



WHAT
YOU
SHOULD
KNOW

ABOUT THE
WATER
YOU
DRINK

Water is the world's most healthful and inexpensive beverage. We'll reach for a tall cold glass of water to quench our thirst without a second thought.

Water: Key to Healthy Living

Water is so vital to existence that no form of life on this planet can survive without it. While we can exist without food for some days, we cannot survive without water.

We use more water than we realize. The average adult consumes one and one-half to five quarts of water daily, half in food and half from beverages such as plain water, coffee, tea and other drinks.

Believe it or not, our bodies are mostly water. A man weighing 156 pounds has between 70 to 80 pints of water within his frame—about 70 percent water by volume. Essential body functions cannot occur without water. In a normal day, we lose about five pints of water in body processes, such as perspiration, excretion and evaporation.

With water so vital to health, it's important that we drink eight to ten glasses daily. More importantly, the water we drink should be free of impurities. For a long time, many of us have taken the presence and healthfulness of our water supplies for granted. However, today we need to become more aware of the quality of our water.

Our Water Supplies

The water we use every day comes from either surface or underground sources. Surface water includes lakes, streams, springs or rivers. Underground, there are also lakes, ponds and streams, and large areas of water-saturated soil and rock called aquifers. It is from these aquifers that we draw our groundwater supplies.

The amount of underground water supplies is very large—it's estimated that there is 20 times as much groundwater in the United States as there is surface water.

Groundwater is a major source of water for industries and households, and usage is increasing. Approximately 50 percent of all United States homes are supplied with groundwater for drinking and cooking. This proportion is even higher in rural areas, where 80 percent of people count on groundwater for their homes and farms.

In many areas, water may no longer be pure and clean due to pollution. Water quality has declined in many parts of the country—in some areas, to the point of concerning many leading experts and government agencies.

What is Water Contamination?

Today, many of the substances that may threaten our health have been found in increasing levels in water sources such as wells and rivers. These contaminants may be either naturally occurring chemicals or man-made compounds.

Water may become contaminated and possibly unfit for use in several ways. One way includes natural minerals, such as arsenic, that leach into underground water from soil and rock formations.

However, the most extensive contamination of drinking water by far is through wastes formed by man's efforts. Surface water supplies, such as rivers and lakes, are contaminated when wastes are dumped directly into them.

Underground water supplies, which provide over 50 percent of the drinking water in the U.S., are contaminated by dumping wastes on the surface of the ground or in pits. The wastes and contaminants reach underground water supplies through nature's hydrologic cycle—the constant movement of water between the earth and the atmosphere. In this process, water vapor exists in pure form in clouds high above the earth. Under the right conditions, precipitation—rain, snow or hail—will fall. In some cases, such as acid-producing smoke from power plants, it will pick up the acids and fall as acid rain. In other cases, it may pick up other air pollutants.

Once this precipitation hits the earth, about 70 percent evaporates quickly. Of that which soaks into the ground, one-third becomes run-off and eventually reaches surface water supplies carrying pollutants, if present, with it. The rest of the water travels downward through the ground until it reaches groundwater supplies. On the way down it will pick up contaminants, if present, and leach chemicals and minerals from the soil and carry them into the groundwater supplies.

How can you tell if your water contains contaminants? Unfortunately, many times you can't. Some substances may make water look, smell or taste unappealing, while not threatening water safety. But others—some that are potentially harmful—have no taste, color or odor.

It takes sophisticated scientific testing to find out if water is safe to drink.

Natural Contaminants

Water picks up some contaminants, such as bacteria and gases, in the atmosphere during the hydrologic cycle. An excellent solvent, it dissolves many other substances as it travels into the earth. Natural contaminants of groundwater and surface water include salt, bacteria, sand, silt and decayed organic matter, and minerals and gases.

Sand, silt, gravel and decayed organic matter are sometimes picked up by streams or rivers that are used as water sources. While they can make water taste bad and look cloudy, they normally don't pose any real health hazards. Organic matter that decays in water can also affect clarity, taste and odor. When it decays in water chlorinated for disinfection, the resulting compounds can be dangerous to health. Salt water sometimes intrudes into fresh ground water when too much fresh water is pumped to the surface.

Dangers of Natural Contaminants

Some naturally occurring contaminants are dangerous to health. One such contaminant is a parasite, giardia lamblia, that causes gastrointestinal illness in humans. These parasites, which are transmitted through wildlife feces, occur in clear water and streams, or where sewage has seeped into a surface water supply. When such parasites are present, insufficient chlorination and filtration in a municipal system can result in sickness of epidemic proportions.

