“Forever Chemicals”: PFAS Contamination and Public Health

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ABSTRACT

Popcorn bags, firefighting foam, and nonstick pans—all seemingly unrelated—are, in fact, united by one thing: they each contain perfluoroalkyl and polyfluoroalkyl substances, collectively known as PFAS. PFAS compounds are found throughout the United States and have been contaminating the country’s water sources since the 1940s, when manufacturers began using PFAS. Almost 5,000 different types of PFAS have been discovered, each containing carbon-fluorine bonds (“C-F bonds”). C-F bonds make PFAS great for products manufacturing because such strong chemical bonds increase material durability, but they also turn PFAS into “forever chemicals.” Once PFAS disperse into the ecosystem, they are extremely difficult to remove because they do not break down over time. The resulting ability of PFAS to bioaccumulate in animals and the human body has been linked to elevated levels of PFAS in the blood stream. Consequently, PFAS are found in mammals’ milk and animal offspring, leading to dairy farm shutdowns. Similarly, PFAS have been linked to long-term, adverse health effects in humans, such as cancer, and developmental health effects, such as low birth weight.

While the Environmental Protection Agency (EPA) has considered and is in the process of setting a maximum contaminant level (MCL) for PFAS chemicals, it has yet to do so. To date, the EPA has created a PFAS Action Plan and set a health advisory level for PFAS chemicals—this advisory level, however, is non-enforceable. Congress has advocated for regulation, and some states, such as New Jersey and New Hampshire, have acted. This Comment argues that while it is critical for the EPA to

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set an MCL for PFAS, states should regulate PFAS at stricter levels than the EPA to protect the health, safety, and welfare of their constituents.

Table of Contents

I. INTRODUCTION

Fifteen years ago, Fred Stone, a dairy farmer from Maine, took part in a program for wastewater sludge disposal.[1] This wastewater sludge contained perfluoroalkyl and polyfluoroalkyl substances, collectively known as PFAS.[2] This PFAS found its way into water on the farm and ended up, through the cows' drinking the water, in the cows' milk.[3] Now Mr. Stone's dairy farm—his whole livelihood—has been shut down due to high levels of PFAS contamination in his cows' milk.[4]

1. Wastewater sludge results when solids separate from municipal wastewater during treatment. *See NPDES Wastewater & Stormwater Permits: Sewage Sludge/Biosolids Program*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/36Puy1q (last visited Dec. 27, 2020). The agriculture industry then uses these solids to grow non-food crops. *See id.*; *see also* Pat Rizzuto, *'Forever Chemicals' Coming to Your Table, if Not Already There*, BLOOMBERG LAW (Sept. 27, 2019), https://bit.ly/395dzJT; *infra* Section II.C.

2. *See Basic Information on PFAS*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/3nt2qX3 (last visited Dec. 27, 2020).

3. *See* Rizzuto, *supra* note 1.

4. *See id.*

PFAS are a collection of man-made chemicals used in United States products manufacturing since the 1940s.[5] PFAS are found in popcorn bags, firefighting foam, nonstick pans, pizza boxes, stain- and water-repellant fabrics, cleaning products, chrome plating, and much more.[6] While thousands of different kinds of PFAS exist, the two most common types are perfluorooctane sulfonic acid (PFOS)[7] and perfluorooctanoic acid (PFOA).[8] PFAS are extremely persistent in the environment and in living organisms because they do not break down over time.[9] Evidence shows that PFAS contamination has been linked to adverse health effects like high cholesterol, kidney cancer, ulcerative colitis, thyroid disease, testicular cancer, and pregnancy-induced hypertension.[10] In today's world, PFAS are impossible to escape; almost everyone in the United States has been exposed to PFAS.[11] Thus, it is imperative that state and federal agencies regulate PFAS and other similar chemicals.[12]

One job of the United States Environmental Protection Agency (EPA), under the Safe Drinking Water Act (SDWA), is to set national primary-drinking-water standards.[13] These primary-drinking-water standards are known as maximum contaminant levels (MCLs).[14] The EPA defines an MCL as "[t]he highest level of a contaminant that is allowed in drinking water."[15] The EPA has not yet set an MCL for any kind of PFAS.[16]

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5. *See Basic Information on PFAS*, *supra* note 2.

6. *See id.*

7. PFOS is mainly used in metal plating and finishing. *See* Ground Water Quality Standards and Maximum Contaminant Levels (MCLs) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), 51 N.J. Reg. 437(a) (adopted June 1, 2020), *available at* https://bit.ly/2vnYHV9.

8. PFOA is mainly found in Teflon nonstick pans and firefighting foam. *See* Lauren Zanolli, *Why You Need to Know About PFAS, the Chemicals in Pizza Boxes and Rainwater*, GUARDIAN (May 23, 2019), https://bit.ly/33KGcJd; *see also Basic Information on PFAS*, *supra* note 2.

9. *See Basic Information on PFAS*, *supra* note 2.

10. *See id.*; *see also The Science Panel Website*, C8 SCI. PANEL, https://bit.ly/37nece4 (last visited Dec. 27, 2020).

11. *See Basic Information on PFAS*, *supra* note 2; *see also* Complaint, Hardwick v. 3M Co., 2:18-CV-01185, at *14 (S.D. Ohio Oct. 4, 2018) ("[B]lood serum testing and analysis . . . has confirmed that PFAS materials are clinically demonstrably present in approximately 99% of the current population of the United States."). If the class is approved, *Hardwick v. 3M Co.* will "likely be the largest class action to date in the United States." Jessica Deyoe, *PFAS National Class Action Clock Is Ticking*, CMBG3 LAW (Aug. 20, 2020), https://bit.ly/2Kwp4Ad.

12. *See infra* Section III.A.

13. *See* 42 U.S.C. § 300g-1 (2018).

14. *See id.*; *see also National Primary Drinking Water Regulations*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/2vstd05 (last visited Dec. 27, 2020).

15. *National Primary Drinking Water Regulations*, *supra* note 14.

16. *See PFAS Laws and Regulations*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/3f9W2RK (last visited Dec. 27, 2020).

Although the EPA has not yet set an MCL for PFAS, the EPA has set a non-actionable health advisory level of 70 parts per trillion (ppt) in drinking water.[17] Health advisory levels are not required levels—they are simply guidelines for regulation and, thus, are non-actionable and non-enforceable.[18] To visualize, one ppt is "the equivalent of one drop of [chemical] impurity in 500,000 barrels of water."[19] Regardless of whether the EPA sets an enforceable national standard—an MCL—states may set their own MCLs for drinking water.[20] And while state MCLs cannot be less stringent than the EPA's MCLs, if one is set, it can be stricter.[21] In fact, states such as New Jersey, Michigan, Minnesota, and New Hampshire have taken the lead on regulating PFAS substances, some setting stricter MCLs than the EPA's current health advisory level (70 ppt).[22]

This Comment argues that, because the EPA has failed to proactively regulate PFAS chemicals quickly—and even if it *does* eventually take action—states should exercise their right to regulate these contaminants and set their own MCLs.[23] Part II discusses the nature of PFAS, where they are found, and why they are so dangerous.[24] Part II then explains what steps the EPA has taken to regulate PFAS, as well as the EPA's inaction in this regard.[25] Additionally, Part II discusses the power of Congress and the states to regulate PFAS and details what laws and regulations Congress and the states are attempting to pass because of EPA inaction.[26] The legislative and administrative actions taken in New Jersey, Michigan, Minnesota, and New Hampshire are discussed, as well as Pennsylvania's current inaction.[27] Part II concludes by explaining how states and the EPA set MCLs—an instruction manual of sorts.[28]

Part III argues that, in order to protect public health, safety, and welfare, the EPA should set an MCL for PFAS, especially for PFOS and

17. *See Drinking Water Health Advisories for PFOA and PFOS*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/2ROwwGg (last visited Dec. 27, 2020).

18. *See id.* ("Health advisories provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water.").

19. *Regulatory Frameworks*, OFF. ASSISTANT SEC'Y NAVY ENERGY, INSTALLATIONS & ENV'T, https://bit.ly/36pKODM (last visited Dec. 27, 2020).

20. *See generally* U.S. CONST. amend. X ("The powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.").

21. *See* 42 U.S.C. § 300g-2(a)(1) (2018).

22. *See* Daniel J. Grucza, *PFAS: States Not Waiting For EPA*, NICKEL REP. (Mar. 12, 2019), https://bit.ly/2v7SJHA.

23. *See infra* Section III.A.

24. *See infra* Section II.A.

25. *See infra* Section II.B.

26. *See infra* Sections II.C–D.

27. *See infra* Section II.D.

28. *See infra* Section II.E.

PFOA.[29] However, even if the EPA sets an MCL, this number may not be very restrictive.[30] Therefore, states should set their own stricter MCLs for PFAS, regardless of what action the EPA takes.[31] This Comment ultimately recommends that states should exercise their regulatory authority and set MCLs for drinking water according to two factors: (1) the amount of preexisting PFAS contamination in their states, and (2) their states' budgetary constraints.[32]

II. BACKGROUND

Understanding what perfluoroalkyl and polyfluoroalkyl substances (PFAS) are and why they are so dangerous is crucial for comprehending why PFAS need to be regulated. PFAS are extremely complex and durable chemicals, making them incredibly dangerous.[33] The chemical bonds that create PFAS, carbon-fluorine bonds ("C-F bonds"), are the shortest and strongest chemical bonds found in nature.[34] The C-F bonds, combined with the lack of proper technology to clean PFAS chemicals, allow PFAS to survive in nature for extended periods.[35] Currently, the EPA and most states have failed to regulate PFAS contaminants.[36]

A. What Are Perfluoroalkyl and Polyfluoroalkyl Substances?

PFAS are thousands of "human-made chemicals" that are not found naturally in the environment.[37] The Organization for Economic Cooperation and Development (OECD) estimates that there are about 4,700 different types of PFAS, and likely many more.[38] What unites all these different types of substances is that each one has at least one atom of carbon bound to a fluorine atom—a short chemical bond that makes substances extremely strong.[39] The two best-known types of PFAS are

29. *See infra* Sections III.A, III.B.2.
30. *See infra* Section III.A.
31. *See infra* Section III.A.
32. *See infra* Section III.B.
33. *See* Rizzuto, *supra* note 1.
34. *See id.*; *see also Naming Conventions and Physical and Chemical Properties of Per- and Polyfluoroalkyl Substances (PFAS)*, INTERSTATE TECH. REG. COUNCIL, https://bit.ly/34Gpf2D (last visited Dec. 27, 2020).
35. *See Naming Conventions and Physical and Chemical Properties of Per- and Polyfluoroalkyl Substances (PFAS)*, *supra* note 34; *see also* Rizzuto, *supra* note 1.
36. *See infra* Sections II.B–D.
37. *Per and Polyfluoroalkyl Substances (PFAS)*, U.S. FOOD & DRUG ADMIN., https://bit.ly/2J8rlN8 (last visited Dec. 27, 2020).
38. *See* ORG. FOR ECON. CO-OPERATION & DEV., SUMMARY REPORT ON UPDATING THE OECD 2007 LIST OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) 16 (2018), https://bit.ly/33nGXao ("In total, 4730 PFAS-related [substances] have been identified in this study.").
39. *See* Rizzuto, *supra* note 1; *see also Naming Conventions and Physical and Chemical Properties of Per- and Polyfluoroalkyl Substances (PFAS)*, *supra* note 34.

perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA).[40]

PFAS have been used in United States products manufacturing since the 1940s.[41] Specifically, they have been used in textiles treated with Scotchgard; Teflon products and other nonstick cookware; stain-resistant coatings for upholstery and carpets; and food packaging, such as microwaveable popcorn bags.[42] One of the more contemporary and most troublesome uses of PFAS is in firefighting foam, used primarily by the United States military and local fire departments.[43] Aqueous film-forming foam (AFFF)—the most frequently used PFAS-containing firefighting foam[44]—is usually used for firefighting training, although it has been used to put out real fires as well.[45] When firefighting foam is used, it travels through run-off to the nearest waterbody, depositing PFAS into well water and drinking water.[46]

While PFAS have been around for quite some time, only recently have their dangers become apparent.[47] PFAS are considered "emerging contaminants."[48] Three necessary elements characterize a contaminant as "emerging": (1) "a real or perceived threat to health"; (2) "an incomplete understanding of toxicology"; and (3) "lack of regulation at the federal level."[49] While the term "emerging" may mislead one to believe that

40. *See Per and Polyfluoroalkyl Substances (PFAS)*, *supra* note 37.

41. *See* Letter from Att'ys Gen. of N.Y., Cal., Conn., Del., D.C., Guam, Haw., Ill., Iowa, Me., Md., Mass., Mich., Minn., Miss., N.J., N.M., Or., R.I., Va., Wash., and Wis. to 116th Cong. (July 30, 2019) at 1 (on file with author) [hereinafter AG Letter]; *see also* Ground Water Quality Standards and Maximum Contaminant Levels (MCLs) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), 51 N.J. Reg. 437(a) (adopted June 1, 2020), *available at* https://bit.ly/2vnYHV9.

42. *See* AG Letter, *supra* note 41.

43. *See id.*

44. AFFF was created using PFAS in the 1960s in response to a naval fire aboard the USS *Forrestal* in 1967. *See PFAS History: Where Did PFAS Come From?*, 3M, https://bit.ly/38Mpyfe (last visited Dec. 27, 2020). One hundred thirty-four U.S. sailors, pilots, and flight officers died. *See id.* This fire is known as one of the worst naval disasters in American history. *See id.*

45. *See* AG Letter, *supra* note 41 at 4; *see also* Prompt and Fast Action to Stop Damages Act, S. 675, 116th Cong. (2019) (stating that the Air Force began using AFFF in the 1970s).

46. *See PFAS Firefighting Foams*, COLO. DEP'T OF PUBLIC HEALTH & ENV'T, https://bit.ly/3mXBfmM (last visited Dec. 27, 2020); *see also Aqueous Film Forming Foam (AFFF)*, ALASKA DEP'T ENVTL. CONSERVATION, https://bit.ly/2KwcfG2 (last visited Dec. 27, 2020).

47. *See Practical Methods to Analyze and Treat Emerging Contaminants (PFAS) in Solid Waste, Landfills, Wastewater/Leachates, Soils, and Groundwater to Protect Human Health and the Environment*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/2HnhmTy (last visited Dec. 27, 2020).

48. *See id.*

49. Scott Fulton et al., *The Use of PFAS at Industrial and Military Facilities: Technical, Regulatory, and Legal Issues*, 49 ENVTL. L. REP. 10,109, 10,110 (2019).

such substances are newly discovered, contaminants can, in fact, be considered "emerging" for extended periods of time.[50] For example, methyl tert-butyl ether (MTBE) has been an emerging contaminant for almost 40 years.[51] PFAS, on the other hand, have been considered emerging contaminants for only about a decade.[52] Although PFAS have been used in products manufacturing since the 1940s, they are just now considered "emerging" because only recently has technology become available to measure and detect PFAS' presence.[53]

The carbon-fluorine bonds ("C-F bonds") in PFAS are the reason PFAS are so difficult to rid from the environment.[54] C-F bonds are "the strongest and shortest bond in nature."[55] These rock-solid bonds make PFAS stain-resistant and "thermally and chemically stable."[56] Consequently, PFAS are resistant to harsh chemicals and high temperatures, making them perfect for products manufacturing.[57] Those same properties also make PFAS useful in everyday nonstick and fire-resistant items.[58] However, PFAS' stability is also why it is so widespread in and harmful to the natural environment.[59] PFAS are extremely soluble and mobile in water, meaning they can quickly move from manufacturing production sites to groundwater—and, ultimately, to drinking water—almost without a trace.[60] PFAS' threat is not limited to water—they also quickly migrate from food packaging to the food itself.[61]

PFAS' durability, in combination with its ability to move quickly and far from its source, makes these substances hard to detect and combat.[62] PFAS have been called "forever chemicals" because of their ability to resist degradation in the environment over long periods of time.[63] Notably, while most chemicals bind to fats and lipids, PFAS bind

50. *See id.*
51. *See id.*
52. *See id.*
53. This new technology mainly detects PFOS and PFOA. *See id.*
54. *See Naming Conventions and Physical and Chemical Properties of Per- and Polyfluoroalkyl Substances (PFAS)*, *supra* note 34.
55. *Id.*; *see also* Rizzuto, *supra* note 1.
56. *See Naming Conventions and Physical and Chemical Properties of Per- and Polyfluoroalkyl Substances (PFAS)*, *supra* note 34.
57. *See* Ground Water Quality Standards and Maximum Contaminant Levels (MCLs) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), 51 N.J. Reg. 437(a) (adopted June 1, 2020), *available at* https://bit.ly/2vnYHV9.
58. *See Naming Conventions and Physical and Chemical Properties of Per- and Polyfluoroalkyl Substances (PFAS)*, *supra* note 34.
59. *See* Rizzuto, *supra* note 1.
60. *See* Prompt and Fast Action to Stop Damages Act, S. 675, 116th Cong. (2019), *available at* https://bit.ly/36xAhVL.
61. *See Per and Polyfluoroalkyl Substances (PFAS)*, *supra* note 37.
62. *See* 51 N.J. Reg. 437(a).
63. *See* AG Letter, *supra* note 41 at 2; *see also* Rizzuto, *supra* note 1.

to proteins.[64] But because most chemical-cleaning methods are designed to target chemicals that bind with fats and lipids, chemicals that bind to proteins are very difficult to clean.[65] Thus, PFAS' ability to bind to protein is one reason why PFAS are so resistant to degradation and common in nature.[66] And when PFAS enter the environment, they eventually make their way into living organisms.[67]

Studies performed on rats show that PFAS bioaccumulate in the body.[68] Bioaccumulation is "the accumulation over time of a substance and especially a contaminant (such as a pesticide or heavy metal) in a living organism."[69] Most commonly, bioaccumulation is used to refer to mercury content in fish.[70] But bioaccumulation is not confined to laboratory tests. At one farm in Maine, the property's drinking water had over twice the EPA's health advisory limit (70 ppt) for PFAS contamination.[71] However, because of bioaccumulation, the levels found in the farm's cows' milk were 20 times the health advisory limit (about 1,400 ppt).[72] Over time, the PFAS bioaccumulated in the cows and transferred to the cows' milk in larger quantities than the contamination found in the drinking water.[73]

PFAS bioaccumulation has been linked to reproductive, developmental, liver, kidney, and immunological health effects.[74] Exposure to PFAS can cause increased liver enzymes, a sign of liver damage; decreased vaccine response; decreased birth weight; and

64. *See* Rizzuto, *supra* note 1.

65. *See* Fulton et al., *supra* note 49, at 10,117 ("We're not used to dealing with chemicals that bind with protein; we're used to chemicals that bind with fats and lipids. So, this has complicated our understanding of how these chemicals bioaccumulate in our bodies.").

66. *See id.*

67. *See* Prompt and Fast Action to Stop Damages Act, S. 675, 116th Cong. (2019), *available at* https://bit.ly/36xAhVL.

68. *See id.*

69. *Bioaccumulation*, MERRIAM-WEBSTER.COM DICTIONARY, https://bit.ly/2Iuv6jN (last visited Dec. 27, 2020).

70. *See What is Bioaccumulation?*, MICH. DEP'T OF CMTY. HEALTH, https://bit.ly/2NDuk2t (last visited Dec. 27, 2020); *see also* Fulton, *supra* note 49, at 10,117.

71. *See* Rizzuto, *supra* note 1. EPA's health advisory limit for PFOS and PFOA is 70 ppt. *See Drinking Water Health Advisories for PFOA and PFOS*, *supra* note 17.

72. *See* Rizzuto, *supra* note 1.

73. *See id.*

74. *See* Prompt and Fast Action to Stop Damages Act, S. 675, 116th Cong. (2019), *available at* https://bit.ly/36xAhVL; *see also* PFAS User Fee Act, H.R. 2570, 116th Cong. (2019) ("Such substances pose serious risks to health, including risks of cancer, reproductive and developmental effects, and effects on the immune system, liver, and kidneys.").

testicular and kidney cancer.[75] Further, evidence shows that PFAS in the bloodstream elevates blood serum cholesterol levels[76] and persists for years, even after exposure to the substances has ended.[77] PFAS can also transfer to breast milk, which can lead to negative developmental health effects in babies that drink the contaminated breast milk.[78] Fortunately, the harms caused by PFAS are being brought to light.

For example, a science panel—the C8 Science Panel—the result of a class action settlement[79] brought against DuPont's[80] Washington Works Plant[81] in Parkersburg, West Virginia, was created to study PFAS' health effects in the local area.[82] The C8 Science Panel included three public health scientists chosen jointly by lawyers for the communities and DuPont.[83] From 2005 to 2013, the C8 Science Panel studied the effects of C8, a type of PFOA, on people in the Mid-Ohio Valley area.[84] These communities were potentially affected by C8 from the Washington Works plant.[85] The main purpose of the C8 study was to find links between C8 exposure and possible diseases attributable to C8 exposure.[86] The study found in the community a probable link[87] between PFOA exposure and high cholesterol, kidney cancer, ulcerative colitis, thyroid disease, testicular cancer, and pregnancy-induced hypertension.[88]

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75. *See* Ground Water Quality Standards and Maximum Contaminant Levels (MCLs) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), 51 N.J. Reg. 437(a) (adopted June 1, 2020), *available at* https://bit.ly/2vnYHV9.

76. Elevated blood serum cholesterol levels—high cholesterol—cause fatty deposits in a person's blood vessels which can eventually cause a heart attack or a stroke. *See High Cholesterol*, MAYO CLINIC, https://mayocl.in/3iJiUYj (last visited Dec. 27, 2020).

