

Bad things in your water aren't always **THIS** clear.



There could be something scary hiding in your water. You can't see it. You can't smell it. You can't taste it. But it's there, and it can make you sick.

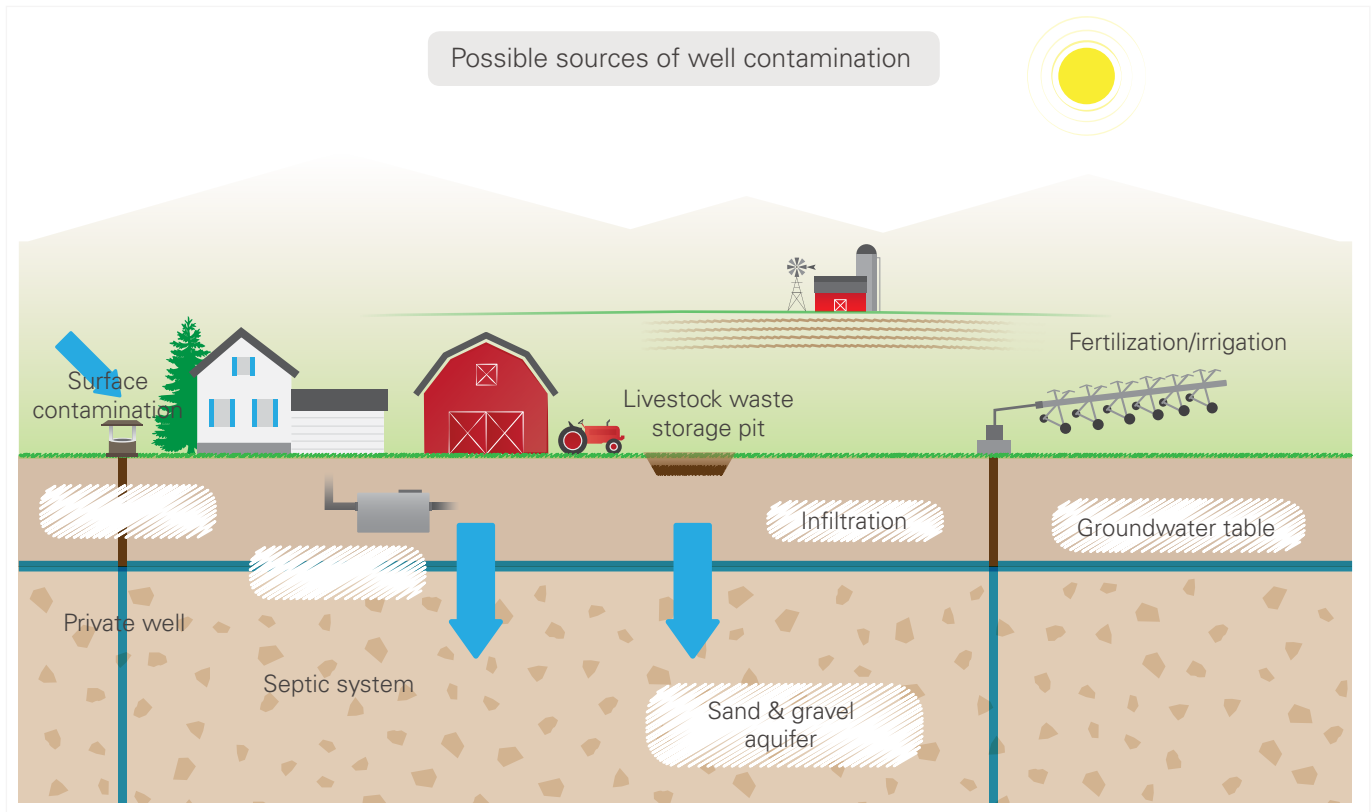
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What's in My Well?

Well, the obvious answer is.... WATER! However, it's not alone down there.

If located and constructed correctly, a well can be a source of good drinking water for decades, and many wells last longer than that. People in rural areas depend on wells for their drinking water, but, unlike large municipal and urban centers, there are no specific regulations regarding private drinking water from a well. Most areas only require private wells to be tested in the event of a real estate transaction, for insurance purposes, or for other administrative reasons. Outside of these events when testing is required, or someone actually falling ill which prompts a water test, a frightening majority of well owners never even think to test their well for issues that could be lurking in every glass of water. Microbiological contaminants in a well, such as *E.coli*, *Giardia*, or *Cryptosporidium*, are invisible to the naked eye. Clear water does not always mean safe water.



How do contaminants get into my well?

There are many ways that microbiological contaminants can enter a well. Heavy rainfall, spring runoff, or flooding events can overwhelm even well-constructed, newer wells, and introduce surface contaminants (such as agricultural run-off) into the aquifer below.

