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## Bottled Water Quality Investigation: 10 Major Brands, 38 Pollutants

### Bottled water contains disinfection byproducts, fertilizer residue, and pain medication

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The bottled water industry promotes an image of purity, but comprehensive testing by the Environmental Working Group (EWG) reveals a surprising array of chemical contaminants in every bottled water brand analyzed, including toxic byproducts of chlorination in Walmart's Sam's Choice and Giant Supermarket's Acadia brands, at levels no different than routinely found in tap water. Several Sam's Choice samples purchased in California exceeded legal limits for bottled water contaminants in that state. Cancer-causing contaminants in bottled water purchased in 5 states (North Carolina, California, Virginia, Delaware and Maryland) and the District of Columbia substantially exceeded the voluntary standards established by the bottled water industry.

Unlike tap water, where consumers are provided with test results every year, the bottled water industry does not disclose the results of any contaminant testing that it conducts. Instead, the industry hides behind the claim that bottled water is held to the same safety standards as tap water. But with promotional campaigns saturated with images of mountain springs, and prices 1,900 times the price of tap water, consumers are clearly led to believe that they are buying a product that has been purified to a level beyond the water that comes out of the garden hose.

To the contrary, our tests strongly indicate that the purity of bottled water cannot be trusted. Given the industry's refusal to make available data to support their claims of superiority, consumer confidence in the purity of bottled water is simply not justified.

Laboratory tests conducted for EWG at one of the country's leading water quality laboratories found that 10 popular brands of bottled water, purchased from grocery stores and other retailers in 9 states and the District of Columbia, contained 38 chemical pollutants altogether, with an average of 8 contaminants in each brand. More than one-third of the chemicals found are not regulated in bottled water. In the Sam's Choice and Acadia brands levels of some chemicals exceeded legal limits in California as well as industry-sponsored voluntary safety standards. Four brands were also contaminated with bacteria.

### Walmart and Giant Brands No Different than Tap Water

Two of 10 brands tested, Walmart's and Giant's store brands, bore the chemical signature of standard municipal water treatment — a cocktail of chlorine disinfection byproducts, and for Giant water, even fluoride. In other words, this bottled water was chemically indistinguishable from tap water. The only striking difference: the price tag.

In both brands levels of disinfection byproducts exceeded safety standards established by the state of California and the bottled water industry:

- Walmart's Sam's Choice bottled water purchased at several locations in the San Francisco bay area was polluted with disinfection byproducts called trihalomethanes at levels that exceed the state's legal limit for bottled water (CDPR 2008). These byproducts are linked to cancer and reproductive problems and form when disinfectants react with residual pollution in the water. Las Vegas tap water was the source for these bottles, according to Walmart representatives (EWG 2008).
- Also in Walmart's Sam's Choice brand, lab tests found a cancer-causing chemical called bromodichloromethane at levels that exceed safety standards for cancer-causing chemicals under California's Safe Drinking Water and Toxic Enforcement

Act of 1986 (Proposition 65, OEHHA 2008). EWG is filing suit under this act to ensure that Walmart posts a warning on bottles as required by law: "WARNING: This product contains a chemical known to the State of California to cause cancer."

- These same chemicals also polluted Giant's Acadia brand at levels in excess of California's safety standards, but this brand is sold only in Mid-Atlantic states where California's health-based limits do not apply. Nevertheless, disinfection byproducts in both Acadia and Sam's Choice bottled water exceeded the industry trade association's voluntary safety standards (IBWA 2008a), for samples purchased in Washington DC and 5 states (Delaware, Maryland, Virginia, North Carolina, and California). The bottled water industry boasts that its internal regulations are stricter than the FDA bottled water regulations (IBWA 2008b), but voluntary standards that companies are failing to meet are of little use in protecting public health.

