August 14, 2025

Via regulations.gov

David Tobias
Health and Ecological Criteria Division
Office of Science and Technology
Office of Water
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW
Washington, DC 20460

Re: Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) (Docket ID No. EPA-HQ-OW-2024-0504-0001)

Dear Mr. Tobias:

The undersigned 42 organizations submit these comments concerning the Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS) (Docket ID No. EPA-HQ-OW-2024-0504) (Risk Assessment), published by the U.S. Environmental Protection Agency (EPA). *See* Draft Sewage Sludge Risk Assessment for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonic Acid (PFOS), 90 Fed. Reg. 3859 (Jan. 15, 2025).[1] Our coalition includes scientists who study per- and polyfluoroalkyl substances (PFAS), as well as longtime advocates for health-protective PFAS standards and communities harmed by PFAS-contaminated sewage sludge. Together, we strongly support EPA's decision to assess the risks from PFOA and PFOS in sludge.

As described below, a well-established and growing body of scientific evidence makes clear that sewage sludge contains PFAS, including PFOA and PFOS, at levels that pose unacceptable risks to human health and the environment. EPA's Risk Assessment confirms this evidence. Accordingly, we urge EPA to take prompt action to finalize the Risk Assessment and, as the Clean Water Act requires, regulate PFOA and PFOS in sewage sludge. Any unnecessary delay will result in additional, avoidable harm to farmers and farm families, rural communities, and consumers across the nation.

[1] *See* Memorandum from David Tobias Extending the Public Comment Period for EPA-HQ-OW-2024-0504 on Regulations.gov Through August 14, 2025 (Apr. 11, 2025), https://www.regulations.gov/document/EPA-HQ-OW-2024-0504-0049; Extension of Comment Period, 90 Fed. Reg. 16128 (Apr. 17, 2025).

I. Sewage Sludge Contains PFAS, Including PFOA and PFOS, at Levels that Threaten Human Health.

PFAS are human-made substances used in a wide range of products, such as paper and cardboard packaging, carpet, cookware, clothing, and firefighting foam.[2] Aptly called "forever chemicals," PFAS can persist for decades in the human body[3] and environment.[4] Because PFAS are so long-lasting, multiple exposures can cause PFAS levels to accumulate over time.[5] Exposure to PFAS has been linked to many serious health harms, including increased risk of certain cancers, decreased immune response, lung toxicity and airway infections, pregnancy-induced hypertension/pre-eclampsia, decreased birth weight, problems with early neurodevelopment, and liver injury in children.[6]

PFAS, including PFOA and PFOS, are routinely found in sewage sludge.[7] EPA recognizes that PFAS in sewage sludge can harm human health and the environment. For example, EPA has characterized PFOA and PFOS as "highly toxic to human beings,"[8] and in November 2020, EPA acknowledged that land application of sewage sludge creates multiple pathways for human

---

[2] U.S. Dep't of Health & Hum. Servs., *Toxicological Profile for Perfluoroalkyls* 2 (2021), https://www.atsdr.cdc.gov/toxprofiles/tp200.pdf.
[3] *See, e.g.*, *id.* at 5 tbl. 1.1.
[4] *See, e.g.*, Mark L. Brusseau et al., *PFAS Concentrations in Soils: Background Levels Versus Contaminated Sites*, 740 Sci. Total Env't 1, 6 (2020).
[5] *See* Juliane B. Brown et al., *Assessing Human Health Risks from Per- and Polyfluoroalkyl Substance (PFAS)-Impacted Vegetable Consumption: A Tiered Modeling Approach*, 54 Env't Sci. & Tech. 15202, 15202 (2020).
[6] U.S. Dep't of Health & Hum. Servs., *supra* note 2, at 6; Jorid B. Sørli et al., *Per- and Polyfluoroalkyl Substances (PFASs) Modify Lung Surfactant Function and Pro-Inflammatory Responses in Human Bronchial Epithelial Cells*, 62 Toxicology in Vitro 104656 (2020); Jianqiu Guo et al., *Umbilical Cord Serum Perfluoroalkyl Substance Mixtures in Relation to Thyroid Function of Newborns: Findings from Sheyang Mini Birth Cohort Study*, 273 Chemosphere 129664 (2021); Qian Yao et al., *Prenatal Exposure to Per- and Polyfluoroalkyl Substances, Fetal Thyroid Hormones, and Infant Neurodevelopment*, 206 Env't Rsch. 112561 (2022); Vishal Midya et al., *Association of Prenatal Exposure to Endocrine-Disrupting Chemicals with Liver Injury in Children*, 5 JAMA Network Open e2220176 (2022).
[7] Risk Assessment at iv (reporting that "[t]here are recent, well-documented examples of significantly elevated PFOA and PFOS concentrations in U.S. sewage sludge contaminated by industrial sources to wastewater treatment plants" and that "[s]tatewide surveys of sewage sludge also find that PFOA and PFOS are consistently detected at wastewater treatment plants that do not receive wastewater from industrial users of the chemicals"); *see also* Ali Behnami et al., *Biosolids, an Important Route for Transporting Poly- and Perfluoroalkyl Substances from Wastewater Treatment Plants into the Environment: A Systematic Review*, 925 Sci. Total Env't 1, 1 (2024).
[8] Risk Assessment at iv; *see also* 40 C.F.R. §§ 141.2, 141.50(a)(24), (25) (defining "maximum contaminant level goal or MCLG" as "the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety" and establishing that "MCLGs are zero" for both PFOA and PFOS).

exposure to PFAS.[9] Nonetheless, EPA and other federal agencies so far have done little to address PFAS in sludge or the related, ongoing contamination of agricultural lands.

