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Fatal Fertilizer: PFAS Contamination of Farmland from Biosolids and Potential Federal Solutions

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PACE ENVIRONMENTAL LAW REVIEW

ARTICLE

Fatal Fertilizer: PFAS Contamination of Farmland from Biosolids and Potential Federal Solutions

MOLLY CAREY*

ABSTRACT

Farmers across the country are increasingly discovering devastating levels of per- and polyfluoroalkyl substances (PFAS) contamination in their soil, water, and farm products from the spread of biosolid fertilizer. Contamination from these “forever chemicals” is causing farmers to close their businesses, lose their incomes and property values, and confront potential adverse health effects from toxic exposure. PFAS are not federally regulated, leaving farmers with no options for federal assistance with contamination crises. This article examines federal regulations that govern the spread of biosolids as well as existing and proposed federal regulations of PFAS. To fill in federal regulatory gaps, this article proposes federal policy recommendations to prevent and remediate PFAS contamination of farmland and provide financial assistance, medical monitoring, and mental health services for affected farmers.

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I. INTRODUCTION

Like many young farmers, Johanna Davis and Adam Nordell had a vision for the future: a plan to grow their business, feed the community, and support their family.¹ They live on their 20-acre organic grain and vegetable farm in Maine where they are raising their three-year-old son.² They sell wholesale vegetables to food co-ops in Maine, and sell home-grown grains to 100 customers participating in their “home bakers” program.³ They recently made several costly farm improvements, including the purchase of a produce washing and packing house, solar panels, a new greenhouse, and a new irrigation well.⁴

But Johanna and Adam’s vision for the future has come to a grinding halt. They recently found out that their soil and water are contaminated with the toxic chemicals known as per- and polyfluoroalkyl substances, or “PFAS.”⁵ PFAS exposure is linked to adverse health effects including cancer, high cholesterol, liver disease, decreased fertility, thyroid problems, hormone disruption, birth defects, and immune system changes.⁶ The water Johanna, Adam, and their toddler have been drinking contains 400-times the amount of PFAS Maine considers to be safe.⁷ They halted the sale of their products and essentially closed their business, losing their income and

1. See Kevin Miller, *‘Complete Crisis’ as PFAS Discovery Upends Life and Livelihood of Young Maine Farming Family*, ME. PUB. (Feb. 7, 2022, 6:30 PM), <https://www.mainepublic.org/environment-and-outdoors/2022-02-07/complete-crisis-as-pfas-discovery-upends-life-and-livelihood-of-young-maine-farming-family> [https://perma.cc/M2T2-PRDL].

2. *Id.*

3. *Id.*

4. *Id.*

5. *Id.*

6. Noel M. Johnson, *Me-FAS, You-FAS, We All Eat PFAS: What to Do About the Forever Chemical*, 21 J. TECH. L. & POL’Y 134, 138 (2021).

7. Miller, *supra* note 1.

any return on investment for recent capital improvements.⁸ They are also of course concerned about health risks, especially for their three-year-old son.⁹

But how could this level of toxic contamination possibly occur on an organic farm?

The culprit is biosolids: the sewage sludge material remaining after wastewater is treated.¹⁰ This substance, which consists of human waste and other municipal wastes, is often applied to farmland as fertilizer.¹¹ In fact, 59 percent of all municipally treated human and animal waste produced in the U.S. is spread on farm and ranchland — a practice occurring in all 50 states.¹² While biosolids may offer some fertilization benefits, they also contain toxic PFAS chemicals.¹³ Thus, PFAS are able to seep into the soil and groundwater where biosolids are land-applied.¹⁴ Dubbed “forever chemicals,” PFAS do not easily break down in the environment, and can accumulate to significant levels in soil and water.¹⁵ This is evidenced by the fact that the contamination Johanna and Adam are facing is likely from biosolids spread by farmers who worked their land decades before they bought it.¹⁶

Even though Johanna and Adam have a certified organic operation, PFAS are not currently federally regulated, so farms are not required to test for it.¹⁷ As such, the U.S. Department of Agriculture (USDA), the U.S. Environmental Protection Agency (EPA), and the U.S. Food and Drug Administration (FDA) do not have any requirements for PFAS testing or PFAS contamination in food, water, or consumer products.¹⁸ Without electing to

8. *See id.*

9. *Id.*

10. *See* Rachel Fullmer, Note, *A Cow Palace Coup: Expanding the Reach of RCRA to Combat Agricultural Pollution*, 28 GEO. ENV'T L. REV. 501, 502 (2016).

11. *Id.*

12. *Id.*

13. *See* M. Christina Schilling Costello & Linda S. Lee, *Sources, Fate, and Plant Uptake in Agricultural Systems of Per- and Polyfluoroalkyl Substances*, CURRENT POLLUTION REPS., (Dec. 15, 2020), <https://link.springer.com/content/pdf/10.1007/s40726-020-00168-y.pdf> [<https://perma.cc/3LT4-F7ZB>].

14. *See id.*

15. Tom Perkins, *Biosolids: Mix Human Waste with Toxic Chemicals, then Spread on Crops*, GUARDIAN (Oct. 5, 2019), <https://www.theguardian.com/environment/2019/oct/05/biosolids-toxic-chemicals-pollution> [<https://perma.cc/ZCU3-YUXG>].

16. Miller, *supra* note 1.

17. *See* Sharon Anglin Treat, *Forever Chemicals and Agriculture Case Study*, INST. FOR AGRIC. & TRADE POL'Y (Nov. 9, 2021), <https://www.iatp.org/documents/forever-chemicals-and-agriculture-case-study> [<https://perma.cc/Q9A4-FZX5>].

18. *See id.*

seek out and pay for private testing on their own, farmers would not know about potential PFAS contamination of their soil, water, and farm products.¹⁹ On top of this, the EPA is still encouraging the agricultural application of biosolids despite known risks of PFAS contamination.²⁰

While some states like Maine are acknowledging the problem and beginning to address PFAS contamination from biosolids, most states are not.²¹ For the states that do monitor PFAS to some extent, state regulations vary in terms of what each state considers “safe” and how contamination issues should be addressed.²² Ultimately, states do not have sufficient funding or resources to adequately address widespread PFAS farmland contamination.²³ Because PFAS are not federally regulated, pathways to assistance for PFAS exposure and contamination currently do not exist at the federal level.²⁴ In addition to health risks from toxic exposure, farmers across the country are facing loss of income, property value, assets, and their lives as they know them.²⁵ It is time for the federal government to step in and prevent PFAS contamination from destroying the livelihoods of farmers like Johanna and Adam.

Therefore, the federal government should provide solutions to help farmers and their families with PFAS contamination. First, the federal government should provide direct assistance and funding to address the needs of farmers and states currently affected by PFAS contamination crises. Then, federal legislation and regulations should be amended to nationally regulate PFAS, prevent future PFAS contamination from biosolids, and create permanent programs for PFAS remediation, financial assistance, and mental and physical health resources for affected farmers.

The following section of this paper will provide background information on PFAS chemicals and PFAS contamination on farms from the spread of biosolids, citing specific incidents of farmland contamination across the country. Part III of this paper will then analyze the existing federal

19. See *id.*

20. Marina Schaffler, ‘Forever Chemicals’ on Farmland Are a Slow-Motion Disaster, ME. MONITOR (Mar. 13, 2022), <https://www.themainemonitor.org/forever-chemicals-on-farmland-are-a-slow-motion-disaster/> [<https://perma.cc/CDS8-6W62>].

21. See Tom Perkins, ‘I Don’t Know How We’ll Survive’: the Farmers Facing Ruin in America’s ‘Forever Chemicals’ Crisis, GUARDIAN (Mar. 22, 2022), <https://www.theguardian.com/environment/2022/mar/22/i-dont-know-how-well-survive-the-farmers-facing-ruin-in-americas-forever-chemicals-crisis> [<https://perma.cc/99UP-66HN>].

22. See generally, PFAS, SAFER STATES, <https://www.saferstates.org/toxic-chemicals/pfas/> [<https://perma.cc/B2T6-VY3R>].

23. See Treat, *supra* note 17.

24. See *id.*

25. See Perkins, *supra* note 21.

and state regulations governing biosolids and the safety of food, water, and consumer products. Part III will also examine proposed federal regulations addressing PFAS specifically. Lastly, part IV will provide federal solutions for resolving and preventing PFAS contamination from the spread of biosolids.

II. BACKGROUND

A. PFAS Chemicals

As noted in the introduction, PFAS chemicals are per- and poly-fluoroalkyl substances, which are highly fluorinated and incredibly strong chemical compounds.²⁶ PFAS “are human made substances that do not occur naturally in the environment.”²⁷ PFAS are not biodegradable and are even resistant to typical methods of chemical breakdown.²⁸ Because of their extreme persistence, PFAS are commonly referred to as “forever chemicals,” readily accumulating in soil and leaching into groundwater.²⁹ While most resilient chemicals accumulate in fat, PFAS chemicals bind to proteins in the blood of humans and animals.³⁰ PFAS are now in the blood of 99 percent of the U.S. population, and in the drinking water of up to 110 million people.³¹

PFAS chemicals emerged in the 1940’s when chemical manufacturers like DuPont introduced famously non-stick Teflon cookware coatings to the marketplace.³² PFAS are now used in many other products as well, including stain-resistant carpets and textiles, waterproof apparel, non-stick food packaging, and even in personal care and cosmetic products.³³ Ingestion from secondary sources such as food, water, and dust is now also a major pathway for toxic exposure.³⁴

There are more than 9,000 PFAS chemicals, though two have gained particular notoriety: Perfluorooctanoic acid (PFOA) and

26. See Isaac Serratos, *PFAS: A Case Study on its Current Costs and How to Regulate Toxic Chemicals in the Future*, 27 HASTINGS W.-N.W. J. ENV’T L. & POL’Y 201, 201 (2021).

27. *Id.* at 204.

28. *Id.*

29. See *id.* at 204–05.

30. *Id.* at 205.

31. *What are PFAS Chemicals?*, ENV’T WORKING GRP., <https://www.ewg.org/pfaschemicals/what-are-forever-chemicals.html> [https://perma.cc/RB7T-TX8L].

32. *Id.*

33. *Id.*; Treat, *supra* note 17.