In some areas, arsenic occurs in high enough levels to be a health hazard.

A Greater Hazard: Man-made Contaminants

Besides naturally occurring substances, man-made chemicals may also be present in water. In recent years a number of man-made compounds have been detected in groundwater and surface water.

They include substances, such as gasoline, solvents and industrial chemicals, and herbicides and pesticides used in farming.

Man-made chemical contaminants get into water sources a number of different ways. Some are leached into groundwater through unlined landfills and toxic dumps, from leaking underground storage tanks and septic tanks, and as a result of agricultural practices. Agricultural chemicals dissolved by rain-water or irrigation may enter surface water through run-off, or into groundwater by seeping downward through soil layers.

The federal government publishes allowable levels for certain contaminants in drinking water through the Safe Drinking Water Act. The Act applies to public water systems and sets limits for some chemical, bacterial and other contaminants (See Table I). The Act also provides suggested limits for secondary contaminants (See Table II).

**TABLE I:
Primary Drinking Water Contaminants***

Name		
Organic Chemicals	Inorganic Chemicals	Other Contaminants
Endrin	Arsenic	Turbidity
Lindane	Barium	Coliform bacteria
Methoxychlor	Cadmium	Radiological—
Toxaphene	Chromium	Radium 226 and 228
2, 4 D	Lead	Gross Beta
2, 4, 5 TP Silvex	Mercury	Gross Alpha
Trihalomethanes	Silver	
	Selenium	
	Nitrate (as N)	
	Fluoride	

*Determined by U.S. EPA

TABLE II: Secondary Drinking Water Contaminants*

Chloride	Manganese
Color	Odor
Copper	pH
Corrosivity	Sulfate
Foaming agents	TDS (total dissolved solids)
Iron	Zinc

*Determined by U.S. EPA

Man-Made Chemicals That Have Been Found in Water Supplies

EDB—Used for many years as a gasoline additive, as a pesticide and fumigating agent, and in farming. EDB is a carcinogen and a mutagen, meaning it could cause cancer or birth defects.

Carbon tetrachloride—Found in industrial degreasing and refrigerating agents, fumigants and chemical manufacturing. It is a suspected cause of cancer.

Trichloroethylenes (TCE)—Used in degreasers, paints, drycleaning fluids, solvents and aerospace operations. Possible effects are skin rashes, liver disfunction and nervous disorders. TCE is absorbed into the skin through bath and shower water. It is a suspected carcinogen.

Trichloroethanes (TCA)—Found in solvents, degreasers and pesticides. It is a suspected cause of cancer.

Trihalomethanes (THM)—Found in water that has been chlorinated before delivery to residential areas. The results of the combination of decaying vegetation with chlorine, THMs are suspected carcinogens.

Benzene—Found in detergents, solvents and antiknock gasolines. There is considerable evidence that benzene causes human cancer.

Nitrates—Byproducts of several different materials, such as animal wastes and agricultural chemicals. Should not be ingested by infants under six months and by expectant mothers, as nitrates reduce the oxygen supply in the blood stream.

Dibromochloropropanes (DBCP)—Used in farm practices until found to cause sterility. Also a suspected carcinogen. DBCP is absorbed into the skin through shower and bath water.

Vinyl Chloride—Used in production of polyvinyl chloride resins for the building and construction industries. Confirmed human carcinogen.

What Can I Do About Contaminants?

Water contamination is a serious problem. It's time-consuming and expensive to test water for contamination. Treatment at the source of contamination has been found to be costly and lengthy, maybe impossible. One city has been pumping out its contaminated aquifer and reinjecting treated water into the ground for ten years with no end in sight. It would also be very costly and time-consuming to revamp local water treatment plants to reduce contaminants. Also, in similar communities, funds to do so may not be available.

When necessary, homeowners can take measures to improve the quality of their water through the use of point-of-use drinking water systems.

Point-of-Use Systems

Traditionally, homeowners faced with problem water have chosen bottled water for drinking and cooking. Increasingly, however, many are finding in-house drinking water systems a convenient, economical alternative.

Home drinking water systems, also called point-of-use systems, offer the advantage of supplying high-quality, good-tasting water on demand. You don't need to worry about running out of water, since the water treatment equipment is plumbed directly to your water line. The point-of-use system is normally placed out of sight under a sink, in a utility room, crawl space, or other convenient location.

