HOME CARE

Water treatment

From Consumer Reports, January 1990

For most people in most parts of the country, there's nothing harmful in the drinking water. Public supplies, whether from wells or municipal reservoirs, are either clean to start with or are clarified to bring them up to par. Some of the people who sell water filters and other treatment devices hope you don't know that. The less you know about what's in your water, the easier it is for less-than-scrupulous salespeople to sell you equipment you may not need.

Plenty of responsible businesses and salespeople are in the water-treatment business. But the selling of water-treatment devices has itself become polluted by high-pressure sales tactics used by sellers of legitimate products and by deceitful sales tactics used by scam artists selling unneeded products.

Door-to-door water-treatment purveyors sometimes pose as pollsters taking a survey. Once inside the door, they may flourish newspaper clippings about local water problems and "test" your water on the spot. In one supposed test, an unnamed chemical, often a flocculating agent, is added to a sample of the homeowner's tapwater. When a sludgelike residue precipitates to the bottom of the container, the salesperson cites that as proof that the household water needs treatment. Actually, the chemical agent has just made ordinarily harmless minerals settle out in a way that visually exaggerates their importance.

What gives these scare tactics an air of credibility is that some drinking water problems are very real. More than 70,000 known contaminants—industrial and agricultural wastes, heavy metals, radon, and microbes—have been found in water. While such contaminants may affect only a portion of the population, they have with good reason drawn a good deal of attention.

If you're concerned about your water quality, the first step is to find out what's

in the water. If you draw your water from a community water system, ask to see the water utility's latest laboratory test results. If you have a private well, you might be able to get information on local water problems from your town public works department or from the local agricultural extension service.

Before doing business with any company you don't know, call your local Better Business Bureau or consumer-protection agency to find out if there are unresolved complaints against it. If you have complaints yourself, report them to the local BBB and to the Federal Trade Commission (Washington, D.C. 20580). You can get information about water treatment from the Water Quality Association, a trade group (4151 Naperville Rd., Lisle, Ill. 60532).

How to test your water

Don't depend on tests done by companies that sell water-treatment equipment. Consult a reputable, state-certified, independent laboratory. Tests cost from $20 to $200, depending on their complexity.

You can often find a lab by asking a local realtor or by looking in the Yellow Pages under "Laboratories—Testing." Or you can use a mail-order lab. Our past tests have turned up three reliable ones: *WaterTest*, 33 South Commercial St., Manchester, N.H. 03101, telephone 800-426-8378; *National Testing Laboratories*, 6151 Wilson Mills Rd., Cleveland 44143, telephone 800-458-3330,* and *Suburban Water Testing Laboratories*, 4600 Kutztown Rd., Temple, Pa. 19560, telephone 800-433-6595. (The 800 numbers are for out-of-state callers.) Mail-order labs send you a kit containing collection bottles and detailed instructions. You ship back samples by overnight express delivery and receive results two to three weeks later.

Over the years, we've found that all labs tend to overstate or understate results occasionally. If the test report says your water has an especially high level of a contaminant, have the water retested or sent to a second lab before taking costly remedial action.

Pollutants to worry about

Of the thousands of potential water pollutants, three stand out as most worrisome—lead, radon, and nitrate. According to health experts we consulted, those substances account for most of the water-borne health hazard posed to the U.S. population, based on the number of people exposed and the strength of the evidence indicating a hazard.

Most organic chemicals that pollute water present only localized problems. But many public water supplies contain low levels of trihalomethanes and related compounds that are byproducts of water chlorination. Some evidence suggests that those chemicals may contribute slightly to cancer risk. That risk, however, must be weighed against the significant disease-prevention benefits of chlorination. The U.S. Environmental Protection Agency requires water systems that serve more than 10,000 to keep the byproducts below 100 parts per billion. Treatment methods for trihalomethanes and other, less common pollutants are summarized in the table below.

