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How Safe Is Your Water?

Matching Treatment Needs & Solutions

By Mindy Hermann

It's a scary water world out there. Pesticides, runoff from landfills, bacteria, cysts and other contaminants—not to mention bioterrorism—can compromise our drinking water. On top of it all, unlike taking a sip of milk that has spoiled, you usually can't tell you're drinking contaminated water; many harmful contaminants have no detectable smell or taste.

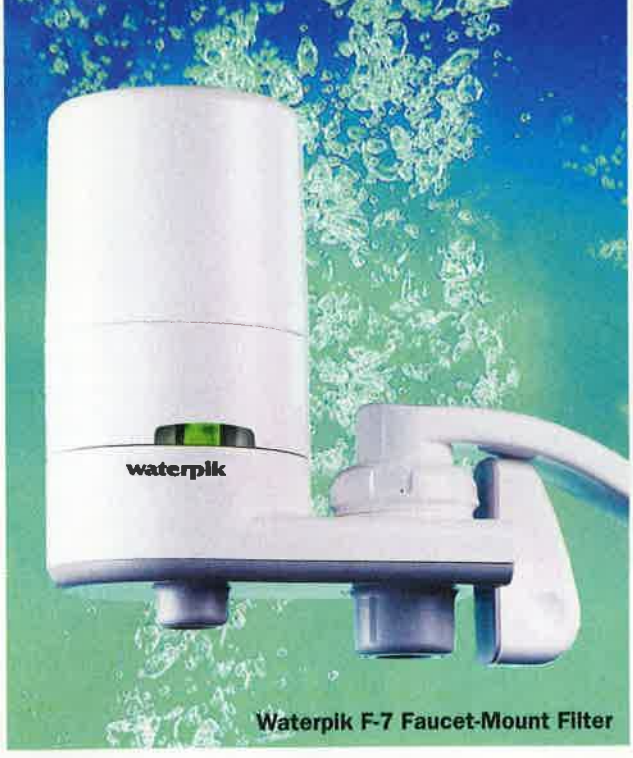
Should you worry? The Safe Drinking Water Act, passed in 1974, authorizes the Environmental Protection Agency to set standards for public drinking water. As a result, municipalities have been charged with minimizing organic chemical contamination of municipal drinking water. (Private wells are not covered by this Act.) Some municipal systems are unable to remove all contaminants, however; plus, contaminants can enter your household water supply somewhere between the plant and the tap. But there's no need to panic.

For those who need to treat their household water, and for those who wish to incorporate supplemental purification, you should know the market is flooded with household water filtration systems. You can waste money on a system that's inappropriate for your needs unless you understand the ABCs of H_2O.

What's the Problem? Water potentially can be contaminated by dozens of substances. Most common are compounds that make water smell and taste bad. Often this is a result of chlorination, a process that kills bacteria. Some water is contaminated by heavy metals. Older houses may have lead pipes that leach lead into the household water. Other metals may be present in your groundwater. Chemicals like pesticides, herbicides and industrial by-products likewise can find their way into water, particularly well water that has not been treated by a municipality. Bacteria and bacterial cysts from animal feces are problematic in some regions.

(Hard water creates problems like clogged pipes, crud, scale on the faucet, and stains on plumbing fixtures; these require a water softener, not filtration. See the sidebar article *Treating Hard Water Is Not Difficult* on page 53.)

Water testing is the first step in determining your filtration needs. Start with your local water authority



Waterpik F-7 Faucet-Mount Filter

if you have municipal water; the authority is required to perform routine testing of the water it supplies. Well water must be tested on a regular basis, since contaminants seep into groundwater and can affect your drinking supply.

Water engineers can be contracted to test your household water. To be absolutely thorough, test water at the point of use—that is, your kitchen faucet. You also can send a sample of your water to be tested by a national laboratory. National Testing Laboratories (NTL) (www.ntllabs.com; 800/458-3330) and Suburban Water Testing (www.h2otest.com; 800/433-6595) are two. NTL charges $161.95 for a 75-item check for bacteria, metals, organic compounds and other contaminants. Of course, the fewer contaminants explored, the lower cost the test. Suburban Water Testing will test for coliform bacteria, nitrate, nitrite, chloride, fluoride and sulfate for $95.00.

A water filter distributor may offer to test your water, but remember it has a vested interest in selling you a system. You're better off with a neutral party.

No one filter will correct every water problem. Sometimes all that's required is a simple carbon filter. Conversely, severely contaminated water may require a combination of filters. Read product specs carefully, since products differ greatly in the contaminants they reduce or remove.

