

Filtration

Monday, October 08, 2007
9:52 AM

Rainwater Harvesting Potential and Guidelines for Texas

Treatment Methods for Potable Use of Rainwater

Harvested rainwater that is intended for potable use requires a higher level of treatment than that for non-potable uses. In addition, an extra measure of diligence is necessary to maintain the safety of the harvested rainwater during storage, filtration, and disinfection.

Storage

After the rainwater is pre-filtered through appropriate first-flush diverters and/or roof washers, it should be stored in a leak-proof tank or cistern that has been approved for potable use by the Food and Drug Administration, National Sanitation Foundation, or the U.S. Department of Agriculture. The storage tank must be kept tightly covered, properly vented, and protected from light to control the growth of algae and keep out contaminants. Additional discussion of storage tanks is available in the Texas Manual on Rainwater Harvesting (TWDB, 2005).

Filtration

Cartridge filters may be placed on the discharge side of the pump, which provides pressure to the plumbing system. A number of different kinds of filters can be used to provide the particulate removal necessary to adequately address potable water uses. A filter that is capable of removing at least 99 percent of the particles that are 3 microns or larger in diameter is recommended for potable water that is free of protozoan pathogens, and particles that may be harboring

smaller microbes or that may interfere with the disinfection process. If necessary, an activated charcoal filter may also be added to improve the taste of drinking water. Filters of different sizes and types from several manufacturers are commercially available, but those certified by the National Sanitation Foundation are recommended.

Disinfection

Disinfecting potable harvested rainwater is necessary to inactivate potentially pathogenic microorganisms that are not physically removed by filtration. Readily available sodium hypochlorite bleach may be used for disinfection. In order to ensure that disinfection is taking place and that there is enough chlorine in the system, a chlorine residual of at least 0.2 mg/l must be maintained at all times in the distribution system. Chlorine residuals can be easily measured using a test kit. Because chlorine does not kill *Giardia* or *Cryptosporidium*, a cartridge or membrane filter (that removes at least 99 percent of the particles which are 3 microns or larger in diameter) is preferred, followed by ultraviolet light for disinfection.

Ultraviolet Disinfection

Ultraviolet disinfection has been used in the water and wastewater industry for many years in Europe. However, regulatory recognition of ultraviolet disinfection was accorded in the United States only recently by the Environmental Protection Agency's adoption of the Long Term Phase 2 Enhanced Surface Water Treatment Rule (LT2). This rule has established the benchmark for the use of ultraviolet light for disinfecting drinking water.

Previously an ultraviolet dose capable of producing an energy of at least 40,000 uwsec/cm² (40 mJ/cm²) was recognized, based on a National Sanitation Foundation recommendation that was consistent with European standards for inactivating bacteria, parasitic cysts, and most viruses. Because some viruses, such as adenovirus, an agent in gastrointestinal illnesses in children, are more resistant due to the virus' double-stranded DNA, the Environmental Protection Agency is considering a higher ultraviolet dose of 186 mJ/cm² to inactivate these viruses also. Current or new rainwater harvesting ultraviolet systems will be able to increase the ultraviolet dose by increasing the number of lamps and/or exposure time within their system, or by pre-treating with chlorine. Increased ultraviolet dosage, regular inspection, and certification for the new standard is recommended for small rainwater harvesting systems that are used for potable purposes, or for any larger public water system where ultraviolet is used as a disinfectant in place of chlorine.

The recommended treatment methods for potable and non-potable indoor uses

of rainwater are shown in Table 2.

26

*Please visit www.tceq.state.tx.us for more information.

Table 2. Recommended Treatment Methods for Indoor Use of Rainwater

Treatment Methods for Non-Potable Indoor Use of Rainwater	Treatment Methods for Potable Use of Rainwater
<p><u>Pre-filtration</u> First flush, roof washer, and/or other appropriate pre-filtration method</p> <p><u>Cartridge Filtration</u> 5 micron sediment filter</p> <p><u>Disinfection</u> Chlorination with household bleach or Ultraviolet light</p>	<p><u>Pre-filtration</u> First flush, roof washer, and/or other appropriate pre-filtration method</p> <p><u>Storage</u> Storage of rainwater only in tanks or cisterns approved for potable use</p> <p><u>Cartridge Filtration</u> 3 micron sediment filter, followed by a 3 micron activated carbon filter</p> <p><u>Disinfection</u> A chlorine residual of at least 0.2 parts per million maintained in the distribution system at all times Or Ultraviolet light for disinfection with a dosage of 186 mJ/cm² for virus inactivation</p>

<http://www.twdb.state.tx.us/iwt/rainwater/docs/RainwaterCommitteeFinalReport.pdf>

Screen clipping taken: 10/10/2007, 11:53 PM