Issue Analysis

Bottled Water and the Overflowing Nanny State:

How Misinformation Erodes Consumer Freedom

By Angela Logomasini, Ph.D.

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Executive Summary

For the past couple decades, bottled water had been growing in popularity as an environmentally preferred choice and as a healthy beverage alternative. Yet in recent years, environmental activists have begun attacking its value and quality. The activists' claims do not hold water, yet, based on those claims, they are promoting bans, taxes, and regulations on bottled water—taking the Nanny State to a whole new level. The following analysis counters this "new wisdom," questioning the justifications for this new assault on consumer freedom. Some key facts include:

Bottled water regulation is at least as stringent as tap water regulation. Under federal law the Food and Drug Administration (FDA) must pass bottled water regulations that are "no less stringent" than Environmental Protection Agency (EPA) regulations. The law does not allow the FDA to set standards that produce a lower quality product. As a result, FDA regulations mirror EPA regulations very closely and are more stringent in some respects because FDA applies additional food, packaging, and labeling regulations.

Bottled water is substantially different from tap. About 75 percent of bottled water is from sources other than municipal systems such as springs or underground sources. Much of the bottled municipal water undergoes additional purification treatments to produce a higher quality product that must meet FDA bottled water quality standards, packaging, and labeling mandates. In terms of safety, tap water has more documented health-related case reports compared to bottled water. The Centers for Disease Control and Prevention recommends bottled water for individuals with compromised immune systems to reduce the risks associated with tap water.

Bottled water containers are a tiny fraction of the solid waste stream. Many people have turned to bottled water to replace other portable drinks containing sugar and calories, producing little increase in total waste. In any case, single-serving plastic water bottles amount to just 0.3 percent of the nation's solid waste. Bottles used in water coolers are recycled at high rates and have even less impact on landfill waste. Taxing and banning either type of container will not matter much in terms of overall waste.

Plastic bottles are safe for consumers. The chemicals which environmental activists suggest are a problem are not even used in the PET plastic used for single-serving water bottles. Bisphenol A, a chemical found in large

five-gallon water cooler jugs and other food containers exists at such low trace levels that there have been no reported health problems and the FDA, along with several scientific organizations around the world, have not found any problem with this substance.

The public has freely turned to bottled water as an alternative to drinks with calories, for convenience, freshness, and whatever other reasons they themselves find worthy. Misinformation spread by activists should not determine who can access this product. People who do not like the product can make their own choices. They should not have any right to make them for the rest of us.

Introduction

In June 2008, the United States Conference of Mayors passed a resolution stating:

> The US Conference of Mayors encourages cities to phase out, where feasible, government use of bottled water and promote the importance of municipal water.[1]

Just a decade ago, such a move would have been considered very odd, since bottled water had been growing in popularity as an environmentally preferred choice and as a healthy alternative to beverages containing calories. But, starting in 2007, environmental activists suddenly began attacking bottled water, claiming that it is wasteful.

Activists claim that bottled water creates much needless waste for landfills, uses too much energy to transport, and contributes to global warming. They say that tap water is essentially the same, but costs less and requires fewer resources to produce and transport. These claims are inaccurate, yet the activist hype has helped create a quasi-religious crusade against bottled water—a crusade that threatens consumer choice as taxes and regulations are increasingly offered to address this "problem."

The following analysis provides an overview of the bottled water controversy, addressing some of the key concerns raised about bottled water and offers some perspective on the actual impact and value of bottled water.

The War on Bottled Water

In August 2007, Nielsen Reports found that online discussions of environmental issues increased by 169 percent in 2007 over the prior year largely due to the release of former Vice President Al Gore's film and book on global warming, *An Inconvenient Truth*. Similarly, online content for bottled water increased by 520 percent, with the predominant message compelling "consumers to explore safety and environmental hazards, and consider alternatives."[2]

The impact of environmentalist concerns over bottled water is evident in the press. A recent search of the Westlaw news database shows that the number of stories on the topic has jumped in recent years—a search for the phrases "bottled water" and "global warming" together brings up a total of 818 stories, most from 2007. We see a similar result from searches for "bottled water ban" and "bottle water tax."

Even some right-of-center reporters and pundits have gone after bottled water largely because it was once touted as a superior, "green" alternative to tap.

Similarly, headlines and news coverage on the topic are filled with absurdly outlandish claims. One headline in a British newspaper actually read: "Bottled water Lethal to Earth."[3] Allen Herskowitz of the Natural Resources Defense Council (NRDC) claimed in a July 2008 ABC News interview: "If people really understood what was behind the manufacture of those plastic bottles, they would think twice."

Even some right-of-center reporters and pundits have gone after bottled water largely because it was once touted as a superior, "green" alternative to tap. In 2005, "20/20" TV journalist John Stossel produced a segment on bottled water, and in an article on the topic he concluded: "[I]f you buy fancy brands because you think they taste better, you're probably just buying the hype."[4] Similarly the Showtime program "Bullshit!," hosted by usually free-market sympathizers Penn and Teller, relied on environmental activist Eric Olson of the NRDC as their "expert" on the topic as to why bottled water is a foolish item to buy. Yet NRDC's "research" on the topic has proven rife with inaccuracies and hype, as detailed in subsequent sections of this paper.

Bottled water has even undergone attacks from clergy. In 2006, the United Church of Canada issued a resolution urging its nearly 600,000 members to stop buying bottled water. "The main thrust is our concern about the privatization of water," a church representative told reporters. Supposedly, because water is a "sacred gift that connects all life," it should not be a source of profits.[5] If we had that view for other essential items—like food—we might all be waiting on line for bread as people once did in the Soviet Union. If recent decades tell us anything, it is that private ownership is the best vehicle for distributing essential goods and services, and "public"—i.e., government—control more often produces shortages and poor quality.

All these unwarranted attacks on bottled water are having an impact on the business. For example, *The New York Post* reported in April 2008 that bottled-water sales grew by just 6 percent in 2007, compared with 9 percent in 2006, while sales of filtration and purification systems skyrocketed. The filter maker Brita reported double-digit sales growth, while Natural Water, a Brita competitor, saw its sales surge more than 100 percent in the six months prior to April 2008.[6] Some stores have even considered not carrying bottled water at all.[7]

On the policy front, bottled water is being challenged the most at the local level. In addition to the 2008 resolution, the U.S. Conference of

Mayors issued a similar resolution on the value of tap water in 2007.[8] As a result, mayors around the nation began to look at the issue more closely, and some have taken action.

In June 2007, San Francisco captured national media attention when it barred city agencies from buying bottled water packaged in single-serving sizes and water in large containers used in water coolers.

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That same month, Salt Lake City decided to stop city agencies from buying bottled water, including the fire department. When firefighters raised concerns, Salt Lake City's then-Mayor Rocky Anderson (D) explained that each firefighter would get a refillable container. Two additional personnel would be dispatched to each fire to refill on the scene, which one would think might cost taxpayers more than the cost of a few bottles of water. In this case, firefighters would have to queue up for a drink when their bottle gets low—hardly a good use of time while fighting fires, when time is essential.

In July 2007, the Ann Arbor, Michigan, city council passed a resolution barring city vendors from selling commercially bottled water at city events. The city said it would sell reusable water bottles that can be filled with tap water. Also that summer, New York City launched a taxpayer-funded campaign to encourage people to drink tap water rather than bottled water.

In February 2008, Albuquerque Mayor Martin Chavez (D) banned city agencies from purchasing bottled water. Suffolk County, New York, followed suit in March by prohibiting county departments from buying workers bottled water in single-serving bottles, and Takoma Park, Maryland, did the same in April 2008. And, of course, in June 2008, the U.S. Conference of Mayors issued its anti-bottled water resolution.

In Canada, school districts announced this year that they are considering removing bottled water from school vending machines.[9] This could lead students to choose less healthy options if they forget to carry bottled water to school or drink from water fountains, which are often far less sanitary. Critics have also raised concerns about the quality of the school's tap water.

There may be more to come in the war on bottled water. Washington State lawmakers are considering a law to ban the sale of petroleum-based water bottles and to prohibit state agencies from buying such products.[10]

Pittsburgh officials have said that they want to ban government purchases of bottled water per the U.S. Conference of Mayors resolution—

Anti-bottled water hysteria has even seeped into marketing.

even though old pipes in the city's office buildings produce rusty, orange water. According to news reports, the mayor indicated he wanted to be green, and bottled water was their best alternative.[11] Apparently, not all tap water meets the same quality standards of bottled water, despite claims to the contrary.

This anti-bottled water hysteria has even seeped into marketing. For example, a number of private establishments have decided that they would no longer market or serve bottled water. A number of restaurants in San Francisco and in other big cities have taken bottled water off their menus. But not all of these restaurants are willing to serve just plain old tap water. Instead, they will offer filtered tap water.

Meanwhile, some New York City restaurants and hotels have decided to be creative and trendy about how they serve their filtered tap water, and some might even post a profit. While people have accused bottled water manufacturers of silly marketing, businesses are starting to do the same with tap water. The Waverly Inn says it will offer treated tap water as an alternative without charge but will also sell sparking tap water at a $5 per glass. The Grand Hyatt Hotel's Commodore Grill & Lounge "sells triple-purified flat or carbonated tap water—using Natural filters from Italy—for $6" a pop as part of a 60-day trial at four Hyatt hotels.[12]

If governments want to stop paying for bottled water and restaurants choose not to provide it, that certainly is their right. It might even save governments some money. But such moves simply do not warrant the media attention they have received, and they are unlikely to matter much for the environment (a point that will be addressed more below). However, laws to ban private sales of bottled water and prevent workers from bringing bottled water to work accomplish little other than impose costs on consumers and undermine consumer freedom.