34. Serratos, *supra* note 26, at 205.

Perfluorooctanesulfonic acid (PFOS).³⁵ PFOS is the key ingredient in 3M's stain-repellent Scotchgard.³⁶ PFOA is most well-known for its use in Teflon products and for being the subject of multiple lawsuits.³⁷

The most notorious lawsuit involving PFOA — *Leach, et al. v. E.I. du Pont de Nemours & Co.* — was a class action against DuPont for contaminating drinking water near DuPont's West Virginia Washington Works Plant.³⁸ The parties reached a settlement, which included the stipulation that an independent company would conduct a health study of those exposed.³⁹ After sampling blood from 69,000 residents living near the DuPont plant, health experts found links between PFOA exposure and high cholesterol, testicular and kidney cancer, ulcerative colitis, and thyroid diseases.⁴⁰

PFOA and PFOS are also notably used to create aqueous film-forming foam (AFFF) used for firefighting purposes — one of the largest sources of PFAS.⁴¹ Areas near airports, military bases, and places where firefighting training occurs can have significant PFAS contamination in soil and groundwater.⁴² Despite knowing the hazards of using PFAS-based firefighting foam since the 1970s, the U.S. military continued to use it for 50 years before beginning to phase it out.⁴³ But the contamination remains: the Environmental Working Group (EWG) has identified at least 206 military sites in the U.S. where drinking water or groundwater is contaminated with PFAS.⁴⁴

35. See Johnson, *supra* note 6, at 138–40.

36. ENV'T WORKING GRP., *supra* note 31.

37. See *id.*

38. See *Leach v. E.I. Du Pont de Nemours Co.*, No. 01-C-608, 2002 WL 1270121, at *1 (W.Va. Cir. Ct. Apr. 10, 2002); Serratos, *supra* note 26, at 206.

39. Serratos, *supra* note 26, at 206.

40. *Id.* at 206–07.

41. See *Aqueous Film-Forming Foam (AFFF)*, PFAS PROJECT LAB (Mar. 30, 2022), <https://pfasproject.com/aqueous-film-forming-foam-ffff/> [<https://perma.cc/RPA9-E7LZ>].

42. Johnson, *supra* note 6, at 136; Treat, *supra* note 17; see also Joce Sterman, Alex Brauer & Andrea Nejman, *Exclusive: Thousands of Farms Warned About Toxic PFAS From Military Bases; No Fix in Sight*, ABC7 NEWS (Sept. 20, 2021), <https://wjla.com/news/spotlight-on-america/exclusive-thousands-of-farms-warned-about-toxic-pfas-from-military-bases-no-fix-in-sight> [<https://perma.cc/9ZGP-XCYM>] (finding how PFAS contamination from military bases also affects farmland).

43. See *Mapping PFAS Chemical Contamination at 206 U.S. Military Sites*, ENV'T WORKING GRP. (Mar. 6, 2019), <https://www.ewg.org/research/mapping-pfas-chemical-contamination-206-us-military-sites> [<https://perma.cc/8KP7-H43Y>].

44. *Id.*

Due to the toxicity of PFOA and PFOS, EPA phased the two chemicals out of U.S. production in November 2016 to prevent human health risks.⁴⁵ However, other PFAS chemicals are supplanting PFOA and PFOS, such as “PFBS,” “F-53B,” and “GenX.”⁴⁶ Meanwhile, the damage from PFOA and PFOS has already been done, and it is not going anywhere without federal intervention.⁴⁷

B. Contamination of Biosolids

Now, how exactly do these Teflon and Scotchgard chemicals end up in biosolids and eventually on farms? Well, on a consumer level, PFAS frequently end up washed down kitchen sinks and shower drains (from pans and consumer products), or tossed in the garbage (from food packaging or swept-up dust).⁴⁸ On an industrial level, plants that use PFAS such as chemical companies, paper mills, textile mills, carpet mills, chrome plating facilities, and leather tanneries may discharge pollutants directly into the air and water.⁴⁹ And as previously mentioned, PFAS from the widespread use of firefighting foam can leach and bioaccumulate in the soil and groundwater.⁵⁰ All of these discharges can end up in municipal wastewater, and thus, in biosolids.⁵¹

When municipal and industrial waste arrives at the wastewater treatment plant, liquids are separated from solids.⁵² Sewage sludge or “biosolids” is the residual solid, semi-solid, or high-solid content liquid material remaining, which is then treated physically and chemically to produce a nutrient-rich product for land application.⁵³

45. Johnson, *supra* note 6, at 134; Elizabeth Fawell, Martin Hahn & Xin Tao, *With the U.S. PFAS “Phase-Out” Clock Ticking, What Every Food Company Should Know*, JD SUPRA (Jan. 6, 2022), <https://www.jdsupra.com/legalnews/with-the-u-s-pfas-phase-out-clock-3971871/> [<https://perma.cc/8ZUV-RZA4>].

46. Johnson, *supra* note 6, at 139.

47. See Treat, *supra* note 17.

48. See *id.*

49. See generally OFF. OF WATER, U.S. ENV’T PROT. AGENCY, EPA-821-R-21-004, MULTI-INDUSTRY PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) STUDY – 2021 PRELIMINARY REPORT (2021), https://www.epa.gov/system/files/documents/2021-09/multi-industry-pfas-study_preliminary-2021-report_508_2021.09.08.pdf [<https://perma.cc/6WBK-9VDM>].

50. Treat, *supra* note 17.

51. See, e.g., Perkins, *supra* note 15.

52. *Basic Information about Biosolids*, U.S. ENV’T PROT. AGENCY, <https://www.epa.gov/biosolids/basic-information-about-biosolids> [<https://perma.cc/A62A-N2YX>].

53. William Goldfarb et al., *Unsafe Sewage Sludge or Beneficial Biosolids?: Liability, Planning, and Management Issues Regarding the Land Application of Sewage Treatment Residuals*, 26 B.C. ENV’T AFF. L. REV. 687, 688 (1999).

The spread of biosolids on farmland is now ubiquitous.⁵⁴ Biosolids contain many beneficial properties for crop production, including nitrogen and phosphorus, which encourage plant growth.⁵⁵ The product has become very popular with farmers because most wastewater treatment plants either give it away for free or sell it at prices well below the cost of synthetic fertilizers.⁵⁶ Each year, over 50 percent of the approximately 4.75 million dry metric tons of biosolids produced nationally is treated and applied to cropland across all 50 states.⁵⁷ This practice is also seen as beneficial to sewer and water district ratepayers and local governments because it provides an avenue for sewage sludge disposal that is less costly than alternatives like incineration.⁵⁸

Solid waste disposal had a problematic history prior to the use of biosolids.⁵⁹ Originally, sewage sludge was largely burned, until this method was found to violate the Clean Air Act (CAA).⁶⁰ After that, waste was directly dumped into the ocean, until it was found that this created marine dead zones.⁶¹ The Ocean Dumping Ban Act was passed in 1988, making it illegal to dump sludge into the ocean.⁶² The EPA now promotes land application of biosolids as a safe and economically beneficial practice of waste disposal.⁶³

However, while biosolids may offer fertilization and economic benefits and seem less environmentally catastrophic than alternative disposal methods, they create a dangerous problem. Municipal waste can be mixed with any number of 80,000 human-made chemicals that are discharged from industrial pipes or pumped into the sewer system.⁶⁴ This waste can contain pharmaceuticals, hormones, pathogens, bacteria, viruses, protozoa and parasitic worms, lead, cadmium, arsenic, mercury, PCBs, dioxins, BPAs, flame retardants, hospital waste, and of course, PFAS.⁶⁵ Before biosolids get used as fertilizer, the waste management industry treats sludge using methods like air drying, pasteurization, composting, and using lime to raise

54. See Fullmer, *supra* note 10, at 502.

55. See Perkins, *supra* note 15.

56. See *id.*

57. Tom Perkins, *Questions Remain About Using Treated Sewage on Farms*, CIV. EATS (Jan. 30, 2020), <https://civileats.com/2020/01/30/questions-remain-about-using-treated-sewage-on-farms/> [<https://perma.cc/37TF-BF3K>]; Fullmer, *supra* note 10, at 502.

58. Treat, *supra* note 17.

59. See Perkins, *supra* note 57.

60. *Id.*

61. *Id.*

62. Goldfarb et al., *supra* note 53, at 689.

63. Perkins, *supra* note 15.

64. See *id.*

65. *Id.*

the pH level.⁶⁶ This can help eliminate odors, pathogens, viruses, and other organisms.⁶⁷ However, the government does not test for thousands of human-made chemicals — including PFAS — which survive this process.⁶⁸ In fact, kilograms of PFAS have been found in sewage sludge when only nanograms of it can be harmful to humans.⁶⁹

C. Farmland Contamination and its Effects

While many may assume that PFAS contamination on farms like Johanna and Adam's is isolated, that is not the reality.⁷⁰ States are becoming increasingly aware of PFAS contamination on farms from the spread of biosolids as more farmers seek soil and water testing.⁷¹

Grostick Cattle Co., a beef farm in Michigan, recently discovered that its cattle contained toxic levels of PFAS linked to the spread of biosolids.⁷² The century-old, direct-to-consumer farm sold beef to schools and at farmers markets.⁷³ The farm received biosolid sludges from 2010 to 2015 from a local wastewater treatment plant, which, in 2018, was found to be a significant source of PFAS.⁷⁴ The chemicals were traced back to a chrome plate manufacturer that sends its effluent to the treatment plant.⁷⁵ Farmer Jason Grostick had been grazing his cattle on the very fields where this PFAS-contaminated sludge was spread.⁷⁶ Now, he can no longer sell his beef, and the future of his farm and livelihood hangs in the balance.⁷⁷

In Vermont, seven out of 34 biosolid land application sites surveyed in a recent study had PFAS levels exceeding state groundwater standards.⁷⁸

66. *Id.*

67. *Id.*

68. *Id.*

69. Perkins, *supra* note 15.

70. See Tom Perkins, *Michigan Beef Found to Contain Dangerous Levels of 'Forever Chemicals'*, GUARDIAN (Feb. 11, 2022, 6:00 AM), <https://www.theguardian.com/environment/2022/feb/11/michigan-beef-dangerous-levels-forever-chemicals> [https://perma.cc/JH28-EUFZ].