77. *See* 51 N.J. Reg. 437(a).

78. *See id. See generally* Rizzuto, *supra* note 1 (stating that bioaccumulation caused PFAS levels to be higher in cows' milk than in the water they were drinking).

79. *See generally* Leach v. E.I. Du Pont de Nemours & Co., No. 01-C-608, 2002 WL 1270121 (W. Va. Cir. Ct. Apr. 10, 2002) (docketing class action lawsuit against DuPont for harm caused by PFAS contamination).

80. DuPont manufactures products for brands such as Kevlar, Tyvek, and Styrofoam. *See Brands & Products: Featured Brands*, DuPont, https://www.dupont.com/ (last visited Dec. 27, 2020).

81. The Washington Works plant is a 1,200-acre site in Parkersburg, West Virginia that has been manufacturing various polymer (plastic) products since 1948. *See Hazardous Waste Cleanup: Chemours Company FC, LLC (Formerly: Dupont Washington Works) in Washington, West Virginia*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/2RqYGYU (last visited Dec. 27, 2020).

82. *See The Science Panel Website*, *supra* note 10.

83. *See id.*

84. *See id.*

85. *See id.*

86. *See id.*

87. *See C8 Probable Link Reports*, C8 SCI. PANEL, https://bit.ly/35whxZK (last visited Dec. 27, 2020) ("A 'probable link' . . . mean[s] that given the available scientific evidence, it is more likely than not that . . . a connection exists between PFOA exposure and a particular human disease.").

88. *See id.*

Over the years, the EPA has studied PFAS contamination but has failed to set any enforceable standards.[89] The EPA should act quickly to set MCLs for all PFAS, but at the very least it should set MCLs for PFOS and PFOA, the most common and well-known PFAS substances.[90]

B. The EPA's Action and Inaction Regarding PFAS Regulation

Every five years, the EPA releases a list called the Unregulated Contaminant Monitoring Rule (UCMR).[91] Each UCMR contains up to 30 unregulated contaminants.[92] While the UCMR does not set federal maximum contaminant levels (MCLs) for the listed chemicals, it requires monitoring of listed contaminants in public water systems.[93] In 2012, the EPA issued the third UCMR ("UCMR 3").[94] UCMR 3 included PFOS and PFOA, requiring nationwide testing for PFOS and PFOA for the first time.[95] More specifically, inclusion of PFOS and PFOA on the UCMR 3 meant that all public community water systems serving more than 10,000 people, and certain public water systems serving 10,000 or fewer people, were monitored for PFOS and PFOA during a 12-month period between January 2013 and December 2015.[96]

Despite the required monitoring from the UCMR 3, the EPA has not yet set an MCL for any PFAS substances, including PFOA or PFOS.[97] On May 25, 2016, the EPA set a health advisory level for both substances.[98] Specifically, the EPA set the health advisory level for PFOS and PFOA at 70 parts per trillion (ppt)[99] in drinking water.[100] The EPA's health advisory level is a combined health advisory level, meaning that "the combined concentrations of PFOS and PFOA should

89. *See infra* Section II.B.

90. *See infra* Section III.B.2.

91. *See* 42 U.S.C. § 300g–4 (2018).

92. *See id.*

93. *See id.*

94. *See* Unregulated Contaminant Monitoring Rule (UCMR 3) for Public Water Systems, 77 Fed. Reg. 26,072, (May 2, 2012) (codified at 40 C.F.R. pts. 141–42).

95. *See id.*

96. *See id.*; *see also* Ground Water Quality Standards and Maximum Contaminant Levels (MCLs) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), 51 N.J. Reg. 437(a) (adopted June 1, 2020), *available at* https://bit.ly/2vnYHV9.

97. *See* William Tarantino & Megan Ault, *Preparing for PFAS Scrutiny: Part 1*, LAW 360 (May 2, 2019), https://bit.ly/35Dkc41.

98. *See* Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate, 81 Fed. Reg. 33250 (May 25, 2016).

99. *See generally Regulatory Frameworks*, *supra* note 19 (explaining that one ppt is "the equivalent of one drop of impurity in 500,000 barrels of water").

100. *See Drinking Water Health Advisories for PFOA and PFOS*, *supra* note 17.

not exceed the 70 ppt [health advisory level]."[101] The EPA explains health advisory levels as follows:

> Health advisories provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water. EPA's health advisories are non-enforceable and non-regulatory and provide technical information to state agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water contamination. EPA's health advisory level for PFOA and PFOS offers a margin of protection for all Americans throughout their life from adverse health effects resulting from exposure to PFOA and PFOS in drinking water.[102]

In other words, health advisory levels are simply a starting point for enforceable regulation,[103] allowing science and technology to progress so enforceable regulations can later be set in its place.[104]

To identify and understand PFAS as quickly as possible, the EPA set forth the "EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan" ("Action Plan").[105] At the May 2018 National Leadership Summit,[106] the EPA announced the four main actions of the Action Plan: (1) "[i]nitiating steps to evaluate the need" for an MCL for PFOS and PFOA; (2) "[b]eginning the necessary steps to propose designating PFOS and PFOA as 'hazardous substances'"; (3) developing groundwater cleanup recommendations; and (4) developing toxicity values.[107] The Action Plan sets out detailed recommended deadlines[108] for each task and explains each task in depth, including any concerns about regulation that the EPA may have.[109] Interestingly, the PFAS Action Plan is the first

101. PA. DEP'T ENVTL. PROT., PERFLUOROOCTANOIC ACID (PFOA) AND PERFLUOROOCTANE SULFONATE (PFOS), https://bit.ly/2G8IXaz (last visited Dec. 27, 2020).

102. *See Drinking Water Health Advisories for PFOA and PFOS*, *supra* note 17.

103. *See* PERFLUOROOCTANOIC ACID (PFOA) AND PERFLUOROOCTANE SULFONATE (PFOS), *supra* note 101.

104. *See Drinking Water Health Advisories for PFOA and PFOS*, *supra* note 17.

105. *See* U.S. ENVTL. PROT. AGENCY, EPA'S PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ACTION PLAN 1 (Feb. 2019), https://bit.ly/2NA4kpK.

106. In 2018, the EPA hosted a National Leadership Summit in Washington, D.C. to take action on PFAS contamination. *See PFAS National Leadership Summit and Engagement*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/2TW7yHK (last visited Dec. 27, 2020). The purpose of this Summit was to develop strategies to begin regulating PFAS. *See id.*

107. *See* EPA'S PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ACTION PLAN, *supra* note 105 at 2.

108. The EPA anticipated beginning the process of setting an MCL for PFOA and PFOS in 2019. *See id.* at 3.

109. *See id.*

initiative for which the EPA has "put together a multi-media, multi-program national research and risk communication plan."[110]

On February 26, 2020, the EPA released the "PFAS Action Plan: Program Update."[111] The Program Update lays out all the steps the EPA is planning to take regarding PFAS, including, but not limited to: developing new testing methods for PFAS in drinking water,[112] continuing to monitor PFAS in the new UCMR 5, issuing guidance for federal groundwater cleanup, and designating PFOS and PFOA as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act.[113] Setting an MCL is a time- and research-intensive process,[114] and with this plan, the EPA announced that it is in the midst of the first step.[115]

Despite the EPA's health advisory level and PFAS Action Plan, the EPA has not yet set MCLs for any PFAS.[116] Although, the EPA *has* taken steps towards setting an enforceable standard.[117] While the EPA is working to set an MCL for PFOS and PFOA, Congress, to its credit, has also been working to advance related legislation.[118]

C. Legislative Actions to Regulate PFAS

Federal legislators have proposed many bills providing for the regulation of PFAS but have yet to pass any such legislation.[119] In fact, 12 PFAS-related bills moved from subcommittee vote to full committee vote on September 26, 2019.[120] On January 10, 2020, the PFAS Action Act became the first of these bills to pass in the United States House of

110. U.S. ENVTL. PROT. AGENCY, EPA'S PFAS ACTION PLAN: PROGRAM UPDATE 2 (Feb. 2020), https://bit.ly/36OgHZi.

111. *See id.*

112. Drinking Water Method 533 is "a new validated method for testing additional PFAS in drinking water." *Id.* at 5. With this new method, the EPA can now measure 29 PFAS chemicals. *See id.*

113. *See* 42 U.S.C. §§ 9601–75 (2018); EPA'S PFAS ACTION PLAN: PROGRAM UPDATE, *supra* note 110 at 5–9.

114. *See infra* Section II.E.

115. *See* EPA'S PFAS ACTION PLAN: PROGRAM UPDATE, *supra* note 110 at 7; *see also infra* Section II.E.

116. *See* EPA'S PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ACTION PLAN, *supra* note 105; EPA'S PFAS ACTION PLAN: PROGRAM UPDATE, *supra* note 110.

117. *See* EPA'S PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) ACTION PLAN, *supra* note 105; EPA'S PFAS ACTION PLAN: PROGRAM UPDATE, *supra* note 110.

118. *See infra* Sections II.C–D.

119. *See, e.g.*, PFAS User Fee Act, H.R. 2570, 116th Cong. (2019); Protecting Communities from New PFAS Act, H.R. 2596, 116th Cong. (2019); Toxic PFAS Control Act, H.R. 2600, 116th Cong. (2019); PFAS Release Disclosure and Protection Act, S. 1507, 116th Cong. (2019).

120. *See* Tiffany Stecker, *Republicans Slam Regulating PFAS Under Superfund Law (1)*, BLOOMBERG LAW (Sept. 26, 2019), https://bit.ly/2SI4e16; *see also supra* note 119 and accompanying text.

Representatives.[121] If passed, these bills would essentially force the EPA to promulgate regulations regarding PFAS contamination.[122]

The Protect Drinking Water from PFAS Act was introduced by Congressman Brendan Boyle (D-PA) on April 29, 2019.[123] This Act would require the Administrator of the EPA to set an MCL for all PFAS substances, not just for PFOS and PFOA.[124] To that end, the Act would amend § 1412(b)(12) of the Safe Drinking Water Act (SDWA)[125] by adding the following language:

> (C) Per- and Polyfluoroalkyl Substances –
>
> > i. Notwithstanding any other deadline established in this subsection, not later than 2 years after the date of enactment of this subparagraph, the Administrator shall publish a maximum contaminant level goal and promulgate a national primary drinking water regulation for total per- and polyfluoroalkyl substances.[126]

The Prompt and Fast Action to Stop Damages Act, introduced by Senator Tom Udall (D-NM) and Senator Martin Heinrich (D-NM) on March 6, 2019, would begin to remediate preexisting PFAS contamination.[127] This act would authorize the Department of Defense to "temporarily provide water uncontaminated with [PFOA] and [PFOS] for agricultural purposes."[128] The military, specifically the Air Force, has used aqueous film-forming foam (AFFF) since the 1970s.[129] While AFFF has been used for actual fire emergencies, its main use is for training

121. *See* PFAS Action Act, H.R. 535, 116th Cong. (2019), *available at* https://bit.ly/3aCCPFD. On July 29, 2020, the House also voted to pass U.S. Representative Antonio Delgado's (NY-19) Water Resources Development Act, H.R. 7575. *See* Water Resources Development Act of 2020, H.R. 7575, 116th Cong. (2020). This bill requires the Army Corps of Engineers to take inventory of all PFAS contamination on their sites and plan to clean up said contamination. *See id.*; *see also* Press Release, U.S. Congressman Antonio Delgado, House Passes Rep. Delgado's Bipartisan Legislation to Identify PFAS Contamination at Federal Water Projects (July 29, 2020), https://bit.ly/3nGCYhU.