Homeowners may choose between two types of drinking water systems. Full-house systems designed to reduce certain organic contaminants are plumbed directly to the incoming water line and treat the entire water supply. With this system, residents benefit from treated water used in bathing as well as in drinking and cooking.

The second type of system is normally installed under the sink and provides protection against certain contaminants only at the location, such as a kitchen faucet, and this benefits water used only for cooking and drinking. Water diverted through the unit is dispensed through a separate faucet. Both types of units may be purchased or rented.

Types of Point-of-Use Water Systems

There are several types of point-of-use home drinking water systems. Keep in mind that no one type may treat all water problems.

Ultraviolet disinfection units may be used alone to kill potentially harmful bacteria, or in conjunction with reverse osmosis equipment. A wide range of bacteria are killed with this treatment. With such equipment, however, organic chemicals are not removed or reduced. Ultraviolet systems are usually installed so that they will treat all of the home water supply.

Home distillation systems provide substantial reductions of most contaminants. Incoming water is boiled and the pure distillate is cooled and directed to the faucet.

Activated carbon filters work by adsorbing certain substances onto special carbon granules and, thereby, removing them from the water. Because many taste and odor problems are reduced by this method, and because carbon filters can effectively reduce certain types of organic contaminants, they are one of the more effective types of filtration units available.

Reverse osmosis units are considered by many experts to be the best all-around solution to virtually all serious contamination problems. These under-sink or remote location units work by forcing water under pressure through special membrane-type "filters."

These units are able to substantially reduce a wide variety of substances, including sodium, calcium, chloride, fluoride, nitrates and arsenic. More importantly, they can also reduce concentrations of many organic chemicals below their maximum contaminant levels (MCLs) as defined by the Federal Primary Drinking Water Standards.

Reverse osmosis units are often combined with other water treatment products, such as activated carbon filters, to treat trihalomethanes and taste and odor problems. Together, they provide very good treatment for a range of water problems.

Choosing a Home Water System Professional

Every state has some type of water contamination. It's likely that you'll hear more and more about water problems as testing continues. This means, too, that more companies which make water treatment products will be competing for your attention.

While many of these companies sell quality products, some may be more concerned about making money than selling a product that will clean or properly treat your water.

Choosing the Right System

Some companies may take advantage of people's fears and questions about local water problems. Beware of those firms that use "quick and easy" water tests.

When you are shopping for water treatment products, ask questions to find out as much as possible about the company and its products. Use these questions as guidelines:

- **“Do you have any independent laboratory tests that show how well your products perform?”**
- **“How long has your company been in business? How long in this community?”**
- **“What kinds of warranties or guarantees do you offer? I'd like to see a copy before I buy.”**
- **“Who are some of your customers in this area? I'd like their names and numbers to discuss your products with them.”**
- **“Who installs your products? Do you have your own installers, or do you contract the work out to independent plumbers? If you use contractors, do you stand behind their work? How?”**
- **“What about after-sale service? Do you stock replacement parts? Do you perform your own repairs?”**
- **“Do I have the choice of renting or purchasing your product? If I rent, may I apply some of the rent against future purchase of this product?”**

If you purchase a system, make sure that you have it serviced periodically to ensure high efficiency. The company that sells you a system should have a maintenance service.

Three Water Options for Your Home

Think of the many uses of water in and around the home. It waters the lawn, washes the car, launders the clothes, bathes our bodies, cleans the dishes, quenches our thirst, and helps with the cooking. It even washes windows!

With so many uses for water, it stands to reason that different "types" of water are best for different jobs. Based on this formula, each home may need three different kinds of water:

- **Utility Water:** This is the water that comes directly from the central treatment facility or from your well. In many cases the water is safe for all uses. It is always suitable for outdoor uses such as watering the lawn or garden, or washing the car.
- **Working Water:** Many areas of the country have high concentrations of dissolved minerals, such as calcium and magnesium, in the water. This is commonly known as "hard water." Hard water can leave spots on dishes, cause dry skin, detract from the cleaning power of laundry detergents and cause scale buildup. A water softener reduces these problems and provides the "working water" for laundry, household cleaning, bathing and skin care.

- **Drinking Water:** For the water you drink or cook with (one-half of one percent of all water we use), you want water that is good tasting, clear, clean and healthful. A home drinking water system fits right under your sink and can improve the taste, odor or appearance of water. If contaminants that may be harmful to your health are known, the proper point-of-use drinking water treatment products can effectively reduce these contaminants to levels considered safe by regulatory agencies.

For more information, please contact the WaterWatch Hotline—1-800-792-0092.

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