

PFAS Pollution, the Precautionary Principle, and a Path Forward: Potential Regulatory Regimes for PFAS Under the Safe Drinking Water Act

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I. INTRODUCTION

“It is only the farmer who faithfully plant seeds in the Spring, who reaps a harvest in Autumn.”

—B.C. Farber

Environmental battles are, more often than not, long ones. This one starts in 1998 with a lone farmer named Wilbur Tennant. As environmental attorney Robert Bilott explains, “[h]ard labor was his birthright. It had paid for the 150 acres of land his great-grandfather had bought and for the two-story, four-room farmhouse pieced together from trees felled in the woods, dragged across fields, and raised by hand.”¹ However, DuPont chemical company took this birthright away from Tennant. In the late ’90s, he noticed that his cattle were dying “inexplicably, and in droves.”² The

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1. ROBERT BILOTT, *EXPOSURE: POISONED WATER, CORPORATE GREED, AND ONE LAWYER’S TWENTY-YEAR BATTLE AGAINST DUPONT 4* (Atria Books, 2019).

2. *Id.* at 5.

problem? The cattle's drinking water.³ As deer, birds, fish, and other wildlife began dying around the same water source, Tennant stopped feeding his family venison from deer shot on his land.⁴ Tennant knew something was seriously wrong when he performed an autopsy on one of his own cows.⁵ As he cut the heart, the muscle looked fine, but a thin, yellow liquid gathered in the cavity.⁶ "There is about a teacup or so full of it—it's a real dark yeller. It's something I have never run into before."⁷

Tennant's story would eventually be highlighted in the box office film *Dark Waters*, which explains attorney Robert Bilott's fight against DuPont—as detailed in the film, Bilott sued DuPont on behalf of Tennant for the pollution wreaking havoc on Tennant's farm.⁸ The offending contaminant was a group of chemicals known as poly-fluoroalkyl substances, or PFAS. After a contentious legal battle, Tennant eventually settled with the company.⁹ Bilott would go on to represent tens of thousands of plaintiffs in PFAS related claims, including the Ohio-based multi-district litigation (MDL), which involved 80,000 class members. This resulted in a class-wide settlement where DuPont agreed to test each individual to determine whether they would be permitted to file actions against the company based on diseases the plaintiffs believed were caused by exposure to PFAS.¹⁰ Based on conclusions of independent, mutually agreeable epidemiologists, six diseases were found to be "Linked Diseases."¹¹ The plaintiffs with "Linked Diseases" were permitted to move forward with the action and DuPont would be barred from contesting general causation in those actions.¹² On January 22, 2021, DuPont, Corteva, and the Chemours Co. announced they jointly

3. *Id.*

4. *Id.*

5. *Id.* at 8.

6. *Id.*

7. *Id.*

8. DARK WATERS (Focus Features 2019).

9. Nathaniel Rich, *The Lawyer Who Became DuPont's Worst Nightmare*, N.Y. TIMES (Jan. 6, 2016), <https://www.nytimes.com/2016/01/10/magazine/the-lawyer-who-became-duponts-worst-nightmare.html>.

10. *In re E.I. DuPont de Nemours & Co. C-8 Personal Injury Litigation*, 314 F. Supp. 3d 875 (S.D. Ohio 2015).

11. *Id.* at 877. The epidemiologists found six "Linked Diseases," including kidney cancer, testicular cancer, thyroid disease, ulcerative colitis, diagnosed high cholesterol, and pregnancy-induced hypertension and preeclampsia. *Id.*

12. *Id.*

committed \$4 billion to cover liabilities for their past use of PFAS and settled the Ohio MDL for \$83 million.¹³

In recent years, PFAS contamination has become ubiquitous. This is due to the nature and potential severity of contamination related to these pollutants. PFAS are a group of persistent organic pollutants used for industrial purposes such as firefighting and oil production; there are also numerous consumer uses, as PFAS are found in cosmetics, food wrappers, and non-stick metal pans.¹⁴ The human health impacts of PFAS exposure are serious, including decreased vaccination response, impaired liver function, and low birth weight.¹⁵ Though this pollution problem was identified in the '90s, the Environmental Protection Agency (EPA) has been slow to confront it; in March 2021, EPA finally determined to regulate two types of PFAS under the Safe Drinking Water Act (SDWA).¹⁶ This Comment will evaluate that final determination, comparing two regulatory approaches under the SDWA: the treatment technique approach and the maximum contaminant level. It will advocate for the application of the precautionary principle to regulation of PFAS contamination in drinking water and, thus, for a strict regulatory regime to protect public health against these harmful pollutants. Further, this Comment will analyze the prudence of applying a grouping approach to all PFAS chemicals versus individual PFAS compounds. This Comment will conclude by recommending three basic actions to EPA in developing drinking water standards for PFAS.

II. BACKGROUND

A. *The Safe Drinking Water Act*

Congress enacted the SDWA in 1974 to protect the quality of drinking water in the United States.¹⁷ The SDWA requires drinking water regulations for all waters actually or potentially designed for drinking use,

13. Morgan Conley, *DuPont, Others Commit to \$4B To 'Forever Chemical' Liabilities*, LAW360 (Jan. 22, 2021, 6:38 PM), <https://www.law360.com/articles/1347674>.

14. Zhanyun Wang et al., *A Never-Ending Story of Per- and Polyfluoroalkyl Substances (PFAS)?*, 51 ENV'T SCI. & TECH. 2508, 2508 (2017), <https://doi.org/10.1021/acs.est.6b04806>.

15. Alissa Cordner et al., *Guideline Levels for PFOA and PFOS in Drinking Water: The Role of Scientific Uncertainty, Risk Assessment Decisions, and Social Factors*, 29 J. OF EXPOSURE SCI. & ENV'T EPIDEMIOLOGY 157, 161 (2019), <https://doi.org/10.1038/s41370-018-0099-9>.

16. Announcement of Final Regulatory Determinations for Contaminants on the Fourth Drinking Water Contaminant Candidate List, 86 Fed. Reg. 12272, 12272 (Mar. 3, 2021) [hereinafter Final Regulatory Determinations for CCL4].

