

A National Assessment of Tap Water Quality

More than 140 contaminants with no enforceable safety limits found in the nation's drinking water

*Utilities need more money to monitor for contaminants
and protect source waters*

*Environmental Working Group
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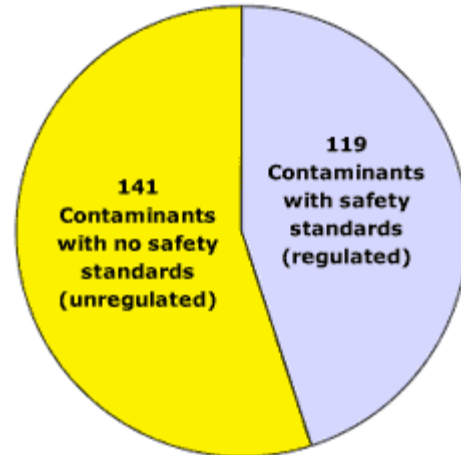
Executive Summary

Tap water in 42 states is contaminated with more than 140 unregulated chemicals that lack safety standards, according to the Environmental Working Group's (EWG's) two-and-a-half year investigation of water suppliers' tests of the treated tap water served to communities across the country.

In an analysis of more than 22 million tap water quality tests, most of which were required under the federal Safe Drinking Water Act, EWG found that water suppliers across the U.S. detected 260 contaminants in water served to the public. One hundred forty-one (141) of these detected chemicals — more than half — are unregulated; public health officials have not set safety standards for these chemicals, even though millions drink them every day.

EWG's analysis also found over 90 percent compliance with enforceable health standards on the part of the nation's water utilities, showing a clear commitment to comply with safety standards once they are developed. The problem, however, is EPA's failure to establish enforceable health standards and monitoring requirements for scores of widespread tap water contaminants. Of the 260 contaminants detected in tap water from 42 states, for only 114 has EPA set enforceable health limits (called Maximum Contaminant Levels, or MCLs), and for 5 others the Agency has set non-enforceable goals called secondary standards. (EPA 2005a). The 141 remaining chemicals without health-based limits contaminate water served to 195,257,000 people in 22,614 communities in 42 states.

260 contaminants found in nation's tap water, more than half have no safety standards.



[Details](#)

Source: EWG analysis of water utility test data for 1998-2003, compiled and provided to EWG by state drinking water offices.

Note: EPA has set enforceable safety standards (called Maximum Contaminant Levels, or MCLs) for 80 chemicals or chemical groups, which are present in tap water tests analyzed by EWG as 114 individual chemicals or chemical variants called isomers. EPA has also established 15 guidelines called National Secondary Drinking Water Regulations (NSDWRs), five of which are represented in tap water tests analyzed by EWG.

EWG acquired tap water testing data from state water offices, which collect it from drinking water utilities to fulfill their role as primary enforcement agents. EPA does not maintain a comprehensive, national tap water quality database. Instead, the Agency sets safety standards for contaminants based on partial information, from test data it gathers from select, representative states and water suppliers. EWG will be making its data available to the EPA, state authorities and water utilities.

The statistics reported here represent an underestimate of the scope of consumers' exposures to unregulated contaminants in the nation's tap water. The state records we have compiled contain no tests whatsoever on unregulated contaminants for fully 23% of the 39,751 water systems represented, and EPA has required testing, in limited surveillance programs, for just a fraction of the hundreds of unregulated tap water contaminants identified in peer-reviewed studies. Some unregulated contaminants were found in the tap water of hundreds of communities, while others were found in very few; some were detected at levels of health concern, while others were not. These differences in the scale and magnitude of exposures can guide priorities when EPA assesses potential mandatory safety standards for these chemicals:

- Of the 141 unregulated contaminants found in tap water, 40 were detected in tap water served to at least one million people. while 20 unregulated contaminants were detected in just one system, only one time.
- Nineteen unregulated contaminants were detected above health-based limits (EPA 2004b) in tap water served to at least 10,000 people. Forty-eight unregulated contaminants were not detected above health-based limits anywhere, and seventy lack health-based limits, which have yet to be developed by EPA.