According to EPA, about 56% of sludge is land applied, 27% is landfilled or disposed of in a sewage sludge monofill, and 16% is incinerated.[10] Without proper oversight, each method of disposal poses risks. Studies show that disposing of sludge in lined and unlined landfills can lead to PFAS contamination of nearby groundwater and drinking water sources, as well as volatilized PFAS in the air over landfills.[11] In addition, EPA acknowledges that sewage sludge incinerators might not operate under conditions that completely destroy PFAS, meaning that PFAS can be released as products of incomplete combustion and deposited to soil and water.[12]

Land application of sewage sludge also poses risks. After sewage sludge is land applied, PFAS in the sludge enter the soil, where they can persist long-term or be taken up by crops.[13] PFAS can also become airborne,[14] leach into groundwater, and run off into surface water, contaminating water supplies.[15] Livestock, fish, and wildlife that ingest PFAS in soil, plants, air,

[9] EPA, *EPA Biosolids PFOA & PFOS Problem Formulation Meeting Summary* 14 (2020), https://www.epa.gov/sites/default/files/2021-02/documents/biosolids-pfoa-pfos-meeting-summary-nov-2020.pdf.
[10] Risk Assessment at iii.
[11] Thabet Tolaymat et al., *A Critical Review of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Landfill Disposal in the United States*, 905 Sci. Total Env't (2023); Tasha Stoiber, Sydney Evans & Olga V. Naidenko, *Disposal of Products and Materials Containing Per- and Polyfluoroalkyl Substances (PFAS): A Cyclical Problem*, 260 Chemosphere (2020).
[12] Risk Assessment at 95; Lloyd J. Winchell et al., *Fate of Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Through Two Full-Scale Wastewater Sludge Incinerators*, 96 Water Env't Rsch. e11009 (2024).
[13] *See* M. Christina Schilling Costello & Linda S. Lee, *Sources, Fate, and Plant Uptake in Agricultural Systems of Per- and Polyfluoroalkyl Substances*, 10 Current Pollution Reps. 799, 803, 805–11 (2024); Gwynn R. Johnson, PFAS in Soil and Groundwater Following Historical Land Application of Biosolids, 211 Water Rsch. 119035 (2022); Weston S. Chambers, Jaida G. Hopkins & Sean M. Richards, *A Review of Per- and Polyfluorinated Alkyl Substance Impairment of Reproduction,* 3 Frontiers Toxicology (2021); Bei Wen et al., *Field Study on the Uptake and Translocation of Perfluoroalkyl Acids (PFAAs) by Wheat (Triticum aestivum L.) Grown in Biosolids-Amended Soils*, 184 Env't Pollution 547 (2014).
[14] *See* Annesh Borthakur et al., *Inhalation Risks of Wind-Blown Dust from Biosolid-Applied Agricultural Lands: Are They Enriched with Microplastics and PFAS?*, 25 Current Op. Env't Sci. & Health 1, 1 (2022).
[15] *See* Andrew B. Lindstrom et al., *Application of WWTP Biosolids and Resulting Perfluorinated Compound Contamination of Surface and Well Water in Decatur, Alabama, USA*, 45 Env't Sci. & Tech. 8015, 8020 (2011); Aurélia Marcelline Michaud et al., *In Situ Occurrence and Mobility of Per and Polyfluoroalkyl Substances in Soils Amended with Organic Waste Products,* 984 Sci. Total Env't 179708 (2025); Michael Holly et al., *Evaluation of Per- and Polyfluoroalkyl Substances Leaching from Biosolids and Mitigation Potential of Biochar through Undisturbed Soil Column*, 4 ACS EST Water 413 (2024); Johnson, *supra* note 13.

and water can become contaminated.[16] Contaminated food and water, in turn, put people at risk. Eating contaminated food and drinking contaminated water are primary sources of human exposure to PFAS.[17] It is estimated that nearly every person in the United States has measurable amounts of PFAS in their body as a result of eating contaminated food, drinking contaminated water, or coming into contact with PFAS-containing items.[18]

