

## Bottled Water

It's everywhere! At work. At home. In backpacks. At conferences and at athletic events. Once considered a yuppie refreshment, bottled water has become a liquid asset for today's active consumer.

Bottled water is the second-largest beverage type sold in the U.S. market. Bottled water consumption increased from 4.7 billion in 2000 to 8.7 billion gallons in 2008! Per person, that is 16.7 gallons in 2000 compared to 28.5 gallons per person eight years later. Americans' thirst for bottled water is due to several factors. Many consumers see it as healthy, safe, and convenient. It's versatile, suitable at any time of day, and need not be kept cold or warm. As far as ready-to-drink commercial beverages go, it's relatively inexpensive. As concern about obesity and diabetes spreads and intensifies, bottled water's lack of calories makes water a more attractive alternative to consumers.

Perceptions matter. We regard bottled water very differently from tap water. Even where tap water is safe and drinkable, many people prefer bottled water, which they regard as superior in taste. The convenient availability of bottled water wherever beverages are sold also significantly differentiates bottled water from tap. Bottled water reflects our times by highlighting the need for convenience among busy, on-the-go Americans.

Should you stick with tap water for a fraction of a penny a gallon or spend an average of 94 cents a gallon for the bottled water delivered to your home or office, or sold in supermarkets? That depends on your

taste buds as well as the substances in your city's water. In many regions, aging water pipes are rusting and cracking, enabling lead and other harmful chemicals and bacteria to leak into public water. Buying bottled water makes the most sense when there is a local contamination warning. Otherwise, it's your decision, and it is up to you to weigh the trade-offs.

### What Is Bottled Water?

The Food and Drug Administration (FDA) describes bottled water as water that is intended for human consumption and that is sealed in bottles or other containers with no added ingredients except that it may contain safe and suitable antimicrobial agents. Fluoride may be added within the limits set by the FDA.

The name of the food is "bottled water" or "drinking water." Bottled water cannot contain sweeteners or chemical additives and must be calorie-free and sugar-free. Flavors, extracts, and essences derived from spices or fruits can be added to bottled water, but these additions must comprise less than 1 percent by flavor limit. Otherwise, they are classified as soft drinks, not bottled water. Bottled water may be sodium-free or contain "very low" amounts of sodium. Some bottled waters contain natural or added carbonation.

### Types of Bottled Water

There are many different varieties of bottled water. The FDA defines bottled water by type, as described in this table:

Artesian Water	Water from a well tapping a confined aquifer, in which the water level stands at some height above the top of the aquifer. It may also be known as “artesian well water.”
Drinking Water	Drinking water is another name for bottled water. Accordingly, drinking water is water that is sold for human consumption in sanitary containers and contains no added sweeteners or chemical additives (other than flavors, extracts, or essences), and it must be calorie-free and sugar-free. Flavors, extracts, or essences may be added to drinking water, but they must comprise less than 1-percent-by weight of the final product or the product will be considered a soft drink. Drinking water may be sodium-free or contain very low amounts of sodium. Fluoride also may be added within the limits set by the FDA. The name of the food is “bottled water” or “drinking water.”
Mineral Water	Water containing not less than 250 parts per million total dissolved solids that originates from a geologically and physically protected underground water source. Mineral water is characterized by constant levels and relative proportions of minerals and trace elements at the source. No minerals may be added to mineral water.
Purified Water	Water that is produced by distillation, deionization, reverse osmosis, or other suitable processes and that meets the definition of “purified water” in the U.S. Pharmacopeia, 23d Revision, Jan. 1, 1995. Purified water is essentially free of all chemicals. It must not contain more than 10 parts per million of total dissolved solids. As appropriate, also may be called “demineralized water,” “deionized water,” “distilled water,” and “reverse osmosis water.” In addition, terms such as purified drinking water, distilled drinking water, and others may be used.
Sparkling Water	Water that, after treatment and possible replacement of carbon dioxide, contains the same amount of carbon dioxide that it had at emergence from the source. However, other similar products such as soda water, seltzer water, and tonic water are not considered bottled waters. They are regulated separately, may contain sugar and calories, and are considered soft drinks. Sparkling bottled waters may be labeled as “sparkling drinking water,” “sparkling mineral water,” “sparkling spring water,” etc.
Spring Water	Water derived from an underground formation from which water flows naturally to the surface of the earth at an identified location. Spring water may be collected at the spring or through a bore hole tapping the underground formation finding the spring, but there are additional requirements for use of a bore hole. Spring water collected with the use of an external force must be from the same underground stratum as the spring and must have all the physical properties before treatment, and be of the same composition and quality as the water that flows naturally to the surface of the earth.
Well Water	Bottled water from a hole bored, drilled, or otherwise constructed in the ground, which taps the water aquifer.
Distilled Water	Steam from boiling water is recondensed and bottled. Distilling water kills microbes and removes water’s natural minerals, giving it a flat taste.