Draining tax dollars. The anti-bottled water craze has caused some politicians to do questionable things with taxpayer dollars. While some cities might save money by not providing bottled water to workers, other anti-bottled water campaigns may negate such savings—for example, New York City's $700,000 ad campaign to urge New Yorkers to drink tap water.[13]

Similarly, in March 2008, San Francisco Mayor Gavin Newsom launched a city government campaign to encourage restaurants to stop providing bottled water. He has also announced several other expensive activities to promote tap water, including applying for an $11-million grant from the federal Environmental Protection Agency (EPA) to promote

"innovative water quality protection measures." The mayor had volunteers distribute stainless steel water bottles to lunchtime visitors following his news briefing on the topic, and the city made them available (while supplies lasted) to anyone willing to sign a pledge to no longer drink bottled water. Allegedly, the stainless steel bottles are "greener," but they are not cheap. In fact, producing steel is much more resource intensive than making a simple plastic bottle. Even if reused many times, these containers will not necessarily save much energy, particularly since they require washing to be reused.[14]

However, not all public officials have been unreasonable. According to news reports, state lawmakers in Connecticut refused one anti-bottled water proposal. One member of the legislature had urged the body to cut bottled water contracts worth $11,300 a year and invest in water fountains. The estimated cost was about $1,550 per fountain, and they would need about 60, costing a total of $93,000. At that rate it would take more than eight years to pay off the water fountain installation, not to mention maintenance costs. And what if lawmakers did not like drinking from fountains? You could be sure that some would bring in their own cases of bottled water. And perhaps before eight years were up and the anti-bottled water craze had ended, lawmakers would return to bottled water and the fountains would simply represent more government waste.[15]

Taxing water. Perhaps the most disturbing trend is the use of this issue as an excuse to levy a new tax. That is what the City of Chicago has done. Taking effect January 2008, it applies a tax of five cents per bottle of water, regardless of size. Each bottle in a case is taxed separately, which means that for the typical case of 24 bottles costing about $3.99, the tax comes to about 30 percent.

Chicago officials have used the hype about bottled water's alleged adverse impact on the environment as an excuse to enrich city coffers and help cover considerable shortfalls, but they would have had a better chance of meeting their goals of a balanced budget if they had cut spending instead. The tax is bringing in about half of what the city projected.[16]

Moreover, city residents apparently are crossing into the suburbs to buy tax-free bottled water. Stores just outside the city say they are seeing increased sales of bottled water. One store reported a 20 percent increase in sales of bottled water by the case.[17] A Sam's Club employee told reporters: "It increased pretty well especially since we're right across the street (from Chicago)."[18] Illinois Retail Merchants Association President

David Vite, notes, "There's no reason someone is gonna pay $1.20 extra for a $4 dollar case of water when they can go to the suburbs to buy it without that."[19]

Jim Tobin of the National Taxpayers United of Illinois, in a letter to the editor, notes some pitfalls of Chicago's new tax. He points out that the city is collecting much less than expected because people leave the city to shop where the taxes are lower. Moreover, when residents go outside the city to buy cheaper bottled water, they also buy other items. As a result, the economic effects for Chicago are bigger than simply losing bottled water sales. Tobin further points out that it hurts supermarkets, convenience stores, and employment within Chicago.[20]

In January 2008, the International Bottled Water Association and several other trade groups filed a lawsuit challenging this tax, seeking to have the tax voided on the grounds that bottled water is a food item. According to state law, the city lacks the authority to tax food items. The trade group also contends that the bottled water tax violates the state's constitution, which includes a clause prohibiting lawmakers from singling out a specific product for a tax while ignoring similar products. Since the tax excludes bottles containing soda, sparking water, and other beverages, the plaintiffs claim the law violates this uniformity clause. Other plaintiffs include the Illinois Retail Merchants Association, Illinois Food Retailers Association, and American Beverage Association.

Bottled Water's Benefits

The current hysteria against bottled water suggests that people who drink it are foolish because the product is simply wasteful. In reality, people buy bottled water because it meets certain needs, such as convenience and consumer satisfaction. But most overlooked in the debate are a number of other important applications.

Medical Needs. Bottled water is often recommended for people whose immunity may be compromised by chemotherapy, transplant operations, or diseases such as AIDS. For example, the Centers for Disease Control and Prevention (CDC) suggests bottled water as one important alternative for HIV patients because tap water is of less reliable quality. Specifically, the CDC notes:

> Because you cannot be sure if your tap water is safe, you may wish to avoid tap water, including water or ice from

a refrigerator ice-maker, which is made with tap water. Always check with the local health department and water utility to see if they have issued any special notices for people with HIV about tap water.

You may also wish to boil or filter your water, or to drink bottled water. Processed carbonated (bubbly) drinks in cans or bottles should be safe, but drinks made at a fountain might not be because they are made with tap water. If you choose to boil or filter your water or to drink only bottled water, do this all the time, not just at home.[21]

For three years, the hospital has kept signs posted over sinks reading: "Do not drink the water. Use bottled water for drinking, brushing teeth, or taking medication."

There are occasions in which tap water is insufficient for more than a short period of time and bottled water becomes an important solution, especially for individuals who are ill. For example, *The New York Times* reported recently that the New York-Presbyterian/Columbia Hospital uses bottled water because its building's tap water has proven dangerous to patients. For three years, the hospital has kept signs posted over sinks reading: "Do not drink the water. Use bottled water for drinking, brushing teeth, or taking medication."[22] The hospital has not permitted anyone to drink the tap water since 2005 after two patients died from Legionnaire's disease. This disease comes from a common bacterium that grows rapidly in industrial-sized water systems. The concern about this bacterium remains. "Until that is resolved, we will not be serving tap water," a hospital spokesperson told the *Times*.[23]

Emergencies. The consistent quality and portability of bottled water make it especially useful in emergency situations. In fact, tap water periodically experiences quality control problems that lead public officials to issue alerts calling on individuals to boil water before using it or use only bottled water for drinking, cooking, and brushing teeth. Moreover, the Environmental Protection Agency, like the CDC, recommends bottled water as a good option for individuals with compromised immune systems, even at times when tap water quality is satisfactory.[24]

Because water treatment facilities can be affected during a power outage, tap water quality can become compromised. In that case, officials issue an alert calling people to boil their water or drink bottled water. A CDC paper offering public health tips for individuals in this situation

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suggests the use of bottled water for anyone using infant formula that requires adding water. "If using ready-to-feed formula is not possible, it is best to use bottled water to prepare powdered or concentrated formula," it notes. "If bottled water is not available, use boiled water. Use treated water to prepare formula only if you do not have bottled or boiled water."[25]

In weather-related and other emergencies, an easily accessible supply of bottled water is essential. The September 11, 2001, terrorist attacks serve as a reminder of the importance of maintaining a robust bottled water industry. The International Bottled Water Association reports that after the attacks, bottled water companies donated more than 2 million bottles of water to rescue workers at all locations.[26] Similarly, the bottled water and beverage industry, in general, provided millions of bottles of water, other supplies, and financial donations to victims of Hurricane Katrina.[27] Such donations are common.

Also consider the fact that many times when we do have emergencies, ranging from major events to shorter-term water-boiling alerts, retail outlets often run low on—or completely out of—bottled water because of increased demand. What would happen if stores kept much smaller supplies of bottled water because they accepted the line that it is too wasteful to carry it, as some have already done? The prospect of fewer people having adequate access to an emergency water supply could have serious, adverse impacts.

Even with existing resources, getting bottled water to residents in times of need can be a challenge. After Hurricane Rita in September 2005, the Texas Rural Water Association (TRWA) formed the Rural Water Emergency Assistance Cooperative (RWEAC) to focus on planning and keeping bottled water on hand. TRWA Director Tom Duck explained: "RWEAC was created in recognition of the fact that rural utilities are often the last to receive vital state and federal assistance in times and circumstances of an emergency as demonstrated during Hurricane Rita this past September."[28]

Health. An easily accessible, calorie-free option for hydration is critical for an on-the-go society, particularly for individuals with special needs, such as the elderly, as well as for individuals engaged in sports, participating in outdoor events, or on the road. For example, the CDC underscores the value of commercially bottled water for Americans traveling overseas because tap water is often of questionable quality in

many places. The agency advises travelers: "To help you and your fellow travelers avoid diarrhea, the most common travel-related illness, and other food- and water-related problems, purchase commercially-bottled water to drink and to brush and rinse your and their teeth."[29]

Moreover, CDC warnings regarding the serious impacts of extreme heat and dehydration during summer activities underscores the value of having bottled water readily available in public places. The CDC, noting the serious health impacts of dehydration, especially for the elderly, recommends keeping hydrated with low-sugar (or no sugar), non-caffeinated drinks during extreme heat to avoid adverse health implications.[30] CDC notes: "Historically, from 1979-2003, excessive heat exposure caused 8,015 deaths in the United States. During this period, more people in this country died from extreme heat than from hurricanes, lightning, tornadoes, floods, and earthquakes combined. In 2001, 300 deaths were caused by excessive heat exposure."[31]

Such realities highlight the importance of bottled water at outdoor public events. Yet some government officials are removing bottled water from such events through bans and by calling on people to bring their own water. And if people do not happen to bring water? They may be forced to drink caffeinated or sugared drinks given no other option—unless regulators decide to ban those too! That is not only silly, it is unfair and not the healthiest option for some people—especially many elderly Americans who are at the greatest risk.

Bottled water is also a valuable assistance to people fighting obesity or simply wanting to shed a few extra pounds. Children in particular benefit when vending machines allow that option. Yet again, regulators may eventually deny us that option.

Choice and Convenience. There is another obvious difference between tap and bottled water: Bottled water comes in a bottle—and that alone helps make it marketable because of convenience. People can easily pick it up while on the go. After all, few people want to fill up reusable bottles at dirty gas station bathrooms or search for a working water fountain. Instead, they appreciate the more consistent quality of bottled water compared to tap water, which varies from one city the next.

The value of consumer choice should not be dismissed. People choose bottled water for a variety of reasons. As noted, among them is that it is often an alternative to beverages that include calories that

some consumers seek to avoid. Clearly, there is a public health benefit associated with allowing people to drink a product that provides hydration without extra calories.

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Anti-bottled water activists say they have some easy alternatives to bottled water, but most of those fall short on many levels. First, they suggest using water filters for tap water. This is not a terrible suggestion, but the fact that the activists suggest we need filters at home is evidence that bottled water and tap water are not the same. While the vast majority of tap water in people's homes is safe, some people do not like the taste. Some people might find that filters help with that issue, but others might still prefer bottled water. However, filters are not problem-free, either. The Centers for Disease control notes:

> Filters collect germs from water, so someone who is not immunocompromised should change the filter cartridges. Anyone changing the cartridges should wear gloves and wash hands afterwards. Filters may not remove *Cryptosporidium* as well as boiling does because even good brands of filters may sometimes have manufacturing flaws that allow small numbers of *Cryptosporidium* to get in past the filter. Selection of NSF-Certified filters provides additional assurance against such flaws. Also, poor filter maintenance or failure to replace the filter cartridges as recommended by the manufacturer can cause a filter to fail.[32]

Environmental activists suggest that we can easily make tap water as portable as commercially bottled water by using refillable bottles. Yet this undermines the convenience factor that makes bottled water so valuable. One must remember to lug along a refillable bottle—which can easily get lost and must be kept clean. Also, a refillable bottle with warm water in your car is not as appetizing as a refrigerated one from a convenience store. And activists do not address the issue of where these bottles will be refilled on the road. Water fountains are not always available, and often the only option is a public bathroom, which is often unsanitary and certainly not a pleasant option for many people.