122. *See* David Schultz, *Senate Bill Would Have EPA Regulate PFAS in Drinking Water (1)*, BLOOMBERG LAW (June 19, 2019), https://bit.ly/2RlpDgF (explaining how federal legislation can force the EPA to promulgate regulations). The National Defense Authorization Act for Fiscal Year 2020, S. 1790, 116th Cong. (2019), discussed in Schultz's article, became law on Dec. 20, 2019. *See id.* For the law to pass, the section about PFAS funding was removed, but the rest of the cited article is still accurate. *See id.*

123. Protect Drinking Water from PFAS Act, H.R. 2377, 116th Cong. (2019), *available at* https://bit.ly/2tGRvD5.

124. *See id.*

125. 42 U.S.C. §§ 300g–j-27 (2018).

126. H.R. 2377.

127. *See* Prompt and Fast Action to Stop Damages Act, S. 675, 116th Cong. (2019).

128. *Id.*

129. *See id.*

purposes.[130] AFFF contains PFAS and has contaminated military bases throughout the United States.[131] Specifically, AFFF infiltrates the drinking water and groundwater near military bases.[132] This contaminated groundwater, when used for agricultural purposes, contaminates the food grown and animals raised on the farms.[133]

For example, Fred Stone, the dairy farmer in Maine,[134] was forced to shut down his dairy farm after he was informed that his cows' milk was contaminated with PFAS.[135] The milk was contaminated with over 20 times the health advisory limit for PFAS in drinking water.[136] While this contamination did not originate from a military base, as it so often does, the resulting contamination was just as serious.[137] The contamination on Mr. Stone's farm came from a wastewater-sludge-disposal program Mr. Stone took part in 15 years prior.[138] Mr. Stone's situation not only highlights how PFAS affects people's drinking water, but also how PFAS affects farmland.[139] Mr. Stone's whole life and source of income was taken from him because of these "forever chemicals."[140] Mr. Stone echoed the impact PFAS had on his life: "These cows, this land are our assets. . . . Now they're worthless."[141]

The Prompt and Fast Action to Stop Damages Act would allow Congress to temporarily support the Department of Defense in addressing PFAS contamination on and around military sites until federal agencies, such as the EPA, create appropriate PFAS regulation.[142] This bill would also allow the Air Force to cover relocation expenses for landowners of contaminated land to ease the remediation of any contamination related to the Air Force's activities with AFFF.[143]

While legislators have proposed many federal bills related to PFAS contamination, to date, none have been enacted as law.[144] While

130. *See* AG Letter, *supra* note 41 at 2.

131. S. 675; *see also* Karen Jowers, *Here's an Updated Map of Military Sites Where DoD Found Cancer-Causing Chemicals in the Drinking Water*, MIL. TIMES (July 14, 2019), https://bit.ly/3eCHcCR (showing a map of the 175 military installations nationwide currently known to be contaminated with PFAS).

132. *See* S. 675.

133. *See id.*

134. *See supra* Section I.

135. *See* Rizzuto, *supra* note 1.

136. *See id.*

137. *See id.*

138. *See id.*

139. *See id.*

140. *See id.*

141. *Id.*

142. *See* Prompt and Fast Action to Stop Damages Act, S. 675, 116th Cong. (2019).

143. *See id.*

144. *See, e.g.*, PFAS User Fee Act, H.R. 2570, 116th Cong. (2019); Protecting Communities from New PFAS Act, H.R. 2596, 116th Cong. (2019); Toxic PFAS Control

Congress should continue to push the EPA to regulate PFAS, states have the ability to adopt their own and possibly stricter regulations.[145] States' MCLs, ideally, should be set at a strict enough level to protect the public health, safety, and welfare.[146] In fact, some states already regulate PFAS.[147]

D. State Actions to Regulate PFAS

Many states are not waiting for the EPA to set an MCL for PFAS and are regulating PFAS on their own.[148] While many states are working to regulate PFAS, the legislative and administrative actions of New Jersey, Michigan, Minnesota, and New Hampshire are detailed below.[149] These states have been most aggressive at tackling PFAS contamination, and their actions should be mirrored across the country.[150] The actions, and inaction, of Pennsylvania are also discussed.[151]

1. New Jersey

New Jersey is on the forefront of regulating emerging contaminants such as PFAS.[152] The New Jersey Department of Environmental Protection (NJDEP) adopted an amendment to the New Jersey Administrative Code that set an MCL of 14 ppt for PFOA and 13 ppt for PFOS in drinking water.[153] In other terms, the MCL is set at 0.014 micrograms per liter for PFOA and 0.013 micrograms per liter for PFOS

Act, H.R. 2600, 116th Cong. (2019); PFAS Release Disclosure and Protection Act, S. 1507, 116th Cong. (2019).

145. *See* 42 U.S.C. § 300g-2(a)(1) (2018) (providing that states may "adopt[] drinking water regulations that are no less stringent than the national primary drinking water regulations . . . .").

146. *See infra* Section III.B.

147. *See infra* Section II.D.

148. *See* Ground Water Quality Standards and Maximum Contaminant Levels (MCLs) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), 51 N.J. Reg. 437(a) (adopted June 1, 2020), *available at* https://bit.ly/2vnYHV9; *Michigan PFAS Action Response Team: Executive Order 2019-03*, DEP'T. ENV'T, GREAT LAKES, & ENERGY, https://bit.ly/2WT3LuR (last visited Dec. 27, 2020); *see also* Press Release, N.H. Dep't. of Envtl. Servs., NHDES Submits Final Rulemaking Proposal for PFOA, PFAS, PFHxS and PFNA (June 28, 2019), https://bit.ly/3mQ9OLA.

149. *See infra* Sections II.D.1–4.

150. *See infra* Sections II.D.1–4.

151. *See infra* Section II.D.5.

152. *See* Press Release, N.J. Dep't. of Envtl. Prot., Affirming National Leadership Role, New Jersey Proposes Stringent Drinking Water Standards for PFOA and PFOS (Apr. 1, 2019), https://bit.ly/32oIRXR ("New Jersey is leading the way in addressing an issue of national importance by setting the first drinking water standards in the nation . . . [for PFAS].").

153. *See* 51 N.J. Reg. 437(a) (adopted June 1, 2020).

in drinking water.[154] The amendment became effective in New Jersey on June 1, 2020.[155]

This amendment includes both public-community[156] and public-noncommunity[157] water sources.[158] Both the New Jersey Private Well Testing Act[159] and the New Jersey Safe Drinking Water Act[160] are now amended by the NJDEP's new regulation.[161] The amendment to the Private Well Testing Act requires testing of private wells subject to any sale or leasing while the amendment to the New Jersey Safe Drinking Water Act requires testing of any newly constructed wells for PFOA, PFOS, and perfluorononanoic acid (PFNA).[162] Lastly, both PFOS and PFOA were added to New Jersey's list of hazardous substances.[163]

While PFOS and PFOA are currently the greatest concern, New Jersey has taken the lead on regulating other types of PFAS as well.[164] On September 4, 2018, New Jersey set an MCL for drinking water of 13 ppt for PFNA,[165] and on January 16, 2018, New Jersey set a specific groundwater quality standard for PFNA at 13 ppt.[166] Further, New Jersey was the first state to set an MCL for any kind of PFAS.[167] But New Jersey is not only on the forefront of setting MCL regulations for

154. *See id.*

155. *See* Affirming National Leadership Role, New Jersey Proposes Stringent Drinking Water Standards for PFOA and PFOS, *supra* note 152.

156. Community water systems have "at least 15 services connections used by year around residents, or regularly serves at least twenty-five year around residents." *SWAP – Frequently Asked Questions*, N.J. DEP'T ENVTL. PROT., https://bit.ly/2CnUMrD (last visited Dec. 27, 2020).

157. Noncommunity water systems are "public water system[s] used by individuals other than year around residents for at least sixty days of the year." *Id.*

158. *See* Ground Water Quality Standards and Maximum Contaminant Levels (MCLs) for Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), 51 N.J. Reg. 437(a) (adopted June 1, 2020), *available at* https://bit.ly/2vnYHV9.

159. N.J. STAT. ANN. §§ 58:12A-26 to 58:12A-377 (West 2019).

160. *Id.* §§ 58:12A-1 to 58:12A-25.

161. *See* 51 N.J. Reg. 437(a).

162. PFNA is another type of PFAS used in the production of nonstick coatings and stain repellent. *See Perfluorononanoic Acid (PFNA): EWG's Tap Water Database*, ENVTL. WORKING GROUP, https://bit.ly/2t4a040 (last visited Dec. 27, 2020); *see also* 51 N.J. Reg. 437(a).

163. *See* 51 N.J. Reg. 437(a); *see also* N.J. DEP'T ENVTL. PROT., COMMUNITY RIGHT TO KNOW ENVIRONMENTAL HAZARDOUS SUBSTANCE (EHS) LIST IN CAS NUMBER ORDER (Jan. 2018), https://bit.ly/33wkOEW.

164. *See* Affirming National Leadership Role, New Jersey Proposes Stringent Drinking Water Standards for PFOA and PFOS, *supra* note 152.

165. *See id.*

166. *See id.*

167. *See id.*

PFAS—it has also been on the forefront of suing companies for their PFAS contamination.[168]

To hold polluters accountable for their actions, on March 27, 2019, New Jersey's Attorney General, Gurbir S. Grewal, and Department of Environmental Protection Commissioner, Catherine R. McCabe, filed four Natural Resource Damage (NRD) lawsuits[169] against DuPont de Nemours and Co.,[170] Chemours Co.,[171] and 3M[172] in the Superior Court of New Jersey.[173] On July 5, 2019, these cases were removed to the United States District Court for the District of New Jersey.[174] These NRD lawsuits asserted claims under New Jersey's Water Pollution Control Act[175] and Spill Compensation and Control Act,[176] along with various tort claims.[177] On top of the NRD lawsuits, the NJDEP issued Directive Orders requiring the defendant-companies "to pay for continued testing and treatment of PFAS-contaminated waters at and near the affected sites," any additional treatment of private and public water supply wells, and the cleanup and removal of any contamination.[178]

168. *See* Press Release, N.J. Dep't. of Envtl. Prot., Attorney General, DEP Announce Suit Against 3M, DuPont, Others for Making, Selling Toxic Chemicals in Firefighting Foam Products (May 14, 2019), https://bit.ly/34O6dGV.

