

The New York Times

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December 17, 2009

That Tap Water Is Legal but May Be Unhealthy

By [CHARLES DUHIGG](#)

The 35-year-old federal law regulating tap water is so out of date that the water Americans drink can pose what scientists say are serious health risks — and still be legal.

Only 91 contaminants are regulated by the Safe Drinking Water Act, yet more than 60,000 chemicals are used within the United States, according to [Environmental Protection Agency](#) estimates. Government and independent scientists have scrutinized thousands of those chemicals in recent decades, and identified hundreds associated with a risk of cancer and other diseases at small concentrations in drinking water, according to an analysis of government records by The New York Times.

But not one chemical has been added to the list of those regulated by the Safe Drinking Water Act since 2000.

Other recent studies have found that even some chemicals regulated by that law pose risks at much smaller concentrations than previously known. However, many of the act's standards for those chemicals have not been updated since the 1980s, and some remain essentially unchanged since the law was passed in 1974.

All told, more than 62 million Americans have been exposed since 2004 to drinking water that did not meet at least one commonly used government health guideline intended to help protect people from cancer or serious disease, according to an analysis by The Times of more than 19 million drinking-water test results from the District of Columbia and the 45 states that made data available.

In some cases, people have been exposed for years to water that did not meet those guidelines.

But because such guidelines were never incorporated into the Safe Drinking Water Act, the vast majority of that water never violated the law.

Some officials overseeing local water systems have tried to go above and beyond what is legally required. But they have encountered resistance, sometimes from the very residents they are trying to protect, who say that if their water is legal it must be safe.

Dr. Pankaj Parekh, director of the water quality division for the City of Los Angeles, has faced such criticism. The water in some city reservoirs has contained contaminants that become likely cancer-causing compounds when exposed to sunlight.

To stop the carcinogens from forming, the city covered the surface of reservoirs, including one in the upscale neighborhood of Silver Lake, with a blanket of black plastic balls that blocked the sun.

Then complaints started from owners of expensive houses around the reservoir. “They supposedly discovered these chemicals, and then they ruined the reservoir by putting black pimples all over it,” said Laurie Pepper, whose home overlooks the manmade lake. “If the water is so dangerous, why can’t they tell us what laws it’s violated?”

Dr. Parekh has struggled to make his case. “People don’t understand that just because water is technically legal, it can still present health risks,” he said. “And so we encounter opposition that can become very personal.”

Some federal regulators have tried to help officials like Dr. Parekh by pushing to tighten drinking water standards for chemicals like industrial solvents, as well as a rocket fuel additive that has polluted drinking water sources in Southern California and elsewhere. But those efforts have often been blocked by industry lobbying.

Drinking water that does not meet a federal health guideline will not necessarily make someone ill. Many contaminants are hazardous only if consumed for years. And some researchers argue that even toxic chemicals, when consumed at extremely low doses over long periods, pose few risks. Others argue that the cost of removing minute concentrations of chemicals from drinking water does not equal the benefits.

Moreover, many of the thousands of chemicals that have not been analyzed may be harmless. And researchers caution that such science is complicated, often based on extrapolations from animal studies, and sometimes hard to apply nationwide, particularly given that more than 57,400 water systems in this country each deliver, essentially, a different glass of water every day.

Government scientists now generally agree, however, that many chemicals commonly found in drinking water pose serious risks at low concentrations.

And independent studies in such journals as *Reviews of Environmental Contamination and Toxicology*; *Environmental Health Perspectives*; *American Journal of Public Health*; and *Archives of Environmental and Occupational Health*, as well as reports published by the [National Academy of Sciences](#), suggest that millions of Americans become sick each year from drinking contaminated water, with maladies from upset stomachs to cancer and birth defects.

Those studies have tracked hospital admissions and disease patterns after chemicals were detected in water supplies. They found that various contaminants were often associated with increased incidents of disease. That research — like all large-scale studies of human illnesses — sometimes cannot definitively say that chemicals in drinking water were the sole cause of disease.

But even the E.P.A., which has ultimate responsibility for the Safe Drinking Water Act, has concluded that millions of Americans have been exposed to drinking water that fails to meet a federal health benchmark, according to records analyzed by *The Times*. (Studies and E.P.A. summaries can be found in the Resources section of [nytimes.com/water](#).)

