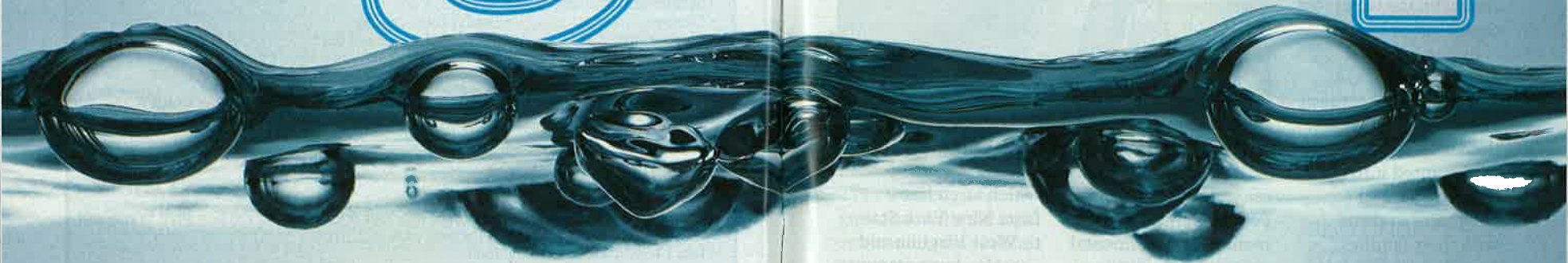


BIG GULP



SPECIAL REPORT

We have the safest drinking water in the world—except for the pesticides that sometimes sneak in. And the rocket fuel. And the antibiotics ...

BY DAVID FREEMAN AND TIMOTHY GOWER


Additional reporting by Christie Aschwanden and Beth Dreher

Sparkling, flat, or flaming?

We've been flooded with scary information lately about the water we drink. Newspaper stories have pointed out that more than 60,000 chemicals are used across the country—and can get into our drinking water—though the EPA enforces limits on fewer than 100. Other reports have warned of perchlorate, an ingredient in rocket fuel, which has been found in water systems in 26 states. And then there are the stories of families who can actually light their water on fire as it comes from the tap, not something you generally look for in your liquid refreshment.

We had questions. We wanted answers. What's risky, what's not, and what's just plain hooey? Is bottled water really any better than tap? How can you make water safer in your home—and around the world? And how does water burn, anyway? To find out, turn the page.

“Our Water Was Spurting and Bubbling Like Alka-Seltzer”

 Jimmy and Victoria Switzer's dream home has a nightmarish problem: They can't drink or cook with the water that comes out of its taps.

Jimmy built the house in Dimock, a small town in northern Pennsylvania, from timber he split himself. “We wanted it to be the place for our daughters to come with their families,” says Victoria, 59. But a couple of years ago, they began noticing that their water seemed ... strange. At first, there was just an orange tint and sediment in the bottom of a glass. Then, periodically, the washing machine would fill up with black sludge. Soon, Victoria says, “our water was spurting and bubbling like Alka-Seltzer.”

On New Year's Day, 2009, a neighbor's wa-



Victoria Switzer says methane gas makes her water undrinkable.

ter well exploded. The Pennsylvania department of environmental protection determined that methane from a natural gas well had seeped into the water supplies of several Dimock families, including the Switzers'. A spark from a motorized pump is thought to have set off the blast. Several of the Switzers' neighbors had so much gas in their water, they could actually light it on fire.

Dimock sits atop a rock formation called the Marcellus Shale,

which stretches from New York State to West Virginia and contains huge amounts of natural gas. Gas companies have long known about the deposits, but only in the past couple of decades have improvements in a drilling method called hydraulic fracturing—or fracking—allowed them to tap these reserves. Fracking involves drilling a deep hole and then injecting about a million gallons of water, sand, and chemicals under high pressure. The jet of

material breaks up rock, releasing gas that's captured at the wellhead.