The Agency has fallen short in efforts both to require the testing that would reveal what pollutants are in tap water supplies, and to set health-based standards for those that are found. EPA has ignored three mandatory Safe Drinking Water Act deadlines to set standards for unregulated contaminants (EPA 2001a). Nearly twenty percent of the contaminants that EPA is

currently considering for regulation have been under study at the Agency for 17 years now, beginning with testing programs initiated in 1988 (EPA 2001b, 2005b).

The agency has also failed to act on its own information showing that increased testing is justified. EPA has required water suppliers to test tap water for approximately 200 unregulated contaminants over the past 30 years (EPA 2001b, 2001c, 2005c, FR 1996 - [details](#)). But the Agency's own scientists have identified 600 chemicals in tap water formed as by-products of disinfection (Richardson 1998, 1999a,b, 2003); tracked some 220 million pounds of 650 industrial chemicals discharged to rivers and streams each year (EPA 2003); and spearheaded research on emerging contaminants after the U.S. Geological Survey found 82 unregulated pharmaceuticals and personal care product chemicals in rivers and streams across the country that provide drinking water for millions of Americans (Kolpin et al. 2004, EPA 2005d). All told, EPA has set safety standards for fewer than 20 percent of the many hundreds of chemicals that it has identified in tap water.

Findings

Our investigation reveals major gaps in our system of public health protections when it comes to tap water safety. Federal programs that allocate grants and low-cost loans to prevent water pollution and protect the rivers, streams, and groundwater that we drink are sorely underfunded.

Just 5 percent of \$6 billion granted to states under the Clean Water Act State Revolving Fund, went toward mitigating polluted runoff from farms, and urban and sprawl areas, which collectively account for 60 percent of water pollution. And only \$2.7 million has been allocated to conserve buffer zones along rivers and streams (1997-2003), over the six-year history of the source water protection program mobilized under the Safe Drinking Water Act State Revolving Fund. This initiative has protected just 2,000 acres nationwide, although it is the most significant source water protection program in the history of the Safe Drinking Water Act (TPL and AWWA 2004).

By failing to clean up rivers and reservoirs that provide drinking water for hundreds of millions of Americans, EPA and the Congress have forced water utilities to decontaminate water that is polluted with industrial chemicals, factory farm waste, sewage, pesticides, fertilizer, and sediment. In its most recent national Water Quality Inventory EPA found that 45 percent of lakes and 39 percent of streams and rivers are "impaired" — unsafe for drinking, fishing, or even swimming, in some cases (EPA 2000). Even after water suppliers filter and disinfect the water, scores of contaminants remain, with conventional treatment regimes removing less than 20 percent of some contaminants (Faust and Aly 1998). By failing to set tap water safety standards expeditiously or require and fund comprehensive testing, EPA allows widespread exposures to chemical mixtures posing unknown risks to human health.