169. In New Jersey, Natural Resource Damage lawsuits are used to compensate the state for injury to natural resources. *See* Nicole R. Moshang & Maria C. Salvemini, *New Jersey and Natural Resource Damages in 2019*, MGKF SPECIAL ALERT – N.J. FORECAST 2019 (Jan. 14, 2019), https://bit.ly/2uuPc6t; *see also* N.J. STAT. ANN. § 58:10-23.11u.b.(4) (West 2020) (authorizing the state to recover "the cost of restoration and replacement of any natural resource" injured by a discharge of hazardous substances or pollutants).

170. *See supra* note 80 and accompanying text.

171. Chemours, a spin-off of DuPont created in 2015, manufactures products for brands such as Teflon, Ti-Pure, and Krytox. *Brands & Products*, CHEMOURS, https://bit.ly/39WGj7s (last visited Dec. 27, 2020).

172. 3M manufactures products for brands such as Command, Post-it, Nexcare, and Scotch. *Brands*, 3M, https://3m.com (last visited Dec. 27, 2020).

173. *See* Press Release, Dep't. of Law & Public Safety, AG Grewal, DEP Commissioner Announce 4 New Environmental Lawsuits Focused on Contamination Allegedly Linked to DuPont, Chemours, 3M (Mar. 27, 2019), https://bit.ly/35DlADL; *see e.g.*, N.J. Dep't of Envtl. Prot. v. E.I. Dupont de Nemours, L-002448-19 (N.J. Super. Ct. Law Div. July 5, 2019); N.J. Dep't of Envtl. Prot. v. E.I. Dupont de Nemours & Co., L-000057-19 (N.J. Super. Ct. Law Div. July 5, 2019).

174. These cases were consolidated for pretrial purposes, including discovery, and on August 31, 2020, the NJDEP filed an amended complaint. *See generally* N.J. Dep't Envtl. Prot. v. E.I. Dupont de Nemours & Co., 3:19-cv-14767 (D.N.J. Jan. 3, 2020); N.J. Dep't of Envtl. Prot. v. E.I. Dupont de Nemours & Co., 1:19-cv-14765 (D.N.J. Nov. 12, 2019) (docketing New Jersey's NRD lawsuits).

175. N.J. STAT. ANN. §§ 58:10A-1 to 58:10A-73 (West 2019).

176. N.J. STAT. ANN. §§ 58:10-23.11 to 58:10-23.11z (West 2019).

177. *See* AG Grewal, DEP Commissioner Announce 4 New Environmental Lawsuits Focused on Contamination Allegedly Linked to DuPont, Chemours, 3M, *supra* note 173.

178. *See id.*

2. Michigan

Michigan is home to more known PFAS contamination sites than any other state in the nation.[179] The existence of these sites is not necessarily a result of Michigan having more PFAS contamination but, rather, Michigan's testing of all public drinking-water supplies, schools, and public industrial wastewater since 2018.[180] To handle the large number of contamination sites, Michigan assembled a PFAS Action Response Team (MPART), a mix of officials from ten different state departments including: the Michigan Department of Military and Veterans Affairs; the Michigan Department of Environment, Great Lakes, and Energy; and the Michigan Department of Health and Human Services.[181] The main purpose of MPART is to protect drinking water, investigate sources and locations of PFAS contamination, and maintain constant transparency to the public.[182]

MPART has also tested deer and fish throughout the state to determine the PFAS levels in these animals.[183] In October of 2018, Michigan's Department of Health of Human Services and Department of Natural Resources issued a "Do Not Eat" advisory for any deer within five miles of Clark's Marsh in Oscoda Township.[184] The levels of PFOS found in one affected deer in the area was 547 parts per billion (ppb); the level at which action is recommended in Michigan is 300 ppb.[185] These deer have high levels of PFAS, specifically PFOS, because of the nearby former Wurtsmith Air Force Base.[186] MPART continues to research and investigate PFAS' effects on the food supply in Michigan.[187]

On July 22, 2020, the Michigan Department of Environment, Great Lakes, and Energy announced that Michigan would adopt strict regulations for PFAS in drinking water.[188] These regulations became

179. *See* Paula Gardner, *Michigan Has More PFAS Sites than Other States. There's a Reason.*, MLIVE (Aug. 26, 2019), https://bit.ly/32DjNK8 ("Michigan identified nearly 100 PFAS contamination sites."); *see also* Garret Ellison, *All Known PFAS Sites in Michigan*, MLIVE, https://bit.ly/36PCxt2 (last visited Dec. 27, 2020) (exhibiting a map of PFAS sites in Michigan).

180. *See* Gardner, *supra* note 179.

181. *See Michigan PFAS Action Response Team: Executive Order 2019-03*, *supra* note 148.

182. *See id.*

183. *See Michigan PFAS Action Response Team: PFAS in Deer*, DEP'T. ENV'T, GREAT LAKES, & ENERGY, https://bit.ly/2rrulPn (last visited Dec. 27, 2020).

184. *See id.*

185. *See id.*

186. *See id.*

187. *See id.*; *see also Michigan PFAS Action Response Team: Executive Order 2019-03*, *supra* note 148.

188. *See* Press Release, Dep't. Env't, Great Lakes, & Energy, Mich. PFAS Action Response Team, Michigan Adopts Strict PFAS in Drinking Water Standards (July 22, 2020), https://bit.ly/34O9HJv.

effective on August 3, 2020 and set MCLs for seven PFAS chemicals including PFNA, PFOA, and PFOS.[189] The levels are set at 6 ppt for PFNA, 8 ppt for PFOA, and 16 ppt for PFOS.[190] Additionally, these new standards add 42 new sites, mainly landfills and former plating or manufacturing sites, to MPART's list of ongoing PFAS investigations.[191]

On January 14, 2020, Michigan Attorney General Dana Nessel filed a lawsuit in Washtenaw County Circuit Court against 17 defendants, including 3M and DuPont, for damages and injury to the state caused by PFAS contamination.[192] The complaint alleges that the defendants "deliberately and intentionally concealed the dangers of PFAS" and "intentionally, purposefully, recklessly, and/or negligently" handled PFAS in a way the defendants knew would cause harm to Michigan residents.[193] This is the first lawsuit brought in Michigan regarding PFAS contamination.[194]

3. Minnesota

Minnesota is home to 3M Corporation, a major chemical manufacturer that has been manufacturing with PFAS since the 1940s.[195] More importantly, 3M was the sole manufacturer of AFFF through the 1970s.[196] In 2002, The Minnesota Pollution Control Agency detected PFOS and PFOA around the 3M manufacturing facility in Cottage Grove, Michigan.[197] Investigations of the East Metro area in Minnesota identified a groundwater contamination area of over 150 square-miles.[198] From this area alone, over 140,000 Minnesota citizens use drinking-water supplies that have been contaminated by PFAS.[199] This contamination led the Minnesota Pollution Control Agency to request the Minnesota Department of Health to set "Health Based Values" for PFOS

189. *See id.*

190. *See id.*

191. *See id.*

192. *See Michigan Files Lawsuit Against 3M, DuPont and others for PFAS Contamination*, DEP'T ATT'Y GEN. (Jan. 14, 2020), https://bit.ly/30Wp93M; *see also* Complaint, Mich. v. 3M Co., 2020-__-NZ, at 1 (Mich. Cir. Ct. Jan. 14, 2020).

193. *Michigan Files Lawsuit Against 3M, DuPont and others for PFAS Contamination*, *supra* note 192; see *also* Complaint, Mich. v. 3M Co., 2020-__-NZ, at 26; 28.

194. *See Michigan Files Lawsuit Against 3M, DuPont and others for PFAS Contamination*, *supra* note 192.

195. *See PFAS History*, 3M, https://bit.ly/2Q4jMfm (last visited Dec. 27, 2020).

196. *See id.*

197. *See History of Perfluoroalkyl Substances (PFAS) in Minnesota*, MINN. DEP'T HEALTH, https://bit.ly/36U3oEv (last visited Dec. 27, 2020).

198. *See id.*

199. *See id.* ("Over 2,600 private wells have been sampled and 798 drinking water advisories issued.").

and PFOA.[200] Recently, the Minnesota Department of Health issued a new, stricter Health Based Value for PFOS.[201] Previously set at 27 ppt, the value as of April 3, 2019, was 15 ppt.[202]

In 2010, Minnesota's Attorney General sued 3M, alleging that the production of perfluorochemicals (PFCs)[203] "damaged drinking water and natural resources in the Twin Cities Metropolitan Area."[204] On February 20, 2018, Minnesota settled its lawsuit against 3M for $850 million.[205] About $720 million of the settlement was set aside for the area's rehabilitation.[206] Specifically, Minnesota's first priority is ensuring safe drinking water in the area, and its second priority is enhancing the natural resources in the area.[207] Once these goals are achieved, any remaining funds will be used for the rehabilitation of contamination sites statewide.[208]

4. New Hampshire

Lastly, New Hampshire has also taken the initiative to regulate PFAS contamination on its own. On June 28, 2019, New Hampshire's Department of Environmental Services (NHDES) proposed MCLs for PFOA, PFOS, perfluorohexanesulfonic acid (PFHxS),[209] and PFNA at 12 ppt, 15 ppt, 18 ppt, and 11 ppt, respectively.[210] In November 2019, after the New Hampshire legislature adopted these standards, Merrimack Superior Court Judge Richard McNamara granted an injunction, requested by 3M, requiring the NHDES to stop enforcing the strict PFAS

200. Health Based Values are functionally similar to health advisory levels. *See id.*; *see also supra* Section II.B.

201. *See History of Perfluoroalkyl Substances (PFAS) in Minnesota*, *supra* note 197.

202. *See id.*

203. While PFCs are not PFAS, they are closely related. *See What are PFCs and How Do They Relate to Per- and Polyfluoroalkyl Substances (PFAS)?*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/3aN4mUH (last visited Dec. 27, 2020). Until recently, both terms were used interchangeably, but there has been a push to distinguish the two. *See id.* PFCs are not toxic, according to the EPA, but are a major component in climate change. *See id.*

204. *Minnesota 3M PFC Settlement*, MINN. POLLUTION CONTROL AGENCY, https://3msettlement.state.mn.us/ (last visited Dec. 27, 2020); *see also* Complaint, Minnesota et al. v. 3M Co., No. 27-CV-10-28862, at 8 (Minn. 4th Jud. Dist. Dec. 30, 2010).

205. *See Minnesota 3M PFC Settlement*, *supra* note 204.

206. *See id.*

207. *See id.*

208. *See id.*

209. PFHxS is another type of PFAS commonly used in manufacturing plastic and nonstick products. *See Perfluorohexane sulfonate (PFHXS): EWG's Tap Water Database*, ENVTL. WORKING GROUP, https://bit.ly/2RUTOdy (last visited Dec. 27, 2020).