LEAD

It has been known for decades that lead is highly toxic and that it often turns up in drinking water. But two recent developments have heightened concern. Surveys have found that significant lead levels are much more commonplace than had been assumed. And levels once considered safe are now known to threaten health, particularly the health of infants and children. Recent studies show that low-level lead exposure may cause permanent learning disabilities and hyperactivity; it is associated with elevated blood pressure, chronic anemia, and peripheral nerve damage.

Who's likely to have the problem? Very little lead occurs naturally in water. It gets there primarily from corrosion of plumbing that contains lead. There are three main sources: lead service pipes from mains, banned since 1986 but widely used before that in the northern U.S., especially in homes built between 1910 and 1940; leaded solder (also banned in 1986) used to join copper pipes within the house; and the brass in faucets, which contains from 3 to 8 percent lead. Very soft water, which is more corrosive than hard water, is especially likely to leach out any lead that may be present in the plumbing.

What to do. Lead levels are measured in parts per billion, ppb. While a level of 50 ppb or less was long considered safe, concern over the effects of chronic low-level exposure has prompted the EPA to propose a tougher standard. A new level of 10 ppb is expected in the near future.

You can minimize your exposure to lead by using these steps:

- Use only cold water for cooking and drinking. Hot water can draw more lead from the plumbing.
- Run the water until it's as cold as it's going to get before drinking it, especially first thing in the morning.

If a test reveals that your water contains more than 10 ppb of lead even after it has run cold, you may want to switch to bottled water or install a treatment device. The least troublesome device is an activated alumina lead-removal cartridge installed on a cold-water line. We liked one we tested, the *Omni Total* (formerly the *Selecto Lead Out-20*). The cartridge costs about $80, and is claimed to be able to treat 15,000 gallons of water. It fits a standard water-filter housing, which costs about $35 plus installation. You could also use a distiller or reverse-osmosis device, but they're needlessly slow if lead is your only water problem.

RADON

Radon, a naturally occurring radioactive gas, may pose a greater health risk than all other environmental pollutants combined. According to EPA estimates, inhaled radon gas causes between 10,000 and 40,000 lung-cancer deaths each year. Most of that exposure comes from radon gas that seeps into a house from the ground. The inhalation exposure caused by radon gas that is released from household water may cause between 100 and 1800 deaths a year, making radon gas more lethal than any other drinking-water contaminant.

Who's likely to have the problem? Water-borne radon is usually confined to well-water systems, either private wells or small community water systems serving less than 500 people. Larger systems may include some form of aeration device that allows the dissolved radon gas to bubble out and disperse harmlessly before water is delivered to the tap. The EPA estimates that at least eight million people in the U.S. may have high levels of

radon in their water supply.

What to do. Before you test your water for radon, test the air inside your house (see CONSUMER REPORTS, October 1989). If the air radon level is high and you use ground water, have the water tested as well. If the air level is low, you needn't worry about the water.

The level that should prompt remedial action is a matter of dispute. According to an EPA official we consulted, you should definitely take action if the water's radon level is 10,000 picocuries per liter or higher (that corresponds to about 1 picocurie per liter of airborne radon).

Radon, so dangerous in a closed space, is easily dispersed in outdoor air. Simply ventilating the bathroom, laundry, or kitchen may be sufficient to dissipate waterborne radon gas. To remove radon from water requires treating all the water entering the house, not just a tap you use for drinking water. That means installing a whole-house granular activated-charcoal filter (about $1500 plus installation) or a home aerator that vents the radon outdoors (about $1000 to $2000, plus installation).

NITRATE

High nitrate levels in water affect mainly infants. Their immature digestive tracts convert the relatively harmless substance into nitrite, which in turn combines with some of the hemoglobin in the blood to form methemoglobin, which cannot transport oxygen. The ailment is rare, but can result in brain damage or death. Some adults, including pregnant women, may also be susceptible to developing methemoglobinemia.

