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INSIDE THIS ISSUE

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EDITOR'S NOTE

Written by Jennifer L. Harder
Editor-in-Chief

Environmental Law News is pleased to publish the following articles in our spring issue:

- Keith Solar and Lauren Presser mark the 50th anniversary of the Marine Mammal Protection Act with a review of its accomplishments, and a look ahead to the future of marine protection under the Act
- Alec Tyra explores the legal landscape relevant to liability for PFAS contamination and the key question of insurance
- Jana Zimmer examines enforcement policies and procedures at the California Coastal Commission and proposes a slate of reforms
- Aaron Ferguson assesses the capacity for the National Environmental Policy Act to accommodate critical forest management projects
- Beth Kent describes the importance of joint development of urban parks and affordable housing, previewing a policy paper slated for publication by UCLA
- Gary Lucks provides his annual insightful review of recently enacted California environmental legislation

To foster a robust dialogue, *Environmental Law News* does not limit or seek to shape the views of authors; we welcome articles from all perspectives. To facilitate that dialogue, we have previously invited authors to submit articles articulating a different perspective on any of the issues addressed in our publications. In this issue, two new authors have accepted that invitation and provided responses to the article written by Phillip Williams in the Fall 2021 issue of *Environmental Law News*, addressing water rights and due process:

- Raquella Thaman assesses water rights, dignity, and personhood
- Sarah Spinuzzi offers a different view of the nature of property rights in water

Environmental Law News again extends an invitation for article submissions, whether you are a new or seasoned author. Feel free to pitch an idea for an article that you would like to write, or offer a response to a prior article. We want to hear from our readers! Please contact Editor-in-Chief Jennifer Harder at jharder@pacific.edu with proposals for articles or questions.

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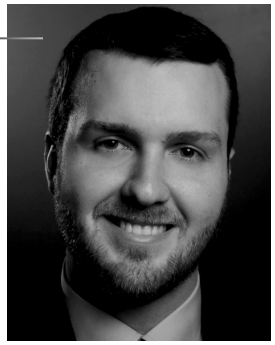
PFAS REGULATION: INSURING AGAINST FUTURE ENVIRONMENTAL LIABILITY

Written by Alec D. Tyra[1]



INTRODUCTION

Per-and Poly Fluoroalkyl Substances (PFAS) are the emerging environmental issue of the twenty-first century. PFAS are a broad class of synthetic compounds that exhibit persistent environmental presence. Exposure to these compounds lead to a host of adverse health effects, including endocrine disruption and cancer. In particular, the PFAS chemical compounds, Perfluorooctyl Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA), initially were ubiquitous in a variety of consumer products. However, major manufacturers phased out both PFOS and PFOA in the United States during the last two decades due to an increasing number of laboratory health assessments demonstrating their toxicity.[2] New PFAS compounds were developed to replace PFOS and PFOA. The PFAS compounds that came to replace PFOS and PFOA are now under similar scrutiny after studies have determined that they present similar health risks.[3] The result of decades of use is a proliferation of PFAS contamination in the environment.[4]

The proliferation of environmental contamination has spurred governmental action to regulate PFAS under the major environmental statutes.[5] PFAS Regulation under these statutes—like the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), and the Clean Air Act (CAA)–present new and significant liability to a wide range of industries. PFAS are ubiquitous in manufacturing, agribusiness, and construction. PFAS contamination also affects landowners, disposal sites, and water utilities who will ultimately need to address remediation efforts for soil and drinking water contamination.

PFAS regulation is also predicted to bring an increase in litigation for affected industries.[6] However, the industry most likely to be affected by increased PFAS regulation and litigation will be insurance. The groups facing increased liability likely have at least one policy that covers liability for some environmental contamination. Ultimately the PFAS problem involves three levels of complexity: scientific issues related to health studies, overlapping legal liability from multiple environmental statutes, and competing and overlapping insurance coverages.

