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Well Disinfection

This handout provides instructions for disinfecting your water system, which includes both the well that has a submersible pump and the associated water distribution system. These instructions can be used for a single-family home or businesses such as resorts and campgrounds. Disinfection can eliminate or reduce harmful bacteria, viruses, or other microorganisms that may be found in your drinking water.

You can disinfect your well by following these instructions, or you can hire a licensed well contractor. Licensed well contractors can be found at: Licensed/Registered Well and Boring Contractor Directory (www.health.state.mn.us/communities/environment/water/wells/lwc/index.html) (only available in English at this time).

Safety Concerns

Be sure to do the following to ensure your safety and that of your family, pets, and livestock.

- Read this entire brochure before starting to disinfect your water system.
- Keep children and animals away from the well area while disinfecting.
- No one should use water from the water system until the disinfection procedures are done.

Electrical

Use extreme caution when working with electricity. Together, water and electricity can be deadly. If you are not confident in your ability to work safely with electricity, contact a licensed well contractor to disinfect your well.

Chemical

- Always follow the manufacturer's use and safety directions.
- Avoid eye and skin contact. Wear protective goggles or a face shield and rubber gloves when working with bleach.
- Do not mix bleach with other chemicals as they may form harmful gases.
- Do not leave bleach or the bleach solution unattended.

Respiratory

- Disinfection can create harmful gases. The area around the well must be well ventilated.
- Harmful gases can accumulate in well pits and create a lack of oxygen.

Procedure for water system disinfection

You will need the following to disinfect your water system:

- A garden hose long enough to reach from your water faucet to the well. This hose also needs to reach an area away from your well, septic system, landscaping, and water bodies.
- Clean 5-gallon bucket.
- Funnel.
- Plastic tarp.
- Protective goggles/face shield and rubber gloves.
- Five gallons of fresh water from a source known to be free of bacteria, such as a municipal water system.
- Chlorine test strips.
- Unopened, unscented household chlorine bleach with no additives, manufactures within six months of use. The label will say the active ingredient is 6 or 8.25% sodium hypochlorite. Do NOT use swimming pool or hot tub disinfectants as they typically contain algicides and fungicides.

STEP 1 - Isolate critical areas

Turn or push the bypass valves to the “bypass” or “out of service” position for all water treatment devices (water softeners, reverse osmosis systems, etc.) and appliances that cannot tolerate bleach. These may harbor organisms and need to be disinfected separately. Follow manufacturer’s instructions for disinfection procedures.

Remove all filters from devices and appliances. Bait tanks and livestock watering troughs may require special attention.

STEP 2 - Electrical safety

Turn OFF the electrical power to the pump. If the circuit breaker box has a lockout hasp, use it to prevent the breaker from being accidentally turned ON. Always use a voltmeter to verify that power has been cut to the well before proceeding with the disinfection process.

STEP 3 - Open the well

- Standard Well Cap: Remove the well cap and move the wires to the outside of the casing to avoid getting the wire connectors wet when doing Steps 6 and 7 (see Figure 1); **or**
- Sanitary Seal: Remove the vent (see Figure 2-top arrow). Do not remove the compression bolts from the compression fit well seal (see Figure 2-bottom arrow).

Figure 1

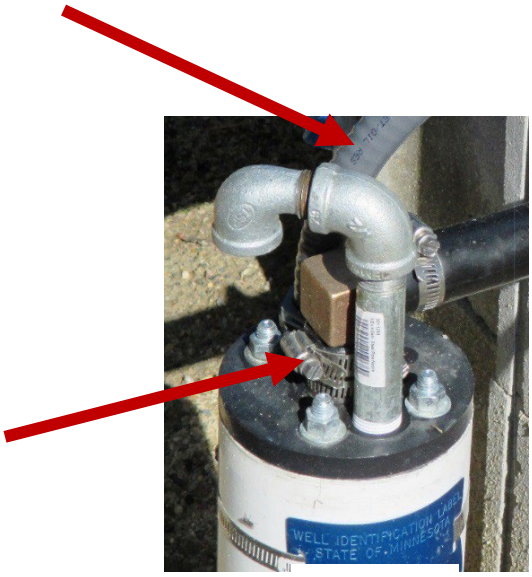

Figure 2

STEP 4 – Inspect these components:

- Wire insulation for cracking, peeling, or missing wire connectors.
- Well casing for cracks or other damage.
- Well cap for missing bolts, damaged vent screens, or loose gaskets.

It is important that any plumbing or well defects are fixed so that surface water, insects, vermin, or other contaminants cannot enter the well.

STEP 5 – Mix a bleach solution

Water chemistry and water system sizes vary. These differences will determine the amount of bleach solution needed to properly disinfect your water system. You want between 50-200 parts per million (ppm) of chlorine in the recirculating water (Step 7) for disinfecting your water system. Do not use bleach solution greater than 200 ppm as it will reduce the disinfection effectiveness.

1. Add water from the water system into a clean 5-gallon pail until it is about three-fourths full, then

Add the amount of bleach as indicated in the table below.

Amount of water in well (feet)	Well Casing Diameter (inches)		
	2	**4**	**6**
10	2 cups	2 cups	2 cups
50	2 cups	2 cups	3 cups
100	2 cups	3 cups	4 cups
300	3 cups	4 cups	10 cups

The amount of water in a well is the total depth of the well minus the static water level. If the amount of water in the well is unknown, go to Minnesota Well Index (https://www.health.state.mn.us/communities/environment/water/mwi) (only available in English at this time) or contact MDH. If unable to determine the amount of water in the well, use the total depth of the well instead.

