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PFAS: A Case Study on its Current Costs and How to Regulate Toxic Chemicals in the Future

*Isaac Serratos**

ABSTRACT

Chemicals like Dichlorodiphenyltrichloroethane (“DDT”) and Chlorofluorocarbons (“CFCs”) that seemed invaluable to human society were eventually phased out and banned after their negative effects were discovered. Moving forward, Per- and polyfluoroalkyl substances (“PFAS”) must be added to this list. The current phase out rate is moving too slowly, increasing eventual remediation costs, and negative health effects in people exposed. This paper examines the different approaches the Stockholm Convention on Persistent Organic Pollutants, the United States Environmental Protection Agency (“EPA”), and recent California statutes are taking in addressing PFAS pollution. Despite the acknowledgement of the problem, without an international treaty to phase out PFAS, PFAS contamination will continue to burden future generations in distant nations from where the chemical was created. An aggressive international chemical regulatory mechanism largely based on Registration, Evaluation, Authorisation, and Restriction of Chemicals (“REACH”) is required to successfully prevent expensive remediation costs like that of PFAS.

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INTRODUCTION

To best understand the threat PFAS pose to humans this paper examines the human health impacts of PFAS in the environment. I then contrast the differing approaches taken by California statutes, federal actions in the United States, and the Stockholm Convention on Persistent Organic Pollutants in phasing out PFAS substances. I also discuss the costs of remediating PFAS contamination in the environment for PFAS chemicals that have already been released. Finally, I propose a global chemical regulatory system based on the European system REACH. PFAS are not one monolithic chemical. PFAS are a group of man-made chemicals that includes Perfluorooctanoic acid (“PFOA”), Perfluorooctanesulfonic acid (PFOS), GenX, and many other chemicals.¹ Perfluoroalkyls (“PFAS”) do not occur naturally.² PFAS chemicals have been manufactured in the United States since the 1940s.³ PFAS are ubiquitous in the United States.⁴ PFAS can be found in food, commercial household products, workplaces, drinking water, and living organisms.⁵

Despite the long history of PFAS manufacturing in the United States, PFAS have largely escaped federal regulation.⁶ In 2006 the United States successfully implemented the PFOA Stewardship program, which voluntarily pushed PFAS manufacturers to stop PFOA and PFOS manufacturing in the United States.⁷ Although this instance of soft law was successful, PFOA and PFOS products may still be manufactured internationally and imported into the United States in goods.⁸ Soft law has

1. *Basic Information on PFAS*, U.S. ENVTL. PROTECTION AGENCY (Dec. 6, 2018), <https://perma.cc/Y9C2-J6SG> [hereinafter *Basic Information on PFAS*].

2. U.S. DEP’T OF HEALTH AND HUMAN SERVICES, CS274127A, AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ASTDR): TOXICOLOGICAL PROFILE FOR PERFLUOROALKYLS 15–16 (2018) [hereinafter U.S. DEP’T OF HEALTH AND HUMAN SERVICES, ASTDR].

3. *For 20-Plus Years, EPA Has Failed to Regulate ‘Forever Chemicals’*, THE ENVTL. WORKING GROUP, <https://perma.cc/TR4Y-Z5NY>.

4. Geological Society of America, *PFAS: These ‘forever chemicals’ are Highly Toxic, Under Studied, and Largely Unregulated*, SCIENCE DAILY (Oct. 29, 2020), <https://perma.cc/6D39-NTSF>.

5. *Basic Information on PFAS*, *supra* note 1.

6. *PFAS Laws and Regulations*, U.S. ENVTL. PROTECTION AGENCY (Dec. 6, 2018), <https://perma.cc/NGQ4-JRZ3>.

7. *PFOA Stewardship Program Baseline Year Summary Report*, U.S. ENVTL. PROTECTION AGENCY (Dec. 6, 2018), <https://perma.cc/Q7K8-AEXV> [hereinafter *PFOA Stewardship Program Baseline Year Summary Report*].

8. *Basic Information on PFAS*, *supra* note 1.

not been sufficiently successfully to solve the PFAS problem within the United States.⁹

Additionally, intermittent lawsuits and fines do not deter companies enough to prioritize safety in chemical manufacturing.¹⁰ To successfully change this paradigm, laws like the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”) that designate parties responsible for hazardous substance cleanup are necessary.¹¹ Without successfully applying statutes that empower citizens to file actions against companies that pollute their surroundings, negative externalities will not be internalized by the company.¹² Although settlements and cleanup efforts are necessary to mitigate the damage that has already been done, it is important to phase out dangerous substances as fast as possible to limit remediation costs.¹³ Without a more aggressive approach to PFAS phase out, the costs of remediating PFAS pollution as well as health costs due to PFAS bioaccumulation will only increase. To effectively regulate chemicals like PFAS, increased research and a precautionary approach to chemical regulation is necessary.¹⁴

International agreements like the Stockholm Convention are integral in phasing out toxic chemicals throughout the world.¹⁵ While the Convention is imperative in facilitating worldwide phaseout of persistent chemicals, the Convention currently moves too slowly to avoid widespread damage to human and environmental health.¹⁶

To supplement the Stockholm Convention, a new international chemical regulatory framework must be implemented. The international framework should revolve around existing legislation in Europe, specifically REACH. The new framework must use the precautionary principle to incentivize innovation towards safer chemicals.

9. *PFOA Stewardship Program Baseline Year Summary Report*, *supra* note 7.

10. *3M Lawsuit*, THE OFF. OF MINN. ATT’Y GENERAL KEITH ELLISON (last visited Feb. 6, 2021), <https://perma.cc/7PSA-89WK> [hereinafter THE OFFICE OF MINNESOTA ATTORNEY GENERAL KEITH ELLISON].

11. *Id.*

12. *Id.*

13. Rebecca Beitsch, *Defense Department Says “Forever Chemical” Cleanup Costs will Dwarf Earlier Estimates*, THE HILL (Sept. 12, 2019, 6:05 PM), <https://perma.cc/9NB7-3JSU> [hereinafter Beitsch].

14. *Follow Up to COP-9*, STOCKHOLM CONVENTION, <https://perma.cc/4Q82-REGB>.

15. *Overview*, STOCKHOLM CONVENTION, <https://perma.cc/4ZVM-Q8NQ>.

16. *Programme of Work*, STOCKHOLM CONVENTION, <https://perma.cc/4EG7-G4VH>.