71. See Perkins, *supra* note 21.

72. See Garret Ellison, *Advisory Warns of PFAS in Beef from Michigan Cattle Farm*, MLIVE (Jan. 28, 2022, 4:29 PM), <https://www.mlive.com/public-interest/2022/01/advisory-warns-of-pfas-in-beef-from-michigan-cattle-farm.html> [https://perma.cc/P4KB-E4U3].

73. See Perkins, *supra* note 70.

74. See Ellison, *supra* note 72.

75. *Id.*

76. See *id.*

77. See *id.*

78. Elizabeth Gribkoff, *Sewage Sludge Spreading Leads to Farm Groundwater PFAS Contamination*, VTDIGGER (Apr. 12, 2020), <https://vtdigger.org/2020/04/12/sewage-sludge-spreading-leads-to-farm-groundwater-pfas-contamination/> [https://perma.cc/5UXC-BK4T].

Vermont farmers have halted the use of biosolids, and many have had to switch their crops and production methods to minimize uptake of PFAS in edible portions of the plants.⁷⁹ One farm that had higher levels of PFOS chose to only harvest corn ears (instead of the whole plant) as PFAS chemicals do not usually accumulate in that part of the crop.⁸⁰

In Georgia, farmer Andy McElmurray outside Augusta watched his dairy cows waste away, then die by the hundreds in response to biosolids spread on his hayfields.⁸¹ The McElmurray's and another nearby dairy owned by the Boyce family sued the City of Augusta, claiming the processed sewage sludge they received from the city was tainted by industrial waste from surrounding factories.⁸² Another Georgia farmer, H. J. Peterson, sued DeKalb County in 1995, claiming 61 of his cows died after eating hay grown using biosolids.⁸³ The Georgia Environmental Protection Division (EPD) issued a report that called for prohibiting use of biosolids as fertilizer, but the practice still continues.⁸⁴ While these Georgia cases do not cite PFAS specifically, this could be because they are several decades old and the link between PFAS and biosolids was not as well known.⁸⁵ Now, knowing the connection between PFAS and industrial discharges into wastewater, PFAS presence in the biosolids plausibly contributed to the contamination on these farms.⁸⁶

Some of the most devastating PFAS farmland contamination stories are emerging in Maine.⁸⁷ Statewide, PFAS contamination has so far disrupted 12 farms as of April 2022, including Johanna and Adam's.⁸⁸ Farmer Fred Stone from Stoneridge Farm was the first to come forward in 2016.⁸⁹ PFAS from sludge fertilizer were found in Fred's dairy cows and their milk.⁹⁰

79. Treat, *supra* note 17.

80. Gribkoff, *supra* note 78.

81. Jennifer 8. Lee, *Sludge Spread on Fields is Fodder for Lawsuits*, N.Y. TIMES (June 26, 2003), <https://www.nytimes.com/2003/06/26/us/sludge-spread-on-fields-is-fodder-for-lawsuits.html> [<https://perma.cc/C6VT-7FQ7>].

82. *Id.*

83. *Id.*

84. *See id.*

85. *See generally*, Arjun K. Venkatesan & Rolf U. Halden, *National Inventory of Perfluoroalkyl Substances in Archived U.S. Biosolids From the 2001 EPA National Sewage Sludge Survey*, 252–253 J. OF HAZARDOUS MATERIALS 413 (2013).

86. *See* U.S. ENV'T. PROT. AGENCY, *supra* note 49, at 3–9.

87. *See, e.g.*, Perkins, *supra* note 21.

88. *MOFGA Celebrates Landmark PFAS Policies*, ME. ORGANIC FARMERS & GARDENERS ASS'N (Apr. 26, 2022), <https://www.mofga.org/news/maine-pfas-legislation/> [<https://perma.cc/SV4J-DCP6>].

89. *See* Perkins, *supra* note 21.

90. *Id.*

Stoneridge Farm halted its milk sales and killed most of its livestock in 2019.⁹¹ PFAS were also found in their soils, hay, cow manure, the family's drinking water, and in Fred and his wife Laura's blood.⁹² Fred and his family are now suffering from health issues such as thyroid disease and reproductive problems, which they believe to be connected to the PFAS contamination.⁹³ The Stone family wanted to sue those responsible for the contamination, but Maine's statute of limitations at that time prevented them from doing so.⁹⁴ They would have had to file a personal injury lawsuit within six years of when the PFAS-contaminated sludge was spread, but they did not find out about the contamination until several years after it had lapsed.⁹⁵ Thus, the Stone family did not receive meaningful financial assistance from this crisis, and their family is now reliant on welfare and the generosity of their friends and family.⁹⁶ Fred is unsure how they can possibly pay their debts or survive.⁹⁷

In 2020, a second Maine dairy farm was found to have PFAS contamination ranging from 12,700 to 32,200 parts per trillion (ppt), which is considered the highest milk contamination level ever recorded in North America.⁹⁸ As a result, the 10th-generation Tozier Farm also had to halt sales of its milk and beef.⁹⁹

PFAS contamination is upending farmers' lives in Maine and across the country. PFAS contamination crises are affecting farmers' incomes, livelihoods, property values, and physical and mental health.¹⁰⁰ Farmers who have spent their entire lives building and investing in their farms are facing a grim future.¹⁰¹ Due to the widespread application of biosolids on farmland, many farms are apt to confront PFAS contamination just like Johanna, Adam, and the other foregoing farmers.¹⁰² Maine has seen more instances of PFAS farmland contamination than any other state because it

91. *Id.*

92. Treat, *supra* note 17.

93. Perkins, *supra* note 21.

94. Treat, *supra* note 17.

95. *Id.*

96. Perkins, *supra* note 21.

97. *Id.*

98. Treat, *supra* note 17.

99. *Id.*

100. See, e.g., Perkins, *supra* note 21.

101. See *id.*

102. See, e.g., *id.*

is testing more than other states.¹⁰³ Experts say these recent contamination discoveries are the tip of the iceberg.¹⁰⁴

III. ANALYSIS

A. Existing Federal Regulation of PFAS

Several federal laws control the safety of food, water, air, and the environment to prevent chemical contamination, including but not limited to: the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Clean Air Act (CAA), the Toxic Substances Control Act (TSCA), the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) or “Superfund,” the Resource Conservation and Recovery Act (RCRA), the Emergency Planning and Community Right-to-Know Act (EPCRA), the Federal Food, Drug, and Cosmetic Act (FDCA), the Federal Meat Inspection Act (FMIA), the Poultry Product Inspection Act (PPIA), and the Egg Product Inspection Act (EPIA).

Despite the long list of federal laws above, governance of PFAS within them is scant to nonexistent. The only effort the federal government has implemented on PFAS is the industrial phase-out of the long-chain PFAS chemicals PFOA and PFOS discussed in section II-A. After awareness of the adverse health and environmental effects of PFAS grew, EPA launched the PFOA Stewardship Program in January 2006 to encourage eight PFAS manufacturers (including DuPont and 3M) to phase out production and use of PFOA and PFOS by 2015.¹⁰⁵ To complement this program, EPA issued Significant New Use Rules (SNURs) for PFAS under TSCA, which required manufacturers and processors of PFOA and PFOS to notify EPA of any new uses of those chemicals.¹⁰⁶

While the PFOA Stewardship Program and SNURs provided some EPA oversight of PFAS, it was insignificant.¹⁰⁷ The program only covered PFOA and PFOS chemicals, when more than 9,000 PFAS are known.¹⁰⁸ Additionally, although PFOA and PFOS were phased out, they were replaced with different PFAS chemicals such as GenX, which pose similar adverse

103. *Id.*

104. *See id.*

105. *Fact Sheet: 2010/2015 PFOA Stewardship Program*, U.S. ENV’T PROT. AGENCY, <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program> [<https://perma.cc/9E7A-QS7B>].

106. *Id.*; *See* Toxic Substances Control Act of 1976 § 5, 15 U.S.C. § 2604(a)(2); 40 C.F.R. § 721 (2007).

107. Serratos, *supra* note 26, at 202–03.

108. *See* Treat, *supra* note 17.

health effects.¹⁰⁹ Also, SNURs may not be very effective, given that it can take an average of three to five years for the EPA to gather enough information to issue a SNUR, and an additional two years for a company to comply with any necessary requirements.¹¹⁰ And, “while the EPA gathers information on the chemical, the manufacturer can market and produce the chemical without restriction.”¹¹¹ Given the long lifespan of PFAS chemicals, a delayed chemical review process can be very dangerous. Considering the persistence of PFAS chemicals in soil, water, and human blood, the catastrophic damage already done by these chemicals cannot be erased by companies phasing out PFOA and PFOS, especially when equally dangerous PFAS chemicals are supplanting them.¹¹² Additionally, as indicated by the name, “phase-outs” are a process. Not all PFOA and PFOS were eliminated all at once, and existing stocks of PFOA and PFOS could still be used regardless of manufacturing and import halts.¹¹³

Thus, despite the phase-out of PFOA and PFOS, these two chemicals and other PFAS remain very present in the environment.¹¹⁴ And because PFAS as a chemical class are not federally regulated at any level, they can be legally present in our food, water, air, soil, and recreational spaces. PFAS then inevitably end up in wastewater and thus in biosolids for land application.

B. Federal Regulation of Biosolids

Despite the tens of thousands of chemicals that can be present in biosolids, the federal government permits the spread of this sewage sludge on land to be used as fertilizer.¹¹⁵ Sections 405(d) and (e) of the CWA give EPA the authority to set standards for the disposal and use of sewage sludge and require EPA to: (1) establish limits and best management practices to

109. Johnson, *supra* note 6, at 138.

110. Serratos, *supra* note 26, at 213.

111. *Id.*

112. See Sharon Lerner, *People Exposed to PFAS Criticize EPA Action Plan as Too Little, Too Late*, INTERCEPT (Oct 19, 2021, 8:33 AM), <https://theintercept.com/2021/10/19/pfas-epa-water-dupont-chemours/> [<https://perma.cc/Q9TY-GRW4>]; Sharon Lerner, *EPA Continues to Approve Toxic PFAS Chemicals Despite Widespread Contamination*, INTERCEPT (Oct. 25, 2018, 9:35 AM), <https://theintercept.com/2018/10/25/epa-pfoa-pfas-pfos-chemicals/> [<https://perma.cc/92GR-4QLE>].