THE PFAS PROBLEM

PFAS are a class of synthetic chemical compounds that have widespread industrial use based on their ability to waterproof, greaseproof, and create non-stick surfaces.[7] Characteristics of these chemical compounds are an alkyl chain,[8] which is a chain of carbon atoms connected via a single covalent bond[9] with at least one carbon atom that is fully fluorinated, which means it is covalently bonded with fluorine atoms rather than hydrogen atoms (as is typical in less complex hydrocarbon compounds).[10] Understanding the basic chemical structure of the PFAS class helps illustrate the myriad of compounds that

make up the class. It is not hard to imagine a multitude of compounds of various lengths of alkyl chains or degrees of fluorination. In addition, numerous other functional groups can be present in the compounds, further increasing the potential combinations of PFAS chemical compounds.[11] Such variability in a single class of chemical compounds, tied together by their common characteristics, allows for application in an equally broad class of industrial and consumer products. PFAS compounds' unique qualities meant PFAS was a mainstay component in many well-known consumer products.[12]

While PFAS, in particular PFOS and PFOA, have been ubiquitous in consumer and industrial uses for decades, recent health studies have demonstrated their potential for adverse health effects.[13] In addition, PFAS compounds designed to replace PFOS and PFOA after the 2006 voluntary phase out program, like GenX and PFBS, have also demonstrated similar adverse health effects as the original constituents.[14] The chemical properties that make PFAS a useful consumer product (resistance to water, oil, and fire) make the chemicals equally as hard to biodegrade once released into the environment.[15] As a result, the PFAS compounds linger in the environment and bioaccumulate in organisms, including humans.[16]

Based on the environmental persistence and large-scale use and production of PFAS in the United States, most Americans have detectable levels of PFAS in their blood.[17] As an example, the average blood concentrations of PFOA is near 4 nanograms/ml.[18] PFOS is also detectable in the blood samples of nearly every American adult likely due to exposure from drinking water.[19] Because the compounds exhibit both lipophobic and hydrophobic properties, they are not absorbed into fatty tissues or cleared through the renal system.[20] Instead, PFOA, PFOS, and related PFAS compounds bind with the proteins in the blood and are stored mainly in several organs and bones.[21] As a result, PFOS and PFOA exhibit a half-life of between 1-3 years in the human system.[22]

Laboratory risk assessments demonstrate that increased accumulation and chorionic exposure to PFAS can cause a host of negative health effects in humans and other organisms.[23] In animal studies, PFOS and PFOA exposures are linked to enlarged livers, reduced body weight, and signs of endocrine disruption.[24] Disruption of the endocrine system results in an impaired thyroid, which correlates with animal assessments showing hypothyroidism associated with increased exposure to PFAS chemicals.[25]

HISTORIC PFAS REGULATION

PFAS pollution and the negative health effects associated with long term exposure have been scrutinized heavily over the last two decades. While the federal and state governments have been monitoring the growing PFAS pollution problem, it was only recently—within the past three years—where there have been significant steps towards regulating PFAS under the major environmental statutes.[26]

In 2006, the U.S. Environmental Protection Agency (EPA) created the PFOA Stewardship program. The Stewardship program aimed to have the eight leading manufacturers of PFOA to agree to two reduction goals: (1) reducing PFOA or other PFAS that broke down to PFOA by ninety-five percent by 2010, using 2000 emission levels as a baseline;[27] and (2) total elimination of PFOA emissions by 2015.[28] The 2010/2015 Stewardship program was a success. All eight companies agreed to[29] and met emission reductions by the specified dates.[30] However, given that the Stewardship program was voluntary, other companies were still free to keep using PFOA or PFOA derivative-containing products, and importing them into the United States.[31]

The EPA started examining PFAS in public drinking water supplies in 2012 under the Unregulated Contaminant Monitoring Rule (UCMR) to determine if a maximum contaminant level (MCL) should be issued. However, the EPA to date has not yet promulgated a Safe Drinking Water Act (SDWA) regulation for PFAS.[32] It, instead, issued a non-binding health advisory for PFOS and PFOA with a recommended MCL of seventy parts per trillion in 2016.[33] The EPA admits that the health advisory offers only marginal protection from PFAS contamination and only serves as informal guidance for state and local officials.[34] In addition, the EPA has not addressed other PFAS chemicals with either a formal regulation or nonbinding health advisory.[35]