### Read the Label

To learn about the quality of bottled water, begin by reading the label. In addition to the volume of water, any pertinent nutritional claims, and contact information for the bottler, the label may include the type of bottled water, its source, and the way in

which it is treated. For more specific information, contact the bottler directly.

### Bottled Water Regulation and Accreditation

Consumers can trust that bottled water is safe for many reasons. In the U.S., bottled

water and tap water are regulated by two different agencies; the FDA regulates bottled water, and the U.S. Environmental Protection Agency (EPA) regulates tap water (also referred to as municipal water or public drinking water). Bottled water is strictly regulated on the federal level by the FDA and on the state level by state officials. These agencies attempt to ensure that all bottled water sold in the U.S. meets these stringent standards. In addition, members of the International Bottled Water Association (IBWA) must meet strict industry standards established by the association. These standards, contained in the IBWA “Model Code,” and are subject to annual inspections by an independent third party. Bottlers belonging to IBWA frequently indicate membership on their labels.

Other agencies such as the NSF International, The Public Health and Safety Company™, and the Underwriters Laboratories, Inc. (UL) also provide accreditation for bottled water manufacturers. Bottled water certified by the NSF undergoes additional testing through unannounced annual plant inspections. NSF certification means that the bottler complies with all applicable FDA requirements, including good manufacturing practices. The UL is an independent accredited testing and certification organization that tests bottled water to FDA, state, and IBWA model code requirements.

### *Federal Regulations*

Bottled water is regulated as a food product under the Federal Food, Drug, and Cosmetics Act (FFDCA) by the FDA. Bottled water companies must adhere to the FDA’s Quality Standards, Standards of Identity (Labeling Regulations) and Food Manufacturing Practices.

**Standard of Quality Regulations.** All bottled water products must comply with the FDA’s Title 21 of the Code of Federal

Regulations (21CFR). These standards, along with the FDA’s Current Good Manufacturing Practices (CGMP), ensure the safety of all bottled water products from production to packaging to consumption.

Any bottled water sold in interstate commerce in the U.S., including products that originate overseas, must meet the following minimum federal standards (check with your health department to see what bottled water standards exist for brands produced, bottled, and sold entirely in one state):

- Bottled water must meet FDA standards for physical, chemical, microbial, and radiological contaminants. When EPA sets a new standard for a contaminant in tap water, FDA must establish a new standard for the same contaminant in bottled water or find that EPA’s new standard is not applicable to bottled water.
- Bottlers must include the name of the product and type of water; the name and address of the manufacturer, packer, or distributor; and the net content on their labels.
- New bottled water sources must be approved by a state or local jurisdiction. Bottlers must also test their sources and finished bottled water products at least once a week for microbiological contaminants and at least once a year for physical, chemical, and radiological contaminants.
- If bottled water is found to be adulterated or hazardous to health, it is subject to FDA enforcement action, such as seizure of domestic products and refusal of entry of imports.
- Bottlers must operate their plants in accordance with FDA’s good manufacturing practices to ensure that their bottled water products are safe and

produced under safe and sanitary conditions.

**Standard of Identity Regulations.** FDA's labeling rules for bottled water establish standards of identity and standardized definitions for terms found on bottled water such as "artesian," "distilled," "drinking," "minerals," "purified," "sparkling," and "spring." If a bottler calls his water "glacial" water, it does have to come from a glacier. "Artesian" water has to flow above the water table, and "naturally sparkling" has to come from a natural carbonated spring. Seltzer, soda water, and tonic water are considered soft drinks; therefore, they are excluded from these regulations. Bottled water must meet the appropriate definitions under the standard of identity or it will be considered misbranded.

