



PFAS – toxic “forever chemicals”

PFAS is a serious environmental concern

Environmentalists have become increasingly concerned about a class of chemicals called perfluoroalkyl and polyfluoroalkyl substances, often abbreviated to PFAS. There are thousands of compounds, estimated over 5000, in the PFAS class. Individual substances have the names PFOA, PFOS, GenX, PFBS, plus there are many other names and substances.

PFAS persists in the environment and does not break down. These substances are difficult to dispose of. That is why they are called “forever chemicals”.

What’s more, they can be found in human body tissue where they accumulate and are released from the body very slowly. Exposure to PFAS has been linked to kidney and testicular cancers, immune system issues, fertility problems, risks to fetuses, low infant birth weights, low growth rates in children, learning concerns, and increased cholesterol levels. Additionally PFOS has been linked to thyroid hormone disruption.



The chemicals have been found in Iowa’s groundwater and surface water. Studies are underway to determine the extent of the contamination in Iowa, in surface waters, in groundwater, and in drinking water.

Regulatory Framework

In June, 2022, the United States Environmental Protection Agency (EPA) updated its guidance for two PFAS chemicals – PFOA and PFOS. PFOA was set at .004 parts per trillion while PFOS was set at .02 parts per trillion.¹ The health advisory is the level of a chemical that can be in drinking water which is not expected cause adverse health effects. Previously the guidance stated the drinking water level for PFAS should not exceed 70 parts per trillion. These are considered voluntary guidelines.

Further, EPA issued final health advisories for two additional PFAS chemicals – GenX which was set at 10 parts per trillion and PFBS which was set at 2,000 parts per trillion.²

EPA has begun a process to set enforceable standards, a maximum contaminate level, for drinking water. In March of 2023, the Environmental Protection Agency released proposed primary drinking water regulations setting a Maximum Contaminant Level of 4 parts per trillion for PFOA and 4 parts per trillion

¹ Pre-publication Notice, “Lifetime Drinking Water Health Advisories for Four Perfluoroalkyl Substances (PFAS)”, Environmental Protection Agency, FRL 9855-01-OW, June 14, 2022

² Pre-publication Notice, “Lifetime Drinking Water Health Advisories for Four Perfluoroalkyl Substances (PFAS)”, Environmental Protection Agency, FRL 9855-01-OW, June 14, 2022

for PFOS. The regulation includes 4 additional chemicals – GenX, PFBS, PFNA, and PFHxS in calculating the overall levels of contamination in the drinking water.³

If drinking water is contaminated with PFAS, there are several options that are recommended by EPA:⁴

- Closing contaminated wells
- Public water departments can blend water from several sources to reduce the amount of PFAS in finished drinking water
- Public water departments can treat the source water with activated carbon or high pressure membrane systems such as reverse osmosis
- It may also be necessary to provide bottled water to residents
- There are some home-installed drinking water systems that removed PFAS from drinking water⁵

Uses of PFAS compounds

PFAS chemicals are resistant to water, oil, grease, and heat. These chemicals have been used as fire retardants, in non-stick cookware (such as Teflon), on stain-resistant clothing (such as Goretex) and fabrics (including Scotchgard-protected fabrics), carpets (such as Stainmaster), umbrellas, tents, in food packaging, in cleaning products, in polishes and waxes, in paint, in insulation for wiring, and in fire-suppressing foams. The fire-suppressing foams have been used at military installations, fire training centers, airports, and some manufacturing facilities. Airports have used de-icers that contained PFAS. Some industries, such as chrome plating, electronics manufacturing, and oil recovery, use PFAS compounds.

A 2021 study lead by Heather D. Whitehead found that PFAS chemicals were widely used in cosmetics sold in the United States and Canada.⁶ Of the 231 products tested, fluorine, an indicator of PFAS, was found in:

- 56% of foundations and eye products
- 48% of lip products
- 62% of long-lasting lipstick
- 47% mascaras
- 82% of waterproof mascara

The Environmental Protection Agency (EPA) reports that food can become contaminated if it is grown in soil or water contaminated with PFAS, if it comes into contact with PFAS during the manufacturing and handling process, and if it is packaged in materials containing PFAS. Some pizza boxes contain PFAS, as well as microwave popcorn bags, candy wrappers, and fast-food wrappers.

