

Warning: Biodegradable Bowls Contain Toxic Chemicals

Analysis by [Dr. Joseph Mercola](#)

✓ Fact Checked

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STORY AT-A-GLANCE

- › Per- and polyfluoroalkyl substances (PFAS), widely used chemicals that make products water-, oil-, grease- and stain-resistant, are associated with significant health hazards
- › PFAS chemicals take thousands of years to degrade, which is why many refer to them as “forever chemicals.” Disturbingly, these toxic chemicals have become ubiquitous in our environment
- › One source of environmental contamination is PFAS-treated food wrappers and containers. Testing reveals all so-called “biodegradable” food containers contain PFAS, making them unsuitable for composting
- › Using toxic nondegradable chemicals in a biodegradable product is a tremendous oversight that has led to a PR nightmare
- › Research confirms that compost in which food packaging was included had a toxic load ranging from 28.7 micrograms per kilo to 75.9 mcg/kg. Compost samples that did not include food packaging had a PFOA contamination level ranging between 2.38 and 7.6 mcg/kg

Per- and polyfluoroalkyl substances^{1,2} (PFAS) are widely used chemicals that make products water-, oil-, grease- and stain-resistant. Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) are associated with a wide array of health problems — even at very low exposure levels — including:

Immune dysfunction³

Low birth weight⁴

Thyroid dysfunction ⁵	High cholesterol ⁶
Ulcerative colitis ⁷	Pregnancy-induced hypertension ⁸
Testicular cancer ⁹	Kidney cancer ¹⁰

In May 2015, 200 scientists from 38 countries signed the so-called Madrid Statement on PFASs,^{11,12} which warns about the harms of all PFAS chemicals, both old and new. According to the Madrid Statement, health effects associated with the older, long-chain PFAS's such as PFOA, include:¹³

Liver toxicity	Disruption of lipid metabolism, and the immune- and endocrine systems
Adverse neurobehavioral effects	Neonatal toxicity and death
Tumors in multiple organ systems	Testicular and kidney cancers
Liver malfunction	Hypothyroidism
High cholesterol	Ulcerative colitis
Reduced birth weight and size	Obesity
Decreased immune response to vaccines	Reduced hormone levels and delayed puberty

PFAS Are 'Everywhere'

PFAS chemicals take thousands of years to degrade, which is why many refer to them as "forever chemicals." Disturbingly, these toxic chemicals have become ubiquitous in our environment, including groundwater.^{14,15}

PFAS are also found in the U.S. food supply – and at levels far exceeding the advisory limit for PFOA and PFAS in drinking water (there's currently no limits in food).

Of the 91 foods tested by the U.S. Food and Drug Administration in 2017 as part of its Total Diet Study¹⁶ (presented¹⁷ at the 2019 meeting of the Society of Environmental Toxicology and Chemistry), 10 were found to contain PFAS.^{18,19,20,21} How do they get there?

Food Wrappers – A Significant Source of PFAS

Industrial production is just one route by which PFAS enter our environment and food supply. Another is through everyday waste, such as fast food wrappers and containers that end up in landfills, from where they continue to contaminate soil and water.

Disturbingly, findings reveal that even so-called "biodegradable" food containers contain these "forever chemicals," which may create an even greater problem.

Thinking the containers are biodegradable and safe, people will place them in their compost, creating a vicious circle where the chemicals contaminate and ruin the compost, which is then mixed into the soil, where they contaminate the food grown in it. Ultimately, the chemicals end up on your plate again, now inside the food.

Research²² by the U.S. Centers for Disease Control and Prevention published in 2007 found PFAS chemicals in the blood of more than 98% of Americans tested. Considering their current prevalence in our food supply, it seems reasonable to assume everyone is exposed to some degree, and that blood levels have likely increased in the years since the CDC's testing.

Biodegradable Bowls Contain PFAS

Concerns over mounting plastic waste pushed fast food companies to invest in safer wrappers and containers, but recent findings reveal a truly remarkable lack of

understanding on behalf of some manufacturers. Writing for New Food Economy, Joe Fassler reports the disappointing news:²³

"The biggest culinary star of the past five years isn't a chef, or a restaurant group, or the author of a cookbook. It's a bowl, a humble piece of take-out packaging that's taken the world of commercial foodservice by storm, rising so quickly that few have noted its troubling secret ...