This table's bleach solution is good for disinfecting a well and the water system in an average home, including water pipes, water tanks, and water heater. Reduce the amount of bleach by 1 cup if only the well needs to be disinfected. You may need to increase the amount of bleach solution if:

- The water system contains multiple buildings,
- Has large amounts of distribution pipe or water storage, or
- If you're disinfecting because your well was flooded, has nuisance bacteria, or is a larger diameter well.

STEP 6 – Add bleach solution to the well

1. Use a funnel when pouring the bleach solution into the well.

Avoid getting any bleach solution on metal well cap components and wires. It will cause corrosion.

STEP 7 - Recirculate chlorinated water

1. Turn the circuit breaker to the pump ON. **CAUTION:** The wires at the wellhead are now energized.
2. Connect a garden hose to the most convenient faucet.
3. Run water from the hose in an area away from the well, septic system, landscaping, and bodies of water until you smell bleach or detect chlorine with test strips. This may take 5-10 minutes and the water may be discolored. Continue monitoring and running the water until it runs clear. If flow significantly decreases, shut off power to the pump and contact a licensed well contractor.
4. Turn the water OFF.
5. Place the garden hose into the well.
6. Turn the water ON.
7. Recirculate water. Continue to recirculate for about 30 minutes after you first smell bleach from the garden hose. Use two chlorine test strips as visual indicators to determine if water from the hose is at least 50 ppm chlorine (high dose) or less than 1 ppm (trace amount). If below 50 ppm, go to STEP 5 and add more bleach solution and repeat STEPS 6 and 7.
8. Turn the circuit breaker to the pump OFF.
9. Rinse well components with fresh, unchlorinated water. Rinsing washes off bleach solution to prevent corrosion.
10. Replace wires and well cap.

Turn the circuit breaker to the pump ON.

STEP 8 - Bring bleach solution to all faucets and fixtures:

1. Select your first faucet or fixture.
2. Remove faucet aerator, if present. This will prevent them from getting clogged from loosened scale.
3. Run hot water until a chlorine test strip indicates a minimum of 50 ppm. This will take time as the chlorinated water in the system must replace the entire volume of your water heater. If below 50 ppm, go to STEP 5 and add more bleach solution and repeat STEPS 6, 7, and 8.
4. Repeat the process with the cold faucet. It will take much less time for chlorinated cold water to appear.

Turn OFF the faucet and repeat for all remaining faucets and fixtures, including showers, tubs, toilets, water-using appliances, exterior faucets, yard hydrants, and outbuildings.

STEP 9 - Disinfection time

1. Turn the circuit breaker to the pump OFF.
2. Place signs or disable faucets and fixtures to prevent anyone from using the water.

Let the bleach solution sit in the water system for a minimum of two hours, preferably six hours, or overnight.

STEP 10 – Remove the chlorinated water

1. Turn the circuit breaker to the pump ON.
2. Attach a garden hose from an outside faucet or yard hydrant. Do not discharge chlorinated water into or near your septic system, onto landscaping, or any water bodies, since bleach solution will harm them.
3. Run the water to flush the bleach solution out of the well. Monitor the process it can take 30 minutes to 24 hours or more to flush all the bleach solution from the well.
4. Use chlorine test strips to verify that water coming from the outside faucet or yard hydrant is free of any bleach solution.
5. Flush the chlorinated water from water heaters.

Run the water from all interior and exterior water faucets and fixtures to flush the bleach solution from the rest of the water system. Use a chlorine test strips that read down to 0 ppm of chlorine to verify that no bleach solution is present.

STEP 11 – Disinfect water treatment systems and appliances

To disinfect water treatment systems and appliances, follow the manufacturer's instructions for each water treatment device or appliance. If disinfection information is unavailable, contact your water treatment or appliance service provider. Bleach solutions may damage or improperly disinfect filters that are a part of a water treatment system or appliance.

STEP 12 - Reconnect appliances, water softeners, and other treatment devices

Return bypass valves to the ON position after following the manufacturer's directions for disinfecting appliances and water treatment devices.

STEP 13 – Test the water

After the bleach solution is removed from the water system, sampling is recommended to make sure the well water tests negative for total coliform before you use it for drinking or cooking. MDH recommends using an accredited laboratory to test your water. Contact an Search for Accredited Laboratories (https://eldo.web.health.state.mn.us/public/accreditedlabs/labsearch.seam) (only available in English at this time) to get sample containers and instructions or ask your county environmental or public health services if they provide well water testing services.

Replace filters on all devices and appliances when MDH or an MDH certified laboratory confirms your water system is total coliform free.

Follow-up

Total coliform may regrow in the water system. For this reason, it is important to retest your water between two to four weeks after disinfection. If total coliform is detected, repeat the disinfection procedure.

It is not unusual to disinfect a water system multiple times to eliminate total coliform if it has been growing in the system for an extended period of time. If disinfection attempts are unsuccessful, the well may need to be cleaned as well as disinfected. Contact a MDH licensed well contractor for further assistance.

For more information on your well and water system, see the "Well Owner's Handbook [PDF] (https://www.health.state.mn.us/communities/environment/water/docs/wells/construction/handbook.pdf) (only available in English at this time)" available on the MDH Well Management Section website.

To obtain this information in a different format call 651-201-4600.
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