



Selling Disinfection to the Public

By Mark Hutchinson

Summary: Disinfection should be considered a minimum level of treatment for those relying on private water supplies for their potable water needs. Oddly, it often is not. Ultraviolet (UV) technology is one of the most effective, convenient and affordable whole-house solutions for effective disinfection.

A few years ago, how many Canadians had heard of *E. coli*, *Cryptosporidium* or *Giardia*? Today, these waterborne bacteria and parasites are almost as well known as polio, typhoid, cholera and hepatitis were to an earlier generation. Waterborne microorganisms can cause serious illness if they contaminate our drinking water.

The recent contaminated drinking water tragedies in Walkerton, Ontario, and North Battleford, Saskatchewan—as well as similar outbreaks in other areas of the world—have taught many of us not to take the purity of our drinking water for granted. This is especially true for those who don't have access to a municipal water treatment system for their daily water needs.

Problem wells

About 15 million people in the United States, and another 4 million in Canada, rely on private wells for their domestic water. In states and provinces where testing of private wells has taken place, 20 to 40 percent of wells are commonly found to be contaminated by fe-

cal coliform bacteria, which is an indicator of the presence of harmful microorganisms.

For those who live in rural areas or summer in cottage country, taking precautions to ensure the safety of their drinking water is starting to become a way of life. Although aesthetics are important, people are growing more concerned about the presence of harmful microorganisms in the water. For those who aren't, they should be.

Contamination of wells isn't a permanent condition that affects some people and never affects others. Run-off events, changing land use patterns, and other water-related events can cause either permanent or temporary contamination of a well. A well that's tested safe one day may not be safe the next day. At the same time, a contaminated well may be found to be safe again a week after a contamination event. Proper monitoring and disinfection are therefore important.

Furthermore, the safety of a well shouldn't be measured by the presence of one type of organism (i.e., *E. coli*) or even a family of organisms (i.e., coliform bacteria). The former is surely dangerous, and the latter is a proven indicator of possible contamination; however, neither is an absolute indicator of the presence (or absence) of other harmful bacteria, viruses or cysts. And iron and sulfur-reducing bacteria can

be problematic as well. Prevention is thus the order of the day, and residents on private wells should be made aware of this. As a result, some governments suggest "the widely-accepted minimum treatment for a groundwater source is disinfection."¹

Odd behavior

In reality, the widely accepted minimum treatment is filtration and, frequently, softening. Filters may improve taste, clarity and smell of a water supply, and softeners may improve your shampoo's lathering, but neither will necessarily make the water safe from bacterial contamination. Oddly, it's not that people don't consider safety their No. 1 concern—any survey will indicate that. Rather, it's that people don't always "put their money where their mouths are."

Taste, clarity and smell have an immediate impact on the desire to consume a particular source of water. Safety, while more important, is something that is less easily assessed. A number of people on private wells consider that if no one has gotten ill in the past, there's no reason to fear things will change in the future. Even residents who indicate they're worried about the safety of their water often will only do something when they receive a bad water test. As someone new to the business once said upon learning of this behavior, this is like "putting on your seat belt after you've

crashed your vehicle into the concrete median.”

As a matter of fact

An honest and straightforward approach is required when selling disinfection. Selling disinfection isn't about using scare tactics—it's about selling the facts.

Here are some key points to remember about disinfection:

- A surprising percentage of wells are contaminated with harmful pathogens,
- Water quality can vary over both short and long time frames, even from day to day,
- There is a variety of pathogenic bacteria, viruses and cysts, and not simply *E. coli*,
- Prevention is a must,
- Water testing isn't adequate, and
- Disinfection is considered by government agencies to be the minimum treatment.

Explaining the options

Convinced of the need to assure the safety of their drinking water, customers want to know what options are available. One extremely appropriate treatment method is the use of an ultraviolet (UV) disinfection system. Water treatment dealers, however, may want to help customers feel confident about their eventual decision (and about the dealer's professionalism and honesty) by explaining the advantages and disadvantages of the various options, which include drinking bottled water, chlorinators, ozonators, filters, distillers and boiling the water.

There are many criteria by which to evaluate the possible solutions. Many are standard for any purchasing decision—effectiveness, cost and convenience, among others. One criterion sometimes overlooked is whether or not each option represents a whole-house solution. Too often, people only focus on their drinking water with undersink options. Yet, it's important to disinfect all the water used in the home—water for bathing, brushing your teeth, washing dishes, cooking and other purposes.