In addition, keeping refillable bottles clean can be a tall order, especially if people haul them around and store them in cars. Coffey

Laboratories in Portland Oregon conducted tests on refillable bottles used by a sample of individuals to see if they contacted significant bacteria. Tests showed that many contained considerable levels of bacteria—even bottles that were washed regularly. Bottles contained bacteria ranging from 99 colonies up to 4,100 colonies for a bottle washed a couple days before the test. A bottled washed the day before the test contained 2,400 colonies of bacteria.[33] While these levels might not be unsafe, it shows that refillable water bottles are no more sanitary than commercially bottled water.

Reliance on water fountains is another option for some situations, such as in schools. But water fountains have their own set of sanitary issues. Susan Poutanen, a microbiologist at Mt. Sinai Hospital in Toronto, explained to a Canadian newspaper that bacterial colonization tends to grow in wet areas like a water fountain, but the risks of illness are low. "The ideal would be to drink from the fountain without touching it and if it looks gunky then don't use it," she notes.[34] One 13-year-old boy at an Oregon middle school conducted a study of water fountains in his school to determine how sanitary they are compared to his school's toilets. He found that the toilets were significantly cleaner than the water fountains.[35] "The toilet water is usually cleaner with regard to bacteria because toilets get continuously flushed, whereas a water fountain is left open to the environment," said Dr. Phillip Tierno of New York University Medical Center. "You know that toilets are occasionally washed, but I've never seen a water fountain sanitized at all."[36]

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For all the issues involved, the really critical one is personal choice. That governments should tax, ban, or spend taxpayer dollars to engage in a campaign against a product that people otherwise freely choose to purchase is unfortunate to say the least. There have been a few voices of reason on this topic, some of which are worth highlighting here.

The editor-at large of *MacLean's* magazine, Canada's leading newsweekly, in a letter to the editor in a local Canadian paper, complained about bans of bottled water in schools. "My issue with bottled water is why a school board (or the United Church, for that matter) thinks it should have the power to deny children a popular and convenient source of water," he notes. "A few years ago my sons' school demanded that every child have a bottle of water on their desk. Now it's forbidden?"[37]

At the U.S. Conference of Mayors, one mayor stood up for reason. Cuyahoga Falls, Ohio, Mayor Don Robart called the Conference's

anti-bottled water resolution "over the top," and offered his own resolution, which read that government bottled water bans "simply eliminate a healthy beverage option" and "bottled water does not in any way burden the public water infrastructure."[38]

How did we get to this point, when such common sense is rare?

It is ironic that environmentalists have suddenly decided that bottled water is an environmental problem because their campaigns against tap water helped spur the bottled water market.

Facts v. Hype

It is ironic that environmentalists have suddenly decided that bottled water is an environmental problem because their campaigns against tap water helped spur the bottled water market. Thanks to environmental activists, people were led to believe that they needed bottled water to avoid the environmentally questionable quality of their tap water. Indeed, the Environmental Working Group (EWG) and the Natural Resources Defense Council (NRDC) led the charge against tap water, claiming that it was polluted and was putting millions of Americans at risk.

Not coincidentally, these activist groups produced many of their studies, during the years that Congress was working to revise the Safe Drinking Water Act (SDWA), to promote stricter regulation, hyping water quality risks with fallacious claims about safety. For example, during 1995, NRDC released "You Are What You Drink," which hyped risks about arsenic and other substances as the EPA was promulgating new rules on those issues.[39] In 1994, EWG released "Tap Water Blues,"[40] which alleged to find serious pesticide contamination in 20,000 residential faucets. "Millions of Americans are routinely exposed to one or more pesticides in a single glass of tap water," it exclaimed.[41]

But according to a former assistant EPA administrator for water, this report misled Americans about the state of drinking water quality.[42] Ninety percent of the samples EWG used for this report came from raw, untreated water sources. Such water would be treated before it was distributed to the public. The EWG report was highly misleading since it suggested that the public drinks raw water, but as the EPA official noted "No one in their right mind would drink water straight from the Mississippi River."[43]

Another EWG study, "Weed Killers by the Glass,"[44] followed up "Tap Water Blues" with more study of pesticide levels in drinking water. This paper noted that pesticide and herbicide levels exceeded federal levels in 28 of 29 cities tested during the season when farmers tend to

use these chemicals the most. However, it failed to acknowledge that such exceedances do not necessarily amount to violations of drinking water standards or even amount to a genuine health concern. Many of the localities surveyed by the report were within compliance with federal standards for such herbicides and pesticides. That is because EPA standards in this area are based on an annual average of samples because pesticide risks are predicated upon long-term exposure, not acute periodic incidences. According to one anonymous EPA source, the findings were not news to the EPA and were consistent with what is commonly known to both the scientists who wrote the standards and the regulators who enforce them. As the official cautioned, "The standards are year long. You worry about people getting cancer over a lifetime...We believe that for systems that meet federal standards, water is safe to drink."[45]

In 2003, NRDC released another paper, "What's on Tap?" which suggests that while all Americans do not face any grave risk, some people in certain places should be concerned. "Yet several cities—such as Albuquerque, Fresno, and San Francisco—have water that is sufficiently contaminated so as to pose potential health risks to some consumers, particularly to pregnant women, infants, children, the elderly, and people with compromised immune systems," notes author Erik Olson. One of the main culprits, according to NRDC, is one of its political opponents: the Bush administration. While cities do face challenges with such things as ailing infrastructure, NRDC's study yet again hypes risks associated with trace level contaminants that pose no significant risks. In fact NRDC did not "fail" a single city in its report because all cities did a good job meeting the EPA's very stringent drinking water standards.[46]

The EWG has also fueled the hype on tap water. One recent study complains that 140 contaminants in our water are unregulated.[47] The EWG wants us to assume these "contaminants" are dangerous. Yet they appear very infrequently at such low levels that their impact is inconsequential.

NRDC has led the charge against bottled water, issuing a report as early as 1999, which suggested that bottled water is not as well regulated as tap water. However, as the following section shows, bottled water meets nearly the same standards as tap water, and where the standards vary, bottled water regulations are at least as stringent if not more restrictive than tap water regulations. An analysis of some of the more recent green hype about bottled water and why it is wrong also follows.

A key line of attack against bottled water is the claim by environmental activists that it does not need to comply with EPA standards for tap water, and therefore bottled water standards are lower. Yet such arguments do not square with reality.

Regulation. A key line of attack against bottled water is the claim by environmental activists that it does not need to comply with EPA standards for tap water, and therefore bottled water standards are lower. As a result, they say, bottled water quality may not even be as good a tap water quality. NRDC makes these arguments in its 1999 paper on bottled water, which has been cited widely as the key source of information on this topic. Yet such arguments do not square with reality.

The EPA sets standards for tap water under the Safe Drinking Water Act (SDWA)[48] of 1996 and the Food and Drug Administration (FDA) sets standards for bottled water under the Federal Food, Drug, and Cosmetic Act (FFDCA).[49] The FDA regulations are based on EPA standards and are mostly the same, with the exception of a few areas where tap water regulations do not apply or where the FDA includes additional or more stringent requirements. According to the EPA, both sets of standards produce bottled and tap water that is safe.[50]

Under the SDWA, the EPA regulates more than 80 drinking water contaminants that might be found in the water of public water systems. For each regulated contaminant, the EPA usually specifies a maximum contaminant level goal (MCLG), which represents the level of a contaminant which the EPA ideally wants to allow in drinking water. EPA uses the MCLG as a guide in setting the enforceable standard, the maximum contaminant level (MCL), which represents the amount of a given contaminant that systems may legally allow in tap water. (For example, EPA allows systems to provide only drinking water that contains no more than 0.005 milligrams of benzene per liter of water.) When the EPA determines that it is technically or economically infeasible to monitor for a contaminant, it is directed by Congress to promulgate mandatory "treatment techniques," such as mandatory installation of filtration devices.

The FFDCA requires that the FDA apply SDWA standards to the extent they make sense for bottled water. Its version of an MCL is known as a Standard of Quality (SOQ). According to the FFDCA, SOQs must be "no less stringent" than EPA MCLs and "no less protective" than EPA treatment techniques.[51] In other words, the FDA has two choices when setting a regulation. It must either be equivalent to EPA standards or it must be more stringent. The law does not allow the FDA to set standards that produce a lower quality product.

When deciding on a SOQ, the FDA must review EPA regulations for tap water once the EPA finalizes or revises them to assess whether

they are applicable to bottled water. If the FDA finds that the tap water regulations are applicable, it must propose those same regulations for bottled water within 180 days after the EPA issues the tap water standards. The Safe Drinking Water Act demands that if the FDA fails to act, the EPA tap water regulations become the standards for bottled water. As a result, the FDA has overwhelmingly applied the EPA's tap water standards to bottled water. Appendix A offers a comparison of FDA and EPA standards.[52] Like the EPA, the FDA requires that the water be tested regularly to ensure that standards are met.

There are some cases in which the standards vary because of differences between delivery systems. Since tap water travels through pipes, regulations need to address potential contamination from pipes. Sanitary packaging for bottled water means that regulations related to food and food packaging apply to bottled water.

FDA regulations are more stringent for some chemicals, including lead, copper, fluoride, and phenols. Dr. Henry Kim, a supervisory chemist at the FDA's Center for Food Safety and Applied Nutrition, Office of Plant and Dairy Foods and Beverages, points out the difference between regulations for lead in both tap and bottled water. He notes that EPA standards tolerate a higher level of lead than do FDA standards for bottled water, because lead can leach from the pipes into water before it reaches the tap, making it more difficult to control.[53] The EPA requires that tap water contain no more than 15 parts per billion of lead, while the FDA standard is much more stringent at five parts per billion. The FDA opts for a more stringent standard simply because it is more readily attainable for bottled water.

Some tap water regulations do not apply to bottled water because the issues they address deal with tap water purification issues and pipe delivery, which obviously do not concern bottled water. For example, the EPA regulates two substances—acrylamide and epichlorohydrin—because they are used in tap water treatment plants and can enter the water there. But these substances are not used to purify or package bottled water and hence are not an issue and do not warrant FDA regulation.[54] The FDA also does not have a regulation for asbestos because it is not a problem in bottled water sources, while the EPA regulates asbestos because it is used in cement pipes that distribute tap water.[55] The FDA does not employ the EPA regulation for phthalates[56] because the FDA applies standards related to food additives to ensure that such chemicals remain at levels below

health concerns. Moreover, most bottled water comes in polyethylene terephthalate (PETE or PET) plastic containers, which do not contain phthalates. The FDA does not apply EPA's Enhanced Surface Water Treatment Rule because it applies only to surface water. Bottled water typically comes from underground sources or from tap water that has already complied with EPA's surface water rule.