Across the country, land application of sewage sludge has resulted in PFAS contamination that renders land unsuitable for agriculture. Due to the absence of widespread testing and disclosure requirements, the full extent of contamination is not yet known. However, several instances of extreme contamination underscore the urgency of the problem. In Michigan, officials shut down a cattle farm after its beef was found to contain unsafe levels of PFAS, traced to sludge application on fields used to grow feed crops.[19] The state has permanently prohibited the farm from being used for agriculture,[20] pushing the owner toward bankruptcy.[21] In Texas, cattle ranchers discovered that a stillborn calf had high levels of PFAS in its liver, which they attribute to sludge application on neighboring land; the ranchers subsequently stopped sending all of their cattle to market.[22] And in Maine, at least 82 farms have suffered PFAS contamination of their soil, wells, or livestock resulting from sludge application, driving at least five farms out of

[16] *See* Clare Death et al., *Per- and Polyfluoroalkyl Substances (PFAS) in Livestock and Game Species: A Review*, 774 Sci. Total Env't 144795, 144795 (2021); Sara J. Lupton et al., *Distribution and Excretion of Perfluorooctane Sulfonate (PFOS) in Beef Cattle (Bos taurus),* 62 J. Agric. & Food Chemistry 1167 (2014); Janine Kowalczyk et al., *Absorption, Distribution, and Milk Secretion of the Perfluoroalkyl Acids PFBS, PFHxS, PFOS, and PFOA by Dairy Cows Fed Naturally Contaminated Feed,* 61 J. Agric. & Food Chemistry 2903 (2013).
[17] Death, *supra* note 16.
[18] Julianne Cook Botelho et al., *Per- and Polyfluoroalkyl Substances (PFAS) Exposure in the U.S. Population: NHANES 1999-March 2020*, 270 Env't Rsch., https://www.sciencedirect.com/science/article/abs/pii/S0013935125001677; Ryan C. Lewis et al., *Serum Biomarkers of Exposure to Perfluoroalkyl Substances in Relation to Serum Testosterone and Measures of Thyroid Function Among Adults and Adolescents from NHANES 2011–2012*, 12 Int'l J. Env't Rsch. & Pub. Health 6098 (2015).
[19] Teresa Homsi, *This Farmer's Livelihood Was Ruined by PFAS-Contaminated Fertilizer that Few Midwest States Test for*, Neb. Pub. Media (Mar. 11, 2024), https://nebraskapublicmedia.org/en/news/news-articles/this-farmers-livelihood-was-ruined-by-pfas-contaminated-fertilizer-that-few-midwest-states-test-for/; Garret Ellison, *Michigan Farmer Sues Auto Supplier After PFAS Taints Cattle Herd*, MLive.com (Aug. 26, 2022), https://www.mlive.com/public-interest/2022/08/michigan-farmer-sues-auto-supplier-after-pfas-taints-cattle-herd.html.
[20] Hiroko Tabuchi, *Something's Poisoning America's Land. Farmers Fear 'Forever' Chemicals.*, N.Y. Times (Aug. 31, 2024), https://www.nytimes.com/2024/08/31/climate/pfas-fertilizer-sludge-farm.html.
[21] Homsi, *supra* note 19; Ellison, *supra* note 19.
[22] Tabuchi, *supra* note 20.

business.[23] The number of contaminated farms in Maine is likely even higher, as the state has not yet completed testing.[24]

Actions to prevent PFAS contamination are likely to be far more protective and cost-effective than efforts to reduce PFAS exposure after contamination has occurred. For example, over the past decade, Maine has spent more than $100 million addressing existing PFAS contamination, including by investigating sites where PFAS-contaminated sewage sludge has been land applied and installing water filtration systems at contaminated private wells.[25] However, "dwindling funds will soon force state officials to make difficult choices about whom to help and whom to turn away."[26] Although some states have taken action to control risks associated with PFAS in sewage sludge,[27] many continue to encourage land application of sludge without appropriate safeguards.[28] Few states other than Maine have performed thorough investigations to determine the extent of contamination or provided relief to farmers, rural families, or other residents at risk.

II. EPA's Risk Assessment Confirms that PFOA and PFOS in Sewage Sludge Pose Unacceptable Risks.

EPA's Risk Assessment adds to the established and growing body of evidence demonstrating that sewage sludge contains PFAS, including PFOA and PFOS, at levels that threaten human

---

[23] *See* Penelope Overton, *Maine Makes First Purchase of Farm Contaminated by Forever Chemicals*, Portland Press Herald (Mar. 5, 2025), https://www.pressherald.com/2025/03/05/maine-makes-first-purchase-of-farm-contaminated-by-forever-chemicals/.

[24] *See* Me. Dep't of Env't Prot., *PFAS and Maine DEP*, Maine.gov, https://www.maine.gov/dep/spills/topics/pfas/maine-pfas.html (last visited Aug. 11, 2024); Penelope Overton, *With Funds Running Out, Maine Is at a PFAS Crossroads*, Portland Press Herald (Jan. 22, 2025), https://www.pressherald.com/2025/01/22/with-funds-running-out-maine-is-at-a-pfas-crossroads.

[25] Overton, *supra* note 24.

