

The Basics of Microbial Testing for Well Water

Why should you test your customers' water?

Scientists have long understood the link between unseen contaminants in water and illnesses. Back in the 1900s, filtration and treatment became mainstays for municipal water, and regulations for the quality of public drinking water systems were established.

If your customers' water is supplied by a municipality, large or small, their water supply is tested routinely, at the source. However, many pipes buried underneath our cities have been in place since the introduction of widespread water treatment. This aged and, in many cases, crumbling infrastructure now poses its own risk, which is why it's smart to test the water where customers use it—at their tap.

But what if your customers are on a private water supply, such as a well, lake water, or even a rainwater tank? In these cases, no one is testing their water unless they are. It's possible that their water was tested when they moved in or drilled a new well, but microbial water quality changes over time and can be impacted by extreme weather events, land-use changes, or a nearby failing septic system. Many water contaminants cannot be seen or even tasted in water, so the only way to be sure of the quality of their water supply is to test it. Even if the presence of a particular contaminant is readily apparent, such as the red-colored stains left by iron on fixtures, getting it tested will quantify the problem, making the best water treatment choice easier.



Private water system users are solely responsible for the quality of their water.




When should you test your customers' water?

Public health authorities recommend that private well owners test for bacteria and nitrates at least once a year. Other contaminants, such as hardness, iron, or radon, may only need to be tested once. This testing frequency depends on the prevalence of naturally occurring substances in the area's groundwater.

If your customer has experienced one of these key events, a water test should happen as soon as possible:

- The water's color, taste, or odor changed.
- Someone in their family developed or has a weak immune system from an illness, medical treatment, or age.
- Their family is growing.
- Someone who drank their tap water had an unexplained gastrointestinal illness.
- They moved into a new home.

Where should tests take place?

	<p>Wellhead</p>	<p>WHY</p>	<p>WHEN</p>
		<p>To check the source water</p>	<p>At least once a year</p>
	<p>Before water treatment</p>	<p>WHY</p>	<p>WHEN</p>
		<ul style="list-style-type: none"> • The well is new, or work was performed on the well • A need for water treatment is suspected • Customer is buying a home on a private well 	<ul style="list-style-type: none"> • After well cap is closed and well is sanitized • When a change to color, taste, and/or odor is detected • Before closing on the real estate transaction
	<p>At the tap</p>	<p>WHY</p>	<p>WHEN</p>
		<ul style="list-style-type: none"> • To determine the need for water treatment • To check efficacy of installed equipment 	<ul style="list-style-type: none"> • After a change to color, taste, and/or odor is detected • Anytime

Understanding water test results

Presentation of results may vary by lab or locale. Regarding microbial contamination, the most important measurement result is total coliform bacteria (TC).

Coliform bacteria occur naturally in soil and decaying vegetation. They are associated with the presence of human or animal fecal contamination. While many coliform organisms are completely harmless, some like *E. coli*, can make people sick and even be deadly. When a water test indicates a high total coliform count, it may or may not include illness-causing strains such as *E. coli*. However, when present, coliforms are a strong indicator that

your customers' water source has already or can easily become contaminated with fecal matter.

How serious is this? It depends on how high the number is. Table 1 on the next page gives the Environmental Protection Agency's Safe Drinking Water Standards. If the results are borderline, the lab may suggest retesting.

As well as a total coliform count, test results may include a fecal coliform count or *E. coli* count. If the test results show any fecal coliforms or *E. coli*, your customers' water is contaminated with human sewage or animal manure. It's not safe to drink unless it's been boiled.

TABLE 1: INTERPRETING TEST RESULTS

Total coliforms	Interpretation
0 or ND (not detected)	Your customers can confidently consume their water.
1 to 5*	As long as it tests negative for fecal coliform or <i>E. coli</i> , your customers' water can be confidently consumed.
6 or higher*	Your customers must boil their water before consuming it.
O/G (overgrown)	Your customers must boil their water before consuming it. Sometimes a test result will say "O/G" or "overgrown" instead of listing the number of total coliforms. This means many other types of bacteria exist in the water sample, which prevented the lab technician from seeing whether there were coliform bacteria.

*If you see "est." or "estimate" next to the test results, it means there were coliform bacteria in the water. However, because there were so many other bacteria as well, the lab technicians couldn't accurately count the number of coliform bacteria. The water is not safe to drink unless it has been boiled.

What happens if the test is positive for total coliforms?

As a water treatment professional, you will be the person your customer turns to for advice on what to do next. Here are five things you should recommend to them:

- 1. Boil water before drinking or cooking with it.** Until the source of the problem has been addressed, water should not be consumed unless it's been brought to a rolling boil for a full minute.
- 2. Shock the well.** To remove bacteria from the well, "shock" it with a high dose of chlorine. The amount of chlorine needed depends on the depth of the well, the pH of the water, and how much slime or biofilm is present. Be sure to let your customers know that shocking a well doesn't offer a long-term solution for ongoing contamination issues. It's a quick fix that needs to be paired with long-term treatment.
- 3. Retest the water.** After shocking the well, wait 24 hours and retest the water. Next, wait a week or two and test it again. Don't give the all-clear until tests have returned two "bacteria-free" results. Remind your customers that if a well has been contaminated once, it may get contaminated again.
- 4. Check the well water regularly.** Because the quality of well water changes throughout the year, you'll want to establish an ongoing testing plan with your customers. At a minimum, water should be tested annually, preferably in the warmer months when the well is most likely to become contaminated by external influences.
- 5. Consider a water treatment system.** Unfortunately, some problems can't be fixed. If the source of contamination cannot be controlled or if your customers want total peace of mind, install a water treatment system that inactivates microorganisms.

