



Well Disinfection

MINNESOTA DEPARTMENT OF HEALTH

NONCOMMUNITY PUBLIC WATER SUPPLY PROGRAM

When to Disinfect

Well disinfection can eliminate or reduce many kinds of harmful bacteria and viruses as well as non-harmful bacteria that can cause unpleasant taste and odors. However, disinfection will **not** correct water problems caused by chemical contamination from nitrate, fuels, pesticides, or other substances. Well disinfection should be performed under the following circumstances:

- ' When coliform bacteria are present in the water
- ' After flooding of the well
- ' After plumbing installation, e.g. softeners, sinks, filters
- ' After casing or pump repairs - submersible types or other
- ' When drinking water tastes or odors change, e.g. from iron or sulfur reducing bacteria
- ' As part of annual maintenance
- ' During startup of seasonal wells

Safety Concerns – Do not allow children or pets in the area when disinfecting a well.



ELECTRICAL

EXTREME CAUTION is advised, as you will be working with electricity and water. Potentially lethal voltages exist - if you are not acquainted with working with electricity, seek professional advice.

Your safety precautions should include:

- ' Turn off the pump circuit breaker before removing the well cap
- ' While the breaker is off, examine for chafed wire insulation or missing wire nuts and repair as necessary
- ' Wear rubber soled shoes or boots, preferably waterproof



CHEMICAL

Severe eye damage may result from contact with chlorine, including bleach and highly chlorinated household water.

- ' **Users of the water must be warned to not drink or bathe with the water while chlorine is still present in the system**
- ' Do not leave bleach jugs lying around - ingestion of bleach is the most common toxic exposure for children in the U.S.
- ' Wear protective goggles or a face shield when working with the bleach

RESPIRATORY

Well pits pose an extreme hazard as they frequently contain a build-up of toxic gases or simply lack oxygen to sustain life.

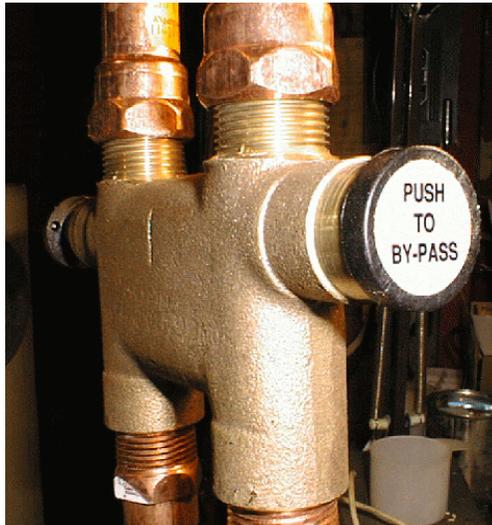
- ' **DO NOT ENTER WELL PITS**, death can occur in even a shallow well pit
- ' Leave disinfection of wells in pits to licensed well or pump contractors

Procedure

STEP 1 - Isolate critical areas

Bypass softeners, bait tanks, livestock, and anything else that might be vulnerable to chlorine to prevent damage to the device or animals. This would also be a good time to install a new filter element if the water system has any present.

Since softeners themselves may be a source of contamination, it is good to disinfect the softener at the same time the well is being disinfected. See the end of this document for a softener disinfection procedure.



STEP 2 - Electrical safety



Turn off electrical power to the pump.

If the breaker box has a “lockout” hasp to prevent someone from accidentally turning on the water pump circuit breaker, use it.



STEP 3 – Open the well

With electrical power off, open the well either by:

- 1) removing the well cap and lifting the wires/wire nuts aside (see Figure 1); or
- 2) removing a threaded plug from a compression fit well seal (see Figure 2).



Figure 1

Note: If the water discharge pipe extends through a sanitary well seal in the top of the well casing, and there is no threaded removable plug, or if your well situation is different than those described in this handout, you should contact a licensed well driller or pump installer to perform the disinfection.



Figure 2

STEP 4 - Mixing a chlorine solution



Note: Do not use bleach that has fragrance added.

Add a half-gallon of bleach to a clean pail with about 3 gallons of water. This is generally sufficient to disinfect a 4-inch diameter well 100 feet deep or less.