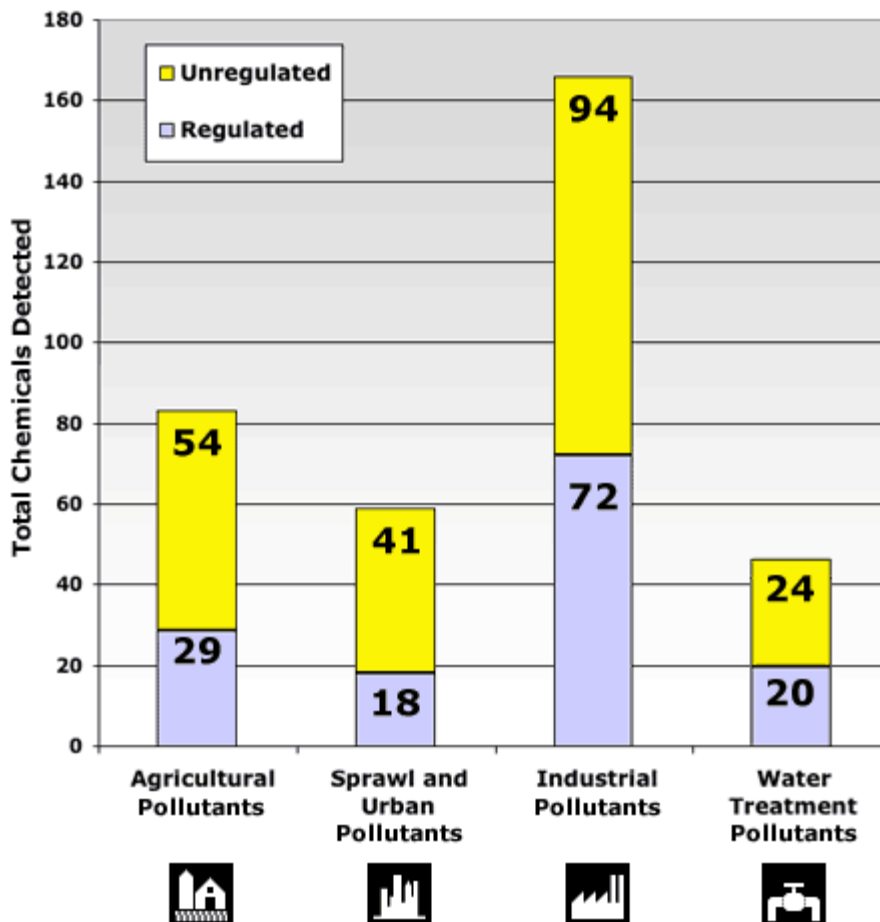
- Of the 141 unregulated contaminants utilities detected in water supplies between 1998 and 2003, 52 are linked to cancer, 41 to reproductive toxicity, 36 to developmental toxicity, and 16 to immune system damage, according to chemical listings in seven standard government and industry toxicity references. Despite the potential health risks, any concentration of these chemicals in tap water is legal, no matter how high.
- For 64 of the unregulated contaminants found in tap water, the government has not yet recommended unenforceable, health-based limits in tap water, let alone set an enforceable safety standard. For 46 of these chemicals, no health information whatsoever is available in standard government and academic references.
- Altogether, the unregulated chemicals that pollute public tap water supplies include the gasoline additive MTBE; the rocket fuel component perchlorate; at least 15 chemical by-products of water disinfection; four industrial plasticizers called phthalates linked to birth defects and reproductive toxicity; 78 chemicals used in industrial and consumer products; and 20 chemical pollutants from gasoline, coal, and other fuel combustion.

Water pollution from many sources — industry, agriculture, development, treatment

A Harris Interactive poll published in October 2005 found that Americans rank water pollution as the number one environmental concern facing the country, topping global warming, ozone depletion, and air pollution (The Harris Poll 2005). And yet we find a deep disconnect between what people care about and what the government is willing to act upon. From agricultural pollution, to industrial waste, to pollution stemming from sprawl and urban runoff, a lack of political will materializes into poor planning and scarce funding that leads to pollution beginning upstream and ending at the tap.

EWG's analysis of tap water testing from 42 states validates the public's concern about tap water. We found that between 1998 and 2003, water suppliers collectively identified in treated tap water 83 agricultural pollutants, including pesticides and chemicals from fertilizer- and manure-laden runoff; 59 contaminants linked to sprawl and urban areas, from polluted runoff and wastewater treatment plants; 166 industrial chemicals from factory waste and consumer products; and 44 pollutants that are by-products of the water treatment process or that leach from pipes and storage tanks.

Unregulated chemicals in tap water stem from all major water-polluting sources



Agricultural chemicals in tap water. EWG's analysis of water suppliers' tap water test results shows that water contaminated with 83 agricultural pollutants, including pesticides and fertilizer ingredients, are served to 201,955,000 people in 41 states. 15% of those people were served water with one or more agricultural contaminants present at levels above non-enforceable, health-based limits. **54 of the agricultural chemicals detected in tap water are are unregulated, without a legal, health-based limit in tap water.**

According to U.S. Department of Agriculture figures, in 2002 the agriculture industry spread commercial fertilizer over one-eighth of the continental U.S. — 110 billion pounds of fertilizer over 248 million acres altogether (USDA 2002; AAPCO 2002). Crop production on those lands was supported by herbicide applications spread over literally one-tenth of the lower 48 states (USDA 2002). And in between farmed land tracts are what EPA estimates to be 238,000 concentrated feed lots for cattle and pigs — the equivalent of 75 in every U.S. county — that collectively produce 500 million tons of manure yearly (EPA 2004a).