DISCUSSION

A. SCIENCE OF PFAS

Among PFAS chemicals, PFOA and PFOS are the most studied.¹⁷ Chemical manufacturers like Dupont and 3M have known about the toxic effects of perfluoroalkyl for decades.¹⁸ Since the 1950s, a 3M mice study revealed that PFAS builds up in blood.¹⁹ In 1963 a 3M technical manual determined that PFAS was toxic.²⁰ In 1956 Stanford University found that PFAS binds to proteins in human blood.²¹ In 1965 DuPont completed a mice study that showed PFAS caused increased liver, kidney, and spleen size.²² By 1970, DuPont scientists admitted PFAS was “highly toxic when inhaled.”²³

Internal documents continued to reveal evidence that PFAS were dangerous to human health and the environment.²⁴ In 1973, a DuPont study showed liver damage from exposure to PFAS in food packaging.²⁵ By 1979, a survey of employees in West Virginia’s Washington Works Plant found possible evidence of liver damage.²⁶ The plant was later the site of a class action lawsuit against the company.²⁷

Perfluoroalkyls are human made substances that do not occur naturally in the environment.²⁸ Perfluoroalkyls are not biodegradable, they are resistant to photooxidation, direct photolysis, and hydrolysis.²⁹ They are

17. *Basic Information on PFAS*, *supra* note 1.

18. *For Decades, Polluters Knew PFAS Chemicals Were Dangerous but Hid Risks from Public*, THE ENVT’L WORKING GROUP, <https://perma.cc/F6DV-VDTM> [hereinafter THE ENVT’L WORKING GROUP].

19. Exhibit 1009, *State of Minnesota v. 3M Company* (Minn. Dist. Ct. Jan. 18, 2011) (No. 27-CV-10-28862).

20. Exhibit 1042, *State of Minnesota v. 3M Company* (Minn. Dist. Ct. Jan. 18, 2011) (No. 27-CV-10-28862).

21. FRANCIX X. WAZETER, NINETY DAY FEEDING STUDY IN THE RAT at 2 (1965).

22. *Risk Management for Per- and Polyfluoroalkyl Substances (PFAS) under TSCA*, U.S. ENVTL. PROTECTION AGENCY (Dec. 10, 2020), <https://perma.cc/VFG5-QZ9L>.

23. Exhibit 5, *State of Minnesota v. 3M Company* (Minn. Dist. Ct. Jan. 18, 2011) (No. 27-CV-10-28862).

24. THE ENVT’L WORKING GROUP, *supra* note 18.

25. C. F. REINHARDT ET AL., NINETY-DAY FEEDING STUDY IN RATS AND DOGS WITH ZONYL RP 10 (1973).

26. Y. L. POWER, STATUS REPORT ON WASHINGTON WORKS LIVER FUNCTION SURVEY AND CORONARY HEART DISEASE MORTALITY STUDY (Dupont, Emp. Relations Dep’t, 1979).

27. *The Science Panel*, C8 SCI. PANEL (Jan. 22, 2020), <https://perma.cc/ZG4P-KZ EQ>.

28. *Basic Information on PFAS*, *supra* note 1.

29. U.S. DEP’T OF HEALTH AND HUMAN SERVICES, ASTDR, *supra* note 2, at 2.

able to move in soil and leach into groundwater.³⁰ Because of their inability to break down, but propensity to travel, perfluoroalkyls have been found as far as the Arctic.³¹ Unlike most persistent chemicals which bind and accumulate in fat, PFAS binds to protein in the blood.³² Among a study in Greenland and the Faroe Islands, polar bears were the most contaminated of animals tested.³³

A minimal risk level (“MRL”) is an estimate of the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health.³⁴ Under the minimal risk levels created by the Agency for Toxic Substance and Disease Registry (“ATSDR”). The provisional minimal risk for intermediate-duration oral ingestion is based on laboratory animal data. The risk levels are as follows for PFOA, PFOS, PFHxS, and PFNA: 3×10^{-6} mg/kg/day, 2×10^{-6} mg/kg/day, 2×10^{-5} mg/kg/day, 3×10^{-6} mg/kg/day, respectively.³⁵

Major pathways for PFOS and PFOA contamination in the general population in Europe and North America are food/water ingestion, dust ingestion, and hand to mouth transfer from contaminated carpets.³⁶ Based on these exposure pathways, adult uptake doses in a high dose scenario are approximately 30 and 47 ng/kg/day for PFOS and PFOA.³⁷ In children under the age of twelve, high exposure scenarios were between 101-219 and 65.2-128 ng/kg/day, respectively.³⁸ Perfluoroalkyls have been detected in human breast milk and umbilical cord blood, in most samples the concentrations of PFOS and PFOA ranged from 4.9 to 11 and from 1.6 to 3.7 ng/mL respectively.³⁹ Since PFOA and PFOS are no longer produced in the United States, the current PFOA and PFOS exposures may be lower today.⁴⁰

30. U.S. DEP’T OF HEALTH AND HUMAN SERVICES, ASTDR, *supra* note 2, at 2.

31. *Id.*

32. Brettania Walker, *Polar Bears Top the List of ‘Most Contaminated’ in the Arctic*, WORLD WIDE FUND FOR NATURE (Aug. 10, 2005), <https://perma.cc/Ry6G-AWF2>.

33. *Id.*

34. *Minimal Risk Levels (MRLs)*, AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY, (Jun. 4, 2018), <https://perma.cc/Q2FZ-7HNL>.

35. U.S. DEP’T OF HEALTH AND HUMAN SERVICES, ASTDR, *supra* note 2.

36. *Id.* at 3.

37. *Id.*

38. *Id.*

39. *Id.*

40. *Id.*

Humans are much worse at eliminating perfluoroalkyls when compared to mice.⁴¹ In humans the half-life of PFOS is 5.4 years, as compared to 731-1,027 hours in mice.⁴² The difference makes using mice as a proxy for health effects in humans problematic. Although animal studies are not perfect proxies for humans, it would be unethical and illegal to subject humans to controlled chemical testing.

Among Americans, the highest levels of PFAS are found among workers who work directly with PFAS chemicals, followed by community members of those workers, and then the general population.⁴³ The National Health and Nutrition Examination Survey (“NHANES”) examined 2,094 samples collected from NHANES participants between 2003 and 2004, the data revealed 98 percent of the samples contained PFOS, PFOA, PFHxS, and PFNA.⁴⁴

B. THE C8 STUDY AS AN EPIDEMIOLOGICAL STUDY OF PFAS

In the case *Jack W. Leach, et al. v. E.I. du Pont de Nemours & Company* plaintiffs filed a class action lawsuit against DuPont for contaminating drinking water supplies near DuPont’s West Virginia Washington Works Plant.⁴⁵ From the 1950s until the early 2000s the plant released PFOA into the air and Ohio River.⁴⁶ Today, PFOA emissions from the plant have been largely eliminated.⁴⁷ Carbon filters are being used to remove PFOA from water systems near the plant.⁴⁸ The parties agreed to settle the case, but as part of the settlement agreement, an independent company would conduct a health study of the residents, called the C8 Health Project.⁴⁹

The C8 Health Project was largely used to determine whether there was a probable link between PFOA exposure and diseases within a community exposed to PFOA.⁵⁰ The C8 Health Project conducted

41. Geary W. Olsen et al., *Half-life of Serum Elimination of Perfluorooctanesulfonate, Perfluorohexanesulfonate, and Perfluorooctanoate in Retired Fluorochemical Production Workers*, 115 ENVTL. HEALTH PERSP. 1298, 1298–1305 (2007).