Environmental groups worry that toxic chemicals used in fracking (often a trade secret), along with the potential migration of methane gas, pose a threat not only to private water supplies but also to rivers and other sources of drinking water. Yet fracking has its share of fans in high places, including Pennsylvania governor Tom Corbett, who argues that with the right environmental protections, it can provide jobs and clean energy. Cabot Oil & Gas Corporation, which owns the wells on the Swit-

zers' property, says the process is safe and that water in the area naturally contains methane.

Nevertheless, the Switzers and other families with contaminated wells now receive free weekly water deliveries courtesy of Cabot. And the state of Pennsylvania has ordered the company to pay \$4.1 million to the families with methane in their water. However, several of them, including the Switzers, refused the payout and are suing Cabot. “We have been living a nightmare,” says a defiant Victoria. “I will not let the gas company destroy my dreams.”

Timothy Gower

WHY WE NEED CLEAN WATER

Plain water is powerful stuff. Medical experts say getting enough lowers your risk of a number of ailments and unpleasantries.

- **Blood clots.** Being properly hydrated makes clots less likely and offers some protection against stroke.

- **Heart disease.** Drinking five glasses of water a day halved the risk of fatal heart disease for men in one large study.

- **Kidney stones.** Keeping things diluted helps prevent kidney stones and wards off urinary tract infections.

- **Cancer.** If you get plenty of water, you're less apt to develop bladder cancer. All



What the Big Thinkers Drink

We asked researchers, regulators, authors, and activists what they pour for themselves: bottled or tap, filtered or straight?

☞ Tap water. I also drink seltzer from a home delivery service.”

Michael Pollan, food activist and the author of *The Omnivore's Dilemma*

that water may flush out cancer-causing compounds before they do any harm.

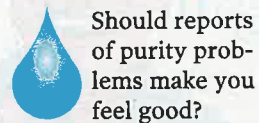
- **Mental fuzziness, crankiness, and fatigue.**

Mild dehydration can affect your thinking and mood.

- **Excess weight.** Down a couple of glasses before a meal and you'll consume fewer calories.

David Freeman

An Imperfect Safety Net



Should reports of purity problems make you feel good? (“Somebody’s paying attention!”) Or worried? (“What *else* is out there?”) Here’s what the experts say about the fear factor.

We used to have rivers of fire.

“Back in the 1970s, contamination came out of the end of a pipe. You could see it—we actually had the Cuyahoga River on fire. We’ve made progress on that, but now we have to worry about what happens when it rains. Water runs over city streets, suburban lawns treated with fertilizer and pesticides, and agricultural lands that may also have been treated or have animal feeding operations, and into our rivers and streams. Runoff is now thought by most folks to be the biggest source of water pollution.” *Lisa Jackson*

THE EXPERTS

Head of the Environmental Protection Agency, **Lisa Jackson** is charged with keeping the nation’s public water systems safe.

Peter Gleick, PhD, is president of the Pacific Institute, which analyzes environmental issues, and the author of *Bottled and Sold: The Story Behind Our Obsession with Bottled Water*.

Olga Naidenko, PhD, is a staff scientist at the Environmental Working Group, an activist research organization.

We’ve been playing whack-a-mole.

“We’re trying to figure out whether we can address contaminants as groups rather than one at a time. Can we look at perchlorate together with other solvents that might act like it? That might help us break the cycle where

every time we decide we need to regulate a chemical, we find out there’s a different one we need to worry about.” *Lisa Jackson*

Worry uncaps the water bottle.

“Sales of bottled water have skyrocketed from around a gallon per person per year in the early 1970s to over 30 gallons today. There are four main reasons: We’ve become increasingly fearful of tap water, we don’t like the taste, and it’s become easier to find bottled water at the same time that it’s become harder to find water fountains. A football stadium in Florida was built with no water fountains—the day it opened, 60 people got heat stroke because they ran out of bottled water. The fourth reason is that we’ve been bombarded with ad campaigns telling us that bottled water will make us skinnier or sexier or

healthier. But no one should assume that bottled water is better than tap water. Some bottled water isn’t monitored at all.” *Peter Gleick*

Our drinking water system helped make this country great.