If you have an older well, there are even more potential avenues for surface contamination to enter your drinking water.

If your well was constructed using outdated practices (old well in continuous use on the property), or was improperly constructed, the chances of surface contamination increase with each decade of use due to structural deterioration.

Some of these issues could be:

- A dug well lined with poorly sealed brick, stone, or tile, or having unsealed covers.
- Improperly sealed casing through a bedrock formation or other unconsolidated formation can allow the migration of contaminated water into the aquifer.

- If the well casing does not extend far enough above the ground surface, surface water can enter the top of the well casing.
- If a well casing ends in a basement, pit, or other area prone to flooding or seepage.
- Corrosion can deteriorate old well casings and allow water to seep into the well from holes or cracks.
- Contaminated near-surface water can enter a well if the well casing is at a non-complying depth.
- Old stove-pipe casings are now considered sub-standard, as they can allow near-surface water to infiltrate the well.
- The well cap could be poorly installed, allowing insects and small animals to enter the well.
- The source of the contamination is too close to the well, and the casing does not extend deep enough to assure bacteria have been filtered out of the water that recharges the aquifer.

If you suspect any issues with your well, be it a new well or an old one, get in touch with your local Well Drilling Professional.

Septic

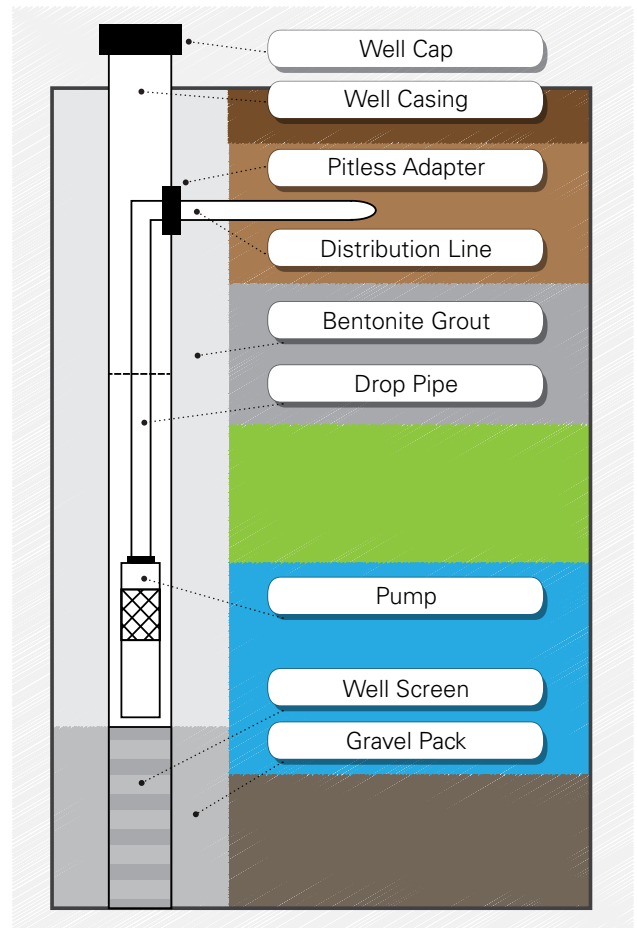
According to the EPA, improperly used or maintained septic systems can be a significant source of ground water contamination that can lead to waterborne disease outbreaks and other adverse health effects. "Cross-connections" between a well or plumbing system and the septic or sewage system can also occur. Make sure your septic system is checked annually and well-maintained to avoid contaminating your water.

It's not me... it's YOU!

Even if your own well is secure from allowing contamination of the aquifer – and your drinking water – you can't be sure that others aren't contaminating that same aquifer. Often, multiple wells are drilled into one aquifer. Aquifers can also be connected through fissures and cracks in the bedrock, and water can flow through from one to another, taking contaminants with it. If one of your neighbors has a well drilled into the same aquifer, and they have a sub-standard, incorrectly placed or incorrectly installed well, or old well, the problem could come from them. Unfortunately, your only good option in this situation is to proactively treat the water coming into your home to ensure any potential contamination is removed before the water is used.

Abandoned Wells

In long-established rural areas, many generations of people have had homes, moved homes, and built homes elsewhere, and all of these homes required water wells. When these people lived there in the past, there were no registrations for drinking water wells, unlike today, nor requirements when the well was no longer needed or had dried up, again, unlike today. Abandoned or improperly decommissioned wells can be a problem in any rural area, and can be another uncontrolled conduit for surface water to contaminate wells and aquifers. Nobody knows where all these wells are, and often times, there is no way to find out other than to stumble across them by chance. Spring run-off, heavy rain, or flooding events turn these abandoned, undocumented, and unknown wells into potential contamination machines.