If molded fiber bowls have become a kind of status symbol in the restaurant world ... it's probably because they've been positioned as an antidote to the industry's alarming take-out waste problem.

Many varieties are explicitly pitched to food-service buyers as compostable, certified by third-party assessors like the Biodegradable Products Institute (BPI). Unlike styrofoam clamshells or wax-lined soup cups, fiber products feel like they'd turn into mush on a leaf pile ...

But these products ... are instead contributing to a growing environmental crisis. According to experts consulted for this story, all molded fiber bowls contain PFAS ...

This means that the bowls used at restaurants like Chipotle and Sweetgreen aren't truly compostable, as has been claimed. Instead, they are likely making compost more toxic, adding to the chemical load of the very soil and water they were supposed to help improve."

All Compostable Bowls Found to Contain PFAS

For its report, New Food Economy tested 18 biodegradable fiber bowls from eight restaurants at 14 locations in New York City, including Chipotle, Sweetgreen and Dig — three restaurants that claim to compost its waste.

All were found to contain high levels of fluorine,²⁴ which is indicative of PFAS being used. The inside (food contact side) of the bowls averaged 1,599 parts per million (ppm)

of fluorine, a level far higher than what you'd find in an accidentally contaminated sample.

Now, the test used only measures total fluorine, not individual PFAS chemicals, and the total level of any given PFAS is likely to be higher than the total fluorine level. Fassler explains:²⁵

"... [A] bowl containing 1,670 ppm fluorine will contain more total PFAS, since every molecule of the chemical compound contains multiple atoms – not just of fluorine, but of carbon, and other elements.

Though it's impossible to say for sure due to the wide variety of PFAS chemicals ... according to a rough calculation, a bowl with 1,670 ppm fluorine would likely contain about 2,000 ppm total PFAS.

Put another way: A bowl with 2,000 ppm total PFAS might be mostly made from sugarcane fiber, but 0.2 percent of its total material would be made from fluorinated chemicals ...

That might not sound like very much. But due to the unique properties of fluorinated chemicals, it turns out to be a significant number, and an alarming one. The Centers for Disease Control and Prevention (CDC) maintain that drinking water can only contain infinitesimal amounts of fluorinated chemicals before health concerns arise."

Do Not Compost 'Biodegradable' Bowls

Research^{26,27} published in 2017 found fluorine in 46% of the fast food wrappers and takeout containers tested, and studies^{28,29,30} have confirmed fluorinated chemicals can migrate from the packaging into the food.

If it's true that 100% of so-called "biodegradable" fiber bowls contain PFAS, then they would actually be a far more hazardous choice than other "standard" wrappers and containers – at least as far as PFAS exposure is concerned. As noted by Fassler, it is the

surface treatment with PFAS that prevents the fiber bowls from falling apart when filled with hot, wet or greasy food.

Using toxic nondegradable chemicals in a biodegradable product is a tremendous oversight. Clearly, restaurants should not advertise these containers as compostable, yet many do just that. It's not surprising then that the revelation has become a PR nightmare. As noted by Fassler:³¹

"... [A]ny product that contains PFAS can't really be compostable, let alone biodegradable, despite restaurants' claims to the contrary. Though fiber products have benefits from a greenhouse gas emissions standpoint, the bowls we tested are likely making soil and water quality worse."

Indeed, recent research confirms this warning. Tipped off about the presence of PFAS in compostable containers, the authors of a 2019 paper^{32,33} decided to assess the presence of these chemicals in municipal compost. In all, samples from nine commercial compost stations and one backyard compost pile were tested for 17 different PFAS.

Confirming suspicions, compost in which food packaging was included had a toxic load ranging from 28.7 micrograms per kilo to 75.9 mcg/kg. Compost samples that did not include food packaging, on the other hand, had a contamination level ranging between just 2.38 and 7.6 mcg/kg.