“Building a good tap water system is how we got rid of cholera, typhoid, and dysentery in the early 1900s.”

Peter Gleick

But it needs help.

“A lot of the infrastructure for drinking water is very old. In the District of Columbia, some of it predates the Civil War. Lead pipes used to be standard back then! But updating it is expensive, and nobody is sure how we’re going to pay the bill.”

Olga Naidenko

There are a lot of known unknowns.

“We know perchlorate is out there. Now we need to know how much or how little is acceptable. Detection methods for contami-

nants are progressing really fast. But toxicology tests, which tell us how dangerous a contaminant is, take years to develop.”

Olga Naidenko

The Reader’s Digest Version:

“If you live in a big city in the United States, you should be confident of your tap water. If you live in a small rural community with a little water system, you’re much more likely to be at risk. These small systems are more vulnerable to things like agricultural runoff and septic tank leakage.” *Peter Gleick*

“Almost 290 million people in this country depend on 50,000 water systems for safe water. We don’t pay attention to this system, because it works—about 92 percent of Americans drink water that meets federal safety standards. Where we don’t meet the standards, we know what we have to do to get there.” *Lisa Jackson*



What the Big Thinkers Drink

☪ At home, we’re insistent on tap water. Our kids carry refillable containers to sports and things like that. Our offices at the EPA are in a historical building where we’ve had some concerns about the pipes, so we filter.”

Lisa Jackson, head of the EPA



What the Big Thinkers Drink

☞ Tap water. This nation has sunk incredible amounts of money and talent into making sure everyone has access to clean drinking water. Now people prefer to buy water that's been sitting on a shelf in a plastic bottle. To me, this is folly defined."

Bill McKibben, environmentalist and the author of *Eaarth: Making a Life on a Tough New Planet*

WHAT YOU'RE BUYING

Claims That Are Hard to Swallow



Liter for liter, bottled water costs hundreds of times as much as the stuff that gushes from the tap, but otherwise it isn't so different—except that it's subject to a good deal less monitoring, says Peter Gleick, author of *Bottled and Sold*. In fact, between 25 and 45 percent of the bottled water sold in the United States originates as tap water. Maybe that's why some manufacturers make such extravagant claims:

● **It's "oxygenated."** Some bottled brands supposedly contain up to 40 times as much oxygen as conventional water; ads say the extra oxygen improves athletic performance. But scientists who tested five brands of oxygen-enriched water found no performance boost—not surprising, the researchers say, since a single breath contains more oxygen than a

whole bottle of oxygenated water. All you get from oxygen-enriched water is an expensive burp, says Gleick.

● **It's "structured."** For years, the manufacturer of Penta water claimed its water had "30 percent smaller molecular water clusters" that hydrate you better. The company has backed off on some of those claims after being challenged by British regulators, but Penta still says its water may help prevent disease and lengthen life—with no accepted scientific evidence to support that idea, Gleick points out.

● **It's a "diet aid."** Can drinking bottled water help you shed unwanted pounds? Yes and no. Drinking lots of water can promote weight loss. But you get that advantage with any kind of water—whether or not it's enriched with vitamins, minerals, or other ingredients. *D. F.*

6 Reasons Bottled Is All Wet

Yes, bottled water is sometimes the most convenient option. It can also be ...

Intellectually bewildering

H₂Om: "While you drink in the delicious spring water, you are living in the 'now,' and you are naturally in a grateful state of being."

Holy Drinking Water:

"If you are a sinner or evil in nature, this product may cause burning, intense heat, sweating, skin irritation, rashes, itchiness, vomiting, bloodshot and watery eyes, pale skin color, and oral irritations."

Semantically confusing

These bottled waters are drawn from the tap. In some cases, bottlers add minerals and filter or distill the water.

Alaska Premium Glacier Aquafina Dasani Glacéau Smartwater Nestlé Pure Life Yosemite

Geographically challenged

From natural springs? Maybe. But Gleick points out that the springs aren't where you'd think.