FDA regulations for managing microbiological agents vary from the EPA's, but again, they must be "no less protective."

FDA regulations for managing microbiological agents vary from the EPA's, but again, they must be "no less protective." Instead of mandating specific filtration or disinfection methods, FDA mandates that water meet the same standards as all food products. These include sanitary production and packaging regulations as well as rules to ensure products are not "adulterated" with any harmful substance. In other words, FDA regulates the final product and gives bottled water companies some leeway in how they reach that level of quality.[57] Essentially, this means that when companies bottle water, the product must not present any human health threat, and the company must be able to demonstrate that fact to FDA inspectors or face enforcement penalties. Specifically, regulations demand that bottled water not be adulterated with the addition of any "deleterious substance that may be injurious to health," which includes additives from the containers that might enter the water in trace amounts, such as phthalates.[58]

There are many good reasons why the FDA takes this approach. In particular, one of the qualities that many consumers like about bottled water is that many kinds come from natural sources and are not subject to the types of treatment techniques—such as chlorination—that affect the flavor of the product. Chlorination is not necessary for bottled water as it is for tap water, because bottled water is not delivered to the consumer via pipes, where it can become contaminated. Sanitary packaging essentially performs the same role that chlorine performs during pipe transport. Moreover, much bottled water comes from groundwater sources, which according to the EPA, are less likely to become contaminated, and hence do not require the same kind of disinfection.[59] According to the EPA, "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."[60] The International Bottled Water Association reports that its members provide 85 percent of the bottled water in the United States.

Membership demands that companies employ a "multi-barrier approach" which may include steps such as source protection, source monitoring, reverse osmosis, micron filtration, distillation, ozonation and final disinfection.[61] In addition, consumers can contact companies to learn about disinfection techniques before selecting a brand if the information does not already appear on the label.

Information found on the label is also regulated by the FDA. Labeling regulations demand that bottled water labels contain only accurate information. Products that do not meet FDA standards are considered "misbranded." Regulatory definitions for specific terms—"ground water," "mineral water," "purified water," "sparkling water," are all defined in FDA regulations (see Figure 1).[62]

Bottled water providers must also meet "Good Manufacturing Practices."[63] Under these regulations, source water must come from an approved source that meets all the laws and regulations of the government that has jurisdiction of the water source. Good manufacturing practices also include regulations on processing, packaging, transport, and storage to ensure sanitary conditions. They also mandate that bottled water companies regularly monitor the water source and final products to ensure they comply with safety regulations. Other regulations involve specific identity and quality requirements for bottled water.[64]

One of the qualities that many consumers like about bottled water is that many kinds come from natural sources and are not subject to the types of treatment techniques—such as chlorination—that affect the flavor of the product.

Figure 1
Types of Bottled Water
Source: U.S. Food and Drug Administration

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.
Mineral Water	Water containing not less than 250 ppm 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. As appropriate, also may be called "demineralized water," "deionized water," "distilled water," and "reverse osmosis water."
Sparkling Bottled 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.
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 feeding the spring, but there are additional requirements for use of a bore hole.

(For complete regulatory definitions, see 21 CFR 165.110(a)(2).)

Today "interstate commerce" covers most all commercial activity in the United States.

Nonetheless, some environmental activists have suggested that bottled water is of a lower quality because FDA only regulates water in "interstate commerce." They suggest that because a large share of bottled water is produced solely intrastate, then such water must be of a lower quality as it does not fall under FDA jurisdiction. For example, a NRDC spokesperson suggested in congressional testimony that as much as 40 percent of bottled water is not covered by FDA regulations.[65] Even if this claim were correct, it should not be alarming. In addition to the fact that states regulate bottled water to ensure safety, bottled water has a tremendous safety record, with very few problems reported. The next section of this paper compares that record to tap water and finds that there have been far fewer health-related problems associated with bottled water.

In any case, the contention that bottled water providers produce water that is of lower quality than demanded by FDA is highly unlikely. In fact, the data in NRDC's own report shows that an overwhelming majority of bottled water meets or exceeds federal water standards.[66] According to NRDC, it "commissioned independent lab testing of more than 1,000 bottles of 103 types of bottled water from many parts of the country."[67] NRDC reports that only "four waters" failed (two exceeded standards for fluoride and two for coliform bacteria) to meet federal standards.[68] That is an impressive compliance rate.

Moreover, given the broad definition of interstate commerce, it is unlikely that anyone could make a legal case that any bottled water does not fall under FDA's jurisdiction, since today "interstate commerce" covers most all commercial activity in the United States. For example in *Wickard v. Filburn* (1942), the Supreme Court ruled that wheat grown and consumed on a farm is considered to be part of interstate commerce because interstate commerce is affected as the farmer does not have to buy wheat in the marketplace. In *Gonzales v. Raich* (2005), the Court ruled that marijuana grown in a home for medicinal use under California law was considered interstate commerce and subject to federal law, as well. In addition, if any part of a food product or packaging involves or affects interstate commerce, the product is covered. Finally, the Food, Drug, and Cosmetics Act says that courts shall presume for enforcement purposes all food products, including bottled water, are part of interstate commerce. Specifically, the law reads: "In any action to enforce the requirements of this Act respecting a device, food, drug, or cosmetic the connection with interstate commerce required for jurisdiction in such action shall be presumed to exist."[69]

In Senate testimony, a NRDC representative acknowledged that the most likely case is that bottled water falls under FDA jurisdiction. In a footnote to the claim that the water is not regulated by FDA, the NRDC staffer notes: "However, the bottled water industry, by and large, has a significant effect on interstate commerce and many of the products used in the bottling plants—such as the bottles, labels, the caps—move through interstate commerce even if the source of the water may be intrastate. Given the prevalence of moving plastic bottled through interstate commerce, most, if not all, bottled water should fall under FDA's watch."[70]

Bottled water providers also must comply with other standards—both public and private. There are state-level regulations, some of which—such as those from California, Pennsylvania, and Florida—are more stringent than federal regulations. In addition, the International Bottled Water Association's members—who supply 85 percent of the bottled water sold in the U.S.—comply with even stricter industry standards. In addition, the association's membership is subject to unannounced sanitary inspections by two independent groups—the National Sanitation Foundation and Underwriters Laboratories.[71]

In the rare case that a bottle of water does not meet a standard, or does not meet California standards, there still is no public health consequence. In fact, a high success rate of meeting EPA/FDA standards indicates that bottled water meets exceedingly high safety standards. EPA regulators design the regulations with safety factors to ensure that even if consumers are exposed to contamination many times higher than levels allowed by regulation, they would not suffer any public health impact, despite environmentalist claims suggesting that trace level chemicals in our water may give us cancer. In their landmark study on cancer, scientists Richard Doll and Richard Peto noted back in 1981, when standards were not nearly as stringent: "With the possible exception of asbestos in a few water supplies, we know of no established human carcinogen that is ever present in sufficient quantities in large U.S. water supplies to account for any material percentage of the total risk of cancer."[72]

A periodic exceedance for chemical contaminants should be of little concern. In fact, EPA regulators do not expect every sample of tap water to meet the agency's standards for chemical contaminants. Instead, the levels are averaged over a period of time because the risks of such trace-level chemicals are associated with long-term exposures

Purified bottled water from public drinking water systems is of a higher quality, since it receives additional treatment after meeting tap water standards.

to contaminants at vastly higher levels over a long period of time. Periodic exceedances of the exceptionally cautious standards are of no consequence, particularly since exceedances were on the order of one to a few parts per billion. Importantly, bottled water still meets an even more stringent standard on this point. Unlike EPA regulations for tap water, bottled water companies are not expected to meet the standard on average. They must meet it with every single sample, which makes FDA standards more stringent in this respect.

Finally, environmental activists suggest that bottled water testing is insufficient compared to tap water regulations. NRDC notes that tap water regulations require local governments to test for bacteria and chemical contaminants far more often than bottled water companies. But there are good reasons for these differences. Tap water must be tested frequently because its source and delivery system make it much more likely to become contaminated, since tap water often comes from surface water sources and then travels through pipes. Moreover, when the volume of water tested is taken into account, bottled water receives more testing per gallon of water.[73]

Given that bottled water largely meets or exceeds federal tap water standards, there is little reason for any health fears. In fact, as the next section shows, bottled water quality is often higher than tap water quality and it suffers less often from contamination problems.

Not the Same as Tap Water. One common reason why people call for bottled water regulation is the assertion that bottled water is not necessary because it is no different from tap water. Yet, as the EPA points out, both tap and bottled water vary from one source to the next. Bottled water that is labeled "purified" originates from the tap, but the final product is different because the tap water undergoes additional treatments to eliminate flavors from chlorination, among other things. In other words, purified bottled water from public drinking water systems is of a higher quality, since it receives additional treatment after meeting tap water standards. In contrast, unpurified tap water is less predictable in terms of flavor and quality because it can take on flavors from disinfections as well as from contaminants from pipes.

Activists like to suggest that a large portion of bottled water is simply "bottled tap water." But, according to the International Bottled Water Association, 75 percent of bottled water is from sources other than

municipal systems.[74] Nonetheless, NRDC still uses this data to suggest that as much as 25 percent of bottled water is simply tap water that may or may not receive additional treatments.[75] Yet a good portion of that 25 percent does receive substantial treatments and hence is of higher quality. All consumers need to do is look at the labels and select a bottled water brand that meets their needs. (In addition to complying with FDA labeling mandates, most bottles include phone numbers where consumers can access additional information and have their questions answered.) The FDA sets labeling standards that help consumers understand the terms on bottled water labels (see Figure 1).

In terms of safety, both tap and bottled water are generally good, yet available data indicates that bottled water has a better safety record. A comparison of health-related problems that have been connected to both bottled and tap water shows that tap water has more documented health-related incidents. For example, one EPA study documents a total of 207 waterborne-disease outbreaks producing 433,947 documented illnesses and 73 deaths between 1991 and 2002. Most of these cases were the result of a major outbreak of the pathogen cryptosporidium in Milwaukee's tap water during 1993, which produced 403,000 illnesses and 50 deaths.[76] In addition, many tap water problems go unreported and undetected. Of note, while many people focus on risks associated with trace-level chemicals in the water supply, the overwhelming majority of deaths resulted from microbiological pathogens in tap water.[77]

The EPA also reports that many of the deaths were among people with compromised immune systems. For example, of 54 deaths associated with cryptosporidium during 1991-2002, 85 percent were among individuals suffering from AIDS.

