

EMERGENCY DISINFECTION

As your first line of defense against contamination of the water in your distribution system, we also recommend that you include the steps necessary for emergency disinfection in your emergency management plan. These steps should be described as completely as possible so that all emergency response personnel can understand them in the event of an emergency situation.

DEVELOP EMERGENCY DISINFECTION PLAN

These procedures can be used as general guidelines for developing a more specific Emergency Disinfection Plan. Each water system varies and a specific plan pertaining to that system should be developed.

EMERGENCY CHLORINATION PROCEDURES

Chlorine Addition to System

1. Set up the chlorination feed pump. Refer to pump O&M manual for specifics on particular pump and proper connection.
2. Make sure that chlorine feed pump operates when plugged into the outlet connected to the well pump. The chlorine feed pump should only operate when the well pump is on. Make sure pump is plugged into correct outlet.
3. Set pump to reach the desired chlorine residual based on the chlorine being used and the gallons per minute (GPM) of the well. Turn well pump to manual and let run for a couple of minutes. Check the chlorine residual downstream from chlorine injection point. If necessary, adjust chlorine pump feed rate to reach the desired residual.
4. Distribute the chlorinated water throughout the system by flushing hydrants or faucets.
5. Continue emergency chlorination until follow up samples come back safe and DNR instructs that Chlorination is no longer required.

Chlorine Addition to Well

1. New wells and wells that are bacteriologically contaminated should be disinfected according to a chlorine solution ratio of 1:100. That is 1 part of chlorine (household bleach) to 100 parts of water.
2. Mixing can be done 25 gallons at a time in a clean plastic container. (Use 1 quart of bleach for every 25 gallons of water.) Always prepare enough solution to meet or exceed the total volume of your well.

<u>Solution needed – Casing Diameter</u>	<u>Minimum amount of chlorine solution</u>
2"	2 gallons of solution per 10 feet of well depth
4"	7 gallons of solution per 10 feet of well depth
6"	15 gallons of solution per 10 feet of well depth
8"	26 gallons of solution per 10 feet of well depth

Example: A 6" well that is 100' deep would need 150 gallons of solution (15 gallons of solution for every 10' of well equals 150 gallons). About 1 & ½ gallons of bleach would be needed at the minimum.

3. Remove the well cap and pour the required amount of solution into the well.
4. Hook up a hose to the system being disinfected and rinse the well casing for 5-10 minutes. Run enough water to circulate the chlorine solution throughout the water system.

5. Turn on each of your other water taps till the bleach smell is just detected and then turn them off to keep the chlorine solution in the system.
6. Let the chlorine solution remain in the system for at least 24 hours.
7. Pump out all of the chlorine solution where the chlorine will do no damage. Pump until you can no longer smell the chlorine. Flush out your other water taps.
8. Resample for bacteria only after all of the chlorine is flushed from the system.

Disinfection of Household Water

The following procedures will destroy the usual bacteria and other microorganisms that may be present in water obtained from a contaminated public water supply system or from alternate emergency sources.

Heat Disinfection (boiling)

Boil the water for at least one minute after reaching a rolling boil.

Chemical Disinfection

1. Strain water through a clean, tightly woven cloth into a clean container to remove any sediment or floating matter.
2. Purify the water with one of the following chemicals (choice of chemical is based on availability)
 - a. Hypochlorite solutions (PUREX, CLOROX or other household bleach)

Read the label to find the percent of available chlorine in the solution and determine the number of drops needed to disinfect each quart of water from the table below:

Available Chlorine	Drops of Bleach to add to each quart of clear water	Drops of Bleach to add to each quart of cloudy water
1%	10	20
4 to 6%	2	4
7 to 10%	1	2
If not known	10	20
<i>Mix thoroughly by stirring or shaking water in container. Let stand for 20 minutes. A slight chlorine odor should be detectable in the water. If not, repeat the dosage and let stand an additional 15 minutes before using.</i>		

- b. Iodine: Use USP tincture of iodine; iodine from the medicine cabinet should be suitable. Add two to three drops to each quart of clear water (or eight to ten drops to each quart of cloudy water). Mix and let water stand for 30 minutes before using.

Purified water should be stored in clean, non-corrosive, tightly covered containers. Containers suitable for water storage include empty vinegar bottles, soft drink jugs and plastic milk containers that have been thoroughly washed and rinsed with purified water. Freezing does not disinfect water; ice cubes must be made from water that is properly disinfected.