113. U.S. ENV'T PROT. AGENCY, *supra* note 105.

114. See generally, *Mapping the PFAS Contamination Crisis: New Data Show 2,854 Sites in 50 States and Two Territories*, ENV'T WORKING GRP., https://www.ewg.org/interactive-maps/pfas_contamination/ [<https://perma.cc/AUR8-JJGC>].

115. See *Biosolids Laws and Regulations*, U.S. ENV'T. PROT. AGENCY, <https://www.epa.gov/biosolids/biosolids-laws-and-regulations#standards> [<https://perma.cc/58PB-BNV8>].

protect the public from adverse effects of chemical and microbial pollutants in sewage sludge, and (2) review sewage sludge regulations every two years to identify any additional pollutants and regulate them accordingly.¹¹⁶ EPA does this via 40 C.F.R. Part 503, Standards for the Use or Disposal of Sewage Sludge,¹¹⁷ though many commentators argue EPA falls short on its ability to reduce dangerous chemicals and pathogens under Part 503.¹¹⁸

The questionable safety of agricultural biosolids becomes apparent upon examining the two different classes of biosolids: Class A and Class B.¹¹⁹ Class A biosolids can be applied anywhere, including at sites with public access, and are thus treated more heavily to remove pathogens.¹²⁰ Class B biosolids are intended strictly for agricultural application and receive less stringent treatment.¹²¹ While Class A biosolids are treated at extremely high temperatures to eliminate all pathogens, Class B biosolids receive treatment to reduce, but not necessarily eliminate, all pathogens.¹²² Thus, agricultural Class B biosolids are a more hazardous substance to begin with due to reduced treatment standards under Part 503.¹²³ While the public may not have physical access to private farmland where sludge is spread, farmers, farmworkers, livestock, and anyone who eats food from those farms or drinks water containing leachate from those biosolids could still be adversely affected.

Additionally, in comparison to agricultural biosolids programs in other countries, EPA's biosolids regulations are "the least stringent restrictions developed by any nation that uses biosolids in agriculture."¹²⁴ For example, EPA's biosolids standards allow for concentrations of heavy metals up to one hundred times higher than the limits imposed by any other country.¹²⁵

Further compounding this regulatory lack, EPA's review of sewage sludge to date has been flawed. Although the CWA requires EPA to identify and regulate potentially dangerous pollutants in biosolids, EPA has only conducted national sewage sludge surveys at wastewater treatment plants

116. Clean Water Act of 1972 § 405, 33 U.S.C. § 1345.

117. U.S. ENV'T. PROT. AGENCY, *supra* note 115; 40 C.F.R. § 503 (2022).

118. Christopher J. Conrad, Comment, *Sewage Sludge and Land Application Practices: Do the Section 503 Standards Guarantee Safe Fertilizer Usage?*, 9 DICK. J. ENV'T L. & POL'Y. 148–49 (2000).

119. See U.S. ENV'T. PROT. AGENCY, *supra* note 52.

120. See Gerald W. Foess & Douglas Fredericks, *Comparison of Class A and Class B Private Biosolids Stabilization Technologies*, FLA. WATER RES. J. 28 (1995).

121. See *id.*

122. Conrad, *supra* note 118, at 156–57.

123. See *id.* at 157.

124. Fullmer, *supra* note 10, at 507.

125. *Id.* at 507–08.

three times since 1988, and has not surveyed contaminant levels again since 2009.¹²⁶ In the testing that EPA has done, it identified more than 352 pollutants, including 61 it classifies as “acutely hazardous, hazardous, or priority pollutants.”¹²⁷ But currently, Part 503 only requires monitoring of nine heavy metals in sewage sludge: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc.¹²⁸ A condemning 2018 EPA Office of Inspector General (OIG) report noted EPA’s shortcomings in its biosolid monitoring, stating the EPA “lacked the data or risk assessment tools needed to make a determination on the safety of 352 pollutants found in biosolids.”¹²⁹ The report flagged reduced agency staff and resources in the biosolids program, as well as EPA’s omission to seek the key data to make accurate risk determinations.¹³⁰ Thus, OIG concluded that EPA’s biosolids program was “at risk of not achieving its goal to protect public health and the environment.”¹³¹

Considering these limitations of EPA’s biosolids rule, many appreciate that Part 503 leaves room for states and municipalities to enact more stringent rules on biosolids if they wish.¹³² While some states have enforced more stringent measures, leniency within Part 503 and lack of EPA oversight of the biosolids program have led to lax state administration of biosolids programs.¹³³ Many states, citing administrative burdens, have adopted an “honor system” for land application of biosolids, leaving no record of where or how much the sludge was applied.¹³⁴ Treatment plants do not typically sign contracts with landowners who accept the biosolid fertilizer, but instead work with a land applier to haul the sludge and find farmers who may want it.¹³⁵ Land appliers do keep records of where the biosolids are applied, but Part 503 does not require them to report this information to

126. 33 U.S.C. § 1345(d)(2)(C) (“From time to time, but not less often than every 2 years, the Administrator shall review the regulations promulgated under this paragraph for the purpose of identifying additional toxic pollutants and promulgating regulations for such pollutants consistent with the requirements of this paragraph.”); Fullmer, *supra* note 10, at 508.

127. *EPA Unable to Assess the Impact of Hundreds of Unregulated Pollutants in Land-Applied Biosolids on Human Health and the Environment*, OFF. OF INSPECTOR GEN., U.S. ENV’T PROT. AGENCY (Nov. 15, 2018), https://www.epa.gov/sites/default/files/2018-11/documents/_epaoig_20181115-19-p-0002_glance.pdf [<https://perma.cc/R6C7-Z6X3>].

128. Conrad, *supra* note 118, at 166.

129. OFF. OF INSPECTOR GEN., U.S. ENV’T. PROT. AGENCY, *supra* note 127.

130. *Id.*

131. *Id.*

132. Fullmer, *supra* note 10, at 509.

133. *Id.*

134. Goldfarb et al., *supra* note 53, at 710.

135. *Id.*

the treatment plant.¹³⁶ This has led to spotty documentation of where biosolids have been applied across the U.S.

Thus, the loose requirements of Part 503 and EPA's lax implementation of it have led to unsafe biosolid treatment standards, inadequate research, and disorganized administration of biosolids programs nationally.¹³⁷

C. Proposed Federal Regulations of PFAS: PFAS Strategic Roadmap and the PFAS Action Act

As the dangers of PFAS have become more evident, the federal government has finally begun to acknowledge the issue and take steps toward regulation.¹³⁸ In October 2021, EPA Administrator Michael S. Regan announced the agency's PFAS Strategic Roadmap, which includes specific actions on PFAS intended to "safeguard public health, protect the environment, and hold polluters accountable."¹³⁹ This roadmap does not carry the force of law but outlines a timeline for regulatory actions, including:

1. designation of PFOA and PFOS as hazardous substances under CERCLA, which would allow polluters to be held liable for PFAS-contaminated sites (*proposed rule published September 6, 2022, final rule expected summer 2023*);
2. establishment of a national drinking water standard for PFOA and PFOS under SDWA, requiring states to enforce national limits of PFAS in drinking water (*proposed rule originally expected fall 2022, final rule fall 2023*);
3. restriction of PFAS discharges from industrial sources under the CWA, enforcing effluent limitations on industrial dischargers (*originally expected 2022 and ongoing*);
4. administration of a toxicity assessment for GenX and five additional PFAS (PFBA, PFHxA, PFHxS, PFNA, and PFDA) to better understand human health and environmental impacts (*assessments ongoing*); and

136. *Id.*

137. *See id.* at 710–11.

138. *See* Treat, *supra* note 17.

139. *PFAS Strategic Roadmap: EPA's Commitments to Action 2021-2024*, U.S. ENV'T PROT. AGENCY (Jan. 27, 2022), <https://www.epa.gov/pfas/pfas-strategic-roadmap-epas-commitments-action-2021-2024> [<https://perma.cc/MP7L-67TH>].

140. Designation of Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) as CERCLA Hazardous Substances, 87 Fed. Reg. 54415 (Sept. 6, 2022) (to be codified at 40 C.F.R. pt. 302).

5. finalization of PFAS risk assessment in biosolids to determine if PFAS regulation of biosolids is appropriate (*expected winter 2024*).¹⁴¹

While the above actions are a tremendous step toward regulating PFAS, they are not as strong or impactful as they could be.¹⁴² First, the roadmap sets loose, vague deadlines, most of which will not come for several years.¹⁴³ For those who have already been adversely affected by PFAS contamination, these measures are already too late.¹⁴⁴ Waiting three to four more years allows contamination to become even more widespread, and does not provide urgent assistance to those who need it.¹⁴⁵

Additionally, the proposed actions will only regulate PFOA and PFOS, when there are thousands of additional PFAS chemicals that could be equally dangerous.¹⁴⁶ While GenX and an additional five PFAS will be “assessed,” it is unclear if or when this may result in regulation, and this process does not include the other thousands of PFAS.¹⁴⁷ Also, studies have already shown that additional PFAS chemicals are dangerous, so it is a tremendous delay in the process to conduct an EPA assessment instead of simply regulating the chemicals.¹⁴⁸

Similarly, conducting a risk assessment on biosolids also seems like an unnecessary delay, given that we already know biosolids contain dangerous PFAS that have adverse effects on humans and the environment.¹⁴⁹ Also, while USDA and FDA are named in the Biden administration’s Fact Sheet on PFAS, neither agency has announced PFAS actions like EPA.¹⁵⁰

Thus, while the roadmap is an improvement from the lack of federal PFAS action to date, it is too narrow, too lenient, and too vague.¹⁵¹ Environmental advocates and people living in contaminated communities feel the plan contains “more promises and planned actions than concrete policies,” which they have seen EPA promise and not deliver before.¹⁵²

141. U.S. ENV’T PROT. AGENCY, *supra* note 139.

142. *See* Treat, *supra* note 17.

