Managing Your Private Well: Testing and Treatment Guide

If you're wondering why no one's told you to test your drinking water it's because private wells have very little governmental regulation, leaving most of the responsibility to the well owner. Even if your water was safe to drink when the well was installed or when you bought your home, that doesn't necessarily mean that the quality is the same today. Regular testing is important; the Connecticut Department of Public Health (CT DPH) recommends testing for the basic indicators every year (see guidance from the CT DPH on which parameters to test for and how often). If you have tested your water and it is over the drinking water standard on one or more parameters, it can be confusing to figure out how to address the issue. This guide is designed to help you get your water tested and if necessary, select proper treatment systems to provide safe drinking water for you and your family.

Step 1: Get your water tested.

There are several labs around the state that have been certified by CT DPH to test drinking water. For an extra fee, some will even come out to your home to collect the sample. Different labs may charge different fees, so call labs in your area to find out what they charge (to view lab locations on a map visit s.uconn.edu/ctwatertestlabs). At a minimum you will want to ask for the basic potability parameters, which now include arsenic and uranium (you should ask to make sure that these are included). Total coliform and E. coli bacteria should also be included. You may also choose additional parameters to test such as radon, pesticides, or other contaminants like petroleum. Your local health district can provide guidance on whether these constituents are likely to be found in your area.

Step 2: Find out what's in your water.

Any Connecticut certified lab will provide you with a water quality report that will include your water sample results and the health standards set by the Connecticut Department of Public Health. If you are unsure if your results meet the state's set standards, visit the CT DPH private well website (s.uconn.edu/ctdph-welltesting), or contact UConn Extension (michael.dietz@uconn.edu).

Step 3: Decide if you need water treatment and choose the best system for you.

Any contaminant that exceeds a health standard should be addressed, but keep in mind that the goal is not necessarily to have "pure" water. Water stripped of all minerals (such as distilled water) has little benefit to human health. If you do need some kind of treatment system, you will also need to decide if you should have a water treatment professional do the installation. Some systems such as a point of use reverse osmosis can be installed relatively easily. Other systems like ion exchange should be installed by professionals. Use the Treatment System Options chart on page 2 to find out what treatment is right for your situation, and if necessary, discuss options with one or more professional water treatment companies.

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CLEAR Center for Land Use Education & Research

UCONN COLLEGE OF AGRICULTURE, HEALTH AND NATURAL RESOURCES

What treatment is right for your situation?

Questions to Ask When Selecting a Water Treatment Device

- What is the required maintenance?
- How does this technology work?
- Are there any indicator lights or mechanisms to alert you of a malfunction?
- What is the product's life expectancy?
- Are there any waste products that will need to be disposed of?
- What is the cost for the unit, installation, routine maintenance?

TREATMENT SYSTEM OPTIONS CHART

● - Fully Treated ○ - Partially Treated	Filtration									Ion Exchange		Disinfection					
	Adsorptive Media Filter [1]	Activated Carbon Filter [1]	Aeration Filtration	Acid Neutralization	Oxidizing Media Filter	Microfiltration	Nanofiltration	Ultrafiltration [3]	Sediment Filtration	Anion Exchange [1]	Water Softener	Boiling Water	Continuous Chlorination	Ozonation	Ultraviolet	Distillation	Reverse Osmosis
Arsenic [2]	●		○		●		○			●			●	●		●	●
Bacteria						●	●	●				●	●	●	●	●	
Chloride							●									●	●
Copper											●			●		●	●
Fluoride	●	●					○			●						●	●
Hardness							●				●					●	●
Hydrogen-Sulfide		●	●		●								●	●			
Iron		●	●		●		●		●		●		●	●		●	●
Lead		●					●									●	●
Manganese		●	●		●		●		●		●		●	●		●	●
Nitrite/Nitrate			○				●			●			●	●		●	●
Pesticide		●					●						●				●
PFAS		●					●										●
pH				●													
Sodium							●									●	●
Sulfate	●					●	●	●		●						●	●
Taste/color/odor		●	●		●	●	●	●	●				●	●		●	●
Turbidity	○	○			○	●	●	●	●							●	●
Uranium	●						●			●						●	●

1. *Be sure to check the specific filter to see what it removes. Depending on the media used in the filter, some particles may not be removed.*
2. *Connecticut groundwater contains two types of arsenic III, also known as, arsenite, and, arsenic V, also known as, arsenate. To ensure all forms of arsenic are removed, pretreatment may be needed through chlorination, aeration, or ozonation. Water with sulfate levels above 100 µg may also affect arsenic removal. Be sure to consult with a water treatment expert before investing in treatment technologies.*
3. *Unlinke microfiltration, ultrafiltration remove particles based on size, weight, and charge in addition to removing viruses*

Water Treatment Options

Definitions

POE: Point of Entry; a treatment device that is connected to where the water enters the home.
POU: Point of Use; a treatment device that is connected to where the resident uses the water.
Backlogging: When contaminants or by-products build up in filters reducing their effectiveness.
Membrane: A thin, selective barrier, that allows water to pass through while stopping contaminants.
Pore: A small opening in a membrane. Sizes vary based on the type of filters.
Backwashing: Reversing the flow of fluid through the filter to recharge the media bed.
Media Bed: Loose, charged granular mixtures that attract oppositely charged particles.