42. *Id.*

43. *PFAS in the U.S. Population*, AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (June 24, 2020), <https://perma.cc/JR5V-4A92>.

44. *Id.*

45. *The Science Panel*, C8 SCIENCE PANEL, <https://perma.cc/2C55-5HC8> [hereinafter C8 SCIENCE PANEL].

46. *Id.*

47. *Id.*

48. *Id.*

49. *Id.*

50. *Id.*

interviews, used questionnaires, and collected blood samples from roughly 69,000 people living near the Washington Works plant.⁵¹ The project used health research conducted on the community near the Washington Works plant and published scientific research done by others to determine if there were probable links between PFOA exposure and the diseases being studied.⁵²

The C8 Health concluded that there was a probable link between PFOA and high cholesterol.⁵³ The C8 panel determined there was an increase in cholesterol that aligned with increasing serum PFOA in the blood after adjusting for confounding variables like age, body mass index, gender, and exercise.⁵⁴ The panel also found that the greater the decrease in PFOA in the blood, the greater the decrease in low-density lipoprotein (“LDL”) cholesterol. More specifically, a 50 percent drop in PFOA predicted a 3.6 percent decrease in LDL cholesterol.⁵⁵

In addition, the panel found probable links between PFOA exposure and testicular cancer and kidney cancer.⁵⁶ Among medically confirmed cases, testicular cancer showed a positive trend among patients with higher PFOA exposure.

Besides the probable links already mentioned, the C8 panel also found probable links between PFOA exposure and ulcerative colitis, thyroid diseases, and pregnancy induced hypertension.⁵⁷ Although the probable links are not randomized control trials that would give definitive results towards how much PFOA exposure causes what ailments, such an experiment would be unethical. Therefore, epidemiological studies such as this provide the best snapshot into how PFOA will affect a community.

51. C8 SCIENCE PANEL, *supra* note 45.

52. *Id.*

53. *Id.*

54. C8 SCIENCE PANEL, PROBABLE LINK EVALUATION FOR HEART DISEASE (INCLUDING HIGH BLOOD PRESSURE, HIGH CHOLESTEROL, CORONARY ARTERY DISEASE) 6 (2012).

55. *Id.* at 7.

56. C8 SCIENCE PANEL, *supra* note 45.

57. *Id.*

C. HOW DOES PFAS REGULATION DIFFER BETWEEN STATE AND FEDERAL GOVERNMENT ACTION

i. California:

In California, the four major sources of PFAS are: fire training/fire response, industrial sites, landfills, and wastewater treatment plants.⁵⁸ As the federal government lagged in placing stringent PFAS controls, California has been regulating PFAS.⁵⁹ Instead of banning PFAS chemicals outright, California has chosen to target specific sectors individually, giving each sector different allowances in how quickly they must phase out some PFAS chemicals.⁶⁰

Senate Bill 1044, Firefighting Equipment and Foam: PFAS chemicals, requires any person that sells firefighter personal protective equipment to provide written notice to the purchaser if the equipment contains intentionally added PFAS chemicals.⁶¹ In addition to notice, the law also prohibits a manufacturer of class B firefighting foam from manufacturing, knowingly selling, distributing for sale, or distributing for use in California foam containing intentionally added PFAS chemicals.⁶² Additionally, the law prohibits a person from discharging class B firefighting foam that contains intentionally added PFAS chemicals.⁶³ The law goes into effect on January 1, 2022.⁶⁴

Assembly Bill 2762, the Toxics Free Cosmetics Act prohibits “[a] person or entity from manufacturing, selling, delivering, holding, or offering for sale, in commerce any cosmetic product that contains any of several specified intentionally added ingredients, except under specified circumstances.”⁶⁵ The law bans PFOA and their salts, as well as PFOS.⁶⁶ Despite the seemingly strong language, the law aligns with regulations already placed in regions like the European Union, but would be a first in

58. *PFAS Background and Nomenclature*, CAL. STATE WATER RESOURCES CONTROL BOARD (Oct. 27, 2020), <https://perma.cc/G348-QBZA> [hereinafter *PFAS Background and Nomenclature*].

59. Emily C. Dooley, *California Advances Bill Banning PFAS in Firefighting Foam*, BLOOMBERG L. (Aug. 30, 2020), <https://perma.cc/Y8XP-M6QJ>.

60. *Id.*

61. S.B.1044, 2020 Leg., Reg. Sess. (Ca. 2020).

62. *Id.*

63. *Id.*

64. *Id.*

65. A.B. 2762, 2020 Leg., Reg. Sess. (Ca. 2020).

66. *Id.*

the United States.⁶⁷ The law also only bans some PFAS chemicals, leaving thousands of the other PFAS chemicals still available for use by manufacturers.⁶⁸ The law does not go into effect until 2025, allowing several more years of direct PFAS interaction between consumers and a personal care product.⁶⁹

Assembly Bill 756 allows the State Water Resources Control Board the power to force all public water systems to monitor their water supplies for PFAS, and to alert or act if PFAS levels set by the board are exceeded.⁷⁰ After the law was passed, the board lowered both the notification and response level required if PFOA or PFOS are detected.⁷¹ In California, PFOA response level is set at ten parts per trillion, this is significantly lower than the 70 parts per trillion recommended by the federal Environmental Protection Agency (“EPA”).⁷² If notification levels are exceeded, the water system must report the detection in the annual consumer confidence report.⁷³ If response levels are exceeded by a water source, the source must be removed from service, treated, or public notification of the response level detected must be provided.⁷⁴

California’s approach targets specific sectors. It does not outright ban all items that contain PFAS chemicals. The targeted approach lowers administrative costs of implementing the law but leaves open several other sectors that expose Californians to PFAS chemicals. The statutes also only target some PFAS substances, without requiring further testing to determine whether more should be regulated.

Similar to California’s emission standards that force manufacturers to comply with more stringent requirements, manufacturers that use PFAS will also have to tailor their products if they want to have access to

67. *Governor Newsom Signs Legislation Making California First in the Nation to Ban Toxic Chemicals in Cosmetics*, OFF. OF GOV. GAVIN NEWSOM (Sept. 30, 2020), <https://perma.cc/YWX3-SWU8> [OFF. OF GOV. GAVIN NEWSOM].

68. A.B. 2762, 2020 Leg., Reg. Sess. (Ca. 2020).

69. *Id.*

70. *What Does AB 756 Require for Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)*, CAL. STATE WATER RESOURCES CONTROL BOARD, (Feb. 6, 2020), <https://perma.cc/7C8B-3CYU> [hereinafter *What Does AB 756 Require for Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)*].

