

How to Disinfect a Well

Partial Chlorination Method

Chlorination is the process of treating (disinfecting) a well and plumbing system with chlorine to kill or reduce certain kinds of bacteria. This includes coliform bacteria that may indicate the presence of disease-causing organisms and other nuisance bacteria (ex: iron bacteria) that can cause unpleasant taste and odour in the water. Disinfecting a well will not get rid of other water quality problems such as hard water or nitrate contamination.

Chlorination is effective for getting rid of a one-time case of bacterial contamination. However, if you have an ongoing contamination problem (possibly related to poor well location, construction or lack of maintenance), disinfecting the well will only fix the problem temporarily until the actual cause of the ongoing problem is identified and corrected.

Sometimes, the source of bacterial contamination or its pathway into a well isn't clear. Some types of wells are also more difficult to disinfect such as wells that have been impacted by flood water, wells located in a pit or artesian (flowing) wells. In these cases, it may be best to hire a qualified person such as a licensed professional well driller or plumber to undertake the work. For more details, please see our Well Water Fact Sheet #1 "How to Reduce the Risk of Well Water Contamination".

Partial versus Full Chlorination

Partial chlorination is the most common method used by well owners to get rid of bacteria in wells and plumbing systems. As this procedure does not require specialized equipment, most people have the means to undertake the partial chlorination steps listed on the following pages.

The other method is Full Chlorination which is the preferred method for disinfecting wells. In addition to

getting rid of bacteria in the well and plumbing system, the full chlorination method kills bacteria that may be present in the aquifer surrounding the well. Full chlorination is the most common method used by well drillers for wells with bacterial contamination, particularly for wells that have been affected by surface or flood waters. While it's often best to have a qualified person such as a licensed professional well driller or plumber to do a full chlorination procedure on your well, you can do it yourself if you have the necessary equipment and carefully follow the steps. (For more information on the Full Chlorination method, please see our Well Water Fact Sheet #4 "How to Disinfect a Well - Full Chlorination Method".)

When to disinfect your well

You should consider disinfecting your well:

- if water tests show the presence of coliform bacteria
- if surface or flood water gets into the well
- after a new well is drilled and hooked up to the plumbing system
- after repairs or changes are made to an existing well
- after a well pump is replaced or repaired
- as part of annual maintenance (ex: for treatment of iron and sulphur bacteria)

If you are disinfecting your well due to flooding or if you suspect surface water has entered your well, wait until the flood water has receded, the likelihood of overland flooding has passed, and for the ground around your well to dry up before starting.

Well Water

Safety Precautions

If you're disinfecting your well because your water test indicates that your well is contaminated with bacteria, continue to boil your tap water or use a safe source of bottled water for drinking during the disinfection process. Refer to Boil Water Advisory Fact Sheet #2 "For Private Wells".

If your well is close to neighbouring wells, the disinfection process could affect the water in those wells. Let neighbouring well owners know that you are disinfecting your well so they can monitor for any chlorine smell and flush their systems as described under the heading "Steps to flush well and plumbing system after disinfection".

Handle chlorine bleach carefully and safely:

- Use protective eyewear, gloves and clothing.
- Keep children and pets away from the well area during the disinfection process and don't leave bleach containers lying around.
- Avoid inhaling the fumes and if using bleach in well houses, well pits or crawl spaces make sure to follow workplace safety and health rules for working in confined spaces. For more information regarding working in confined spaces, contact SAFE Manitoba (204-945-6848, www.safemanitoba.com).

Preparing to Disinfect a Well

You can use regular household bleach to disinfect a well. The chlorine in the bleach will destroy bacteria. Check the label on the bottle to make sure the bleach does not have any kind of additives (ex: scent, detergent).

The calculations used in the fact sheet are based on a chlorine concentration of about five per cent (5%), which is the typical concentration found in regular household bleach. Minor variations in the concentration of chlorine will not affect the disinfection process.

It is important to do the following prior to beginning the disinfection process:

1. Advise everyone that the well is being disinfected and not to use the water.

2. Store enough water to last the household for up to 24 hours. Use a safe source of bottled water for drinking during the disinfection process or fill clean water containers with the well water, but remember to boil the water if it's being used for drinking. The bathtub can be used to store water for household purposes.
3. Buy new containers of regular, unscented, detergent-free, chlorine bleach as bleach can lose its strength over time.
4. Disconnect or bypass water filters and treatment equipment, including water softeners, reverse osmosis (RO) systems and carbon filters. Check the owners' manuals for instructions on cleaning or disinfecting the treatment equipment.
5. Shut off power to your water heater.

Calculations for Partial Chlorination

Check your Well Information Report (well drillers report or well log) to get the diameter of well casing, the depth of the well and the depth to the water level required for the calculations outlined below. If you do not have a Well Information Report, you can ask your well driller for a copy or call Manitoba Conservation and Water Stewardship, Groundwater Management Section at 204-945-6959.