In 2019, the EPA created its comprehensive PFAS action plan—its first major PFAS regulatory effort since the Stewardship program. The action plan sets out short- and long-term goals with a focus on setting an enforceable drinking water standard[36] and strengthening cleanup efforts by potentially listing PFAS as hazardous substances under CERCLA.[37] As a part of implementing the PFAS action plan, the EPA published its preliminary determination to regulate PFOS and PFOA in drinking water systems in early 2020.[38] In addition, the EPA passed a significant new use rule under Toxic Substance Control Act (TSCA), which restricted new manufacturing, use, and importation of PFAS compounds. This renewed focus on PFAS includes

closing importation of products containing PFAS chemicals into the United States and extending the phase out of the PFAS-containing products originally set in the 2010/2015 Stewardship program.[39]

In early 2020, the House passed the PFAS Action Act which would, in part, require the Administrator of the EPA to create drinking water standards and list PFOS and PFOA as hazardous substances under CERCLA.[40] The Senate passed a competing piece of legislation, the PFAS Release Disclosure and Protection Act of 2019, with less stringent measures addressing PFAS contamination.[41]

Absent comprehensive federal regulations, several states have moved ahead with creating their own enforceable drinking water standards.[42] The states that have adopted rules about acceptable MCL standards have come to no general consensus on the topic.[43] For example, California has adopted more restrictive standards than the federal health advisory by imposing a notification level for PFOS and PFOA at 5.1 and 6.5 parts per trillion and a response level at 10 and 40 parts per trillion.[44] Changes in the executive and legislative branches of the government spurred accelerated efforts in addressing PFAS pollution. In addition, California has passed a sweeping ban on PFAS in cookware and food packaging.[45] States, like California, will continue to pursue PFAS regulation with or without more comprehensive national standards. In addition, changes in political leadership have accelerated federal regulatory efforts.

PRESENT REGULATORY EFFORTS

The current administration and Congress have taken more aggressive steps to provide comprehensive PFAS regulation. President Biden made it a campaign mission to invest more in "green" policies and reverse the previous administration's effort to roll back environmental regulations. President Biden's comprehensive environmental policy included promises to address PFAS contamination issues, and early signs from his administration point to acceleration on PFAS regulation.

In early 2021, the Biden administration revoked the previous administration's finding and determination on one PFAS chemical compound for "political interference."[46] Furthermore, the Biden EPA reissued a determination to regulate two of the more well-studied PFAS chemicals, PFOA and PFOS, under the SDWA.[47] These early actions from the current administration, along with newly proposed legislation and EPA regulations indicate more expansive PFAS regulations are imminent.

PFAS LEGISLATION

Congress has introduced dozens of different PFAS-related legislation. As discussed above, the House of Representatives passed the PFAS Action Act of 2019. The 2019 Act was a comprehensive piece of legislation that would have regulated PFAS under most of the major environmental statutes. Ultimately, Congress did not enact that piece of legislation. The House introduced and passed the substantially similar PFAS Action Act of 2021.[48] The major difference between the two acts is that Congress was willing to include steps to regulate PFAS in the National Defense Authorization Act of 2020 (NDAA). Often considered a "must pass" piece of legislation, PFAS regulation under the NDAA could indicate Congress' willingness to pass a more robust standalone PFAS legislation.[49]

If enacted, the PFAS Action Act of 2021 (Act of 2021) would impose new regulation–and liability–under existing environmental laws related to hazardous waste, solid waste, clean water, and clean air (as of this writing, the PFAS Action Act of 2021 had passed the House but had not made it out of committee in the Senate - *ed.*).

The 2021 Act requires the EPA to regulate PFAS as both hazardous and solid wastes. For hazardous waste regulation, the 2021 Act would require the EPA to designate PFOA and PFOS as "hazardous substances" under Section 102(a) of CERCLA. The EPA would be required to designate PFOA and PFOS within one year of the 2021 Act's enactment date. In addition, the EPA would be required to consider and list within five years of the 2021 Act's enactment date. For solid waste disposal, the 2021 Act would require the EPA to set new regulations to limit air emissions from incinerated products that contain PFAS compounds.[50]

The 2021 Act would also require the EPA to adopt drinking water regulations under the SDWA. The 2021 Act would require the EPA to set a national primary drinking water regulation under Section 1412(b) of the SDWA within two years. At a minimum the regulation would include standards for PFOA and PFOS. The 2021 Act also includes steps for the EPA to create a framework for drinking water standards for other PFAS compounds. The EPA would also be required to set water quality standards for PFAS under Section 304(a)(1) of the Clean Water Act (CWA). Also under the CWA, the EPA would be required to establish effluent limitation guidelines

for discharges for priority industry categories. Priority categories include plastics, synthetic fibers, textiles, paints, finishes, paper, paper board, and electronics.[51] The list of priority categories underscores the use of PFAS in some of the most basic consumer and industrial consumables.

