the guidelines listed below or consult a licensed well professional for a well inspection.

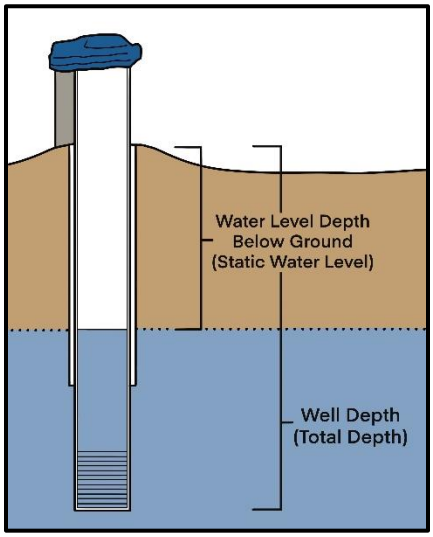
1. Check the general condition of your well cap and casing, making sure there are no cracks or damage.
2. Check that there is no space between the outside edges of your casing and the earth. If you have spacing, your well may need to be regrouted. Consult a well professional to have your well regrouted.
3. Build a 4- to 6-inch-tall mound around your well, leaving approximately 12 to 18 inches of exposed casing, to drain runoff away from your well.
4. It is recommended to install a sealed and vermin-proof well cap. If you already have a sealed cap, check the condition of the seal and vent screen.
5. Take proactive measures to protect your well from potential contaminant sources. Examples of potential contaminants include septic systems, harmful chemicals, waste from livestock or pets, stormwater runoff, and vermin such as insects and rodents.

Step 2: Calculations

In Step 2, we will calculate the total storage capacity of your system to determine the amount of bleach needed to shock your system. When making calculations, be sure that you are using the correct units! If you mix units in your calculations, gallons vs cubic inches or inches vs feet, your calculations will not be correct. Contact WQPD staff if you would like help making calculations.

1. **Calculate the depth of water inside your well.**
   To do this, you will need the total depth of your well and the water level depth below the ground's surface (static water level). This information can be found on your well log, which can be found at mbmggwic.mtech.edu. If you would like an accurate and up-to-date measurement of your static water level, reach out to the WQPD to potentially have your well measured by our staff. The total depth of your well, minus the static water level, is equal to the depth of water inside of your well.

$$Total\ Well\ Depth\ (feet) - Static\ Water\ Level\ (feet) = Depth\ of\ Well\ Water (feet)$$



2. Calculate the volume of water inside your well.

To calculate the volume of water inside of your well, you will need to know the diameter of your well casing in inches and the depth of water in your well in feet. Use the table below to find the volume of water (gallons) per 1 foot of depth inside of your well. You will then multiply the depth of your well water by this value to calculate the total volume of water inside of your well.

Table 1: Storage Per Foot of Water Depth for Various Well Sizes

Well Diameter (inches)	Storage Per Foot of Water Depth (gallons)
4	0.65
6	1.47
8	2.61
10	4.08
12	5.88

$$Depth\ of\ Well\ Water\ (feet)\ x\ Storage\ Per\ Foot\ of\ Water\ Depth\ (gallons) = Volume\ of\ Well\ Water\ (gallons)$$

3. **Calculate the total volume of water within your private water supply.**

Typically, the total volume of water within your system will include the volume of water inside your well (calculated in the step above), your hot water heater, your pressure tank, and your pipes. The volume of water in your hot water heater and pressure tank should be listed on the plumbing fixtures. The volume of water in your pressure tank is called the drawdown.

The tank's drawdown may be listed on a manufacturer chart. If you cannot find a listed drawdown amount, divide the total volume of your tank by 3. The water inside household plumbing typically adds a small volume compared to the well, so an estimate of 5 gallons can be used in most cases. As previously noted, be sure that you are using gallons as your unit of measure.

$$Volume\ of\ Well\ Water + Volume\ of\ Hot\ Water\ Tank + Volume\ of\ Pressure\ Tank + Volume\ of\ Plumbing\ Pipes = Total\ Volume\ of\ Water\ in\ Your\ Private\ Water\ Supply$$

4. **Calculate the amount of bleach needed for mixing your solution.**
   The strength of solution needed to shock your system can vary depending on your purpose for shocking. WQPD staff can help make recommendations on solution strengths. Use table 4 and the equation below to determine how many pints of 5.25% liquid laundry bleach are needed to make your solution. Only use the recommended dosing for iron bacteria if you have a significant iron bacteria issue at your residence!

$$Total\ Volume\ of\ Water\ in\ the\ System\ (Gallons)\ x\ \frac{x\ Pints\ of\ Bleach_{5.25\%}}{100\ Gallons} = Pints\ of\ Bleach\ Needed$$

**1 pint = 2 cups*

Table 2: Shocking Purpose and Pints of 5.25% Bleach Needed

Shocking Purpose	Pints of Bleach Needed Per 100 Gallons of Water
Total Coliform	2
Nuisance Bacteria/Contamination After a Flood Event	3

Step 3: Mix your solution

Next, we will dilute the bleach needed to shock your system in a plastic five-gallon bucket. Wear eye protection, rubber gloves, and clothes you don't mind potentially ruining when handling bleach to avoid damaging yourself or your belongings.

Make sure the bucket is clean before using it to shock your system. Do not add more than ½ gallon of bleach per five gallons of solution. If your system needs more bleach than a ½ gallon, then you will need to separate your bleach into two batches.

Step 4: Pour the solution into your well

To properly pour the solution into your well you will first need to turn your well pump off with the cap still on to avoid electrocution. Then, remove the well cap and wipe the interior of the cap with your cloth and the mixed solution to disinfect the cap. Pour the solution into the well.

NEVER POUR UNDILUTED BLEACH DOWN YOUR WELL.

Step 5: Distribute the solution throughout your system

You will now turn your well pump back on. Use a hose connected to a hydrant or spigot near your well to run the water until you can smell chlorine coming out of the hose. You will then use the hose to thoroughly wash chlorinated water down the interior edges of your well for 15 to 20 minutes. Then, run the water through all outside faucets until you can smell chlorine. Next, you will move onto the inside of the house. Run water through all faucets, hot and cold, until you can smell chlorine. Don't forget the shower and bathtub faucets. Be careful not to flush an abundance of chlorinated water into your septic system. Be sure not to forget any plumbing lines. If you miss a line, you may not properly chlorinate the entire system, and your water supply will remain contaminated.

Step 6: Allow the system to disinfect

It is recommended to allow the system to sit for 18 to 24 hours.

DO NOT CONSUME YOUR WATER DURING DISINFECTION. WATER CHLORINATED AT THIS LEVEL IS HARMFUL TO PEOPLE, ANIMALS, AND VEGETATION.

Step 7: Flush the system

After your system has sat with the chlorinated solution for enough time, turn on an outside hose and run the water over gravel or rocks. DO NOT ALLOW THE WATER TO POUR ONTO VEGETATION OR INTO STORM DRAINS OR BODIES OF WATER. After you can no longer smell chlorine, flush all faucets inside of our house until you can no longer smell chlorine. While the system has now been shocked, do not drink the water until you have tested the water again.

Step 8: Test your water

Retest your water 3 to 5 days after completing the shocking procedure. Retesting immediately after treatment can result in false results due to the potential of residual chlorine.

If you are not able to successfully disinfect your well, contact the Water Quality Protection District or a licensed well professional.