

PRIVATE DRINKING WATER IN CONNECTICUT

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Publication No. 27: Disinfection Procedure for Private Drinking Water Wells (after a flooding)

All new or repaired wells should be routinely disinfected prior to use of the water system. A water system should also be disinfected following plumbing repairs or modifications, as internal piping may have been exposed to contamination. All wells at some point need to be properly disinfected to ensure the bacteriological quality of the well is satisfactory.



When should you consider disinfecting your well?

- Whenever an unsatisfactory bacteriological result has been collected from your well or home.
- When the well cap has been taken off the well exposing the well casing interior.
- If the well has been flooded over
- Routine maintenance of the well to reduce iron and manganese bacteria

In the case of a new well, try to coordinate between the well driller and pump installer and the contractor-plumber (if applicable). That way, the disinfection can be combined with pressure and leak tests of the entire water system, and the required bacteriological test for assuring safety of the drinking water supply can be performed at the same time. The chance of contamination is less likely to occur if there is no long delay between the time the well is drilled and the time the pump installer completes the connection from the well to the house plumbing along with the CT Public Health Code mandated, section 19-13-B51 k , disinfection requirement.

Prior to disinfection, it is expected that the entire well and piping system has been running clear and clean/purged of any sediment, foreign matter, or corrosion materials (due to incomplete development, unsanitary construction, or long idleness of the well). These substances reduce the chlorine's effectiveness in destroying harmful bacteria and organic materials.

1. Go to your home's electrical power panel. Shut-off power to the well pump (open circuit breaker/remove fuse that should be labeled "well pump"). Electrical power to the well pump should be off before any further work is started.
2. Carefully remove well top bonnet and/or sanitary seal. Keep in mind that the sanitary seal may be old and brittle due to age and may require replacement to insure a tight waterproof sanitary seal after well disinfection is completed.
3. Prepare a chlorine solution by mixing the required amount of chlorine to about 10 gallons of water. For effective disinfection, a minimum of 50 parts per million (ppm) chlorine dosage is specified. See Tables 1 and 2 and "Examples" for exact amount of chlorine compound needed to develop the required 50-ppm dosage. Note: For a typical 6 inch well of about 100-300 foot depth, use approximately 4oz. of 70%



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available chlorine granules (HTH) or 1.0 quart of household 5.25% bleach (Clorox). A 1 foot section of 6 inch steel well casing contains approximately 1.5 gallons of water.

4. Pour the 10-gallon solution down the well casing.
5. Open every hot and cold-water faucet and tap in the home's plumbing system until the chlorine odor is noticed; then close the taps. This procedure should include all the domestic plumbing (storage tanks, toilets, baths, showers) and appliances (run the clothes/dish washing machines on warm until you smell the beach in the machines interior). Bypass any carbon filter units during the chlorination and subsequent flushing procedure as the active sites on the carbon granules will attract the chlorine in the bleach and become exhausted rendering the filter unit unable to do its proper function. NOTE: turn off the power/gas to water heaters before doing this portion of the disinfection procedure. If there are large non-pressure or pressure storage tanks on the water system, they should be temporarily waterlogged to assure that all water-contact surfaces are chlorinated adequately.
6. With the use of a hose connected to one of the home's sill cocks, recirculate some of this newly chlorinated well water back down and along the interior of the well casing to promote solution circulation within the well and dilute this initial concentrated chlorine solution so that it does not attack the concrete grout between the tile sections of a dug well or the steel casing of drilled wells.
7. Replace the sanitary seal and cover the well casing so that the system cannot be subsequently contaminated.
8. Allow the chlorinated water to stand idle in the well and piping system for at least three hours, but preferably, overnight.
9. With the well pumping, flush the chlorinated water from the system through the storage tank and taps. An outside sill cock may be used to flush the water to waste, however, care should be taken to avoid contact of chlorinated water with the grass and shrubbery. (In a small well supply, it may take a few days to remove all the chlorine from the system). Do NOT over tax a low-yielding well.
10. All water tanks should be flushed thoroughly after the chlorine has dissipated so that any sediment formed will not interfere with the water quality analysis. Replace filter elements and backwash water softeners, if present, after flushing.
11. Collect sample for bacterial test, note-no chlorine residual should remain, preferably confirmed by use of a free chlorine residual swimming pool test kit.



Drilled vs. Dug Wells

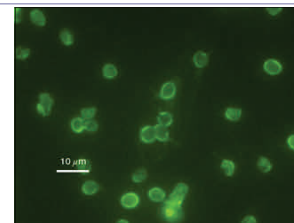
Most homeowner wells are either drilled or dug. In the case of a drilled well, the steel casing should extend a minimum of six inches above the established grade. It should also be outfitted with a certified watertight well cap with screened vent, as is specified in Public Health Code 19-13-B51 (j) (b). The following web site lists all approved watertight well caps in the State of CT: www.watersystemscouncil.org. An existing well pit should be eliminated and the well casing raised to a minimum of six inches above established grade. The above listed well casing extension guidance document should be referred to for this procedure.