Lastly, the 2021 Act would require the EPA to create air quality regulations for PFAS emissions. The EPA would be required to list PFOA and PFOS as hazardous air pollutants under the Clean Air Act within 180 days of the 2021 Act's enactment. In addition, the EPA would be required to regulate other PFAS compounds under the Clean Air Act within five years. Other provisions of the 2021 Act provide grants for further testing and create a labeling requirement for PFAS-free products.

The 2021 Act sets out ambitious and comprehensive PFAS regulation. However, ultimately, the fate of the 2021 Act is unknown as the legislation moves into the upper chamber of Congress.[52]

EPA RULEMAKING

With or without PFAS legislation from Congress, the current administration is moving forward on regulations for PFOA and PFOS. The EPA has determined to set drinking water regulations for PFOA and PFOS.[53] In addition, the EPA has proposed rules regulating PFOA and PFOS under CERCLA and RCRA.[54]

In February 2021, the EPA reissued its determination on PFOA and PFOS[55] while reproposing the Fifth Unregulated Contaminant Monitoring Rule (UCMR 5) to collect new data on PFAS in drinking water.[56] With these two actions, the EPA stated that it would move forward with implementing a drinking water standard.

On January 10, 2022, the EPA submitted a proposal to the White House Office of Management and Budget that will designate PFOA and PFOS as "Superfund hazardous substances."[57] EPA intends to open to the proposed rule for public comments in spring 2022.[58] If the Office of Management and Budget does not object to the EPA's proposal within 90 days, the proposal will be subject to public comment and will likely become a final rule in 2023.

The EPA also announced two separate rules to address PFAS contamination under RCRA. First, the EPA will propose adding PFOA and PFOS as well perfluorobutane sulfonic acid (PFBS), and GenX to the RCRA Hazardous Constituents. The second regulation will clarify EPA rules that RCRA corrective action can require investigation and cleanup for hazardous wastes.[59]

For the last two decades, the government has taken slow and discrete measures to address PFAS pollution. The recent proposed legislation and rulemaking efforts underscore the federal government's effort to accelerate PFAS regulation. The regulations are expansive in their scope in addressing PFAS pollution. However, expansive regulation subjects the regulated community to new and expansive liability.

FUTURE LIABILITY

New PFAS regulation creates liability under the major environmental statutes. As discussed, the EPA is currently working on rulemaking efforts to regulate PFAS under CERCLA, RCRA, and the Safe Drinking Water Act. If the Senate passes the PFAS Action Act of 2021 there will be additional liability under the CWA, CAA, and TSCA. However, there is no guarantee that the Senate will be able to agree on a comprehensive PFAS bill. In addition, the EPA has not announced a proposed drinking water standard under the SDWA. As such, the most immediate liability facing the regulated community will be under CERCLA and RCRA for certain PFAS compounds.

CERCLA

CERCLA imposes a strict liability standard for environmental remediation costs for "hazardous substances."[60] By imposing this standard, CERCLA achieves its broad policy goal: holding parties responsible for past environmental contamination.[61] To be held liable under CERCLA, a party must fit the criteria of being a Potentially Responsible Party (PRP). CERCLA § 107(a) lists four broad categories of persons as PRPs. These are: Current Owners/Operator, Past Owner/Operator, Arrangers and Transporters. These broad categories can be summarized as: (a) the present owner of a facility from which there has been a release of a hazardous substance; (b) the present operator of a facility; (c) the owner of the facility at the time of disposal or release; (d) the operator of the facility at the time of disposal or release; (e) anyone who arranges for the disposal or treatment of hazardous substances or who arranges with a transporter for disposal of hazardous substances; (f) any transporter of hazardous substances; and (g) an owner of a facility with knowledge of a spill or release of hazardous substances who sells or transfers without disclosing.[62] In addition to imposing strict liability, CERCLA liability is retroactive, and

joint and several. This means that CERCLA liability is nearly impossible to avoid once it attaches to a PRP.