Water treatment systems

There are a number of different options—from point-of-entry (POE) to point-of-use systems (POU)—and different treatment technologies. Each has its own benefits and drawbacks. As Table 2 shows, not all water treatment systems inactivate microorganisms.

TABLE 2: WATER TREATMENT SYSTEMS

Treatment method	Type of system	Benefits	Drawbacks	Maintenance	Inactivates microorganisms
Ultraviolet light (UV)	POE and POU	<ul style="list-style-type: none"> Doesn't require chemicals or generate disinfection byproducts Installs easily Inactivates microbial contaminants found in water* Will not alter the taste† 	<ul style="list-style-type: none"> Usually requires pretreatment (e.g., softeners in hard-water areas) May require high UV doses to inactivate some viruses 	<ul style="list-style-type: none"> Replace lamp annually Occasionally clean and replace quartz sleeve 	Yes
Chlorine	POE	<ul style="list-style-type: none"> Reduces some disagreeable taste and odors Provides residual disinfection Can help remove iron and manganese 	<ul style="list-style-type: none"> Requires storage and use of noxious chemicals Requires ongoing monitoring of chlorine levels Does not work on chlorine-resistant microbes, like <i>cryptosporidium</i> and <i>giardia</i> Requires professional installation Can alter water's taste and odor Is corrosive Can produce harmful byproducts 	<ul style="list-style-type: none"> Check for loose, worn, missing, or broken parts Clean the entire system semiannually Clean all surfaces showing corrosion Refill chlorine supplies Clean any clogged injectors 	Yes
Filters	POU and POE	Can remove some disagreeable tastes and odors	Isn't a standalone solution	Change filter periodically	No, filters can only remove some large microbes
Reverse osmosis (RO)	POU	<ul style="list-style-type: none"> Filters many contaminants from water Doesn't require chemicals 	<ul style="list-style-type: none"> Can produce 2 to 4 gallons of wastewater for every gallon of treated water Can demineralize water Reduces pH Can require pretreatment Often requires professional installation 	Replace filter and membrane	Maybe, most RO units are not specified to remove microbial contaminants. Check the manufacturer's specifications.
Softeners	POE	Serves as a pretreatment solution for hard water or other water treatment conditions	Requires professional installation	Replace salt as required	No, softeners are used as pretreatment solutions for other treatment methods

* Efficacy of VIQUA systems has been demonstrated in internal testing. Visit VIQUA.com for details.

† In rare circumstances, low levels of sulfur in source water may become detectable due to the UV system.

Deliver total peace of mind with VIQUA UV systems

While UV is perfect for private wells, anyone concerned about having treated water can benefit from a VIQUA UV system. It doesn't matter if they live in the city, a small town, or on a remote rural property—all your customers deserve the peace of mind that comes with knowing their water has been properly treated.

VIQUA whole-home and single-tap systems:

- ✓ Will not alter the taste, pH, color, or smell of the water.
- ✓ Do not require you or your customers to handle dangerous chemicals.
- ✓ Eliminate the need for a contact tank and a large system footprint.
- ✓ Do not produce disinfection byproducts.

Plus, our systems are easy-to-install, easy-to-maintain, and have been rigorously tested to meet industry-leading quality standards. Every VIQUA system comes with an industry-leading warranty and strong aftermarket support, so you can be confident your installations will deliver on the promise of better water, day in, day out. Learn more at [VIQUA.com](https://www.viqua.com).



Build your testing program with help from VIQUA

Establishing a microbial testing program is easy and inexpensive. It's also the right thing to do for your customers and your business. If you're committed to making microbial testing part of your business, VIQUA will help you get started. As part of our Certified Partner Program, we provide dealers who want to use well water testing to create awareness for well water quality with:

- Unlimited access to presence-absence test kits at no charge
- An incubator so you can process the tests yourself without going to a lab
- Cobranded, customer-facing materials that explain test results and implications

To learn how you can become a Certified Partner, visit www.viqua.com/dealer/certified-partner-program.

About VIQUA

VIQUA is proud to be one of the world's leading suppliers of residential and light commercial UV water treatment systems, providing treated water without the use of chemicals. Available as point-of-entry or point-of-use solutions, VIQUA UV systems inactivate common waterborne pathogens*—including *cryptosporidium*, *giardia*, *pathogenic E. coli (STEC/VTEC)*, *campylobacter*, *legionella*, *salmonella*, *shigella*, *norovirus*, *enterovirus*, and *hepatitis A virus*—to continuously deliver on our promise: consistently better water.† For more information, visit www.viqua.com.

*Efficacy of VIQUA UV systems has been demonstrated in internal testing using surrogate organisms, specifically MS2 Phage. MS2 is a well-documented surrogate organism that is accepted in the water treatment industry in the design and testing of UV systems being used to treat *cryptosporidium* and *giardia*. Contact VIQUA for the details on internal testing performed.

† Versus identical incoming water that is not treated with a UV system. Based on internal efficacy testing, VIQUA UV treatment systems, when installed in accordance with the manufacturer's recommendations and with use of a VIQUA UV lamp that is within its expected life, and subject to mechanical and water quality variables, can inactivate common waterborne pathogens. Actual efficacy of any particular VIQUA UV system will be dependent upon mechanical and water quality variables, including incoming water quality, the specific pathogen(s) present, age of UV light bulb, etc. Accordingly, no guarantee can be provided of actual percentage of common waterborne pathogens inactivated in an application.