According to the EPA, the risks of tap water are underestimated. In fact, agency officials believe that many Americans suffer from acute gastrointestinal illness (diarrhea) every year from drinking tap water. In one study, the EPA estimates that 16.4 million Americans suffer from acute gastrointestinal illnesses annually. This number is simply an estimate, but it is indicative of the potential illnesses associated with tap water, with the vast majority being minor and short-term, fortunately.

In recent years, tap water illnesses have been increasingly related to the means of distribution via piping. Keeping the water clean from the treatment plant to the tap offers challenges that do not exist for sanitary packaged bottled water. Potential contamination in municipal pipes is

In recent years, tap water illnesses have been increasingly related to the means of distribution via piping. Government agencies have not found nearly as many health-related problems associated with bottled water.

a key reason why bottled water is recommended for ill individuals. Dr. Stephen C. Edberg, director of the Clinical Microbiology Laboratory of the Yale-New Haven Hospital and professor of Laboratory Medicine, Internal Medicine and Chemical Engineering at Yale University, notes the differences:

> The greatest disparity between tap water and bottled water is the distribution system. Tap is delivered through pipes where the most variability in the safety of tap water occurs. On average, a city loses between 18 percent and 44 percent of its water from leaking pipes. These pipes are often in the same trenches as our sewer pipes. It has been shown that even under normal operating conditions, pressure changes in the distribution system can cause environmental intrusion from the outside of the pipe to the inside, allowing sewage contamination to enter drinking water systems. This open distribution system is more vulnerable to contamination.
>
> Bottled water, on the other hand, uses a more controlled process that can avoid external contamination from the source through the bottling process. Moreover, the bottle hygienically seals in the quality. [78]

Government agencies have not found nearly as many health-related problems associated with bottled water. Both the sources of water used for bottled water (much of which comes from ground rather than surface waters, which tends to be cleaner) and their delivery systems play a critical role in keeping risks low. Dr. Edberg notes that, "the CDC has associated bottled water with less than 10 incidents resulting in possible cases of illness in the past 35 years."[79]

Amy Simonne, Assistant Professor for Food Safety and Quality at the University of Florida, says, "There has not been a documented major outbreak of illness from bottled water in the U.S."[80] The fact that there has not been a major outbreak does not mean there are no isolated cases of individual problems. The CDC reports a handful of cases over the past several decades in their reports on waterborne illnesses.[81] Yet the few illnesses associated with bottled water are dwarfed by the more numerous tap water-related illnesses.

Like all food products, bottled water is also subject to recalls under FDA guidelines, which have occurred periodically. Yet these recalls are not necessarily associated with many actual illnesses, nor are they related to any deaths. Peter H. Gleick, author of *The World of Water, The Biennial Report on Freshwater Resources: 2004-2005*, lists a number of such recalls. None of them produced significant, long-term public health impacts. Of the 12 cases he found, 10 occurred in the United States. (In one recall by the state of Pennsylvania, the water contained coliforms, and one person reported some gastrointestinal distress.) All of the FDA recalls fell within Class II and III for food recalls.[82] Both classifications indicate that the FDA determined the risks of any long-term problems to be "remote" or "unlikely." The exact definitions of these classes are as follows:

- Class II recall: a situation in which use of or exposure to a volatile product may cause temporary or medically reversible adverse health consequences or where the probability of serious adverse health consequences is remote.

- Class III recall: a situation in which use of or exposure to a volatile product is not likely to cause adverse health consequences.[83]

More recently, there have been a few additional recalls, some which have captured headlines, although the risk remained low. In 2004, Coca-Cola recalled Dasani bottled water overseas because it contained elevated levels of the chemical bromate. Nestlé and Wegmans supermarkets conducted similar recalls in 2006. While much hype in the press makes it appear as serious, the risk was actually very low and the impact negligible. Bromate is a by-product of disinfection with ozone, which water companies ensure stays below levels of concern.

Even though the recalls involved exceedances of standards, the levels of bromate in the water still did not pose acute or long-term health risks. Theoretically, long term risks—such as cancer risks—would involve drinking a substantial amount of this water over several decades. Moreover, according to the EPA's assessment of bromate, there is no human data indicating a cancer risk. Instead, bromate causes cancer in rodents administered very large doses, which is of questionable relevance to humans exposed to trace levels for short intervals.[84] Hence, there is little

reason to worry about a periodic short-term exposure to bromate in bottled or tap water.

Still NRDC suggests that bottled water produces significant waterborne illnesses and is not necessarily safer than tap water as a result. But the group is hard pressed to come up with much evidence. NRDC claimed in 1999: "[O]utbreaks from contaminated bottled water have indeed occurred and are well documented by CDC and others in the scientific literature."[85] Yet it could only identify three such "outbreaks" ever, and only one occurred within U.S. jurisdiction. In that case, there was an issue with bottled water in the U.S. territory of the Mariana Islands in the Pacific, which NRDC points out is covered by U.S. bottled water regulations. According to NRDC, at least 11 people became sick, with four being hospitalized. However, the fact that NRDC could only find this one incident—compared to the many cases of waterborne problems with tap water—is indicative of an impressive safety record for bottled water.

Ironically, this single U.S. bottled water "disease outbreak" is addressed in a CDC document that underscores the more significant risks posed by tap water-related disease outbreaks. Specifically, the CDC report addresses the largest waterborne disease outbreak in recent decades—the contamination of Milwaukee tap water. The CDC report notes: "For the 2-year period 1993-1994, 17 states and one territory reported a total of 30 outbreaks associated with drinking water. These outbreaks caused an estimated 405,366 persons to become ill, including 403,000 from an outbreak of cryptosporidiosis in Milwaukee, the largest WBDO [waterborne disease outbreak] ever documented in the United States, and 2,366 from the other 29 outbreaks."[86] In comparison, the incident in the Marianas was a rare and unfortunate accidental contamination of bottled water with a relatively small and controlled impact.

By highlighting the challenges faced in the provision of tap water, this analysis is not meant to suggest that anyone should panic about tap water. The reality is that everything in life involves risks. In fact, much of human history has been characterized by a struggle to avoid dangerous microbes, particularly those in our food and water. Developed nations have made tremendous progress in this area, managing to provide food and water for millions of people every day with relatively few incidents. It is only because we have achieved such high standards that outbreaks have become major news. In the developing world, those challenges remain considerable, as poor quality sanitation produces tragic results.

In the United States, problems with our water supply are relatively rare, but risks remain that demand some attention. When compared to bottled water, risks appear to be somewhat higher for tap water in large measure because of the distribution system. This reality simply underscores the fact that the two products are not the same. Accordingly, bottled water has important applications for individuals with special needs, for emergency situations, and for individuals who simply desire the qualities associated with bottled water.

The reality is that everything in life involves risks.

Energy Usage. Often overlooked in this debate is the fact that plastic bottles are an incredibly energy efficient product. Their light weight makes their transport cheaper than for the alternatives of glass and aluminum. Moreover, while plastic bottles might not be recycled at the same rate as aluminum or glass, they require vastly less energy to produce than glass or aluminum bottles, which makes them less expensive.

These basic points were underscored in studies conducted by the research firm Franklin and Associates in the 1990s. The firm conducted a series of studies on packaging for both industry and the EPA. These studies involved "life cycle assessment," a process of assessing a product's full impact from "cradle to grave."

A 1993 study focused on beverage containers, measuring their impact from production to disposal.[87] It considered energy and other resources used in manufacturing (raw materials and energy), distribution for sale, collection for disposal, and final disposal. Products that were recycled were given credits for their portions which were actually fully recycled and used in new products. It assessed each based on the amount of liquid that reached consumers—that is, it assessed the impact of each product in the delivery of 1,000 gallons of liquid delivered to the market. That way, each product was compared based on its equal contribution to consumers.

The results of this assessment are surprising to those who think that plastic products are bad for the environment. Plastic bottles (polyethylene terephthalate or PET bottles in this case) provided considerable energy savings and high points for their environmental value. They used less energy and other resources than the alternatives—plastic bottles were 47 percent more energy efficient than aluminum cans and 63 percent more energy efficient than glass bottles. Plastic containers also had the least environmental impact (air emissions and total waterborne wastes) of all soft drink containers.[88]

These findings are not so surprising given the fact that plastics are so lightweight. According to the American Chemistry Council, plastic containers use approximately 90 percent less material by weight than do similarly sized glass containers. Similarly, plastic containers use about 38 percent less material than steel. Moreover, as in many industries, plastics producers have continued to find ways to reduce the material used for their containers without sacrificing utility. As a result, a two-liter plastic bottle and a one-gallon milk container made today each weigh about 33 percent less than the same products did during the 1970s.[89]

Solid Waste. Another complaint is that the bottles take up too much landfill space, and do not decay. In reality, plastic bottles amount to 0.3 percent of the nation's solid waste.[90] Taxing and banning plastic water bottles in workplaces will not matter in terms of overall waste.

The fact that plastics do not biodegrade does not matter, either, since in a landfill not much of anything degrades. Landfills are designed to prevent degradation—to keep the waste intact so that decay does not create problems associated with gases and liquids produced by decomposition. In fact, during the early 1990s, University of Arizona archeologist William Rathje found that there was little or no decomposition of materials placed in landfills. He even found 40-year old newspapers that were still readable and intact food products, including lettuce.[91]

The claim that we need to reduce use of the plastic bottles because we may soon run out of landfill space is also unfounded. This claim was originally made in the 1990s when Congress considered solid waste legislation. At the time, journalists and government researchers reported that existing landfills would close in five to 10 years, and then we would have nowhere to put waste.[92] But that is true at any point in time, because landfills last only so long, and new landfills would replace the used up space. There was at the time—and still is—plenty of space for landfills. During the alleged landfill crisis, Gonzaga University economist A. Clark Wiseman pointed out that, given projected waste increases, we would still be able to fit the next 1,000 years' worth of trash in a single landfill 120 feet deep, with 44-mile sides.[93] Wiseman's point is clear: Land disposal needs are small compared with the land available in the 3 million square miles of the contiguous United States.

Problems arise when states fail to permit new facilities. Yet while it is often politically difficult to find sites for these landfills, it

is not impossible. Landfill companies have found ways to compensate communities for hosting landfills and hence have been able to continue to provide sufficient landfill space.[94] In fact, new landfills are now designed to be much larger and last longer.