Your first choice is between a point-of-entry (POE) and point-of use (POU) system.

POE systems treat your whole house. They have a large-bore filter to screen out rust, dirt, sand, silt and sediment. Some also can remove chlorine. Filter replacements tend to be inexpensive.

A POU system is best for contaminants that affect health, such as nitrate and lead, and that need to be removed from drinking and cooking water.

Activated carbon filters are the most common POU filters. They work by attracting and adsorbing chemicals into their highly porous carbon as water passes through. They are best for removing chlorine, tastes, odors and some volatile organic chemicals (VOCs). In general, they do not remove metals or nitrates, nor bacteria. In fact, they can be a breeding ground for certain bacteria. Some manufacturers add silver to their carbon filters to reduce or prevent bacteria growth.

"Some (carbon filters) are certified to remove just chlorine, tastes and odors, while others are certified to also remove lead, organic compounds and giardia cysts," says Jim Hairston, Ph.D., Professor of Agronomy & Soils, and ACES Water Quality Coordinator, Auburn University.

Small-bore filters are best for eliminating bacteria and cysts. Ceramic filters eliminate fine particulate matter, bacteria, cysts and turbidity (that is, cloudiness from fine particles) and can be rinsed out. Only a few systems contain this type of filter.

Filters with tiny holes measuring 5, 1 or 0.5 microns (in comparison, a strand of hair is about 100 microns) must be paired with a 50-micron prefilter to prevent clogging by larger particles.

Reverse-osmosis (RO) filtration units remove most inorganic chemicals, namely salts, metals and minerals, most microorganisms, and many organic chemicals. RO systems contain at least three different filters. A mechanical filter removes dirt, sediment and other impurities; these can clog the delicate RO-membrane middle filter, which takes out dissolved solids, including salts, metals, minerals and suspended particles such as asbestos. RO can remove the sodium from softened water and also certain organic contaminants, detergents and pesticides. An activated carbon filter removes chlorine and bad odors and tastes. A carbon-block filter can remove or reduce trihalomethanes (THMs), chloroform and other compounds that remain in your water after it has been chlorinated to destroy algae and other plant matter. This type of filter can also remove some pesticides, solvents and other VOCs that RO does not filter out.

A major downside of RO is that it wastes a lot of water. For every gallon of clean water, you waste three gallons.

"In general, about 75 percent of water going through the filter goes to waste," according to Dr. Hairston.

He points out that while an RO system can be adjusted to waste less water, it does create higher maintenance costs, because filters clog more readily.

The distillation process vaporizes water into steam. Steam is then condensed into water, leaving behind min-

Quixtar eSpring Countertop Water Purifier

Treating Hard Water Is Not Difficult

Do you have trouble working soap into a lather using the water in your house? Are you plagued by soap scum crusting in your sinks? The problem may be hard water.

Hard water contains high amounts of calcium, magnesium and iron picked up from the soil. Calcium and magnesium clog pipes with scale and leave soap scum. Iron stains sinks, toilets, clothing and linens. When your water is hard, soaps and detergents don't work as well.

Water filters do not remedy hardness; instead, you need to install a water softener.

Water softeners get rid of calcium and magnesium through a process called ion exchange. Hard water passes through a tank that is filled with charged polystyrene beads that attract ions like calcium and magnesium. When you start up your softener for the first time, the beads are first washed with salty brine. As your hard water flows through the beads, calcium and magnesium cling to the beads and push the sodium off and into your water. That is why softened water has a very slight salty taste. (Most softened water contains relatively low amounts of sodium—about 75 milligrams per quart in water that had an initial hardness of 10 grains per gallon [gpg]. If you are on a sodium-restricted diet, you can use more expensive potassium chloride or you can purchase a reverse osmosis [RO] system to remove the salt from your drinking water. Of course, you can simply drink and cook with bottled water.)

When your tank has reached its capacity and the beads can't hold any more calcium and magnesium, the softener "regenerates" by backwashing to flush dirt out of the tank, flush the beads with brine to recharge them with sodium, and flush calcium, magnesium and excess brine out of the tank. The typical softener regenerates in the middle of the night, because most systems cannot regenerate and dispense soft water at the same time.

The first step in buying a water softener, as with a water filter, is to have your water tested. If you use municipal water, call your water district office for its test results. Water up to 1 gpg, or about 17 parts per million, is considered soft; 10 gpg is considered to be hard water, according to the Water Quality Association, which represents the water treatment industry. (To convert parts-per-million [ppm] to gpg, divide ppm by 17.1.) Remember to also ask about iron content.

