

Drinking water Alternatives

Cornell Cooperative Extension, College of Human Ecology

Bottled Water

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Water is classified as bottled if it is sealed in a sanitary container, sold for human consumption, and meets all applicable standards. Bottled water must be calorie-free and sugar-free, and it cannot contain artificial sweeteners or additives. Flavors, extracts, or essences, which are all derived from spice or fruit, can be added to bottled water, but these additions must comprise less than 1 percent by weight of the final product. Beverages containing more than 1 percent by weight of the flavor limit are classified as soft drinks, not bottled water. Some bottled waters contain natural or added carbonation, whereas others may be sodium free or contain very low amounts of sodium.

Approximately 700 brands of bottled water are sold in the United States. In New York State alone, consumers can expect to choose among more than 100 brands. This wide selection reflects diverse consumer demand for safe and good-tasting drinking water alternatives.

Sources and Types of Bottled Water

A variety of sources are used in the production of bottled water. A bottler's choice of water source is influenced by regulations, consumer preference in the marketplace, and availability or proximity of the preferred source. In general, water bottlers will first seek a natural source in an effort to position their water as a premium product. Natural water is derived from an approved underground source, such as a protected well or spring, that has been inspected, tested, and found to be safe and sanitary with respect to water quality. Approximately 75 percent of bottled water comes from natural sources. The other 25 percent is derived from municipal water systems.

A municipal water system is an approved source for bottled water,

primarily because public water supplies are already regulated by federal and state drinking water standards.

The source of municipal water can be groundwater or natural surface waters, such as lakes, rivers, or glaciers, or human-made impoundments such as reservoirs. Typically, municipal water systems are disinfected or filtered for treatment purposes before reaching consumers. As a result, bottled water derived from a municipal source is considered to be manufactured or processed, and it must be labeled "municipal" unless the water is treated with an additional process such as distillation or purification.

In many ways, the source of bottled water also determines how it is defined or labeled. As a result, a variety of different bottled water types are available to consumers (see Table 1). Not all types of bottled water are defined as drinking water. Drinking water refers only to bottled water obtained from an approved source that has undergone a minimal treatment process consisting of filtration and some type of disinfection.

Treatment of Bottled Water

In recent years, new regulations and technological developments have dramatically altered the nature of the bottled water industry. Many water treatment technologies are now available to water bottlers, and the treatment used is determined largely by the quality of the source water. Natural spring or mineral waters generally require minimal treatment, mostly because they are collected underground where the natural features of the aquifer serve to protect and maintain source water quality. In some instances, the source water may require extensive treatment before bottling because of a high mineral content.

Some water sources, such as municipal water systems and other complex surface or groundwater supplies, require more advanced treatment. Under these conditions, source water may be filtered with activated carbon to remove most contaminants and taste and odor compounds, or it may be filtered through a very fine membrane under extremely high pressure. This latter process, called reverse osmosis, removes most salts and chemicals from the source water and produces treated water that has a low mineral content. It is often desirable to reintroduce some dissolved solids to enhance taste and add smoothness to the water. In addition, depending on source water quality, treatment may be extensive because membranes are subject to potential fouling by minerals, bacteria, or other constituents.

Regulation of Bottled Water and the Bottled Water Industry

In addition to advancements in water treatment technology, heightened consumer awareness regarding water quality and public health issues has expanded federal and state regulations governing the manufacturing, advertising, and labeling practices of the bottled water industry. In the United States, the bottled water industry is required to meet federal guidelines and also comply with state regulations, which may be more stringent than federal standards.

Federal Regulations

The quality and safety of municipal water supplies is regulated by the U.S. Environmental Protection Agency (EPA) under the federal Safe Drinking Water Act. For this purpose, the EPA establishes maximum contaminant levels, or standards, on more than 80 contaminants found in drinking water.