SUBSTANCES REMOVED	PROCESS	PROS/CONS	FINANCIAL COST
ACTIVATED CARBON FILTER			
• Fluoride • Hydrogen-Sulfide • Iron • Lead • Manganese • Pesticides • PFAS • Taste/Color/Odor	A charged media bed, like a magnet on a refrigerator, attracts contaminants and holds them on the surface of the filter	PRO: Filters inexpensive and easy to find.	POU Initial: low Maintenance: low
		CON: If not properly maintained, can breed bacteria. If not properly maintained, over-saturated filters can leach previously contained contaminants.	POE Initial: medium - high Maintenance: low
AERATION FILTRATION			
• Arsenic • Hydrogen-Sulfide • Iron • Manganese • Nitrate/Nitrite • Taste/Color/Odor	Adds oxygen to the water, changing some contaminants into solid masses that can be filtered out of the water	PRO: Easy maintenance.	POU Initial: not applicable Maintenance: not applicable
		CON: Too much oxygen can cause water to become corrosive, potentially leaching lead or copper from pipes into water.	POE Initial: medium - high Maintenance:low
ANION EXCHANGE			
• Arsenic • Fluoride • Nitrate/Nitrite • Uranium	Like a magnet on a refrigerator, sodium chloride or potassium chloride attract negatively charged contaminants and replace them with chloride.	PRO: Sodium chloride and potassium chloride are inexpensive and easy to find.	POU Initial: not applicable Maintenance: not applicable
		CON: Too much salt can make water corrosive, potentially leaching lead or copper from pipes into water. Discharge water can be damaging to the environment.	POE Initial: high Maintenance: low - medium
ACID NEUTRALIZATION FILTER			
• pH	Water is passed through neutral-izing material, such as limestone, crushed oyster shells, or marble chips, dissolving them and causing the ph of the water to increase.	PRO: Protects pipes from corroding.	POU Initial: not applicable Maintenance: not applicable
		CON: Can increase the hardness of the water. Requires regular maintenance.	POE Initial: medium - high Maintenance: low

Water Treatment Options continued...

SUBSTANCES REMOVED	PROCESS	PROS/CONS	FINANCIAL COST
BOILING WATER			
• Bacteria	Water is brought to a rolling boil to kill bacteria.	PRO: Inexpensive, requires no additional treatment hardware.	POU Initial: low Maintenance: not applicable
		CON: Only efficient for small quantities.	POE Initial: not applicable Maintenance: not applicable
CONTINUOUS CHLORINATION AND FILTRATION			
• Arsenic • Bacteria • Hydrogen-Sulfide • Iron • Manganese • Nitrate/Nitrite • Pesticides	Bleach is added to a well or holding tank in order to kill bacteria, viruses and some parasites. Some metals can become oxidized and later filtered out	PRO: Removes bacteria from drinking water system.	POU Initial: not applicable Maintenance: not applicable
		CON: Difficult to maintain. Unmaintained machines may overchlorinate water, impacting long-term health.	POE Initial: medium - high Maintenance: low
DISTILLATION			
• Arsenic • Bacteria • Chloride • Copper • Fluoride • Hardness • Iron • Lead • Manganese • Nitrite/Nitrate • Sodium • Sulfate • Taste/Color/Odor • Turbidity • Uranium	Converts water into steam, separating it from contaminants and killing pathogens. The steam is then cooled, resulting in purified water.	PRO: Removes wide variety of contaminants and pathogens.	POU Initial: Medium Maintenance: Dependent on energy consumption
		CON: Energy to power can be expensive. Beneficial minerals are removed alongside harmful minerals.	POE Initial: not applicable Maintenance: not applicable
OXIDIZING MEDIA FILTER			
• Arsenic • Hydrogen-Sulfide • Iron • Taste/Color/Odor	Water passes through a charged media bed, which attracts dissolved contaminants. Newly formed masses are large enough to be filtered out of water.	PRO: More effective than other filtration methods for iron, manganese, arsenic, and radium.	POU Initial: not applicable Maintenance: not applicable
		CON: Regeneration of media requires chemicals that can be harmful and which need to be stored properly.	POE Initial: high Maintenance: medium
OZONATION			
• Arsenic • Bacteria • Copper • Hydrogen-Sulfide • Iron • Manganese • Nitrate/Nitrite • Taste/Color/Odor	Electricity is used to generate ozone (O^3) and added to the water to kill pathogens, remove some pesticides and changes dissolved contaminants into solid masses.	PRO: No residual effects. Dissolves almost immediately.	POU Initial: not applicable Maintenance: not applicable
		CON: Expensive to generate.	POE Initial: high Maintenance: high
MICROFILTRATION			
• Bacteria • Sulfate • Taste/Color/Odor • Turbidity	Synthetic filters with small pores filter out impurities	PRO: Microfiltration can remove minerals as small as bacteria and larger contaminants.	POU Initial: low Maintenance: medium
		CON: Expensive. If filter becomes oversaturated with contaminants, it can backlog into the system.	POE Initial: high Maintenance: medium

Water Treatment Options continued...

