Quality Water

Program #3—on a video containing SIX PROGRAMS about safe and effective water systems

Coliform Bacteria

This VIEWER REFERENCE GUIDE is yours to keep! DO NOT RETURN IT when you return the video.

How can I be sure my drinking water is free from harmful bacteria?

❑ *If disease-causing organisms are in your water, you can't expect to know by how the water looks, tastes, or smells. A water test is the only reliable indicator of water safety!*

- Have your water tested at least annually for coliform bacteria, the indicator used for micro-biological safety.
- If coliform bacteria are present in your drinking water, your risk of contacting an illness is increased, and you need to address the problem.

How do bacterial contaminants get into my water system?

❑ *Soil is nature's water filter. When a short ciruit of the soil's natural filtering ability occurs, contaminants may reach groundwater and the well.*

- Normally, after water seeps though a few feet of soil, it is free of coliform and disease-causing organisms.
- Inadequate well construction is the most common deficiency that leads to surface contaminant entering the well or near the well.

Common well defects that lead to bacterial contamination

❑ *Missing or defective sanitary seal*

- The well should be fitted with an approved sanitary seal, cap, or plug that fits tight and is secure and prevents water or other contaminants from entering.

❑ *Contaminant seepage through joints, cracks, or holes in the well casing*

- Well construction standards require a solid, water-tight casing to groundwater and grouting the top 20 feet or to the water table.
- Cracks or holes, especially in the top 20 feet of the well, may allow water that has not been filtered by 20 feet of soil to enter the well and contaminate it. This seepage is common in large-diameter wells cased with concrete, clay tile, brick, or stone.

❑ *Contaminant seepage along the outside of the well casing*

- Fill the open space between the drill hole and casing with grout (a slurry of cement or bentonite clay) when the well is constructed.
- Before 1975, wells were seldom grouted when constructed, and some wells drilled since 1975 were not properly constructed.
- Grouting old wells is difficult, costly and may not be totally effective.The owner of an old well should consider drilling a new well and plugging the old one as the most reliable solution to water safety.

❑ *Well flooding*

- Flooding is a common problem for wells located in underground pits or basements because many receive water during wet weather.
- Well construction standards require the casing to extend at least a foot above the ground surface (or high water if subject to flooding) and the ground surface to slope away from the well in all directions.

What should I do if I find bacterial contamination in my well water sample?

❑ *Address the situation, find the problem, and solve it whenever bacteria is found.*

- Use an alternate source of safe water for drinking and food preparation, or disinfect (boil 10 minutes or chemically treat) your water until it is safe.
- Carefully inspect well for defects and construction inadequacies. For newer wells, repair or upgrade if practical. For old wells or those not easily repaired or upgraded, first consider drilling a new well and plugging the old one.
- Shock chlorinate following procedures in Extension bulletin "Shock Chlorination," MF-911.
- Connect to a public water system if available.
- As a last resort, install continuous disinfection equipment.

How is water continuously disinfected?

❑ *Chlorine treatment—single-step method*

- Use a liquid chlorine injector pump, or a chlorine tablet dispenser to achieve free chlorine concentration of about 1 milligram per liter. Adequate time MUST be provided (about 30 minutes) for chlorine to kill bacteria before water is consumed. Install baffled tank or long coil of pipe in plumbing system between chlorinator and tap to provide sufficient time for thorough disinfection.

❑ *Chlorine treatment—two-step method called "superchlorination/dechlorination"*

- Apply higher chlorine concentration (5 -10 mg/L free chlorine) to speed disinfection process. Then remove excess chlorine (and the taste and odor it causes) with an activated carbon or KDF filter.

❑ *Ozone treatment*

- A small ozone generator produces and injects ozone into water supply. This process costs more for equipment and energy than chlorine. It is more difficult to control and to test than chlorination.

❑ *Ultraviolet light treatment*

- Water flows past an ultraviolet lamp; radiation kills or deactivates bacteria. Even low levels of turbidity will result in poor disinfection. This process requires bacteria testing to evaluate effectiveness.

❑ *Heat pasteurization*—Boiling for just 10 minutes kills bacteria, virus, and protozoa and assures microbial safe water.

❑ *Distillation*—The process of boiling water to form steam and then recondensing the steam produces water free of minerals and bacteria.

NOTE—All disinfection except heat or distillation requires water free of debris or turbidity.

Which disinfection system is best?

❑ *None is perfect. In most cases, however, chlorine is the disinfectant of choice. Each system has benefits and drawbacks. Some common advantages and disadvantages of each process are:*

- Ozone and ultraviolet light act much faster than chlorine. There is no need for baffled tanks or pipe coils to retain water in plumbing before consumption.
- Chlorine can cause flavors and odors which are objectionable to some people; neither ultraviolet light nor ozone adds flavors nor odors to the water.
- Chlorine has staying power—it continues to disinfect the water for several hours, usually until the water is used; ozone and ultra-violet light provided no residual disinfection.
- Test kits can be used to monitor chlorine or ozone levels in water; performance of ultraviolet disinfection units is more difficult to monitor.
- Distillation uses lots of energy. It is best suited to small batches of water in an emergency.
- Pasteurizing or heat is the only process that can reliably disinfect cloudy water and kill protozoa cysts.

NOTE—Discuss disinfection options with water treatment equipment suppliers to determine which system best meets your needs.

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Sources of additional information

- Your local health department or county Extension office
- Your local library
- NSF International, P.O. Box 130140, Ann Arbor, MI 48113-0140 (313-769-8010)
- Water Quality Association, 4151 Naperville Rd., Lisle, IL 60532 (708-505-0160)

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