While it's disturbing that all compost samples contained PFOA and PFOS – the older, long-chained PFAS that are no longer in use – compost with food packaging was clearly more heavily contaminated with a variety of PFAS. If there's any good news here, it's that some states are starting to take action against PFAS.

As noted by Fassler,³⁴ San Francisco is banning bowls manufactured with PFAS as of January 1, 2020, and Washington's Healthy Food Packaging Act³⁵ – enacted in 2018 – bans all PFAS in paper food packaging, effective 2022.³⁶ A drawback of the Act is that the ban will not take effect until or unless a safer alternative is commercially available.

Sewage Sludge – A Major Source of PFAS on Farms

As reported by The Intercept³⁷ in June 2019, sewage sludge appears to be a major source of PFAS. Documents³⁸ obtained by The Intercept reveal 44 samples of sewage sludge tested by the Maine Department of Environmental Protection all contained at least one PFAS chemical, and "In all but two of the samples, the chemicals exceeded safety thresholds for sludge that Maine set early last year."

Maine's tolerance levels for PFAS are set at 2.5 parts per billion (ppb) for PFOA, 5.2 ppb for PFOS, and 1,900 ppb for PFBS. Mike Belliveau, executive director of the Environmental Health Strategy Center in Portland, told The Intercept these levels are "probably about 10 times weaker than they should be," adding that "Even low parts-per-billion levels of PFAS in sludge can threaten the health of the food supply."

You can learn more about the hazards of sewage sludge in the featured documentary, "Biosludged,"³⁹ and the scientific fraud perpetrated by the U.S. Environmental Protection Agency that legalizes the pollution of agricultural soils through the usage of contaminated industrial and human waste as fertilizer.

DuPont Shirks Cleanup Duty

In related news, DuPont, a longtime maker of PFAS chemicals stands accused of creating a fraudulent spinoff, Chemours, in an effort to shirk environmental liabilities caused by its chemical manufacturing. (Chemours is the name of the spinoff company created through DuPont's merger with Dow Chemical Inc. in 2015.⁴⁰) Chemours lawyers told Bloomberg:⁴¹

"The separation agreement was the product of a one-sided process that lacked any of the hallmarks of arm's-length bargaining. DuPont unilaterally dictated the terms of the separation agreement and imposed them on Chemours."

One of DuPont's environmental liabilities is the cleanup of Pompton Lakes in New Jersey. As reported by NorthJersey.com July 15, 2019:⁴²

"The new claims by the state attorney general's office were quietly added as amendments to a lawsuit filed against DuPont and Chemours seeking financial

damages for widespread pollution in Pompton Lakes.

This includes a neighborhood where residents have had to endure cancer-causing solvents that migrated for decades beneath their homes from a now-shuttered DuPont explosives factory.

Like dozens of sites across the U.S., the cleanup in Pompton Lakes had long been DuPont's responsibility. That changed in July 2015, when DuPont created Chemours as a spinoff company that took over the bulk of the DuPont's environmental liabilities.

But two separate lawsuits against DuPont – one by New Jersey officials and another by Chemours itself – allege what many in Pompton Lakes feared at the time of the spinoff:

DuPont created Chemours to insulate itself from future cleanup and natural resource damage claims, and left Chemours vulnerable to financial problems that could put cleanup efforts at risk in New Jersey and across the country."

Indeed, Chemours' lawsuit against DuPont claims DuPont set up the company to fail from the start, allowing DuPont to simply walk away from all of its cleanup responsibilities.

Chemours is now asking the court to deny DuPont's request for unlimited indemnity for its environmental liabilities.⁴³ (Chemours, meanwhile, claims it has now stopped making three PFAS products used in the making of grease-resistant packaging.⁴⁴)

North Jersey reports that, according to Chemours, the company received only 19% of DuPont's business lines at the company's inception, while taking on two-thirds of the environmental liabilities and 90% of all pending litigation against DuPont.

In all, Chemours liabilities exceeded earnings by 5.5-to-1 right from the get-go, yet its management team was not fully informed about the company's financial situation. Chemours also claims DuPont systematically underestimated the legal and environmental cleanup costs.

