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TECHNICAL BULLETIN

WELL DISINFECTION

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DRINKING WATER SERVICES

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How to Disinfect a Well in Three Steps

1. Calculate the amount of water in the well: To obtain this information, you must know the well casing diameter (in inches) and the total depth of the water in the well (in feet). Table 1 below converts well casing diameter to gallons of water per foot of well depth. Well water depth can be determined by the following method:

   a. Depth of well **(feet)** – static water level **(feet) =** well water depth **(feet)**

   [**Note:** The well depth & static water level are listed on your well log from the time of drilling. Use the static water level from the well log if you do not have a current static water level reading from your well. If you do not have access to your well log, please see the following Water Resources Department search tool at: http://apps.wrd.state.or.us/apps/gw/well_log/Default.aspx, or contact Drinking Water Services (DWS) for assistance at (971) 673-0405. Use the total depth of the well if the depth of the water alone cannot be determined.]

   b. Multiply the well water depth by the number in Table 1 that corresponds to your well casing diameter.

Table 1: Converting Well Casing Diameter into Gal. of Water/ft Well Water Depth:

Well Casing Diameter (inches)	Gal. of Water per Feet of Well Water Depth
4	**0.65**
6	**1.5**
8	**2.6**
10	**4.1**
12	**5.9**
14	**8.00**

2. Add the correct amount of bleach: After determining well water volume, add one cup (8 oz) of normal household bleach (containing approximately 8.25% sodium hypochlorite) for every 100 gallons of well water to create a chlorine concentration of approximately 50 parts per million (ppm). Do not use bleach that is more than a few months old, because its strength dissipates over time. Before pouring into the well, mix the bleach into 4-5 gallons of water to aid the disinfection process (this will improve mixing in the well). Below is an example calculation of well water volume (in gallons), and the correct amount of bleach to be added:

   Example: A 6-inch diameter well casing contains 65 feet of water. How much normal household bleach should be added to disinfect well?

   Answer: Based on Table 1 there are 1.5 gallons of water per foot of water depth in a 6-inch diameter well casing. To determine the number of gallons, multiply the total water depth (65 feet) by the number of gallons of water per foot of well depth (1.5 gal/ft).

   Gallons in well = Total water depth x number of gallons of water per foot of well depth
   = 65 ft x 1.5 gal/ft = **97.5 gallons of water**

   Since 97.5 gallons is about 100 gallons, add one cup of normal household bleach (8.25%) to disinfect this well.

[**Warning**: Bleach used during disinfection must be flushed thoroughly from all service lines. Human exposure to strong bleach solutions (over 4 ppm chlorine) may cause severe irritation to eyes and skin, and can be harmful if swallowed. Bleach solutions are also deadly to organisms living in water and soil. Please use appropriate protection and precautions when handling bleach, and provide notification to any customers who may be receiving highly chlorinated water before the system is flushed. This procedure is for shock disinfection only, and should not to be used on a regular basis.]

3. Follow the disinfection process:

   a. Add bleach to 4-5 gallons of water, mix together, and pour into well through a plug or casing vent hole at the top of the sanitary seal.

   b. To thoroughly mix the bleach solution with the well water, attach a hose to the nearest tap downstream, prior to any unpressurized storage reservoirs (if this is not possible contact DWS or a water system maintenance professional for further technical consultation). Recirculate water from the tap back into the well by running water through the same hole at the top of the sanitary seal that was used to add the bleach solution. If possible, make sure the chlorinated water also contacts the inside of the well casing above the static water level (to the top of the casing) by running water down the inside walls of the casing with a special hose fitting inserted through the vent hole. This will result in more thorough disinfection.

   c. To disinfect the distribution system in addition to the well, after 15-20 minutes of recirculation, open each plumbing fixture served by the well until you can detect 50 ppm chlorine (if you don't have a chlorine test kit just make sure you can smell bleach at each faucet). When you are able to detect bleach at its maximum strength close all taps. Let the bleach stand in the well and piping for at least eight hours. To determine the amount of chlorine solution needed to disinfect a storage tank, see: http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Operations/Pages/shockchlorination.aspx (contact DWS or a water system maintenance professional for additional consultation on disinfection of storage tanks).

   d. After at least eight hours, thoroughly flush the well, tank (if applicable) and distribution piping to remove all chlorine (see Warning above). Make sure strong chlorine solutions are disposed of in accordance with Department of Environmental Quality guidelines at: http://www.deq.state.or.us/wq/pubs/bmps/chlorwaterdisp.pdf.

   e. Collect a representative number of coliform samples (after ensuring a zero chlorine residual, by either sampling with an approved test kit, or waiting at least five days after the well was disinfected and flushed). Remember that it can be difficult to thoroughly disinfect a large system. If total coliform samples are still positive, repeat the disinfection process above until sample tests are negative.

For additional technical information see the *American Water Works Association Standard C654-03* or the *U.S. Environmental Protection Agency Groundwater Rule Corrective Action Guidance Manual, November 2008, Section 3.1.3.4 (p. 3-11)* at http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1002YAV.txt, or contact Drinking Water Services at (971) 673-0405.