wellcare® information for you about

Drinking Water Treatments

If test results come back positive for water contamination, you must select a treatment option to improve the quality or safety of your drinking water. As a private well owner, you are responsible for taking the right steps to keep your water clean and pure.

Well owners may choose from four primary options for water treatment:

- Disinfection of the well to eliminate bacteria.
- Point of use treatment, usually under the kitchen sink, to filter contaminants from drinking and cooking water.
- Point of entry, usually at point where well water enters home plumbing system.
- Multiple treatments for the household water system, usually near your water storage tank, to filter multiple contaminants or improve water quality for all household uses.

Contact your local health department, cooperative extension service, state health or environmental agency or your well professional for guidance in selecting the most effective and efficient water treatment system.

Selecting Water Treatment Options

The more you know about the quality of your water and what treatment may be needed, the more likely you will be to avoid unnecessary, costly or inappropriate equipment.

Table 1: Water Contaminants and Treatment Options

Contaminant	Recommended Treatment
Arsenic	Point of Use: reverse osmosis, distillation or cartridge-type removal devices
Bacteria	Disinfection: chlorine, ultraviolet light or ozone treatments
Chromium	Point of Use: coagulation, ion exchange, reverse osmosis or lime softening
Iron	Multiple: shock chlorination, water heater modification, activated carbon filter, oxidizing filter or oxidizing chemical injection. Tests will determine best treatment.
MTBE (methyl tertiary butyl ether)	Contact your state health department or well professional.
Nitrate	Point of use: ion exchange, electrodialysis or reverse osmosis
Radium	Point of use: ion exchange and reverse osmosis
Radon	Point of use: aeration devices or granular activated carbon (GAC) filters
Sulfur & Manganese	Point of use: sulfur – distillation, reverse osmosis or ion exchange; manganese and hydrogen sulfide – shock chlorination, water heater modification, activated carbon filter, oxidizing filter or oxidizing chemical injection
TCE (trichloroethylene)	Point of use: packed tower aeration (GAC filter with reverse osmosis distillation)

Only one water treatment – shock chlorination – is managed easily at home with a common household chemical, bleach. Most other treatments require the service of a home water treatment professional. You can check the telephone directory for listings or ask your well contractor to refer you to a treatment company.

Before purchasing a water treatment device, ask if it has been approved by NSF International, a non-profit group that develops standards for equipment related to public health. NSF International certifies water treatment devices as effective in removing specific contaminants.

It is important to monitor and carefully maintain all Point of Entry (POE) and/or Point of Use (POU) treatment systems. These systems typically use a filtering system that needs changing on a regular basis much like the filter screen on your furnace. Failure to maintain a POE or POU can result in the growth of bacteria or ineffective filtering which may allow contaminants to enter or stay in your drinking water. Maintaining the filter is easy and low cost and is important to safeguarding the health of your household.

Table 2: Household Water Cleanup Options and Estimated Costs

Water Treatment System	Estimated Costs
Activated carbon filtration	Faucet-mounted $25-50 Under the sink $50-300 Whole house $500-800
Distillation	Countertop $300-350 Automatic $600-800
Ion exchange	Whole house $500-800
Reverse osmosis	Single tap $400-600
Bottled water	$7 to $15 weekly for a family of four
New well	$3.50 to $4.50 per inch diameter per foot of depth, plus casing and pump costs
Public system	$12,000+ per household hookup depending on distance to water main, plus monthly water payments

* Chart prepared by Virginia Water Resources Research Center, Blacksburg, Virginia, 1996

Glossary of Water Treatments

Like water testing, you must approach water treatments as a smart shopper. Understand which treatments and devices are recommended for your specific drinking water problem and at what scale. Do you need a point-of-use filter on the kitchen tap or a whole house system to treat all the water your family uses? This glossary will help you understand the terms used by water treatment professionals.

Aeration

Water is mixed with air by spraying or cascading, then the air is vented from the water. Closed aeration uses pressure to remove molecules, while open aeration uses gravity to remove gases.

Activated Carbon Filter
A highly porous, absorbent material, usually made from coal or wood, is used to filter contaminants, such as excess chlorine, and to reduce soluble materials, such as organic chemicals and radon.

Activated Carbon Block Filter
Activated carbon is molded into a cartridge filter with a much greater absorption capacity and speed than a granular carbon filter. Specialized media may be added to target specific contaminants.

Chlorination
Chlorine is added to water to destroy unhealthy bacteria and control microorganisms and to remove dissolved iron, manganese and hydrogen sulfide. Shock chlorination of a private well uses concentrations of chlorine that are 100 to 400 times the amount found in municipal water supplies. The highly chlorinated water is held in the pipes for 12 to 24 hours before it is flushed out and the system is ready for use again. (See also Disinfection.)