17. See 42 U.S.C. § 300f(1)-(3) (1974).

including both above ground and underground sources.¹⁸ This statute directs EPA to promulgate National Primary Drinking Water Regulations (NPDWRs) to control the contaminants present in drinking water.¹⁹ These regulations apply to public water systems (PWSs), or systems “for the provision to the public of water for human consumption through pipes or other constructed conveyances” if the system has fifteen or more service connections or regularly serves at least twenty-five individuals.²⁰ There are two primary processes EPA follows to determine which contaminants will be subject to a NPDWR. The first is the Unregulated Contaminant Monitoring Rule (UCMR).²¹ The SDWA requires EPA to issue a list of thirty or fewer unregulated contaminants to be monitored by PWSs.²² This data is collected to support EPA’s determination of whether to regulate particular contaminants in the interest of protecting public health.²³ EPA uses the UCMR program in coordination with the Contaminant Candidate List (CCL).²⁴ The CCL is a list of unregulated contaminants that are known or anticipated to occur at water systems and may warrant regulation under the SDWA.²⁵ While the CCL is used to determine which contaminants to monitor under the UCMR, its primary purpose is for making regulatory determinations.²⁶

EPA approaches regulatory determinations for contaminants on the CCL in three phases.²⁷ The first phase, the data availability phase, identifies the contaminants for which EPA has sufficient health data to move on to the second phase, the data evaluation phase. After collecting additional data and more thoroughly evaluating this information, EPA identifies contaminants eligible for the regulatory determination phase.²⁸

18. *Id.*; see also 42 U.S.C. § 300f(4).

19. 42 U.S.C. § 300g-1(b).

20. 42 U.S.C. § 300f(4).

21. 42 U.S.C. § 300j-4(a)(2)(A) (requiring the Administrator to promulgate regulations establishing the criteria for a monitoring program for unregulated contaminants).

22. 42 U.S.C. § 300j-4(a)(2)(B).

23. *Id.*; see also *Learn About Unregulated Contaminant Monitoring*, EPA, [https://www.epa.gov/dwucmr/learn-about-unregulated-contaminant-monitoring-rule#:~:text=EPA%20uses%20the%20Unregulated%20Contaminant,Drinking%20Water%20Act%20\(SDWA\)](https://www.epa.gov/dwucmr/learn-about-unregulated-contaminant-monitoring-rule#:~:text=EPA%20uses%20the%20Unregulated%20Contaminant,Drinking%20Water%20Act%20(SDWA)) (last visited May 27, 2022).

24. 42 U.S.C. § 300g-1 (b)(1)(B)(i).

25. 42 U.S.C. § 300g-1 (b)(1)(A).

26. See 42 U.S.C. § 300g-1 (b)(1)(B)(ii) (requiring the Administrator to make regulatory determinations for not fewer than five contaminants every five years).

27. Preliminary Regulatory Determinations for Contaminants on the Fourth Contaminant Candidate List, 85 Fed. Reg. 14098, 14098 (Mar. 10, 2020) [hereinafter *Preliminary Regulatory Determinations for CCL4*].

28. *Id.*

For EPA to make a positive preliminary determination to regulate a contaminant, three statutory criteria must be met.²⁹ First, it must be shown that the contaminant may have an adverse effect on human health. Second, it must be shown that the contaminant is known to occur or there is a substantial likelihood that it will occur in public water systems with a frequency and at levels that raise a public health concern. Third, EPA must believe that regulation of the contaminant presents a meaningful opportunity to reduce health risks for people served by public water systems.³⁰

For each contaminant the Administrator decides to regulate, EPA must promulgate enforceable drinking water regulations.³¹ A primary drinking water regulation applies to public water systems and specifies a maximum contaminant level (MCL), a treatment technique, or both.³² An MCL is the “maximum permissible level of a contaminant in the water which is delivered to any use of a public water system.”³³ EPA develops MCLs based on maximum contaminant level goals (MCLGs), which are levels “at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety.”³⁴ MCLs must be as close to the MCLG as feasibly possible.³⁵ A drinking water regulation that establishes an MCL must list the best available technology (BAT), treatment techniques, and other means that are feasible for meeting the MCL.³⁶ A treatment technique can be set in lieu of a MCL when EPA decides that it is not “economically or technologically feasible to ascertain the level of the contaminant.”³⁷ A treatment technique is an enforceable procedure or level of technological performance that all public water systems must comply with in order to control a contaminant.³⁸ These treatments must prevent known or anticipated adverse effects on health to the extent feasible.³⁹ When formulating these minimum standards, EPA

29. 42 U.S.C. § 300g-1 (b)(1)(A).

30. *Id.*

31. *Id.*

32. *Id.*; see also 42 U.S.C. § 300g-1(b)(7)(A).

33. 42 U.S.C. § 300f(3).

34. 42 U.S.C. § 300g-1(b)(4)(A).

35. 42 U.S.C. § 300g-1(b)(4) (defining feasible as “with the best use of technology, treatment techniques and other means which the Administrator finds, after examination for efficacy under field conditions and not solely under lab conditions, are available (taking cost into the consideration)”).

36. 42 U.S.C. § 300g-1(b)(4).

37. 42 U.S.C. § 300g-1(b)(7)(A).

38. *Id.*; see also *How EPA Regulates Drinking Water Contaminants*, EPA, <https://www.epa.gov/sdwa/how-epa-regulates-drinking-water-contaminants> (last visited May 27, 2022).

39. 42 U.S.C. § 300g-1(b)(7)(A).

must consider a detailed risk and cost assessment and best available peer-reviewed science.⁴⁰

B. PFAS Pollution Problem

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals; these include PFOA, PFOS, GenX, and a number of other related counterparts.⁴¹ They are defined by their persistence in both the environment and the human body.⁴² This persistence is what makes the chemicals so useful—"[d]ue to the strong electronegativity and small atomic size of fluorine, the perfluoroalkyl moiety imparts enhanced properties to molecules (e.g., stronger acidity, higher surface activity at very low concentrations, stability, and/or water- and oil-repellency)."⁴³ These properties make PFAS a very useful family of chemicals; they can be found in food packaging materials, commercial household products, including stain- and water-repellant fabrics, non-stick products, waxes, paints, and fire-fighting foams.⁴⁴ They can also be found in the workplace, in drinking water, and in living organisms.⁴⁵

In human epidemiology studies, PFOA and PFOS have consistently been linked to increased cholesterol levels among exposed populations, and in more limited circumstances, impacts on the immune system, cancer (for PFOA), and thyroid hormone disruption (for PFOS).⁴⁶ Notably, PFAS exposure during infancy has been linked to decreased immune response to vaccinations at five years of age.⁴⁷ In fact, the Center for Disease Control (CDC) has addressed the potential intersection between PFAS exposure and COVID-19, recognizing that exposure to high levels of PFAS may impact the immune system.⁴⁸ Further, PFAS exposure is associated with

40. 42 U.S.C. § 300g-1 (b)(3)(A), (C).