Communities where the drinking water has contained chemicals that are associated with health risks include Scottsdale, Ariz.; El Paso, Tex., and Reno, Nev. Test results analyzed by *The Times* show their drinking water has contained arsenic at concentrations that have been associated with cancer. But that

contamination did not violate the Safe Drinking Water Act.

In Millville, N.J., Pleasantville, N.J., and Edmond, Okla., drinking water has contained traces of uranium, which can cause kidney damage. Those concentrations also did not violate the law. (Contaminant records for each of the 47,500 water systems that provided data are at nytimes.com/contaminants.)

“If it doesn’t violate the law, I don’t really pay much attention to it,” said Stephen Sorrell, executive director of Emerald Coast Utilities Authority, which serves Pensacola, Fla. Data show that his system has delivered water containing multiple chemicals at concentrations that research indicates are associated with health risks. The system has not violated the Safe Drinking Water Act during the last half-decade.

The Times analysis was based on water test data collected by an advocacy organization, the Environmental Working Group. The data, which contain samples from 2004 to this year, are from water systems that were required by law to test for certain contaminants and report findings to regulators. The data were verified by comparing a randomly selected sample against millions of state records obtained by The Times through public records requests.

The Times examined concentrations of 335 chemicals that government agencies have determined were associated with serious health risks. The analysis counted only instances in which the same chemical was detected at least 10 times for a single water system since 2004, at a concentration that the government has said poses at least a 1-in-10,000 risk of causing disease.

That is roughly equivalent to the cancer risk posed by undergoing 100 X-rays. (More information on data sources is at nytimes.com/water-data.)

Some local regulators say gaps in the Safe Drinking Water Act can put them in almost untenable positions. Los Angeles regulators, for instance, test more than 25,000 samples a year looking for poisons, industrial chemicals and radioactive elements. The water that the system delivers to more than four million residents is cleaner than required by law, according to state data. Dr. Parekh has lobbied for millions of dollars to build reservoirs and buy new treatment systems.

But some residents doubt his motives. People affiliated with groups protesting water rate hikes have printed leaflets accusing him and other officials of “fooling us into thinking that our city’s water is not safe to drink!”

Though the city’s water rates are among the lowest in the state — the average household pays \$41 a month — other residents have included Dr. Parekh’s name on a poster naming “water officials who want to steal your money.”

In a statement, the E.P.A. said that a top priority of [Lisa P. Jackson](#), who took over the agency in January, was improving how regulators assessed and managed chemical hazards.

“Since chemicals are ubiquitous in our economy, our environment, our water resources and our bodies, we need better authority so we can assure the public that any unacceptable risks have been eliminated,” the E.P.A. wrote. “But, under existing law, we cannot give that assurance.”

Ms. Jackson has asked Congress to amend laws governing how the E.P.A. assesses chemicals, and has issued

policies to insulate the agency's scientific reviews from outside pressures.

But for now, significant risks remain, say former regulators.

"For years, people said that America has the cleanest drinking water in the world," said William K. Reilly, the E.P.A. administrator under President [George H. W. Bush](#). "That was true 20 years ago. But people don't realize how many new chemicals have emerged and how much more pollution has occurred. If they did, we would see very different attitudes."

Accumulating Threats

The Safe Drinking Water Act was passed in 1974 after tests discovered carcinogens, lead and dangerous bacteria flowing from faucets in New Orleans, Pittsburgh and Boston and elsewhere.

At the time, so little was known about the chemicals in American waters that the law required local systems to monitor only 20 substances. (Private wells are not regulated by the act.)

Over the next two decades, researchers at the E.P.A. began testing hundreds of chemicals, and Congress passed amendments strengthening the act. Eventually, the list of regulated substances increased to 91.

In 2000, the list stopped growing. Since then, the rate at which companies and other workplaces have dumped pollutants into lakes and rivers has significantly accelerated, according to an earlier analysis by The Times of the Clean Water Act.

Government scientists have evaluated 830 of the contaminants most often found in water supplies, according to a review of records from the E.P.A. and the [United States Geological Survey](#). They have determined that many of them are associated with cancer or other diseases, even at small concentrations.

Yet almost none of those assessments have been incorporated into the Safe Drinking Water Act or other federal laws. (A complete list of drinking water standards and health guidelines is at nytimes.com/water-data.)