71. Jeffrey Dintzer & Clynton Namuo, *New California Law Represents Strategic Shift in PFAS Regulation*, ALSTON & BIRD (Sept. 19, 2019), <https://perma.cc/W2ZL-DW6U>.

72. *PFOA & PFOS Drinking Water Health Advisories*, EPA (Nov. 2016), <https://perma.cc/S7MJ-SQ5P>.

73. *What Does AB 756 Require for Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)*, *supra* note 70.

74. *Id.*

California's market.⁷⁵ By setting more stringent requirements than those set by other states or nationally, manufacturers are more likely to comply with the most stringent standards as opposed to creating a different product for each state.⁷⁶ Creating a product for each state or country increases manufacturing complexity and cost.

California's power in regulating internal affairs, while tacitly setting the standards of other states, or even nationally, demonstrates how powerful California's regulations are. Therefore, if California broadened its regulations to include more industry sectors that use PFAS, and increased the number of PFAS chemicals regulated, the state could implicitly set PFAS national standards for manufacturers.

Although California may attempt to stringently regulate PFAS, it may encounter hurdles in House Bill 2576, which updated the Toxic Substance Control Act.⁷⁷ Although the act primarily increased the EPA's power to regulate chemicals, it also could limit states' abilities to apply more stringent regulations.⁷⁸ House Bill 2576 allows the EPA "to pause state regulatory action when the EPA has defined the scope of a risk evaluation for an existing high priority chemical but before the EPA has concluded in a final rule whether further regulatory action is needed."⁷⁹ States may apply for waivers from the "pause" but the EPA may choose to deny the waiver.⁸⁰ To deny the waiver the EPA would need to find that the waiver would unduly burden interstate commerce, the finding is open to judicial review.⁸¹ Although only a temporary pause, the statute may make it more difficult to regulate chemicals on a state by state basis

Additionally, California may also encounter challenges to limit PFAS substances under Dormant Commerce Clause lawsuits. The Dormant Commerce Clause points out that because Congress has the power to control interstate commerce, states cannot discriminate against interstate commerce or unduly burden interstate commerce.⁸² The section was designed to prevent state policies that favor state enterprises over out of state businesses. If the law is discriminatory against out of state

75. John Gardella, *PFAS Ban Included in California Cosmetics Bill*, THE NAT'L L. REV. (Sept. 9, 2020), <https://perma.cc/DG8G-DGT2>.

76. *Id.*

77. Frank R. Lautenberg Chemical Safety for the 21st Century Act, H.R. 2576, 114th Cong. (2016).

78. Sarah E. Light, *Regulating Toxic Chemicals through Precautionary Federalism*, 3 PENN UNDERGRADUATE L.J. 1, 7–8 (2016).

79. *Id.* at 12.

80. Frank R. Lautenberg Chemical Safety for the 21st Century Act, H.R. 2576 § 13(f)(2).

81. *Id.*

82. U.S. CONST. art. I § 8, cl. 3.

competition, the law may be struck down.⁸³ Because the laws do not discriminate against out of state enterprises that use PFAS, the laws would likely survive this attack.

Instead, challengers to the law could argue that the laws are unduly burdensome. The court would then need to weigh whether the benefits of the state's interests are outweighed by the burden on state commerce; specifically examining whether less restrictive alternatives exist. As *Rocky Mountain Farmers Union v. Corey* made clear “[n]or is the dormant Commerce Clause a blindfold. It does not invalidate by strict scrutiny state laws or regulations that incorporate state boundaries for good and nondiscriminatory reason. It does not require that reality be ignored in lawmaking.”⁸⁴ California's PFAS laws are nondiscriminatory, and benefit the health of the state's citizens, therefore it is likely to survive any Dormant Commerce Clause challenges.

ii. Executive Federal Actions Addressing PFAS Chemicals

In 2006, EPA invited eight major PFAS manufacturers to join the PFOA Stewardship Program.⁸⁵ The program set out to achieve a 95 percent reduction in PFOA chemicals no later than 2010, measured from a year 2000 baseline.⁸⁶ By 2015 the program aimed to eliminate the chemicals from emissions and products by 2015.⁸⁷ All participating companies met the PFOA Stewardship Program goals.⁸⁸ The program also encouraged research into alternatives to PFOA.⁸⁹

To meet the goals, most companies stopped manufacturing PFOA by transitioning to other chemicals or exited the PFAS industry completely.⁹⁰ Companies that switched to other chemicals illustrate the problem in only regulating some chemicals among the thousands of chemicals that make up the PFAS family. PFOA is often replaced by another PFAS chemical like GenX or ADONA.⁹¹ Less information is available for the new chemicals, but some studies have shown that they have similar toxicological effects to

83. *West Lynn Creamery Inc. v. Healy*, 512 U.S. 186 (1994).

84. *Rocky Mt. Farmers Union v. Corey*, 913 F.3d 940, 957 (9th Cir. 2019).

85. *Assessing and Managing Chemicals under TSCA*, EPA (Aug. 9, 2018), <https://perma.cc/64SA-CACY>.

86. *Id.*

87. *Id.*

88. *Id.*

89. *Id.*

90. *Id.*

91. PFAS Background and Nomenclature, *supra* note 58.

chemicals like PFOA.⁹² New PFAS chemicals are more likely to end up in drinking water due to their ability to remain in water even after treatment.⁹³

The EPA was largely forced to use the Stewardship program because of its inability to effectively regulate chemicals.⁹⁴ The current iteration of the Toxic Substances Control Act (“TSCA”) is the strongest it has ever been, but still too weak to effectively phase out PFAS. Under House Bill 2576, the TSCA Modernization Act of 2015 improved the ability of the EPA to identify and regulate dangerous chemicals.⁹⁵ The Act removed the requirement that EPA impose the least burdensome rules when regulating a chemical.⁹⁶ The Act also established a risk-based standard to determine whether to regulate a chemical, instead of a cost benefit standard that had existed previously.⁹⁷ The EPA may now also require testing of chemicals through orders and consent decrees rather than rulemakings.⁹⁸ The EPA may require data for a risk evaluation without having to first demonstrate that a chemical might be dangerous.⁹⁹ In addition, any risks posed by the chemical to vulnerable populations like children, the elderly, workers, and minority communities must be addressed in risk management.¹⁰⁰ TSCA also removed caps on fees charged by the EPA to manufacturers to regulate chemicals, while putting those fees in a fund.¹⁰¹ Finally, TSCA increased transparency by requiring future designations of information as confidential business information to be substantiated and renewed occasionally.¹⁰²

Although the amendments to TSCA are substantial, the EPA is still limited in chemical regulation when compared to the European Union.¹⁰³ TSCA forces the EPA to prove that a chemical is a hazard instead of

92. *Id.*

93. Pim De Voogt et al., *Polyfluorinated Chemicals in European Surface Waters, Ground-and Drinking Waters*, in HANDBOOK OF ENVTL. CHEMISTRY 73, 90–97 (2012).