And the public health risk of modern landfills is close to nil. According to one study conducted by academic researchers Kenneth Clinton and Jennifer Chilton, modern landfills pose a theoretical one-in-10-billion risk of cancer for someone exposed to the chemicals for 70 years.[95] This risk level is so low as to be infinitessimal, especially when you compare it to the more significant risks we encounter in everyday life. For example, smoking 1.4 cigarettes during one year, traveling 300 miles by car, traveling 10 miles on a bicycle, living two days in Boston, and eating 40 tablespoons of peanut butter over a year's time each pose a theoretical risk of one in a million—making these relatively safe activities far more dangerous than depositing anything in a modern landfill.[96]

If claims about human impacts on climate are correct, even drastic changes in the global economy would make little difference in mitigating climate change.

Climate. If claims about human impacts on climate are correct, even drastic changes in the global economy would make little difference in mitigating climate change. The most rational strategies would be to manage adverse impacts—if any arise—and to capitalize on any potentially beneficial changes—such as increased agricultural productivity. Banning a commodity like bottled water will not do that; it would simply deny choice to consumers. Even if human-induced global warming predictions were correct (a big assumption) and all the nations of the world met the ambitious goal of returning the world to below 1990 carbon emission levels as outlined in the Kyoto Protocol, we still would have accomplished very little, as Danish statistician Bjørn Lomborg has pointed out:

> The effect of Kyoto (and even more so Bonn) on the climate will be minuscule. All models agree that the Kyoto Protocol will have surprisingly little impact. One model by a lead author of the 1996 IPCC [Intergovernmental Panel on Climate Change] report shows us how an expected temperature increase of 2.1°C in 2100 will be diminished by the protocol to an increase of 1.9°C. Or to put it more clearly, the temperature that we would have experienced in 2094 we have now postponed to 2100. In essence, the

> Kyoto Protocol does not negate global warming but merely buys the world six years.[97]

Claims about the risks of chemicals in plastics do not hold water.

But even the prospect of saving six years may be overly optimistic. A letter to the United Nations signed by 100 climate scientists suggests that humans can have little impact on global climate. They note:

> It is not possible to stop climate change, a natural phenomenon that has affected humanity through the ages. Geological, archaeological, oral and written histories all attest to the dramatic challenges posed to past societies from unanticipated changes in temperature, precipitation, winds and other climatic variables. We therefore need to equip nations to become resilient to the full range of these natural phenomena by promoting economic growth and wealth generation.[98]

Given such realities, the idea that taxing or prohibiting plastic bottles matters in terms of global warming should be dismissed as completely implausible.

***Chemicals and Plastic*s.** Claims about the risks of chemicals in plastics do not hold water. The FDA is required to consider all such substances since it regulates water as a food product, and chemicals coming from the bottle would be considered food additives and regulated as such. FDA ensures that such chemicals never reach levels of concern, and, to date, the agency has not found any documented health problems associated with such chemicals.

Nonetheless, activists regularly suggest that the public is at risk from trace chemicals coming from plastic bottles of all kinds. One chemical found in plastics that activists claim poses a risk is Bisphenol A (BPA), which is used to make polycarbonate containers, such as baby bottles, reusable water bottles (Nalgene water bottles, which ironically environmentalists promote when they call for reusable bottles), five-gallon bottles used for large water coolers, and some other products. Activists say that BPA leaches out into the water or other food items in containers and threatens to impact public health, largely by disrupting endocrine systems.

But the best science on the topic shows that the trace levels of BPA that currently exist do not pose any significant health risk. For example:

- After an exhaustive review of the data, the FDA concluded: "An adequate margin of safety exists for BPA at current levels of exposure from food contact uses."[99]
- In July 2008, the European Food Safety Authority reaffirmed a 2006 study on BPA that found human exposure to the substance through consumer products is not high enough to have any adverse impacts.[100]
- Another comprehensive review of the issue, conducted by the National Toxicology Program (NTP) at the National Institutes of Health, came to similar conclusions. It found no direct evidence of any problems among humans and expressed minimal to negligible concern for almost all factors. It called for more research in one area and expressed only "some concern"—more significant findings would state "concern" or "serious concern"—because rodent studies showed some association of potential effects on behavior. Yet as NTP noted: "These studies in laboratory animals provide only limited evidence for adverse effects on development and more research is needed to better understand their implications for human health."[101] Indeed, the relevance of the impacts on rodents to the potential impacts on humans is questionable.

BPA, despite extensive study and the inability of anyone to document problems with it, is the subject of much hype and press coverage. For example, a *Washington Post* headline on the draft of the NTP report read: "U.S. Cites Fears on Chemical in Plastics."[102] The story suggested that government researchers had made a new and major finding on BPA.[103] Yet instead of discovering a problem, the draft brief—like the final report—underscored the fact that researchers have been unable to find any impact on humans from the chemical. The key conclusions in the brief are as follows:

> The NTP has negligible concern that exposure of pregnant women to Bisphenol A will result in fetal or neonatal mortality, birth defects or reduced birth weight and growth in their offspring…

Human exposure to natural "endocrine mimicking substances" dwarfs the exposure and impact of the man-made versions. We regularly consume these endocrine mimicking substances in our food without ill effect.

> The NTP concurs with the conclusion of the CERHR [Center for the Evaluation of Risks to Human Reproduction] Expert Panel on Bisphenol A that there is negligible concern that exposure to bisphenol A causes reproductive effects in non-occupationally exposed adults and minimal concern for workers exposed to higher levels in occupational settings.[104]

Yet some people still suggest that BPA can mimic endocrine-related chemicals and impact public health. The Competitive Enterprise Institute's Jonathan Tolman clarifies such risks, showing that they are inconsequential. He notes that we are constantly exposed to other estrogen-mimicking compounds in our diet produced by plants, which are called phytoestrogens. Human exposure to these natural "endocrine-mimicking substances" dwarfs the exposure and impact of the man-made versions. A 1999 National Academy of Sciences study estimates exposure to BPA in food cans amounts to about 6.3 micrograms per day and 0.75 micrograms per day for beverage cans. By comparison, NAS estimated that average human exposure to Mother Nature's phytoestrogens is 1,000,000 micrograms per day! We regularly consume these endocrine-mimicking substances in our food without ill effect. Tolman concludes: "Given the huge relative disparity between the exposures to phytoestrogens as compared to BPA concentrations, the risk of BPA in consumer products appears to be about the same as tablespoon of soymilk."[105] That is hardly a risk level worth worrying about.

Moreover, the FDA has repeatedly made clear that it does not consider BPA to be a problem. The agency notes:

> Based on our ongoing review, we believe there is a large body of evidence that indicates that FDA-regulated products containing BPA currently on the market are safe and that exposure levels to BPA from food contact materials, including for infants and children, are below those that may cause health effects. However, we will continue to consider new research and information as they become available.
>
> This position is consistent with two risk assessments for BPA conducted by the European Food Safety Authority

(EFSA) Scientific Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food and the Japanese National Institute of Advanced Industrial Science and Technology. Each of these documents considered the question of a possible low-dose effect and concluded that no current health risk exists for BPA at the current exposure level.[106]

Another concern about plastic water bottles is being raised in email alerts that tell people they can get cancer from bottles of water especially if they are left in the car or put in the freezer. Some claim that these problems were reported by the Bloomberg School of Public Health at Johns Hopkins University. However, Johns Hopkins issued a statement noting that these emails were a hoax and not endorsed by the school.[107]

Regardless of the source, the emails' claim is not credible. One chemical it claimed was released by the bottles is Di(2-ethylhexyl) (DEHA), an additive used to make certain plastics. Yet, as John Hopkins and the American Cancer Society note, DEHA is not even used to make plastic water bottles.[108] The American Cancer Society also points out that the EPA and the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) both have reported that there is no good evidence that DEHA produces significant health or environmental effects. After studying the issue in 1995, the EPA concluded that DEHA "cannot reasonably be anticipated to cause cancer, teratogenic effects, immunotoxicity, neurotoxicity, gene mutations, liver, kidney, reproductive, or developmental toxicity or other serious or irreversible chronic health effects; and…it cannot reasonably be anticipated to cause significant and serious adverse effects on the environment."[109] Similarly the IARC monograph on the topic reports: "No epidemiological data relevant to the carcinogenicity of di(2-ethylhexyl) adipate were available. There is limited evidence in experimental animals for the carcinogenicity of di(2-ethylhexyl) adipate."[110] IARC concludes that, "Di(2-ethylhexyl) adipate is not classifiable as to its carcinogenicity to humans."[111]

There are also claims about dioxins in plastics being released when the plastics are frozen. Yet Rolf Halden, Ph.D., P.E., assistant professor in the Department of Environmental Health Sciences and the Center for Water and Health at John's Hopkins's Bloomberg School notes: "There are no dioxins in plastics. In addition, freezing actually works against the release of chemicals. Chemicals do not diffuse as readily in cold

temperatures, which would limit chemical release if there were dioxins in plastic, and we don't think there are."[112]

Environmental activists also suggest that we should worry about the effects of chemicals called phthalates that are used in a variety of products. Phthalates are a group of substances used to make polyvinyl chloride (PVC) plastics flexible, and they are found in medical devices such as vinyl tubing, home siding, plastic pipes, toys and other items. They have been in use for about 50 years without any reported human health problems.

The anti-bottled water activists are clearly grasping at straws, suggesting that we should worry about a small piece of plastic used inside the cap to help keep the seal from leaking.

Strangely, the greens urge people not to drink bottled water to avoid these chemicals, even though they are not even used in the bottles. Recently a NRDC staff attorney said in congressional testimony that we should fear phthalates in bottled water because the phthalate DEHP—di(zethylhexyl) (2-ethylhexyl)—is used for the gasket of the plastic cap.[113] Among her complaints was the fact that the FDA does not impose the EPA drinking water standard for phthalates to bottled water.

The anti-bottled water activists are clearly grasping at straws, suggesting that we should worry about a small piece of plastic used inside the cap to help keep the seal from leaking. The cap's contact with the surface of the water in this case is small and occurs only when bottles are not upright. And the exposure level from this small, thin piece of plastic is tiny. In fact, the NRDC study on bottled water found only two samples out of 1,000 containing phthalates. One sample was in compliance with EPA's standard and the other exceeded it by only a few parts per billion. It is worth underscoring the fact that NRDC did not detect phthalates in 99.8 percent of the samples, which is why FDA does not apply the EPA standard for phthalates—the phthalate standard is simply not relevant because exposure level in bottled water is slim to none.