[26] *Id.*

[27] *See, e.g.*, Me. Dep't of Env't Prot., *Per- and Poly-fluoroalkyl Substances (PFAS)*, Maine.gov, https://www.maine.gov/dep/spills/topics/pfas/ (last visited Aug. 11, 2025) (summarizing Maine's efforts regarding PFAS treatment and destruction, including banning land application of sludge and sludge-derived products in 2022); Colo. Dep't of Pub. Health & Env't, *Requirement – Colorado Biosolids-PFAS Interim Strategy* 2 (2024), https://drive.google.com/file/d/1bZk4wBZ8AK3nDTSQFVi4R1R7KO4L2Fk6/view (explaining Colorado's Biosolids-PFAS Interim Strategy which requires regular monitoring of PFAS levels in sludge); Mich. Dep't of Env't, Great Lakes & Energy, *Interim Strategy Requirements: Land Application of Biosolids Containing PFAS*, Michigan.gov, https://www.michigan.gov/egle/about/organization/water-resources/biosolids/pfas-related/interim-strategy (last visited Aug. 11, 2025) (detailing Michigan's interim strategy for the land application of PFAS-contaminated sewage, which includes restricting industries that discharge PFAS directly into the wastewater system).

[28] *See, e.g.*, *Domestic Wastewater Biosolids*, Fla. Dep't Env't Prot., https://floridadep.gov/water/domestic-wastewater/content/domestic-wastewater-biosolids (last updated Dec. 13, 2024); *Land Application*, Ind. Dep't Env't Mgmt., https://www.in.gov/idem/waste/waste-industries/septage-management/biosolids-and-industrial-waste-land-application-program/ (last visited Aug. 11, 2025); *Land Application of Wastewater and Wastewater Treatment Residuals*, Mo. Dep't Nat. Res., https://dnr.mo.gov/water/business-industry-other-entities/technical-assistance-guidance/land-application-wastewater (last visited Aug. 11, 2025).

health. In the Risk Assessment, EPA modeled potential PFOA and PFOS exposures and estimated associated health risks under three scenarios: (1) land application of sewage sludge to a farm with majority pasture-raised dairy cows, beef cattle, or chickens; (2) land application to a farm growing fruits or vegetables; and (3) land application to reclaim damaged soils, such as overgrazed pastures.[29] EPA found that, when the majority of a person's dietary intake of a product comes from a property impacted by sludge application, the highest risk pathways include "(1) drinking milk from majority pasture-raised cows consuming contaminated forage, soil, and water, (2) drinking water sourced from contaminated surface or groundwater on or adjacent to the impacted property, (3) eating fish from a lake impacted by runoff from the impacted property, and (4) eating beef or eggs from majority pasture-raised hens or cattle where the pasture has received impacted sewage sludge."[30]

Land application of sewage sludge containing PFOA or PFOS at just one part per billion (ppb) can result in exceedances of EPA's acceptable thresholds for cancer and non-cancer risks by several orders of magnitude.[31] For example, children who consume milk that has been contaminated with PFOA as a result of sludge application may experience a lifetime cancer risk thousands of times above the level that EPA deems acceptable.[32] Unacceptable cancer risks exist even if the land-applied sludge contains PFOA at levels *too small to be quantified*.[33] And EPA admits that the Risk Assessment "likely underestimates the amount of milk consumed by children who grow up on dairy farms," meaning that these children likely will experience even greater risk.[34]

Indeed, as EPA acknowledges, its risk calculations underestimate risk across the board, in part because they "model risks associated with sludge containing 1 ppb of PFOA or PFOS, which is on the low end of measured U.S. sewage sludge concentrations."[35] In fact, 1 ppb is "near available detection thresholds for PFOA and PFOS in sewage sludge,"[36] and real-world testing demonstrates that PFOA and PFOS are commonly detected in sludge at 10 to 100s of ppb.[37] In

[29] Risk Assessment at v.
[30] *Id.* at v–vi.
[31] *Id.* at vi.
[32] *Id.* at 102, 105.
[33] *Id.* at 106 ("The modeling suggests that even when modeled concentrations are below currently available method detection limits (MDLs), estimated cancer risks associated with PFOA can exceed acceptable thresholds.").
[34] *Id.* at 72–73.
[35] *Id.* at vi.
[36] *Id.* at 79.
[37] *Id.* at 12; Ting Zhou et al., *Occurrence, Fate, and Remediation for Per- and Polyfluoroalkyl Substances (PFAS) in Sewage Sludge: A Comprehensive Review*, 466 J. Hazardous Materials 1, 5 tbl. 1 (2024) (showing mean concentrations of PFAS in sewage sludge from two studies in the United States, with concentrations of PFOA at 23.5 and 34 ng/g dw and PFOS at 22.5 and 403 ng/g dw); Garrett W. Link et al., *Per- and Polyfluoroalkyl Substances (PFAS) in Final Treated Solids (Biosolids) from 190 Michigan Wastewater Treatment Plants*, 463 J. Hazardous Materials 132734 (2024); Elham Tavasoli et al., *Distribution and Fate of Per- and Polyfluoroalkyl Substances (PFAS) in Wastewater Treatment*

addition, EPA expressly ignored the risks of exposure to PFOA in combination with PFOS,[38] along with abundant evidence that dozens if not hundreds of additional PFAS chemicals are also present in sludge samples.[39] And EPA evaluated the risks posed by ingesting a *single* home-grown crop, animal product, locally caught fish, or contaminated water,[40] even though people living on or near sludge-treated farms ingest PFAS through multiple sources.