Table 1. Bottled Water Definitions and Labels

Drinking water	Bottled water that is obtained from an approved source, meets all applicable federal and state standards, and has undergone a minimal treatment process consisting of filtration and some type of disinfection
Mineral water	Water that is collected and bottled directly at the point of emergence from a protected underground source without any treatment to alter its natural mineral composition (i.e., minerals cannot be added to this product). Mineral water contains at least 250 milligrams per liter (mg/L) of natural dissolved substances and is distinguished from other types of bottled water by its constant level and relative proportions of natural minerals and trace elements in the source water.
Well water	Water that is pumped or collected using some other mechanical means from a bored or drilled well that taps into a groundwater aquifer (a water-bearing rock or soil formation located underground)
Artesian water	Water that is collected from a bored or drilled well that taps into an aquifer trapped beneath a confining layer of impermeable clay or bedrock, which pressurizes the groundwater and allows it to rise up through the well to an elevation above the water table without mechanical pumping
Spring water	Water that is collected directly from an underground formation from which water flows naturally to the ground surface or from a bored hole that taps the source of the spring. Although spring water requires minimal treatment before it is bottled, it must retain the same physical properties and composition as the natural spring water.
Purified water	Water that has been produced by a suitable treatment process such as distillation, deionization, or reverse osmosis and meets the most recent definition of purified water in the United States Pharmacopeia
Distilled water	Water that has been produced by vaporizing and then condensing the water during the process of distillation. Distilled water must also meet the definition of purified water in the United States Pharmacopeia.
Sparkling water	Water that contains natural or added carbon dioxide in the same amount that it had at the point of emergence from its source. Sparkling water does not include soft drinks, such as carbonated, soda, seltzer, and tonic waters, which are regulated differently and may contain sugar and calories.

Bottled water, by contrast, is regulated primarily as a food by the U.S. Food and Drug Administration (FDA) under the Federal Food, Drug, and Cosmetic Act. As with other foods regulated by the FDA, bottled water must be processed, packaged, shipped, and stored in a safe and sanitary manner and be truthfully and accurately labeled.

The FDA relies primarily on the maximum contaminant levels set by the EPA as water quality standards for bottled water. In this respect, bottled water must generally conform to the same drinking water standards established for public water supplies. In carrying out its mission to ensure the safety of bottled water, the FDA inspects bottling facilities on a regular basis. The FDA also requires the bottled water industry to adhere to additional guidelines, such as Quality Standards, Labeling Regulations, and Good Manufacturing Practices (GMPs).

Quality Standards ensure the safety of bottled water from production to packaging to consumption. Labeling Regulations establish standard definitions for certain labels used for bottled water, such as artesian, drinking, mineral, purified, sparkling, and spring waters. The bottled water industry is also subject to both general food GMPs and specific bottled water GMPs. General food GMPs govern the overall maintenance of the bottling plant, including buildings and fixtures, grounds, and sanitary facilities. Bottled water GMPs provide detailed regulations governing plant construction and design, sanitary facilities operations, equipment design and construction, production and process controls, and record keeping.

Failure to comply with FDA regulations subjects the bottled water manufacturer or its product to a range of enforcement actions. If a product is found to be adulterated or mislabeled, or if a manufacturer declines to address certain violations, the FDA generally seeks voluntary compliance through use of warning letters and requests for product recalls. Depending on the circumstances, the FDA may also pursue civil action or criminal prosecution through the U.S. Department of Justice. Criminal cases may involve misdemeanors or felonies, which can result in substantial fines and jail sentences. Finally, the FDA has the authority to warn the public directly by issuing press releases that announce possible contamination issues or health concerns.

State Regulations

A significant portion of the responsibility for regulating the safety of bottled water sources is delegated to state governments.

In general, states have the authority to inspect, sample, and approve sources of water that can be used to supply a bottling plant. As with any food establishment, state officials perform unannounced, or in some cases annual, inspections of bottling plants. States are also vested with the authority and responsibility to grant permits to operate bottling facilities within the state and to grant permits to both in- and out-of-state bottlers who sell their products within the state.

In New York State, bottled water must be certified by the state Department of Health before it can legally be sold to consumers. As of 1995, 35 certified bottled water facilities were located in New York, and at least 100 additional facilities located in other states or countries were certified to sell their products within New York. Before certification, both the bottling plant and the product must meet several requirements listed in the New York State Sanitary Code. Bottled water must also comply with the same statewide water quality standards set for municipal drinking water systems.