#### *State Standards*

In addition to FDA's extensive regulatory requirements, the bottled water industry is subject to state regulatory requirements as well. The FDA relies on state and local government agencies to approve water sources for safety and sanitary quality. Also, some states have regulations that differ from FDA's in content or coverage. All 50 U.S. states regulate bottled water produced within their state. Twenty-three states also regulate out-of-state bottlers, requiring manufacturers to provide documentation demonstrating compliance with state requirements and obtain a license, registration, or other approval prior to distributing product.

#### *Inspection of Bottled Water Plants*

The FDA monitors and inspects bottled water products and processing plants as part of its general food safety program. Because FDA's experience over the years has shown that bottled water has a good safety record, bottled water plants generally are assigned a relatively low priority for inspection. The Agency, however, inspects firms that have

had violations more frequently, depending on the number, significance, and recurrence of violations. In addition, FDA's field offices follow up on consumer and trade complaints and other leads, as appropriate, on potentially violative bottled water products. In Fiscal Years 2007 and 2008, FDA and state agencies under contract to FDA conducted 412 and 468 inspections of bottled water facilities, respectively. In the first nine months of FY 2009, FDA and state contract agencies conducted 253 inspections.

#### *Sampling and Testing*

As with other types of food, FDA periodically collects and analyzes samples of bottled water. Samples come from several different sources. Some samples are collected during inspections if the inspector's observations warrant collection to test for contaminants or if the bottled water facility has a previous history of contamination. Other samples are collected in response to trade or consumer complaints. Finally, samples of foreign bottled water products offered for entry into the U.S. may be collected and tested to determine if they are in compliance with all applicable U.S. laws and FDA regulations. FDA laboratories may test the water for microbiological, radiological, or chemical contamination. Individual samples are not tested for all possible contaminants cited in the quality standard but for selected contaminants, depending on the reason for the sampling.

#### *International Bottled Water Association (IBWA)*

The IBWA requires its members to follow the Bottled Water Code of Practice ("Code of Practice"), which provides a comprehensive guidance for bottled water technical and federal regulations. Bottlers are also required to comply with all applicable state or local agency regulatory

requirements for bottled water in the states in which products are distributed and/or sold.

One important measure is the annual facility inspection. International Bottled Water Association members are required to undergo an annual, mandatory plant inspection. These inspections are conducted by an outside third-party organization and assess compliance with all applicable regulations. IBWA currently contracts the services of NSF International and Underwriters Laboratories – independent, highly qualified technical auditing and compliance firms – to perform these comprehensive audits. With imported water, look for the IBWA mark on the label.

### *Regulation for Imports*

All European imports must meet the federal and state standards as applicable. They must also meet strict standards set by the European Union.

### **Differences between Tap Water and Bottled Water**

Consistent quality and taste are the principal differences between bottled water and tap water. Many people prefer bottled water because of its taste. The taste of all water has to do with the way it is treated and the quality of its source, including its natural mineral content. Most bottled water comes from a ground water source, where water quality varies less from day to day, or is treated and immediately bottled. Bottled water from a dedicated source or plant may have a more consistent taste than tap water, which mostly comes from surface sources and must travel through pipes to reach homes.

In the same way that tap water's taste and quality may vary from place to place, so too does bottled water's taste and quality vary among and even within brands. The taste and quality of both bottled water and tap

water depend on the source and quality of the water, including its natural mineral content and how, or if, the water is treated.

One of the key taste differences between tap water and bottled water is due to how the water is disinfected. Tap water may be disinfected with chlorine, chloramine, ozone, or ultraviolet light to kill disease-causing germs. Water systems use the disinfectants chlorine and chloramine because they are effective and inexpensive, and they continue to disinfect as water travels through pipes to homes and businesses. Bottled water that is disinfected is typically disinfected using ozone or other technologies such as ultraviolet light or chlorine dioxide. Ozone is preferred by bottlers, though it is more expensive than chlorine, because it does not leave a taste and because bottlers do not need to worry about maintaining disinfectant in water sealed in a container. Untreated water, whether from a bottle or from a tap, will have the characteristic taste of its source.

Bottled water is much more expensive, per gallon, than tap water. Because of this, consider whether you are buying it as a healthy alternative to bottled beverages, for its taste, or for other reasons.

