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Me-FAS, You-FAS, We All Eat PFAS: What To Do About the Forever Chemical

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Abstract

Per- and polyfluoroalkyl, more commonly known as PFAS, has been found in the blood of 95% of the population. PFAS is a family of over 3,000 human-made chemicals. One chemical in the PFAS family, PFOA, is most well-known for its use in Teflon products and has been the subject of multiple litigations. While PFOA has been phased out of production in the United States due to its known negative human health effects, other PFAS that are just as harmful are now used in place of PFOA. The molecular structure of PFAS contains strong bonds that are difficult to break down through natural processes. This characteristic makes PFAS both extremely helpful to industrial processes and harmful to human health and the environment. Because of its resiliency, PFAS remain in the environment long after initial release. Its stability and endurance have led scientists to dub PFAS as "the forever chemical." This Note explores the history of PFAS production in the United States and concludes with potential regulatory action that can be taken to limit human exposure to PFAS.

Me-FAS, You-FAS, We All Eat PFAS: What To Do About the Forever Chemical

Noel M. Johnson*

INTRODUCTION

In recent history, humans have manipulated and created different chemicals that add convenience to our daily lives. One of these human-made chemicals was thrust into the spotlight in 2005 when a town in West Virginia sued DuPont for water contamination.[1] The chemical contaminating the town's water supply was perfluorooctanoic acid or PFOA.[2] This chemical is essential in the creation of the better known and widely used, miracle of cookware, Teflon.[3] PFOA belongs to a group of chemicals called per- and polyfluoroalkyl, or PFAS.[4] These chemicals are referred to as "forever chemicals" because of their durability and lack of available technology to remove the compounds from the environment.[5] Within the group of PFAS, PFOA and perfluorooctanesulfonic acid (PFOS) have been extensively studied and phased out of the United States due to their toxicity and danger to human health.[6] Although PFOA and PFOS have been phased out, other PFAS, such as GenX and PFBS, are still extensively used in our daily lives.[7]

This Note first examines the historical use of PFAS in the United States and the potential harm these chemicals pose to humans. Section II discusses the current

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[1] Rebecca Porter, *DuPont Takes Heat Over Chemical in Teflon Pans*, 42 JUN TRIAL 14 (2006).

[2] *Id.*

[3] *Id.*

[4] *Basic Information on PFAS*, ENVT'L PROTECTION AGENCY, https://www.epa.gov/pfas/basic-information-pfas (last visited Feb. 13, 2021).

[5] *See* Leticia M. Diaz & Margaret R. Stewart, *"Forever Chemicals": Forever Altering the Legal Landscape*, 7 BELMONT L. REV. 308, 311 (2020).

[6] *Basic Information on PFAs*, *supra* note 4.

[7] *Id.*

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regulatory landscape in the United States. Section III examines how different countries and states have responded to PFAS contamination. Lastly, Section IV advocates for an approach to address the monitoring and regulation of PFAs.

I. HISTORY OF CONTAMINATION

PFAS is a family of almost 3,000 human-made chemicals.[8] Production of these chemicals began in the 1940s.[9] Mass production of PFAS was catalyzed by a DuPont research chemist who attempted to create a new refrigerant to replace existing refrigerants such as chlorofluorocarbons (CFCs).[10] This chemist inadvertently discovered a "miracle of science," Teflon.[11] DuPont wanted to mass produce Teflon, but quickly discovered how difficult it was to work with.[12] Teflon's high melting point makes it impossible to mold and shape, resulting in clumping of the product.[13] DuPont experimented and soon found that adding a surfactant with Teflon, prevented clumping and made production more efficient.[14] The surfactant necessary for the production of Teflon was PFOA.[15]

For years, DuPont produced Teflon and purchased PFOA from 3M.[16] PFOA and other PFAS are resistant to grease, oil, water, and heat due to their chemical structure.[17] The strong chemical bond between carbon and fluorine molecules, which make up this family, are extremely strong, stable, and persistent.[18] The properties that make PFAS such a valuable asset to almost every industry, also make the chemicals resistant to degradation in the environment and dangerous to our health.[19]

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[8] Lawrence G. Cetrulo, *PFAS Generally—History*, 4 TOXIC TORTS LITIGATION GUIDE § 48:2 (2020).

[9] U.S. FOOD & DRUG ADMIN., *Per and Polyfluoroalkyl Substances (PFAS)*, (Oct. 20, 2020), https://www.fda. gov/food/chemicals/and-polyfluoroalkyl-substances-pfas.