PFAS presents a unique situation for CERCLA liability. PFAS pollution has been ongoing for decades. With PFAS used in a wide range of products, PFAS pollution is equally as widespread. In addition, PFAS compounds are resistant to environmental degradation. Therefore, PFAS pollution has been accumulating uninterrupted for a sustained period of time. This creates issues for CERCLA sites that have existing PFAS pollution. First, Superfund sites subject to ongoing remediation and/or litigation now have a new set of PRPs added into the mix. Second, PFAS pollution could also re-open closed Superfund sites to address new remediation measures. Lastly, PFAS pollution could create new Superfund sites separate from existing sites.

RCRA

RCRA imposes cradle-to-grave liability for waste that presents "imminent and substantial" endangerment.[63] While CERCLA imposes liability on past environmental pollution and cleanup, RCRA imposes a proactive obligation to manage the generation, transportation, treatment, storage, and disposal of hazardous and solid waste. RCRA also imposes recordkeeping, reporting, labeling, exporting, and container requirements for generators, transporters, and treatment, storage, and disposal facilities (TSDFs).[64] In addition, the EPA can issue corrective actions under RCRA for active and potentially inactive sites for mishandling hazardous and solid waste. Parties that knowingly contributed to the generation or mishandling of hazardous waste are, therefore, subject to liability. RCRA corrective actions require cleanup of present or future releases from facilities that pose an imminent threat.[65]

RCRA regulation of PFAS will impose liability on the current management of PFAS-containing products. With the widespread use of PFAS in products, waste management will be difficult. Products ranging from construction material, fertilizers, and food packaging would all be subject to RCRA management. Even with the phase out of PFOA and PFOS, disposal sites would now have the added responsibility of managing decades of waste buildup. After years of not managing PFAS waste, active facilities will be subject to corrective actions, or potentially Superfund cleanup.

CERCLA and RCRA are complementary laws that impose liability on past, present, and future management and remediation of hazardous wastes.[66] However, there is significant overlap between the two statutes.[67] At many sites the same contamination may constitute both releases of "hazardous substances" under CERCLA and "solid wastes" presenting an imminent and substantial endangerment under RCRA. Therefore, claims could fall under either CERCLA or RCRA.

The EPA has issued guidance on when to use CERCLA and when to use a RCRA corrective action.[68] CERCLA imposes more stringent penalties for violations of orders and contains an express bar against pre-enforcement review. Therefore, regulators will generally consider CERCLA liability first to impose harsher penalties. The guidance emphasizes that regulators should consider using RCRA corrective actions instead of CERCLA where the pollutants are statutory "solid wastes" under RCRA but are outside of CERCLA's definition of "hazardous substances."[69] With the EPA aiming to list PFOA and PFOS as hazardous substances—along with the extensive past environmental pollution—regulators will likely place liability for past PFAS pollution under CERCLA. RCRA liability will likely be imposed for the improper current and future management of PFAS waste.

LIABILITY UNDER OTHER STATUTES

CERCLA and RCRA are the statutes at the forefront of PFAS regulation. Additional liability will be imposed by regulations under the SDWA, CWA, CAA, and TSCA. However, the EPA has not started rulemaking efforts under these statutes like it has under CERCLA and RCRA. Potential exposure for environmental pollution will increase as the EPA takes further steps to regulate PFAS under the other major environmental statutes. If and when the regulated community faces environmental liability for PFAS pollution, insurance will be used to cover litigation and remediation costs.

ENVIRONMENTAL INSURANCE

Insurance will play a significant role in environmental remediation for PFAS for several reasons. First, RCRA requires some form of financial assurance in the event of a corrective action. This financial assurance can come in the form of bond, surety, or insurance.[70] Second, the industries that will be affected by PFAS regulation already have extensive coverage policies. Third, PFAS contamination spans decades and may implicate multiple, different policies for each affected insured. The complexities of coverage issues present an additional challenge in PFAS litigation over liability under multiple environmental statutes.

Many insured may first turn to their commercial general liability policies (CGL) to offset some of the costs of PFAS regulation and litigation. However, most CGL policies will not offer protection for environmental harms due to the absolute pollution exclusion found in most, if not all, CGL policies.[71] The standard absolute pollution exclusion excludes coverage for personal injury and property damage "arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release, or escape of pollutants."[72] The absolute pollution exclusion was first adopted in 1986 and replaced as the "sudden and accidental" policy exclusion common in policies written in the 1970's and early 1980's.[73] While the exact extent of the absolute pollution exclusion has been extensively litigated, many courts disagree about the proper interpretation. What is clear is that the absolute pollution exclusion provides a broader exception to coverage for claims than older policies.