Runoff from these farms and feed lots can be laden with sediment, disease-causing microorganisms, pesticides, and fertilizer ingredients that can widely contaminate water supplies. In fact, in its most recent in a series of mandated biannual investigations on national water quality, EPA found that agricultural pollutants impair nearly one of every five miles of rivers and streams across the country (EPA 2000). Despite the widespread pollution, EPA has failed to set pollution prevention standards for agricultural operations, as mandated under the Clean Water Act. The Agency's inaction has spurred lawsuits in 40 states, and as a result, EPA and States have begun efforts, still in their infancy, to comply with the law (CalEPA 2005). In the meantime, water suppliers must strip pesticides and related pollutants from tap water supplies, often relying on additional processes such as carbon treatment to increase removal efficiencies at a cost to taxpayers running into the millions of dollars. And still, millions of Americans drink the residues that remain despite the treatment.

Industrial chemicals in tap water. EWG's analysis of water supplier's tap water test results shows that water contaminated with 166 industrial pollutants, including plasticizers, solvents, and propellants, are served to 210,528,000 people in 42 states. 56% of those people were served water with one or more industrial contaminants present at levels above non-enforceable, health-based limits. **94 of the industrial chemicals detected in tap water are are unregulated, without a legal, health-based limit in tap water.**

U.S. industries manufacture and import approximately 82,000 chemicals, 3,000 of them at over a million pounds per year (GAO 2005, EPA 2005f). The EPA approves an average of two new industrial chemicals every day, 80 percent them within three weeks of an industry's application, with or without safety studies (GAO 2005, EPA 1997). A 1998 EPA study found that fully 43 percent of chemicals used in the highest volumes (more than one million pounds per year) completely lacked any of the seven most basic health and safety screening studies, let alone substantive information on the potential of the chemical to pollute tap water sources (EPA 1998). Health officials do not know the full extent of industrial pollution to tap water supplies, and what the health consequences of exposures may be.

But health officials do know with certainty that some of these chemicals end up in rivers and streams that form the nation's tap water supplies, and that many of them persist all the way to the tap. EPA's Toxics Release Inventory reporting program shows that in 2003 U.S. industries

discharged 220 million pounds of 650 chemicals to rivers and streams (EPA 2003). And EWG's analysis shows that water suppliers detected 166 industrial chemicals in treated tap water from 42 states between 1998 and 2003. But the vast majority of industrial chemicals remain untested and unregulated in tap water.

Chemicals from sprawl and urban areas. EWG's analysis of water supplier's tap water test results shows that water contaminated with 59 pollutants linked to sprawl and urban areas, including plasticizers, solvents, and propellants, are served to 202,697,000 people in 42 states. 53% of those people were served water with one or more of these contaminants present at levels above non-enforceable, health-based limits. **41 of the urban and sprawl chemicals detected in tap water are unregulated, without a legal, health-based limit in tap water.**

As the U.S. population continues to grow, water supplies are strained with increasing loads of wastewater and stormwater runoff laden with the signature pollutants of urban and sprawl areas — chemicals from automobile emissions, road surfaces, yards and homes, and from the wastewater treatment plants that dump effluent into waterways at a rate of 60 gallons per person, every day.

While growth benefits the national economy, growth without national, state, or local plans that recognize — and control — impacts to the environment strains the quality of local streams and rivers. It burdens water suppliers with ever-increasing loads of pollutants. Government studies show that each new person joining the ranks of the U.S. population spurs development that consumes an average of just over an acre of countryside, for new housing, businesses, and infrastructure (USCB 2005, USGS 2003). At current national growth rates of three million people each year, this translates into tainted runoff from new development over an area one and a half times the size of Yellowstone National Park, every year. And it equates to an annual increased wastewater load of 66 billion gallons to U.S. waterways. Water suppliers sit at the equivalent of the tailpipe of this growth and its collateral pollution.