[10] ROBERT BILOTT, EXPOSURE: POISONED WATER, CORPORATE GREED, AND ONE LAWYER'S TWENTY-YEAR BATTLE AGAINST DUPONT 56 (Atria Books 2019).

[11] *Id.* at 57.

[12] *Id.* at 58.

[13] *Id.*

[14] *Id.*

[15] *See id.*

[16] Frederick A. McDonald, *Omnipresent Chemicals: TSCA Preemption in the Wake of PFAS Contamination*, 37 PACE ENV'T L. REV. 139, 145 (2019).

[17] U.S. FOOD & DRUG ADMIN., *supra* note 9.

[18] Diaz & Stewart, *supra* note 5, at 311.

[19] Cetrulo, *supra* note 8.

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Manufacturers of PFAS were aware early on of the dangers PFAS posed to public health based on their internal studies.[20] The dangers were not shared with government agencies until widespread implementation had taken effect and it was even longer until this news reached the general public.[21] Even though the general public was unaware, people were exposed to PFAS every day throughout their daily lives.

The EPA has indicated that major sources of PFAS ingestion are in "food packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water."[22] PFAS are found in household products including carpets, cleaning supplies, and nonstick or Teflon products.[23] PFAS is also found in public drinking water. Elevated levels of PFAS enter the environment and drinking water from industrial sites that produce or use PFAS, such as, airports and military bases, landfills, and wastewater treatment plants.[24] One of the largest sources of PFAS is firefighting foams.[25] Specifically, areas near airports, military bases, and areas where firefighting training occurs, can have significant PFAS groundwater contamination.[26] Not only are these chemicals prevalent throughout the United States, but they have also been found in isolated areas including remote oceans and the Arctic.[27] This data indicates that PFAS can be transported over long ranges through water and possibly air.[28]

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[20] Diaz & Stewart, *supra* note 5, at 310–11 ("The dangerous accumulative properties of PFAS chemicals became apparent early on after its introduction into the global marketplace resulting in manufacturers' conducting internal studies of the effects of these chemicals.") (*citing For 50 Years, Polluters Knew PFAS Chemicals Were Dangerous But Hid Risks From Public*, Env't Working Grp., https://static.ewg.org/reports/2019/pfa-timeline/3M-DuPont-Timeline_sm.pdf (last visited Apr. 8, 2021)).

[21] *Id.* ("However, it was only after its widespread implementation that the discovery of its bioaccumulation in ground, surface, and drinking water was shared with government agencies, and it was even longer before the news reached the general public.") (*citing* EPA, *E.I. DuPont de Nemours and Company PFOA Settlements*, https://www.epa.gov/enforcement/ei-dupont-de-nemours-and-company-pfoa-settlements [https://perma.cc/MG5C-N239]).

[22] *Basic Information on PFAS*, *supra* note 4.

[23] *Id.*

[24] Carol F. Kwiatkowski et al., *Scientific Basis for Managing PFAS as a Chemical Class*, 7 ENV'T SCI. TECH. LETTERS 532, 533 (2020).

[25] *Basic Information on PFAS*, *supra* note 4.

[26] *Id.*

[27] Cetrulo, *supra* note 8.

[28] *Id.*

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The chemical structure of PFAS allows it to "bioaccumulate" over time.[29] Bioaccumulation occurs when chemicals enter a living organism and are not broken down by their internal body processes. Organisms higher up in the food chain, such as humans, eat a much greater concentration of certain chemicals because these chemicals have accumulated in all their food sources.[30] This means that another source of PFAS for humans can be from the plants and animals we eat that have been exposed to PFAS.[31] When humans absorb PFAS through one of these pathways, the highest concentrations are found in the liver, kidneys, and blood.[32] PFAS can take anywhere from seventy-two hours to fifteen and a half years to leave the human body.[33] But, PFAS can persist much longer in the environment. Studies have estimated that one particular PFAS, perfluoroalkanes, has a lifetime in the thousands of years.[34] PFAS's longevity and extensive production history means that although 3M and major United States manufacturers have stopped production of PFOA and PFOS, these chemicals are still prevalent throughout our population and the environment.[35]

A. PFAS Pervasiveness in the United States

Due to the wide production of PFAS and its resistance to degradation, these chemicals have been dubbed "The Forever Chemical."[36] A study from 1999 to 2008 collected blood serum from a representative sample of the United States general population and found 95% of participants have a measurable level of PFAS in their blood.[37] Limited testing of public water supply in the United States found PFAS present in water supplies serving an estimated 16.5 million people.[38] It is estimated that six million people are getting their water from a source with a combined PFOS and PFOA concentration over the EPA's lifetime health advisory concentration.[39]

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[29] *Id.*

[30] Kwiatkowski et al., *supra* note 24, at 535.

