

Maintaining a Clean Source of Water

The quality and cleanliness of water stored in tanks should be monitored regularly. This is particularly important when stored water is used for human consumption. Several factors will cause stored water to become unsanitary. One of the main factors is the quality of the source water supplying the tank.

When the source of water to be stored in tank reservoirs is a private well, the principal focus for maintaining clean water should be the condition of the well itself. For information on drinking water well disinfection procedures see New Mexico Cooperative Extension Guide M-115, *Disinfecting a Domestic Well with Shock Chlorination* (http://aces.nmsu.edu/pubs/_m/m-115.pdf). For additional information on well-head protection see NMSU Cooperative Extension Service publication *New Mexico Farm*A*Syst*, Chapter 1, "Improving Drinking Water Well Condition" (<http://aces.nmsu.edu/farmasyst/pdfs/1fact.pdf>).

When proper well disinfection and wellhead protection is practiced, water stored in tanks should remain relatively clean and require disinfection on an as-needed basis only. The integrity of the tank openings, fittings and other potential points of contamination should also be well maintained. Routine cleaning of the interior of the tank, at least annually, is advisable. Pressurized spray heads or rotary jet heads can do an adequate job of tank cleaning if access is restricted. If access is possible, scrubbing the interior tank walls with mild detergent can produce excellent results.

Even when water in a tank is renewed through outflow/inflow cycles, contaminants will remain behind to degrade existing stored quantities. Treatment of stored water using standard household bleach will usually produce good results following the procedure describe below.

Determining Volume of Water to be Treated

The first step is to determine the amount of water to be treated. This can be done using the following formulas.

For vertical cylinder tanks

Water volume in gallons = $D^2 \times H \times 0.78 \times 7.48$

Where D = the diameter of the tank in feet
 H = standing height of the water in feet
 0.78 = a constant of pi (π)
 7.48 = gallons per cubic foot

(Note: This formula is not accurate for cylinder tanks positioned horizontally)

For square and rectangular tanks

Water volume in gallons = $L \times W \times H \times 7.48$

Where L = length of tank in feet
 W = width in feet
 H = standing height of water in feet
 7.48 = gallons per cubic foot

Example: The volume of water in a six-foot-diameter vertical cylinder tank where the water stands at eight feet is:

$$6 \times 6 \times 8 \times 0.78 \times 7.48 = 1,680.31 \text{ gallons}$$

For practical purposes, this can be rounded to the nearest hundred, in this example, 1,700 gallons.

Chlorine Concentration

The procedure described is intended to obtain about 1 part per million (ppm) concentration of free chlorine, which is the concentration commonly prescribed for private (non-public) water systems. This method of sanitizing will allow continual household use of the treated water. This is not a method of shock chlorine disinfection. Routine cleaning of the tank, as described above, will help diminish the need for shock chlorination. Shock chlorine disinfection requires concentrations around 200 ppm and may necessitate the treated water to be drained off. The method described here will help prevent the waste of valuable supplies of stored water due to "super-chlorination."

¹Extension Water Resource Specialist, Department of Extension Plant Sciences, New Mexico State University, Las Cruces.

Sanitizing Procedure

In a clean quart container about half full of water, put **1 to 1½ fluid ounces** (2–3 tablespoons) of a standard **unscented, non-detergent household chlorine bleach** (5.25% concentration) **for every 500 gallons** of water to be treated. Pour the bleach solution directly into the storage tank. Distribute the bleach solution throughout the tank by stirring or mixing with a clean pole or paddle. Two to three minutes of thorough mixing should suffice.

Example solution mix: For 1,700 gallons of water to be treated at the rate of 1¼ fl oz/500 gal

$$1,700 \text{ gallons} \times 1.25 \text{ fl oz}/500 \text{ gal} = 4.25 \text{ fl oz chlorine bleach}$$

Close the tank lid and all other openings. Let stand a minimum of eight hours after stirring, before using. If stirring and mixing the solution in the tank is not possible, let the treatment stand for 24 hours.

This rate of chlorine for disinfection will provide good results for fresh, relatively clear water. It will not work as effectively on water that is murky or cloudy and containing abundant suspended solids. Shock treatment or other practices should be considered for highly turbid water. For recommendations, contact your county Extension agent.

Post-Treatment Precautions

Do not use the treated water for drinking until the smell of chlorine has disappeared. This will take 1 to 2 days depending on ambient temperature, wind conditions, etc. Volatilization of the chlorine will occur sooner with the tank lids removed. However, subsequent contamination from rodents, birds, or airborne sources should be considered. Boiling or cooking with chlorinated water will usually volatilize the chlorine, rendering it tasteless and safe for most people.

People sensitive or allergic to chlorine should avoid primary contact with the treated water until all the smell has disappeared.

Some desirable plants may be affected by chlorinated water used for irrigation.

Maintenance Tips

- When well disinfection is practiced on a recommended annual schedule, basic cleaning of the water storage tank should be done on the same schedule. If water is derived from sources other than a well (rain-harvested or surface water, etc.), the stored water supply should be sanitized every six months or more frequently.
- Sediment in a water tank will contribute to buildup of microflora and fauna. Draining and removing sediment buildup from a tank will help to keep water clean and safe.
- A **whole house** or **point of use** water filtration system is advisable when using stored water for domestic purposes. Relatively inexpensive cartridge filters are commercially available at most hardware and home improvement stores. Dual (sediment and activated charcoal) filtration devices are more effective.
- Restrict tank access by varmints, birds and other undesirable characters. Keep tank lids closed at all times and locked if necessary.

References

- Lauer, William C. (2006). *Disinfection of Pipelines and Storage Facilities Field Guide*. Denver, CO: American Water Works Association
- Division of Environmental Health. *Water Storage Tank Maintenance* (Drinking Water Program publication). Fairbanks: Alaska Department of Environmental Conservation.
- Fogt, Robert (2009, June). Public presentation, notes provided by New Mexico Environment Department, Drinking Water Bureau.

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