

Millions of Americans Are Ingesting a Chemical Some Experts Believe Has No Safe Exposure Level

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Aircraft parked on Wurtsmith Air Force Base, where levels of PFOS have been found in the groundwater at levels over 600,000 ppt. (Photo: Courtesy of Aaron Weed)

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Karen Deichelbohrer has lived in her home roughly three miles from Wurtsmith Air Force Base near the shores of Lake Huron, Michigan, for about 20 years. Her husband passed away two years ago. Her daughter moved out eight years before that. And Deichelbohrer, now 65, lives in the roomy four-bedroom house alone with her five cats and a dog.

Deichelbohrer's home now feels too big for her and her pets, and she would like to sell up and move to smaller surrounds. However, tests conducted on her private drinking water well showed that it has been contaminated with toxic Per- and Polyfluorinated Alkyl Substances (PFAS). These human-made chemicals are used ubiquitously in industry, including the manufacturing of nonstick cookware, textiles, paper and paints, as well as firefighting foams used for decades at military bases like Wurtsmith.

The tests on Deichelbohrer's well showed levels of PFAS contamination below a federal advisory around which there's much discrepancy between experts, some of whom say the threshold isn't nearly protective enough of people's health. Authorities have issued Deichelbohrer a filter for her kitchen tap water, but the water piped to the rest of her house is untreated, she said. And she's concerned that, unless her home is permanently connected with the cleaner municipal drinking water supply -- a costly procedure -- it will be difficult to sell.

The human health impacts associated with over-exposure to PFAS include cancer, developmental effects on fetuses during pregnancy, as well as liver, immune and thyroid problems.



What's more, Deichelbohrer, who said she suffers from diabetes and high blood pressure, wonders whether the contaminated water has affected her health, or that of her family. "I really don't know ... 20 years I've been drinking that water," she said, before pointing out one of the grim ironies of living in one of the wettest places in the nation. "I've got lots of water around me; I just can't drink any of it."

But Deichelbohrer's story is just the tip of the iceberg. PFAS contamination is not only a problem at Wurtsmith -- a [superfund site](#) around which more than half of the private wells tested contain PFAS to some degree, and where the extent of the pollution has yet to be fully delineated -- but nationally and internationally, where the environmental toll of PFAS contamination is only starting to be realized. This, despite the fact that some of the potential harmful health problems from human exposure to these chemicals have been known for decades, said attorney Robert Bilott, whose lawsuit against DuPont in the early 2000s was integral to lifting the lid on the issue.

"The first letter I recall sending out is a letter alerting the EPA [Environmental Protection Agency] and state regulatory agencies to the problem on March 6, 2001," Bilott said. "We're sitting here almost 17 years later, and it's still not properly regulated by the federal government, which is really rather remarkable."

The human [health impacts](#) associated with over-exposure to PFAS include cancer, developmental effects on fetuses during pregnancy and on breastfed infants, as well as liver, immune and thyroid problems. What's more, Bilott believes there is no safe exposure threshold.

"The concept that there is a safe level of any amount of these types of chemicals in the water is just not workable," he said. "It just doesn't fit into the current way people are trying to regulate and set limits for these chemicals."

Decades of Dangerous Exposure

Wurtsmith was decommissioned in 1993, and a cleanup of the former base has been ongoing ever since. PFASs were detected in "[measurable quantities](#)" in 2003, but it was only in recent years that authorities have actively responded to the threat of these contaminants. Levels

of perfluorooctanesulfonic acid (PFOS -- a member of the PFAS family) have been found in the groundwater at quantities of over 600,000 parts per trillion (ppt). To put that in perspective, the [EPA established](#) a recommended though nonbinding drinking water threshold of 70 ppt for two of the more commonly found PFASs: perfluorooctanoic acid (PFOA) and PFOS.

While only two of the 273 private drinking-water wells tested so far around Wurtsmith contained PFOA and PFOS above the EPA's advisory (one well containing levels as high as 3,396 ppt), more than half -- like Deichelbohrer's -- contain lower levels of these chemicals, and numerous experts believe that the federal threshold is far too lenient. The results of a [2012 study](#), for example, led researchers to suggest a PFAS drinking water threshold of no higher than 1 ppt.

[Authorities also admit](#) they don't know if the PFASs in the drinking-water wells will remain at low levels, or how long PFASs have been there. As a precaution, those affected have been told not to use their well water for drinking, cooking, making baby formula or food, or washing fruits and vegetables.

New cases of PFAS contamination are being discovered "almost daily" across the country.

Fears of PFAS exposure at Wurtsmith stretch beyond those living in close proximity to the base, and extend to former servicemembers based there in the past -- some of whom remember the liberal way in which the PFAS-laced firefighting foam was used and disposed of.