In any case, there is little need to worry about the impacts of phthalates from other consumer products where exposure might be more than that found in a bottle cap gasket. The Agency for Toxic Substances and Disease Research (ATSDR) at the CDC found in 2002 that long-time exposure of DEHP to rats and mice produced cancer in the rodents. This led the Department of Health and Human Services to conclude that DEHP can "reasonably be anticipated to be a human carcinogen" and that EPA should classify it as "a probable human carcinogen"—but ASTDR points out that basing such classifications on rodent tests is questionable

"because of the differences in how the livers of humans and primates respond to DEHP as compared with the livers of rats and mice."[114] For that reason, the WHO's International Agency for Research on Cancer changed its classification for DEHP from "possibly carcinogenic to humans" to "cannot be classified as to its carcinogenicity to humans." Specifically, IARC notes: DEHP is *"not classifiable as to its carcinogenicity to humans"* because "the mechanism by which di(2-ethylhexyl) phthalate increases the incidence of hepatocellular tumours in rats and mice is not relevant to humans."[115]

In addition, a 15-year scientific evaluation of DEHP produced by the European Union assessed the impacts of DEHP use in medicine. DEHP is used for plastic tubing, medical devices, and blood bags. As a result, the highest human exposures to DEHP occur via medical equipment, particularly for individuals who are regularly exposed—such as kidney dialysis patients. Yet the EU researchers could not find any measurable adverse health effects of DEHP to individuals exposed to it at the highest levels. However, they do note its importance and value in providing important medical treatments.[116]

Despite all this, activist groups continue to pick and choose which periodic studies to cite, in order to raise fears about plastic bottles and other plastic products. As a result, those studies are often misinterpreted in the media. Policy makers and others should view anti-bottled water activists' claims with deep skepticism.

Activist groups continue to pick and choose which periodic studies to cite, in order to raise fears about plastic bottles and other plastic products.

Conclusion

After years of promoting bottled water as an environmentally friendly, healthy alternative to tap water, environmental activists have turned against this product they once favored. Such an about-face alone should make everyone wary of the claims now being lobbed at bottled water. Like past contrived environmental panics, this one is just that—a contrived panic over nothing of substance. Plastic bottles used to transport various types of water are not going to make us sick, they are not a significant contributor to global warming, and they are highly energy efficient.

This panic threatens consumer choice. The fact that a product requires energy to transport is not a good reason to regulate it. After all, all products in commerce require energy to transport. However, it is a clever excuse for those who seek to control economic activity. The real

question is: Do these products meet a consumer desire that is worth the cost? In the case of bottled water, the answer to that question is clearly "yes" because people freely choose to buy it.

The public has freely turned to bottled water as an alternative to drinks with calories, for convenience, freshness, and whatever other reasons they themselves find worthy. So why is it necessary for an entire nation to wage a crusade against this product? People who do not like the product can make their own choices. They should not have any right to make them for the rest of us.

Appendix

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Appendix A
2008 MONITORING MATRIX
IBWA Code of Practice Monitoring Requirements

MONITORING PARAMETER GROUP *Individual Group Analytes*	MONITORING FREQUENCY	SOQs, MCLs, SMCLs, and Guidelines (Apply to finished products)		
Inorganic Chemicals (IOCs)	ANNUALLY	**IBWA SOQ**	**FDA SOQ**	**EPA MCL**
Antimony (1)	(Product and Source)	0.006	0.006	0.006
Arsenic		0.01	0.01	0.01
Barium	For items with footnote (2), see *FDA D/DBP Rule Monitoring Requirements on page 21.*	1	2	2
Beryllium (1)		0.004	0.004	0.004
Bromate (2)		0.010	0.010	0.010
Cadmium		0.005	0.005	0.005
Chlorine (2)		0.1	4.0	4.0
Chloramine (2)		4.0	4.0	4.0
Chlorine dioxide (2)		0.8	0.8	0.8
Chlorite (2)		1.0	1.0	1.0
Chromium		0.05	0.1	0.1
Cyanide (1)		0.1	0.1	0.2
Fluoride		(3)	(3)	4
Lead		0.005	0.005	0.015 AL
Mercury		0.001	0.002	0.002
Nickel (1)		0.1	0.1	
Nitrate-N		10	10	10
Nitrite-N		1	1	1
Total Nitrate + Nitrite		10	10	10
Selenium		0.01	0.05	0.05
Thallium (1)		0.002	0.002	0.002
Secondary Inorganic Parameters	ANNUALLY	**IBWA SOQ**	**FDA SOQ**	**SMCL (4)**
Aluminum	(Product and Source)	0.2	0.2	0.2
Chloride (5)		250	250	250
Copper		1	1	1 AL
Iron (5)		0.3	0.3	0.3
Manganese (5)		0.05	0.05	0.05
Silver		0.025	0.1	0.1
Sulfate (5)		250	250	250
Total Dissolved Solids (TDS) (5)		500	500	500
Zinc (5)		5	5	5
Volatile Organic Chemicals (VOCs)	ANNUALLY	**IBWA SOQ**	**FDA SOQ**	**EPA MCL**
1,1,1-Trichloroethane	(Product and Source)	0.03	0.2	0.2
1,1,2-Trichloroethane		0.003	0.005	0.005
1,1-Dichloroethylene	For items with footnote (2), see *FDA D/DBP Rule Monitoring Requirements on page 21.*	0.002	0.007	0.007
1,2,4-Trichlorobenzene		0.009	0.07	0.07
1,2-Dichloroethane		0.002	0.005	0.005
1,2-Dichloropropane		0.005	0.005	0.005
Benzene		0.001	0.005	0.005
Carbon tetrachloride		0.005	0.005	0.005
cis-1,2-Dichloroethylene		0.07	0.07	0.07
trans-1,2-Dichloroethylene		0.1	0.1	0.1
Ethylbenzene		0.7	0.7	0.7
Methylene chloride (Dichloromethane)		0.003	0.005	0.005
Monochlorobenzene		0.05	0.1	0.1
o-Dichlorobenzene		0.6	0.6	0.6
p-Dichlorobenzene		0.075	0.075	0.075
Haloacetic Acids (HAA5) (2)		0.06	0.06	0.06
Styrene		0.1	0.1	0.1

(1) Included in FDA's 9 contaminant regulations.
(2) Included in FDA's D/DBP rule. See D/DBP monitoring requirements section on page 21 in Appendix A for details.
(3) SOQ dependent upon temperature and other factors. See fluoride section on page 22 of Appendix A for details.
(4) SMCL = Secondary maximum contaminant level. SMCLs are guidelines established by the USEPA for use in evaluating aesthetic, non-health-related properties in water. SMCLs are not enforceable for public water systems.
(5) Mineral water is exempt from allowable level. The exemptions are aesthetically based allowable levels and do not relate to a health concern.

All SOQs, MCLs, SMCLs, and guidelines in mg/L (ppm) except as noted. Refer to your state bottled water regulations to determine if additional testing is required.

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Volatile Organic Chemicals (VOCs) (Continued)	ANNUALLY	**IBWA SOQ**	**FDA SOQ**	**EPA MCL**
Tetrachloroethylene	(Product and Source)	0.001	0.005	0.005
Toluene		1	1	1
Trichloroethylene	For items with footnote (2), see *FDA D/DBP Rule Monitoring Requirements on page 21.*	0.001	0.005	0.005
Vinyl chloride		0.002	0.002	0.002
Xylenes (total)		1	10	10
Bromodichloromethane		(6)	(6)	(6)
Chlorodibromomethane		(6)	(6)	(6)
Chloroform		(6)	(6)	(6)
Bromoform		(6)	(6)	(6)
Total Trihalomethanes (2)		0.01	0.08	0.08
Semivolatile Organic Chemicals (SVOCs)	ANNUALLY	**IBWA SOQ**	**FDA SOQ**	**EPA MCL**
Benzo(a)pyrene	(Product and Source)	0.0002	0.0002	0.0002
Di(2-ethyhexyl)adipate		0.4	0.4	0.4
Di(2-ethyhexyl)phthalate		0.006	NA	0.006
Hexachlorobenzene		0.001	0.001	0.001
Hexachlorocyclopentadiene		0.05	0.05	0.05
Total Recoverable Phenolics		0.001	0.001	NA
Synthetic Organic Chemicals (SOCs)	ANNUALLY	**IBWA SOQ**	**FDA SOQ**	**EPA MCL**
2,4,5-TP (Silvex)	(Product and Source) (unless otherwise noted)	0.01	0.05	0.05
2,4-D (Dichlorophenoxy acetic acid)		0.07	0.07	0.07
Alachlor		0.002	0.002	0.002
Aldicarb		0.003	NA	0.003
Aldicarb sulfone		0.003	NA	0.003
Aldicarb sulfoxide		0.004	NA	0.004
Atrazine		0.003	0.003	0.003
Carbofuran		0.04	0.04	0.04
Chlordane		0.002	0.002	0.002
Dalapon		0.2	0.2	0.2
Dibromochloropropane (DBCP)		0.0002	0.0002	0.0002
Dinoseb		0.007	0.007	0.007
Dioxin (2,3,7,8-Tetrachlorodibenzo-p-dioxin) (1)(7)	Product: Every 3 years Source: Annually	$3x10^{-8}$	$3x10^{-8}$	$3x10^{-8}$
Diquat (1)(7)		0.02	0.02	0.02
Endothall (1)(7)		0.1	0.1	0.1
Endrin	ANNUALLY (Product and Source)	0.002	0.002	0.002
Ethylene dibromide		0.00005	0.00005	0.00005
Glyphosate (1)(7)	Product: Every 3 years Source: Annually	0.7	0.7	0.7
Heptachlor	ANNUALLY (Product and Source)	0.0004	0.0004	0.0004
Heptachlor epoxide		0.0002	0.0002	0.0002
Lindane		0.0002	0.0002	0.0002
Methoxychlor		0.04	0.04	0.04
Oxamyl (vydate)		0.2	0.2	0.2
Pentachlorophenol		0.001	0.001	0.001
Picloram		0.5	0.5	0.5
Polychlorinated biphenyls (PCBs)		0.0005	0.0005	0.0005
Simazine		0.004	0.004	0.004
Toxaphene		0.003	0.003	0.003

(1) Included in FDA's 9 contaminant regulations.
(2) Included in FDA's D/DBP Rule. See D/DBP monitoring requirements section in Appendix A for details.
(6) No SOQs or MCLs established for individual trihalomethane contaminants. The sum of the 4 THMs is regulated as total trihalomethanes (TTHMs).
(7) FDA requires that the four synthetic organic chemicals (SOC) listed must be tested quarterly for four consecutive quarters for each type of finished bottled water (e.g., spring, purified, etc.). If none of the SOCs are detected, then once every three years for each type of finished product. If SOCs are detected, maintain monitoring for four consecutive quarters in each three-year period. New products and new companies must do an initial round of quarterly monitoring in the first year of operation.

All SOQs, MCLs, SMCLs, and guidelines in mg/L (ppm) except as noted. Refer to your state bottled water regulations to determine if additional testing is required.

