



Filtering Rainwater

By Dr. Larry Sunn

When I grew up in Michigan's UP, I remember drinking out of a rain barrel with a ladle. My grandmother would yell out the door, "Remember not to drink off the top!" Much has changed in 6 decades. There are more pollutants, and today we are more aware of the risks.

Rainwater harvesting is viewed by many, including the EPA, as a partial solution to the problems posed by water scarcity: droughts, erosion from runoff, and our over-reliance on ever depleting aquifers—such as the Trinity aquifer that underlies Comal County. As we have cited in preceding articles, there is a growing interest throughout the County in using rainwater for potable uses. A question frequently asked is, "Is rainwater safe to drink?" Yes, it can be as safe as your well or tap water by properly filtering and purifying it.

Start by taking measures to keep foreign matter out of the incoming rainwater. "First flush" devices, gutter screens, and other pre-tank screening mechanisms keep the rainwater as clean as possible before it enters your storage tank. Using screens and filters greatly reduces maintenance and lengthens the life of your pump and filtration system.

But even the best screening systems allow some unwanted particulates into your tank. To keep sediment where it belongs, at the bottom of your tank, screen incoming rainwater, give the remaining sediment time to settle, avoid disturbing it, and don't pull water from the bottom of the tank. Use a floating filter, which, as cautioned by my grandmother, extracts cleaner water from the middle of the tank, leaving floaters or sediment undisturbed.

Next is filtration. Filters are both inexpensive, require quarterly replacement, and are measured in microns. One micron is about 1/25,000th of an inch. For comparison, sand is about 100 – 1,000 microns, a human hair is about 100 microns, a particle of dust is about 1 micron and a virus can be smaller than .01 micron. The needed filters in your system, once the water leaves your storage tank, are cartridge filters. They range widely in what they are capable of removing and are used in a series (e.g., usually a 20 micron followed immediately by a 5 micron filter).

However, filters will not eliminate all substances in the water. To create drinking quality water, filtration is always followed by disinfection. Although there are other disinfecting options (e.g., chlorine, ionization, membranes) we at the CTGCD recommend using ultraviolet light. UV lights have been used for a century in Europe and are now common in the US. When using UV lights, the water must always pass through the filters first—if no filter is used before the water circulates around the UV light, pathogens and bacteria will cast shadows in the flowing water, thereby allowing some live organisms to pass through your system in the shadows unharmed.

UV light works by penetrating an organism's cell walls and disrupting that cell's genetic makeup, making it impossible to reproduce and rendering it harmless. Often it is claimed that UV "kills" the microorganism, but it doesn't—it just makes them unable to reproduce and they are thus harmless.

Several issues with UV lights should be taken into consideration: first, you'll need to replace the bulb at the manufacturer's specified intervals—generally after 9,000 hours, or about every 12 months (cost is about \$100 once per year). Second, UV light's effectiveness is not visible to the human eye, so it may appear to be lit when in fact, as the UV light ages, it may not be disinfecting—ergo the need to replace UV lights per manufacturer's recommendation. Finally, for the UV light to remain effective, the glass protective enclosure around the light needs to be cleaned at the bulb's replacement interval.

UV light manufacturers rate their systems at a given flow rate (e.g., 12 gallons per minute). When installing a UV light, make sure the flow rate of the UV unit is matched to meet or exceed your home's peak water flow use rate. If your family's use flow rate is greater than that of the UV light, purchase a larger unit or install a pressure regulator or flow restrictor. Usually, a family of four consumes peak flows at 8 to 14 gallons per minute. The UV

light unit is always installed after your water has passed through all filters—which includes your pre-tank screens and the filters in your conveyance system. The resulting water is clean, safe, and ready to use.

In sum, rainwater is free, but you do pay for filter changes—about \$120/year or \$10/month. Feel free to send rainwater capture questions to us at the Comal Trinity Groundwater Conservation District by emailing Dr. Sunn at comaltrinitygcdsecretary@gmail.com. All of our CTGCD rainwater and well water consulting services are offered to the public without charge.