143. *See* Fabio Dworschak et al., *EPA Plan Changes PFAS Outlook for Companies, Regulators*, LAW360 (Nov. 1, 2021, 5:27 PM), <https://plus.lexis.com/api/permalink/ae118947-1988-4da6-8430-0fe07986b7ea/?context=1530671> [<https://perma.cc/8G53-CUKF>].

144. *See* Lerner, *supra* note 112.

145. *See id.*

146. *See id.*

147. Treat, *supra* note 17.

148. Johnson, *supra* note 6, at 147.

149. Perkins, *supra* note 15.

150. *See* Treat, *supra* note 17.

151. *See* Lerner, *supra* note 112.

152. *Id.*

At the congressional level, the House of Representatives passed the PFAS Action Act — a landmark bill targeting PFAS — in July 2021.¹⁵³ While many of the recommendations are like those of the PFAS Strategic Roadmap, it is the most comprehensive federal PFAS bill to date.¹⁵⁴ Some key provisions in the bill include:

1. requiring the EPA to set drinking water standards for at least PFOA and PFOS within two years, and other PFAS thereafter;
2. designating PFOA as a “hazardous substance” under CERCLA within one year, and requiring the EPA to determine if all PFAS are “hazardous substances” under CERCLA within five years;
3. requiring testing of all PFAS for toxicity to human health under TSCA;
4. requiring the EPA to designate PFOA and PFOS as “hazardous air pollutants” under the CAA within six months; and
5. creating effluent regulations under the CWA.¹⁵⁵

The provisions above are slightly more stringent than those in the PFAS Strategic Roadmap, given the call for determination of all PFAS as “hazardous substances” under CERCLA, and the development of national drinking water standards for all PFAS, not just PFOA and PFOS.¹⁵⁶ However, while the bill does call for effluent regulations that could limit the amount of PFAS discharged into the waste stream, it does not include any regulations for biosolids. This is a tremendous oversight for the regulation of PFAS, given that biosolids are a significant pathway for PFAS and they are land-applied in all 50 states.¹⁵⁷ Additionally, even if Democrats were to have congressional majority in addition to the presidency, the bill is not expected to pass so long as the filibuster is in place.¹⁵⁸ Thus, it remains unclear whether or not EPA’s Strategic Roadmap or the PFAS Action Act can help struggling farmers like Johanna and Adam.

D. State Regulation of PFAS in the Absence of Government Support

Given the lack of federal action on PFAS, many states have stepped in to address the PFAS contamination crisis. However, the stringency of states’

153. PFAS Action Act of 2021, H.R. 2467, 117th Cong. (2021).

154. See John Gardella, *PFAS Action Act 2021 Moves Forward – But How Significant Is the Progress?*, NAT’L. L. REV. (Aug. 3, 2021), <https://www.natlawreview.com/article/pfas-action-act-2021-moves-forward-how-significant-progress> [<https://perma.cc/VY3Z-GBBU>].

155. *Id.*

156. Compare H.R. 2467, *supra* note 153, with *PFAS Strategic Roadmap*, *supra* note 139.

157. Fullmer, *supra* note 10.

158. Serratos, *supra* note 26, at 214.

PFAS regulations varies, and states have different determinations of what they consider “safe.” Seven states have set their own enforceable drinking water standards for varying levels of PFAS, including Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, and Vermont, while many others only have proposed standards or have adopted guidance and/or notification levels for PFAS in drinking water.¹⁵⁹ Seven states have also banned PFAS in food packaging, including California, Connecticut, Maine, Minnesota, New York, Vermont, and Washington.¹⁶⁰ But as for regulation of biosolids and policies that specifically target the farming population, only three states stand out: Michigan, Vermont, and Maine.

In 2021, Michigan began prohibiting land application of biosolids containing more than 150 parts per billion (ppb) of PFAS, and now requires testing of biosolids before land application.¹⁶¹ This is how farmer Jason Grostic of Grostic Cattle Co. discovered he had PFAS contamination on his farm from the spread of biosolids, requiring him to halt sales of his contaminated beef.¹⁶² Michigan’s Department of Environment, Great Lakes, and Energy (EGLE) also identified dozens of PFAS polluters and required them to stop discharging PFAS chemicals to prevent PFAS from ending up at treatment plants.¹⁶³ However, Michigan’s program only monitors for PFOS, and there are no federal regulations to confirm that 150 ppb is a safe level.¹⁶⁴ Michigan also relies on industry to self-report chemical use, so it may not be getting accurate information.¹⁶⁵ EGLE also must get farmers’ permission to test cattle, and several farmers with high levels of PFAS in their soil and water will not permit testing because of the effects it may have on their farm businesses.¹⁶⁶

In 2021, Vermont launched its own PFAS Roadmap, outlining actions it had already undertaken, and those it planned to take to further mitigate PFAS contamination.¹⁶⁷ When Vermont detected PFAS contamination at

159. See SAFER STATES, *supra* note 22.

160. Fawell et al., *supra* note 45.

161. *MPART Investigation Yields New Data on PFAS*, MICH. DEP’T. OF ENV’T, GREAT LAKES & ENERGY (Jan. 28, 2022), <https://www.michigan.gov/egle/newsroom/mi-environment/2022/01/28/mpart-investigation-yields-new-data-on-pfas> [<https://perma.cc/AX7Y-VTZ4>].

162. Perkins, *supra* note 70.

163. *Id.*

164. *Id.*

165. *Id.*

166. *Id.*

167. See generally PFAS ROAD MAP, VT. DEP’T OF ENV’T CONSERVATION, (2021), <https://anrweb.vt.gov/PubDocs/DEC/PFAS/General-info/Vermont-PFAS-Roadmap.pdf> [<https://perma.cc/7FRY-L52X>].

wastewater treatment facilities, it then initiated testing on farms where biosolids were applied.¹⁶⁸ After PFAS contamination was detected at these sites, the state adopted new Solid Waste Rules requiring PFAS testing for biosolids, soils, groundwater and crops at land application sites.¹⁶⁹ Vermont's Department of Environmental Conservation (DEC) is also working to reduce PFAS before it enters wastewater through pretreatment and pollution prevention efforts.¹⁷⁰ Staff from the Vermont Agency of Agriculture, Food & Markets (VAAFM) are also meeting with farmers to better understand their production systems in order to determine risk.¹⁷¹ VAAFM then plans to sample retail milk and agricultural commodities for PFAS.¹⁷² However, much of this work is grant funded and may only continue as funding allows.¹⁷³

The widespread PFAS contamination crisis on farmland in Maine has sparked robust regulations and programs that are unparalleled by other states.¹⁷⁴ In 2021, Maine enacted a groundbreaking law banning the use of PFAS in all products by 2030, which will ultimately help prevent PFAS from ending up in the waste stream and on farms.¹⁷⁵ Additionally, while Maine halted the spread of sludge with elevated PFAS levels in 2019 through bill L.D. 1911, a loophole allowed those sludges to be dried at compost facilities and then sent to farms — still containing high levels of PFAS.¹⁷⁶ To correct this, farmers supported the amendment of L.D. 1911 to ban land application of all biosolids that have not been tested for all PFAS chemicals.¹⁷⁷ The Maine Legislature voted to pass this amendment in April 2022.¹⁷⁸ Another bill, L.D. 2019, was passed in April 2022 to ban the distribution of pesticides

168. *Id.* at 1.

169. *Id.*

170. *Id.*

171. *Id.* at 8.

172. *Id.*

173. *See id.* at 7–8.

174. *See Perkins, supra* note 21.

175. *See Tom Perkins, Maine Bans Toxic 'Forever Chemicals' Under Groundbreaking New Law*, GUARDIAN (July 15, 2021 9:01 PM), <https://www.theguardian.com/us-news/2021/jul/15/maine-law-pfas-forever-chemicals-ban> [<https://perma.cc/B6SD-BA9D>]; 38 ME. REV. STAT. ANN. tit. 38, § 1614 (2021).

176. Penelope Overton, *Farmers Urge Passage of Bill to Stop Agricultural Use of PFAS-Laden Sludge*, PORTLAND PRESS HERALD (Feb. 23, 2022), <https://www.pressherald.com/2022/02/23/farmers-urge-passage-of-bill-that-would-stop-the-agricultural-use-of-pfas-laden-sludge/> [<https://perma.cc/K28F-Q928>].

177. *Id.*; H.P. 1417, 130th Leg., 2d Reg. Sess. (Me. 2022), <http://www.mainelegislature.org/legis/bills/getPDF.asp?paper=HP1417&item=1&snum=130> [<https://perma.cc/FBE9-MYRD>].

178. ME. ORGANIC FARMERS & GARDENERS ASS'N, *supra* note 88.

containing PFAS chemicals.¹⁷⁹ An additional bill, L.D. 2013, was proposed to create the Fund To Address PFAS Contamination, which would allow the Department of Agriculture, Conservation, and Forestry (DACF) to allocate funds of \$100 million for monitoring the health of those exposed to PFAS contamination, buying and selling PFAS-contaminated agricultural land, conducting research, and assisting agricultural businesses with contaminated land.¹⁸⁰ In April 2022, the Maine Legislature's Appropriations and Financial Affairs (AFA) Committee unanimously voted to include \$60 million in the supplemental budget for direct farmer support.¹⁸¹

Maine is also the only state to initiate a widespread investigation of PFAS contamination from biosolids.¹⁸² After the discovery of PFAS at Fred Stone's dairy farm, Maine initiated a sludge testing program in 2019, and discovered that all municipal sludge tested in the state contained PFAS.¹⁸³ Maine has now identified more than 700 sites where biosolids have been land-applied, with a goal to test them all by 2025.¹⁸⁴

Maine has proven that with more testing comes more PFAS contamination discoveries.¹⁸⁵ While Maine is acting swiftly to mitigate PFAS contamination crises on farms, most states are not, and it is unclear if they will without federal mandates or support.¹⁸⁶

IV. SOLUTIONS

State governments can only do so much to mitigate PFAS contamination on farms without federal assistance, national standards, and testing protocols.¹⁸⁷ There are several ways the federal government can address the PFAS contamination crisis on farms from the spread of biosolids.¹⁸⁸ While federal legislation and regulations need to be amended

179. H.P. 1501, 130th Leg. 2d Reg. Sess. (Me. 2022), <https://legislature.maine.gov/bills/getPDF.asp?paper=HP1501&item=1&snum=130> [https://perma.cc/XGY5-A2JB]; ME. ORGANIC FARMERS & GARDENERS ASS'N, *supra* note 88.