The Importance of Water Testing

Have you ever been sick and weren't sure why? Felt like you had the flu, or had stomach problems, or just felt awful? We've all been sick, or had the flu. But sometimes, it's not the flu – it's the water.

Unless you do a water test, you can't know that your water isn't making you or your family sick. There are reasons people have to get water tests, such as for real estate transactions, or when a new well is drilled. However, beyond this, alarmingly few well owners have annual water tests performed. You can't deal with a problem you aren't aware is even there. Getting a water test can confirm any issues and allow you to take the necessary actions to protect yourself and your family.

For your own peace of mind, water testing is a good idea. It's also an important part of responsible well stewardship. Check your local regional health authority website, or other municipal resources, for local procedures and water testing facilities (accredited testing labs) in your area.

Please note: In some areas water tests have a fee, and in others they are free. Check with your local government websites – they often have information about the requirements in your area.

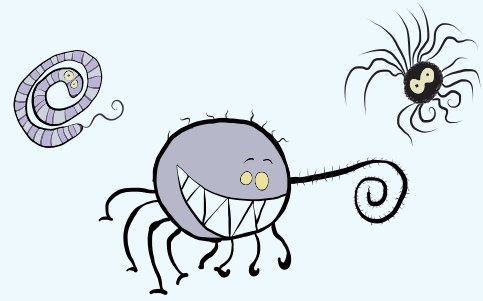
What do these numbers mean?

Water test results can be confusing without some understanding of how to interpret them. They can vary somewhat between areas and what's being tested for. In terms of determining issues with microbiological contamination, the most important measurement result is for Total Coliform Bacteria (TC).

Coliform bacteria occur naturally in soil and decaying vegetation. They are often associated with the presence of human or animal fecal contamination. Normally, coliform organisms do not grow in well water because the water is cold (10°C or 50°F) and is usually either alkaline or acidic (pH). As water moves through the ground, these bacteria are usually filtered out and do not reach the aquifer. Unfortunately, once allowed into a well, coliforms will survive for a very long time (without removal).

Many coliform organisms are completely harmless. However, there are several families of coliform, such as *E.coli*, that can make people sick, and can even be deadly. *E.coli* is found in the intestines of warm-blooded animals like dogs, cats, birds, and humans. When a water test indicates a high "Total Coliform" count, it may or may not include potentially illness-causing strains such as *E.coli*. If coliforms are present, though, they are a strong indicator that your water has been contaminated with some form of fecal matter.

What numbers should make you worry? Most labs will have call-outs at the bottom of the test results that indicate if you should be concerned about some part of the test. If there is an excess of coliforms, nitrates, or any other potential contaminants tested, it is usually listed there. This chart should help as a general guideline regarding Total Coliforms and when action is needed to correct the situation.



Giardia and *Cryptosporidium* are usually considered surface water issues and are not usually part of a well water test. However, this does not mean that they can't or won't be present in your well water. Both of these microbes live in the intestines of warm-blooded animals, and can be present wherever there is fecal contamination or surface water infiltration into a well or aquifer.

Total Coliform Section	E.coli Section	Interpretation
0-5	0	Your water is safe for drinking
> Or =6	0	Your water is unsafe for drinking unless boiled
Est. (estimate)	Est. (estimate)	Your water is unsafe for drinking unless boiled
o/g (overgrown)	o/g (overgrown)	Test was overgrown with non-coliform bacteria, making the coliform test result unclear. Your water is unsafe for drinking unless boiled.

Est.: Est. means that only an estimate of the coliforms or E.coli bacteria can be made. An overgrowth of bacteria occurred on the filter media, but the lab is still able to see some growth of coliforms or E.coli.

o/g: This listing on a report indicates that bacteria other than coliforms have been grown in the lab. They could be bacteria that feed on dissolved minerals in the well water, such as iron or sulfur, or that debris has fallen into the well and contaminated it. These other bacteria can mask the presence of coliforms; they grow faster and bigger, covering up the smaller coliform colonies in the test.

Always be safe. If there is bacteria present in your water, **DO NOT DRINK IT!** Boil all water intended for drinking or cooking for one minute at a rolling boil, and contact your local licensed well professional or Water Treatment Professional.

My results say my water is “crappy”. What now?

The first action recommended with the receipt of a “bad” water test indicating bacterial contamination is to “shock” the well. Shocking is the process of adding chlorine (often in the form of household bleach) to the well to kill off microbiological contaminants. There are many websites and other resources that explain this process thoroughly. You may have even received material from the testing lab about how to shock your well after a positive bacterial well test. You can shock chlorinate your well on your own, however, it’s best to call your local well or Water Treatment Professional to ensure that this process is done properly. There are factors that can reduce the effectiveness of shock chlorination, such as water pH, slime or biofilm on well casings, sizing and depth calculations, etc., and these factors can best be resolved or avoided with the help and oversight of a professional.