Development degrades water supplies in unexpected ways. When the U.S. Geological Survey set out to study insecticides in U.S. streams and rivers they found the highest concentrations not in the heavily sprayed farm belt, but in urban streams and rivers. When homeowners use insecticides, rainwater and groundwater carry those chemicals to local waters. USGS scientists found more than half of all streams tainted with insecticides that exceeded levels set to protect health and the environment, in 10 to 40 percent of all samples. Ten percent of tested streams contained at least two neurotoxic, organophosphate insecticides in combination with at least four herbicides (USGS 1999).

New studies of urban and sprawl pollutants reveal more than just pesticides, through. USGS scientists have detected 82 pharmaceuticals, hormones, medications and other residues of consumer products in streams from 30 states. Eighty percent of streams contained at least one synthetic chemical, and the most contaminated stream contained detectable levels of 38 chemicals. Scientists found the antidepressant Prozac, anti-microbial hand soap and toothpaste chemicals (triclosan and triclocarban); active ingredients in oral contraceptives and thyroid hormone treatments; and hormone-mimicking detergents called alkylphenols. (Kolpin et al. 2004)

Many of these chemicals are excreted in human urine or are washed down the drain. Many resist standard treatment regimes at wastewater treatment plants. And based on a landmark study released in November 2005, it appears that many of these chemicals also resist removal downstream, at tap water treatment plants. In first-time tests in tap water of Organic Wastewater Contaminants, or OWC's, as they are called, USGS scientists found prescription and non-prescription drugs and their metabolites, fragrance compounds, flame retardants and plasticizers,

and cosmetic compounds — between 11 and 17 compounds in each sample (Stackelberg et al. 2005). The resesarchers note deficiencies in current safety standards revealed by their findings:

[S]tandards or advisories have not been established for most of these compounds... Drinking-water criteria currently are based on the toxicity of individual compounds and not combinations of compounds. Little is known about potential human-health effects associated with chronic exposure to trace levels of multiple OWCs through routes such as drinking water. The occurrence in drinking-water supplies of many of the OWCs analyzed for during this study is unregulated and most of these compounds have not been routinely monitored for in the Nation's source- or potable-water supplies. — Stackelberg, et al. 2005

The U.S. population is growing at a rate of one person every 10 seconds. If we fail to undertake a national, coordinated initiative to control pollution from growth and sprawl, consumers can expect ever-growing loads of these pollutants in tap water supplies. If we fail to modernize health protections for drinking water exposures, we can expect health risks to increase.

Pollutants from water treatment, storage, and distribution. EWG's analysis of water suppliers' tap water test results shows that water contaminated with 44 pollutants that are residues of water treatment, storage, and distribution, including chemical by-products of water disinfection, are served to 178,679,000 people in 41 states. 79% of those people were served water with one or more of these contaminants present at levels above non-enforceable, health-based limits. **24 of these chemicals detected in tap water are are unregulated, without a legal, health-based limit in tap water.**

Tap water disinfection is crucial for controlling waterborne disease, but the chemicals used for disinfecting can form harmful chemical by-products in the treated water. These by-products form when disinfectants react with organic pollution from agriculture, urban and sprawl runoff. EPA restricts levels of 11 of these chemicals in tap water that collectively are linked to cancer and reproductive toxicity, but scientists have identified not just 11, but 600 disinfection by-products in treated tap water altogether, any of which can be present in public water supplies (Richardson 1998, 1999a,b, 2003 - [additional references](#)). EPA has required short-term testing of only a handful of these in federal, unregulated contaminant monitoring programs, and water suppliers have found them: EWG's analysis of water suppliers' 1998-2003 tests of tap water quality reveals additional disinfection by-products — 17 unregulated chemicals altogether, in water consumed by 21.9 million Americans in 1,796 communities.

Recent federal clampdowns on levels of 9 regulated by-products (four chemicals known as trihalomethanes and five haloacetic acids) have spawned changes in water disinfection regimes at plants across the country, with many water systems switching from chlorine to alternate chemicals or mixtures of disinfectants and, as a result, generating novel, largely unstudied suites of disinfection by-products.