180. S.P. 729, 130th Leg. 2d Reg. Sess. (Me. 2022). <https://www.mainelegislature.org/legis/bills/getPDF.asp?paper=SP0729&item=1&snum=130> [https://perma.cc/8MQV-NMPG].

181. ME. ORGANIC FARMERS & GARDENERS ASS'N, *supra* note 88.

182. Treat, *supra* note 17.

183. *Id.*

184. *Per- and Polyfluoroalkyl Substances (PFAS)*, ME. DEP'T OF AGRIC. CONSERVATION & FORESTRY, <https://www.maine.gov/dacf/ag/pfas/index.shtml#dacf> [https://perma.cc/AF7L-G8PF].

185. See Treat, *supra* note 17.

186. See *id.*

187. Treat, *supra* note 17.

188. See generally *id.*

or passed to address certain aspects of the issue, states currently experiencing PFAS crises need immediate assistance and do not have time to wait for legislation or rulemaking.¹⁸⁹ Solutions should thus be staged in two phases: (1) providing immediate financial assistance to states, and (2) subsequent federal policy solutions to regulate PFAS and help affected farmers.

A. Immediate Federal Solutions to Help Farmers and States Experiencing PFAS Contamination Crises

States need immediate federal funding and resources to address PFAS contamination on farms and to help farmers who have had their lives upended by the crisis.¹⁹⁰ States like Maine that are finding widespread PFAS contamination of farmland need prompt financial assistance to cover PFAS testing on farms, farmer income replacement, lost property values, lost assets, PFAS remediation, alternative methods for biosolid disposal, and health monitoring for farmers who have suffered from PFAS exposure.¹⁹¹

As a frame of reference for how much funding states need, Maine's Department of Environmental Protection (DEP) estimates that at least \$20 million will be needed annually for PFAS testing, which is slated to run until 2025.¹⁹² This amount does not include the cost of reimbursing farmers for lost sales, purchasing the farms if they are deemed unsuitable for farming, or addressing health problems from long-term PFAS exposure.¹⁹³ And the more a state is testing, the more money it will need to assist farmers who receive a positive result.¹⁹⁴ States must have sufficient funding in order to be able to mitigate PFAS contamination disasters, otherwise farmers will be reluctant to test out of fear of losing their farms and businesses.¹⁹⁵

Immediate federal funding could be acquired through earmarked funding in the next congressional appropriations package.¹⁹⁶ The funds

189. See generally Perkins, *supra* note 21.

190. See *id.*

191. See generally Schauffler, *supra* note 20.

192. *Id.*

193. See *id.*

194. See Treat, *supra* note 17.

195. See Phil Hirschhorn, *Maine Legislators Consider Relief Fund for Farmers Facing "Forever Chemicals" Contamination on Their Land*, WMTW NEWS 8 PORTLAND, (Mar. 15, 2022, 7:53 PM), <https://www.wmtw.com/article/maine-legislators-consider-relief-fund-for-farmers-facing-forever-chemicals-contamination-on-their-land/39444713#> [<https://perma.cc/J7FZ-9WT4>].

196. See generally Luke Broadwater et al., *As Earmarks Return to Congress, Lawmakers Rush to Steer Money Home*, N.Y. TIMES (Apr. 1, 2022),

could be earmarked for the EPA to enter into a cooperative agreement with an organization that represents state departments of the environment for the purpose of addressing PFAS contamination at the state level. The Environmental Council of the States (ECOS) is a national nonprofit, nonpartisan association of state and territorial environmental agency leaders.¹⁹⁷ EPA's earmarked funds could be used to enter into a cooperative agreement program with ECOS, wherein ECOS could redistribute funds to its member states' departments of the environment to address critical PFAS issues. Support for affected states could provide funding and technical assistance for testing, remediation, research, and alternative waste disposal.

This type of cooperative agreement is certainly attainable, as it has been used before for in similar contexts. For example, the FDA entered into a cooperative agreement with the National Association of State Departments of Agriculture (NASDA) for the purpose of conducting produce inspections under the Food Safety Modernization Act (FSMA).¹⁹⁸ Through fiscal year (FY) 2020 and 2021 appropriations funding, FDA was able to partner with NASDA to provide funding and technical assistance to NASDA's members (state departments of agriculture) to conduct on-farm produce safety inspections.¹⁹⁹ This model would work very well for state departments of environment to address PFAS contamination.

While there was a moratorium on earmarks for more than a decade, the 117th Congress reinstituted earmarking with bicameral, bipartisan support.²⁰⁰ Democrats and Republicans collectively secured 4,962 earmarks totaling \$9 billion in the \$1.5 trillion FY 2022 appropriations bill, signed into law by President Biden in March 2022.²⁰¹ Current earmarking rules are narrower than they were before the ban in 2011, requiring earmarked funding to benefit state and local governments — not private entities.²⁰² Earmarks for water and infrastructure projects are therefore favored because they aim to provide direct benefits to state and local

<https://www.nytimes.com/2022/04/01/us/politics/congress-earmarks.html>
[<https://perma.cc/66GU-G7D8>].

197. *About ECOS*, ENV'T COUNCIL OF THE STATES, <https://www.ecos.org/about-ecos/>
[<https://perma.cc/UYQ3-T73Q>].

198. AMBER D. NAIR, CONG. RSH. SERV., R46706, PRODUCE SAFETY: REQUIREMENTS, IMPLEMENTATION, AND ISSUES FOR CONGRESS (2021).

199. *See* AMBER D. NAIR, CONG. RSCH. SERV., R46851, FY2020 AND FY2021 AGRICULTURE APPROPRIATIONS: FEDERAL FOOD SAFETY ACTIVITIES 6 (2021).

200. Broadwater et al., *supra* note 196.

201. *See id.*

202. George Cahlink & Thomas Frank, *Big Earmark Money in Senate Energy, Environment Bills*, E&E NEWS (Nov. 2, 2021, 7:03 AM), <https://www.eenews.net/articles/big-earmark-money-in-senate-energy-environment-bills/> [<https://perma.cc/S2CS-ZBPM>].

governments.²⁰³ In fact, earmarks in the FY 2022 bill include 30 percent of Clean Water State Revolving Fund (CWSRF) dollars set aside for specific drinking water and wastewater projects.²⁰⁴ Thus, PFAS-related funding projects should be securable in the next appropriations package due to their relevant environmental and water infrastructure focus.

Since appropriated discretionary funds are negotiated every year, this option is only a short-term, temporary solution. Permanent, mandatory federal support via legislation and administrative regulation is needed to further address PFAS contamination on farms.

B. Subsequent Federal Solutions to Address PFAS Contamination on Farms

After action has been taken on immediate assistance and financial relief for states, the federal government should implement permanent solutions to regulate PFAS, prevent future PFAS contamination from biosolids, and research and create permanent programs for PFAS remediation, financial assistance, and mental and physical health resources for affected farmers. While EPA's PFAS Strategic Roadmap offers several steps in the right direction, it falls short in many areas, especially those relevant to agriculture (see section III-C). Solutions presented in this section provide recommendations to fill in the gaps.

Proposed federal policy recommendations are organized in the following five categories: (1) national PFAS standards and identification, (2) prevention of PFAS contamination from biosolids, (3) PFAS remediation assistance, (4) direct financial assistance for affected farmers, and (5) behavioral and physical health resources. Bulleted solutions are listed under each category.

1. Recommendations for National PFAS Standards and PFAS Identification:

- **Set national drinking water standards for all PFAS chemicals as a class, not just PFOA and PFOS:** Amending the National Primary Drinking Water Regulations (NPDWR)²⁰⁵ to set a national maximum contaminant level (MCL) for PFAS in drinking water will require states and operators of public water systems to enforce these

203. *Id.*

204. *Earmarks Return as Congress Approves FY 22 Spending Bill*, ASS'N OF METRO. WATER AGENCIES (Mar. 14, 2022), <https://www.amwa.net/article/earmarks-return-congress-approves-fy22-spending-bill> [<https://perma.cc/9SEE-WHEX>].

205. 40 C.F.R. § 141 (2022).

standards to protect and treat tap water.²⁰⁶ This would prevent further PFAS contamination of water sources under the Safe Drinking Water Act (SDWA).²⁰⁷

- **Classify PFAS as “Hazardous Air Pollutants”²⁰⁸ under the Clean Air Act (CAA) and as “Toxic Pollutants”²⁰⁹ under the Clean Water Act (CWA):** This will allow EPA to specifically regulate all PFAS discharges and emissions, preventing chemical plants and factories from discharging and emitting dangerous levels of PFAS into the soil, water, and air.²¹⁰
- **Amend the Toxic Substances Control Act (TSCA)²¹¹ to allow for all PFAS to be regulated as a class of chemicals (instead of individual chemicals):** This will ban all PFAS manufacturing in the U.S., similar to how TSCA regulates Polychlorinated Biphenyls (PCBs).²¹² This will prevent the creation of new PFAS chemicals to replace other PFAS chemicals.²¹³ It will also prevent the need for Significant New Use Rules (SNURs) for each new PFAS chemical, which take a long time and allow companies to use PFAS while the EPA researches new chemicals.²¹⁴
- **Amend 21 C.F.R. § 109(B) to classify PFAS chemicals as “poisonous or deleterious substances” pursuant the Federal Food, Drug, and Cosmetic Act (FDCA):** This will allow the FDA to set maximum “tolerances” of PFAS in food and food packaging, similar to the regulation of PCBs.²¹⁵ This could also lead to designation of food products containing PFAS as “reportable food” under the FDCA,

206. See *National Primary Drinking Water Regulations*, U.S. ENV'T PROT. AGENCY (Jan. 26, 2022), <https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations> [https://perma.cc/D7UT-6M7P].

207. See *generally Summary of the Safe Drinking Water Act*, U.S. ENV'T PROT. AGENCY, <https://www.epa.gov/laws-regulations/summary-safe-drinking-water-act>; Safe Drinking Water Act of 1974, 42 U.S.C. §§ 300f–300j-27.