41. *Our Current Understanding of the Human Health and Environmental Risks of PFAS*, EPA, [epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas](https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas) (last visited May 27, 2022).

42. *Id.*

43. Wang et al., *supra* note 14, at 2508.

44. *Our Current Understanding of the Human Health and Environmental Risks of PFAS*, *supra* note 41.

45. *Id.*

46. *Id.*

47. Philippe Grandjean et al., *Estimated Exposures to Perfluorinated Compounds in Infancy Predict Attenuated Vaccine Antibody Concentrations at Age 5-years*, 14 J. OF IMMUNOTOXICOLOGY 188, 188 (2017), doi:10.1080/1547691X.2017.1360968.

48. *Statement on Potential Intersection between PFAS Exposure and COVID-19*, CDC, <https://www.atsdr.cdc.gov/pfas/health-effects/index.html> (last visited May 27, 2022).

negative health outcomes during pregnancy and later in life.⁴⁹ These outcomes can include gestational diabetes, childhood obesity, preeclampsia, and low birth weight.⁵⁰ Considering the impacts on sensitive populations, including pregnant women and children, this is a public health concern of utmost importance.⁵¹

PFAS are typically described as long-chain or short-chain, depending on the number of carbon atoms they contain.⁵² Long-chain PFAS, such as PFOA and PFOS, have been found to have a bioaccumulation potential equivalent to contaminants like polychlorinated biphenyls (PCBs) and dichlorodiphenyltrichloroethane (DDT).⁵³ As a result, there have been widespread efforts to combat pollution resulting from the use of long-chain PFAS. For example, governments at the Ninth Conference of the Parties (COP9) of the Stockholm Convention agreed to a global ban on PFOA.⁵⁴ PFOS has been restricted under the European Union's Persistent Organic Pollutants Regulation for more than ten years.⁵⁵ In the United States, EPA established the 2015 PFOA Stewardship Program, which effectively eliminated domestic production of long-chain PFAS.⁵⁶ Starting in 2006, EPA invited eight major companies in the PFAS industry to join in a global stewardship program with the objective of complete elimination of PFOA from industrial emissions and products.⁵⁷ Participating companies:

- submitted baseline data on emissions and product content at the end of October 2006;

49. John T. Szilagyi et al., *Perfluoroalkyl Substances (PFAS) and Their Effects on the Placenta, Pregnancy, and Child Development*, 7 EARLY LIFE ENV'T HEALTH 222, 222 (2020).

50. *Id.*

51. See 42 U.S.C. § 300g-1(b)(1)(C) (prioritizing the regulation of drinking water contaminants that have greater adverse impacts on infants, children, pregnant women, and other vulnerable subgroups).

52. *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](https://www.awwa.org/Portals/0/AWWA/ETS/Resources/Per-andPolyfluoroalkylSubstances(PFAS)-OverviewandPrevalence.pdf?ver=2019-08-14-090234-873).

53. *Id.*

54. *At UN Meeting, Governments Agree to a Global Ban on PFOA—A Toxic Water Pollutant*, INT'L POLLUTANTS ELIMINATION NETWORK (May 3, 2019), [https://ipen.org/news/un-meeting-governments-agree-global-ban-pfoa-%E2%80%93-toxic-water-pollutant#:~:text=\(Geneva%2C%20Switzerland\)%3A%20Governments%20at,health%20effects%20at%20background%20levels](https://ipen.org/news/un-meeting-governments-agree-global-ban-pfoa-%E2%80%93-toxic-water-pollutant#:~:text=(Geneva%2C%20Switzerland)%3A%20Governments%20at,health%20effects%20at%20background%20levels).

55. *Perfluoroalkyl Chemicals (PFAS)*, EUR. CHEM. AGENCY, <https://echa.europa.eu/hot-topics/perfluoroalkyl-chemicals-pfas>.

56. *Fact Sheet: 2010/2015 PFOA Stewardship Program*, EPA, <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program>.

57. *Id.* These companies included Arkema, Asahi, BASF Corporation, Clariant, Daikin, 3M/Dyneon, DuPont, and Solvay Solexis. *Id.*

- reported annual progress toward goals each succeeding October and report progress in terms of both U.S. and global operations; and
- agreed to work cooperatively with EPA and to establish scientifically credible analytical standards and laboratory methods to ensure comparability of reporting.⁵⁸

All participating companies state that they met their PFOA reduction goals.⁵⁹ Additionally, EPA addressed PFOA and PFOS in drinking water through establishing a health advisory level (HAL).⁶⁰ A HAL is non-enforceable and non-regulatory.⁶¹ It is used primarily to provide technical information to state agencies and public health officials.⁶² In November of 2016, EPA published a combined seventy parts per trillion (ppt) HAL for PFOA and PFOS.⁶³ The Biden-Harris Administration is also targeting PFAS pollution.⁶⁴ In February of 2021, EPA announced that it is reproposing the UCMR 5 to collect new data on PFAS in drinking water⁶⁵ and reissuing final regulatory determinations for PFOA and PFOS.⁶⁶

C. Fourth Contaminant Candidate List

On March 10, 2020, EPA requested public comment on a preliminary determination under the Fourth CCL.⁶⁷ In this request for comment, EPA made preliminary determinations to regulate two contaminants, PFOA and PFOS, and not to regulate six other contaminants.⁶⁸ On March 3, 2021, EPA announced the final determination to regulate PFOS and PFOA.⁶⁹

58. *Id.*

59. *Id.*

60. *Fact Sheet: PFOA & PFOS Drinking Water Health Advisories*, EPA, https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf (last visited May 27, 2022).

61. *Id.*; see also 42 U.S.C. § 300g-1(b)(1)(F) (“The Administrator may publish health advisories (which are not regulations) or take other appropriate actions for contaminants not subject to any national primary drinking water regulation.”).

62. *Fact Sheet: PFOA & PFOS Drinking Water Health Advisories*, *supra* note 60.

63. *Id.*

64. See Press Release, EPA, EPA Advances Science to Protect the Public from PFOA and PFOS in Drinking Water (Nov. 16, 2021), available at <https://www.epa.gov/newsreleases/epa-advances-science-protect-public-pfoa-and-pfos-drinking-water>.

65. Revisions to Unregulated Contaminant Monitoring Rule (UCMR 5) for Public Water Systems and Announcement of Public Meeting, 86 Fed. Reg. 13846, 13846 (Mar. 11, 2021).