Dug wells are “high risk.” They are typically not constructed watertight and allow the entrance of surface water, insects, and rodents. Dug wells should be inspected and repaired prior to disinfection. They should be tightly sealed after chlorination. Serious consideration should be given to connecting to a public water system, if available. If this is not possible, a properly constructed drilled well should be considered.

Bacteriological Test

Before the required water sample is taken, it is very important that there be no trace of chlorine left in the water supply. A desirable and precise method to determine the complete absence of chlorine in the water is to use a swimming pool chlorine residual test kit and follow the directions accordingly.

Once the chlorine is absent from the water system, a sample is collected in a sterile bottle furnished by, and to be analyzed at, a state-approved laboratory. The collection of the sample should be done with care, following the instructions of the laboratory.



The effectiveness of the disinfection and safety of the water supply for drinking purposes is shown if the test report results an absence of coliform bacteria.

Note: If the test is found positive for coliform bacteria, a resample should be taken to confirm the first test. Occasional positive tests result from improper sampling technique or other chance contamination. If the resample test is again unsatisfactory, the disinfecting and sampling should be repeated.

Pipe Diameter	Gal/Ft of Pipe	Pipe Diameter	Gal/Ft of Pipe
2.5"	0.254	24"	23.4
4"	0.672	30"	36.6
6"	1.47	36"	52.6
8"	2.61	42"	71.6
10"	4.08	48"	93.6
12"	5.86	54"	119.0
16"	10.45	60"	146.0
18"	13.20	72"	211.0

Table 2

TABLE OF DOSAGE OF DISINFECTANT FOR VARIOUS VOLUMES OF WATER
APPROXIMATE CHLORINE DOSAGE TO PRODUCE 50-PPM AVAILABLE CHLORINE

Volume of Water (Gallons)	Dry Calcium Hypochlorite (HTH, Perchloron or similar compound with 70% available chlorine)	# of 5-gram Tablets	Liquid 5.25% Sodium Hypochlorite (Clorox or similar unscented household bleach)
50	0.5 oz	3	5 fl. oz
100	1.0 oz	6	11 fl. oz
150	1.5 oz	9	16 fl. oz
200	2.0 oz	12	22 fl. oz
300	3.0 oz	17	1 qt.
500	5.0 oz	28	2 qt.
1000	10 oz	56	1 gal.
2000	1 lb. 3 oz.		2 gal.
3000	1 lb. 13 oz.		3 gal.
4000	2 lbs. 7 oz.		4 gal.
5000	3 lbs.		5 gal.
10,000	6 lbs.		10 gal.
25,000	15 lbs.		25 gal.
50,000	30 lbs.		50 gal.
100,000	60 lbs.		100 gal.

Note: 1 quart = 32 fl. oz and 1 gallon = 4 quarts

Example A

Given: 6” drilled well, Depth – 500 feet

Calculations: (from Table 1)

500 feet x 1.47 gallons per foot = 735 gallons of water to be disinfected

Dosage Required: 50 ppm Chlorine

Use: (from Table 2)

7.5 oz. of 70% HTH or similar compound; or

42 HTH tablets (5 grams each); or

approximately 3 quarts Clorox or similar household bleach.

Example B

Given: 36” dug well, depth-20’

Calculations: (from Table 1)

20 feet x 52.6 gallons per foot = 1052 gallons of water to be disinfected.

Dosage Required: 50-ppm chlorine

Use: (from Table 2)

10 oz. of 70% HTH or similar compound; or

56 HTH tablets (5 grams each); or

approximately 1 gallon Clorox or similar household bleach.

Example C

Given: Community well water supply, with same well as in “Example B” (1052 gallons); and 1-10,000 gallon non-pressure tank; and 1-5,000 gallon pressure tank

Calculations: Total volume to be disinfected = 1052 gallons + 10,000 gallons + 5,000 gallons = 16,052 gallons

Dosage Required: 50 ppm chlorine

Use: (from Table 2)

9 lbs. 10 oz. of 70% HTH or similar compound

NOTE: In a case where such a large concentration of chlorine is required, it is suggested that the dosage applied at the well be staggered, i.e., 5 portions of 2 lbs. HTH per each 10 gallons of solution water over a period of time.

For more information please click on the following links:

EPA Office of Groundwater and Drinking Water

<http://www.epa.gov/ogwdw/>

EPA New England

<http://www.epa.gov/region01/>

Adapted from *Healthy Drinking Waters for Rhode Islanders*, University of Rhode Island Cooperative Extension, April 2003.