For instance, the drinking water standard for arsenic, a naturally occurring chemical used in semiconductor manufacturing and treated wood, is at a level where a community could drink perfectly legal water, and roughly one in every 600 residents would likely develop bladder cancer over their lifetimes, according to studies commissioned by the E.P.A. and analyzed by The Times. Many of those studies can be found in the Resources section of nytimes.com/water.

That level of exposure is roughly equivalent to the risk the community would face if every person received 1,664 X-rays.

And in some places, tap water contains not just one contaminant, but dozens. More than half of the systems analyzed by The Times had at least seven chemicals in their water. But there is nothing in the law that addresses the cumulative risks of multiple pollutants in a single glass of water, as some public health advocates have urged.

In a statement, the E.P.A. said that a 2003 review of Safe Drinking Water Act standards found that

advances in science or technology had made it possible to tighten regulations of some chemicals. However, at the time, “the agency decided that changes to these standards would not provide a meaningful opportunity for health risk reduction.”

Another review of drinking water standards is under way, and results will be released soon, the agency says.

Because some of the diseases associated with drinking water contamination take so long to emerge, people who become ill from their water might never realize the source, say public health experts.

“These chemicals accumulate in body tissue. They affect developmental and hormonal systems in ways we don’t understand, ” said Linda S. Birnbaum, who as director of the National Institute of Environmental Health Sciences is the government’s top official for evaluating environmental health effects.

“There’s growing evidence that numerous chemicals are more dangerous than previously thought, but the E.P.A. still gives them a clean bill of health.”

Skepticism From Residents

After six years of helping to build treatment systems to cleanse water of parasites and human waste in nations like Gambia and Liberia, Dr. Parekh was ready for a more relaxing life. So in 1986 he returned to Los Angeles, where he had earned graduate degrees in public health and environmental engineering, and joined the city’s Department of Water and Power.

At the time, almost all of its drinking water came from the pristine Eastern Sierra to the northeast. Until the 1970s, Los Angeles regulators hadn’t even bothered to filter it.

But when Los Angeles lost some of its rights to that water, the city began relying more on ground water from the nearby San Fernando Basin, Northern California and nearby states.

Soon, Dr. Parekh and his colleagues started seeing evidence that those new supplies were contaminated. The San Fernando Basin contains a huge [Superfund](#) site — an area so polluted by industry that the federal government has cleanup oversight — and as pollution spread underground, the city had to abandon 40 percent of the area’s wells.

Then, in October 2007, Dr. Parekh received a troubling call. A local laboratory was using tap water for experiments and had discovered compounds called bromates, which studies have associated with cancer.

Bromates are regulated by the Safe Drinking Water Act, but officials are required to test for them only when water leaves a treatment plant. Even after it was treated, Los Angeles’s water contained certain contaminants that, when combined with cleaning chemicals and exposed to sunlight in reservoirs, had formed bromates. Those bromate concentrations did not break federal rules, but city workers thought they were unhealthy and worried they could eventually violate the law unless action was taken.

Dr. Parekh’s colleagues released more than 600 million gallons of contaminated water into the ocean. Then a member of Dr. Parekh’s staff had an idea: to protect the drinking water from sunlight, cover the reservoirs with plastic balls.

The city bought 6.5 million dark balls — similar to the kind [McDonald's](#) uses for its playground pits — for about \$2 million, and dumped them into reservoirs. Angry residents began attacking the city's regulators on blogs and leaving profane phone messages. A spokesman for the Los Angeles Department of Water and Power said he believed such complaints were not widespread.

Today, Los Angeles is drawing up plans for underground storage tanks. And Dr. Parekh and others are designing a treatment system that may cost as much as \$800 million. The city has not determined how to pay those costs.

"I drink my tap water. My 86-year-old mother drinks tap water," Dr. Parekh said. "We work very hard to give this city the cleanest water in the state. But water sources are getting more polluted. If we just do what's required, it's not enough."

Polluters Push Back

Earlier this decade, scientists at the E.P.A. began telling top agency officials that more needed to be done. Dr. Peter W. Preuss, who in 2004 became head of the E.P.A.'s division analyzing environmental risks, was particularly concerned.

So his department started assessing a variety of contaminants often found in drinking water, including perchlorate, an unregulated rocket fuel additive, as well as two regulated compounds, trichloroethylene, a degreaser used in manufacturing, and perchloroethylene or perc, a dry-cleaning solvent. Research indicated that those chemicals posed risks at smaller concentrations than previously known. Links to that research can be found in the Resources section of nytimes.com/water.