66. Final Regulatory Determinations for CCL4, 86 Fed. Reg. 12272, 12272 (Mar. 3, 2021).

67. Preliminary Regulatory Determinations for CCL4, 85 Fed. Reg. 14098, 14098 (Mar. 10, 2020).

68. *Id.*

69. Final Regulatory Determinations for CCL4, 86 Fed. Reg. at 12272. Additionally, EPA has revised the UCMR 5 to include an additional twenty-nine PFAS chemicals. Revisions to the

The next step will be to promulgate a NPDWR; the statutory time frame provides for EPA's proposal of a regulation within twenty-four months and action on a final regulation within eighteen months of the proposal.⁷⁰ On February 9th, 2022, EPA put out a notice of public meeting regarding environmental justice considerations for the development of PFAS NPDWR.⁷¹ These meetings are especially important because race/ethnicity play an important role in differential exposure to PFAS.⁷²

In EPA's final determination to regulate PFOA and PFOS under the SDWA, it affirmed that it is considering a number of non-exclusive approaches to evaluate potential regulatory regimes. Such considerations include a grouping approach, a treatment technique approach, and two different monitoring approaches.⁷³ These methods of evaluation are important to consider because there more than 4,000 types of PFAS that have been manufactured and used since the 1940s. Additionally, evaluations of the Toxic Substance Control Act Inventory Notification Rule indicates that there are currently 602 types of PFAS commercially active in the United States.⁷⁴ This presents a unique challenge, as contaminants are often evaluated individually to determine whether and how to regulate their presence in drinking water. Individually evaluating the thousands of types of PFAS present in the environment would be extremely time-consuming and costly. Therefore, EPA is considering a grouping and a treatment technique approach to evaluate and regulate PFAS.⁷⁵

Dr. Linda Birnbaum, Director of the National Health Institute of Environmental Health Sciences, is a proponent of this view. In the context of PFAS, Dr. Birnbaum believes that grouping is the "most prudent approach to protect human health."⁷⁶ She proposes that understanding the

Unregulated Contaminant Monitoring Rule (UCMR 5) for Public Water Systems and Announcement of Public Meetings, 86 Fed. Reg. 73131 (Dec. 27, 2021).

70. 42 U.S.C. § 300g-1(b)(1)(E).

71. Notice of Public Meeting: Environmental Justice Considerations for the Development of the Proposed Per- and Polyfluoroalkyl Substances (PFAS) National Primary Drinking Water Regulation, 87 Fed. Reg. 7412 (Feb. 9, 2022).

72. Sung Kyun Park et al., *Determinants of Per- and Polyfluoroalkyl Substances (PFAS) in Midlife Women: Evidence of Racial/Ethnic and Geographical Differences in PFAS Exposure*, ENV'T RSCH., May 2019, at 186 (concluding that geographic locations and race/ethnicity play an important role in differential exposure to PFAS).

73. Preliminary Determinations for CCL4, 85 Fed. Reg. at 14122; *see also* Final Regulatory Determinations for CCL4, 86 Fed. Reg. at 12279.

74. Preliminary Determinations for CCL4, 85 Fed. Reg. at 14122.

75. Final Determination for CCL4, 86 Fed. Reg. at 12279.

76. Hearing on Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS), Senate Committee on Environment and Public Works, 116th

cumulative effects of PFAS requires examining human health in the context of total lifetime exposure.⁷⁷ Regulatory approaches to PFAS can account for lifetime exposure by adopting standards for all PFAS as a single group, instead of each individual PFAS contaminant. A cumulative standard allows regulated entities and consumers to better understand the total amount of PFAS in the water. This is in contrast to an approach that sets a limit for each individual substance, but no standard for the combination of all PFAS present in drinking water. Under this approach, utilities and customers are left to calculate that total amount of PFAS contamination on their own. Further, this data would not be as readily available for EPA and other agency review.

For example, the State of Minnesota does not have a cumulative standard for total PFAS in drinking water. Instead, Minnesota Department of Public Health guidance recommends maximum levels of 15 ppt for PFOS; 35 ppt for PFOA; 47 ppt for PFHxS; 2,000 ppt for PFBS; and 7,000 ppt for PFBA.⁷⁸ In contrast, the European Environment Agency takes the view that regulating PFAS by setting limits for each individual compound is not adequate to protect human health and establishes a “group limit” on all PFAS in drinking water at 500 ppt.⁷⁹ Even industry leaders concede that a category-based approach to chemical regulation is prudent, encouraging EPA to identify the toxicological properties of different PFAS and prioritize those that present more serious health impacts.⁸⁰ Further, EPA has experience with this regulatory approach as it regulates disinfection byproducts, PCBs, and radionuclides through a grouping approach.⁸¹

In addition to the grouping approach, another option EPA is evaluating is the treatment technique approach. EPA can promulgate a

Cong. 13 (2019) (testimony of Linda Birnbaum, Director, National Institute of Environmental Health Sciences and National Toxicology Program), https://www.epw.senate.gov/public/_cache/files/2/2/22ca7c4b-b1dc-4a12-9264-7a4f16608933/BF2D70A4FB747A3F61E584CC30D58D0A.birnbaum-testimony-03.28.2019.pdf.

77. *Id.*

78. BRYAN CAVE LEIGHTON PAISNER, STATE-BY-STATE REGULATION OF PFAS SUBSTANCES IN DRINKING WATER 3 (Jan. 22, 2021), <https://www.bclplaw.com/en-US/insights/state-by-state-regulation-of-pfas-substances-in-drinking-water.html>.

79. See *Emerging Chemical Risks in Europe—‘PFAS,’* EUR. ENV’T AGENCY, <https://www.eea.europa.eu/themes/human/chemicals/emerging-chemical-risks-in-europe> (last visited May 27, 2022).

80. Jessica Bowman, *INSIGHT: With PFAS One-Size-Fits-All Isn’t the Answer*, BLOOMBERG LAW (May 20, 2019, 5:00 AM), <https://news.bloomberglaw.com/environment-and-energy/insight-with-pfas-one-size-fits-all-isnt-the-answer>.