An independent laboratory can test your water for hardness, iron and a variety of potential contaminants.

Note: A water softener dealer may be able to test your water, too, but, don't forget, it has a vested interest in selling you a softener.

"When choosing a system, it is most important to select the right-size softener based on compensated hardness, which takes into account the hardness and iron content of your water," advises Mark Hoover, a certified water specialist at Worldwide Water Systems, Akron, Ohio. Softener "size" is measured in grains, which takes into account water hardness and the number of people in your household. A softener that is too small will need to regenerate often and uses a lot of salt and water.

Check out the size of your water pipe. Some softeners can fit on three-fourths-in. pipes; others are designed to fit 1-in. pipes but can be used on a three-fourths-in. pipe with an adapter.

Another important consideration is regeneration cycle. Softeners come with one of three types of controls: automatic, demand or mechanical (no electricity needed). Some systems with a two-tank configuration can regenerate and supply water at the same time.

Automatic timers signal the system to regenerate at a set hour every few days during low water use, typically 2 a.m. This type of softener should be disconnected to prevent unnecessary regeneration if you go away.

Demand timers regenerate based on the amount of water used. A demand system saves money over time but is more expensive initially. The added expense of about $30 to $150 may make more sense if you have three or more household members. Expect your system to regenerate up to three times a week. The more often your system regenerates, the more water, salt and electricity you use.

Mechanical systems work on a timer or a valve that monitors the number of gallons used.

Other factors to consider are warranty, installation and service.

Some warranties are more generous than others, but most water softeners are trouble-free, says Harry Jacobson of Jacobson Plumbing in Cave Creek, Ariz. "Mechanical timers on older models had problems, but new digital timers are much more reliable."

Many plumbers recommend systems with Fleck controls, available mainly through plumbing supply stores and over the Internet. The Fleck control and many other companies' commercial controls are inexpensive, but they come unassembled. Some systems can be serviced only by the manufacturer.

Before you decide to order and install your own system, check out the installation instructions online to make sure you're up to the task.

"If you hire a plumber, expect him to spend about two hours hooking up your system," says Hoover.

Depending on where you live, installation plus parts will run you $100 to $200 or so.

Or take the easy way out. Major distributors like Culligan and Kinetico handle everything from customizing your system to installation to service. You pay a price for this but it makes owning a softener virtually trouble-free.

You can select a basic softener or go for the bells and whistles. Added features cost more but buy convenience and may save money.

Culligan, for example, offers its "Aqua-Sensor" control that adjusts to daily usage and water hardness, meaning regeneration is done only when necessary. GE's advanced monitor shows average water usage, water flow rate and days until your salt tank is empty. RainSoft systems include customized controls.

Don't fall prey to hard sells and extremely high prices. Lawsuits have been settled and are pending against at least one manufacturer, whose independent dealers used deceptive telemarketing and scare tactics and made unfounded claims about its system's benefits.

Plumbers also caution against magnetic systems that "condition" water. They have not been scientifically proven to soften water or offer health benefits.

érals, bacteria and other substances. Distillation is a slow process—generating only 2 to 5 gal. daily—wastes water and is expensive. *(Editor's Note: Distillation systems were not considered for Best Buys.)*

Ultraviolet (UV) systems kill bacteria and viruses. Many systems combine a UV lamp with a carbon-block filter. Both must be replaced on a regular basis.

It Goes Like This. Once you've identified the type of filter you need, pick the filter style that best fits your budget and habits.

A pitcher is inexpensive (around $20) and easy to use, as long as you remember to fill it up. Its carbon cartridges have long shelf life, so you can stock up when they are on sale.

Faucet-mount filters (about $20 to $40) have a similar carbon-based technology. If you forget to switch to unfiltered water for scrubbing dishes, your water use will go up and the life span of your filter cartridge will go down. Klutzy cooks may want to avoid faucet-mount filters, as they can get in the way when working around the faucet.

Countertop and under-sink models filter a greater volume of water and use larger, longer-lasting cartridges. Your initial outlay will be higher for one of these systems, especially if you go for RO (from about $85 to $540 for countertop devices, and from about $45 to $350 for under-sink units). Systems that use carbon cartridges are relatively inexpensive to maintain, but if you have an aversion to poking around under the kitchen sink to change filters, stick with countertop models.

Installation ranges from easy to difficult. Pitchers are a breeze; replacing a filter means pulling the old one out and popping the new one in. Faucet-mount systems, and some countertop models, require no more than the right wrench for removing your aerator and replacing it with the filter. Countertop/under-sink hybrids and pure under-sink systems can be complicated to install. Space under the sink usually is tight, requiring dexterity and experience in maneuvering in tight spaces. If your plumbing skills aren't up to the task, hire a plumber.