* Denotes FDA Regulation

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Additional Regulated Contaminants	ANNUALLY	**IBWA SOQ**	**FDA SOQ**	**EPA MCL**
Methyl tertiary butyl ether (MTBE)	(Product and Source)	0.07	NA	NA
Naphthalene		0.3	NA	NA
1,1,2,2-Tetrachloroethane		0.001	NA	NA
Microbiological Contaminants		**IBWA SOQ**	**FDA SOQ**	**EPA MCL**
Total coliform / *E. coli*	SOURCE: at least once each week (21 CFR §129.35(a)(3)) PRODUCT: at least once each week (21 CFR §129.35(g)(1))	No *Eschericia coli* detectable in a 100 ml portion/sample. No validated total coliform detectable in a 100 ml portion/sample as substantiated by resampling. NOTE: Confirmation AND validation of all positive total colifrm results in finished product required. See Appendix C of the Code of Practice.	**MPN:** <2.2 organisms per 100 ml. **MF:** <4 CFU per 100 ml.	No more than 5% of monthly samples valid for total coliform.
Radiological Contaminants	SEE BELOW	**IBWA SOQ**	**FDA SOQ**	**EPA MCL**
Gross Alpha Particle Radioactivity	SOURCE: Every 4 years PRODUCT: Annually	15 pCi/L	15 pCi/L	15 pCi/L
Gross Beta Particle and Photon Radioactivity (8)		50 pCi/L	50 pCi/L	50 pCi/L
Radium 226/228 (combined)	SOURCE: Every 4 years PRODUCT: Annually	5 pCi/L	5 pCi/L	5 pCi/L
Uranium	SOURCE: Every 4 years PRODUCT: Annually	0.030	0.030	0.030
Water Properties	ANNUALLY	**IBWA SOQ**	**FDA SOQ**	**GUIDELINE**
Color	(Product and Source)	5 Units	15 Units	5 Units
Turbidity		0.5 NTU	5.0 NTU	0.5 NTU
'pH (9)		5-7/6.5-8.5	NA	6.5-8.5
Odor		3 T.O.N.	3 T.O.N.	3 T.O.N.

(8) If the gross beta particle activity exceeds 50 pCi/1, an analysis of the sample must be performed to identify the major radioactive constituents present. Compliance (with § 141.16) may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/1 and if the average annual concentrations of tritium and strontium–90 are less than those listed in table A, *Provided*, That if both radionuclides are present the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year. Consult with your testing laboratory for more information.

(9) The Code of Practice guideline for pH in purified water is 5.0-7.0 (see Appendix B for definition and requirements for purified water). The guideline for source water and other product waters is 6.5-8.5. NOTE: This guideline is not enforceable.

All SOQs, MCLs, SMCLs, and guidelines in mg/L(ppm) except as noted. Refer to your state bottled water regulations to determine if additional testing is required.

Notes

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29 U.S. Centers for Disease Control and Prevention, "Got Water? Keep it Available and Keep it Clean!" http://www.cdc.gov/Features/GotWater.CDC. The CDC report also adds: "In areas where chlorinated tap water is not available or where hygiene and sanitation are poor, drink beverages made with boiled water, such as tea and coffee, or unopened bottled or canned beverages. Remember that water on the outside of cans or bottles may also be contaminated. Therefore, dry wet cans or bottles before you open them and wipe clean surfaces which your mouth will directly touch. Playing ball, hiking a trail, or flying to a distant land, you'll need water to drink. Wherever you get your drinking water (a private well, a public water system, or a stream next to your camping site), it's important to know that it's clean, because clean means free of germs that can cause water-related illnesses. Take the necessary precautions before you drink: check with your water supplier and make sure it is following the state standards concerning clean water, drink commercially-bottled water if reliable safe tap water is unavailable, and purify water from a lake, river, or stream."

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48 42 U.S.C. § 300f *et seq*.
49 21 U.S.C. § 301*et seq*.
50 "Bottled Water Basics" (brochure), EPA, September 2005, http://www.epa.gov/safewater/faq/pdfs/fs_healthseries_bottledwater.pdf.
51 §410 of the Federal Food, Drug, and Cosmetic Act, codified at 21 USC §349.
52 The chart is reprinted from the monograph *Code of Practice: Bottle Water Code of Practice* (International Bottled Water Association, revised 2007.
53 Anne Christiansen Bullers, "Bottled Water: Better Than the Tap?" *FDA Consumer*, July-August 2002, http://www.fda.gov/FDAC/features/2002/402_h2o.html.
54 *Federal Register*, Vol. 58, 382.
55 *Federal Register*, Vol 59, 61533.
56 Phthalates are chemicals that can be released from the plastic container in trace amounts. However, phthalates are generally not used in containers for water.
57 These regulations refer to: 21 CFR Part 129; by Lauren M. Posnick, Sc.D. and Henry Kim, Ph.D., Catherine Bailey, M.Ed, "Bottled Water Regulation and the FDA," *Food Safety Magazine*, August/September 2002, http://www.cfsan.fda.gov/~dms/botwatr.html. The FDA explains: "These regulations require that bottled water be safe and that it be processed, bottled, held and transported under sanitary conditions. Processing practices addressed in the CGMP regulations include protection of the water source from contamination, sanitation at the bottling facility, quality control to assure the bacteriological and chemical safety of the water, and sampling and testing of source water and the final product for microbiological, chemical, and radiological contaminants. Bottlers are required to maintain source approval and testing records to show to government inspectors. Checking adherence to part 129 regulations is an important part of FDA inspections of bottled water plants."
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105 National Research Council, *Hormonally Active Agents in the Environment*, Washington: National Academy Press, 1999, p. 68. Citing this report, the Competitive Enterprise Institute's Jonathan Tolman notes: "We are constantly exposed to a variety of other estrogen mimicking compounds in our everyday diet, not from manmade chemicals, but from compounds produced by plants themselves—so called phytoestrogens. All legumes, for example contain estrogen mimicking compounds with soy products being one of the largest contributors. It would have been helpful [to compare] the levels of exposure of phytoestrogens to the level of exposure to BPA in order to give readers a basis of comparison with which to judge the risk. In 1999, the National Academy of Sciences published its study, Hormonally *Active Agents in the Environment*, and estimated the potential daily human exposure of various estrogens. According to the NAS study the estimated exposure to BPA in food cans was 6.3 micrograms per day, and BPA in beverage containers was less than 0.75 micrograms per day. By comparison, the exposure to phytoestrogens was estimated at 1,000,000 micrograms per day. Given the huge relative disparity between the exposures to phytoestrogens as compared to BPA concentrations, the risk of BPA in consumer products appears to be about the same as a tablespoon of soymilk."
106 FDA, "Bisphenol A," http://www.fda.gov/oc/opacom/hottopics/bpa.html. The FDA provides this disclaimer at the bottom of this document: "At this time, FDA is not recommending that anyone discontinue using products that contain BPA while we continue our risk assessment process. However, concerned consumers should know that several alternatives to polycarbonate baby bottles exist, including glass baby bottles." The idea that a public health agency would suggest that glass bottles—which can easily break and injure a child—might be a better alternative than unbreakable, lightweight plastic bottles just goes to show how odd the debate has become.
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110 International Agency for Research on Cancer (IARC) - Summaries & Evaluations DI(2-ETHYLHEXYL) ADIPATE, (Group 3) Vol.: 77 (2000) (p. 149), CAS No.: 103-23-1
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114 Agency for Toxic Substance and Disease Registry (ASTDR), Public Health Statement: Di(2-ethylhexyl)phthalate (DEHP), CAS#: 117-81-7, September 2002, http://www.atsdr.cdc.gov/toxprofiles/tp9-c1-b.pdf. ASTDR further notes: "DEHP, at the levels found in the environment, is not expected to cause adverse health effects in humans. A man who voluntarily swallowed 10 g (approximately 0.4 ounces) of DEHP had stomach irritation and diarrhea. Most of what we know about the health effects of DEHP comes from studies of rats and mice that were given DEHP in their food, or the DEHP was placed in their stomach with the aid of a tube through their mouth. In most of these studies, the amounts of DEHP given to the animals were much higher than the amounts found in the environment. Rats and mice appear to be particularly sensitive to some of the effects of DEHP. Thus, because certain animal models may not apply to humans, it is more difficult to predict some of the health effects of DEHP in humans using information from these studies."

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116 European Commission Health & Consumer Protection Directorate-General Directorate C - Scientific Opinions, C2 - Management of scientific committees; scientific co-operation and networks, OPINION ON Medical Devices Containing DEHP Plasticised PVC; Neonates and Other Groups Possibly at Risk from DEHP Toxicity Adopted by the Scientific Committee on Medicinal Products and Medical Devices, September 26, 2002Doc.SANCO/SCMPMD/2002/0010 Final, http://www.dehp-facts.com/upload/documents/document46.pdf. A summary of the report says that its authors cannot show that there is no risk (since no one can prove a negative), but also that they could not find any health effects from DEHP exposure even among individuals who are most exposed. The report notes: "The general view of DEHP toxicity is therefore that mechanisms for adverse effects do exist in rodents, but that these do not appear to be of great significance in non-human primates and that the evidence that such mechanisms could be operative in humans is lacking…However there are no reports concerning any adverse effects in humans following exposure to DEHP-PVC, even in neonates or other groups of relatively high exposure. So far, for example, there are no indications that neonates of high DEHP exposure have any altered long-term fertility patterns…There are also other groups of patients or individuals who experience prolonged periods of elevated DEHP exposure, including patients on haemodialysis or in receipt of repeated blood product transfusions, where risks and benefits should be considered carefully. At the present there is no evidence that any of these groups do experience DEHP related adverse effects."

About the Author

Angela Logomasini is Director of Risk and Environmental Policy at the Competitive Enterprise Institute (CEI). At CEI, Angela conducts research and analysis on environmental regulatory issues. She is co-editor of CEI's book *The Environmental Source*, and her articles have been published in the *Wall Street Journal, New York Post, Washington Times*, and other newspapers. Angela also makes regular appearances on media programs. She has appeared on dozens of radio shows, including the Diane Rehm Show, CNN Radio, and Radio America. Television appearances include CNBC's "Capitol Report," CNN, and Houston PBS.

Angela served as Legislative Assistant to Senator Sam Brownback from 1996-1998, advising the Senator on energy and environmental issues. Before that she was Environmental Editor for the Research Institute of America (RIA), where she and another editor developed a three-volume environmental compliance desk reference, written for RIA affiliate Clark Boardman Callahan. From 1989 to 1994, Angela worked for Citizens for a Sound Economy (CSE), serving as Director of Solid Waste Policy for a CSE affiliate, Citizens for the Environment and as a policy analyst covering various economic issues.

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