**Figure 1. Pollutants in Walmart and Giant Bottled Water Exceed Industry and California Standards**



The California legal limit of 10 parts per billion (ppb) for total trihalomethanes (TTHMs) in bottled water has been set by the California Health and Safety Code, Division 104, Part 5 (Sherman Food, Drug, and Cosmetic Law, CDPH 2008). The industry standard, Bottled Water Code of Practice, published by the International Bottled Water Association (IBWA 2008a), also sets a limit for TTHMs at 10 ppb. Two of the TTHM chemicals, bromodichloromethane and chloroform, are regulated in California under the Safe Drinking Water and Toxic Enforcement Act, also known as Proposition 65 (OEHHA 2008). For bromodichloromethane, a concentration above 2.5 ppb exceeds a cancer safety standard, as established by the state of California (OEHHA 2008). The standard is based on the Proposition 65 No Significant Risk Level for bromodichloromethane at 5 micrograms per day. For a water consumption rate of 2 L/day (Title 27, California Code of Regulations, Article 7, Section § 25721), this corresponds to a contaminant concentration in water of 2.5 ppb. The concentration values indicated by the bars correspond to findings from the specific brand purchased at the specific location. For the entire dataset, see section [Walmart and Giant Water Exceeds Safety Limits](#) [0]. Two independent samples of Sam's Choice water were purchased in Oakland, CA, with total trihalomethane levels at 21 and 23 ppb and levels of bromodichloromethane at 7.7 and 8.5 ppb. Two independent samples of Acadia water were purchased in Stafford, VA with total trihalomethane levels at 22 and 23 ppb.

## Broad Range of Pollutants Found in 10 Brands

Altogether, the analyses conducted by the University of Iowa Hygienic Laboratory of these 10 brands of bottled water revealed a wide range of pollutants, including not only disinfection byproducts, but also common urban wastewater pollutants like caffeine and pharmaceuticals (Tylenol); heavy metals and minerals including arsenic and radioactive isotopes; fertilizer residue (nitrate and ammonia); and a broad range of other, tentatively identified industrial chemicals used as solvents, plasticizers, viscosity decreasing agents, and propellants.

The identity of most brands in this study are anonymous. This is typical scientific practice for market-basket style testing programs. We consider these results to represent a snapshot of the market during the window of time in which we purchased samples. While our study findings show that consumers can't trust that bottled water is pure or cleaner than tap water, it was not designed to indicate pollutant profiles typical over time for particular brands. Walmart and Giant bottled water brands are named in this study because our first tests and numerous followup tests confirmed that these brands contained contaminants at levels that

exceeded state standards or voluntary industry guidelines.

The study also included assays for breast cancer cell proliferation, conducted at the University of Missouri. One bottled water brand spurred a 78% increase in the growth of the breast cancer cells compared to the control sample, with 1,200 initial breast cancer cells multiplying to 32,000 in 4 days, versus only 18,000 for the control sample, indicating that chemical contaminants in the bottled water sample stimulated accelerated division of cancer cells. When estrogen-blocking chemicals were added, the effect was inhibited, showing that the cancer-spurring chemicals mimic estrogen, a hormone linked to breast cancer. Though this result is considered a modest effect relative to the potency of some other industrial chemicals in spurring breast cancer cell growth, the sheer volume of bottled water people consume elevates the health significance of the finding. While the specific chemical(s) responsible for this cancer cell proliferation were not identified in this pilot study, ingestion of endocrine-disrupting and cancer-promoting chemicals from plastics is considered to be a potentially important health concern (Le 2008).