94. U.S. GOV’T ACCOUNTABILITY OFFICE, GAO-13-249, TOXIC SUBSTANCES: EPA HAS INCREASED EFFORTS TO ASSESS AND CONTROL CHEMICALS BUT COULD STRENGTHEN ITS APPROACH 1–4 (2013) [hereinafter U.S. GOV’T ACCOUNTABILITY OFFICE].

95. COMMITTEE ON ENERGY AND COMMERCE, DEMOCRATIC STAFF, SUMMARY OF H.R. 2576 (2015) [hereinafter COMMITTEE ON ENERGY AND COMMERCE, DEMOCRATIC STAFF].

96. *Id.*

97. *Id.*

98. *Id.*

99. *Id.*

100. *Id.*

101. COMMITTEE ON ENERGY AND COMMERCE, DEMOCRATIC STAFF, *supra* note 95.

102. *Id.*

103. John S. Applegate, *Synthesizing TSCA and REACH: Practical Principles for Chemical Regulation Reform*, 35 *ECOLOGY L.Q.* 721 (2008) [hereinafter Applegate].

requiring the manufacturer to prove the chemical is safe.¹⁰⁴ Also, the EPA cannot classify a family of chemicals a hazard, instead, it must assess each chemical individually.¹⁰⁵ After a chemical is determined to pose a significant risk, the EPA can place the chemical on the Significant New Use Rules (“SNURs”).¹⁰⁶ The system requires a company to notify EPA when it decides to manufacture a chemical in ways or uses that pose a significant risk.¹⁰⁷ SNURs take an average of three-to-five years for the EPA to gather enough information, and an additional two years for the company to comply with the regulatory requirements.¹⁰⁸ SNURs require significant government resources, are slow, and are used infrequently.¹⁰⁹ While the EPA gathers information on the chemical, the manufacturer can market and produce the chemical without restriction.¹¹⁰

The EPA could also promulgate rules that set the drinking water limit for PFAS.¹¹¹ If the rule was challenged, EPA’s rule would likely be upheld due to the large body of evidence that has linked PFOA and PFOS to negative health effects.¹¹² Although the rule would likely survive a challenge, installing water treatment infrastructure would require significant investment to retrofit existing treatment facilities with the required technology.¹¹³

The Stewardship program demonstrates the allure of soft law. The program was able to eliminate PFOA through collaboration with large manufacturers. The government and the manufacturers were able to claim they no longer use PFOA while using minimal governmental resources. Although successful, the program had a limited scope, it is uncertain if the program were expanded if companies would be as willing to cooperate.

iii. Congressional Action On PFAS

To alleviate the slow speed in the Executive Branch the 116th United States House of Representatives passed the PFAS Action Act of 2019, or (House Bill 535). The bill would go farther in regulating PFAS than any

104. Applegate, *supra* note 103.

105. *Id.* at 736.

106. U.S. Gov’t Accountability Office, *supra* note 94, at 8.

107. *Id.* at 4.

108. *Id.* at 13.

109. *Id.* at 10.

110. *Id.* at 9.

111. Tripp Baltz et al., *Nearly Half the Country Working on PFAS Rules as EPA Drags Feet*, BLOOMBERG L. (Feb. 19, 2020, 3:00 AM), <https://perma.cc/EP5K-MU3P>.

112. C8 SCIENCE PANEL, *supra* note 45.

113. *Perfluorooctanoic Acid*, EPA (Mar. 2020), <https://perma.cc/9VX6-QDP9> [hereinafter *Perfluorooctanoic Acid*].

state thus far, while allocating over a billion dollars in remediation funds.¹¹⁴ Only some of the bill's provisions are discussed here. The bill was not passed by the Senate due to Republican opposition. As of January 21, 2021, Democrats hold narrow majorities in both houses of Congress as well as the Presidency.¹¹⁵ Despite the majority, passing the bill would require the elimination of the filibuster in the Senate.¹¹⁶

House Bill 535 would require the Administrator of the EPA to designate PFOA and PFOS hazardous substances under CERCLA.¹¹⁷ The Act would also task the Administrator of the EPA with whether to designate some or all PFAS substances as hazardous substances under CERCLA within five years of enactment of this Act.¹¹⁸ The Act also requires drinking water standards to include PFOA and PFOS under the Safe Drinking Water Act.¹¹⁹ The EPA may also promulgate a primary national drinking water regulation within eighteen months of PFAS' safety determination.¹²⁰

Due to decades of widespread PFAS use within the United States, and low biodegradation of the substances, remediation efforts are necessary.¹²¹ House Bill 535 would create the PFAS Infrastructure Program, to award grants to assist communities in paying for capital costs associated with PFAS treatment.¹²² The Program would be appropriated \$250 million for the first two fiscal years, with the subsequent three fiscal years receiving 100 million each.¹²³ In total, the bill would appropriate a maximum of \$550 million in community grants for water treatment of PFAS contamination.¹²⁴

The bill would require the EPA Administrator to add PFOA and PFOS to the list of hazardous air pollutants under the Clean Air Act.¹²⁵ The Act would also task the Administrator of the EPA with whether to designate some or all PFAS substances as hazardous air pollutants under the Clean Air Act within five years of enactment of this Act.¹²⁶

114. H.R. 535, 116th Cong. (2d Sess. 2020) [hereinafter H.R. 535].

115. Ella Nilsen, *Democrats win the Senate – by the Slimmest Margin Possible*, VOX (Jan. 6, 2021), <https://perma.cc/U2KJ-YVVH>.

116. Molly E. Reynolds, *What is the Senate Filibuster, and What Would it Take to Eliminate it?*, BROOKINGS (Sept. 9, 2020), <https://perma.cc/5VJD-7JS7>.

117. H.R. 535, *supra* note 114.

118. *Id.*

119. *Id.*

120. *Id.*

121. THE OFFICE OF MINNESOTA ATTORNEY GENERAL KEITH ELLISON, *supra* note 10.

122. H.R. 535, *supra* note 114.

123. *Id.*

124. *Id.*

125. *Id.*

126. *Id.*

Further, the bill would use market forces to encourage consumers to choose products that do not contain PFAS.¹²⁷ It would accomplish this by requiring the EPA Administrator to revise the Safer Choice Standard to identify requirements for some consumer products to be labeled with a Safer Choice Label.¹²⁸ To receive a Safer Choice Label a pot, pan, cooking utensil, carpet, rug, clothing, upholstered furniture, stain resistant, water resistant, or grease resistant coating must not contain any PFAS.¹²⁹

The bill would also make it unlawful for the owner or operator of any industrial source to introduce PFAS into surface waters, unless the owner or operator notifies the owner or operator of the applicable treatment facility about the identity, quantity, whether the treatment facility is able to treat the substance, and whether the substance would interfere with the treatment facility.¹³⁰ Within two years after the date of enactment of this act, the EPA administrator must also publish human health water quality criteria for each PFAS determined hazardous.¹³¹ Effluent limitations and pretreatment standards for the introduction or discharge of hazardous PFAS must be created within four years of enactment of this Act.¹³²

To subsidize new PFAS treatment requirements, the bill would appropriate \$500 million over five fiscal years in award grants to owners and operators of publicly owned treatment works, not to exceed \$100,000 per grant.¹³³ The overall bill would amount to \$1.05 billion in grants for primarily infrastructure improvements to treatment facilities.¹³⁴ That cost does not include governmental resources spent testing and administering the proposed policies. Although there are insufficient funds to clean up PFAS nationwide, using CERCLA the EPA could secure additional resources from PFAS manufacturers.