[31] Cetrulo, *supra* note 8.

[32] *Id.*

[33] *Id.*

[34] Kwiatkowski et al., *supra* note 24, at 535.

[35] Kayoko Kato et al., *Trends in Exposure to Polyfluoroalkyl Chemicals in the U.S. Population: 1999–2008*, 45 ENV'T SCI. TECH. 8037, 8037 (2011).

[36] Diaz & Stewart, *supra* note 5, at 311.

[37] Kato et al., *supra* note 35, at 8037.

[38] Kwiatkowski et al., *supra* note 24, at 533.

[39] *Id.*

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B. Medical Impacts from Exposure to PFAS

There are two categories of PFAS: short-chains, and long-chains.[40] Long-chained PFAS have more carbon bonds and thus, a longer chain of molecules, making them particularly difficult to break down in the natural environment.[41] Long-chained PFAS have been linked to health effects including kidney and testicular cancer, elevated cholesterol, liver disease, decreased fertility, thyroid problems, hormone disruption, birth defects, and changes in the immune system.[42] Little is known about the health effects of long-term exposure to short-chained PFAS.[43] Evidence suggests that short-chained PFAS have similar adverse health effects as long-chained PFAS.[44] Research on the health effects of a chemical on the human population typically consists of animal testing in a lab. Animals are exposed to different concentrations of a chemical to determine possible toxicity levels and health consequences of exposure to humans.[45] The scientific method requires scientists to expose animals to only one type of PFAS at a time to have reliable results and prove or disprove their hypothesis.[46] This inhibits understanding of the true health effects on humans because we are exposed to multiple PFAS daily.[47] There is very little research on the combined effect of exposure to multiple PFAS, and less than 1% of all PFAS have been tested for their toxic effects.[48]

II. CURRENT FEDERAL REGULATIONS

Long-chained PFAS have been extensively studied and investigated in the United States, unlike short-chained PFAS.[49] PFOA and PFOS are long-chained

[40] *Per- and Polyfluoroalkyl Substance (PFAS)*, AM. WATER WORKS ASS'N (Aug. 19, 2019), https://www.awwa.org/Portals/0/AWWA/ETS/Resources/Per-andPolyfluoroalkylSubstances(PFAS)-OverviewandPrevalence.pdf?ver=2019-08-14-090234-873 [hereinafter AM. WATER WORKS ASS'N].

[41] *Id.*; Cetrulo, *supra* note 8.

[42] DAVID JORDON, COMPANIES AGREE TO PHASE OUT CERTAIN PFAS FOOD PACKAGING (2020), Westlaw 4435541; Kwiatkowski et al., *supra* note 24, at 534.

[43] *Id.*

[44] *Id.*

[45] *See* Hope R. Ferdowsian & Nancy Beck, *Ethical and Scientific Considerations Regarding Animal Testing and Research*, 6 PLOS ONE 1, 3 (2011).

[46] *See* Kwiatkowski et al., *supra* note 24, at 535.

[47] *Id.*

[48] *Id.*

[49] AM. WATER WORKS ASS'N, *supra* note 40.

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PFAS that have been the primary focus of most studies.[50] Both compounds are found to be persistent, bio-accumulative, and toxic.[51] Because of these compounds' toxicity, in 2006, the EPA and eight major leading companies joined a global stewardship program to eliminate their use of PFOA.[52] This goal was achieved in 2015.[53] With the elimination of long-chained PFOA, the United States industry shifted significantly towards short-chained PFAS alternatives.[54] Some of these replacements include "PFBA," "PFBS," "F-53B," and "GenX."[55] Recent findings have indicated a higher toxicity of GenX and F-53B than PFOA and PFOS, respectively.[56] Evidence suggests that short-chained PFAS are just as persistent in the environment and more difficult to remove from drinking water than long-chained PFAS.[57] Short-chained PFAS also may be more mobile because they are more water-soluble and easily infiltrate groundwater, surface water, and the oceans.[58] The EPA has been conducting toxicity assessments on PFBS and GenX.[59]

Currently, the EPA regulates PFAS in drinking water on an advisory basis under the Toxic Substances Control Act (TSCA).[60] Under TSCA, the EPA is permitted to track the use of PFAS in manufacturing and test the chemicals if they present an unreasonable risk to human health or the environment.[61] The EPA issued

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[50] Matthias Kotthoff et al., *Perfluoroalkyl and Polyfuoroalkyl Substances in Consumer Products*, 22 ENVT'L SCI. & POLLUTION RESEARCH 14547, 14547 (2015).