"For instance, DuPont estimated that three lawsuits against it over contamination from the toxic chemical PFOA would cost no more than \$128 million. They were settled by Chemours for \$671 million less than two years later;" North Jersey reports.⁴⁵

Lawmakers Promise to Pursue Corporate Accountability

As attention on PFAS pollution increases, PFAS manufacturers such as DuPont and 3M are ramping up lobbying efforts to prevent tighter regulations. Several recent hearings^{46,47,48} have been held on PFAS, however, and Democratic lawmakers have promised to "continue pursuing corporate accountability," Think Progress reports.⁴⁹ As noted by the Union of Concerned Scientists in a May 15, 2019, press release:⁵⁰

"Today, the Energy and Commerce Committee of the U.S. House of Representatives held a hearing on perfluoroalkyl and polyfluoroalkyl substances (PFAS), a widely-used family of chemicals that contaminate the drinking water of millions of Americans.

Representatives also introduced a number of bills to manage the threat of PFAS pollution, including legislation that would require the U.S. Environmental Protection Agency to designate PFAS as hazardous chemicals, as well as bills to expand water testing, improve water infrastructure, assist communities facing PFAS contamination issues and limit the use of these chemicals in the future. This effort to tackle a common and dangerous class of pollutant is long overdue ..."

Certain states are also taking matters into their own hands. Michigan, for example, where PFAS is a common water contaminant, says it's planning to start regulating certain PFAS to protect residents rather than waiting for the EPA to take action.⁵¹

The New Jersey Department of Environmental Protection also has its sights on corporate accountability. Commissioner Catherine McCabe told Think Progress,⁵² "New Jersey believes that the manufacturers ... should be held responsible to the public for

the costs and damages of the drinking water contamination and other harmful consequences of their actions and negligence."

How to Avoid PFAS Chemicals

The Madrid Statement recommends avoiding any and all products manufactured using PFASs, noting they include products that are stain-resistant, waterproof or nonstick. Helpful tips can also be found in the EWG's "Guide to Avoiding PFCS."⁵³ Other suggestions that will help you avoid these dangerous chemicals include avoiding:

Items that have been pretreated with stain repellants, and opt out of such treatments when buying new furniture and carpets

Water- and/or stain-repellant clothing — One tipoff is when an item made with artificial fibers is described as "breathable." These are typically treated with polytetrafluoroethylene, a synthetic fluoropolymer

Items treated with flame retardant chemicals⁵⁴ — This includes a wide variety of baby items, padded furniture, mattresses and pillows. Instead, opt for naturally less flammable materials such as leather, wool and cotton

Fast food and carry out foods — The wrappers are typically treated with PFCs

Microwave popcorn — PFCs may not only present in the inner coating of the bag, it also may migrate to the oil from the packaging during heating. Instead, use "old-fashioned" stovetop popcorn

Nonstick cookware and other treated kitchen utensils — Healthier options include ceramic and enameled cast iron cookware, both of which are durable, easy to clean and completely inert, which means they won't release any harmful chemicals into your home.

A newer type of nonstick cookware called Duralon uses a nonfluoridated nylon polymer for its nonstick coating. While this appears to be safe, your safest bet is still ceramic and enameled cast iron.

While some recommend using aluminum, stainless steel and copper cookware, I don't for the following reasons: Aluminum is a strongly suspected causal factor in Alzheimer's disease, and stainless steel has alloys containing nickel, chromium, molybdenum and carbon.

For those with nickel allergies, this may be a particularly important consideration. Copper cookware is also not recommended because most copper pans come lined with other metals, creating the same concerns noted above. (Copper cookware must be lined due to the possibility of copper poisoning)

Oral-B Glide floss and any other personal care products containing PTFE or "fluoro" or "perfluoro" ingredients – The EWG has an excellent database called Skin Deep⁵⁵ you can peruse to find healthier options

Unfiltered tap water – Unfortunately, your choices are limited when it comes to avoiding PFASs in drinking water. Either you must filter your water or obtain water from a clean source. Both solutions can be problematic and/or costly.