D. REMEDIATION COSTS OF PFAS

In the PFAS Action Act of 2019, the total cost in primarily capital investments to upgrade water treatment facilities amounted to \$1.05 billion.¹³⁵ The large investment does not address soil contamination cleanup.¹³⁶ Military leaders recently admitted contamination cleanup costs

127. H.R. 535, *supra* note 114.

128. *Safer Choice*, EPA (Oct. 29, 2020), <https://perma.cc/EF3R-PPWR>.

129. H.R. 535, *supra* note 114.

130. *Id.*

131. *Id.*

132. *Id.*

133. *Id.*

134. *Id.*

135. *Id.*

136. *Id.*

are slated to surpass the \$2 billion estimate the Department of Defense originally gave.¹³⁷ The Department of Defense has currently identified 425 military sites where water has been contaminated by PFAS.¹³⁸ There are an estimated 26,000 PFAS contaminated sites in the United States.¹³⁹ The longer PFAS chemicals can be manufactured, imported, or disposed of in the U.S., the greater the remediation costs will grow.¹⁴⁰

i. Using CERCLA for PFAS Remediation

Current efforts to remediate PFAS contamination are time and resource intensive on the party seeking relief, as is evident in the Minnesota PFAS Settlement.¹⁴¹ As proposed by the House Bill 535 PFAS Action Act of 2019, adding PFAS substances under CERCLA would make it easier for parties to initiate remediation efforts. Private citizens, city governments, or nonprofits would have sufficient resources to be able to launch a successful CERCLA claim against a polluter.¹⁴²

CERCLA applies when there has been a release of a hazardous substance into the environment.¹⁴³ If the EPA believes that a site has been contaminated it may undertake investigations, monitoring surveys, testing, and other information gathering that may be necessary to determine what threat the contamination presents to public health and welfare.¹⁴⁴ Four types of potentially responsible parties include current owners or operators, some past owners, those that arrange for the disposal of hazardous substances, and parties that transport hazardous substances for disposal treatment.¹⁴⁵

CERCLA authorizes EPA to initiate remediation of a contaminated site by either leading the cleanup itself or by compelling a potentially responsible party to clean up the site through an administrative order or civil action.¹⁴⁶ Cleanup efforts required by CERCLA must achieve a degree

137. Beitsch, *supra* note 13.

138. *Id.*

139. Dr. Ramona Darlington, Dr. Edwin Barth, & Dr. John McKernan, *The Challenges of PFAS Remediation*, NAT'L CTR. FOR BIOTECHNOLOGY INFO. (Jan. 1, 2018), <https://perma.cc/LKB5-R4CW>.

140. Beitsch, *supra* note 13.

141. *Agreement & Order, State of Minnesota v. 3M Co.*, No. 27-CV-10-28862 (Minn. Dist. Ct. Jan. 18, 2011).

142. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Federal Facilities*, EPA (Sept. 4, 2019), <https://perma.cc/528G-QSLU>.

143. 42 U.S.C. §9604(a)(1) (2018).

144. *Id.* at § 9604(b).

145. *Id.* at § 9607(a).

146. *Id.*

of cleanliness that assures protection of human health and the environment, avoiding substandard cleanups.¹⁴⁷

Liability under CERCLA is typically joint and several, allowing a plaintiff to sue a single defendant to recover everything, leaving the liable defendant to sue other liable parties to recover an equitable share of the cost.¹⁴⁸ Potentially responsible parties can be liable for costs under three categories. The parties must reimburse cleanup costs incurred by the federal, state, and tribal government.¹⁴⁹ The parties must also pay for damage to natural resources.¹⁵⁰ Lastly, parties must pay for certain health related studies, but the party does not need to pay for damages against a person's health, property, or business under CERCLA.¹⁵¹ The health related studies would be useful in gaining a better understanding of long term PFAS effects, and could be used as evidence to phase out other PFAS chemicals not currently regulated.

ii. Minnesota PFAS Settlement

In 2010, the state of Minnesota sued 3M.¹⁵² The state alleged 3M manufactured PFAS in the state for 50 years, disposing of waste and discharging water that contained PFAS chemicals in Minnesota, resulting in ground and surface water damage.¹⁵³ The State is seeking to recover damages for injury, loss, and destruction of Minnesota's natural resources caused by 3M's pollution.¹⁵⁴

The complaint alleges 3M buried wastes containing PFAS in unlined dumps, thereby releasing PFAS into the groundwater.¹⁵⁵ 3M also discharged wastewater containing PFAS into State surface water, which flowed into the Mississippi River.¹⁵⁶ More than 100 square miles of groundwater have been contaminated by 3M's PFAS disposal, including four aquifers which provide the sole source of drinking water for 125,000 Minnesotans.¹⁵⁷ PFAS pollutants have spread and contaminated Lake Elmo, including about 139 miles of the Mississippi River.¹⁵⁸

147. *Id.* at § 9606(d)(1).

148. *Superfund Liability*, EPA (Jan. 18, 2021), <https://perma.cc/ECF3-CRJ6>.

149. 42 U.S.C. § 9607(a)(4)(A).

150. *Id.* at § 9607(a)(4)(C).

151. *Id.* at § 9607(a)(4)(D).

152. Amended Complaint, *State of Minnesota v. 3M Company*, No. 27-CV-10-28862 (Minn. Dist. Ct. Jan. 18, 2011) [hereinafter Amended Complaint].

153. *Id.* at 1.

154. *Id.* at 1–2.

155. *Id.* at 9.

156. *Id.*

157. *Id.*

158. *Id.*

Because of the contaminants the State has been forced to provide alternative sources of groundwater while restoring surface waters. The State has also begun evaluating risks to public health from residential soils contaminated with PFOA and PFOS.¹⁵⁹ PFAS concentrations in groundwater below 3M disposal sites have been measured at 100 times above standards established by the Minnesota Department of Health¹⁶⁰ Due to PFOS accumulation in fish, the Department has recommended people limit fish consumption from Lake Elmo and parts of the Mississippi River.¹⁶¹

The State filed claims for relief under Minnesota Environmental Response and Liability Act, Minnesota Water Pollution Control Act, trespass, common law nuisance, statutory nuisance, and negligence. The State relied on state laws and tort claims, they were not able to use CERCLA because PFAS is not currently listed as a hazardous substance under CERCLA.