### **With Bottled Water, You Don't Know What You're Getting**

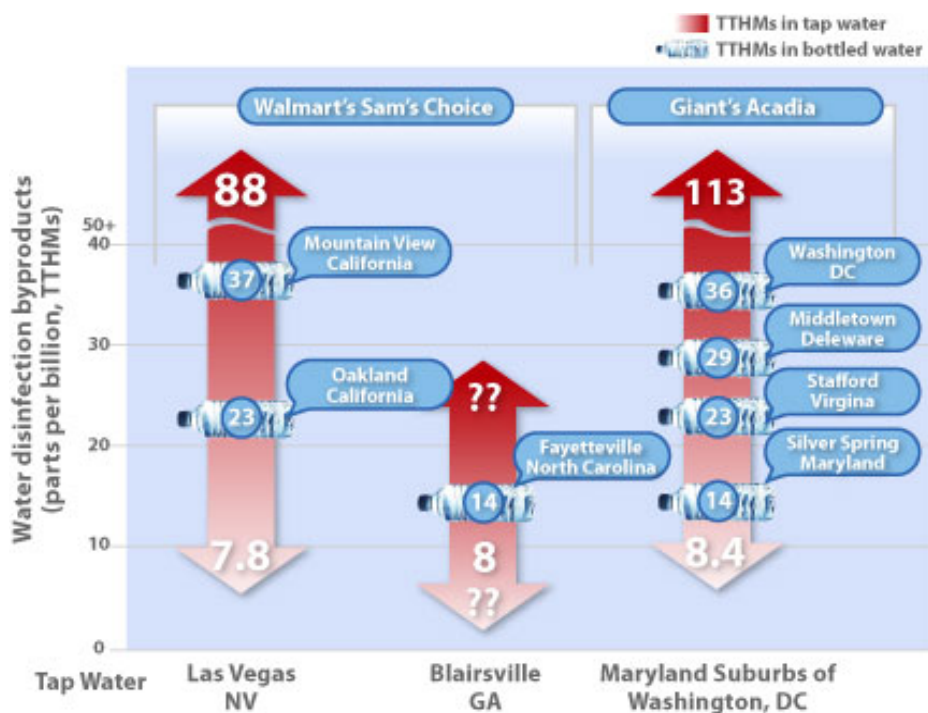
Americans drink twice as much bottled water today as they did ten years ago, for an annual total of over nine billion gallons with producer revenues nearing twelve billions (BMC 2007; IBWA 2008c). Purity should be included in a price that, at a typical cost of \$3.79 per gallon, is 1,900 times the cost of public tap water.<sup>1</sup> But EWG's tests indicate that in some cases the industry may be delivering a beverage little cleaner than tap water, sold at a premium price. The health consequences of exposures to these complex mixtures of contaminants like those found in bottled water have never been studied.

Unlike public water utilities, bottled water companies are not required to notify their customers of the occurrence of contaminants in the water, or, in most states, to tell their customers where the water comes from, how and if it is purified, and if it is merely bottled tap water. Information provided on the U.S. EPA website clearly describes the lack of quality assurance for bottled water: "Bottled water is not necessarily safer than your tap water" (EPA 2007b). The Agency further adds following consumer information:

*Some bottled water is treated more than tap water, while some is treated less or not treated at all. Bottled water costs much more than tap water on a per gallon basis... Consumers who choose to purchase bottled water should carefully read its label to understand what they are buying, whether it is a better taste, or a certain method of treatment (EPA 2007b).*

In conjunction with this testing program, EWG conducted a survey of 228 brands of bottled water, compiling information from websites, labels and other marketing materials. We found that fewer than half describe the water source (i.e., municipal or natural) or provide any information on whether or how the water is treated. In the absence of complete disclosure on the label, consumers are left in the dark, making it difficult for shoppers to know if they are getting what they expect for the price.

### **Figure 2. Walmart and Giant Are Bottling Tap Water**



The municipal water sources of the Walmart's Sam's Choice and Giant's Acadia bottled waters were identified through contact with Walmart representatives, their bottled water manufacturer, and city/utility officials; or from the label (Giant). Data on the levels of disinfection byproducts (total trihalomethanes or TTHMs) in these municipal water sources were obtained from Notla Water Authority in Blairsville, Georgia; Las Vegas Valley Water District; and Washington Suburban Sanitary Commission. These data were from tap water tests carried out in 2007, which the water utilities disclosed to their customers in an annual report. For every utility the range of values from lowest to the highest represents the concentrations of TTHMs that were found in the tap water over the course of the year. Notla Water Authority provided a single value for TTHMs, not a range.

This study did not focus on the environmental impacts of bottled water, but they are striking and have been well publicized. Of the 36 billion bottles sold in 2006, only a fifth were recycled (Doss 2008). The rest ended up in landfills, incinerators, and as trash on land and in streams, rivers, and oceans. Water bottle production in the U.S. uses 1.5 million barrels of oil per every year, according to a U.S. Conference of Mayors' resolution passed in 2007, enough energy to power 250,000 homes or fuel 100,000 cars for a year (US Mayors 2007). As oil prices are continuing to skyrocket, the direct and indirect costs of making and shipping and landfilling the water bottles continue to rise as well (Gashler 2008, Hauter 2008).