81. Final Regulatory Determination for CCL4, 86 Fed. Reg. 12272, 12279-80 (Mar. 3, 2021); see, e.g., National Primary Drinking Water Regulations: Disinfectants and Disinfection Byproducts, 63 Fed. Reg. 69390 (Dec. 16, 1998).

treatment technique rule rather than a maximum contaminant level (MCL) if the agency determines it is not economically or technologically feasible to ascertain the level of the contaminant.⁸² An MCL is an enforceable, measurable standard that limits a particular level of contaminant present in drinking water.⁸³ These standards are enforced through testing and monitoring requirements.⁸⁴ Thus, there must be reliable testing methods to enforce an MCL. There are currently two analytical methods widely used to monitor drinking water occurrence of PFAS: EPA Methods 537.1 and 533.⁸⁵ EPA, however, “does not anticipate that reliable and validated methods that accurately and precisely capture all PFAS or total PFAS (and not other fluorinated, non-PFAS compounds) will be available for a number of years.”⁸⁶ Because of such limitations, EPA is considering whether PFAS should be regulated by an enforceable treatment technique in lieu of an MCL.

In addition to these considerations, EPA is also evaluating two monitoring approaches for PFAS.⁸⁷ One is under the Standardized Monitoring Framework (SMF) for synthetic organic chemicals, where monitoring schedules are based around how much of a regulated contaminant is detected in drinking water samples.⁸⁸ The purpose of the SMF is to standardize, simplify, and consolidate monitoring requirements.⁸⁹ To achieve this goal, certain contaminants are regulated through nine-year compliance cycles, divided into three-year compliance periods.⁹⁰ Monitoring schedules depend on the type of contaminant and

82. 42 U.S.C. § 300g-1(b)(7)(A).

83. 42 U.S.C. § 300f(3).

84. See 42 U.S.C. § 300g-7.

85. See Final Regulatory Determination for CCL4, 86 Fed. Reg. at 12279 (utilizing Methods 537.1 and 533 for nationwide drinking water monitoring for PFAS under the UCMR 5).

86. Preliminary Regulatory Determination for CCL4, 85 Fed. Reg. 14098, 14122 (Mar. 10, 2021).

87. *Id.* at 14123.

88. Final Determination for CCL4, 86 Fed. Reg. at 12280.

89. See National Primary Drinking Water Regulations—Synthetic Organic Chemicals and Inorganic Chemicals; Monitoring for Unregulated Contaminants; National Primary Drinking Water Regulations Implementation; National Secondary Drinking Water Regulations, 56 Fed. Reg. 3526 (Jan. 30, 1991) [hereinafter National Primary Drinking Water Regulations—Synthetic Organic Chemicals and Organic Chemicals]; see also *The Standardized Monitoring Framework: A Quick Reference Guide*, EPA, https://www.epa.gov/sites/production/files/2020-05/documents/smf_2020_final_508.pdf (last visited May 27, 2022).

90. National Primary Drinking Water Regulations—Synthetic Organic Chemicals and Organic Chemicals, 56 Fed. Reg. at 3560; see also Frederick Pontius, *Standardized Compliance Monitoring*, J. OF AM. WATER WORKS. ASS'N, Sept. 1991, at 16, <https://www.jstor.org/stable/41293343>.

the amount of contaminant present in the water.⁹¹ Systems detecting contamination are required to sample quarterly until the state determines that the results are “reliably and consistently” below the MCL.⁹² Reliably and consistently “means that the State has enough confidence that future sampling results will be sufficiently below the MCL to justify reducing the quarterly monitoring frequency.”⁹³ When results are found to be reliably and consistently below the MCL, required monitoring frequency decreases. Though the purpose is to simplify monitoring requirements, the SMF has been criticized as being overly complicated and confusing for public water utilities and state agencies.⁹⁴

Another monitoring approach would “allow state primacy agencies to require monitoring at PWSs where information indicates potential PFAS contamination, such as proximity to facilities with historical or ongoing uses of PFAS.”⁹⁵ There are a number of reasons to consider this approach, as studies have shown that geographical variance is a major determinant in PFAS exposure.⁹⁶ PFOA and PFOS are found at elevated concentrations in surface waters, soils, groundwater, and drinking water near to domestic and military airports, oil and gas sites, and firefighter training areas.⁹⁷ This contamination originates from the repeated use and uncontrolled release of fire-fighting foams during fire-fighting and fire-fighting training activities. For example, PFOA was detected in groundwater at Ellsworth Air Force Base at over 4,000 times EPA’s health advisory limit.⁹⁸ A survey of PFAS soil testing results recently revealed that concentrations of PFAS in soil reported for PFAS-contaminated sites were “orders-of-magnitude greater than background levels, particularly for PFOS.”⁹⁹ Because PFAS contamination differs based on proximity to

91. *Id.* at 18.

92. National Primary Drinking Water Regulations—Synthetic Organic Chemicals and Organic Chemicals, 56 Fed. Reg. at 3561.

93. *Id.*

94. *Id.* at 3526 (“EPA received extensive comments stating that the proposed monitoring requirements are complex and would lead to confusion and misunderstanding among the public, water utilities, and State personnel.”).

95. Final Determination for CCL4, 85 Fed. Reg. 14098, 12280 (Mar. 3, 2021).

96. Park et al., *supra* note 72, at 186.

97. Ian T. Cousins et al., *The Precautionary Principle and Chemicals Management: The Example of Perfluoroalkyl Acids in Groundwater*, 94 ENV’T INT’L 331, 331 (2016), <http://dx.doi.org/10.1016/j.envint.2016.04.044>.

98. *Id.* at 332.

99. Mark Brusseau et al., *PFAS Concentrations in Soils: Background Levels Versus Contaminated Sites*, SCI. OF THE TOTAL ENV’T, May 2020, at 1, http://www.u.arizona.edu/~boquo/pdfs/publications/2020_Brusseau_et_al_PFAS_in_Soil_STE.pdf.

certain facilities, EPA needs a regulatory regime that accounts for these geographical variances.