"Twice when I was at Wurtsmith, there were accidental discharges in hangars, and I happened to be in the hangar both times it happened," said James Bussey, a former senior airman who was stationed at Wurtsmith from 1989 to 1992. "When that stuff sprays in the hanger, it's about 20 to 30 feet deep."

Bussey spent five and a half years of active service in the Air Force, which included a stint in Saudi Arabia, where he was exposed to toxic open burn pits, he said. Now, Bussey suffers from a series of medical problems, including neuropathy in his legs and hands, liver damage, sterility and psoriasis -- conditions that he said started to appear roughly five years ago.



"I consider my illnesses mild compared to what other people in my group have," said Bussey, referring to an [online group](#) of hundreds of former service-members and civilians who were based at, or live near, contaminated military bases. Many in the group are associated with Wurtsmith, and suffer similar debilitating health issues. Last year, Bussey co-authored a letter to Veterans Affairs Secretary David Shulkin, asking that a group of service members from Wurtsmith be tested for PFAS contamination. As a result, Bussey has been invited to the War Related Illness and Injury Study Center in New Jersey for specialized testing, but he's the only Wurtsmith veteran who has been, he said.

"I'm highly pissed," Bussey said. "I've asked them a few times to at least pull a small control group in to be tested -- at least four to five people. But I'm the only one they've tested."

PFAS chemicals have also contaminated other waterbodies surrounding Wurtsmith. In 2012, the Michigan Department of Health and Human Services issued a "do not eat" advisory for fish caught in nearby Clark's Marsh, where fish contain PFOS levels as high as 9,580,000 ppt, and for parts of the Au Sable River, which flows to the south of Wurtsmith into Lake Huron. [A report from last year](#) confirmed that fish swimming in these waterbodies -- as well as nearby Allen Lake -- contained concentrations of PFOS that could "harm people's health" if they were eaten.

"A lot of people here are worried," said Aaron Weed, supervisor for the adjacent town of Oscoda. The lakes, marshes and the river are tourist attractions integral to the area's economy, he said, while some residents rely on locally caught fish as a staple in their diet. "Some real estate deals have even been stopped because of the contamination," said Weed.

The city draws its drinking water from Lake Huron, toward which groundwater contamination is migrating. Levels of total PFAS were recently detected in the municipal drinking water as high as 26 ppt, though individual PFAS chemicals have been found at relatively low amounts. [Authorities](#) still consider the water safe to drink, but the ongoing argument over safe exposure levels lead some local residents to question that determination.

Nor is this the first time Wurtsmith has come under intense federal scrutiny. In 2001, the Agency for Toxic Substances and Disease Registry (ATSDR) investigated the human health risks of exposure to trichloroethylene (TCE) contamination in several on- and off-base water supply wells. Because of recent developments, the agency has reopened the study, but is only looking at the possible health impacts of exposure to TCE, not PFASs. According to a Michigan Department of Health and Human Services spokesperson, that's because the "ATSDR feels the information we now have on PFAS in groundwater is not scientifically adequate in order to estimate exposure when the base was active."

"Tens of Millions of Americans" Drinking PFAS-Contaminated Water

PFAS contaminants pose a problem that stretches far beyond the geographical borders of Wurtsmith, however. A growing number of PFAS hotspots are emerging at military and industrial sites across the US and abroad.

In an attempt to better understand the breadth of the problem, Northeastern University has collaborated with the Environmental Working Group (EWG) to create an [interactive map](#) identifying areas where PFAS contamination is apparent. The map uses federal data, as well as info from other publicly documented sites. It's complete as of last summer, researchers told Truthout, and will be updated later this month. Meanwhile, new cases are being discovered "almost daily" across the country, said Phil Brown, director of the Social Science Environmental Health Research Institute at Northeastern University. "It's a testament to just how astonishingly big this problem is," he said.

The regulations that currently exist encompass only a handful of individual PFAS chemicals, when it's estimated that there are more than 3,000 variations under the PFAS family.

The [Department of Defense \(DoD\)](#) has identified 664 [fire- or crash-training sites](#) where PFAS-laced firefighting foam was used. As of the end of August last year, the military has sampled more than 2,600 groundwater wells for PFOS/PFOA contamination on



90 installations. Of these, 1,621 contained levels of these chemicals exceeding the EPA lifetime health advisory, DoD spokesperson Adam Stump wrote in an email to Truthout. According to Stump, as of the end of 2016, the DoD had spent \$198.7 million addressing PFOS/PFOA releases, and he added that "we are not aware of the number of installations still to be tested." Similar question marks hang over the nation's drinking water supplies.