In 2018, the State and 3M settled the lawsuit for \$850 million to the State of Minnesota as a restricted grant earmarked for remediation efforts.¹⁶² After expenses were paid, \$720 million was left over for remediation efforts led by the Minnesota Pollution Control Agency and Minnesota Department of Natural Resources.¹⁶³ Under draft proposals for treatment scenarios the costs ranged from \$250 million to \$1.2 billion. The sheer cost for one region of the country demonstrates the magnitude of PFAS contamination throughout the country. Despite the “historic” settlement, adequately cleaning PFAS contamination most likely falls on the responsibility of taxpayers to pay the difference between the settlement amount and actual cost of remediation.¹⁶⁴

E. HOW IS THE INTERNATIONAL COMMUNITY ADDRESSING PFAS?

Rosa Gwinn, PFAS lead for the firm Architecture, Engineering, Construction, Operations, and Management (“AECOM”) stated that the cost of global PFAS clean-up could add up to a trillion dollars.¹⁶⁵ Gwinn also went on to say, “I don’t think we’ll ever get global standards for PFAS

159. *Id.* at 11.

160. *Id.* at 12.

161. *Id.* at 12.

162. THE OFFICE OF MINNESOTA ATTORNEY GENERAL KEITH ELLISON, *supra* note 10.

163. *Minnesota 3M PFC Settlement*, MINN. POLLUTION CONTROL AGENCY (last visited Feb. 5, 2021), <https://perma.cc/R8ES-LH3L>.

164. Jennifer Bjorhus, *Cleanup of PFAS 'Forever Chemicals' Could Cost up to \$1.2 Billion, Exceed 3M Settlement*, STAR TRIB. (Feb. 27, 2020, 9:26 A.M.), <https://perma.cc/EH6R-KTTZ>.

165. Will Hatchett, *No 'Silver Bullet' for PFAS*, ENV'T ANALYST (Sept. 20, 2020), <https://perma.cc/Z6M5-EJNQ> [hereinafter Hatchett].

because the way countries manage environmental concerns varies so much.” Although Gwinn’s stance demonstrates the difficult task of global regulations, it does not take into account the international principle of avoiding transboundary harm.¹⁶⁶ States have the responsibility to ensure that activities within their own jurisdiction do not cause damage to the environment of other States.¹⁶⁷ PFAS chemicals are not stationary, nor do they break down, therefore if a country continues to use them they will eventually cross national borders into other nations, regardless of the PFAS regulations of the receiving country.

The Stockholm Convention on Persistent Organic Compounds was adopted on May 22, 2001 and entered into force on May 17, 2004.¹⁶⁸ Parties to the Convention acknowledged that “persistent organic pollutants possess toxic properties, resist degradation, bioaccumulate and are transported, through air, water and migratory species, across international boundaries and deposited far from their place of release, where they accumulate in terrestrial and aquatic ecosystems.”¹⁶⁹ Over 152 countries have signed onto the Convention. After a party signs onto the convention the party must develop and implement a plan to meet its goals under the Convention within two years of the Convention becoming law.¹⁷⁰

To list a chemical under the Convention, a party must submit a proposal that describes the chemical’s identity, persistence, bioaccumulation, potential for long range environmental transport, and adverse effects. The chemical’s attributes and data surrounding it are then aggregated and used to create the chemical’s risk profile.

A Persistent Organic Pollutant (“POP”) can be listed under three Annexes: Annex A requires parties take measures to eliminate production and use of the chemicals, Annex B requires parties to restrict production and use with only specific exemptions allowed, and Annex C requires parties to reduce unintentional release of chemicals.¹⁷¹

166. U.N. GAOR, 56th Sess., *Draft Article 3 on Report of the International Law Commission*, at ¶158–176, (2004).

167. *Draft articles on Prevention of Transboundary Harm from Hazardous Activities, with commentaries*, Y.B. Int’l L. Comm’n 2001, U.N. Doc. A/56/10 (2001).

168. *Text of the Convention, Stockholm Convention*, U.N. ENV’T PROGRAMME, <https://perma.cc/96KM-DSUZ>.

169. United Nations Env’t Programme, *Stockholm Convention on Persistent Organic Pollutants, Texts and Annexes 3* (revised in 2017) [hereinafter *Stockholm Convention on Persistent Organic Pollutants*].

170. *Id.* at 12.

171. *All POPs listed in the Stockholm Convention*, UNITED NATIONS ENV’T PROGRAMME, <https://perma.cc/GZB3-MCR9>.

In 2009, the Stockholm Convention on POPs added PFOS to Annex B.¹⁷² In 2015, PFOA was proposed for listing.¹⁷³ By 2016, the POPs Review Committee had aggregated the technical data surrounding PFOA and adopted its risk profile during its twelfth meeting.¹⁷⁴ Because the POPs Review Committee uses technical data from around the world, if the 2019 United States Action Plan passed, the data could be heavily relied upon to place additional PFAS substances in the Stockholm Convention. In 2019, during the ninth meeting of the Conference of the Parties to the Stockholm Convention, the parties agreed to list PFOA and its compounds to Annex A.¹⁷⁵

There are currently no proposals to designate anymore PFAS chemicals under the Stockholm convention, demonstrating the limits of the convention despite being binding and having 152 signatories. PFOA was first produced in 1947, but was not proposed to the Stockholm Convention until 2015, or listed for elimination until 2019.¹⁷⁶ The timeline of global PFOA regulation demonstrates current global chemical regulation is too slow and relaxed to properly protect human health and the environment.

F. A NEW WAY TO REGULATE CHEMICALS LIKE PFAS:

The Stockholm convention on POPs provides a good example on how to regulate chemicals after they have been widely manufactured and have received a toxicological profile. Conversely, the Stockholm Convention, or one like it, could take on a more preventative role, using the precautionary principle. The precautionary principle is “[w]hen an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not fully established.”¹⁷⁷ The approach does not require a chemical be determined either safe or unsafe, it allows for a risk management assessment.

The Convention could act as a global repository of existing and new chemicals that demonstrate how the substance can be safely used, and the risk management measures necessary. If the risks cannot be managed, the chemical may be heavily restricted or substituted with a less dangerous chemical. The new chemical certification process could be largely based on the current European Union law, REACH.

172. *Stockholm Convention on Persistent Organic Pollutants*, *supra* note 169, at 53.

173. *Perfluorooctanoic Acid*, *supra* note 113.

174. *Stockholm Convention on Persistent Organic Pollutants*, *supra* note 169, at 52–53.

175. *Id.*

176. *Id.*, at 41–42.

177. James Cameron, *The Precautionary Principle*, TRADE, ENVIRONMENT, AND THE MILLENNIUM 287, 287–312 (Gary P. Sampson & W. Bradnee Chambers eds., 1999).