Best Buys in Water Filters,

Best Buy Categories:
[P]=Premium selection;
[M]=Midrange selection;
[E]=Economy selection;
See page 72.

Water Filters & Purifiers Pitchers

[E] PūR Ultimate Pitcher
List: $24.99; Best Price: $19.50
Two-step process using activated carbon, an ion exchange resin and a pleated microfilter treats chlorine, sediment, several VOCs, bad taste and odor, and cysts, as well as reduces lead, copper and asbestos. The pitcher holds 8 cups. Each filter provides up to 40 gal., about a 2-month supply, and has a built-in "Automatic Safety Monitor" gauge that shows how much filter life is left and when to replace it. The best price found for this unit's filter was $35.99 online for a package of five.

[E] Brita Classic Water Filtration Pitcher
List: $19.99; Best Price: $16.88
This pitcher reduces chlorine, sediment, bad taste and odor, zinc, benzene, metals, lead and some VOCs. Its filter should be replaced every 2 months. The best price found for this unit's filter was $16.99 online for a package of three. Replacement cartridges cost around $20 for a package of five.

Faucet-Mount

[M] PūR Ultimate Faucet Mount
List: $44.99; Best Price: $40.99
This high-end system reduces trihalomethanes, asbestos, atrazine, benzene, chlorine, lead, lindane, mercury and other compounds. Its 1-micron carbon filter traps cysts. The "Automatic Safety Monitor" shows how much life is left in the filter and when to replace it. Filters are good for 100 gal., or up to 2 months. The best price found for this unit's filter was $48.99 online for a package of four.

[E] Waterpik Model F-7
List: $34.99; Best Price: $20.88
This carbon-block system is NSF-certified for a range of contaminants, including chlorine, bad taste and odor and particles (NSF/ANSI 42) and cysts, lead and asbestos (NSF/ANSI 53). A green/yellow/red monitor light indicates when to change the filter. Filters are good for 200 gal., or about 3 months. The best price found for this unit's filter was $12.99 apiece online

Countertop

[P] Quixtar eSpring Water Purifier
List: $539; Best Price: $539
An expensive product for sure, but if you're looking for a UV system, this is one of the few that has been NSF-certified. With its UV light and carbon-block filter, it reduces more than 140 contaminants and improves taste and odor. It is certified under NSF 42, 53 and 55B (for treating microorganisms with UV light). Electronic "smart chips" signal when to replace the filter cartridge, no less than once a year. The best price found for this unit's filter was $164.95 online for a single filter cartridge with a UV lightbulb.

[M] Doulton CP100SC
List: $199; Best Price: $139.99
This NSF-certified product features a cost-effective ceramic filter and a carbon filter that reduces chlorine, improves taste and odor, and reduces cysts, pesticides, solvents, lead, iron and other metals. It filters down to 0.5 microns. It does not have a filter-change indicator. The best price found for this unit's filter was $42 online for a single filter.

Filtration systems sometimes come with helpful, non-filtering-related features. A visual filter-change indicator lets you know when it's time to swap filters. Pay for a premium product and the manufacturer may even notify you when your filter needs changing, send you supplies and send a service rep to give you a hand.

If you're a home-improvement or warehouse-store shopper, consider a brand whose filter replacements are sold in your favorite store. Love ordering online? Then by all means choose a brand that sells over the Internet. Are you prepared to change your own filters? If not, choose a brand with a service contract.

Don't try to kill a fly with a sledgehammer. If your only complaint is off-odors and -flavors, you probably don't need an expensive multifilter system. Make a small investment first in something like a pitcher system to make sure you like the taste of filtered water before spending big bucks.

Limit your search to products that have been certified by the National Sanitation Foundation (NSF) or by the Water Quality Association (WQA). NSF is an independent, not-for-profit organization that establishes standards

Purifiers & Softeners

[E] Aquasana AQ-4000C
List: $119.95; Best Price: $84.88
A dual-filter, carbon-block system that handles a wide range of contaminants: chlorine, turbidity (cloudiness), inorganic compounds, organic chemicals, lead, parasites and particles down to 0.5 microns. The filter set should be replaced twice a year. It does not include a filter-change indicator. The best price found for this unit's filter was $42.88 online for a dual-filter cartridge.