From 2013 to 2016, all US public water systems serving 10,000 or more customers were ordered by the EPA to test their water supplies for PFOA and PFOS above certain thresholds. These tests reported elevated levels of these chemicals in 162 systems serving 15.1 million Americans, [EWG](#) found. But according to EWG senior scientist David Andrews, the tests excluded roughly one-third of the nation. He wrote in an email to Truthout that "it would not be surprising" to find out that "10's of millions of Americans" were drinking water containing levels of these chemicals above the much stricter 1 ppt threshold recommended by some researchers.

Then comes the problem of regulating PFASs. Alongside the EPA's unenforceable threshold of 70 ppt, some states have proposed or have already enacted their own drinking water thresholds which, in some cases, are stricter than federal guidelines. For example, last November, the state of [New Jersey announced](#) that it would set a drinking water standard of 14 parts per trillion for PFOA, and 13 parts per trillion for perfluorononanoic acid (PFNA). [Minnesota](#) has enacted thresholds of 35 parts per trillion for PFOA and 27 parts per trillion for PFOS.

But the regulations that currently exist encompass only a handful of individual PFAS chemicals, when it's estimated that there are more than 3,000 variations under the PFAS family. What are the potential health risks of human exposure to so many different but related chemicals?

Most of the health studies conducted into PFASs have been done on laboratory animals, where they've been shown to cause issues like reproductive and developmental problems, liver and kidney damage, and immunological effects. Both PFOA and PFOA have caused tumors in animal studies. [But the EPA also acknowledges](#) that human epidemiology studies

show links with low infant birth weights, effects on the immune system, cancer (in the case of PFOA), and thyroid hormone disruption.

Long-chain PFASs like PFOA and PFOS that contain a backbone of eight or more carbon atoms have been phased out in the US, replaced by shorter-chain compounds with six or fewer carbon atoms. These substitutes are believed to be less toxic. But Philippe Grandjean, an environmental epidemiologist at the Harvard T.H. Chan School of Public Health and co-author of the aforementioned [2012 study](#), sounds a warning about certain short-chain PFASs.

"They appear to be leaving the body more quickly," he said, noting that long-chain PFASs like PFOA can remain in the blood for years, if not decades. Some short-chain PFASs, on the other hand, rapidly disappear from the blood but aren't evenly distributed around the body, and tend to concentrate in organs like the liver, kidneys and lungs, possibly for years, he said. It would be "wrong to assume these slightly modified structures don't have similar toxic potentials," he added.

What's more, while some long-chain PFAS compounds are relatively easy to remove from water with activated carbon filtration systems, their short-chain cousins behave differently, requiring the filters to be changed more frequently -- an expensive process for compounds that are "just as persistent in the environment as long-chain compounds," Tom Bruton, science and policy fellow with the Green Science Policy Institute, told Truthout.

The Future of PFAS Regulation

There has been recent movement at the federal level around this issue: The latest [defense spending bill](#) authorizes a \$7 million, five-year human health study into the impact of PFAS exposure at levels above and below health advisory levels.

The national health study is a good next step, "but as we know, the government moves very slowly," said Andrea Amico, co-founder of community action group [Testing for Pease](#). Amico lives close to the former Pease Air Force Base, New Hampshire, which is now a bustling industrial park. In 2014, a drinking-water well supplying businesses in the park was shut down after elevated levels of PFASs were found in the water. Two further drinking water supply wells



were found to be contaminated with PFASs, though below the federal advisory level.

In 2015, the New Hampshire health department tested for three perfluorochemicals -- PFOS, PFOA and PFHxS -- in the blood of over 1,500 people who drank the contaminated water at the former base. [The study found](#) that mean levels of all three chemicals were higher than the national average in both children up to the age of 11, and adolescents and adults 12 and older. Amico's husband, who worked at the industrial park, and her two children, who both attended a day care there, were blood-tested. All three were found to have PFAS levels in their blood higher than the national average. And while Amico's husband and children, now seven and four, don't currently suffer any major health issues, Amico said that she's concerned about the potential long-term ramifications of these chemicals on her loved ones.

"It's something that I worry about, especially with my seven-year-old," she said. "She was exposed at such an early age in her life, when her body was critically developing. And so, I ask myself: 'How is this going to affect her as an adult?'"

In other states, recent developments promise to maintain a bright spotlight on the issue. A long gestating [Minnesota state lawsuit](#) against 3M, one of the nation's leading manufacturers of PFASs, is scheduled to go to court early this year, for example. The suit seeks to recover [\\$5 billion](#) in environmental and health damages. And a [recent state executive order](#) created a multi-agency response team to tackle PFAS contamination in Michigan, where Wurtsmith is only one of many such contaminated sites.

However, according to Robert Bilott, the problem could be swiftly eliminated if the EPA regulated all PFASs in their entirety. "You can't be regulating these things one at a time," Bilott said. "You should be addressing these as a class."

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