210. *See* NHDES Submits Final Rulemaking Proposal for PFOA, PFAS, PFHxS and PFNA, *supra* note 148.

standards by the end of the year.[211] Despite the injunction and delays, New Hampshire's Governor signed House Bill 1264 into law on July 23, 2020, setting MCLs for drinking water at the previously indicated levels.[212] The bill also requires that $50 million be set aside for loans to communities to remediate drinking water with PFAS exceeding the MCLs.[213]

New Hampshire has sued 3M, DuPont, Chemours, and five other firefighting-foam manufacturers in the state.[214] These lawsuits claim that the named companies were malicious and negligent because they "knew for decades" that PFAS chemicals were harmful.[215] New Hampshire hopes these lawsuits will help the state pay for treatment, remediation, disposal, and any other response and management costs arising from PFAS.[216] On August 14, 2019, this lawsuit was transferred to the United States District Court for the District of South Carolina.[217] The case was combined with other lawsuits from all over the United States regarding AFFF firefighting foam and is currently being heard by a special United States Judicial Panel on Multidistrict Litigation.[218]

Lastly, New Hampshire created a website dedicated to keeping the public informed about the state's PFAS investigations.[219] The website contains information about what PFAS are and how citizens can get their

211. *See* Adrianne Appel, *New Hampshire Judge Suspends State's New PFAS Restrictions*, BLOOMBERG LAW (Nov. 26, 2019), https://bit.ly/2LsaFW7. *See generally* Plymouth Vill. Water & Sewer v. Robert R. Scott, Comm'r of the N.H. Dep't of Envtl. Servs, No. 217-2019-CV-00650 (N.H. Super. Ct. Nov. 26, 2019) (requesting an injunction against New Hampshire to stop enforcing strict PFAS standards because 3M is, arguably, not able to comply).

212. *See* H.B. 1264, 2020 Session (N.H. 2020); *see also* John Gardella, *New Hampshire Adopts Aggressive PFAS Drinking Water Bill*, X NAT. L. REV. 206 (2020), https://bit.ly/32nzveN.

213. *See* H.B. 1264, *supra* note 212; *see also* Gardella, *supra* note 212.

214. *See* Annie Ropeik, *N.H. Sues Makers of PFAS Chemicals for Drinking Water Contamination*, N.H. PUB. RADIO (May 29, 2019), https://bit.ly/32y4rpS. *See generally* New Hampshire v. 3M Co., 216-2019-CV-00446 (N.H. Super. Ct. Aug. 14, 2019) (docketing case against 3M, DuPont, Chemours, and five other companies for manufacturing firefighting foam with PFAS).

215. Ropeik, *supra* note 214. *See generally 3M*, 216-2019-CV-00446 (docketing New Hampshire firefighting foam litigation).

216. *See* Ropeik, *supra* note 214.

217. *See generally 3M*, 216-2019-CV-00446 (docketing New Hampshire firefighting-foam litigation); *In re*: Aqueous Film-Forming Foams Products Liability Litigation, MDL No. 2:18-mn-2873-RMG (D.S.C. 2018) (docketing multidistrict firefighting foam litigation).

218. *See generally In re: Aqueous Film-Forming Foams Products Liability Litigation*, MDL No. 2:18-mn-2873-RMG (docketing multidistrict firefighting foam litigation).

219. *See NH PFAS Investigation*, N.H. DEP'T OF ENVTL. SERVS., https://bit.ly/2KWGTYO (last visited Dec. 27, 2020).

own drinking water tested.[220] The website even includes an interactive map that highlights every water well in the state that has been sampled.[221] Each well location shows the levels of PFOA, PFOS, PFHxS, PFNA, and total known PFAS concentrations found.[222] NHDES has stated that its next step in addressing PFAS contamination is to help the drinking water and wastewater authorities comply with the new contaminant standards.[223]

5. Pennsylvania

In September 2018, Pennsylvania Governor Tom Wolf formed the PFAS Action Team to address the "growing national concerns surrounding" PFAS.[224] The Action Team consists of, and is led by, the secretaries of Environmental Protection; Health; Military and Veterans Affairs; Community and Economic Development; and Agriculture, as well as the State Fire Commissioner.[225] Together, the Action Team and the Pennsylvania Department of Environmental Protection (PA DEP) have been conducting case studies of potentially contaminated areas.[226] Two sites of major concern in Southeastern Pennsylvania—the Easton Road and Ridge Run Hazardous Sites Cleanup Program Sites—have been investigated and studied in-depth.[227] Some other sites being studied for PFAS contamination include, but are not limited to, Penn State's Former Fire Training Site, the Pittsburgh Air National Guard Base and Air Reserve Station, and the Boyertown landfill.[228]

While the Pennsylvania PFAS Action Team and the PA DEP are studying PFAS contamination around the state, the PA DEP has announced that it does not intend to stray from the EPA's health advisory level at this time.[229] Instead, the state will remediate any PFAS

220. *See id.*

221. *See NHDES PFAS Sampling*, N.H. DEP'T ENVTL. SERVS., https://bit.ly/2qCwojd (last visited Dec. 27, 2020).

222. *See id.*

223. *See NH PFAS Investigation*, *supra* note 219.

224. *PFAS in Pennsylvania*, PA. DEP'T ENVTL. PROT., https://bit.ly/2RsBpFU (last visited Dec. 27, 2020).

225. *See id.*

226. *See id.*

227. *See Easton Road PFC Site*, PA. DEP'T ENVTL. PROT., https://bit.ly/2KUCBRV (last updated Oct. 2020) (stating that samples at the Easton Road Site range from non-detect to 229 ppt for combined PFOA and PFOS); *see also Ridge Run PFAS Site*, PA. DEP'T ENVTL. PROT., https://bit.ly/37O6pbC (last updated Apr. 2020) (stating that samples at the Ridge Run Site range from non-detect to 16,360 ppt for combined PFOA and PFOS).

228. *See PFAS in Pennsylvania*, *supra* note 224.

229. *See DEP Involvement*, PA. DEP'T ENVTL. PROT., https://bit.ly/2Ogxjz1 (last visited Dec. 27, 2020).

contamination found above 70 ppt, although not a legally enforceable level.[230] The DEP website explicitly states that:

> Under authority of the Pennsylvania Safe Drinking Water Act and regulations, DEP has the authority to require corrective actions on a case-by-case basis for a public water system in which an unregulated contaminant is present and creates a risk to public health. As per long-standing protocol, DEP utilizes EPA's [health advisory levels] to determine risk to public health.
>
> At this time, DEP does not intend to deviate from the health advisories EPA has established for PFOA and PFOS.[231]

So, unlike other states that have set their own stricter health advisory levels and MCLs, Pennsylvania has decided instead to follow the EPA's lead.[232] In 2019, Patrick McDonnell, Secretary of the PA DEP, stated that the PA DEP wants to first "see action at the federal level" before acting on its own.[233] Pennsylvania has never set its own MCL and is seeking guidance from the EPA.[234] The regulatory process takes a long time, typically at least two years; this is a long and burdensome process for environmental departments that do not have the proper tools.[235]

Pennsylvania residents want the process to move faster, especially in Horsham, Warrington, and Warminster, where residents have found elevated levels of PFAS in their blood.[236] Pennsylvania should follow New Jersey and New Hampshire's lead by setting its own MCLs for PFAS.[237] At the very least, Pennsylvania should begin by setting a standard for PFOS and PFOA, the two most common types of PFAS, to protect as many Pennsylvanians as possible from contamination.[238]

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230. *See id.*

231. *See id.*

232. *See id.*

233. Laura McCrystal, *Pa. Officials Plan to Regulate and Test for PFAS – but Residents Want Faster Results*, PHILA. INQUIRER (Apr. 15, 2019), https://bit.ly/3aFqIYm.

234. *See id.* ("The state is working to hire a toxicologist to advise the state on this process by reviewing scientific research and other states' regulations.").

235. *See id.*; *see also infra* Section II.E.

236. Tests of communities in the Bucks-Montgomery County area in Pennsylvania showed average levels of 7.63 micrograms per liter of PFHxS in residents' bloodstream. *See* Laura McCrystal & Justine McDaniel, *First Blood Tests in Bucks, Montco Show Above-Average Contamination After Tainted Water*, PHILA. INQUIRER (Nov. 26, 2018), https://bit.ly/2tQUVTB. This is more than five times the national average. *See id.* Local levels of PFOS were more than double the national average while local levels of PFOA were more than 1.5 times the national average. *See id.*

237. *See* Affirming National Leadership Role, New Jersey Proposes Stringent Drinking Water Standards for PFOA and PFOS, *supra* note 152 (detailing New Jersey's MCLs for PFOS and PFOA); *see also* NHDES Submits Final Rulemaking Proposal for PFOA, PFOS, PFHxS and PFNA, *supra* note 148 (detailing New Hampshire's MCLs for PFOA, PFOS, PFHxS, and PFNA).

238. *See infra* Section III.B.2.

E. How to Set an MCL

Understanding how the EPA sets a maximum contaminant level (MCL) is an important step in comprehending the reasons why MCLs have not yet been set for PFAS contaminants.[239] After determining that a chemical should be regulated, the EPA sets a maximum-contaminant-level goal (MCLG).[240] The EPA sets MCLGs based on data collected from surveying various drinking-water supplies throughout the United States.[241] MCLGs, similar to health advisory levels,[242] are "non-enforceable public health goals" that consider *only* a chemical's adverse health effects on humans.[243] These levels are set at "the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur."[244] In other words, MCLGs must be set at a level that allows for an "adequate margin of safety."[245] Regulators specifically consider groups of people who are more sensitive to health risks, such as children and the elderly, when setting MCLGs.[246]

After an MCLG is set, an MCL is set as close to the MCLG as is feasible.[247] MCLs are determined using the best available technology and cost-benefit analysis.[248] For example, while the MCLG of a chemical carcinogen[249] in drinking water would be set at zero, this level would be extremely difficult, if not impossible, to achieve for an MCL because a zero-level MCL would require a total absence of chemical carcinogen presence in the water.[250] An MCL must be set at a level that is actually achievable but also beneficial enough to make setting the level and cleaning the water worth the costs.[251]

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239. States that set MCLs do so in a process similar to the EPA's process. *See How Drinking Water Standards are Created in California*, CLEAN WATER ACTION, https://bit.ly/2TXjQiZ (last visited Dec. 27, 2020).

240. *See generally How EPA Regulates Drinking Water Contaminants*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/2uASXql (last visited Dec. 27, 2020) (explaining the process the EPA uses to set MCLs).

241. *See id.*

242. *See supra* Section II.B.

243. *How EPA Regulates Drinking Water Contaminants*, *supra* note 240.