Under-Sink

[P] American Plumber RO-3500
List: $349.95; Best Price: $349.95
This RO system is NSF-certified for reduction of arsenic, heavy metals, lead, nitrate and turbidity. It also reduces cysts and bad taste and odor. You get a lot of machine—an RO filter plus a carbon filter set that remove a multitude of contaminants—for the money. It does not come with a filter-change indicator. The best price found for this unit's filter was $35.95 online for a single cartridge.

[M] GE SmartWater Dual Stage Drinking Water Filter GXSV10C
List: $159.00; Best Price: $149.00
This system contains two separate carbon-block filters, one for aesthetics like sediment, taste and odor, and the other for chemicals, VOCs and cysts. An electronic filter-change monitor is included, as is a faucet. Filters should be changed every 6 months or approximately 600 gal. The best prices found online for this unit's filters was $9.97 for the sediment filter and $33.97 for the chemical filter. Both filters should be changed at the same time.

[E] Waterpik Model IF-10A
List: $52.60; Best Price: $44.99
This basic unit is NSF-certified to reduce chlorine, bad taste and odor. It does not include an indicator light to signal when the filter should be changed. It should be changed every 6 months. The best price found for this unit's filter was $12.99 online for a single filter.

Water Softeners

[P] Culligan Gold Series Water Softener
List: N/A; Best Price: N/A
This full-feature model is the standard for premium softeners. It is suitable, the company says, for any size household. Its "Quadra-Hull" tank has four layers that resist rust and corrosion, so much so that the tank carries a limited lifetime warranty. The "Accusoft Plus" microprocessor offers precise regulation. Varying tank sizes allow customization to the homeowner's particular needs. The optional "Aqua-Sensor" monitors the chemistry of the tank so it regenerates only when needed. Culligan trains its own service technicians and performs its own installation. Price is set by the individual dealer and depends on tank size and features.

[P] Kinetico 2020C
List: $1,995; Best Price: $1,995
This compact, nonelectric, twin-tank softener can supply soft water continuously without stopping to regenerate. (It regenerates only when necessary and has an unlimited supply capacity.) The unit is powered by moving water and has no monitors or timers. Price includes installation (Kinetico requires that it install the unit) and a 10-year parts warranty.

[M] GE SmartWater Extra Large Capacity GXSF35E
List: $669.00; Best Price: $669.00
This 35,000-grains-per-cycle unit is best for families of two to four. It features a deluxe, demand-driven, electronic monitor with a status light and audible alarm. The system regenerates approximately every 3 days, is low wattage, and is said to have among the least salt requirements in the sector. GE offers a 10-year limited warranty on the tank. Installation is somewhat complicated—pipe cutting and soldering are necessary, and local building codes need to be consulted.

Brita Classic Pitcher

[E] Fleck 5600 Timer Control Valve Water Softener (24000 Grain Capacity)
List: $741.00; Best Price: $399.00
This 24,000-grains-per-cycle softener features a basic Fleck timer; add $30 for a standard demand-regulated meter or $70 for an electronic demand-regulated meter. In addition to a 120-day, money-back guarantee, you get a 10-year warranty on the tanks and 5-year warranty on the control valve. Assemble or install yourself, or hire a plumber.

For more information on the above Best Buys, contact the manufacturer directly. See page 68.

and administers testing and certification programs. WQA is a trade organization that certifies filters and filter systems. (The WQA recently switched to a higher level of approval for filtration products.) These organizations ensure that a product removes what it claims to remove. A claim by an independent lab performing tests according to NSF standards does not guarantee that the product meets NSF or WQA standards.

A system can be certified for some or all of the possible filtration claims. Check with NSF (www.nsf.org) or WQA (www.wqa.org) for the most recent certification information on products you are considering. You can search their Web sites to find out which brands have been certified in the following categories:

NSF/ANSI 42: Drinking Water Treatment Units—Aesthetic Effects

Bacteriostatic; reductions of chloramines, chlorine, hydrogen sulfide, iron, styrene, bad taste and odor, zinc; scale control; particulate

NSF/ANSI 53: Drinking Water Treatment Units—Health Effects

Numerous organic compounds

NSF/ANSI 55: Ultraviolet Microbiological Water Treatment Systems

NSF/ANSI 58: Reverse-Osmosis Drinking Water Treatment Systems

Heavy metals, cryptosporidium and giardia cysts

Buy from a reputable company that will be available to provide service and repair or replacement parts. ◐

Mindy Hermann is a registered dietitian and writer specializing in food and nutrition. She is co-author of Readers Digest's Change One and has written for numerous health and women's magazines. She was once a devoted user of water-filtering pitchers; her municipally supplied water easily overwhelmed under-sink water treatment systems. She has since moved.