Arctic Clear (source of water: Tennessee)
Arctic Falls Bottled (New Jersey)
Arctic Springs (California)
Arctic Wolf Spring (New Jersey)
Glacier Mountain Natural Spring (New Jersey)
Glacier Mountain Bottled (Ohio)
Everest (Texas)



Calorically enhanced

Vitaminwater: 125 calories, 33 grams of sugar per 20-ounce bottle. (In response to a lawsuit, lawyers for Coca-Cola said, "No consumer could reasonably be misled into thinking that vitamin-water was a healthy beverage.")

O.N.E. Coconut Water: 60 calories, 14 grams of sugar per 11.2-ounce container.

SoBe LifeWater (antioxidant flavors): 100 calories, 24 grams of sugar per 20-ounce bottle.

Financially demanding (but shipping is free)

Bling Water: "The Ten Thousand" is a 750-milliliter bottle of water that sells for \$2,600. The bottle has more than 10,000 hand-applied Swarovski crystals.

Acqua di Cristallo Tributo a Modigliani: A 1,250-milliliter gold-plated bottle of water costs \$3,600.

Ecologically challenging

Fiji: bottled and shipped from Viti Levu, Fiji (7,800 miles to New York City)

Voss: bottled in Southern Norway

Perrier: bottled in Vergèze, France
Evian: bottled in the Rhône-Alpes region of southeastern France

Antipodes: bottled in Whakatane, New Zealand

Who Drinks What Where (and Who Can't)

Biggest Imbibers

The top consumers of bottled water in 2010:

California
Texas
New York
Florida
Arizona
Massachusetts
Illinois
Pennsylvania
Maryland/District of Columbia
Louisiana

Totally Tap

Some cities are trying to ban bottled water. Of course, in most cases all they can do is stop using municipal money to buy it.

Cambridge, Massachusetts
Chico, California
San Francisco
San Jose, California
Santa Barbara, California



Three Towns Where the Water Isn't Safe to Drink

● Pavillion, Wyoming

Last August, the EPA recommended that many residents use bottled water for drinking and cooking because wells are contaminated, possibly from hydraulic fracking, a technique used to drill for natural gas.

● Porterville, California

Thanks to agricultural runoff, there's excess nitrate in the water here and in other towns in the San Joaquin Valley. High levels can kill an infant, but many residents continue to use tap water because they can't afford bottled.

● Hinkley, California

It's been over a decade since Erin Brockovich's lawsuit against PG&E over groundwater contaminated with hexavalent chromium, but last year, tests showed that contamination is still spreading. Last March, the company agreed to provide bottled water to residents near the power plant and to the Hinkley School and Senior Center.

GETTY IMAGES

WHAT YOU CAN DO

... To Filter Your Water



Our tap water system may be good, but it's far from flawless. There are many circumstances that might make you want extra protection.

For instance: Water that's perfectly drinkable at the treatment plant could be dirtied on its way to your sink. "If your pipes are old, a problem can start at the curb and come out the tap," says EPA administrator Lisa Jackson. "Lead and copper can leak out of old pipe solder. If you're concerned, ask your local health department about testing." It's also possible that your water company is falling short. Request a consumer confidence report (each water utility is required to issue one annually), or check the Environmental Working Group's tap water database at ewg.org/tap-water/whats-in-yourwater. If you're on well water (more than 13 million U.S.

homes are), the National Ground Water Association recommends annual testing by a certified groundwater contractor.

Thinking about filtering? Here are three options:

● Cheap and easy

A basic carbon filter—the kind in Brita-style pitchers and faucet-mounted units—can improve taste and do a fair job of removing common contaminants, including lead and "disinfection by-

products"—the cancer-causing toxins that can form when chlorinated water mixes with high levels of plant or animal debris. But if your family uses more than two gallons of water a day, you might find the approach too slow.

● **Works harder but is pricier** A filter that combines carbon and reverse-osmosis technology can remove perchlorate and many other toxins. These filters, typically mounted under the sink, process water faster, but they can cost several hundred dollars to install.