³ Iowa Department of Natural Resources, “EPA Releases Proposed National Drinking Water Regulation for PFOA and PFOS”, Water Supply News, March 20, 2023 and

Brittney J Miller, “EPA finally offers limits for ‘forever chemicals; in water”, *Cedar Rapids Gazette*, March 15, 2023

⁴ “Fact Sheet PFOA & PFOS Drinking Water Health Advisories”, Environmental Protection Agency, November, 2016

⁵ “PFAS and Private Wells”, Iowa Department of Natural Resources, available at www.iowadnr.gov/Environmental-Protection/PFAS

⁶ Heather D. Whitehead, Marta Venier, Yan Wu, Emi Eastman, Shannon Urbanik, Miriam L. Diamond, Anna Shalin, Heather Schwartz-Narbonne, Thomas A. Bruton, Arlene Blum, Zhanyun Wang, Megan Green, Meghanne Tighe, John T. Wilkinson, Sean McGuinness, and Graham F. Peaslee, “Fluorinated Compounds in North American Cosmetics”, *Environmental Science & Technology Letters Article ASAP*, American Chemistry Society, June 15, 2021, DOI: 10.1021/acs.estlett.1c00240;

“Study: Some cosmetics dangerous”, *Cedar Rapids Gazette*, June 16, 2021

Although PFAS manufacturing companies have agreed to phase out manufacturing of some of the compounds (PFOA and PFOS), the products are still produced internationally and can legally be imported into the United States.

National Guard Base near Sioux City finds toxic PFAS chemical contaminating groundwater⁷

Alarm bells rang in February, 2019, when the Air National Guard reported that PFAS, a toxic chemical that causes serious health problems in humans, had contaminated the groundwater near the base seven miles south of Sioux City. Although, the results were labeled as preliminary, the tests showed that the PFAS contamination had migrated off the National Guard base. Final results were published in March, 2019, confirming the initial announcement. The report indicated that the contamination most likely has moved off the guard base.

It was believed that the contamination came from firefighting foams (also called aqueous film-forming foam or AFFF) used at the base beginning in the late 1980's. The National Guard replaced its fire suppression systems that use the PFAS chemicals in 2016.

PFAS was found in soil, sediment, surface water, and ground water, with some tests showing levels that could impact human health. One spot near the main hangar tested at 8,610 parts per trillion. Six out of eight ground water tests and one of two surface water tests were above 70 parts per trillion. The Guard and the Iowa Department of Natural Resources (DNR) are continuing work and remedial investigations of the contamination.

Within a mile of the guard base, there are 189 private wells. The DNR requested that 12 private wells south and west of the base be tested for PFAS contamination; also the DNR also requested that the Southbridge collector well owned by the city of Sioux City be tested. Testing which was completed in 2019 found no detectable levels of PFAS or found low levels.

PFAS-contaminated groundwater found on Des Moines National Guard Base⁸

In 2019, groundwater testing at the National Guard base in Des Moines showed PFAS levels at 13,490 parts per trillion. Tests performed on the Guard base in Des Moines hinted that a plume of contamination may be moving off the base property. The Iowa Department of Natural Resources requested further testing. Des Moines Water Works performed additional sampling and testing of the public drinking water supply. The drinking water supply entering the treatment facility showed no contamination. They did find

⁷ Kate Payne, "Military Report Shows Groundwater Contamination At Sioux City National Guard Base", IPR News, *Iowa Public Radio*, February 19, 2019 ;

"185th ARW release statement on water contamination report", Siouxland News, *KMEG*, February 22, 2019;
Kate Payne, "Iowa Official Responds to Military Report Of Groundwater Contamination At Sioux City Base", IPR News, *Iowa Public Radio*, February 23, 2019;

"Guard official concerned about potential groundwater contamination near Sioux City base", *Radio Iowa*, February 25, 2019;