SUBSTANCES REMOVED	PROCESS	PROS/CONS	FINANCIAL COST
NANOFILTRATION			
• Arsenic • Bacteria • Chloride • Fluoride • Hardness • Iron • Lead • Manganese • Nitrite/Nitrate • Sodium • Sulfate • Taste/Color/Odor • Turbidity • Uranium	Synthetic filters with pores smaller than ultrafiltration stop nearly all impurities found in water.	PRO: Nanofiltration is very efficient at removing viruses, bacteria, heavy metals, and other impurities.	POU Initial: high Maintenance: medium
		Expensive. If filter becomes oversaturated with contaminants, it can backlog into the system.	POE Initial: high Maintenance: medium
ULTRAFILTRATION			
• Bacteria • Sulfate • Taste/Color/Odor • Turbidity	Synthetic filters with smaller pores than a microfilter filter out impurities including viruses.	PRO: Ultrafiltration effective at removing bacteria and viruses and larger substances in water.	POU Initial: low Maintenance: medium
		CON: Regeneration of media requires chemicals that can be harmful and which need to be stored properly.	POE Initial: high Maintenance: medium
REVERSE OSMOSIS			
• Arsenic • Chloride • Fluoride • Hardness • Iron • Lead • Manganese • Nitrite/Nitrate • Pesticide • PFAS • Sodium • Sulfate • Taste/Color/Odor • Turbidity • Uranium	A high pressure pump pushes water through a semi-permeable filter stopping nearly everything except water from passing through.	PRO: Most efficient water filter on the market.	POU Initial: Medium Maintenance: low
		Large discharge of waster water. If precautions are not taken to treat hard water, pores can easily clog.	POE Initial: high Maintenance: medium
SEDIMENT FILTRATION			
• Iron • Manganese • Taste/Color/Odor • Turbidity	Water is passed through either pleated, melt-blown or string wound filters to catch large particles	PRO: Simple maintenance.	POU Initial: medium Maintenance: low
		CON: Not as efficient as microfiltration filters.	POE Initial: low Maintenance: low
ULTRAVIOLET			
• Bacteria	UV light is used to kill bacteria, viruses, and other pathogens.	PRO: Removes pathogens without adding any additional chemicals to water.	POU Initial: low - medium Maintenance: low
		CON: If water's turbidity is above 1 NTU, pretreatment may be required.	POE Initial: medium Maintenance: low
WATER SOFTENER			
• Copper • Hardness • Iron • Manganese	Like a magnet to a refrigerator, sodium chloride or potassium chloride attract positively charged contaminants out of water and replace them with sodium.	PRO: Sodium chloride and potassium chloride is inexpensive and easy to find.	POU Initial: not applicable Maintenance: not applicable
		CON: Too much salt can make water corrosive, potentially leaching lead or copper from pipes into water. Discharge water can be damaging to the environment.	POE Initial: high Maintenance: low - medium

Helpful Tips

Just because you had an exceedance, it doesn't necessarily mean you need to install a treatment device.

Before investing in potentially expensive treatment equipment, you should consider:

- What is the source of the problem, and can you address it?
- Does your well casing or cap have any cracks, and will it be an affordable fix?
- What would the cost be to either connect to a municipal system or drill a new well?
- Should you begin using store bought water for consumption?

Well water treatment advertisements can be misleading.

See the example provided by Pennsylvania Extension on misleading advertisements:

> *"a device that is your only solution to purer water... a device that produces water like God made in the beginning... water that will make your hair more silky and manageable... healthier water."*

Certain water treatment companies prey on the beliefs of their customers. These companies are more likely to try to sell you something you don't need. Be sure to review the Questions to Ask section on page 1 to make sure the treatment system is right for you.

Consumers with exaggerated health fears or misinformation are easy prey for treatment companies.

Media can often exaggerate the health effects of water contaminants. Many homeowners will use water treatment as a quick fix to their problems, often falling victim to choosing the first thing offered to them.

One size does not fit all.

Different systems are made to treat different contaminants. For example, some reverse osmosis systems can remove bacteria while others cannot. Be sure to ask about specific contaminants removed by a treatment system.

Be sure to ask about maintenance and potential associated costs.

Every treatment technology will require some form of maintenance. Without it, a device may backlog, severely reducing the efficiency of treatment or become damaged, reducing its practical lifespan.

There is minimal government regulation of water treatment technologies.

Manufactures have no legal obligation to have their devices tested by the EPA, National Sanitation Foundation or the Water Quality Association. Testing is often not done because of time or financial constraints. To avoid false advertising, faulty products or worse, make sure to look for the product safety symbols (right) when choosing a device.

Look for These Labels

The field of treatment devices is completely unregulated, which can make it difficult to choose which device is best for you. For starters we recommend looking for the water quality standard labels on your selected device to ensure that they have some compliance with a national standard.

For more information, visit:
ctiwr.uconn.edu/welltesting

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