III. DISCUSSION

The approaches outlined by EPA present both benefits and downfalls. It is clear the PFAS pollution problem is widespread and has the potential to become a permanent problem—a very serious one, given the link between PFAS and immune response. EPA must move forward on regulating PFOA, PFOS, and other PFAS; but what is the best way to do so? Here, given the unknowns and complications presented by the variance in the pollutants, EPA should consider employing the precautionary principle: “Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”¹⁰⁰ Experts argue that the persistence of a chemical supports the pertinence of the precautionary principle in chemicals management.¹⁰¹ For example, in the European chemicals regulation, REACH, designations of persistence, bioaccumulation, and toxicity are key classification tools in the regulatory scheme.¹⁰² In this scheme, the most hazardous chemicals are those in which consequences are not easily reversible by regulatory action—since the target of such actions is a rapid reduction in effects, the success “relies on the reversibility of exposure, i.e. that the exposure to a chemical can be rapidly reduced once the emissions are controlled.”¹⁰³ Exposure can be poorly reversible due to slow elimination kinetics, or alternatively, due to continuous exposure.¹⁰⁴ Continuous exposure occurs when a chemical is used for an essential purpose.¹⁰⁵

Essential use is a central concept to the PFAS pollution problem. While these chemicals present a number of environmental and health risks, they also serve a vital function in society through a number of uses. The technical definition of essential use contains two elements. One, that the use is “necessary for health, safety or is critical for the functioning of society,” and two, that “there are no available technically or feasible

100. Cousins et al., *supra* note 97, at 334.

101. *Id.*

102. *Id.*

103. *Id.*

104. *Id.* at 331.

105. Cousins et al., *supra* note 97, at 337.

alternatives.”¹⁰⁶ For example, PFAS are used in hospital equipment to create a barrier against infections and transmission of diseases in hospitals—an even more essential use in the context of the COVID-19 pandemic.¹⁰⁷ Further, PFAS are used in medical textiles, including the now easily recognizable surgical mask.¹⁰⁸ Importantly, PFAS are also used in aqueous film-forming foams (AFFFs), which are used to fight fires.¹⁰⁹ This essential use has led to the introductions of thousands of short-chain alternatives. These short-chain alternatives, though they lack the bioaccumulation equivalent of long-chain counterparts, should also be regulated under the precautionary principle because of the high likelihood of continuous exposure through essential use.¹¹⁰

There is also legal precedent to apply in the context of the precautionary principle, chemical contamination, and the Safe Drinking Water Act (SDWA). In 1969, the Environmental Defense Fund (EDF) published a study that found thirty-six organic chemicals at the Carrollton water-treatment plant, a plant that, at the time, delivered more than 110 million gallons of water a day to 600,000 people.¹¹¹ Another EDF report concluded that “persons drinking treated Mississippi River water had a greater chance of developing cancer than those in neighboring areas whose drinking water came from ground-water sources.”¹¹² These reports generated heightened public awareness over the safety of drinking water.

In 1974, Congress passed the SDWA to address these mounting concerns. Pursuant to the SDWA, EPA published interim drinking water regulations within ninety days after the passage of the Act.¹¹³ EDF challenged the interim regulations on four grounds, including “the failure to fully control organic contaminants in drinking water.”¹¹⁴ While the court upheld EPA’s actions based on doctrines of agency deference, it also

106. Cousins et al., *The Concept of Essential Use for Determining When Uses of PFASs Can Be Phased Out*, 21 ENV’T SCIENCE: PROCESSES AND IMPACTS 1803, 1804 (2019), doi: 10.1039/c9em00163h.

107. Jessica Bowman, *INSIGHT: With PFAS One-Size-Fits-All Isn’t the Answer*, BLOOMBERG LAW (May 20, 2019, 5:00 AM), <https://news.bloomberglaw.com/environment-and-energy/insight-with-pfas-one-size-fits-all-isnt-the-answer>.

108. See Cousins et al., *supra* note 106, at 1807.

109. *Id.* at 1806.

110. See Cousins, *supra* note 97, at 334.

111. James M. Symons, *A History of the Attempted Federal Regulation Requiring GAC Adsorption for Water Treatment*, J. OF THE AM. WATER WORKS ASS’N, 1984, at 34, <https://www.jstor.org/stable/41272142>.

112. *Id.*

113. *Env’t Def. Fund v. Costle*, 578 F.2d 337, 340 (D.C. Cir. 1978); see also 42 U.S.C. § 300g-1(1)(B).

114. *Costle*, 578 F.2d at 340.

required EPA to amend the interim regulations to account for newly acquired data.¹¹⁵ Applying the precautionary principle as well as legislative intent, the court stated, “In light of the clear language of the legislative history, the incomplete state of our knowledge regarding the health effects of certain contaminants and the imperfect nature of the available measurement and treatment techniques cannot serve as justification for delay in controlling contaminants that may be harmful.”¹¹⁶

Further, there is evidence of legislative intent to apply the precautionary principle through a grouping approach. Discussing Section 1401 of the SDWA, House of Representatives Report 93-1185 states:

[T]he Committee anticipates that the Administrator will establish primary drinking water regulation for some groups of contaminants The establishment of such group-wide regulations should help assure that the public health will be protected from currently undiscovered, unidentified, or under-researched sub-groups or specific contaminants within the group.¹¹⁷

In the case of PFAS and drinking water, it would be prudent for EPA to apply the same reasoning. Even if there is an “incomplete state of knowledge” regarding PFAS monitoring and treatment, EPA must not delay in promulgating drinking water standards for PFOA and PFOS, and other types of PFAS. Additionally, EPA should use a “group-wide” approach to promulgate a cumulative MCLG and MCL for PFOA, PFOS, and any future PFAS regulated under the SDWA. This should include a well-defined monitoring framework to enforce that standard. In contrast, the sole use of a treatment technique approach, even one that applies to PFAS as a group, would have downfalls that should be avoided given the serious and widespread nature of PFAS pollution.

A. *The Problem*

Under the 1996 amendments to the SDWA, EPA has the authority to promulgate a treatment technique rule if the Agency determines it is not economically or technologically feasible to ascertain an MCL.¹¹⁸ A treatment technique is an enforceable procedure or level of technological performance which all public water systems must comply with in order to control a contaminant.¹¹⁹ For example, EPA regulates lead and copper under a treatment technique approach. The treatment technique for the

115. *Id.* at 350.

116. *Id.* at 345.

117. H.R. REP. NO. 93-1185, at 17 (1974).

118. 42 U.S.C. § 300g-1(b)(4).

119. 42 U.S.C. § 300g-1(b)(7)(A).