Kate Payne, "DNR Suspects Chemicals from Sioux City Base May be Contaminating Residents' Private Wells", IPR News, *Iowa Public Radio*, March 21, 2019

⁸ Kate Payne, "Iowa Officials Launch PFAS Working Group to Address Risks to Drinking Water", IPR News, *Iowa Public Radio*, March 22, 2019;

Kate Payne, "Des Moines Water Works Official Says More Testing Needed, After PFAS Found At Area Military Base", IPR News, *Iowa Public Radio*, July 19, 2019;

Perry Beeman, "Tap water in Des Moines area; Quad-Cities had traces of toxic 'forever chemicals'", *Iowa Capital Dispatch*, March 26, 2021;

Nicole Welle, "Des Moines Water Works Detects Toxic PFAS in Drinking Water", University of Iowa Center for Global and Regional Environmental Research, March 29, 2021, <https://iowaenvironmentalfocus.org/2021/03/29/des-moines-water-works-detects-toxic-pfas-in-drinking-water/>

stormwater runoff from the airport site was carrying PFAS into the alluvium where the Water Works was drawing water.

Late March, 2021, the Des Moines Water Works found PFOS, one of the PFAS chemicals, in its finished drinking water at the level of 6.5 parts per trillion. The Water Works is going to continue testing the water for PFAS chemicals.

PFAS found in well near Cedar Rapids airport⁹

On April 1, 2021, David Cwiertyny who is the director of the Center for Health Effects of Environmental Contamination of the University of Iowa reported that the Center had detected a well near the Cedar Rapids airport with high levels of PFAS. The family using the well was provided with reverse osmosis system which is expected to protect the drinking water.

Camanche municipal wells contaminated by PFAS linked to 3M plant in Cordova, Illinois

A large manufacturing plant operated by 3M in Cordova, Illinois, northeast of the Quad Cities, used PFAS in manufacturing adhesives and fire-fighting foam. Based on reporting and testing, the plant released PFAS into waterways entering the Mississippi River,¹⁰ emitted PFAS into the air, and applied PFAS-contaminated sludge to farm fields. The municipal water supply for the city of Camanche was contaminated by PFAS. As a result, 3M was required to replace two drinking water wells supplying the city.¹¹

As part of a settlement with the Environmental Protection Agency, 3M is testing private wells within 3 miles of the plant and public water systems that are 10 miles away, including Davenport, Iowa.¹²

United States Geological Survey studying surface waters

The United States Geological Survey collected surface water in 60 streams in Iowa in 2019 and 2020. PFAS was found in one-third of the streams. Most of them had small amounts. Researchers involved with the study reported that the streams with wastewater treatment plant discharges were more likely to contain PFAS. One stream, which is in an agricultural area, had an elevated level of PFAS (it was recorded at double the level of the old federal advisory guideline for drinking water which was 70 parts per trillion).¹³

Reporting by Tom Cullen of *The Storm Lake Times* indicated that the tests detected PFAS in locations that the Iowa Department of Natural Resources had not predicted. Cullen reported, “Dana Kolpin, a USGS research hydrologist who was the study’s main author, told *The Storm Lake Times* the results suggest ‘extensive contamination that’s much more prevalent than previously known.’ He suggests there might be a link between PFAS contamination and nonconventional agricultural practices like biosolid application and irrigation for livestock. The City of Storm Lake’s wastewater treatment plant generates 450 tons of biosolids, byproducts of human waste, each year and sells them to farmers, sometimes at no cost.”¹⁴

⁹ Perry Beeman, “Scientists find ‘forever chemicals; near CR airport, push for widespread testing”, *Iowa Capital Dispatch*, April 1, 2021

¹⁰ Sonya Lunder, “Who is Dumping PAS? Nobody Really Knows”, December 8, 2021, www.sierraclub.org/articles/2021/12/who-dumping-pfas-nobody-really-knows

¹¹ Jared Strong, “3M agrees to pay more than \$800K to fix Camanche PFAS”, *Iowa Capital Dispatch*, June 19, 2023

¹² Cloe Johnson, “3M to test, treat water supplies in Illinois, Iowa”, *Cedar Rapids Gazette*, November 8, 2022

¹³ Jared Strong, “New study finds ‘forever chemicals; in streams across Iowa”, *Iowa Capital Dispatch*, October 25, 2021. This article has a list of the streams where PFAS was detected.