UV disinfection

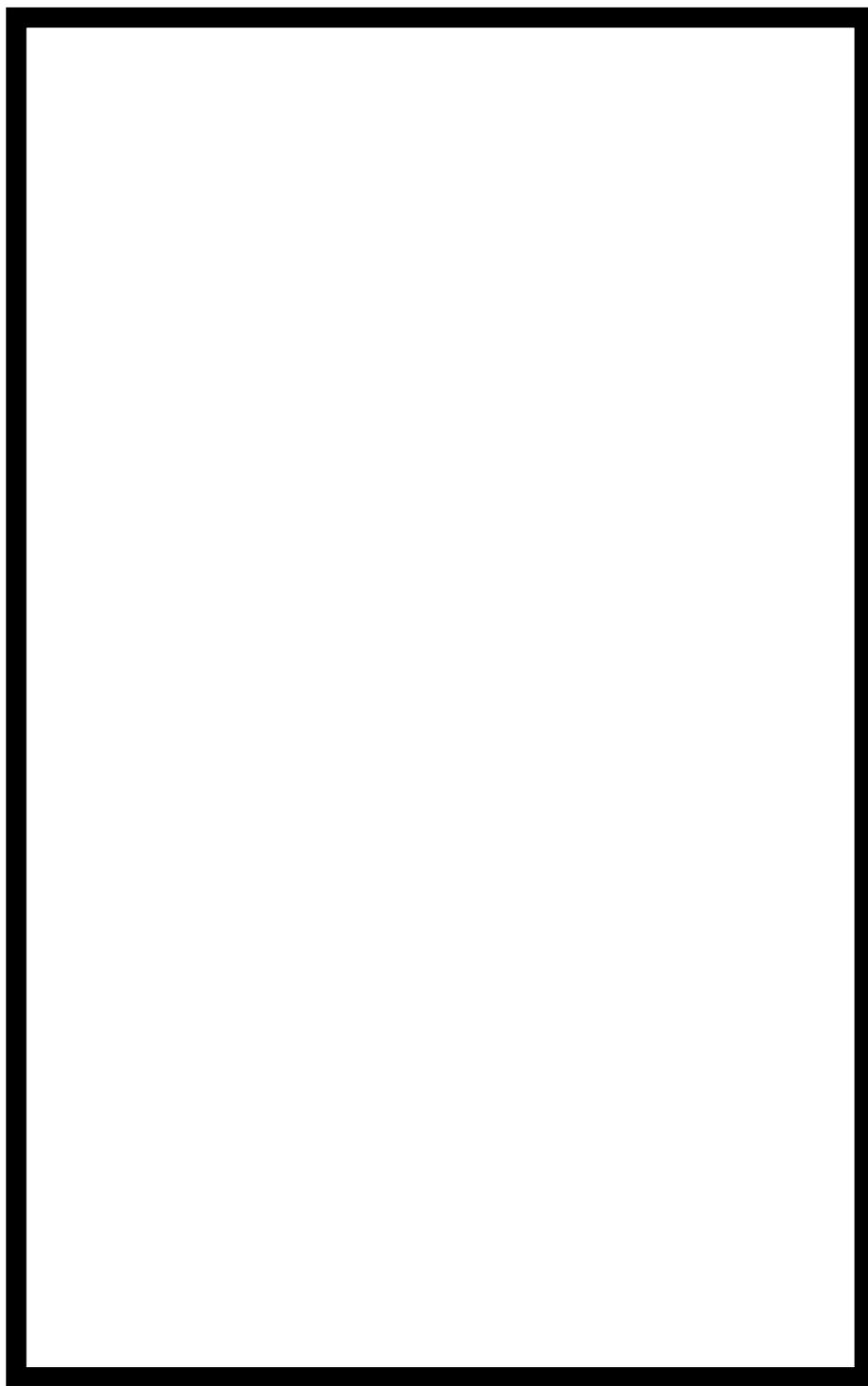
UV disinfection has been used in water treatment since the late 1970s and is a cost effective, reliable way to kill virtually all waterborne microorganisms. To disinfect water, UV systems use a specialized lamp. It's convenient, environmentally friendly and provides a whole-house solution for all residential needs—drinking water, personal hy-

giene, cooking and other uses. The taste of water isn't affected, and there are no harmful by-products created. Maintenance generally requires only an annual lamp replacement and sleeve cleaning. If a customer is interested in a UV system, he or she should consider one that's certified and listed by NSF International. This certification validates the reported effectiveness of the system.

Bottled water

Bottled water is not a treatment op-

tion but rather an option to treatment, in that some people consider buying it an acceptable way of dealing with bad or suspect water. It's convenient in some ways and not in others. Bottles can be purchased at any local grocer; however, they must be carted home and eventually recycled. Bottled water is, of course, often delivered. The two most important reasons why people on private water supplies concerned about safety might choose bottled water are ease of decision-making (no need to learn about



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equipment), and a low initial investment. While the low upfront cost of bottled water is an important driver, the cumulative cost can be high. Indeed, Americans spent almost \$6.5 billion on bottled water in 2001, according to Beverage Marketing Corp.'s recent report, *Bottled Water in the U.S.* Finally, bottled water isn't a whole-house solution, though some people have been known to put bottled water in every room of the house.

