



EPP Rapid Research

1402 Third Avenue , Suite 1420
Seattle, Washington 98104
Tel 206-352-2050
Fax 206-352-2049
www.pprc.org

EPP Rapid Research

What is the best water bottle option for field staff?

February 26, 2008

Request:

Sellen Construction is working towards reducing their environmental impact and has begun to supply filtered water instead of bottled water to employees at their main office; however they would also like to provide field staff with a convenient and environmentally friendly way to take water into the field.

Questions:

- Are there any water bottles made from an organic material that does not leach contaminants over multiple uses?
- Are they designed so they are easy to clean?
- In addition are any of them locally manufactured?

Key Findings:

Currently there is a major backlash against the trend to buy water in disposable or even recyclable bottles. The huge number of bottles has created major resource demand, and bottles are beginning to be taxed and even outlawed. Bottled water is responsible for a large carbon footprint, which is even larger if the water is transported long distances, as well as negative health implications related to chemicals leaching from plastic containers.

Environment

It takes 1.5 million barrels of oil -- enough to fuel 100,000 cars for a year -- to make the plastic bottles to meet Americans' demand for bottled water and only 1 in 5 bottles is recycledⁱⁱ. Bottled water produces up to 1.5 million tons of plastic waste per yearⁱⁱⁱ. Water bottles that are not recycled can end up:

- In water bodies; the United Nations Environment Program estimated in 2006 that every square mile of ocean hosts 46,000 pieces of floating plastic.^{iv}
- Being incinerated and producing toxic byproducts such as chlorine gas and ash containing heavy metals.
- Land filled and taking up to 1,000 years to biodegrade.
- Leaking toxic additives, such as phthalates, into the groundwater^v.

It actually takes a lot more water to “make” bottled water than is in the container. The manufacture and transport of a one kilogram bottle of Fiji water, for example, consumes 6.74 times as much water as is in the bottle (7.1 gallons) as well as .849 kilograms of fossil fuel and emits 562 grams of Greenhouse Gases (1.2 pounds)^{vi}.

Often bottled water must be transported long distances, which involves burning massive quantities of fossil fuels. Almost one-fourth of all bottled water crosses national borders to reach consumers.

Communities may suffer a disproportionate loss to their own water supplies such as water shortages in Texas and the Great Lakes region near bottling plants^{vii}.

Health/Toxicity

Concurrently, research shows that some of the materials that water is typically stored in (primarily PET) and re-usable bottles made from polycarbonate may be leaching carcinogenic and hormone-mimicking chemicals such as bisphenol-A) to the users.

There is also evidence to suggest that #1 PETE bottles leach a compound known as DEHA, which is classified by the EPA as a possible human carcinogen, as well as acetaldehyde, which has received the same designation from the International Agency for Research on Cancer.^{viii} Antimony is a heavy metal which can leach after prolonged storage of water in PET, especially if PET bottles are exposed to conditions that may occur in field work, such as exposure to sun, heat in vehicles, or prolonged storage in plastic^x. This is true for reusable containers in general; there is more leaching in heat^x, after longer periods of storage and as the bottles get scratched and worn.

At the same time we are being re-informed that bottled water might be no purer than ordinary tap water -- and that at least a quarter of the bottled water sold might actually be tap water^{xi}.

Economics

Bottled water is also expensive. It is "America's second most Popular Beverage" and costs 240 to over 10,000 times more per gallon for bottled water than tap water^{xii}. Estimates place worldwide bottled water sales at between \$50 and \$100 billion each year, with the market expanding at an annual rate of 7 percent^{xiii}.

Finding the best water bottle then has the potential for a "triple bottom line" win in all three areas.

Best Options:

Aluminum

Aluminum is also considered one of the best options, although it is worth being aware that many regular aluminum soda cans are coated with bisphenol-A and some aluminum water bottles also have coatings that may leach.

Alternative Resin (Corn)

New Wave Enviro Products makes a compostable corn resin bottle with a built in filter that removes chlorine from tap water. It claims that it can be refilled 90 times^{xiv}. A caveat might be that corn may be Genetically Modified (GM) – and taking a toll on the environment with pesticides and energy-intensive agriculture. Corn based biofuels actually use as much energy to produce as it provides. Corn based bioplastics have these drawbacks as well.

Glass

Glass is free of the concerns about leaching, is recyclable, with the major drawback of being breakable

Lightweight Stainless:

Stainless steel is one of the best options, since it is durable and doesn't leach. There is a slight possibility of a nickel allergy, although no records of this in practice

Kleen Canteen and Enviro Products are two companies that offer stainless steel water bottles.

Plastic

The plastics that are considered safe for re-usable bottles are #2 HDPE (high density polyethylene), or a #4 LDPE (low density polyethylene), or a #5 PP (polypropylene)^{xv}. A plastic being used as an alternative to polycarbonate is polyethersulphone, or PES. Health Canada, for example, has approved its use in food-processing equipment and considers any resulting human exposures would be "extremely low," but has never done an assessment checking whether use in bottles holds any risks^{xvi}.

References:

ⁱ London Mayor Urges Boycott On Bottled Water, <http://www.planetark.com/dailynewsstory.cfm/newsid/47056/story.htm>

ⁱⁱ Water, water - and wasted plastic bottles – everywhere, <http://www.suntimes.com/lifestyles/health/348952.CST-NWS-eatwater19.article>, Accessed 2/22/08

ⁱⁱⁱ 5 Reasons Not to Drink Bottled Water, <http://lighterfootstep.com/5-reasons-not-to-drink-bottled-water.html>

^{iv} 5 Reasons Not to Drink Bottled Water, <http://science.howstuffworks.com/great-pacific-garbage-patch.htm>

^vThe Trouble with Bottled Water, <http://www.progressivekid.com/shop/BottledWaterTrouble.aspx>

^{vi} Pablo Calculates the True Cost of Bottled Water, http://www.treehugger.com/files/2007/02/pablo_calculate.php

^{vii} The Trouble with Bottled Water, <http://www.progressivekid.com/shop/BottledWaterTrouble.aspx>

^{viii} On the Trail of Water Bottle Toxins, <http://leas.ca/On-the-Trail-of-Water-Bottle-Toxins.htm>, Accessed 2/22/08

^{ix} Plastic Containers, www.thegreenguide.com/reports/productprint.mhtml?id=44 - 34k

^x Boiling water spikes bisphenol A levels, http://www.theglobeandmail.com/servlet/Page/document/v5/content/subscribe?user_URL=http://www.theglobeandmail.com%2Fservlet%2Fstory%2FLAC.20080130.LBOTTLE30%2Fstory%2F&ord=13480098&brand=theglobeandmail&force_login=true

^{xi} Water, water - and wasted plastic bottles – everywhere, <http://www.suntimes.com/lifestyles/health/348952.CST-NWS-eatwater19.article>

^{xii} The Trouble with Bottled Water, <http://www.progressivekid.com/shop/BottledWaterTrouble.aspx>

^{xiii} 5 Reasons Not to Drink Bottled Water, <http://lighterfootstep.com/5-reasons-not-to-drink-bottled-water.html>

^{xv} Which plastic water bottles don't leach chemicals? http://trusted.md/blog/vreni_gurd/2007/03/29/plastic_water_bottles, Accessed 2/22/08

^{xvi} Are alternatives any safer than plastics? <http://www.theglobeandmail.com/servlet/story/RTGAM.20080311.wplastic11/BNStory/specialScienceandHealth/home>