¹⁴ Tom Cullen, “‘Forever’ chemicals widespread in Northwest Iowa”, *The Storm Lake Times*, October 29, 2021

Iowa Department of Natural Resources has been testing to determine how extensive the contamination is in Iowa in drinking water sources and finished drinking water

The Iowa Department of Natural Resources undertook studies to determine the extent of the contamination in Iowa's groundwater, surface water, and finished drinking water¹⁵ using an action plan for testing drinking water sources across the state.¹⁶ The testing began in October, 2021, focusing on 59 cities, 2 businesses, and 3 rural water systems.¹⁷ The DNR is tested all surface water supplies and systems that rely on shallow alluvial wells,¹⁸ testing raw water before it is treated and finished water (which is treated water) for 25 different PFAS compounds.¹⁹ As a result of the test results, a number of public drinking water supplies have special monitoring requirements for PFAS chemicals.

The DNR testing showed that PFAS chemicals had moved through porous bedrock, also called karst, and into a deep well used by the city of Osage. The well is 676 feet deep and showed PFOS at 4.8 parts per trillion. The Osage well sits on the site of a former fire station. Osage is replacing the well.²⁰

Recommendations

It is interesting to note that Dana Kolpin of the US Geological Survey and David Cwiertny, director of the Center for Health Effects of Environmental Contamination at the University of Iowa, have concerns about the testing being done through the Department of Natural Resources which was led by Roger Bruner. Kolpin and Cwiertny are suggesting that the testing should include agricultural streams and wastewater effluent. Bruner is pushing back by indicating that the concentrations were not meaningful in some of the streams, insinuated that the reason Kolpin and Cwiertny are advocating for expanded testing is so that they can obtain more research funding, and reasoned that there are not enough labs in Iowa and neighboring states to perform the expanded testing.²¹ Further, Cwiertny believes that the Department of Natural Resources should have determined the industries that used PFAS and then focused their testing on those areas where PFAS was widely used.²² So, this debate will probably continue. It implies that more testing is needed, more testing labs are needed, and the rural areas of the state need to be tested.

¹⁵ You can access the test results from the DNR web page www.iowadnr.gov/Environmental-Protection/PFAS by clicking on the box labeled "Iowa DNR PFAS Sampling Interactive Dashboard and Map".

¹⁶ "PFAS Action Plan", Iowa Department of Natural Resources, January 23, 2020;

"Collection of Public Drinking Water Samples for Per- and Poly Fluoroalkyl Substances (PFAS) Standard Operating Procedures", Iowa Department of Natural Resources, February 23, 2021;

"Water Supply Protocol for Per- and Poly Fluoroalkyl Substances (PFAS) Detection", Iowa Department of Natural Resources, May 17, 2021;

"DRAFT Iowa Department of Natural Resources Strategy for Ranking Public Water Supplies for Per and PolyfluoroAlkyl Substances Sampling", Iowa Department of Natural Resources;

"DRAFT PFAS Contaminated Sites Site Investigation Protocol", Iowa Department of Natural Resources;

See the DNR PFAS website at www.iowadnr.gov/Environmental-Protection/PFAS and www.iowadnr.gov/Environmental-Protection/Water-Quality/Drinking-Water-Compliance/Drinking-Water-Health-Advisories

¹⁷ For a list of the cities and rural water systems being tested, see Jared Strong, "Drinking water for 59+ cities to be tested for 'forever chemicals'", *Iowa Capital Dispatch*, October 21, 2021

¹⁸ Tom Cullen, "'Forever' chemicals widespread in Northwest Iowa", *The Storm Lake Times*, October 29, 2021

¹⁹ Kate Payne, "Iowa DNR is testing more than 50 public water systems for 'forever chemicals' but no plans for private wells", IPR News, *Iowa Public Radio*, March 22, 2021