244. *Id.*

245. *Id.*

246. *See id.*

247. *See id.*

248. *See id.* Cost-benefit analysis involves weighing the costs of a decision against the benefits the decision would produce, to determine how the decision should be made. *See* Cost-Benefit Analysis, CTRS. FOR DISEASE CONTROL & PREVENTION, https://bit.ly/3dgVGrj (last visited Dec. 27, 2020); *see also infra* Section III.B.

249. A carcinogen is "a substance or agent causing cancer." *Carcinogen*, MERRIAM-WEBSTER.COM DICTIONARY, https://bit.ly/31PFs2T (last visited Dec. 27, 2020).

250. *See How EPA Regulates Drinking Water Contaminants*, *supra* note 240.

251. *See id.*; *see also* Cost-Benefit Analysis, *supra* note 248.

A simple example of the sort of cost-benefit analysis mentioned above is used when deciding whether to build a new coal-fired power plant.[252] Under a pure cost-benefit analysis, the power plant would not be built if the anticipated pollution costs arising from the plant would outweigh the benefits—like new jobs brought to the area.[253] If, however, the benefits outweigh the costs of pollution, the power plant would be built.[254] Similarly, while the benefits of setting overly-strict MCLs may be great, such requirements would likely force factories that cannot comply to shut down.[255] In any event, if the requisite technology required to comply with an MCL does not exist, it will be impossible to achieve the end goals of a stringent MCL.[256] These crucial factors must be considered when setting feasible MCLs.

PFAS are found almost everywhere in the United States today and greatly impact human health and safety.[257] Regardless of EPA action, states can and must create stricter MCLs to protect the public health and safety.[258] States should set feasible MCLs for drinking water based on the level of PFAS contamination in their states and the size of their budgets because states can more effectively regulate PFAS than the federal government.[259]

III. ANALYSIS

When the EPA regulates contaminants in drinking water by creating a maximum contaminant level (MCL),[260] that MCL is enforceable throughout all of the United States.[261] The EPA should set an MCL for PFAS contaminants in drinking water because the agency would then have the ability to regulate PFAS in the whole country uniformly.[262] However, if the EPA does not act, Congress has the ability to force the

252. *See More on Benefit-Cost Analysis: A Simple Example*, ENVTL. ECON. (July 15, 2005), https://bit.ly/37t9Ukq.

253. *See id.*

254. *See id.*

255. *See id.*; *see also How EPA Regulates Drinking Water Contaminants*, *supra* note 240.

256. *See How EPA Regulates Drinking Water Contaminants*, *supra* note 240.

257. *See* AG Letter, *supra* note 41 at 1–2; *see also The Science Panel Website*, *supra* note 10.

258. *See infra* Section III.A.

259. *See infra* Section III.B.

260. MCLs are "[t]he highest level of a contaminant that is allowed in drinking water." *National Primary Drinking Water Regulations*, *supra* note 14.

261. One of the many requirements of the Safe Drinking Water Act (SDWA) is to set national primary drinking water standards. *See* 42 U.S.C. § 300g-1 (2018).

262. *See How EPA Regulates Drinking Water Contaminants*, *supra* note 240; *see also National Primary Drinking Water Regulations*, *supra* note 14.

EPA to set national standards.[263] While national PFAS standards are important for consistent regulation, states are able to set stricter standards than the EPA.[264] Even if the EPA sets an MCL, in order to protect their own constituents, states should set MCLs for PFAS in drinking water at even stricter levels than the EPA.[265]

Each state has problems and concerns that differ from those of neighboring states.[266] While the federal government has the power and funding to set national regulations,[267] states better understand the needs of their own constituents.[268] Due to smaller constituent bases, state and local government officials are easier to contact than those at the federal level.[269] The voice of one person in a room of 100 will be heard louder and clearer than a voice in a room of 10,000. States also have more flexibility than their federal counterpart to find funding solutions, and this flexibility allows for more and stricter regulation.[270]

While it is important for the EPA to continue researching PFAS and for Congress or the EPA to eventually create laws and regulations regarding PFAS, states, in setting stricter PFAS regulations, can protect the general public health and safety now. States are better equipped to regulate according to the needs of their constituents and, because of this ability, can protect the most people from PFAS quickly and efficiently.

A. States Should Set Stricter MCLs than the EPA and Congress

Ideally, to protect the most people, states should set the strictest MCLs possible.[271] However, strict MCLs make it more difficult to ensure that drinking water meets the requisite standard.[272] MCLs must be set at

263. *See* Schultz, *supra* note 122; *see also* Protect Drinking Water from PFAS Act, H.R. 2377, 116th Cong. (2019), *available at* https://bit.ly/2tGRvD5.

264. *See* 42 U.S.C. § 300g-2(a)(1) (2018) (providing that states may "adopt[] drinking water regulations that are no less stringent than the national primary drinking water regulations . . . .").

265. *See infra* Section III.A.

266. *See* Mary Graham, *Why States Can Do More*, AM. PROSPECT (Nov. 16, 2001), https://bit.ly/36kA6xa ("'Most of the problems remaining now . . . are site-specific, varying from area to area and requiring tailored controls at the regional, state, or local level for effective mitigation,' the EPA Science Advisory Board concluded in 1990.").

267. *See id.* ("Inadequate funding is the most important issue . . . 83 percent of state program managers . . . sa[id] that they were reluctant to accept any new program responsibilities because they did not have resources to fund current programs.").

268. *See id. But see* Meredith Medoway, *Why the Federal Government, Not States, Should Regulate the Environment*, MIC (Feb. 11, 2012), https://bit.ly/2NTOUMT.

269. *See generally* Graham, *supra* note 266 (explaining why states are better at environmental regulation than the federal government).

270. *See infra* Section III.B.1.

271. *See National Primary Drinking Water Regulations*, *supra* note 14.

272. *See id. See generally* New Hampshire v. 3M Co., 216-2019-CV-00446, (N.H. Super. Ct. Aug. 14, 2019) (arguing that New Hampshire's MCLs are too strict for 3M to comply with).

feasible[273] levels, using the best available technology and cost-benefit analysis.[274] If the costs of regulation and compliance outweigh the benefits of regulating, the MCL will not be feasible.[275]

Considering these factors, states should set MCLs relative to their contamination levels, while considering the state's ability to regulate. Accordingly, states such as New Jersey, Michigan, and Minnesota—with large concentrations of PFAS contamination, and larger departments of environmental protection[276]—should set stricter standards than states with lower concentrations of PFAS contamination and smaller, less robust, departments of environmental protection.[277] While no water supply will ever be completely free of harmful contaminants, public health can still be protected by regulating the level of PFAS found in drinking-water supplies and by cleaning highly contaminated areas.[278] Any state's most important goal should be to protect human health and safety as much as possible—but it must strike a balance with the needs of others.[279] If a state sets a standard too strict to implement, because the state does not have enough available resources to expend on regulation and implementation, PFAS levels will effectively remain the same. As technology progresses and cleanup costs decrease, states with smaller budgets can update their MCLs to increasingly strict standards.

When a regulation is set, business practices must adapt to comply.[280] The costs of compliance will be lower for corporations in the states with less PFAS contamination, as contamination is *already* near acceptable levels.[281] Thus, business practices in these states will likely not change much because corporations are already creating less contamination.[282] Instead of suddenly changing business practices and technology, these businesses can change and update as new technologies

273. For something to be feasible, it must be "capable of being done or carried out." *Feasible*, MERRIAM-WEBSTER.COM DICTIONARY, https://bit.ly/37qcbNt (last visited Dec. 27, 2020).

274. *See How EPA Regulates Drinking Water Contaminants*, *supra* note 240; *see also supra* Section II.E.

275. *See How EPA Regulates Drinking Water Contaminants*, *supra* note 240; *see also* Cost-Benefit Analysis, *supra* note 248.

276. *See* Lauren Gibbons, *Environment Budget with $120 Million for Water Cleanup Earns Widespread Support in Michigan Legislature*, MLIVE (Sept. 24, 2019), https://bit.ly/37QjCRG; *see also* Tim Anderson, *Michigan, Minnesota Among States Dealing with PFAS Contamination*, COUNCIL STATE GOV'TS (Apr. 2018), https://bit.ly/35MkW5q.

277. *See Maximum Contaminant Levels*, ALASKA DEP'T ENVTL. CONSERVATION, https://bit.ly/3f0Atmz (last visited Dec. 27, 2020).

278. *See Guidance Values and Standards for Contaminants in Drinking Water*, MINN. DEP'T. HEALTH, https://bit.ly/2RPsJbH (last visited Dec. 27, 2020).

279. *See id.*

280. *See How EPA Regulates Drinking Water Contaminants*, *supra* note 240.

281. *See id.*

282. *See id.*

emerge, in order to ensure continuous compliance with the MCLs.[283] Further, lower levels of contamination will be easier to remediate.[284]

For example, compare the Easton Road and Ridge Run Sites in Pennsylvania.[285] Samples at the Easton Road Site range from non-detect to 229 ppt for combined PFOS and PFOA, while samples at the Ridge Run Site range from non-detect to 16,360 ppt for combined PFOS and PFOA.[286] EPA's health advisory level for PFOS and PFOA combined is 70 ppt.[287] Thus, while both sites are extremely contaminated, Ridge Run is significantly more PFAS-contaminated than Easton Road.[288] Consequently, the Ridge Run Site will take more time, money, resources, and manpower to clean than the Easton Road Site.[289] Conversely, businesses around the Easton Road Site will be better able to adapt to stricter regulation than those around the Ridge Run Site because less immediate remediation will be necessary.[290] While both sites should work towards compliance, Ridge Run businesses will need better technology, more money, and more time.[291] States similar to Ridge Run, with higher levels of contamination, should set feasible standards now, even if they are more lenient than the standards set by states more similar to Easton Road.

States must implement regulations that are within their means and achievable, *today*, with the goal of getting rid of as much contamination as quickly as possible. Drinking water should, ideally, have minimal to no harmful chemical contamination, but legislatures will not pass extremely stringent standards if businesses will close as a result and if achieving such standards is not realistic.[292]

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283. *See id.*

284. *See More on Benefit-Cost Analysis: A Simple Example*, *supra* note 252.

285. *See supra* Section II.D.5.

286. *See Easton Road PFC Site*, *supra* note 227; *see also Ridge Run PFAS Site*, *supra* note 227.

287. *See Drinking Water Health Advisories for PFOA and PFOS*, *supra* note 17.

288. *See Easton Road PFC Site*, *supra* note 227; *see also Ridge Run PFAS Site*, *supra* note 227.

289. *See DEP Involvement*, PA. DEP'T ENVTL. PROT., https://bit.ly/2Ogxjz1 (last visited Dec. 27, 2020); *see also Maximum Contaminant Levels*, *supra* note 277.

290. *See generally More on Benefit-Cost Analysis: A Simple Example*, *supra* note 252 (explaining how extremely high costs will force businesses to close).