Lead and Copper Rule (LCR) requires systems to monitor drinking water at customer taps; if lead or copper exceed certain action levels in more than ten percent of customer taps sampled, the system is required to take additional steps such as corrosion control treatment, public notification, and lead service line replacement.¹²⁰ This approach has been criticized as a key factor in the Flint, Michigan Water Crisis. Due to inconsistent interpretations of the LCR, Flint officials did not immediately implement corrosion control treatment as prescribed under the rule. Instead, officials waited to implement any prescribed treatment until a six-month monitoring period was over. Flint residents drank lead poisoned water throughout that period, leading to a serious public health crisis.¹²¹

Granular activated carbon (GAC) filtration is one of the most widely studied and utilized methods of PFAS removal and would be a likely candidate for a treatment technique. The process of filtering water through charcoal for purity is mentioned in Sanskrit writing; ancient mariners used to store drinking water in charred wooden barrels to maintain purity aboard ship.¹²² Activated carbon is often used to adsorb natural organic compounds, taste and odor compounds, and synthetic organic chemicals in drinking water; GAC is considered an effective adsorbent because it is a highly porous material and has a large surface area where contaminants may adsorb.¹²³ A one-size fits all prescription to treat PFAS pollution via GAC filtration, however, presents numerous shortfalls. As EPA researcher Thomas Speth explains, “GAC can be 100 percent effective for a period of time, depending on the type of carbon used, the depth of the bed of carbon, flow rate of the water, the specific PFAS you need to remove, temperature, and the degree and type of organic matter as well as other contaminants, or constituents, in the water.”¹²⁴ For example, short-chain PFASs are more water soluble than long-chain PFASs and thus have a lower potential for sorption to particles. This makes it difficult to remove short-chain PFAS from a water supply using GAC filters.¹²⁵

EPA tried to use its authority under the treatment technique rule in 1978 when it proposed a GAC treatment technique rule. The 1978 proposal required jurisdictions that were considered vulnerable to

120. 40 C.F.R. § 141.80.

121. See Moriah Schmidt, *Don't Drink the Water: Why the Safe Drinking Water Act Failed Flint*, 19 VT. J. OF ENV'T L. 218, 225 (2018), <https://www.jstor.org/stable/26510745>.

122. Symons, *supra* note 109.

123. *Reducing PFAS in Drinking Water with Treatment Technologies*, EPA, <https://www.epa.gov/sciencematters/reducing-pfas-drinking-water-treatment-technologies> (Mar. 3, 2021).

124. *Id.*

125. Cousins et al., *supra* note 97, at 333.

synthetic chemical contamination to install GAC filters.¹²⁶ Opponents criticized the proposal for being overly ambiguous and relying on an understudied treatment technique; EPA withdrew the proposed rule in 1981 after intense public scrutiny.¹²⁷ For example, Joshua Lederber, a Nobel Laureate and noted authority in the health protection field, warned that “you could make a horror story of the chemistry of what’s in charcoal . . . If you were to take charcoal and disaggregate it and hydrogenate it, you would end up with a lot of horror substances that we would really seriously like to avoid.”¹²⁸ He further questioned “the wisdom of mandating the wide-spread deployment of a treatment technique,” stating further that “[a]ctivated carbon has been proposed as if it were a reliable panacea for cleaning up water subject to chemical contamination and almost no thought has been given to the possibilities of side-effect hazard.”¹²⁹

In spite of the push to regulate chemical contaminants, EPA withdrew its GAC filtration proposal in 1981.¹³⁰ EPA based its decision on five reasons: 1) the difficulty with the quantification of vulnerability, 2) the incompleteness of the new data-gathering effort, 3) the slowness with which health effects data to support the need for SOC control were being developed, 4) the continued resistance to the concept, and 5) the age of the proposed regulation.¹³¹ The announcement, however, stated that the regulation might be re-proposed at a later date.¹³²

Both the LCR and this failed regulation illustrate two potential downfalls to regulating drinking water contaminants under a treatment technique approach. First, such a rule tends to rely on regulatory standards that are hard to precisely define, such as the concept of communities who are “vulnerable” to chemical contamination.¹³³ Defining these concepts are critical to public health because they provide a trigger for agency action, such as decreased monitoring or application of a certain treatment technique. As illustrated by the Flint Water Crisis, unclear regulations—

126. Control of Organic Chemical Contaminants in Drinking Water, 43 Fed. Reg. 5756 (Feb. 9, 1978).

127. See Symons, *supra* note 111, at 42.

128. George W. Pendygraft et al., *The EPA-Proposed Granular Activated Carbon Treatment Requirement: Panacea or Pandora’s Box?*, J. OF THE AM. WATER WORKS ASS’N, February 1979, at 55, <https://www.jstor.org/stable/41270222>.

129. *Id.* at 56 (citing Letter from J. Lederberg to Douglas M. Costle (Aug. 25, 1978)).

130. Withdrawal of Proposed Regulations, 46 Fed. Reg. 17567 (Mar. 19, 1981)

131. *Id.*; see also Symons, *supra* note 111, at 42.

132. Withdrawal of Proposed Regulations, 46 Fed. Reg. at 17567.

133. Control of Organic Chemical Contaminants in Drinking Water, 43 Fed. Reg. 5755 (Feb. 9, 1978).

especially in the context of drinking water standards—can have deadly consequences. Though the treatment technique approach sounds simplistic, the reality of defining exactly how a treatment technique should be implemented is often complicated.

The issue of inconsistency in interpretation would likely be exacerbated under the Standardized Monitoring Framework (SMF). Like the LCR, the SMF has been heavily criticized as leading to inconsistent interpretation by utilities and public health officials.¹³⁴ Both regulatory frameworks require regulators to define elusive concepts—“reliably and consistently below the MCL”¹³⁵ and “action level.”¹³⁶ Regulators sometimes define numeric limits for these triggers, such as the action level under the LCR: “The lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples collected . . . is greater than 0.015 mg/L.”¹³⁷ Compare EPA Guidance on the definition of “reliably and consistently” below the MCL. “‘Reliably and consistently’ below the MCL means that though the system detects contaminants in its water supply, it has sufficient knowledge of the source or extent of the contamination to predict that the MCL will not be exceeded.”¹³⁸ The Guidance further explains that “wide variations” in results will not meet the test.¹³⁹ Critics of the proposed carbon filtration treatment technique rule cited similar worries about inconsistent interpretation, with one of the main concerns being that it would be difficult to define and quantify which communities qualified as “vulnerable” to chemical contamination.¹⁴⁰

Additionally, for EPA to invoke the authority to promulgate a treatment technique rule, it must show that it is not economically and technologically feasible to ascertain an MCL.¹⁴¹ Thus, the burden of proof is on EPA to show why such a regulatory approach is prudent. Notably, the treatment technique approach would require a hefty investment from public water systems who do not currently employ one of the accepted PFAS removal methods; as the American Water Works Association noted in testimony to Congress, PFAS regulatory actions should be prudently

134. National Primary Drinking Water Regulations—Synthetic Organic Chemicals and Organic Chemicals, 56 Fed. Reg. 3526 (Jan. 30, 1991).