But when E.P.A. scientists produced assessments indicating those chemicals were more toxic — the first step in setting a standard for perchlorate and tougher standards for the other two substances — businesses fought back by lobbying lawmakers and regulators and making public attacks.

Military contractors, for example, said that regulations on perchlorate, which has been associated with stunted central nervous system development, would cost them billions of dollars in cleanup costs. In 2003, an Air Force colonel, Daniel Rogers, called an E.P.A. assessment of the chemical "biased, unrealistic and scientifically imbalanced." Military officials told E.P.A. scientists they were unpatriotic for suggesting that bases were contaminated, according to people who participated in those discussions.

Property owners who had rented space to dry cleaners lobbied lawmakers and top E.P.A. officials to remove government scientists from research on perc, which has been associated with some kinds of tumors, according to interviews with lobbyists. (Trichloroethylene has been associated with liver and kidney damage and cancer.)

Soon, Dr. Preuss was told by some superiors that he might be dismissed if he continued pushing for extensive assessments of certain chemicals, he said.

"It's hard for me to describe the level of anger and animosity directed at us for trying to publish sound, scientific research that met the highest standards," Dr. Preuss said. "It went way beyond what would be considered professional behavior."

Today, the Safe Drinking Water Act still does not regulate perchlorate or more than two dozen other substances that Dr. Preuss's department has analyzed over the last eight years. And standards for acceptable levels of trichloroethylene and perc have not changed in 18 years.

Those two chemicals have been detected in drinking water in more than a dozen states, including California, Massachusetts, New York and Oregon. A study published last week by the [Centers for Disease Control and Prevention](#) found traces of perchlorate in every person examined by researchers.

A Department of Defense official, who asked not to be named because of the sensitivities regarding perchlorate, said the military's perspective on the chemical had changed since 2005, and it now deferred to the E.P.A.'s assessments. Colonel Rogers did not reply to e-mail messages and calls seeking comment.

"We need action," said Senator [Barbara Boxer](#), a California Democrat and chairwoman of the Environment and Public Works Committee, which oversees the Safe Drinking Water Act. "E.P.A. has the authority to set new standards, but it wasn't used over the last eight years. There are people at risk."

In a statement, the E.P.A. said that standards for trichloroethylene and perc were under examination, and that a decision regarding perchlorate would be issued next year.

Dr. Preuss's department has also written, but not yet published, a much tougher assessment of arsenic, the most common contaminant that companies are forced to clean up at Superfund sites. The chemical is a case study in the complexities of establishing risk levels and how industries fight regulatory efforts.

In 2000, the E.P.A. proposed setting a limit on arsenic in drinking water at five parts per billion — roughly equivalent to one drop in 50 drums of water. But water systems and industries that use arsenic complained, arguing that the science was uncertain and the chemical was expensive to remove. Regulators relented, doubling the arsenic limit to 10 parts per billion.

Since then, new studies have emerged, and interviews with more than 30 researchers as well as reports by the National Academy of Sciences indicate there is a general consensus on the dangers of arsenic at low concentrations. Those studies can be found in the Resources section of [nytimes.com/water](#).

Dr. Parekh estimates that arsenic poses more of a risk to Los Angeles residents than any other contaminant in drinking water.

A decade's worth of evidence also indicates that the costs of removing arsenic from drinking water have often been smaller than initially estimated.

But there is still a scientific debate over the costs and benefits of lowering the arsenic standard in drinking water. Many of the scientists opposed to new regulation receive funding from industries that use arsenic. But they raise concerns that underscore the difficulties of evaluating such risks.

"I think most people would say that, from a health perspective, setting an arsenic limit as close to zero as possible is best," said Kenneth Cantor, who recently retired from the [National Cancer Institute](#). "But we can't do controlled experiments where we expose some people to two parts per billion, and other people to eight parts per billion, and see which ones get more cancer. So there is some uncertainty, just as there is uncertainty in every scientific conclusion."

Some industry groups have financed studies that highlight that uncertainty. And industry lobbyists have urged sympathetic lawmakers and officials to complain about tougher risk assessments, according to interviews and correspondence provided by E.P.A. employees or obtained through the Freedom of Information Act.

Those lobbying efforts have succeeded, to a degree. Some officials from the Department of Agriculture and E.P.A. staff members have pushed back, and some said that a stricter arsenic assessment would have “disastrous impacts,” according to a confidential memo from one of the E.P.A.’s regional offices, and would present “a severe challenge in communicating risk information” to the public. The new assessment “lacks common sense” and is “unexpected and bewildering,” another memo argued.