[51] *Id.*

[52] *Risk Management for Per- and Polyfluoroalkyl Substances (PFAS) Under TSCA*, U.S. ENV'T PROT. AGENCY, https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-and-polyfluoroalkyl-substances-pfas#tab-3 (last visited Feb. 17, 2021).

[53] *Id.*

[54] Mohamed Ateia et al., *Cationic Polymer for Selective Removal of GenX and Short-Chain PFAS from Surface Waters and Wastewaters at ng/L Levels*, 163 WATER RSCH. 1, 1 (2019).

[55] *Id.*

[56] *Id.*

[57] Kwiatkowski et al., *supra* note 24, at 534.

[58] *Id.* at 535.

[59] *Technical Fact Sheet: Draft Toxicity Assessments for GenZ Chemicals and PFBS*, ENV'T PROTECTION AGENCY (2018), https://www.epa.gov/sites/production/files/2018-12/documents/tech_fact_sheet_genx_pfbs_draft_tox_assess_final_508.pdf.

[60] Jeff B. Kray & Sarah J. Wightman, *Contaminants of Emerging Concern: A New Frontier for Hazardous Waste and Drinking Water Regulation*, 32 NAT. RESOURCES & ENV'T 36, 39 (2018); Matthew Thurlow et al., *PFAs Contamination Remains A Hot-Button Issue: Overview of Recent Regulatory, Litigation, and Technical Developments*, 19 ENVIRONMENTAL LITIGATION AND TOXIC TORTS COMMITTEE NEWSLETTER (ABA Section of Env't, Energy, & Res., Chi., Ill), Apr. 2018, at 19.

[61] *Id.*

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a Lifetime Health Advisory (LHA) in 2016 for PFOA and PFOS to keep these chemicals under seventy parts per trillion (ppt) in drinking water.[62] The LHA is not law and merely acts as technical guidance for state agencies and public health officials.[63]

With the growing pressure from concerns over PFAS, the EPA has taken several steps to monitor the chemicals.[64] The EPA has predominantly monitored PFAS through Significant New Use Rules, or SNUR. SNURs aid the United States in phasing out PFAS because the rules can prohibit or limit the use of PFAS in new products.[65] In 2002, the EPA published multiple SNURs that require a company to notify the EPA before manufacturing or importing seventy-five different PFAS.[66] In 2013 another SNUR was issued that requires all companies that sell carpets to report the use of PFOA-related chemicals if they are used in the manufacturing process or imported carpets.[67] The EPA issued a SNUR for long-chained PFAS in 2015 that requires manufacturers and importers to notify the EPA at least ninety days before starting or resuming new uses of PFOA and PFOA-related chemicals in any products.[68] The latest 2020 proposal would ensure that the EPA reviews new uses of PFAS in the use of furniture, automobile parts, electronics, and household appliances that contain a surface coating of PFAS.[69]

A major issue with the management of PFAS is that there are so many different compounds that exist within the PFAS family. Agencies like the EPA have focused on one compound or a small group of PFAS at a time.[70] Accordingly, our understanding of PFAS's health effects and toxicity is based on a relatively small number of compounds.[71] Very little is known about the majority of PFAS or its complex mixtures.[72] A step that could be taken for more comprehensive management of PFAS would be to manage PFAS as a single chemical class rather than individual

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[62] Thurlow et al., *supra* note 60, at 19.

[63] *Id.*

[64] *See* McDonald, *supra* note 16, at 160.

[65] *See* U.S. ENV'T PROT. AGENCY, 100K20002, PFAS ACTION PLAN: PROGRAM UPDATE (2020).

[66] McDonald, *supra* note 16, at 160.

[67] *Id.*

[68] U.S. ENV'T PROT. AGENCY, 100K20002, PFAS ACTION PLAN: PROGRAM UPDATE (2020).

[69] *Id.*

[70] Kwiatkowski et al., *supra* note 24, at 534 (2020).

[71] Ian T. Cousins et al., *The High Persistence of PFAS is Sufficient for Their Management as a Chemical Class*, 12 ENV'T SCI.: PROCESSES & IMPACTS 2307, 2308 (2020).

