

SHOCK CHLORINATION PROCEDURE FOR CONTAMINATED WELLS

This shock chlorination procedure is designed for disinfecting groundwater wells that have been tested positive for *E. coli* or fecal coliform. For disinfecting wells to control iron or sulfur bacteria, please refer to "SHOCK CHLORINATION PROCEDURE FOR IRON AND SULFUR BACTERIA" or contact your Public Health Inspector.

Before You Start

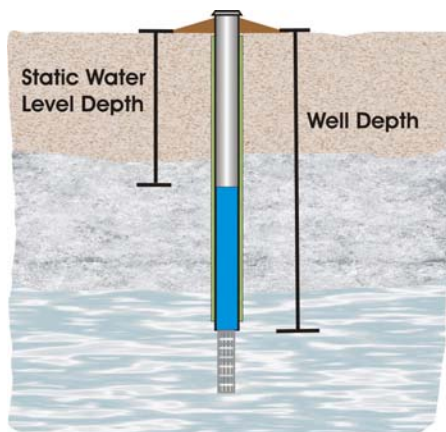
- Store sufficient water to meet family needs for 24 hours, including the water required for animals. If the water has tested positive for total coliforms, *E. coli*, or fecal coliforms, the water from this supply is not safe for drinking and must be boiled for 1 minute or treated before being used. Consult with your Public Health Inspector on proper ways of disinfecting your water supply.
- Before attempting to chlorinate the well, it is essential to check the following:
 - All repairs to the well should be completed before the chlorination process
 - Check the condition of the well: location, well casing, and sanitary seal (well cap)
 - Check the condition of the plumbing system: leaking pipes, pressure tank and cross connections
- Shock chlorination is a process designed to inactivate harmful bacteria within the well and distribution system. If the bacteria have been introduced to the well directly or by means of poor well location or well design, shock chlorination should effectively reduce the bacteria levels. Shock chlorination is NOT intended to provide disinfection of the aquifer beyond the immediate location of a well.
- Unless you are familiar with water wells, and are comfortable working with chemicals, the process should be done by a licensed water well contractor or licensed plumber. If you have point-of-use or point-of-entry home water treatment devices, consult with your water treatment company before starting with the shock chlorination.
- Details about the construction of your water well, including well depth, may be available from Alberta Environment's Groundwater Information System. Please consult with your Public Health Inspector on how to get this information.

Caution: Chlorine is a strong oxidizing agent and is highly corrosive. It may cause skin and eye damage, or irritation to the nose and/or throat. Use goggles and rubber gloves when handling this material. It is also recommended that protective clothing (splash apron) and rubber boots be worn. Always provide adequate ventilation when using chlorine.

- Materials Required
 - A clean water tank with a holding capacity of at least 1,360 liters (300 gallons)
 - Garden hose
 - Appropriate volume of chlorine or bleach solution

Procedure for Shock Chlorination

1. Loosen and remove the well cap, be careful not to contaminate the cap. Caution should be taken when removing the well cap, as bare wires may be exposed posing an electrical hazard.
2. Measure the well depth and the static or resting water level, then calculate the depth of the water in the well using the following formula:



$$\text{Depth of water} = \text{Total well depth} - \text{Static water level depth}$$

To measure how much water is in the casing, carefully drop a weighted fishing line into the well until you hear it hit the water (static water level). Mark the fishing line, and measure the distance to the water level. Subtract this amount from the total casing length (well depth).

3. Using Table 1, determine the amount of water and chlorine solution required. Pump the recommended amount of water into a clean water storage container. A clean galvanized stock tank or pick-up truck box lined with a 4 mm thick plastic sheet is suitable.

Table 1. Amount of Chlorine and Water Required to Obtain 50 ppm Chlorine Solution

Casing Diameter		Volume of Water Needed per 1 ft (30 cm) of water in casing		Milliliters of 5.25% Bleach needed per 1 ft (30 cm) of water	Milliliters of 12% Industrial Bleach needed per 1 ft (30 cm) of water
(in)	(mm)	(gallons)	(liters)	(milliliters)	(milliliters)
4	100	1.1	5	4.75	2.1
6	150	2.4	10.9	10.5	4.55
8	200	4.2	19.1	18	8

4. Mix the recommended amount of chlorine with the water to give the recommended 50 ppm chlorine solution.
5. Household bleach is easy to obtain, inexpensive and already in liquid form for easy mixing. **Use fresh bleach that does not contain detergent or other additives.** Industrial bleach, usually in the form of calcium hypochlorite, is used to disinfect swimming pools and can be found in hardware stores and pool equipment outlets. This material should be handled with care since the dust will irritate the eyes, nose, mouth and skin. Calcium hypochlorite is also highly corrosive when wet.

6. Attach a clean hose to an outside spigot on the container used to hold the chlorine solution and place the hose into the well casing. If there is no outside spigot, use a hose to siphon the solution into the well. Turn the hose on and wash down the interior of the well casing in a swirling motion from top to bottom.
7. Open one hot faucet first and let the water run, then open the cold water faucet farthest from the pressure tank and let the water run until a strong chlorine odor is detected. Open the remaining cold faucets one at a time (including dishwashers, washing machines etc) in the distribution system until the water coming out has a chlorine-like odor.

Caution: Do not let all of the water faucets run at the same time because you may loose system prime or damage your pump.