208. 42 U.S.C. § 7412.

209. 33 U.S.C. § 1345(d).

210. See *Hazardous Air Pollutants*, U.S. ENV'T PROT. AGENCY, <https://www.epa.gov/haps> [https://perma.cc/2RDF-KB5M]; see also *Toxic and Priority Pollutants Under the Clean Water Act*, U.S. ENV'T PROT. AGENCY, , <https://www.epa.gov/eg/toxic-and-priority-pollutants-under-clean-water-act> [https://perma.cc/7LPN-ZSVL].

211. Toxic Substances Control Act of 1976, 15 U.S.C. §§ 2601–29.

212. See *generally Policy and Guidance for Polychlorinated Biphenyl (PCBs)*, U.S. ENV'T PROT. AGENCY, <https://www.epa.gov/pcbs/policy-and-guidance-polychlorinated-biphenyl-pcbs> [https://perma.cc/A2XL-MT67].

213. See Serratos, *supra* note 26, at 211–12.

214. See *id.* at 213.

215. 21 C.F.R. § 109(B) (2022).

allowing for mandatory recall of products containing the chemicals.²¹⁶

- **Amend USDA Food Safety and Inspection Service (FSIS) livestock, poultry, and egg inspection under the Federal Meat Inspection Act (FMIA),²¹⁷ Poultry Products Inspection Act (PPIA),²¹⁸ and the Egg Products Inspection Act (EPIA)²¹⁹ to regulate PFAS:** This would allow the remainder of agricultural food products not covered by the FDCA to be regulated for PFAS, ensuring that meat, poultry, and egg products regulated by FSIS meet PFAS standards when tested and are not “adulterated” with PFAS under the above Acts.
- **Amend the National Organic Program (NOP) certification requirements to test certified organic farms and certification-seeking farms for PFAS:** This will create an additional avenue for USDA-administered on-farm PFAS testing and will require farms to comply with PFAS soil and water standards in order to obtain or maintain organic certification.²²⁰ It will also help build and maintain consumer trust in the organic label.²²¹

2. Recommendations for Prevention of PFAS Contamination from Biosolids:

- **Ban the land application of PFAS-contaminated biosolids under EPA’s Part 503 Biosolids Rule²²² pursuant to section 405(d)(2)(C) of the CWA:** This will prevent the spread of biosolids containing unsafe levels of PFAS on farmland and establish safer alternatives for biosolid disposal under the CWA.²²³ The Food Safety Modernization Act (FSMA) also follows the Part 503 Biosolids Rule,²²⁴ so recommended changes to Part 503 will also become requirements

216. 21 U.S.C. § 350(f)–350(i).

217. Federal Meat Inspection Act, 21 U.S.C. §§ 601–95.

218. Poultry Products Inspection Act, 21 U.S.C. § 451–73.

219. Egg Products Inspection Act, 21 U.S.C. § 1031–56.

220. See generally *National Organic Program*, AGRIC. MKTG. SERV., U.S. DEPT. OF AGRIC., <https://www.ams.usda.gov/about-ams/programs-offices/national-organic-program> [<https://perma.cc/4SJN-R86K>].

221. See Lisa Held, *Efforts to Strengthen the USDA Organic Standard Pick Up Steam*, FOODPRINT (Jul. 26, 2021), <https://foodprint.org/blog/organic-standards/> [<https://perma.cc/U7GG-R5R4>].

222. 40 C.F.R. § 503 (2022).

223. 33 U.S.C. § 1345.

224. Food Safety Modernization Act, 21 U.S.C. §§ 2201–52.

under FSMA, which produce farms and processing facilities must comply with in order to meet updated food safety standards.²²⁵

- **Amend EPA regulations²²⁶ under the Resource Conservation and Recovery Act (RCRA)²²⁷ to classify PFAS as “hazardous waste”:** This would create “cradle-to-grave” PFAS waste management requirements under the RCRA, regulating the generation, transportation, treatment, storage, and disposal of hazardous PFAS waste to prevent contamination.²²⁸

3. Recommendations for PFAS Farmland Testing and Remediation Assistance:

- **Classify all PFAS chemicals (not just PFOS and PFOA) as “hazardous substances”²²⁹ under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):** This would require facilities to report on all PFAS releases, would allow EPA to remediate PFAS-contaminated Superfund sites, and would hold responsible parties accountable for remediation costs, such as factories and chemical plants that violate output regulations.²³⁰
- **Amend regulations²³¹ under the Emergency Planning and Community Right-to-Know Act (EPCRA)²³² to include PFAS on the list of Extremely Hazardous Substances (EHSs):** This would require industries to report on the storage, use, and releases of PFAS to federal, state, and local governments and would also ensure community notification and targeted response for PFAS contamination events.²³³
- **Amend and increase funding for the USDA’s Environmental Quality Incentives Program (EQIP) to assist farmers with PFAS**

225. *FSMA 101: Overview and Background*, NAT’L SUSTAINABLE AGRIC. COAL., <https://sustainableagriculture.net/fsma/overview-and-background/> [https://perma.cc/WT4J-QX8Q].

226. 40 C.F.R. §§ 260–73 (2022).

227. Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901–92.

228. See generally *Resource Conservation and Recovery Act (RCRA) Overview*, U.S. ENV’T PROT. AGENCY, <https://www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-overview>, <https://www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-overview> [https://perma.cc/SP57-LML8].

229. 42 U.S.C. § 9602.

230. *Superfund: CERCLA Overview*, U.S. ENV’T PROT. AGENCY, <https://www.epa.gov/superfund/superfund-cercla-overview> [https://perma.cc/6MGG-L947].

231. 40 C.F.R. § 355 (2022).

232. 42 U.S.C. § 11002(a)(2).

233. See *What is EPCRA?*, U.S. ENV’T PROT. AGENCY, <https://www.epa.gov/epcra/what-epcra> [https://perma.cc/9A3A-R29X].

contamination: This could allow USDA's Natural Resources Conservation Service (NRCS) to help fund and administer PFAS soil and water testing and any remediation options within the scope of NRCS.²³⁴

- **Amend and increase funding for USDA's Conservation Reserve Program (CRP) to include PFAS-contaminated land:** This would allow farmers to be paid for taking PFAS-contaminated farmland out of agricultural production and implementing sustainable ground cover options to improve soil and water quality.²³⁵
- **Develop programs under USDA's Agricultural Research Service (ARS) to determine remediation options for PFAS-contaminated farmland:** This will help states, communities, and farmers understand the best methods for PFAS remediation, whether or not removal of PFAS from the soil is achievable at a given farm, and how to help farmers transition to other types of operations if their previous production system is no longer viable.²³⁶ This is currently happening at the state level in Maine and Vermont,²³⁷ but national support and guidance is needed.

4. Recommendations for Direct Financial Assistance for Affected Farmers:

- **Create a new disaster payment program under Title I of the Farm Bill²³⁸ to compensate farmers facing PFAS contamination on their land:** This would allow farmers to receive funding for loss of income, property values, and assets (such as livestock, equipment, and infrastructure). This should be in the form of direct payments, similar to the Livestock Indemnity Program (LIP),²³⁹ as opposed to loans like the Emergency Loan Program.²⁴⁰ While the Dairy

234. See *Environmental Quality Incentives Program*, NAT'L SUSTAINABLE AGRIC. COAL., <https://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/environmental-quality-incentives-program/> [<https://perma.cc/LS4Y-XE24>].

235. See *Conservation Reserve Program*, NAT'L SUSTAINABLE AGRIC. COAL., <https://sustainableagriculture.net/publications/grassrootsguide/conservation-environment/conservation-reserve-program/> [<https://perma.cc/B8JJ-PGEE>].

236. See *generally National Programs*, AGRIC. RSCH. SERV., U.S. DEPT. OF AGRIC., <https://www.ars.usda.gov/research/programs/> [<https://perma.cc/SB6S-KRW2>].

237. Schauffler, *supra* note 20; Gribkoff, *supra* note 78.

238. 7 U.S.C. § 9081.

239. *Livestock Indemnity Program: Fact Sheet*, U.S. DEPT. OF AGRIC. (Apr. 2021), https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/FactSheets/livestock_indemnity_program_lip-fact_sheet.pdf [<https://perma.cc/6HWS-KZ6X>].

240. *Emergency Loan Program: Fact Sheet*, FARM SERV. AGENCY, U.S. DEPT. OF AGRIC., (Aug. 2019), <https://www.fsa.usda.gov/Assets/USDA-FSA->

Indemnity Payment Program (DIPP) was recently amended to cover lost sales and dairy cattle due to PFAS contamination,²⁴¹ it only applies to dairy farms, and it only covers a small portion of the losses farmers experience when faced with PFAS contamination. Additional programs are needed to cover other types of agriculture and the full range of economic losses.

5. Recommendations for Behavioral and Physical Health Resources:

- **Increase funding for the Farm and Ranch Stress Assistance Network (FRSAN)²⁴² to provide targeted assistance to farmers affected by PFAS contamination:** This would ensure farmers and ranchers facing PFAS contamination across the U.S. have access to appropriate mental and behavioral health support services while navigating contamination crises.²⁴³
- **Provide funding to state and community health departments to assist with medical monitoring for PFAS:** This would allow state and local health departments to fund the ongoing medical monitoring of farmers and families who have experienced toxic exposure from PFAS. EPA's Environmental Justice Grants could be used for funding and community education on PFAS to prevent harmful exposure.²⁴⁴

C. Counter Arguments

While the solutions listed above would likely be celebrated by many (particularly states, communities, and farmers confronting PFAS contamination), they would not be immune to opposition. The amendment of regulations and creation of new government programs might be politically challenging to accomplish. Increased regulation would also likely be opposed by affected industries. And eliminating biosolid spread on agricultural land leaves a huge gap in waste disposal outlets. How can these conflicts be addressed?

Public/usdafiles/FactSheets/2019/emergency-loan-program.pdf [https://perma.cc/Y4VD-TE49].

241. See *Dairy Program Expanded to Assist with Livestock Losses Due to Contamination*, MORNING AG CLIPS (Dec. 13, 2021), <https://www.morningagclips.com/dairy-program-expanded-to-assist-with-livestock-losses-due-to-contamination/> [https://perma.cc/6NHQ-2LB4].