1. Calculate the depth of water in your well. To determine the depth of water in the well, subtract the depth to the water level from the depth of the well.

$$(\text{depth of well}) - (\text{depth to the water level}) = \text{depth of water in the well}$$

2. Use Table 1 below to calculate how much bleach is needed. The table indicates the amount of bleach that is required for different well casing diameters. To determine the overall amount of bleach needed, multiply the amount of bleach per metre of water by the depth of water in the well.

$$(\text{amount of bleach per metre}) \times (\text{depth of water in the well in meters}) = \text{amount of bleach needed}$$

TABLE 1

Diameter of well casing	Chlorine bleach added per 1 metre (3 feet) of water in the well
5 cm (2 in)	10 ml (2 tsp)
10 cm (4 in)	40 ml (8 tsp)
12.5 cm (5 in)	65 ml (4 tbsp)
15 cm (6 in)	90 ml (6 tbsp)
20 cm (8 in)	160 ml (11 tbsp)
75 cm (30 in)	2 ¼ l (9 ½ cup)
90 cm (36 in)	3 ¼ l (13 ½ cup)

Example:

- Diameter of well casing (inside diameter) = 12.5 centimetres (5 inches)
 - Depth of well (completed well construction depth) = 30 metres (98.4 feet)
 - Depth to the water level (water level before pumping) = 5 metres (16.4 feet)
1. $30\text{ m (depth of well)} - 5\text{ m (depth to the water level)} = 25\text{ m (depth of water in the well)}$
 2. According to Table 1, a well with a 12.5 cm diameter indicates 65 ml (4 tbsp) of bleach is needed per 1 metre of water in the well. $65\text{ ml (bleach per 1 metre)} \times 25\text{ m (depth of water in the well)} = 1.625\text{ l (amount of bleach needed)}$

A total of 1.625 l of bleach is required to disinfect a well with a 12.5 cm diameter casing that has 25 m of water in it.

Steps for Partial Chlorination

1. Remove the cap from the well casing.
2. Pour half of the required bleach into the well. Use a funnel to control the flow and direction of the bleach and try not to let the bleach run over wire connections.

3. Immediately after pouring the bleach into the well, rinse the inside of the well casing using a garden hose that is connected to the water supply being disinfected.
4. Let the water circulate for 10 to 15 minutes by inserting the running garden hose into the top of the well and make sure it's far enough in to stay put. This will circulate the chlorine within the well and provide a more complete disinfection. Then turn the hose off.
5. Open all faucets (inside, outside, cold and hot water, baths and showers) and flush all toilets (one at a time), until you can smell the chlorine. This circulates the chlorine throughout the household plumbing system. Then turn the faucets off.
6. If you don't smell chlorine after running all the faucets in the house, repeat the process to ensure the bleach is properly circulated through the well and plumbing system.
7. Pour the remaining half of the bleach into the well.
8. Again rinse the inside of the well casing and allow the garden hose to run, circulating the water in the well for another 10 to 15 minutes. Turn off the water to the garden hose and remove the garden hose from the well.
9. Replace and tighten the well cap.
10. Shut off the water supply to all toilets. Use stored water to flush toilets.
11. Let the bleach remain in the system for a minimum of 12 hours; 24 hours is best. The longer the bleach remains in the system, the more time the chlorine has to destroy the bacteria.
12. Keep the amount of chlorinated water that goes in your sewage system to a minimum while undertaking the disinfection process. Excess chlorine may affect the proper operation of a septic tank and field.

Steps to flush well and plumbing system after disinfection

After 12 to 24 hours, you must flush the chlorine solution out of the well and plumbing system.

1. Flush the well using a garden hose that is connected to the water supply being disinfected. Allow the water

to run through the garden hose until you can no longer detect a chlorine smell.

If the well is low yielding or tends to pump sediment (sand or fine particles), you should flush it slowly. Over-pumping may damage the well or increase the amount of sediment

2. Direct the chlorinated water to an area away from vegetation to avoid damage. Because chlorine can kill fish and aquatic organisms, make certain that it doesn't drain into a lake, river or other surface water body. Do not direct the chlorinated water to a septic tank or field. It can kill the bacteria needed to operate the system.
3. Flush the plumbing system by running each faucet (including inside, outside, cold and hot water faucets, baths and showers) and flush all toilets (one at a time) until you can no longer smell chlorine.
4. Turn the power back on to your hot water heater.
5. Reconnect any water treatment devices. This is a good opportunity to undertake maintenance on water treatment equipment (replace filters, UV lights, filter media, etc.).

After disinfecting your well and plumbing system

Disinfecting wells can temporarily cause a visible change in your well water. Your water may look dirty or appear darker than normal. You may experience more staining and sediment problems. This is a common occurrence, mainly due to the flushing action and/or oxidation of any iron or manganese present in the water. The water should clear within a few days.

Until you have retested your water, DO NOT drink the well water. Continue to boil your water for drinking water or use a safe source of bottled water, until a laboratory test for bacteria confirms your water supply is free of bacteria.

Wait one week to test your well water after disinfection. If the test result is free of coliform bacteria (a negative result) you can resume normal use of the water. Do a follow-up test after one month to verify that there isn't any coliform bacteria in the water.

If either the initial or follow-up test indicate the presence of coliform bacteria (a positive result), further actions may be required. You may consider doing another round of partial chlorination or contacting a knowledgeable person such as a licensed professional well driller or plumber to identify and deal with the cause of the ongoing bacterial contamination.

For more information

For more information on drinking water safety, water treatment devices or to receive a copy of other drinking water fact sheets, please visit the Office of Drinking Water website at www.manitoba.ca/drinkingwater or contact the Private Well, Education and Outreach Co-ordinator at 204-948-1351. To locate a local office near you, please refer to the website at www.manitoba.ca/waterstewardship/odw/reg-contacts/index.html.

For information on certification for water treatment devices, visit www.nsf.org.

For information on well driller reports, well construction, well sealing, or for a listing of licensed well drillers, contact Manitoba Conservation and Water Stewardship, Groundwater Management Section at 204-945-6959.

For health information, contact Health Links at 204-788-8200 in Winnipeg; toll free at 1-888-315-9257 or contact your local public health office. To find your nearest office, go to: www.manitoba.ca/health/publichealth/offices.html.