[72] *Id.*

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compounds.[73] This kind of management has been done before with various pesticides and flame retardants.[74]

The EPA has been making more efforts to regulate PFAS and in 2019, it started a "coordinated agency-wide PFAS Action Plan."[75] One of the proposals is to create a new Maximum Contaminant Level (MCL) for PFOA and PFOS under the Safe Drinking Water Act (SDWA).[76] The EPA issued an update in February 2020 to explain steps taken to address PFAS in the United States and to set goals for the future.[77] The EPA developed new laboratory methods to better test for PFAS in drinking water and proposed to regulate PFOA and PFOS under the SDWA.[78] The EPA is working to determine if there is enough available data and research to develop water quality criteria under the Clean Water Act (CWA).[79] These criteria would only act as guidance to state agencies setting water quality standards for PFOA and PFOS.[80] As of the 2020 update, the EPA has not updated its Lifetime Drinking Water Health Advisory level of seventy ppt.[81] On March 3, 2021, the EPA announced its final regulatory determination to regulate PFOA and PFOS under the SDWA.[82] This triggers a twenty-four-month deadline for the EPA to set an MCL and a National Primary Drinking Water Regulation.[83]

The EPA is moving forward with the regulatory process of proposing to designate PFOA and PFOS as "hazardous substances" under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or

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[73] *See* Kwiatkowski et al., *supra* note 24, at 534.

[74] *Id.* at 532.

[75] *Per- and Polyfluoroalkyl Substance (PFAS)*, AM. WATER WORKS ASS'N, https://www.awwa.org/Portals/0/AWWA/ETS/Resources/Per-andPolyfluoroalkylSubstances(PFAS)-OverviewandPrevalence.pdf?ver=2019-08-14-090234-873 (last visited Aug. 19, 2019); McDonald, *supra* note 16, at 161.

[76] *Id.*

[77] U.S. ENV'T PROT. AGENCY, 100K20002, PFAS ACTION PLAN: PROGRAM UPDATE (2020).

[78] *Id.*

[79] *Id.*

[80] *Id.*

[81] *Id.*

[82] Announcement of Final Regulatory Determinations for Contaminants on the Fourth Drinking Water Contaminant Candidate List, 86 Fed. Reg. 12,272 (Mar. 3, 2021) (to be codified at 40 C.F.R. pt. 141).

[83] John Gardella, *PFAS Under Biden Administration—Change Is Coming*, 10 NAT'L L. REV. 353 (2020), https://www.natlawreview.com/article/pfas-under-biden-administration-change-coming.

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Superfund).[84] PFAS chemicals are designated as "pollutants or contaminants" under current federal laws which make it difficult for the EPA and states to clean up the chemical under CERCLA[85] Under Superfund law, a pollutant designated as a "hazardous substance" triggers reporting requirements for releases into air, land, or water.[86] This will cause an investigation into a release or historical release and potential remediation of the substance.[87] In contrast, a substance designated as a "pollutant or contaminant" must be shown to pose an "imminent and substantial danger" to public health before the EPA will investigate and initiate a cleanup action.[88]

The PFAS "pollutants or contaminants" designation also make it extremely difficult for the EPA to remediate contaminated sites because the EPA cannot compel the responsible party to pay for the cost of the cleanup under CERCLA.[89] Typically, the EPA will remediate a contaminated site using money from Congress in its Superfund account and sue the responsible party for the cost of the cleanup.[90] CERCLA does not permit the EPA to recover costs for cleanups of "pollutants or contaminants."[91] PFAS will need to be designated as a "hazardous substance" before the EPA can effectively utilize its power under CERCLA. With the recent change in administration, there is a high chance that PFOA and PFOS will be designated as a "hazardous substance" within a few years.[92]

The Food and Drug Administration (FDA) is charged with "protecting the public health . . . by ensuring the safety of our nation's food supply, cosmetics, and products that emit radiation."[93] The FDA can help play a role in the regulation of PFAS through its role in the regulation of food and cosmetics. As of December 2019, the FDA has not promulgated any regulations that limit the concentration of PFAS

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[84] U.S. ENV'T PROT. AGENCY, 100K20002, PFAS ACTION PLAN: PROGRAM UPDATE 9 (2020).

[85] Melanie Benesh, *It's Time to Designate PFAS a "Hazardous Substance*," ENVIRONMENTAL WORKING GROUP (July 3, 2019), https://www.ewg.org/news-and-analysis/2019/07/it-s-time-designate-pfas-hazardous-substance.