242. 7 U.S.C. § 5936(a).

243. See generally *Farm and Ranch Stress Assistance Network (FRSAN)*, NAT'L INST. OF FOOD AND AGRIC., U.S. DEPT. OF AGRIC., <https://www.nifa.usda.gov/grants/funding-opportunities/farm-ranch-stress-assistance-network-frsan> [https://perma.cc/MQ9W-FRDF].

244. See generally *Environmental Justice Grants, Funding, and Technical Assistance*, U.S. ENV'T PROT. AGENCY, <https://www.epa.gov/environmentaljustice/environmental-justice-grants-funding-and-technical-assistance> [https://perma.cc/5462-J76U].

First, while the politics of increased regulation may present challenges, they are not impossible to overcome. Although the Republican Party is notorious for opposing increased environmental regulation,²⁴⁵ the issue of PFAS may not be as partisan as one might suspect. For example, the PFAS Action Act (discussed in section III-C) was passed by the House of Representatives with bipartisan support.²⁴⁶ Some Republican members of Congress from states experiencing PFAS crises have also become strong advocates on the issue. For example, Senator Susan Collins (R-ME) fought for \$1.6 million in the draft Fiscal Year 2022 Interior Appropriations bill to install a PFAS wastewater treatment system to serve the entire state of Maine.²⁴⁷ Sen. Collins also led an effort to write a letter to President Biden urging funding for PFAS research and remediation, signed by a bipartisan group of 33 Senators.²⁴⁸ Additionally, many of the above solutions can be accomplished at the administrative level, which is currently under democratic control under President Biden and is already making strides toward PFAS regulation.²⁴⁹ This could help to avoid partisan conflict at the congressional level and allow for more timely passage of regulations.²⁵⁰ This is also not the first time that sweeping action against hazardous chemicals has been taken (given the banning of chemicals like PCBs),²⁵¹ so precedent proves it can be done. And, once PFAS testing becomes more common, this could likely become a national emergency that is prioritized by many policymakers, regardless of party affiliation.²⁵²

245. Elizabeth Kolbert, *An Earth Day Reminder of How the Republicans Have Forsaken the Environment*, NEW YORKER (Apr. 22, 2020), <https://www.newyorker.com/news/daily-comment/an-earth-day-reminder-of-how-the-republicans-have-forsaken-the-environment> [https://perma.cc/CZV2-R9Z9].

246. Monica Amarello, *Landmark Bipartisan PFAS Action Act Passes House*, ENV'T WORKING GRP. (Jul. 21, 2021), <https://www.ewg.org/news-insights/news-release/2021/07/landmark-bipartisan-pfas-action-act-passes-house> [https://perma.cc/ZL4D-RTMM].

247. *Senator Collins Secures \$1.6 Million for PFAS Treatment Facility in Funding Bill*, SUSAN COLLINS (Oct. 19, 2021), <https://www.collins.senate.gov/newsroom/senator-collins-secures-16-million-pfas-treatment-facility-funding-bill> [https://perma.cc/F5CT-T5JK].

248. *Collins, Shaheen Lead Bipartisan Letter to President Biden Urging Funding for PFAS Research & Remediation in FY2023 Budget Request*, SUSAN COLLINS (Feb. 3, 2022), <https://www.collins.senate.gov/newsroom/collins-shaheen-lead-bipartisan-letter-to-president-biden-urging-funding-for-pfas-research-and-remediation-in-fy2023-budget-request> [https://perma.cc/SFB6-PNYR].

249. See U.S. ENV'T PROT. AGENCY, *supra* note 139.

250. Juliet Eilperin, et al., *Tracking Biden's Environmental Actions*, WASH. POST (Jan. 21, 2021), <https://www.washingtonpost.com/graphics/2021/climate-environment/biden-climate-environment-actions/> [https://perma.cc/YQG7-6935].

251. See generally U.S. ENV'T PROT. AGENCY, *supra* note 212.

252. See Perkins, *supra* note 21.

Second, while increased regulation of PFAS might be met with industry opposition, it is not insurmountable. Companies are already aware that PFAS are dangerous: many are already participating in the PFOA Stewardship Program to phase out production and use of PFOA and PFOS,²⁵³ several have been facing lawsuits from communities affected by PFAS contamination for decades,²⁵⁴ and companies themselves have conducted their own studies revealing the toxicity of PFAS, proving they knew PFAS were dangerous and chose to use them anyway.²⁵⁵ So, sweeping PFAS regulation should not come as any surprise to polluters who have been strategically dodging culpability for years, especially because there has been much to indicate PFAS regulation would be coming.²⁵⁶ Because national attention and state regulations on PFAS will continue to grow and the number of lawsuits will continue to increase, it may be in companies' best interests to transition away from PFAS sooner rather than later.²⁵⁷ Some investors are already pressuring chemical companies to do so.²⁵⁸

Finally, while there are valid criticisms of alternative methods of biosolids disposal, feasible possibilities do exist that involve less risk than land application. Experts such as civil engineer Laura Orlando of Boston University believe a ban on land application is called for until research reveals a better alternative.²⁵⁹ Incineration is a costly alternative that creates additional environmental concerns from the burning of toxic waste.²⁶⁰ Landfilling biosolids creates issues too: it is costly and would

253. See U.S. ENV'T PROT. AGENCY, *supra* note 105.

254. Ellen M. Gilmer, *Forever Litigated 'Forever Chemicals': A Guide to PFAS in Courts*, BLOOMBERG L. (Jan. 13, 2020), <https://news.bloomberglaw.com/environment-and-energy/forever-litigated-forever-chemicals-a-guide-to-pfas-in-courts> [<https://perma.cc/L7ZP-WMWZ>].

255. Sharon Lerner, *3M Knew About the Dangers of PFOA and PFOS Decades Ago, Internal Documents Show*, INTERCEPT (Jul. 31, 2018), <https://theintercept.com/2018/07/31/3m-pfas-minnesota-pfoa-pfos/> [<https://perma.cc/9V6E-HBRN>].

256. See, e.g., William C. Schillaci, *EPA Announces Three Actions Regarding PFAS*, EHS DAILY ADVISOR (Feb. 20, 2020), <https://ehsdailyadvisor.blr.com/2020/02/epa-announces-three-actions-regarding-pfas/> [<https://perma.cc/73F9-GYCV>].

257. Pat Rizzuto, *'Buckle Up' for PFAS Regulation, Litigation in 2022, Lawyers Say*, BLOOMBERG L. (Dec. 29, 2021), <https://news.bloomberglaw.com/environment-and-energy/buckle-up-for-pfas-regulation-litigation-in-2022-lawyers-say>, [<https://perma.cc/4PKQ-KJ5R>].

258. See Simon Jessop, *Investors Push World's Top Chemicals Companies Over Hazardous Substances*, REUTERS (Dec. 13, 2021), <https://www.reuters.com/markets/europe/investors-push-worlds-top-chemicals-companies-over-hazardous-substances-2021-12-13/> [<https://perma.cc/2NHN-9MKR>].

259. Perkins, *supra* note 57.

260. Treat, *supra* note 17.

release significant amounts of the problematic greenhouse gas methane as biosolids decompose.²⁶¹

However, landfilling is simple from a handling perspective,²⁶² and with the right safeguards in place, it could be a suitable interim alternative.²⁶³ Orlando calls for biosolids to be isolated in landfills with methane controls until an alternative is developed.²⁶⁴ This would involve reducing the overall amount of biosolids through processes like controlled anaerobic digestion, and shifting toward a decentralized sewage system where waste is treated in much smaller quantities.²⁶⁵ Orlando posits that this would actually “force us to think about sludge reduction” for the first time.²⁶⁶ While anaerobic digestion is expensive, it can reduce waste volumes by up to 50 percent.²⁶⁷ Orlando argues that dealing with smaller batches of waste as opposed to one gigantic one would be significantly less volatile, especially because human waste could be separated from more toxic industrial waste.²⁶⁸ This would also require industry to safely handle its own waste instead of discharging it into public sewers.²⁶⁹ Orlando notes that industry may even benefit from alternative waste disposal because it can generate energy from the methane gas byproduct of anaerobic digestion.²⁷⁰

V. CONCLUSION

Farmers like Johanna and Adam who are confronting detrimental PFAS contamination on their farms from biosolid application need assistance from the federal government. And given that land application of biosolids occurs in all 50 states, PFAS contamination of farmland a national crisis.²⁷¹ States need additional funding to adequately address the devastation farmers are facing.²⁷² And without national regulations, other states may not be willing to voluntarily go to the same lengths as Maine because it is

261. *What Is Sewage Sludge and What Can Be Done With It?*, PENN STATE EXTENSION, (Sep. 15, 2010), <https://extension.psu.edu/what-is-sewage-sludge-and-what-can-be-done-with-it> [<https://perma.cc/D9LP-QSX2>].

262. *Id.*

263. Perkins, *supra* note 57.

264. *Id.*

265. *Id.*

266. *Id.*

267. *Id.*

268. *Id.*

269. *Id.*

270. *Id.*

271. See Fullmer, *supra* note 10.

272. See Treat, *supra* note 17.

costly and disruptive to industry.²⁷³ Farmers also may not want to test for PFAS out of fear of losing their businesses.²⁷⁴ States need to know that support systems are in place for them if PFAS becomes nationally regulated. And farmers need to know that support is available to them if they receive a positive test and are faced with loss of income, diminished property value, unfarmable land, relocation, and adverse health effects.

States like Maine need federal funding immediately to bolster the enormous costs of combating PFAS contamination crises.²⁷⁵ Then, federal legislation and regulations could be amended to nationally regulate PFAS, prevent future PFAS contamination from biosolids, and research and create permanent programs for PFAS remediation, financial assistance, and mental and physical health resources for affected farmers.

Maine Senator Stacy Brenner, who is also a farmer, captured the issue best: “No farmer should fear testing their land and water because the results might devastate their livelihood. Farmers need to know there is unequivocal support from the state to make this right.”²⁷⁶

273. See Perkins, *supra* note 21.

274. See Hirschhorn, *supra* note 195.

275. See Perkins, *supra* note 21.

276. Hirschhorn, *supra* note 195.