291. *See DEP Involvement*, *supra* note 289 (setting a stricter MCL than EPA's health advisory level will lead to more difficulty when cleaning contamination because more contamination will have to be cleaned to comply with the requirement); *see also Maximum Contaminant Levels*, *supra* note 277.

292. For example, a New Hampshire judge issued an injunction to stop the state's enforcement of strict PFAS regulations. *See* Appel, *supra* note 211. The judge explained that businesses were not able to comply with the extremely strict standards. *See id.*; *see also supra* Section II.D.4.

B. Protecting Public Health and Safety Is Too Important to Leave PFAS Unregulated

Beyond concerns over business closures, PFAS are still largely unregulated for many other reasons, including the costs associated with the regulatory process, remediation complications, and unclear health effects.[293] While these obstacles are important to keep in mind when regulating any chemical, protecting public health and safety is too important to let contaminants like PFAS go unregulated.[294]

1. Funding PFAS Research and Mediation

Smaller states and states without large funding sources for environmental research struggle to set MCLs and typically wait for the federal government to do so first.[295] The Department of Environmental Conservation in Alaska has stated that it "does not have the resources and scientific expertise necessary to develop its own MCLs, and "[l]ike most states, Alaska adopts federal MCLs."[296] Only a limited number of states, like New Jersey and California, have budgets and programs large enough to set their own MCLs.[297]

Funding is the largest hurdle for states to overcome, but a possible solution exists.[298] States have more flexibility than the federal government when it comes to funding.[299] Primarily, states have the authority to attach fees to services or projects in order to fund other projects the people think are sufficiently important.[300] For example, Iowa raised pesticide registration fees and fertilizer taxes to fund research into how to reduce the use of chemicals in farming.[301] Similarly, Florida used toll revenues on a section of Interstate 75 near the Everglades to finance conservation and pollution control of the Everglades.[302] States with large

293. *See* Glenn G. Lammi, *Consequences Must Be Carefully Assessed Before PFAS Are Pushed into the Superfund Quagmire*, FORBES (Sep. 26, 2019), https://bit.ly/2Gog8Hg; *see also infra* Sections III.B.1–3.

294. *See The Science Panel Website*, *supra* note 10; *see also* Rizzuto, *supra* note 1.

295. *See Maximum Contaminant Levels*, *supra* note 277; *see also* McCrystal, *supra* note 233 (explaining that the PA DEP is waiting for the federal government to set an MCL first).

296. *Maximum Contaminant Levels*, *supra* note 277.

297. California alone spends about $26 million per year on its MCL program. *See Per- and Polyfluoroalkyl Substances (PFAS)*, CAL. WATER BDS.: STATE WATER RES. CONTROL BD., https://bit.ly/2UPvGwc (last visited Dec. 27, 2020). California has not yet set an enforceable regulation for PFAS, but in August 2019, the state set a notification level—similar to a health advisory level—of 6.5 ppt for PFOS and 5.1 ppt for PFOA. *See id.*

298. *See* Graham, *supra* note 266.

299. *See id.*

300. *See id.*

301. *See id.*

302. *See id.*

PFAS contamination problems, but small budgets, could use similar fees and toll revenues, as those states see fit, to fund PFAS regulation and mediation.

With over 4,700 different known types of PFAS, regulating and cleaning up all of them would be a massive endeavor.[303] About 450,000 contaminated sites in the United States are already "stuck in a regulatory state of purgatory."[304] All the time or resources in the world would not be enough to take on all of these sites at once.[305] While states should continue to research other types of PFAS besides PFOS and PFOA, states should start regulating PFOS and PFOA, the most well-known types, first.

2. Regulating PFOS and PFOA First

While there are thousands of PFAS chemicals, PFOS and PFOA are the most common, and states should regulate them first.[306] Plenty of research already exists on PFOS and PFOA,[307] and most states already know the location and extent of PFOS and PFOA contamination within their borders.[308] States should take the plethora of available information and employ it to regulate PFOS and PFOA.[309]

Public health and safety should always be a top priority. Most government and regulatory offices explicitly state that their purposes are to protect the public health and welfare.[310] Title 42 of the United States Code, the Title in which most environmental statutes are codified, is even called "The Public Health and Welfare."[311] Ideally, human health and quality of life should never be sacrificed for lack of resources, but this is not, and cannot, always be the case.

To avoid public backlash and to avoid taking on too much at once, states must regulate PFOS and PFOA first. PFOS and PFOA are the two

303. *See* SUMMARY REPORT ON UPDATING THE OECD 2007 LIST OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS), *supra* note 38 at 16.

304. Lammi, *supra* note 293.

305. *See id.*

306. *See Basic Information on PFAS*, *supra* note 2.

307. *See* SUMMARY REPORT ON UPDATING THE OECD 2007 LIST OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS), *supra* note 38; *see also supra* Section II.D.

308. *See Basic Information on PFAS*, *supra* note 2; *see also PFAS in Pennsylvania*, *supra* note 224.

309. *See* SUMMARY REPORT ON UPDATING THE OECD 2007 LIST OF PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS), *supra* note 38.

310. *See* Clean Air Act, 42 U.S.C. § 7401b (2018) (stating a purpose of "promot[ing] the public health and welfare"); *see also Our Mission and What We Do*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/3nwvGMr (last visited Dec. 27, 2020) ("The mission of the EPA is to protect human health and the environment."); *Overview of the Safe Drinking Water Act*, U.S. ENVTL. PROT. AGENCY, https://bit.ly/3nsbD1Y (last visited Dec. 27, 2020) ("The [SDWA] was originally passed . . . to protect public health.").

311. 42 U.S.C. §§ 1–18647 (2018).

most common types of PFAS and will be the easiest to begin regulating.[312] However, regulating PFOS and PFOA is just the start. The EPA and state agencies should continue to *research* other types of PFAS in order to *regulate* them in the future.[313]

3. Health Effects Data About PFAS is Still Unclear

Another issue standing in the way of regulation is the lack of a medical consensus regarding PFAS' health effects.[314] Many scientists argue over how dangerous PFAS actually are because their findings are unclear as to the health effects of these substances.[315] Studies of PFAS contamination in rats have shown severe immunological and developmental health effects.[316] Nonetheless, one critic has maintained that just because something affects a rodent in a certain way does not mean the chemicals "interact with humans in a comparable manner."[317] However, *human* health is not something to play with and ignoring potential health effects could cause public health to worsen, harming more and more people as time goes on.[318] Mr. Stone, the dairy farmer in Maine, is only one example of someone whose life has been dismantled because of PFAS; many others have also lost their farms, their livelihoods, and their health because of these "forever chemicals."[319]

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312. *See Basic Information on PFAS*, *supra* note 2.

313. *See id.*; *see also supra* Sections II.B–D.

314. *See The Science Panel Website*, *supra* note 10. *But see* Jeffrey Karp et al., *PFAS Update: Evolving Science and Liability*, IADC TOXIC & HAZARDOUS SUBSTANCES LITIG. COMM. NEWSLETTER (Oct. 2019), https://bit.ly/30Uhp25.

315. *See* Lammi, *supra* note 293 ("[T]he Centers for Disease Control emphasized in a 2018 report that '[f]inding a measurable amount [of PFAS] in blood does not imply that the levels . . . cause an adverse health effect.'").

316. *See generally* Prompt and Fast Action to Stop Damages Act, S. 675, 116th Cong. (2019), *available at* https://bit.ly/36xAhVL (discussing health studies in rats). The Science Panel in West Virginia also identified probable links between PFAS contamination and adverse health effects in humans such as diagnosed high cholesterol, kidney cancer, ulcerative colitis, thyroid disease, testicular cancer, and pregnancy-induced hypertension. *See The Science Panel Website*, *supra* note 10; *see also supra* Section II.A.

317. Karp et al., *supra* note 314, at 6 n.23.

318. For example, pollution has been causing climate change and the effects of climate change have been ignored for far too long. *See* Malorie Macklin, *How Ignoring Environmental Issues Harms People*, ONE GREEN PLANET (2016), https://bit.ly/36tm7VU (last visited Dec. 27, 2020); *see also Flint Water Crisis Fast Facts*, CNN, http://cnn.it/37sz57D (last updated Oct. 14, 2020 1:21 PM) (describing that officials ignored toxins in Flint, Michigan's water since 2014). Each year more of the planet deteriorates faster and faster; in the past 40 years over 52% of the world's wildlife has been lost. *See Flint Water Crisis Facts*, *supra*.

319. For example, Wilbur Tennant, a farmer in West Virginia, sought legal help after his cows suddenly began dying. *See* Nathaniel Rich, *The Lawyer Who Became DuPont's Worst Nightmare*, N.Y. TIMES (Jan. 6, 2016), https://nyti.ms/2Gn4bS7. Lawyer Robert Billot took the case and, little did he know, fell into deep water—a fight against

The news media and even pop culture have struck fear into the public regarding PFAS.[320] Like the chicken and the egg, public perception will fuel scientific research, and scientific research will help guide regulation. Although the science behind the health effects PFAS contaminants cause is still developing, the mixture of the public's perception of PFAS and the available scientific research advises more PFAS research and regulation, not less.

IV. CONCLUSION

PFAS are dangerous chemical compounds found in every-day consumer products and have been accumulating in the environment since the 1940s.[321] These chemical compounds are extremely resilient and do not degenerate over time.[322] PFAS have been linked to severe health effects in humans and need to be regulated.[323] While the EPA claims it is in the process of setting an MCL for PFAS, it has yet to do so.[324] While bills are currently being considered by Congress to regulate PFAS, none have been made into law.[325] Instead, many states—including New Jersey, Michigan, Minnesota, and New Hampshire—are taking charge and setting their own MCLs.[326] Public safety is too important to ignore.[327] Thus, even if the federal government sets an MCL, states should continue the fight to set even stricter MCLs relative to each state's level of contamination and regulatory enforcement capacity.[328]

Fred Stone is not the only victim of PFAS contamination; his story is only one of many.[329] Today, PFAS contamination is found almost everywhere in the United States.[330] People are becoming ill and losing their livelihoods because of "forever chemicals" not many people even know how to pronounce.[331] Therefore, PFAS should be regulated quickly at the state level, not just for Mr. Stone, but for every person affected.

DuPont and its PFAS contamination. *See id.*; *see also* DARK WATERS (Focus Features 2019) (movie adaptation of previous article starring Mark Ruffalo as Robert Billot); Rizzuto, *supra* note 1; *supra* Section II.C.

320. *See* DARK WATERS, *supra* note 319; *see also* McCrystal & McDaniel, *supra* note 236.

321. *See supra* Section II.A.

322. *See supra* Section II.A.

323. *See supra* Section II.A.

324. *See supra* Section II.B.

325. *See supra* Section II.C.

326. *See supra* Section II.D.

327. *See supra* Section III.A.

328. *See supra* Section III.B.

329. *See supra* Section II.C; *see also* Rizzuto, *supra* note 1.

330. *See supra* Section II.A.

331. *See supra* Section II.C; *see also* Rizzuto, *supra* note 1.