135. See Memorandum from EPA on Final Guidances for State Sampling Waiver Programs 6 (Aug. 25, 1992), <https://www.epa.gov/sites/production/files/2015-09/documents/wsg71.pdf>.

136. 40 C.F.R. § 141.80(b).

137. 40 C.F.R. § 141.80(c)(1).

138. Memorandum from EPA on Final Guidances for State Sampling Waiver Programs, *supra* note 133.

139. *Id.*

140. Symons, *supra* note 111, at 42.

141. 42 U.S.C. § 300g-1(b)(7)(A).

implemented to “avoid aggravating affordability issues for customers.”¹⁴² For example, Cape Fear Public Authority prepared a cost-estimate for GAC filtration, anion exchange, and reverse osmosis in response to PFAS detection in the Cape Fear River; estimates ranged from \$46 million up to \$150 million.¹⁴³ In the context of the failure of the LCR and the Flint Michigan crisis, EPA should be wary to introduce expensive, complicated regulatory regimes that are vulnerable to inconsistent interpretations.

B. *The Solution*

A grouping approach implemented through an MCLG, MCL, and well-defined monitoring standard will provide a consistent regulatory regime and adequate protection for public health, in line with the precautionary principle. For example, the EU has implemented a grouping approach and established a limit of 500 ppt for twenty types of PFAS; regulators are currently developing protocols for all 4,700 PFAS chemicals.¹⁴⁴ EU regulations stand in sharp contrast to EPA’s combined 70 ppt HAL, which accounts for only two types of PFAS.¹⁴⁵ Even more strikingly, the Environmental Working Group (EWG) recommends a one ppt safe level for total PFAS.¹⁴⁶

Individual states are far ahead of EPA. For example, Massachusetts adopted an MCL at 20 ppt limit for six combined PFAS.¹⁴⁷ Vermont has the same 20 ppt limit for five combined PFAS.¹⁴⁸ California employs very

142. Hearing on Examining the federal response to the risks associated with per- and polyfluoroalkyl substances (PFAS), Senate Committee on Environment and Public Works, 116th Cong. 13 (2019) (testimony of Tracy G. Mehan III).

143. BLACK & VEATCH, ALTERNATIVES EVALUATION REPORT: EMERGING CONTAMINANTS TREATMENT STRATEGIES STUDY 2 (Apr. 30, 2018), https://www.cfpua.org/DocumentCenter/View/11386/BlackVeatch_FinalReport.

144. Press Release, Eur. Parliament, Trilogue results of the revision of the Drinking Water Directive (Dec. 15, 2020), <https://sven-giegold.de/wp-content/uploads/2019/12/Media-briefing-Drinking-water-19.12.2019.pdf>.

145. *Fact Sheet: PFOA & PFOS Drinking Water Health Advisories*, EPA, https://www.epa.gov/sites/production/files/2016-06/documents/drinkingwaterhealthadvisories_pfoa_pfos_updated_5.31.16.pdf.

146. Press Release, EWG, Europe to Adopt Sweeping Tap Water Limits for PFAS, Other Toxic Contaminants, <https://www.ewg.org/release/europe-adopt-sweeping-tap-water-limits-pfas-other-toxic-contaminants#:~:text=For%20PFAS%2C%20the%20EU%20would,for%20all%20%2C700%20PFAS%20chemicals>.

147. *State-by-State Regulation of PFAS Substances in Drinking Water*, BRYAN CAVE LEIGHTON PAISNER (Jan. 22, 2021), <https://www.bclplaw.com/en-US/insights/state-by-state-regulation-of-pfas-substances-in-drinking-water.html>. These include PFOA, PFOS, PFHxS, PFNA, PFHpA, and PFDA. *Id.*

148. *Id.*

strict 5.1 ppt limit for PFOA and 6.5 ppt limit for PFOS.¹⁴⁹ Minnesota stands out in terms of how it regulates PFAS; like California, there are individual limits for each PFAS. These include 15 ppt for PFOS, 35 ppt for PFOA, 47 ppt for PFHxS, 2,000 ppt for PFBS, and 7,000 ppt for PFBA.¹⁵⁰ If you calculate the combined limit, it adds up to 9,097 ppt for all PFAS. Compared to the EU's 500 ppt limit for all PFAS, this standard falls short. It also illustrates the downfall of an individual or state-level approach. If regulators and customers want an accurate picture of the total amount of PFAS in drinking water, they are left to calculate this combined limit on their own. Under a grouping approach, this information is readily available and more importantly, enforceable as a drinking water regulation.

Given the nature of PFAS contamination, it is certain that EPA should continue to implement a grouping approach to adequately account for the vast number of PFAS and the widespread nature of contamination. Further, EPA should apply the precautionary principle given the widespread, irreversible nature of PFAS pollution and its impacts on sensitive populations. With this principle in mind, EPA should promulgate a national primary drinking water regulation for PFAS that adheres to the precautionary principle. To achieve this goal, EPA can take three main actions. First, it should adopt a cumulative MCLG and MCL for all PFAS regulated under the SDWA. Such a grouping approach will lessen confusion among regulators and provide public health experts with more comprehensive health information based on cumulative, lifetime exposure. Second, EPA should implement a well-defined standard of monitoring that is not within the SMF in order to give regulators more flexibility in monitoring approaches. Third, if EPA decides to regulate through an enforceable treatment technique, this should not be the sole regulatory mechanism; it should also promulgate a cumulative MCL to provide clarity to the public and regulators about how much PFAS is allowed in drinking water. This regime would allow regulators more flexibility in determining how best to treat local drinking water. Through these three actions, EPA can address a long-awaited pollution control problem in a way that satisfies public health goals as well as logistical concerns from regulated entities.

149. *Id.*

150. *Id.*

IV. CONCLUSION

While the PFAS pollution is a unique and serious problem, history provides an informed basis to structure a regulatory regime that accounts for these concerns. By taking the three recommended actions outlined in this Comment, EPA can adhere to the precautionary principle in order to account for the irreversible nature of PFAS pollution. Further, such a regulatory regime comports with congressional intent by protecting sensitive populations from a contaminant that has been shown to have greater adverse impacts on these populations, including pregnant women and children. In order to avoid a serious public health crisis, EPA should apply a forward-looking approach to regulating PFAS in drinking water. While this approach might seem costly and unnecessary in the short-term, it avoids long-term, unforeseeable consequences that often occur in the context of large-scale chemical contamination.