There is some irony in the fact that to reduce risk of infectious disease from microbes in tap water, water utilities must add chemicals that increase cancer risks, and that introduce risks to development and reproduction. Water disinfection is considered one of the great health triumphs of the 20th century, but 100 years after its inception the EPA and water suppliers are still in active study, negotiation and rulemaking to understand and reduce its health risks.

But potential risks from water treatment chemicals don't end with disinfection. Acrylamide, for instance, a probable human carcinogen, is added to water to aid in coagulation, or the clumping and removal of solids in the water. And water tanks and pipes in the distribution system — including pipes in the home — can add pollutants. Lead from pipes and lead-based solder can leach into water. And asphalt- or coal tar-lined storage tanks and pipes can leach chemicals

linked to cancer, called PAHs, into tap water supplies. Critical upgrades to pipes, tanks, and other aging treatment and distribution equipment is part of water utilities' urgent \$165 billion current need for infrastructure upgrades (EPA 2005e).

Policy Gaps Lead to Health Risks

Federal source water protection programs — failing. Scientists and policymakers have long known that pollution to drinking water sources can be reduced through two key means: preventing (or reducing) the release in the first place, or maintaining a buffer of protected lands around the water source that can, in essence, reduce or slow down the pollutant load. Neither has been done effectively.

Funding for federal initiatives on source water protection demonstrate a systematic failure on the part of legislators and policymakers to prioritize the critical measures needed to clean up and protect drinking water supplies. A recent review of federal funding programs conducted by the American Water Works Association and The Trust for Public Lands shows that taxpayer funds allocated to states and water utilities do not go toward pollution prevention and source water protection, but instead are used to fund projects that can range from sorely-needed pipe and equipment upgrades to projects that build new infrastructure and help subsidize sprawl (TPL and AWWA 2004).

This study found that in 2003 the government provided states with \$6 billion under the Clean Water Act State Revolving Fund; only 5 percent went toward mitigating the non-point source pollution like agricultural and urban runoff that accounts for 60 percent of the total contaminant load to rivers and streams. The remainder went to infrastructure improvements at wastewater treatment plants, many of which benefitted water quality but others of which subsidized expansions necessitated by growth and sprawl. In 2003 under the Clean Water Act Non-Point Source Program states received \$237.5 million; only 17 percent went toward controlling non-point source pollution. And in 2003 states received \$14 billion under the Drinking Water State Revolving Fund, but in the six-year history of the fund (as of 2003) just \$2.7 million had gone toward land protection, conserving just 2,000 acres altogether (TPL and AWWA 2004). While the merits of some competing projects could be argued, the skew in funding is so decidedly shifted away from pollution prevention and source water protection, that no one can argue the vital need for additional support for these programs that so directly improve and protect water quality.

Gaps in federal standard-setting process. Every year water suppliers are required by law to submit a report to their customers detailing tap water testing results. In nearly every case, utilities are able to tell customers that the water meets or exceeds every standard in federal law, a laudable accomplishment considering the quality of the raw (untreated) water in many cases. But because of significant gaps in the standard-setting process, "meeting federal standards" doesn't necessarily mean the water is perfectly safe to drink.

- Under the Safe Drinking Water Act, EPA sets standards not only based on health considerations, but also based on cost; the Agency is required to prove that the cost of removing a contaminant does not exceed the benefits. Because of this provision, EPA has set legal limits for 40 percent of regulated contaminants at levels higher than the Agency's own recommended health-based limits. In setting new limits for chemical disinfection by-products in tap water, EPA assumed that each life saved from pollution reductions (in this case, from bladder cancer) is worth an average of \$5.6 million, a price tag that was then balanced against the costs of treatment plant upgrades. The final standard was set based on the balance of this equation (FR 1998). The price assigned to a human life has changed several times over the Agency's history, and in the end dictates whether or not legal limits for contaminants in tap water are set at levels that protect human health.