Chlorinators

Chlorinators add chlorine to water stored in a tank, allowing sufficient contact time to kill harmful microorganisms. These systems require regular purchase and handling of chemicals, and they can be prone to maintenance issues. Chlorine is effective against most bacteria and viruses, but not against *Cryptosporidium*. This is an important consideration since it was this parasite that recently caused widespread illness among 14,000 people in North Battleford, Saskatchewan, and the death of 104 people in Milwaukee in 1993. It also is susceptible to certain potentially cancer-causing disinfection by-products (DBPs) in waters containing organics, notably trihalomethanes (THMs) and haloacetic acids (HAAs).

Ozonators

Ozonation like UV is a very effective disinfectant. Ozone can be problematic, however, because while it has a short half-life, it can be a volatile chemical and should be closely monitored. Most often it's used in municipal and commercial/industrial applications, although a few practical residential systems have been developed. Like chlorine, it also has a DBP—bromate—in waters containing the bromide ion.

Filters

Filters vary widely in cost and performance. Most aren't very expensive and are easy to install, but they aren't effective against many waterborne microorganisms. These filters are meant to remove sediment, taste and odor from the water. They may remove pathogens, although they aren't designed to remove sufficient numbers of them (typically a 99.99 percent or 4-log reduction is sought with any disinfection system). Filters may also treat water for the entire household.

At the extreme of filter performance are reverse osmosis (RO) purification systems, which are typically practical for point-of-use only given their high cost. Still, RO systems aren't immune to bacterial growth and may require a post-treatment disinfection system for those with weakened immune systems. Some manufacturers offer such a system as part of their product. Though maintenance is simple, pre- and post-filters require regular replacement and membranes should be replaced every three to five years.

Distillers

Distillers represent a way of boiling water and removing unwanted contaminants more efficiently and conveniently than you can in a pot on the stove. They are nonetheless energy intensive, and don't provide water that's immediately consumable (i.e., cold). They aren't a whole-house solution.

Boiling water

Boiling water is an option with almost no upfront cost, though the energy use does add up. More importantly, boiling water is very labor intensive and inconvenient in that it doesn't produce immediately consumable water. It can also

concentrate rather than remove some volatile contaminants. Like distillers, boiling water isn't a whole-house solution.

Opportunities everywhere

Consumer awareness is increasing. The number of water tests performed is growing, and there are more and more people taking preventative measures. Still, consumer behavior sometimes needs encouragement. It's not that people don't care enough for their families. The flaws in their knowledge or reasoning must simply be addressed. They must understand the dangers and realize that, without proactive measures, their safety may not be assured. This doesn't necessarily need to be done through a sales pitch that focuses on fear—but rather one that stresses the positive health benefits of treated water. One should keep in mind also that combining technologies mentioned above offers a more pragmatic, multi-barrier solution to water treatment than any one individually. And adding UV to the mix offers even more assurance. In fact, UV (like RO) typically includes pre-filtration, making the complete package a multi-barrier solution.

Conclusion

In the end, every customer on a private water supply should take steps to assure their supply is safe at all times. Many of these customers are already in the marketplace, buying filters, softeners, salt, pumps and other pieces of equipment and supplies. A well-trained representative should be able to succinctly deliver the message that there is reason for concern and that reacting to an incident after the fact isn't worth the risk, especially given the affordability and convenience of some available options. In many ways, the most effective, convenient and affordable of these disinfection options is a UV system.

References

1. Ontario Ministry of the Environment, "Drinking Water Treatment," p. 11, December 2001.

About the author

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Battle over WG-13 in Europe

Infighting at the European federation of national water treatment associations continues over the position of convener of Working Group (WG) 13, the subcommittee on water softeners for Technical Committee (TC) 164, which is in charge of standards harmonization for water treatment equipment.

The "chairmanship" of German testing and certification agency DVGW's Dr. Ivo Wagner has some annoyed because of his positions regarding heterotrophic bacteria restrictions, softener autodisinfection and hard water blending—all of which are mandated in Germany. But an attempt to question the validity of his election as convener went nowhere. Thus, Wagner's opponents are seeking to invalidate any standard that may be passed by WG-13 that include the restrictions. They'd prefer the issue were left in limbo, rather than have a standard approved "based on unsound science."

To date, a number of other harmonization measures have taken place (see www.cenorm.be/standardization/tech_bodies/cen_bp/workpro/tc164.htm). The softener standard has been stalled.

—Carlos David Mogollón