REACH is a regulation of the European Union adopted to improve the protection of human health and the environment, while promoting chemical innovation.¹⁷⁸ REACH places the burden of proof to identify and manage risks linked to the substances marketed and manufactured in the European Union on manufacturers.¹⁷⁹ The European Chemical Agency then assesses whether the risks of substances can be managed.¹⁸⁰ Authorities may restrict or ban the substance if the risks are unmanageable.¹⁸¹ REACH does not ban all chemicals in the face of uncertainty, it restricts and mandates economic balancing of risks and benefits to permit some uses subject to future changes and the development of alternatives.¹⁸² Risky chemicals must be “progressively replaced by suitable alternative substances or technologies where these are economically and technologically viable.”¹⁸³ Companies are able to be given limited approval while being incentivized to find safer alternatives that will allow them more uses. The riskiest chemical authorization is public, expensive, and if the chemical is not controlled, the manufacturer must demonstrate the benefits outweigh the costs.¹⁸⁴ The process also requires the disclosure and analysis of substitute substances.¹⁸⁵

An international treaty based on REACH would force chemical manufacturers to innovate towards safer chemicals while preventing widespread damage to human and environmental health from chemicals like PFAS. REACH has been described as a risk assessment framework based on “seek[ing] to prevent toxic harm before it occurs ... on the basis of a risk characterized by less-than-absolute safety and modified by cost and other non-health considerations...”¹⁸⁶

Successful regulation of chemicals should be preventative, and the restrictions placed on the substances should be proportional to the risk presented. Chemical regulation should also direct manufacturers, users, and

178. *Understanding REACH*, EUR. CHEMICALS AGENCY, <https://perma.cc/2REM-UB76> [herein after *Understanding REACH*].

179. *Id.*

180. *Id.*

181. *Id.*

182. Applegate, *supra* note 103, at 741–742.

183. Council Regulation (EC) No. 1907/2006, of the European Parliament and of the Council, of 18 Dec. 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) . . . , 2006 O.J. (L 396) 1 [hereinafter Council Regulation No. 1907/2006].

184. Applegate, *supra* note 103, at 746.

185. Council Regulation No. 1907/2006, *supra* note 183 at 60(4)-(5).

186. Applegate, *supra* note 103, at 760.

distributors towards safer options. For example, PFAS in firefighting foam is being replaced with PFAS free foam in airports around the world.¹⁸⁷

A widely used international treaty on chemical regulation would prevent current transboundary harms and save the world trillions of dollars in remediation costs.¹⁸⁸ In just PFAS remediation, some experts have estimated global costs to balloon to over \$2 trillion. The extra cost and time due to more stringent regulations on new and existing chemicals do not outweigh the costs for remediation and health issues caused by toxic chemicals.¹⁸⁹

Companies may claim that unnecessary regulations are placed on them without scientific certainty of their dangers. A lack of information should not be a barrier to regulatory action, instead it should be an incentive to regulatory entities to “information force”. Information forcing allows regulators to make informed decisions on whether the chemical can be safely used, marketed, and disposed of within its borders. By pushing the responsibility on the company to justify the use of a chemical, taxpayers are not left funding research into a substance only the proponent will profit from.

An international chemical regulatory process that is transparent would also allow average consumers to vote with their currencies. For example, in the PFAS Action Plan of 2019, Congress made it a point to include the safe choice label to better inform consumers what products contained PFAS. Consumers should know the chemicals they are being exposed to and the possible effects of those chemicals. Consumers would be able to actively purchase items without questionable chemicals, thus incentivizing companies to only use the safest chemicals.

Through a transparent international chemical regulation mechanism, trade would be simplified. For example, The Toxics Free Cosmetics Act banned the use of chemicals in cosmetics that had already been banned in the EU due to REACH.¹⁹⁰ By only having one standard, vendors would have less regulatory hurdles to overcome.

i. Implementing An International Chemical Regulation

To successfully implement an international chemical regulation agreement, first, a common problem must be identified. Using PFAS as an example, its widespread use and inability to break down has led to

187. Liz Hitchcock & Laurie Valeriano, *PFAS-Free Firefighting Foams are Safer and Effective for Military Use*, SAFER CHEMICALS, HEALTHY FAMILIES (Sept. 12, 2019), <https://perma.cc/QSX3-5VFA>.

188. Hatchett, *supra* note 165.

189. Applegate, *supra* note 103, at 761–762.

190. OFF. OF GOV. GAVIN NEWSOM, *supra* note 67.

pervasive contamination of the entire world. Areas like the Arctic with little PFAS manufacturing have mammals like the polar bear with high concentrations of PFAS in their blood due to bioaccumulation. In more urban areas like Minnesota, the state is expected to have to spend up to \$1.2 billion in remediation costs. The dichotomy demonstrates that both the most remote and urban locations are affected by persistent chemicals and their effects.

Second, a cost benefit analysis is useful in determining how much a country or state would benefit or lose from implementing a chemical regulation treaty. Because the regulation would primarily shift the burden to prove a chemical is safe, most of the cost would be shifted away from the government adopting the policy. There are costs in more stringent enforcement but compared to a system that puts the pressure of reviewing a chemical on an agency, the process is faster and less resource dependent.

Third, a monitoring mechanism must be established to ensure each country is abiding by the safety regulations that have been internationally agreed upon. It would not be in a country's interest to accept lower quality or unsafe chemicals because its own citizens or environment would be damaged. To oversee the regulatory mechanism, an international body of scientists, like that of the POPs review committee could be established. The committee would oversee company requests for authorization. Because the committee's review process would be transparent and the documents open to the public, chances of regulatory capture are improbable.

Despite the obvious benefits the international regulatory mechanism would create, it would also relinquish regulatory power of nation states. Countries like the United States are unlikely to sign onto such a mechanism. While wealthy individualistic countries like the United are unlikely to be swayed, as more countries join the chemical regulation agreement, the agreement will be normalized. As the number of countries that use the system increase, so too will the pressure to join. Countries that choose not to join may still benefit from safer chemicals overall.

CONCLUSION

REACH, PFAS Action plan of 2019, state actions, and the Stockholm Convention make clear governments have and are attempting to limit the number of toxic substances that are emitted. Like humans in a globalized world, chemicals travel, requiring international chemical regulations to effectively halt the spread and damage of hazardous substances like PFAS. Current chemical regulations externalize the costs of chemical manufacturers by forcing taxpayers to fund remediation efforts. At best, current United States efforts attempt to list PFAS chemicals under statutes like CERCLA or the Safe Drinking Water Act. Although these steps are important in protecting health and the environment, they are not preventative, and therefore insufficient in preventing widespread use of the next chemical like PFAS.

By not joining the Stockholm Convention on Organic Pollutants, the United States is only increasing its future costs in remediation efforts to clean hazardous substances. In addition, it is excluding itself from leading the way in chemical innovation. Increased chemical regulation is necessary to prevent widespread hazardous substances.