[86] *Id.*; 42 U.S.C. § 9604(A).

[87] Benesh, *supra* note 85.

[88] *Id.*

[89] Benesh, *supra* note 85; 42 U.S.C. § 9611.

[90] *Id.*

[91] *Id.*

[92] THE BIDEN PLAN TO SECURE ENVIRONMENTAL JUSTICE AND EQUITABLE ECONOMIC OPPORTUNITY, https://joebiden.com/environmental-justice-plan/ (last visited Mar. 8, 2021).

[93] U.S. FOOD & DRUG ADMIN., WHAT WE DO (2018), https://www.fda.gov/about-fda/what-we-do.

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in food.[94] In 2019, the FDA performed a study on different food groups and tested ninety-one different foods for PFAS.[95] This study indicated that only fourteen out of the ninety-one foods tested contained PFAS and the agency determined that none of the levels were likely to be a health concern.[96] This response would be fine if food was our only exposure to PFAS; however, humans encounter varying levels of PFAS every day outside of their food sources.

Based on a 2020 study on the short-chained PFAS, 6:2 FTOH, the FDA announced that manufacturers of grease-proof paper and paperboard for food packaging voluntarily agreed to phase out sales of this substance for use as food contact paper.[97] This decision is based on rodent studies that raised questions about the health effects on humans.[98] The FDA is continuing studies on PFAS contaminated food, but thus far the FDA has not taken an aggressive approach to limit PFAS in food.

III. Optional Approaches to Regulation

A. Europe's Plan for PFAS

The European Union (E.U.) has taken a more cautionary approach than the United States to address the worldwide PFAS problem. An E.U. drinking water directive addresses twenty different PFAS as one group rather than a single compound as the EPA does.[99] Other countries have passed more direct bans on PFAS as well. Denmark banned PFAS in paper and paperboard food packaging material.[100] South Australia has banned the use of PFAS in firefighting foams.[101] Most importantly, several European countries have committed to phasing out all non-

[94] Cetrulo, *supra* note 8.

[95] *Id.*

[96] *Id.*

[97] Comm'r of Food and Drugs, FDA Announces Voluntary Agreement with Manufacturers to phase out certain short-chain PFAs used in food packaging (2020), https://www.fda.gov/news-events/press-announcements/fda-announces-voluntary-agreement-manufacturers-phase-out-certain-short-chain-pfas-used-food.

[98] *See id.*

[99] Kwiatkowski et al., *supra* note 24, at 536.

[100] *Id.* (citing Directive 2020/2184, On the Quality of Water Intended for Human Consumption, 2020 O.J. (L 435) 1, 53).

[101] *Id.*

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essential uses of PFAS by 2030.[102] This approach was used for ozone-depleting chemicals in the late 1980s.[103] The Montreal Protocol defined "essentially" as "necessary for health or safety, or critical for the functioning of society, and without technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health."[104] In 2015, over two-hundred scientists advocated to phase out non-essential uses of PFAS.[105]

Some international businesses have set their own goals to eliminate their use of PFAS. IKEA successfully phased out all PFAS in its textile products in 2016.[106] Kaiser Permanente, Levi Strauss & Co., and Crate and Barrel have also volunteered to phase out their use of PFAS based on their own environmental and health values.[107]

B. State Approaches and Avoidance of PFAS Regulation

The purpose of TSCA is to "prevent unreasonable risks of injury to health or environment associated with the manufacture, processing, distribution in commerce, use, or disposal of chemical substances."[108] Congress has specified preemption guidelines for the EPA to enforce upon states concerning the regulation of toxic chemicals under TSCA.[109] With the issuance of recent SNURs, the EPA issued enough regulations on PFAS to partially preempt state government action.[110] Specifically, states are most likely preempted from regulating PFAS as it relates to the manufacturing of the compound.[111] This means the best hope states have for the regulation of PFAS is through their state water laws.[112]

States are taking a wide range of approaches to reduce harm from PFAS chemicals. As of 2019, twenty states have developed a policy to protect drinking

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[102] *Id.* (defining non-essential in the phase-out of ozone-depleting CFCs as, "being necessary for health or safety, or critical for the functioning of society, and without technically and economically feasible alternatives or substitutes that are acceptable from the standpoint of environment and health").

[103] *Id.*

[104] *Id.*

[105] *Id.*

[106] *Id.*

[107] *Id.*

[108] McDonald, *supra* note 16, at 171.