All Americans need to learn more about the quality of their drinking water, both tap water and bottled water, before deciding whether to drink tap water, bottled water, or both. If your water comes from a public water system, the best way to learn more about tap water is to read your water supplier's annual water quality report. If your water comes from a household well, EPA recommends testing the water regularly for bacteria, nitrates, and other contaminants. The best way to learn more about bottled water is to read its label, or contact the producer directly.

## Common Bottled Water Treatments

Distillation	Water is boiled, and the steam is condensed to remove salts, metals, minerals, asbestos, particles, and some organic materials.
Micron Filtration	Water is filtered through screens with microscopic holes. The smaller the filter holes, the more contaminants the filter can remove. Good filters can remove most chemical contaminants and microbes. Filter holes are measured in microns. (The period at the end of this sentence is 500 microns.) When considering filter size, look for an absolute (the largest hole), not nominal (the average hole) rating. An absolute one micron filter is needed to remove <i>Cryptosporidium</i> . ( <i>Cryptosporidium</i> is a microscopic parasite that lives in the intestine of infected animals and humans. Boiling water is the most effective way of killing <i>Cryptosporidium</i> .)
Ozonation	Water is disinfected using ozone, which kills most microbes, depending on the dosage applied.
Reverse Osmosis	Water is forced under pressure to pass through a membrane, leaving contaminants behind. This process removes all microbes, minerals, color, turbidity, organic and inorganic chemicals.
Ultraviolet (UV) light	Water is passed through UV light, which kills most microbes, depending on dosage applied.

## Problems Associated with Bottled Water

### *Lack of Fluoride*

The American Dental Association (ADA) is concerned that most bottled water does not contain fluoride, which increases an individual's risk for cavities. Individuals who drink bottled water as their primary source of water could be losing the decay preventive effects of optimally fluoridated water available from their community water supply. While the fluoride content of bottled water varies greatly, the vast majority of bottled waters do not contain optimal levels of fluoride. To make sure you and your family, especially children, are getting the right amount of fluoride protection in your bottled water, contact the company if the fluoride content is not shown on the label and ask what level of fluoride the water contains. Amounts of fluoride are the same whether they are reported in parts per million (ppm) or milligrams per liter (mg/L).

To help prevent tooth decay, water should contain 0.7 to 1.2 ppm of fluoride. The ADA

recommends that consumers seek advice from their dentist about specific fluoride needs.

Consider if you or your family are getting the recommended amount of fluoride:

- How much bottled water do you (or family members) consume each day?
- Is bottled water also used for meal preparation and added to canned or powered soups, juices, and other drinks?
- Is another source of drinking water used during the day, such as an optimally fluoridated community water supply at day care, school, or work?

### *Environmental Concerns*

According to the Natural Resources Defense Council (NRDC) in 2006, the equivalent of two billion half-liter bottles of water were shipped to U.S. ports, creating thousands of tons of global warming pollution and other air pollution, not to speak of the fuel used up in to transport water to U.S. ports and across our nation before reaching the shelves at the

retail level. In New York City alone, the transportation of bottled water from western Europe released an estimated 3,800 tons of global warming pollution into the atmosphere. In California, 18 million gallons of bottled water were shipped in from Fiji in 2006, producing about 2,500 tons of global warming pollution.

And while the bottles come from far away, most of them end up close to home – in a landfill. Most bottled water comes in recyclable PET plastic bottles, but only about 13 percent of the bottles we use get recycled. In 2005, 2 million tons of plastic water bottles ended up clogging landfills instead of getting recycled.

The IBWA states that the bottled water industry is working to reduce its environmental footprint by using lighter-weight plastics for containers and increasing the fuel efficiency in the transportation of the product to market. Bottled water containers – from individual serving size to five-gallon jugs – are fully recyclable and should be properly recycled through whatever system a local municipality has in place.

In fact, all bottled water containers – whether plastic, glass, or aluminum – are recyclable, where recycling facilities exist. IBWA actively supports comprehensive curbside recycling programs and partners with other beverage and food companies, municipalities, and the recycling industry and seeks to educate consumers and reduce litter. The larger bottles found on some home and office bottled water coolers can be sanitized and re-used dozens of times before the bottled water company removes them from the marketplace and recycles them.