While many opt for bottled water, it's important to realize that PFASs are not regulated in bottled water, so there's absolutely no guarantee that it'll be free of these or other chemicals. Bottled water also increases your risk of exposure to hazardous plastic chemicals such as bisphenol-A, which has its own set of health risks.

Most common water filters available in supermarkets will not remove PFASs. You really need a high-quality carbon filtration system. The New Jersey Drinking Water Quality Institute recommends using granulated activated carbon "or an equally efficient technology" to remove PFC chemicals such as PFOA and PFOS from your drinking water.⁵⁶ Activated carbon has been shown to remove about 90% of these chemicals

Sources and References

- ¹ [EPA.gov PFAS](#)
- ² [The Guardian May 23, 2019](#)
- ^{3, 4, 5} [EPA.gov Health effects from PFAS](#)
- ^{6, 7, 8, 9, 10} [C8 Science Panel Research Studies](#)
- ^{11, 13} [Environmental Health Perspectives 123:A107–A111, Madrid Statement](#)
- ¹² [Newser May 1, 2015](#)
- ¹⁴ [EPA.gov, Health Advisory PFOA and PFOS](#)
- ¹⁵ [The Intercept, The Teflon Toxin Series](#)
- ¹⁶ [FDA.gov Total diet study](#)
- ¹⁷ [EWG.org Images of FDA presentation](#)
- ¹⁸ [CNN Health June 3, 2019](#)
- ¹⁹ [The Guardian June 3, 2019](#)
- ²⁰ [Chicago Tribune June 3, 2019](#)
- ²¹ [Business Insider June 4, 2019](#)
- ²² [Environmental Health Perspectives 2007 Nov; 115\(11\): 1596–1602](#)
- ^{23, 25, 31, 34} [The New Food Economy, The bowls at Chipotle and Sweetgreen ... contain cancer-linked “forever chemicals”](#)
- ²⁴ [Infogram.com Fluorine Testing Results](#)
- ²⁶ [Environmental Science and Technology Letters February 1, 2017](#)
- ²⁷ [Environmentalhealthnews.org February 1, 2017](#)
- ²⁸ [Food Additives and Contaminants 2008; 25\(3\); 384](#)
- ²⁹ [Food Additives and Contaminants 2005 Oct;22\(10\):1023-31](#)
- ³⁰ [Journal of Agricultural and Food Chemistry 2007; 55\(8\): 3203-3210](#)
- ³² [Environ. Sci. Technol. Lett. 2019; 6\(6\): 372-377](#)
- ³³ [Popular Science May 30, 2019](#)
- ³⁵ [Toxic-Free Food Packaging ESHB 2658](#)
- ³⁶ [Department of Ecology, State of Washington, Alternatives to PFAS in Food Packaging \(PDF\)](#)
- ³⁷ [The Intercept June 7, 2019](#)
- ³⁸ [Documentcloud.org, PFAS Summary of Sludge Data 053019 \(PDF\)](#)
- ³⁹ [YouTube. Biosludged. December 10, 2018](#)
- ^{40, 41, 43} [Bloomberg July 1, 2019](#)
- ^{42, 45} [Northjersey.com July 15, 2019](#)
- ⁴⁴ [Politico August 9, 2019](#)
- ⁴⁶ [House Committee on Energy & Commerce, May 15, 2019](#)
- ⁴⁷ [Committee on Oversight and Reform, Subcommittee on Environment March 6, 2019](#)
- ⁴⁸ [Senate Committee on Environment and Public Works May 22, 2019](#)
- ^{49, 51, 52} [Think Progress July 25, 2019](#)
- ⁵⁰ [UCSUSA.org May 15, 2019](#)

- ⁵³ EWG's Guide to Avoiding PFCS (PDF)
- ⁵⁴ Green Science Policy, Flame Retardants
- ⁵⁵ EWG Skin Deep Cosmetics Database
- ⁵⁶ New Jersey Drinking Water Quality Institute, Recommendation on Perfluorinated Compound Treatment Options for Drinking Water, June 2015 (PDF)