Coagulation
Chemicals neutralize the electrical charges of fine particles (contaminants) in water, making it easier to remove the particles by settling, skimming, draining or filtering.

Disinfection
Chemicals such as chlorine, iodine, ozone or hydrogen peroxide are used to destroy disease-producing bacteria without eliminating all microorganisms. Treatment also may involve steps such as distillation, microfiltration, ultrafiltration, boiling or the use of ultraviolet light. (See also Chlorination.)

Distillation
Organic and inorganic contaminants are separated from water through a combination of evaporation, cooling and condensation.

Electrodialysis
An electric current is used to remove ions (an atom or group of atoms) from water through a semi-permeable membrane (which allows select molecules to pass and blocks others).

Ion Exchange
A water softening process in which ions (an atom or group of atoms) from a solid medium, usually a resin, are exchanged for ions in water. Positive charged ions are known as cations. Negative charged ions are known as anions. An undesired effect of ion exchange is the addition of sodium to the treated water, a consideration for those on a low-sodium diet.

Lime Softening
Slaked lime is added to water to reduce hardness, which is filtered out.

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Disinfection: Using Shock Chlorination to Remove Bacteria

Bacterial contamination of drinking water is very common. Studies show that more than 40 percent of private water supplies are contaminated with coliform bacteria, which can cause gastrointestinal illnesses. You should test for bacteria yearly, usually in the spring, or if there is any change in the taste, color or odor of your drinking water.

If your water tests positive for coliform bacteria, take the following steps to disinfect your well:

Step 1: Use a chemical disinfectant, such as chlorine granules, tablets or liquid chlorine. Household bleach is fine, provided it is not perfumed. Follow the printed directions exactly (or ask for instructions for your well driller or local health department).

Step 2: Pour the proper amount of chlorine bleach or powdered chlorine, dissolved in a small amount of water, directly into the well.

Step 3: Connect a garden hose to a nearby faucet and wash down the inside of the well.

Step 4: Open each faucet one by one and let the water run until a strong odor of chlorine is detected. If a strong odor is not detected, add more chlorine to the well.

Step 5: Let the water stand in the household water system for at least 12 to 24 hours.

Step 6: Flush the system of the remaining chlorine. Start by turning on outside faucets and letting them run until the chlorine smell dissipates. Let the water run on the ground to reduce the load on your septic system. Finally, run the indoor faucets until the system is completely flushed.

Step 7: Retest your water supply for bacteria after one to two weeks. If shock chlorination has not eliminated the bacteria problem, you may need a continuous disinfection system.

Note: Be careful when handling concentrated chlorine solutions. Wear rubber gloves, goggles and a protective apron. If chlorine accidentally gets on your skin, flush immediately with clean water. Never mix chlorine solutions with other cleaning agents or ammonia or toxic fumes will form.

Oxidizing Filter
A type of filter that changes the balanced state of dissolved molecules, making them insoluble and, therefore, filterable.

Oxidizing Chemical Injection
Agents such as oxygen, ozone, chlorine or peroxide are used to attract electrons so they can be removed from water.

Reverse Osmosis
Pressure is used to force water molecules through a semi-permeable membrane (it allows select molecules to pass and blocks others). The pressure forces the molecules to flow in the reverse direction, moving from a concentrated solution to a dilute solution, hence diluting their presence in the water. To make these devices effective, water may need to be pretreated with chlorine or oxidation.

Maintaining Water Treatment Devices

Treatment systems must be properly maintained to ensure water quality. Most filter cartridges, membranes or ultraviolet lights must be replaced at least once a year. Ask about maintenance needs before your water treatment system is installed. Then, keep accurate maintenance records and test systems and the treated water regularly.

For more information on your drinking water

The following sites provide up-to-date information on efforts to protect public water supplies and steps you can take as a private well owner:

Home*A*Syst Program	www.uwex.edu/homeasyst
Water Quality Association	www.wqa.org
The Groundwater Foundation	www.groundwater.org

For more information about wells and other wellcare® publications

wellcare® is a program of the **Water Systems Council (WSC). WSC** is a national nonprofit organization dedicated to promote the wider use of wells as modern and affordable safe drinking water systems and to protect ground water resources nationwide.

Contact us at 888-395-1033 or visit www.watersystemscouncil.org

This publication was developed in part under Assistance Agreement No. X-82849101-1 awarded by the U.S. Environmental Protection Agency. It has not been formally reviewed by EPA. The views expressed in this document are solely those of WSC. EPA does not endorse any products or commercial services mentioned in this publication.