[109] *Id.* at 159.

[110] *Id.* at 167.

[111] *Id.* at 171.

[112] *Id.* at 172–73.

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water with four other states currently working on policies.[113] New Jersey and Vermont have set limits on PFAS that are well below EPA health advisory levels for drinking water.[114] Other states—Alaska, Michigan, and North Carolina—have enacted prohibitions and policies against more stringent drinking water standards.[115]

Washington and other states have banned PFAS in firefighting foams, a major source for PFAS soil and groundwater contamination.[116] On July 1, 2020, Minnesota banned the discharge of firefighting foams for training and testing purposes unless appropriate containment, treatment, and disposal measures are in place.[117] This ban excludes emergencies but requires notification within twenty-four hours of any known discharge.[118] Washington and Maine have both banned another large source of PFAS in the use of food contact materials.[119] California has proposed to regulate PFAS used in carpets and rugs, another significant source of PFAS contamination in homes.[120] California has also recently passed the Toxic-Free Cosmetics Act which will ban the use of PFAS in cosmetics on January 1, 2025.[121] States who wish to protect their citizens can take steps such as these to limit their resident's exposure to PFAS. Both Minnesota and New York have responded to pollution in their states with lawsuits on behalf of their citizens against major manufacturers of PFAS.[122] Minnesota was successful and obtained a multimillion-dollar settlement.[123]

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[113] *Per- and Polyfluoroalkyl Substance (PFAS)*, AM. WATER WORKS ASS'N, https://www.awwa.org/Portals/0/AWWA/ETS/Resources/Per-andPolyfluoroalkylSubstances(PFAS)-OverviewandPrevalence.pdf?ver=2019-08-14-090234-873 (last visited Aug. 19, 2019).

[114] Louise Dyble & Angela Levin, *Federal PFAS regulation and the states*, THOMSON REUTERS WESTLAW (Mar. 31, 2020), https://www.environmentallawandpolicy.com/wp-content/uploads/sites/452/2020/06/WLJ_PI_Dyble.pdf.

[115] *Id.*

[116] Kwiatkowski et al., *supra* note 24, at 536.

[117] Firefighting Foam, 325F.072 20C Minn. Prac. Bus. Reg. (2020).

[118] *Id.*

[119] Kwiatkowski et al., *supra* note 24, at 536.

[120] *Id.*

[121] John Gardella, *PFAS Ban in Cosmetics is Precedent Setting Step in CA*, NAT'L LAW REV. (2020), https://www.natlawreview.com/article/pfas-ban-cosmetics-precedent-setting-step-ca.

[122] McDonald, *supra* note 16, at 148.

[123] *Id.*

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IV. WHAT SHOULD WE DO

An argument can be made that states should take on the burden of regulating PFAS through their water laws. However, two problems arise if the country's PFAS problem is left to state regulation. First, there is no way to ensure that a state will set reasonable exposure guidelines to keep citizens safe, as seen with states like Alaska and North Carolina who have enacted legislation against any policies more stringent than the EPA recommendations.[124] Second, without federal regulation, there is an extra burden placed on states who choose to regulate PFAS. Because PFAS easily moves throughout our environments, contamination in a state with relaxed PFAS regulations could contribute to pollution in a state with more stringent PFAS regulations. For example, State X has a landfill with PFAS contaminated soil and no regulations requiring treatment. State Y borders State X and has strict regulations for reporting PFAS and ensuring its removal from the environment. When the PFAS leaches into the groundwater in State X and flows into State Y, State Y now pays for the cost to remediate the contamination from State X. State Y will have to continue to use its time and resources to fix the PFAS contamination coming from its neighboring state. This puts an unfair burden on states that are taking more aggressive measures to protect their citizens. Because of these problems, we must have a more uniform federal regulation.

The EPA should regulate PFAS as a class of chemicals rather than each individual compound. This kind of management has been done before with organophosphate pesticides, organochlorine pesticides, and organohalogen flame retardants.[125] There are several advantages to managing PFAS as a class. First, this approach reduces the likelihood of replacing well-studied hazardous chemicals with poorly studied but structurally similar PFAS compounds that have the potential to be equally hazardous.[126] For example, PFAS compounds such as PFOA and PFOS have toxicological effects that are well understood.[127] Related compounds like GenX, are still actively used in the industry yet, scientists are only beginning to understand their negative health effects through animal testing.[128] Additionally, in lab tests, animals are exposed to one PFAS compound while humans are exposed to several different

[124] Louise Dyble & Angela Levin, *Federal PFAS regulation and the states*, THOMSON REUTERS WESTLAW (Mar. 31, 2020), https://www.environmentallawandpolicy.com/wp-content/uploads/sites/452/2020/06/WLJ_PI_Dyble.pdf.

