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DEPARTMENT OF HEALTH

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/divs/eh/wells/lwc).

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 completing the disinfection procedures.

Electrical

Use extreme caution when working with electricity and water. Together, water and electricity can be deadly.

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 that is long enough to reach from your water faucet to the well. This hose also needs to reach an area that is away from your well, septic system, landscaping, and bodies of water.
- Clean 5 gallon bucket.
- Funnel.
- Plastic tarp.
- Protective goggles/face shield and rubber gloves.
- Five gallons of commercially bottled water.
- Chlorine test papers.
- Unopened, unscented household bleach with no additives that is less than six months old.

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.

STEP 3 – Open the well

Open the well by:

- Removing the well cap and moving the wires with the connector caps to the outside of the casing to avoid getting them wet when doing Steps 6 and 7 (see Figure 1); or
- Removing the vent (see Figure 2-top arrow). Do not remove the compression bolts from the compression fit well seal (see Figure 2-bottom arrow).

Note: If the well is different from those described, contact Minnesota Department of Health (MDH) or an MDH licensed well contractor. You will find MDH contact information on the last page of this document.

Figure 1

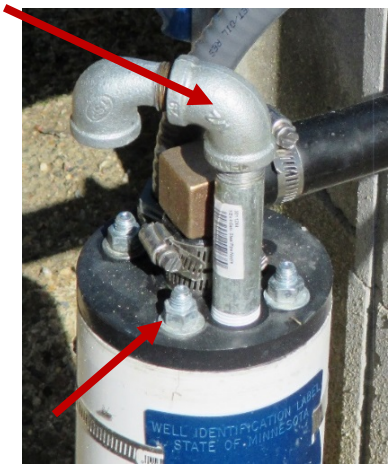

Figure 2

STEP 4 – Inspection

Inspect all well components by examining:

- Wire insulation for cracking, peeling, or missing wire nuts.
- Well casings for cracking.
- Loose well caps.

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

STEP 5 – Mixing 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 bleach in the recirculating water (Step 7) for disinfecting your water system. Do not mix bleach solution that is greater than 200 ppm. A bleach solution with greater than 200 ppm of bleach will reduce the disinfection effectiveness.

It is recommended to start with:

1. Pouring water from the water system into a clean 5 gallon pail so the pail is about three-fourths full, then
2. 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	1 quart
300	3 cups	1 quart	2.5 quarts

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 (www.health.state.mn.us/divs/eh/cwi) 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 more buildings,
- Has large amounts of pipes or storage, or
- If you are disinfecting because your well was flooded, has nuisance bacteria, or is a dug well.

STEP 6 – Adding bleach solution to the well

1. Use a funnel when pouring the bleach solution into the well.
2. Avoid getting any bleach solution on the well cap components and wires. It will cause corrosion.

STEP 7 – Recirculate chlorinated water

1. Turn the circuit breaker to the pump ON. Be careful, the wires in the well casing are “live and hot.”
2. Connect a garden hose to the most convenient threaded hose connection.
3. Run the water out of the hose for about 10 minutes in an area away from the well, septic system, landscaping, and bodies of water. 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. Put the funnel into the well.
6. Place the garden hose into the funnel.
7. Turn the water ON.
8. Recirculate water. Continue to recirculate for about 30 minutes after you first smell bleach from the garden hose. Use chlorine test papers as a visual indicator to determine if the water from the hose is at least 50 ppm of bleach. If below 50 ppm, go to STEP 5 and add more bleach solution and repeat STEPS 6 and 7.
9. Turn the circuit breaker to the pump OFF.
10. Rinse well components with commercially bottled water. Rinsing washes off bleach solution to prevent corrosion.
11. Replace wires and well cap.
12. Turn the circuit breaker to the pump ON.

STEP 8 – Bring bleach solution to faucets

- Cold and hot water faucets.
- Toilets, shower, and bath fixtures.
- Outside faucets or yard hydrants.

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 water until chlorine test papers indicate a minimum of 50 ppm. If below 50 ppm, go to STEP 5 and add more bleach solution and repeat STEPS 6, 7, and 8.
4. Turn OFF the faucet and repeat for the remaining faucets and fixtures.
5. Turn the circuit breaker to the pump OFF.
6. Rinse well components with commercially bottled water. Rinsing washes off bleach solution to prevent corrosion.
7. Replace well components including vents, wires, and well cap.
8. Turn the circuit breaker to the pump ON.

STEP 9 – Disinfection time

1. Turn the circuit breaker to the pump OFF.
2. Put signs or disable faucets and fixtures to prevent anyone from using the water.
3. 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 put the end of the hose in or near your septic system, landscaping, or any bodies of water, 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 of the bleach solution from the well.
4. Use chlorine test papers to verify that the water coming from the outside faucet or yard hydrant is clear of any bleach solution.
5. Flush the chlorinated water from water heaters.
6. 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 paper that reads to 0 ppm of chlorine to verify that no bleach solution is present.

STEP 11 – Disinfecting 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 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, it is recommended that you take a water sample to make sure that the well water tests negative for total coliform before you use it for drinking or cooking. Sample bottles and collection instructions can be obtained at your local county public health office, or MDH certified laboratories can be found at Search for Accredited Laboratories (www.health.state.mn.us/labsearch).

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 a period of time. If disinfection attempts are unsuccessful, the well may need to be cleaned as well as disinfected. Contact an MDH licensed well contractor for further assistance.

Contact Information

651-201-4600 or 800-383-9808

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www.health.state.mn.us/divs/eh/wells

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