The IBWA also states that the annual bottled water production accounts for less than 0.02% of the total ground water withdrawn in the U.S. each year. The bottled water industry uses minimal amounts of ground

water to produce this important consumer product – and does so with great efficiency.

In the event of drought or other water supply challenges, bottlers can adjust their water withdrawal to mitigate adverse impacts on a water resource. However, the industry is just one small piece of the puzzle, and other water users must adopt the same protective measures to help ensure adequate resources for all.

### **How to Store Bottled Water**

Unopened bottled water products can usually be stored indefinitely, provided the bottles are kept in the proper environment, such as a dry place out of direct sunlight. Always keep bottled water away from volatile chemicals, such as cleaning compounds, paints, or gasoline. In addition, don't store bottled water in a garage or storage shed. If you suspect any of your stored bottled water has become contaminated (smells funny, showing algae growth, etc.), discard or boil it before using it in an emergency. Changing out your emergency bottled water supply annually is generally recommended. According to FEMA, it is important to keep bottled water in its original container and not to open until you need to use it. They recommend storing bottled water in its original sealed container and observing the expiration or "use by" date.

### **References**

American Dental Association. Bottled Water.

[http://www.ada.org/sections/publicResources/pdfs/art\\_water\\_bottled.pdf](http://www.ada.org/sections/publicResources/pdfs/art_water_bottled.pdf)

American Dental Association. The Facts about Bottled Water for the Dental Patient.

[http://www.ada.org/sections/scienceAndResearch/pdfs/patient\\_30.pdf](http://www.ada.org/sections/scienceAndResearch/pdfs/patient_30.pdf)

Be Prepared with Bottled Water throughout the Year. <http://www.bottledwater.org>

Bottled Water Regulation and the FDA.  
<http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/BottledWaterCarbonatedSoftDrinks/ucm077079.htm>.

Environmental Protection Agency. Water Health Series: Bottled Water Basics.  
[http://www.epa.gov/safewater/faq/pdfs/fs\\_healthseries\\_bottlewater.pdf](http://www.epa.gov/safewater/faq/pdfs/fs_healthseries_bottlewater.pdf)

Federal Emergency Management Agency. Food and Water in an Emergency.  
<http://www.fema.gov/pdf/library/f&web.pdf>

International Bottled Water Association. Bottled Water Code of Practice.  
[http://www.bottledwater.org/files/IBWA%20Code%20of%20Practice%20Updated%2009%20Final\\_0.pdf](http://www.bottledwater.org/files/IBWA%20Code%20of%20Practice%20Updated%2009%20Final_0.pdf)

International Bottled Water Association. Labeling.  
<http://www.bottledwater.org/content/labeling-0>

Is Bottled Better? *Good Housekeeping*, 221(11):131, November 1995.

Natural Resources Defense Council. Bottled Water, Chapter 5 – Misleading Bottled Water Labeling and Marketing.  
<http://www.nrdc.org/Water/Drinking/Bw/chap5.asp>

NSF Water Safety Kit – Common Questions about Bottled Water.

[http://www.nsf.org/consumer/newsroom/pdf/fact\\_water\\_bwfaq.pdf](http://www.nsf.org/consumer/newsroom/pdf/fact_water_bwfaq.pdf)

Siskos, Catherine. Bottled Water Everywhere. *Kiplinger's Personal Finance Magazine*, 52(9):47, September 1998.

U.S. and International Bottled Water Developments and Statistics for 2008.  
<http://www.bottledwater.org/public/2008%20Market%20Report%20Findings%20reported%20in%20April%202009.pdf>

U.S. Food and Drug Administration. Bottled Water Regulation and the FDA.  
<http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/BottledWaterCarbonatedSoftDrinks/ucm077079.htm>

Von Wiesenberger, Arthur. Reading between the Lines of Bottled Water Labels,  
<http://www.bottledwaterweb.com>

U.S. Department of Health and Human Services. Testimony by Joshua M. Sharfstein, M.D. on Regulation of Bottled Water. Before the U.S. House of Representatives Committee on Energy and Commerce – Subcommittee on Oversight and Investigations, July 8, 2009.  
<http://www.hhs.gov/asl/testify/2009/07/t20090708a.html>)

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