For wells greater than 100 feet deep or with a larger casing diameter, increase the amount of bleach proportionately.

If you have a dug well with a diameter greater than 18 inches, use 2 to 4 gallons of bleach added directly to the well. Please note that many dug wells are difficult or impossible to disinfect due to their unsanitary construction.



STEP 5 - Adding chlorine to the well

Pour the mixture into the well (use a funnel if pouring through a small hole).

**STEP 6 - Recirculating chlorinated water**

Recirculation of chlorinated water helps to wash down the sidewalls of the well casing, mix the water column thoroughly, and distribute the chlorine. Complete this procedure by using the following steps:

- ' Turn on the pump power.
- ' Using a clean garden hose  connected to the water system, run the water to the ground surface in an area away from the well for approximately 10 minutes. You may notice that the water coming from the garden hose turns reddish for a brief period. This is due to the chlorine precipitating iron in the water. If the water appears excessively red and cloudy from this reaction, continue this procedure until the water runs clear.
- ' Turn off the pump power.
- ' Place the garden hose into the top of the well casing (or into funnel) 
- ' Turn on the pump power.
- ' Re-circulate water. Continue to re-circulate for about 2 hours after you first smell chlorine from the garden hose.



STEP 7 - Bringing chlorine to each faucet

While water is circulating, run water from each fixture* one at a time until you smell bleach (or use chlorine test papers), then close the faucet. Do this for each faucet, including:

- ' cold and hot water taps
- ' toilets and shower/bath fixtures
- ' any outside faucets or yard hydrants

*Faucet aerators may need to be removed if clogging occurs from precipitated iron.

(Chlorine test papers, such as those commonly used in restaurants to check chemical sanitizing dishwashers, are not necessary but provide a visual indication that chlorine is present.)

**STEP 8 - Removing the chlorinated water**

Let system set overnight with chlorine in the water lines. In the morning, run a garden hose to flush out the system.

- ' Since chlorine will kill vegetation, direct the water to an area where it won't matter if plants are harmed.
- ' Do not run the water into your septic system (tank or drainfield) as the amount of water required to flush the system may hydraulically overload the septic system.
- ' TOTAL chlorine must be absent prior to taking water samples for coliform analysis. While this test is not necessary for the homeowner, be aware that any amount of chlorine left in the system may erroneously result in a negative coliform test.



When a chlorine test kit is unavailable, wait a few days after the last trace of chlorine odor has been smelled before submitting a water sample for coliform analysis. This will help in obtaining a valid test result.

Disinfection Issues

Expectations and Concerns

It may take as little as half an hour or as long as 4 days to completely remove the chlorine odor from the water system. This is dependent upon many factors including the height of the water column in the casing, well drawdown, pump capacity, etc. To facilitate faster removal of the chlorine in stubborn cases, a hose splitter may be attached. Run one hose back into the casing and run the other hose to waste.



- ❑ Water heaters take a long time to flush out once chlorine has been introduced into them.
- ❑ **Do not shower or bathe with water containing high levels of chlorine due to the possibility of damaging your eyes.**
- ❑ It is not unusual to need to disinfect 2, 3, 4, or more times to clear water systems of coliform bacteria that has been growing in the system for a period of time.
- ❑ If the well refuses to clear, a licensed well driller should be enlisted to utilize special techniques and equipment to flush the well. It is essential that any water system defects that could allow surface water to enter the well be corrected.
- ❑ Plumbing grit and precipitated minerals may form when the chlorine is added to the system. This grit can cause clogging with faucet aerators, flush valves, water solenoids, and equipment using filters.

Softener Disinfection

Water softeners may be damaged by excessive amounts of chlorine but the softener itself should be chlorinated when there are bacteria problems.

Follow the manufacturer's instructions for disinfecting the particular unit you have, or use this procedure:

- ' During the disinfection process, turn softener to 'Bypass' once chlorine is first smelled in a softened water tap.
- ' Keep unit on bypass until chlorine is flushed out of the system.
- ' To disinfect the softener, add ½-cup bleach to the brine tank and regenerate the unit.



Follow-up

Frequently, coliform bacteria will re-grow in the water system after about a month. For this reason, it is important to retest in approximately 30 days after disinfection. If coliform is again detected, disinfect the well using the same procedure.