Who's likely to have the problem? Nitrate occurs mainly in well water, usually as a result of agricultural activities. Chemical fertilizers and manure contain nitrates and other nitrogen compounds that are converted to nitrate in the soil, where it readily migrates into ground water. Rural families—especially those with infants or pregnant women—should have their wells tested regularly for nitrate. Some state health departments test private wells for free. High nitrate levels may signal that other contaminants—agricultural pesticides or bacteria and viruses from a leaking septic tank—are also present.

What to do. Removing nitrate from household water is not so simple. You could treat the water with a reverse-osmosis or distillation device. Or you could dig a deeper well, to an uncontaminated aquifer, or solve the problem by switching to bottled water.

Water-treatment devices

CARBON FILTERS

Carbon filters can treat a variety of both aesthetic and safety problems, so they're the most popular and versatile water-treatment device. They come in many forms. High-volume filters—in-line filters that serve a single cold-water faucet—typically cost $100 and up. Tiny, faucet-mounted filters that contain a couple of ounces of carbon cost $20 to $30. Pour-through devices that work a little like manual drip-style coffee makers can cost less than $10. Whole-house carbon filters ($1500 and up) have five-foot-high tanks and can be backwashed.

The most practical are in-line filters that treat water at a single location, such as at the kitchen sink. The two main designs are under-sink models, which tie into a water line and have their own spigot next to the sink taps, and countertop models, which sit on a counter and attach with flexible tubes to a sink faucet.

At the heart of a carbon filter is activated charcoal: carbon that has been heated until it develops a honeycomb of tiny channels. As water passes through that labyrinth, specific contaminants adhere to the walls of the channels. Carbon filters work best when they work slowly enough to ensure adequate contact time between water and carbon. Most we tested come with narrow, quarter-inch tubing, which helps limit the water flow.

Best at: Removing organic compounds—chemicals such as pesticides, solvents, or chloroform. Carbon filters can also improve water's taste by removing the (usually) harmless chemicals that cause off-flavors and smells. Carbon won't remove hardness minerals or most heavy metals.

The down side. Carbon can't remove microbes (indeed, under certain conditions, a carbon filter can breed them) or much sediment (microscopic bits of grit can clog the filter).

Upkeep. The filter or its cartridges have to be routinely replaced, at a cost of $5 to $100. A filter's longevity depends on water use and the level of pollutants in the water, not easily gauged. Manufacturers typically recommend replacing a filter after a certain time or after a given quantity of water has passed through. Some filters have a water meter built in to make assessing that easier. For a high-volume in-line filter, you should expect to change the cartridge about every six months or 1000 gallons.

The tests. We used water spiked with 1 part per million of chloroform, 10 times the maximum allowed by the EPA. Since chloroform can show up as a byproduct of chlorination, it's one of the most common organic compounds in drinking water.

Buying advice. The more charcoal the better. Our tests showed that the small pour-through filters that work like drip-style coffee carafes and the fist-sized units that thread onto the end of a faucet are simply too small to be relied on for removing hazardous chemicals. High-volume filters such as under-sink or countertop devices do a much better job.

Look for those that have replaceable filter cartridges. Some do not, which means that the whole filtration unit has to be returned to the manufacturer—or thrown out—when the carbon is spent.

A standard-sized carbon cartridge measures about 9¾ inches high by 2½ to 3 inches in diameter. If you're shopping for replacement filter cartridges, look for those made either with a "carbon block" or with granulated charcoal. They do a better job than the designs that use powdered charcoal.

Some carbon filters come with a built-in sediment filter, but if your water contains significant amounts of undissolved solids, the sediment part may clog before the carbon is used up. To extend the life of the filter, install a separate sediment prefilter upstream of the carbon. A 5-10 micron filter is fine enough for most purposes. One with a clear plastic sump enables you to see when the cartridge needs changing. Cost of such a prefilter: about $50 plus installation.

For brand-name Ratings of carbon filters, see page 204.

REVERSE-OSMOSIS DEVICES

If a carbon filter resembles a dense maze, a reverse-osmosis device resembles a fine sieve. At the heart of the system is a rolled-up cellophanelike material, the semipermeable membrane that screens out all but the smallest molecules. When water under pressure is pushed against the membrane, only