III. EPA Must Finalize the Risk Assessment Without Delay and Take Prompt Action to Regulate PFOA and PFOS in Sewage Sludge.

From its inception, the Clean Water Act has prohibited any unpermitted disposal of sewage sludge that would result in pollutants entering navigable waters. 33 U.S.C. § 1345(a); Clean Water Act of 1972, Pub. L. No. 92-500, § 405(a), 86 Stat. 816, 884 (1972). When Congress amended the Act in 1987, it ordered EPA to regulate toxic pollutants in sewage sludge. 33 U.S.C. § 1345; Water Quality Act of 1987, Pub. L. No. 100-4, § 406, 101 Stat. 7, 71–74 (1987). Specifically, Congress ordered EPA to (1) identify toxic pollutants that may adversely affect public health or the environment; (2) specify the acceptable management practices for sewage sludge containing those toxic pollutants; and (3) establish numerical limitations for each pollutant. 33 U.S.C. § 1345(d)(2)(A). Management practices and numerical criteria must "be adequate to protect public health and the environment from any reasonably anticipated adverse effects of each pollutant." *Id.* § 1345(d)(2)(D). In addition to establishing deadlines for EPA's first actions to regulate toxic pollutants in sewage sludge, *id.* § 1345(d)(2)(A)–(B), Congress imposed a biennial review-and-regulate requirement, mandating that, at least every two years, EPA review its sewage sludge regulations "for the purpose of" (1) identifying additional toxic pollutants and (2) promulgating regulations for such pollutants, *id.* § 1345(d)(2)(C).

EPA's Risk Assessment confirms what is already clear from the existing scientific literature: PFOA and PFOS may be present in sewage sludge in concentrations that may adversely affect public health and the environment. *See id.* § 1345(d)(2)(A)(i), (C). Accordingly, we urge EPA to promptly publish a final risk assessment and comply with its statutory duty to adopt regulations adequate to protect public health and the environment. *See id*. § 1345(d)(2)(A), (D), *see also* Draft Sewage Sludge Risk Assessment, 90 Fed. Reg. at 3864 (explaining that EPA "will . . . prepare a final risk assessment" and, "[i]f the final risk assessment indicates that there are risks above acceptable thresholds when using or disposing of sewage sludge, the EPA expects to propose a regulation under CWA section 405 to manage PFOA and/or PFOS in sewage sludge to protect public health and the environment"). Such regulations must specify acceptable

---

Facilities, 23 Env't Sci.: Processes & Impacts 903 (2021); Rooney Kim Lazcano et al., *Characterizing and Comparing Per- and Polyfluoroalkyl Substances in Commercially Available Biosolid and Organic Non-Biosolid-Based Products,* 54 Env't Sci. Tech. 8640 (2020).

[38] Risk Assessment at vi.

[39] *See, e.g.,* Olga S. Arvaniti et al., *Perfluoroalkyl and Polyfluoroalkyl Substances in Sewage Sludge: Challenges of Biological and Thermal Treatment Processes and Potential Threats to the Environment from Land Disposal*, 36 Env't Scis. Eur. 1, 3 (2024) (expanding the list of PFAS found in sewage sludge around the world to 182 substances, up from 39 substances listed in previous review papers).

[40] Risk Assessment at vi–vii.

management practices, including appropriate and protective restrictions on land application, and establish numerical limitations for both PFOA and PFOS in sewage sludge. 33 U.S.C. § 1345(d)(2)(A)(i), (C). If EPA fails to take prompt action, farmers and farm families, rural communities, and consumers will continue to experience health risks and other harm.

IV. EPA Must Take Additional Steps to Limit Risks Associated with Land Application of Sewage Sludge.

A. During a Future Biennial Review, EPA Must Revisit and Update Its Risk Assessment for PFOA and PFOS in Sewage Sludge.

Although EPA's Risk Assessment amply demonstrates the need to regulate PFOA and PFOS in sewage sludge, it *underestimates* risks. For instance, EPA "model[ed] risks associated with sludge containing 1 ppb of PFOA or PFOS, which is on the low end of measured U.S. sewage sludge concentrations."[41] As EPA admits, "[r]ecent investigations in Michigan that include industrially impacted biosolids have shown PFOS concentrations as high as 2,150 ppb."[42] Researchers detected PFOS in 95 percent of sludge samples collected between 2018 and 2022 from 190 wastewater treatment plants in Michigan; the average PFOS concentration in those samples was 40 ppb.[43] And in Colorado, researchers found that over two-thirds of sludge samples collected between 2023 and 2024 exceeded 1 ppb for PFOA, up to a maximum of 110 ppb, while 95 percent of samples exceeded 1 ppb for PFOS, up to a maximum of 49 ppb.[44]