As stated, CGL policies in the 1970's and early 1980's provided a qualified pollution exclusion for "sudden and accidental" pollution events. The sudden and accidental pollution exclusion was interpreted by courts to not exclude gradual and unintentional releases of pollution. This qualified pollution exclusion was first developed in response to the proliferation of environmental statutes in the early 1970's.[74] These new environmental laws imposed liability for environmental harms that did not exist in the decades prior. CGL policies before the 1970's therefore did not have a reason to have a pollution exclusion.

These three timeframes are important for determining coverage issues. CGL policies are "occurrence-based".[75] This means that an insurance policy in effect during the occurrence of the loss (i.e., pollution event) will provide coverage. This means that very early CGL policies or "sudden and accidental" CGL policies could provide coverage for PFAS pollution that occurred in the policy period. Because PFAS pollution spans decades, it is conceivable that three different forms of CGL policies could be in effect.

The complexity of the different CGL coverages and general exclusions could leave the regulated community underinsured for PFAS. The problem of entities being underinsured has led to the creation of a new insurance market for pollution legal liability (PLL) policies. Insurance carriers began offering PLL plans in the 1990's to fill the gap in environmental risk and CGL coverage. Unlike CGLs, PLLs are specially designed to provide coverage for pollution-related events.[76] Coverage issues will play a significant role in PFAS cleanup, regulation, and litigation. In addition, different insurance policies will create related litigation over coverage issues.

CONCLUSION

PFAS is the emerging environmental pollution problem of the twenty-first century. The federal government has spent the last two decades considering how to address the PFAS problem, from the Stewardship program to the PFAS Action Act of 2021. Now, the EPA is planning to take the first step by regulating certain PFAS compounds under CERCLA and RCRA. Designating PFOA and PFOS as hazardous substances under CERCLA imposes new liability for a wide range of industries. This liability will likely only be the first in a rapidly developing effort to provide comprehensive regulation for PFAS pollution. This new and expanding legal exposure affects the insurance industry the most, as the regulated community will seek to tender PFAS pollution claims under a number of different coverage policies.

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2. *Fact Sheet: 2010/2015 PFOA Stewardship Program*, EPA, https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program#launch (last visited Feb. 21, 2022).

3. Major manufacturers in the United States voluntarily phased out PFOS in 2002, and PFOS was regulated at an international level under the Stockholm Convention on Persistent Organic Pollutants in 2011. *Technical Fact Sheet–Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)*, EPA 2 (2017) https://alamedapointenvironmentalreport.files.wordpress.com/2021/04/epa-fact-sheet_pfos_pfoa_11-20-17.pdf (Hereinafter "2017 EPA Technical Fact Sheet"); Lena Vierke et al., *Perfluorooctanoic Acid (PFOA)—Main Concerns and Regulatory Developments in Europe from an Environmental Point of View*, 24 Envtl. Sci. Eur. 1, 2 (2012) ("PFOS has recently been identified as a persistent organic pollutant (POP) and was included into Annex B of the Stockholm Convention on Persistent Organic Pollutants."). In addition, there is a growing concern about the chemicals that have come to replace PFOS and PFOA. Katherine E. Pelch et

al., *PFAS health effects database: Protocol for a systematic evidence map*, 130 Env't Intl. 1, 2 (2019).

4. *See PFAS Contamination in the U.S. (Oct. 4, 2021)*, EWG (https://www.ewg.org/interactive-maps/pfas_contamination/map/) (Hereinafter "PFAS contamination map") (This map shows active groundwater and surface water contamination sites.).

5. *See infra* Historic PFAS Regulation and Present Regulatory Efforts.

6. 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

7. Vierke et al., *supra* n. 3 ("Due to their outstanding properties–they provide water, oil, and grease repellency and are very stable – certain [PFAS] have been used in a variety of consumer products.").

8. *See generally* Linus Pauling, General Chemistry 241 (Dover Publications 3d ed. 1988); An alkyl chain is a chain of carbon atoms that are bonded by a single bond.

9. A covalent bond is a bond in which two atoms "share" a pair of electrons rather than an ionic bond in which there is a donation of an electron. *See e.g.*, Pauling, *supra* n. 8, at 152.