● **For the water worrier** If you want to drink your bathwater (or just brush your teeth with filtered water), consider getting a whole-house system. These systems treat all the water in the household and can be customized to target specific contaminants. Typical cost: several hundred to a few thousand dollars. D. F.

FOR BEST RESULTS

● Pick a filter or system certified by NSF International, which sets recognized standards in this field.


● Follow the manufacturer's instructions for installation and use.

● Replace filters on schedule. Bacteria can grow on outdated filter elements and make you sick.



WHAT YOU CAN DO

... To Safeguard Our Water Supply

 Our rivers and streams contain tiny traces of contraceptives, antidepressants, blood pressure medicine, even antibiotics given to livestock. How do they get there? Whenever you take a drug or apply one to your skin, some active ingredients eventually go down the toilet or the bathtub drain. Unused medication often gets flushed, too, and runoff containing pharmaceuticals given to animals can end up in streams and rivers. Treatment facilities aren't designed to remove these kinds of contaminants. We asked EPA scientist Christian Daughton, PhD, about the consequences.

● **Should you worry?** Not too much. The concentration of active drug ingredients is generally so low—in the parts per trillion—that scientists couldn't even detect them until fairly recently, says

Daughton, one of the first researchers to raise awareness of the issue. The biggest concern, most scientists agree, is for fish and other aquatic creatures. "They can't get away," says Daughton. In one study, researchers put low levels of synthetic estrogen—the kind used in birth control pills—in an experimental lake full of fish. Many of the males failed to develop sex organs, nearly wiping out the population.

● **What can you do?** Don't flush meds down the toilet unless you're told to do so by your doctor or pharmacist. Instead, ask your hospital or police department if your community has a "take-back" program for unneeded medicine. To reduce your own exposure, filter your drinking water. The more sophisticated the filter, the more pharmaceutical traces you'll eliminate. *T. G.*

What the Big Thinkers Drink

☞ **Filtered tap water.** I use a whole-house filter to cut down on disinfection by-products—the chlorine that disinfects water sometimes creates other dangerous compounds."

Jane Houlihan, senior vice president for research at the Environmental Working Group

WHAT YOU CAN DO

... To Help a Thirsty World

 The leading cause of death and illness around the world isn't malaria, tuberculosis, or AIDS—it's diarrhea. It's an ever-present threat for nearly 900 million people across the globe who drink, bathe, and cook with contaminated water. But environmental engineer David Manz, PhD, developed a remarkably cheap and easy way to purify water—and now he's helping to slash the risk of cholera and deadly dysentery-causing diseases in villages throughout Latin American, Africa, and Asia.

Manz was a professor at the University of Calgary in 1988 when, during trips to South Africa and the Philippines, he kept meeting people sickened by their local water. As soon as he got home, he began searching for affordable solutions. "You don't have many

opportunities in life to make a real difference," Manz says. "I decided to champion this idea as long as it took."

On his own time and using his own money, he began experimenting with

eating microorganisms. About the size of an office water cooler, the BioSand Filter can supply household water that's free of up to 99 percent of bacteria and parasites that cause diarrhea.

Roughly 750,000 BioSand Filters, provided free by Manz, are now in use in the developing world. "We know this filter works," says Carolyn Meub, executive director of Pure Water for the World. A recent study found it can reduce rates of diarrhea among small children by 45 percent.

Village doctors have told Meub that in the past, they couldn't keep enough diarrhea medicine in stock; now they barely need it. Thanks to Manz's filter, one woman in the hills of Honduras told Meub, her family was no longer plagued by illness. "Clean water," the woman said, "is medicine." *T. G.* ■

Do More

If you want to help provide a BioSand Filter to a family in Latin America or Haiti, go to purewaterfortheworld.org/donation. Cost per filter, plus installation, instruction, and more: \$150.

sand, long used in the developing world as a crude water filter. The problem: Pouring water through packed, fine grains removes large particles, making it less hazy, but doesn't always eliminate disease-causing bugs. Manz's brainstorm was to figure out a way to create a permanent "biofilm"—a layer atop the sand full of germ-