EPA's Risk Assessment applied other unrealistic conditions, including ignoring non-sewage sludge-related exposures to PFOA or PFOS and ignoring the combined risk of PFOA and PFOS together.[45] As EPA acknowledges, "risk estimates that account for multiple dietary exposures (*e.g.*, consuming impacted milk, water, and eggs), multiple sources of exposure (*e.g.*, exposure to PFOA or PFOS-containing consumer products), or exposure to other PFAS would be greater than those presented in this draft risk assessment."[46] And EPA examined exposure over a maximum ten-year period, even though it is undisputed that many people are exposed to PFOA, PFOS, and many other PFAS from sludge and other sources over a longer duration.[47]

By underestimating risks from PFOA and PFOS in sewage sludge, EPA obscures the likely real-world consequences associated with land application of sewage sludge, putting people and the environment at risk. Indeed, as EPA recognizes, actual risks could be orders of magnitude

---

[41] *Id.* at vi.
[42] *Id.* at 13.
[43] Link, *supra* note 37, at 5.
[44] *PFAS and Biosolids*, Colo. Dep't of Pub. Health & Env't, https://cdphe.colorado.gov/water-Biosolids-PFAS (last visited Aug. 11, 2025); Sammy Herdman, *More 'Forever Chemical' Protections Needed for Colorado Farmlands and Food*, Colo. Newsline (Jan. 23, 2025), https://coloradonewsline.com/2025/01/23/forever-chemical-colorado-farmlands/.
[45] Risk Assessment at vi.
[46] *Id*. at vi–vii.
[47] *Id.* at 75.

greater than its estimates.[48] Accordingly, we urge EPA, *first*, to regulate PFOA and PFOS in sewage sludge based on its Risk Assessment and, *second*, to revisit and update its Risk Assessment to determine whether additional regulation is needed.

B. During a Future Biennial Review, EPA Must Assess Risks Associated with PFAS Other than PFOA and PFOS, Synthetic Organic Fluorine Compounds, and Microplastics in Sewage Sludge.

Not only must EPA finalize the Risk Assessment without delay, but it also must conduct risk assessments for PFAS other than PFOA and PFOS, synthetic organic fluorine compounds, and microplastics in sewage sludge. Reliable methods are available to detect and quantify these substances.[49] And, as explained below, available information indicates that the substances "may be present in sewage sludge in concentrations which may adversely affect public health or the environment." 33 U.S.C. § 1345(d)(2)(A)(i); *see also id.* § 1345(d)(2)(C) (directing EPA to conduct biennial reviews of its sewage sludge regulations "for the purpose of identifying additional toxic pollutants and promulgating regulations for such pollutants"). EPA must assess risks associated with these substances in isolation and with combination with one another and other substances present in sewage sludge, including PFOA and PFOS.

Recent studies document the presence of PFAS other than PFOA and PFOS in sludge, sludge-impacted soil, surface water, groundwater, and vegetables,[50] often in concentrations that exceed PFOA and PFOS.[51] These additional substances include short-chain PFAS, which can be more mobile in the environment than long-chain PFAS, such as PFOA and PFOS.[52] Due to their

---

[48] *Id.* at vii (explaining that "sewage sludge containing ten times more PFOA or PFOS [than the amount considered in the Risk Assessment] (i.e., 10 ppb) would yield risk estimates that are ten times greater than those presented in the draft risk assessment (assuming all other factors are constant)").

[49] *See, e.g.*, EPA, *Method 1633, Revision A: Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS* (2024), https://www.epa.gov/system/files/documents/2024-12/method-1633a-december-5-2024-508-compliant.pdf.

[50] Johnson, *supra* note 13 (finding agricultural fields following many years of sewage sludge land application had soil concentrations of 12 PFAS (PFPeA, PFHxA, PFHpA, PFOA, PFNA, PFDA, PFUnDA, PFDoDA, PFBS, PFHxS, PFOS, PFDS) that were 1 to 2 orders of magnitude higher than global background soil levels); Justin Caniglia et al., *Extraction, Analysis, and Occurrence of Per- and Polyfluoroalkyl Substances (PFAS) in Wastewater and After Municipal Biosolids Land Application to Determine Agricultural Loading*, 4 Frontiers Water (2022) (detecting 12 PFAS in surface soil and runoff samples after land application of biosolids, including PFDA, PFHpA, PFHxA, PFBS, PFOS, and PFOA at greater than control site concentrations); Nanthi Bolan et al., *Distribution, Behaviour, Bioavailability and Remediation of Poly- and Per-fluoroalkyl Substances (PFAS) in Solid Biowastes and Biowaste-Treated Soil*, 155 Env't Int'l 1, 9 tbl. 2 (2021) (reviewing research showing that PFBA, PFNA, PFDA, PFBS, PFOA, and PFOS are bioavailable in sludge and vegetables grown in sludge-applied soil).