10. Hydrocarbon meaning carbon bonded with hydrogen. Methane CH4 is the simplest hydrocarbon with one carbon atom bonded to four hydrogen atoms.

11. Vierke et al., *supra* n. 3, at 1-2 ("They are characterized by a fully (per-) or partly (poly-) fluorinated carbon chain in connection with different functional groups.").

12. Leticia M. Diaz & Margaret R. Stewart, *'Forever Chemicals': Forever Altering the Legal Landscape*, 7 Belmont L. Rev. 308, 309 (2019) ("PFAS has worked its way into most everyday products used by the average American.").

13. *See* Pelch, *supra* n. 2, at 2.

14. *See* Justin M. Conley et al., *Adverse Maternal, Fetal, and Postnatal Effects of Hexafluoropropylene Oxide Dimer Acid (GenX) from Oral Gestational Exposure in Sprague-Dawley Rats*, 127 Envtl. Health Perspectives 037008-1, 037008-1 (2019) ("HFPO-DA exposure produced multiple effects that were similar to prior toxicity evaluations on PFAS, such as perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)."); Fengie Chen et al., *Internal Concentrations of Perfluorobutane Sulfonate (PFBS) Comparable to Those of Perfluorooctane Sulfonate (PFOS) Induce Reproductive Toxicity in Caenorhabditis Elegans*, 158 Ecotoxicology & Envtl. Safety 223, 223.

15. *See generally* R.C. Buck et al., *Perfluoroalkyl and Polyfluoroalkyl Substances in the Environment: Terminology, Classification, and Origins*, 7 Envt. Assessment & Mgmt. 513 (2011).

16. *Id.*

17. Emanuela Corsini et al., *Perfluorinated compounds: Emerging POPs with potential immunotoxicity*, 230 Toxicology Letters 263, 263-64 (2014); Pelch, *supra* n. 1, at 2 ("Virtually all Americans have multiple PFAS at detectable levels in the blood serum.").

18. *Id.*

19. *Id.*

20. Francisca Perez et al., *Accumulation of perfluoroalkyl substances in human tissues*, 59 Env't Int'l. 354, 355.

21. *Id.*

22. Yiyi Xu et al., *Serum Half-Lives for Short- and Long-Chain Perfluoroalkyl Acids after Ceasing Exposure from Drinking Water Contaminated by Firefighting Foam*, 128 Envtl. Health Perspectives 077004-1, 077004-1 (2020) ("PFBS showed the shortest half-life {average 44 d [95% confidence interval (CI): 37, 55 d]}, followed by PFHpA [62 d (95% CI: 51, 80 d)]. PFPeS and PFHpS showed average half-lives as 0.63 and 1.46 y, respectively. Branched PFOS isomers had average half-lives ranging from 1.05 to 1.26 y for different isomers. PFOA, PFHxS, and linear PFOS isomers showed average half-lives of 1.77, 2.87, and 2.93 y, respectively.").

23. *See* Pelch, *supra* n. 2, at 2 ("The scientific literature on PFAS has increased exponentially in the last decade, which has resulted in a greater understanding of the potential adverse health effects associated with PFOS and PFOA exposure.").

24. Bevin E. Blake et al., *Associations between longitudinal serum perfluoroalkyl substance (PFAS) levels and measures of thyroid hormone, kidney function, and body mass index in the Fernald Community Cohort*, 242 Envtl. Pollution 894, 901 (2018) ("PFAS are suspected to be endocrine disruptors that target the thyroid and alter thyroid hormones.").

25. *Id.*

26. *See CA PFAS Timeline*, SWRCB https://www.waterboards.ca.gov/pfas/ca_pfas_timeline.html (last visited Feb. 27, 2022).

27. Fact Sheet: 2010/2015 PFOA Stewardship Program, EPA https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-20102015-pfoa-stewardship-program (Last visited Feb. 27, 2022) (Hereinafter "Stewardship Factsheet").

28. *Id.*

29. *Letters Committing to Participation in the PFOA Stewardship Program*, EPA https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/letters-commiting-participation-pfoa-stewardship-program. (last visited Feb. 27, 2022).

30. *See 2010/2015 PFOA Stewardship Program - 2014 Annual Progress Reports*, EPA (Feb. 27, 2022) https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/20102015-pfoa-stewardship-program-2014-annual-progress.