- *EWG's analysis of tap water tests from 42 states shows that 195,257,000 people in communities have been served drinking water contaminated with one or more pollutants at levels above health-based limits, and in 4,950 communities four or more contaminants exceeded health-based limits between 1998 and 2003.*
- Under the Safe Drinking Water Act, EPA is allowed to set maximum legal limits for contaminants as if people are exposed to just one contaminant at a time. That's not the reality of human exposure — studies show instead that people carry hundreds of chemicals in their bodies at any given time. For example, recent investigation by EWG identified an average of 200 industrial chemicals, pesticides and pollutants in ten babies at the moment of birth. And a growing number of studies show that the risks add up when we're exposed to multiple chemicals that act in tandem to harm an organ or system in the body — and the total risk can be greater than the sum of the parts: some chemicals amplify the risks of companion chemicals.
 - *EWG's analysis of tap water tests from 42 states shows that 113 million people in 3,382 communities have been served drinking water found to be contaminated with at least 10 different pollutants on the same day.*
- Under the Safe Drinking Water Act, EPA is not required to set maximum legal limits for contaminants in tap water at levels that protect the health of children.
 - *EWG's analysis of tap water tests from 42 states shows that in 1,161 communities, concentrations of one or more pollutants exceeded EPA's recommended (not mandatory) limit for one-day exposures to protect a 22-pound child.*

The cost-benefit balancing act EPA must orchestrate when setting tap water quality standards stands, and the absence of specific requirements to protect children or consider composite risks, from multiple chemicals with similar target target organs and modes of action, stand in stark contrast to the Agency's mandate when it comes to pesticides in food. There, the Agency is specifically required to set standards that protect children, using an additional 10-fold safety factor and considering all routes of exposure and additive risks from exposures to multiple chemicals. Standards are set to protect health.

Recommendations

The cost of treating water is high and will only increase if current policies continue. According to the EPA, the nation's water utilities will need an estimated \$53 billion in investments for water treatment over the next 20 years, to meet safety standards for water polluted with the chemicals that EPA has failed to control upstream (EPA 2005e). This investment is not designed to vastly improve tap water quality — it's set to ensure that water suppliers can continue to meet current standards. And yet at current levels of contamination, the public doesn't trust the water: Americans will spend an estimated \$10 billion in 2005 on bottled water (IBWA 2005), in part because of the belief that water from the tap isn't safe enough to drink. So we pay for our water twice, once at the tap and once in a bottle. We have, in essence, created a system with an economic divide, where those who can, buy bottled, and those who can't, drink it from the tap. Tap water should be safe for everyone to drink.

In light of the findings of this study, which show that tap water in 42 states is contaminated with more than 140 unregulated chemicals that lack legal limits in drinking water supplies, we recommend the following:

EPA should maintain a national database of tap water quality testing. Without it, the Agency is hindered in its ability to make wise choices in the limiting testing it does require and the unregulated contaminants it does consider for regulation. The database compiled by EWG represents the most comprehensive database of tap water testing in existence. We recommend that EPA also construct and maintain a comprehensive, national database of tap water quality testing.

- EPA should study the health impacts of all water disinfection by-products, and require monitoring and toxicity testing sufficient to support a human health risk assessment for these compounds.
- EPA should set health-protective standards for chemicals that are currently unregulated, but present in tap water. EPA should greatly expand requirements for testing unregulated contaminants. EPA and Congress should provide support for utilities to get that testing done.
- Congress and EPA should support utilities and states in efforts to protect source waters. Source water protection programs should be significantly expanded, including efforts to prevent or reduce pollution to source waters, and efforts to conserve land in buffer zones around tap water supplies. Financial support for these efforts is crucial.
- We strongly urge that federal laws and policies be reformed to ensure that vulnerable populations, including pregnant women and children, are protected from chemicals. We urge that to the maximum extent possible, exposures to industrial chemicals in tap water during sensitive times in life, including in utero, be eliminated. The sooner society takes action, the sooner we can provide tap water that is safe for everyone.

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Additional Resources

National Tap Water Quality. The National Tap Water Testing database is available at

www.ewg.org/sites/tapwater/.

Unregulated contaminants. Tap water contaminants that have been found by water utilities and that lack enforceable health standards are shown at

www.ewg.org/sites/tapwater/national/unregcontams.php/.

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EWG is a nonprofit research organization based in Washington, D.C., that uses the power of information to protect human health and the environment. The group's work on water quality is available at www.ewg.org/issues/siteindex/issues.php?issueid=5006.