[51] Link, *supra* note 37.

[52] Ansley J. Levine et al., *Leaching of Select Per-/Poly-Fluoroalkyl Substances, Pharmaceuticals, and Hormones Through Soils Amended with Composted Biosolids*, 343 J. Env't Mgmt. 118185 (2023); Olivia Mroczko et al., *Spatiotemporal Patterns of PFAS in Water and Crop Tissue at a Beneficial Wastewater Reuse Site in Central Pennsylvania*, 51 J. Env't Quality 1282 (2022); Wen, *supra* note 13.

mobility, short-chain PFAS pose significant risks to groundwater, surface water, and crops.[53] EPA already has determined that low-level exposures to several PFAS linked to sludge—other than PFOA and PFOS—can cause serious harm to human health.[54] And EPA admits that exposure to multiple PFAS, in combination with exposure to sludge-related PFOA and PFOS, would result in greater risks than those presented in the Risk Assessment.[55]

Total organic fluorine levels are often higher than the total identified PFAS in sludge, indicating the presence of additional, unidentified PFAS. Total organic fluorine can be determined for sludge and other media by measuring total fluorine concentrations and subtracting total elemental fluorine. Sierra Club and Ecology Center commissioned an analysis of various classes of synthetic fluorine compounds in 20 samples of sludge-derived home fertilizers. Total fluorine concentrations ranged from 13 to 321 parts per million in the products.[56] The concentration of elemental fluorine was no more than 1 part per million, indicating a substantial volume of unidentifiable organic fluorine compounds. Scientists have speculated that pharmaceuticals and pesticides could contribute to the portion of unidentifiable PFAS, although questions remain about their origin.[57]

In addition, scientists have developed a Total Oxidizable Precursor (TOP) Assay as an indirect measure of the chemicals that can be "oxidized" or degraded into PFAS carboxylates and sulfonates, including PFOA and PFOS. When TOP Assay is used on sewage sludge, it consistently identifies a bulk of PFAS-precursors that can serve as a long-term reservoir of terminal PFAS, such as perfluorocarboxylic acids and perfluorosulfonic acids, in soils.[58] Sewage-sludge based fertilizers that were tested by Sierra Club and Ecology Center with oxidation using the TOP Assay had 2 to 8 times more PFAS chemicals than the non-oxidized samples, with concentrations ranging from 193 to 374 parts per billion in samples.[59]

---

[53] *See, e.g.*, Levine, *supra* note 52.
[54] *Human Health Toxicity Assessments for GenX Chemicals*, EPA, https://www.epa.gov/chemical-research/human-health-toxicity-assessments-genx-chemicals (last updated Dec. 2, 2024); *Perfluorobutanoic Acid (PFBA)*, EPA, https://iris.epa.gov/ChemicalLanding/&substance_nmbr=701 (last visited Aug. 11, 2025); *Perfluorohexanoic Acid (PFHxA)*, EPA, https://iris.epa.gov/ChemicalLanding/&substance_nmbr=704 (last visited Aug. 11, 2025).
[55] Risk Assessment at vi–vii (acknowledging that "risk estimates that account for . . . exposure to other PFAS would be greater than those presented in [the Risk Assessment]).
[56] Sierra Club & Ecology Ctr., *Sludge in the Garden: Toxic PFAS in Home Fertilizers Made from Sewage Sludge* 9 tbl. 5 (2021), https://www.sierraclub.org/sites/default/files/PFA-Garden-Sludge-Report.pdf.
[57] Kyra M. Spaan et al., *Pharmaceuticals Account for a Significant Proportion of the Extractable Organic Fluorine in Municipal Wastewater Treatment Plant Sludge*, 10 Env't Sci. Tech. Letters 328 (2023).
[58] Sierra Club, *supra* note 56, at 7.
[59] *Id.*

Finally, EPA must investigate regulatory options to address additional pollutants, including microplastics, which frequently are found at high levels in sewage sludge.[60] Like PFAS, microplastics can accumulate long-term in soils, be taken up by plants, and cause adverse health impacts—such as respiratory problems, inflammation, and oxidative stress—when ingested or inhaled.[61] Microplastics also have the potential to adsorb other pollutants—including heavy metals, antibiotic residues, microbes, and even PFAS—meaning that land application of sewage sludge containing microplastics can contribute to the long-term contamination of agricultural soils with multiple pollutants.[62]