Other critics have said that Dr. Preuss’s assessment will affect not just water regulations, but also toxicity estimates for anything containing arsenic.

“If the science is uncertain, and there are enormous costs associated with more regulation, maybe we should wait for certainty,” said Robert C. LaGasse, executive director of the Mulch and Soil Council, who has met with the E.P.A. on this issue. “Arsenic naturally occurs in soils and fertilizer. This could have a chilling effect on gardening.”

Dr. Preuss said such concerns should not shape scientific evaluations. “It is our job to follow the science, and when a preponderance of evidence indicates there is a risk, we should say so,” he said.

In May, Ms. Jackson, the E.P.A. head, announced reforms to protect agency scientists like Dr. Preuss from outside pressures. Dr. Preuss said he was an enthusiastic supporter of Ms. Jackson’s efforts, and believed the arsenic assessment would be published without interference.

“But there are still tens of thousands of chemicals we haven’t assessed,” he added. “If you don’t know what’s dangerous, you can’t write laws against it.”

Risky — and Legal

The effects of pollution are clear throughout the Los Angeles area. In Santa Monica, officials have shut wells contaminated by a gasoline additive that is not regulated by the Safe Drinking Water Act. In Pomona, a college town to the east, water supplies contain chemicals dumped by manufacturing and agricultural companies.

And in Maywood, a city of 30,000 just southeast of downtown Los Angeles, tap water is often brown and tastes bitter, say residents. Many people don’t own white clothing, because they complain it becomes stained when it is washed.

Last month, Carlos Husman drew a bath for his 4-month-old granddaughter that was filled with what looked like particles of rust and dirt, staining the sides of the bathtub.

Maywood is only one square mile, but has three water systems. All are privately owned, so local officials have no real power except forcing them to follow federal and state regulations. About three-quarters of the nation’s water systems are private entities, beholden only to their shareholders and the law.

Laboratory tests show Maywood's tap water has contained toxic levels of mercury, lead, manganese and other chemicals that have been associated with liver and kidney damage, neurological diseases or cancer.

But when Maywood's residents asked for cleaner water, they were told what was flowing from the taps satisfied the Safe Drinking Water Act, and so the managers didn't have to do more.

Indeed, some of the chemicals in Mr. Husman's water — like manganese, which has been associated with Parkinson's disease — are essentially unregulated, and so the water system isn't required to remove them, even when particles float in a glass.

"When I shower in the morning, it looks like blood," Mr. Husman said. "How can the government see this water, know it contains dangerous chemicals, and say it's legal?"

When a city council member named Felipe Aguirre lobbied for cleaner water, anonymous leaflets arrived. "Felipe Aguirre has deceived the citizens of Maywood!" one reads. "Felipe Aguirre does not care that Maywood residents will be paying more for water already safe to drink!" another says. "Do you want this liar and corrupt politician to decide the future of Maywood and its residents?"

Water system managers say their water is safe. "If it wasn't, the E.P.A. or the state would tell us to change," said Gustavo Villa, general manager of Maywood Mutual Water Company No. 2. Before taking his job in 2006, Mr. Villa drove 18-wheeler trucks, and had no experience running a water system. He said the system was trying to install machinery to remove some manganese, but halted construction because of missing permits.

Lawmakers on Capitol Hill and in state legislatures have pursued options that could help Maywood and other cities. The California Legislature, for instance, this year passed a bill focused on Maywood that would revoke permits from the town's water systems if they cannot "deliver safe, wholesome and potable drinking water."

In May, the Senate Environment and Public Works Committee passed the Water Infrastructure Financing Act, which, if approved by Congress and signed by [President Obama](#), would authorize \$14.7 billion in loans to help states improve their systems.

And the E.P.A. recently said it would analyze a host of chemicals — known as endocrine disruptors — that some scientists have associated with cancer and other diseases. Congress called for such tests in 1996, but the agency failed to meet deadlines for 13 years.

In the meantime, regulators struggle to explain to residents that even legal drinking water can pose risks. Some of them have recommended that people use home water filters.

Most people don't comprehend the complicated scientific papers that describe cancer risks, Dr. Parekh said. "And if the law is working, they don't have to," he added. "But in this new world, where pollution is so much more common, they may have to learn to understand it."