Shut the faucets off after testing for chlorine if you are using a chlorine test kit.

8. It is best to verify the chlorine concentrations by using a test kit. Chlorine test papers are available through restaurant or swimming pool suppliers. There should be at least 10 ppm of chlorine in all faucets. If chlorine is not present or is weak at any faucet, it is an indication it is being used up in cleaning the well and you may need to add small amounts of chlorine into the well to maintain or increase the desired chlorine concentration.
9. Make sure the chlorine reached the whole system by completing the following:
 - Starting at any location, open the remaining hot water faucets one at a time until each faucet has been run. Allow hot water to run at least 30 to 60 seconds until a strong chlorine odor and/or a noticeable drop in water temperature is detected. In some cases, the water heater may have to be completely emptied before chlorine concentration can be detected at the faucet. Shut the faucet off after proper concentration is noted.
 - All the toilets should be flushed at least once. Check chlorine concentration inside the water tank above the toilet.
 - Unfinished plumbing that has been capped (plumbing dead ends) should be flushed. If necessary, provide a temporary faucet. Plumbing that is no longer in use should be removed from the distribution system. Contact a licensed plumber to perform the work. Check chlorine concentration and shut each faucet off after proper concentration is noted.
 - All outside spigots and household appliances connected to the water supply (i.e. dishwasher, washing machine, ice maker, etc.) must be disinfected. Check chlorine concentration and shut faucets off after the proper concentration is noted.
 - If fire suppression is present, partly drain the system storage tank so the pump turns on and begins drawing chlorinated water into the system and the tank. Then shut the pump off and check chlorine concentration at the storage tank outlet drain.
 - Disconnect the water feed line to the furnace humidifier and turn the valve on and allow the water to run until a proper chlorine concentration is noted.
10. After completing the chlorination, rinse the well cap with chlorinated water and turn the outside spigot off. Replace the well cap to form a watertight seal. All bolts and screws must be reattached. If any parts are lost or broken, replace them as necessary.

11. Once the chlorinated water has reached all the appliances, fixtures and faucets, let the chlorinated water stand in the well and plumbing system for 12 hours.

WHILE THE CHLORINE IS IN THE SYSTEM DO NOT DRINK THE WATER. CONTACT WITH THE WATER MAY CAUSE SKIN, EYE AND NOSE IRRITATION.

12. When the chlorine has been contained in the well for 12 hours, start flushing the chlorine from the system by running an outside spigot to a culvert or drainage ditch until you can no longer detect chlorine in the water. NOTE: Do not run the well excessively to avoid damaging the well pump, and avoid running the water into or onto the septic system. Flush the chlorinated water into an area where desirable vegetation will not be harmed, such as a gravel driveway and away from any surface body of water.

13. After the chlorine has been flushed from the well, flush the hot and cold water faucets, appliances and fixtures, one at a time. The length of time for flushing depends on the concentration of chlorine, depth of the well, aquifer formation type, the water pH and the size of the distribution system. It will usually take 4 to 8 hours to flush the well after a standard well chlorination. The water may become discolored during flushing because the chlorine may have loosened the hard water deposits in the plumbing.

Caution: The chlorine must be completely flushed from plumbing system. Chlorine may damage the rubber and plastic parts in the faucets and plumbing.

14. Backwash all filters and softeners and regenerate any water treatment equipment. Consult your water treatment equipment supplier for any specific procedures required for backwashing and regenerating any water treatment equipment.

15. Submit a water sample for bacteriological analysis seven (7) days after the shock chlorination has been completed. The water should not be used for drinking, making infant formula, or washing fruits and vegetables, until the water sample results confirm that total coliforms and *E. coli* are no longer present.

For more information, contact your Public Health Inspector at one of the locations listed below.

Source: Technical Advisory Committee on Safe Drinking Water, Environmental Public Health Field Manual for Private, Public and Communal Drinking Water Systems in Alberta, 2nd Edition, 2004

<p>Airdrie Airdrie Public Health Centre 604 Main Street South Airdrie, AB T4B 3K7 Phone: 403-912-8400 Fax: 403-912-8410</p>	<p>Banff Banff Health Centre 303 Lynx Street PO Box 1266 Banff, AB T1L 1B3 Phone: 403-762-2990 Fax: 403-762-5570</p>	<p>Calgary/Mountain View/Rocky View Calgary Health Region, 10101 Southport Rd SW Calgary, AB T2W3N2 Phone: 403-943-2288 Fax: 403-943-8056</p>	<p>Canmore Canmore Public Health #104, 800 Railway Avenue Canmore, AB T1W 1P1 Phone: 403-678-5656 Fax: 403-678-5068</p>
<p>Claresholm Claresholm Public Health 5221 2nd Street W PO Box 1391 Claresholm, AB T0L 0T0 Phone: 403-625-4061 Fax: 403-625-4062</p>	<p>Didsbury Didsbury Health Unit PO Bag 130 1210 -20th Avenue Didsbury, AB T0M 0W0 Phone: 403-335-7292 Fax: 403-335-7610</p>	<p>Okotoks Okotoks Public Health Centre 11 Cimarron Commons Okotoks, AB T1S 2E9 Phone: 403-995-2600 Fax: 403-995-2639</p>	<p>Strathmore Public Health Building 650 Westchester Road Strathmore, AB T1P 1H8 Phone: 403-361-7200 Fax: 403-361-7244</p>