Extracting water for bottling places a strain on rivers, streams, and community drinking water supplies as well. When the water is not bottled from a municipal supply, companies instead draw it from groundwater supplies, rivers, springs or streams. This "water mining," as it is called, can remove substantial amounts of water that otherwise would have contributed to community water supplies or to the natural flow of streams and rivers (Boldt-Van Rooy 2003, Hyndman 2007, ECONorthwest, 2007).

## Recommendations

Currently there is a double standard where tap water suppliers provide information to consumers on contaminants, filtration techniques, and source water; bottled water companies do not. This double standard must be eliminated immediately; Bottled water should conform to the same right-to-know standards as tap water.

To bring bottled water up to the standards of tap water we recommend:

- Full disclosure of all test results for all contaminants. This must be done in a way that is readily available to the public.
- Disclosure of all treatment techniques used to purify the water, and:
- Clear and specific disclosure of the name and location of the source water.

To ensure that public health and the environment are protected, we recommend:

- Federal, state, and local policymakers must strengthen protections for rivers, streams, and groundwater that serve as America's drinking water sources. Even though it is not necessarily any healthier, some Americans turn to bottled water in part because they distrust the quality of their tap water. And sometimes this is for good reason. Some drinking water (tap and bottled) is grossly polluted at its source – in rivers, streams, and underground aquifers fouled by decades of wastes that generations of political and business leaders have dismissed, ignored, and left for others to solve. A 2005 EWG study found nearly 300 contaminants in drinking water all across the country. Source water protection programs must be improved, implemented, and enforced nationwide (EWG 2005b). The environmental impacts associated with bottled water production and distribution aggravate the nation's water quality problems rather than contributing to their solution.
- Consumers should drink filtered tap water instead of bottled water. Americans pay an average of two-tenths of a cent per gallon to drink water from the tap. A carbon filter at the tap or in a pitcher costs a manageable \$0.31 per gallon (12 times lower than the typical cost of bottled water), and removes many of the contaminants found in public tap water supplies.<sup>2</sup> A whole-house carbon filter strips out chemicals not only from drinking water, but also from water used in the shower, clothes washer and dishwasher where they can volatilize into the air for families to breathe in. For an average four-person household, the cost for this system is about \$0.25 per person per day.<sup>3</sup> A single gallon of bottled water costs 15 times this amount.

EWG's study has revealed that bottled water can contain complex mixtures of industrial chemicals never tested for safety, and may be no cleaner than tap water. Given some bottled water company's failure to adhere to the industry's own purity standards, Americans cannot take the quality of bottled water for granted. Indeed, test results like those presented in this study may give many Americans reason enough to reconsider their habit of purchasing bottled water and turn back to the tap.

Footnotes.

<sup>1</sup> A recent survey documented bottled water prices ranging from \$0.89 to \$8.26 per gallon (Food and Water Watch 2007). Retail prices vary widely depending on whether people are buying bottled water in bulk or individual bottles. Given this wide range in prices, EWG assumed a flat \$1.00 per liter price per liter (or \$3.79 per gallon), which is what most consumers would pay for a typical liter bottle of water bought from a convenience store. In comparison, EPA estimates that tap water costs consumers about \$0.002 per gallon, on average, nationwide (EPA 2004).

<sup>2</sup> EWG compared the prices and capacities of 7 faucet-mounted and pitcher filters. The prices ranged from \$19.99 to \$39.99 with treatment capacities ranging from 40 gallons to 100 gallons. With this information, we estimate an average cost of these types of systems as \$0.31 per gallon.

<sup>3</sup> EWG compared 5 different whole house carbon filter units and documented prices in the range between \$64.99 to \$795 per unit, with life spans between 3 and 36 months. Thus, the annual cost is in the range of \$260 - \$595 with an average of \$375. This leads to an estimated cost of \$1.00/day that translates into \$0.25 daily cost per person for an average four-person household.

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