Industry Regulations

Founded in 1958, the International Bottled Water Association (IBWA) is the trade association representing the bottled water industry. IBWA members produce and distribute 85 percent of the bottled water sold in the United States. As one condition of membership, however, water bottlers are subject to another level of oversight. IBWA members must submit to an annual, unannounced plant inspection administered by NSF International, an independent third-party organization. Essentially, IBWA contracts with NSF to review all areas of plant operation from source through finished product and to check compliance with federal and state regulations. If the words "IBWA Bottler Member" or "Member of IBWA" appear on the bottle, then both the product and the bottling plant have passed NSF inspections. Although this does not indicate that the product is free of contaminants, it does guarantee that the concentrations of contaminants are below the bottled water standards established by the FDA. Conversely, the absence of the "IBWA Bottler Member" or "Member of IBWA" does not imply that the product is unsafe, only that the bottling plant is not involved in the IBWA program.

IBWA has also established a strict set of standards called the Model Code, a quality assurance program that establishes stricter guidelines than federal and state requirements. Consequently, NSF not only ensures that the water produced by the bottling plants

meets all applicable federal and state regulations, but it also reviews IBWA member facilities according to the requirements of the Model Code. Furthermore, any bottled water product imported to the United States must meet all applicable federal and state regulations. Bottled water products imported from Europe must also meet strict standards set by the European Union. In addition, international members of the IBWA who sell their products in the United States must submit a certificate of inspection to IBWA, usually from NSF. To determine if a bottler is a member of IBWA, call 1-800-WATER11 or visit the IBWA Web site, <http://www.bottledwater.org>.

NSF Certification

In addition to inspecting all IBWA bottler members, NSF International offers a voluntary certification program. Bottlers meeting all requirements are authorized to place the round NSF mark on product labeling and use it in advertising. To be certified, a bottler must submit written corrective actions for all deficiencies identified during the annual IBWA audit and annual testing by NSF of the bottled water product(s). To determine if a bottler is NSF certified, call 1-800-NSF-MARK or check the NSF Web site, <http://www.nsf.org>.

Consumer Issues

The major reason for the existence of the bottled water industry in the United States is consumer demand for good-tasting drinking water. Chlorine, which is most often used to disinfect municipal water supplies, tends to leave an aftertaste. It is suggested that people who are able to detect chlorine in their tap water store a sealed container of water in the refrigerator because chilled water tastes better than water straight from the tap. As an alternative, water bottlers often use ozone (a supercharged and highly reactive form of oxygen) or ultraviolet (UV) light as final disinfecting agents. Neither of these processes uses chlorine or leaves a chemical aftertaste. In addition, ozonation is effective for removing *Cryptosporidium*, a waterborne parasite that lives in the intestines of certain animals and can be passed into drinking water through their waste.

Health concerns are another important reason for the bottled water industry. According to the Centers for Disease Control and Prevention (CDC), bottled water has never been responsible for an outbreak of a waterborne illness. This makes bottled water an attractive alternative to certain people, especially to individuals who have compromised immune systems or whose private drinking water supplies are contaminated.

For both health and taste reasons, IBWA recommends that bottled water be stored in a cool, dry environment away from chemicals, household cleaning products, and solvents such as gasoline and paint thinners. IBWA also suggests that bottles be labeled with the date and replaced every six months for freshness.

Water Quality and the Consumer

The following statistics were gathered from responses to a 1997 national survey of water consumers sponsored by the Water Quality Association and conducted by an independent research firm based in Princeton, New Jersey:

- Seventy-five percent are concerned about one or more aspects of their household water supply, yet only 50 percent cited possible health contaminants.
- Thirty-two percent believe their water is not as safe as it should be.
- Fifty-nine percent believe the kind of water they drink can affect their health.
- Twenty percent are dissatisfied with the quality of their household water supply.
- Thirty-two percent currently use a home water treatment device other than bottled water (a 27 percent increase from 1995 data).
- Ninety percent of respondents who own a water treatment device are satisfied with its effectiveness; 60 percent are very satisfied.

Forty-one percent believe that federal laws governing the quality of drinking water are not strict enough.

Summary

Consumer demand for refreshing alternative beverages, as well as increasing public concern about health and fitness and greater consumer education about the ingredients in food and beverages, are promoting sales of bottled water. The bottled water industry is regulated by federal and state regulations, which ensure the quality and safety of bottled water products and by IBWA, the trade association representing the industry. A wide variety of bottled waters are available to the consumer, and the majority of these products are acceptable alternatives to drinking water.

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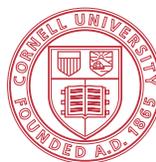
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