C. EPA Must Issue Appropriate Pretreatment Standards to Control PFAS Discharged to POTWs.

EPA has acknowledged that "[t]raditional wastewater treatment technology does not remove or destroy PFOA or PFOS," but "[a]ppropriate pretreatment solutions at industrial dischargers exist, are cost-effective, and have been shown to be effective in reducing high concentrations of PFOA and PFOS."[63] Congress directed EPA to control pollution from industrial facilities that discharge wastewater to publicly-owned treatment works (POTWs) by establishing pretreatment standards—that is, industry-specific, technology-based regulations that govern the introduction into POTWs of "pollutants which are determined not to be susceptible to treatment by [POTWs] or which would interfere with the operation of [POTWs]." 33 U.S.C. § 1317(b)(1). Congress also directed EPA to revise pretreatment standards "from time to time, as control technology, processes, operating methods, or other alternatives change." *Id.* § 1317(b)(2). To fulfill its obligations under the CWA, EPA must take prompt action to establish pretreatment standards for all industries that discharge PFOA, PFOS, and other PFAS to POTWs, prioritizing those industries that discharge PFAS in the greatest quantities.

---

[60] Esther A. Gies et al., *Retention of Microplastics in a Major Secondary Wastewater Treatment Plant in Vancouver, Canada,* 133 Marine Pollution Bull. 553 (2018); J. Lofty et al., *Microplastics Removal from a Primary Settler Tank in a Wastewater Treatment Plant and Estimations of Contamination onto European Agricultural Land via Sewage Sludge Recycling,* 304 Env't Pollution (2022); Jing Sun et al., *Microplastics in Wastewater Treatment Plants: Detection, Occurrence and Removal,* 152 Water Rsch. 21 (2019).

[61] Theresa Schell et al., *Fate of Microplastics in Agricultural Soils Amended with Sewage Sludge: Is Surface Water Runoff a Relevant Environmental Pathway?*, 293 Env't Pollution 118520 (2022); Noreen Khalid, Muhammad Aqeel & Ali Noman, *Microplastics Could Be a Threat to Plants in Terrestrial Systems Directly or Indirectly,* 267 Env't Pollution 115653 (2020); Kirsty Blackburn & Dannielle Green, *The Potential Effects of Microplastics on Human Health: What Is Known and What Is Unknown,* 51 Ambio 518 (2022).

[62] Francesca Corte Pause et al., *Connecting the Dots: Livestock Animals as Missing Links in the Chain of Microplastic Contamination and Human Health,* 14 Animals 350 (2024); Carmen Mejías et al., *Adsorption of Perfluoroalkyl Substances on Polyamide Microplastics: Effect of Sorbent and Influence of Environmental Factors,* 216 Env't Rsch. (2023).

[63] EPA, *Biosolids Listening Sessions on the PFOA and PFOS Draft Risk Assessment Slides for the Docket* 16 (2025), https://www.regulations.gov/document/EPA-HQ-OW-2024-0504-0097.

* * *

Although EPA's Risk Assessment underestimates risks, it clearly demonstrates that PFOA and PFOS in sewage sludge adversely affect human health and the environment. To prevent additional, avoidable harm, EPA must finalize the Risk Assessment and promptly promulgate protective regulations. Without delaying those critical actions, EPA must also revisit and update its Risk Assessment, assess risks associated with other unsafe pollutants in sewage sludge, and issue appropriate pretreatment standards to control PFAS discharged to POTWs.

If you have any questions about our comments or requests, please do not hesitate to contact: Christina I. Reichert (creichert@earthjustice.org), Alexis Andiman (aandiman@earthjustice.org), Jonathan Kalmuss-Katz (jkalmusskatz@earthjustice.org), Susan Kraham (skraham@earthjustice.org), Christine Santillana (csantillana@earthjustice.org), Jon Devine (jdevine@nrdc.org), and Sonya Lunder (slunder@nrdc.org).

Respectfully submitted,

Earthjustice
Natural Resources Defense Council
Alaska Community Action on Toxics
Alliance of Nurses for Healthy Environments
Center for Environmental Health
Center for Water Security and Cooperation
Clean Cape Fear
Coalition Against the Spread of Sewage Sludge
Coosa Riverkeeper
Delaware Riverkeeper Network
Don't Spread on Me
Ecology Center
Environmental Advocates NY
Environmental Confederation of Southwest Florida
Florida Physicians for Social Responsibility
Green Science Policy Institute
Jackson Creek Oyster Company
Maryland Ornithological Society
Maryland Pesticide Education Network
Maryland Public Health Association
Matanzas Riverkeeper
Merrimack Citizens for Clean Water
Miami Waterkeeper
Minnesota Center for Environmental Advocacy
Montana Environmental Information Center
Northeast Organic Farming Association of New York
Olympic Environmental Council
Potomac Riverkeeper Network

Protect Mill Canyon Watershed
Protect the Peninsula's Future
Rachel Carson Council
Sierra Club Atlantic Chapter
Slingshot
St. Johns Riverkeeper
The Water Collaborative of Greater New Orleans
Vermont Natural Resources Council
Waterkeeper Alliance
Waterkeepers Chesapeake
West Plains Water Coalition
Wild Virginia
Zero Waste Ithaca
Zero Waste Washington