31. *Stewardship Factsheet*, *supra* n. 26 ("The manufacture and import of PFOA has also been phased out in United States as part of the PFOA Stewardship program. Existing stocks of PFOA might still be used and there might be PFOA in some imported articles.").

32. Jeff B. Kray & Sarah J. Wightman, *Contaminants of Emerging Concern: A New Frontier for Hazardous Waste and Drinking Water Regulation*, 32 Nat. Res. & Env't 36, 36 (Mar. 1, 2018) https://www.americanbar.org/groups/environment_energy_resources/publications/natural_resources_environment/2017-18/spring/contaminants-emerging-concern-new-frontier-hazardous-waste-and-drinking-water-regulation/

33. 81 Fed. Reg. 33250 (May 25, 2016).

34. *Drinking Water Health Advisories for PFOS and PFOA*, EPA https://www.epa.gov/ground-waterand-drinking-water/drinking-water-health-advisories-pfoa-and-pfos (last visited Feb. 27, 2022) https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos

35. See generally *PFOA, PFOS, and Other PFASs: EPA Actions to Address PFAS, EPA* https://www.epa.gov/pfas/epa-actions-address-pfas (last visited Feb. 27, 2022) (describing the actions taken to address PFAS contamination).

36. *EPA's Per-and Polyfluoroalkyl Substances (PFAS) Action Plan* - 823R18004, EPA, 11-12 (Feb. 2019) https://www.epa.gov/sites/default/files/2019-02/documents/pfas_action_plan_021319_508compliant_1.pdf (last visited Feb. 27, 2022) (Hereinafter "PFAS Action Plan").

37. *See id.* at 15.

38. 85 Fed. Reg. 14098 (Mar. 10, 2020).

39. *EPA Continues to Act on PFAS, Proposes to Close Import Loophole and Protect American Consumers*, EPA (Feb. 20, 2022) https://www.epa.gov/newsreleases/epa-continues-act-pfas-proposes-close-import-loophole-and-protect-american-consumers

40. PFAS Action Act, H.R. 535, 116th Cong. (2019).

41. PFAS Release Disclosure and Protection Act of 2019, S.1507 116th Cong. (2019). (the senate bill did not mandate a safe drinking water standard, nor does it designate PFAS as a hazardous substance under CERCLA).

42. Michael Traynham, *In the Absence of Federal Standards, States Step in to Regulate PFAS*, JD Supra (Aug. 6, 2020).

43. The Association of State Drinking Water Administrators (ASDWA) has compiled a list of state regulations in a table to compare various approaches across the country. *PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)*, ASDWA https://www.asdwa.org/pfas/ (Last visited Feb. 27, 2022).

44. *Id.*

45. AB 1200, Reg. Sess. 2021-2022 (2021).

46. *EPA Takes Action to Protect Scientific Integrity*, EPA (Feb. 9, 2021) https://www.epa.gov/newsreleases/epa-takes-action-protect-scientific-integrity (Last visited Feb. 27, 2022).

47. *EPA Takes Action to Address PFAS in Drinking Water*, EPA (Feb. 22, 2021) https://www.epa.gov/newsreleases/epa-takes-action-address-pfas-drinking-water

48. *Congress Presses Forward on PFAS Measures*, Nat. L. Rev. (Aug. 20, 2021) https://www.natlawreview.com/article/congress-presses-forward-pfas-measures (last visited Feb. 27, 2022.)

49. *Id.*

50. H.R. 2467, 117th Cong. (2021).

51. *Id.*

52. *Id.*

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56. John Gardella, *EPA PFAS Testing Rule Finalized to End 2021*, Nat. L. Rev. (Dec. 30, 2021) https://www.natlawreview.com/article/epa-pfas-testing-rule-finalized-to-end-2021

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62. *See* 42 U.S.C. § 9607(a)(1)-(4) (2018).

63. 42 U.S.C. § 6973 (2018).

64. See 40 CFR Part 262-265.

65. 42 U.S.C. § 6973 (2018).

66. Daniel L. McKay, *RCRA's Oil Field Wastes Exemption and CERCLA's Petroleum Exclusion: Are They Justified*, 15 J. Energy Nat. Resources & Envtl. L. 41, 41 (1995).

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