[125] Kwiatkowski et al., *supra* note 24, at 536.

[126] *Id.*

[127] Kotthoff et al., *supra* note 50, at 14547.

[128] Kwiatkowski et al., *supra* note 24, at 535.

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compounds every day.[129] If only PFOA is regulated, but humans are exposed to three other PFAS compounds, a PFOA regulation does little to protect them. If PFAS were regulated as a chemical group, humans would be better protected from the wide array of PFAS exposure. Additionally, it can take many years to gather enough evidence to prove that each PFAS chemical is harmful on its own and should be regulated.[130] Regulating PFAS by each compound is both time-consuming and expensive.[131] The health of our citizens should take priority and PFAS should be grouped as a class to ensure this.

A second advantage of regulating PFAS as a class is that it is simpler and less expensive to implement testing.[132] It is much easier to test for a broad general group of chemicals (such as fluorine) than it is to test for a very specific set of molecules. Methods to test for fluorine, a component for the chemical structure of all PFAS, already exist and would be easy to implement.[133] Class-based methods can also result in more frequent testing, which improves compliance and detection of emerging risks.[134] Ian T. Cousins et al., has proposed several different approaches to grouping PFAS as a chemical class.[135] The most cautionary approach groups PFAS compounds by their intrinsic, persistent properties.[136]

The next step that should be taken by the federal government is to list PFAS as a "hazardous substance" for Resource Conservation and Recovery Act and CERCLA purposes. This will ensure that the EPA can monitor the use and releases of PFAS into the environment and compel large corporations to remediate PFAS contaminated sites. Congress has attempted to take steps to require the EPA to classify PFAS chemicals as a "hazardous substance" for CERCLA purposes.[137] The PFAS Action Act of 2019 was passed by the House of Representatives and but did not pass through the Senate.[138] With the new Biden administration and Senate composition, a PFAS Action Act will likely be brought to Congress. President Biden

[129] *Id.*

[130] Cousins et al., *supra* note 71, at 2307.

[131] *Id.*

[132] Kwiatkowski et al., *supra* note 24, at 536.

[133] *Id.*

[134] *Id.*

[135] Cousins et al., *supra* note 71, at 2307.

[136] *Id.*

[137] PFAs Action Act of 2019, H.R. 535, 116th Cong. (2019).

[138] *Id.*

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has also voiced his intent to designate PFAS as a "hazardous substance" as discussed in Section II.[139]

V. CONCLUSION

Almost every individual in the United States has been exposed to PFAS.[140] Large industries knew of the harmful effects of PFOA and PFOS but concealed this information from government agencies and the general public.[141] This concealment led to widespread pollution throughout the United States.[142] The persistence of PFAS in the environment and the danger to public health that PFAS pose requires an aggressive and efficient approach to protect the public health and environment.[143] To accomplish this we should regulate PFAS as a chemical class rather than as individual compounds. Next, PFAS should be designated as a "hazardous substance" to ensure any release into the environment is rectified and human exposure limited. These two steps are necessary to reduce the impacts from PFAS pollution. With the new Biden Administration's focus on science and environmental justice, this country is likely to see a change in the regulatory landscape of PFAS in the next few years.

[139] *The Biden Plan to Secure Environmental Justice and Equitable Economic Opportunity*, BIDEN HARRIS, https://joebiden.com/environmental-justice-plan/ (last visited Mar. 8, 2021).

[140] Kato et al., *supra* note 35, at 8037.

[141] Diaz & Stewart, *supra* note 5, at 310–11 (*citing* Envt'l Working Group, *For 50 Years, Polluters Knew PFAS Chemicals Were Dangerous But Hid Risks From Public*, https://static.ewg.org/reports/2019/pfa-timeline/3M-DuPont-Timeline_sm.pdf?_ga=2.230061662.339423941.1571840814-235200328.1562959090).

[142] *Mapping the PFAS Contamination Crisis: New Data Show 2,337 Sites in 49 States*, ENV'T WORKING GROUP, https://www.ewg.org/interactive-maps/pfas_contamination/ (last visited Jan. 6, 2021).

[143] Kwiatkowski et al., *supra* note 24, at 532.

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