Phew... Glad that’s over with. Now I don’t have to worry, right?

If you’ve shocked your well, re-tested, and received a clear test, you would think you shouldn’t have to worry about it again. This is an assumption many well owners make, and it’s unfortunately completely incorrect. If a well has been contaminated once, it means it can become contaminated again. Water quality is NOT static and changes throughout the year. Events such as spring run-off, heavy rains, and flooding events all have the potential to re-contaminate your well at any time. And unless you can guarantee that your neighbors are taking all the proper precautions with regards to agricultural practices and well stewardship, you could end up having the same issue again years, months, or even weeks. Unless you are willing to restrict yourself to bottled water for cooking and drinking, which can be expensive and creates waste, you need to think about ongoing water disinfection treatment.

What are my options?

There are multiple options available to disinfect water of microbiological contamination. There are generally two different classes of devices, depending on whether you want to treat your water as it enters the home (POE or Point of Entry), or if you want to have a disinfection system under your sink or on top of the counter (POU or Point of Use).

It’s best to determine your needs with the help of a Water Treatment Professional. They can help you determine your need for pre-treatment (reducing hardness, acidity, etc.), which is very important for thorough disinfection. Your local Well or Water Treatment Professional will be able to help you determine which treatment system is best suited for your water conditions.

For your understanding, here is an overview of some common water treatment options, and their pros and cons:

Treatment Method	POU/POE	Benefits	Drawbacks	Maintenance	Disinfects
Chlorine	POE	<ul style="list-style-type: none"> Reduces some disagreeable taste/odor Residual disinfection Can help remove iron/manganese from water 	<ul style="list-style-type: none"> Requires storages/use of noxious chemicals <i>Cryptosporidium</i> is highly resistant Contact Tank required Requires professional installation Can alter taste/odor of water 	<ul style="list-style-type: none"> Checking for loose, worn, missing, or broken parts Lubricating the entire system semi-annually Cleaning all surfaces showing corrosion Refilling chlorine supplies Cleaning any clogged orifices 	Yes
Filters	POU/POE	<ul style="list-style-type: none"> Can remove some taste/odor problems from water 	<ul style="list-style-type: none"> Not a stand-alone solution 	<ul style="list-style-type: none"> Periodic changes 	No – Filters can remove some large microbes and debris, but do not actually disinfect
Ozone	POE	<ul style="list-style-type: none"> Water tastes great Disinfects over wide temperature ranges No disinfection byproducts 	<ul style="list-style-type: none"> Requires professional installation Requires contact tank Complex technology Ozone can require off-gassing Requires pre-treatment 	<ul style="list-style-type: none"> Periodic cleaning per manufacturer instructions 	Yes
Reverse Osmosis (RO)	POU/POE	<ul style="list-style-type: none"> Filters many contaminants from water No chemicals required No disinfection byproducts 	<ul style="list-style-type: none"> Can be wasteful of water (as much as 1-3 gallons of waste water for 1 gallon of product water) Can demineralize water pH sensitive Can require pre-treatment Often requires professional installation 	<ul style="list-style-type: none"> Filter replacement Membrane replacement 	Maybe – Some RO units are specified to remove microbiological contaminants, but most are not. Check manufacturer's specifications.
Softeners	POE	<ul style="list-style-type: none"> Used as pre-treatment for hard water or other water treatment conditions 	<ul style="list-style-type: none"> Requires professional installation 	<ul style="list-style-type: none"> Salt or media monitoring and replacement as required 	No. Softeners are used as pre-treatment solutions for other disinfection methods
Ultraviolet Light (UV)	POE/POU	<ul style="list-style-type: none"> Requires no chemicals – no disinfection byproducts Can be installed by homeowner Effective against resistant microbes Does not alter taste/odor of water 	<ul style="list-style-type: none"> Usually requires pre-treatment 	<ul style="list-style-type: none"> Yearly lamp replacements Occasional quartz sleeve cleaning/replacement 	Yes

For more information about how UV can keep your water safe, visit www.KnowUV.com.

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A TROJAN TECHNOLOGIES BUSINESS

425 Clair Rd. W, Guelph, Ontario, Canada N1L 1R1
 t. (+1) 519.763.1032 • tf. 1.800.265.7246 (US and Canada only) • t. +31 73 747 0144 (Europe only) • f. (+1) 519.763.5069
 e-mail: info@viqua.com www.viqua.com

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