²⁰ Jared Strong, "'Forever chemicals' found in deep wells in areas with porous bedrock", *Cedar Rapids Gazette*, July 17, 2023

²¹ Tom Cullen, "'Forever' chemicals widespread in Northwest Iowa", *The Storm Lake Times*, October 29, 2021

²² Kate Payne, "Iowa DNR is testing more than 50 public water systems for 'forever chemicals' but no plans for private wells", IPR News, *Iowa Public Radio*, March 22, 2021

However, it is obvious that PFAS has contaminated Iowa's groundwater, surface water, and finished water in some places. The levels are unknown in many of the waterbodies and, likewise, if there are levels that are injurious to public health are unknown.

In the meantime, the following policies should be supported:

- The Iowa Department of Natural Resources, the United States Geological Survey, and university researchers should undertake a PFAS testing program involving water, sediments, and fish tissue and concentrating on waterbodies near airports, places used for fire training exercises, and industries that have been large consumers of PFAS products.
- The Department of Natural Resources should build a registry of industrial locations where PFAS has been used. That registry should be used in prioritizing future testing for water contamination. The Department has determined that there may be 1100 industrial locations across the state where PFAS may have been used.²³
- The Department of Natural Resources should expand the testing of public water sources.
- Testing of water from private wells should include a test for PFAS, particularly if the wells are close to airports and fire training centers.
- Public water sources near airports, military bases, fire training exercise areas, and areas where PFAS foams have been used to extinguish fires should be regularly tested for PFAS contamination.
- Fire departments should eliminate the use of PFAS foams. Fire departments should replace their supply of fire-suppression chemicals with fluorine-free foams (those not containing PFAS compounds). PFAS-based foams should not be used in training exercises.
- Sewage sludge (biosolids) should be tested for PFAS chemicals. Any sewage sludge testing positive for PFAS should not be applied to land. The state of Michigan prohibits farms from applying biosolids with more than 150 parts per billion of PFOS although environmentalists are calling on a ban of all fertilizers testing positive for PFAS.²⁴ Michigan officials found cuts of beef with elevated levels of PFAS, a result of the animals being raised on a farm that used biosolids from a sewage treatment plant as fertilizer on the farm and being fed the crops grown on those fields.²⁵
- The Department of Natural Resources should identify farm fields where sewage sludge has been applied. Then they should undertake a testing program to determine if those fields have been contaminated with PFAS and if stormwater runoff is contaminating neighboring streams.
- The Iowa legislature should prohibit the manufacturing, distribution, and sale of consumer products containing PFAS chemicals. In fact, during the 2023 Iowa legislative session, Representative Charles Isenhardt introduced a bill – HF62 – that would prohibit the manufacturing, distribution, and sale of consumer products containing PFAS chemicals. The bill would have prohibited the sale of upholstered furniture containing flame-retardant chemicals, as well as the sale of food packaging, the sale of fire-fighting foam, and the sale of fire-fighting personal protective equipment containing PFAS compounds. The Iowa legislature did not pass the bill. Note, the Sierra Club does not support banning fire-fighting personal protective equipment containing PFAS until there is satisfactory replacement equipment.

²³ A map of the potential locations can be found at “2021 Groundwater Status Report”, sent to the Iowa Legislature by the Iowa Department of Natural Resources

²⁴ Diana Kruzman, “There are ‘forever chemicals’ in beef now”, *Grist*, February 8, 2022; Tom Perkins, “Michigan beef found to contain dangerous levels of ‘forever chemicals’”, *The Guardian*, February 11, 2022

²⁵ An organic farm in Maine that used sewage sludge as a fertilizer prior to 2014 had PFAS detected in their well water, soil, and plant tissue. The residents of the farm had PFAS in their blood at levels of 250 times that of average Americans. See Abigail Curtis, “Unity organic farmers halt sales after finding ‘forever chemicals’ in soil and water”, *Bangor Daily News*, January 26, 2022

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“EPA Actions to Address PFAS”, Environmental Protection Agency, www.epa.gov/pfas/epa-actions-address-pfas

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