MANAGING PFAS IN OREGON:
A Clean Water Agency Perspective

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oregon association of CLEAN WATER agencies

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Executive Summary

Growing scientific evidence shows that exposure to per- and polyfluoroalkyl substances (PFAS) may lead to a range of human health problems, even at low exposure levels. PFAS are a high priority concern because they do not breakdown easily, they are difficult to treat, and they are found just about everywhere. For these reasons, PFAS have been dubbed "forever chemicals."

PFAS pose significant challenges to wastewater and stormwater agencies. Publicly owned treatment works (POTWs) and stormwater management facilities are not designed to handle complex chemicals like PFAS, and effective, affordable treatment technology has not been developed. As the receivers of PFAS pollution from industries, businesses and households, clean water agencies will likely be subject to new water quality requirements, and the public will bear the costs of removing or treating PFAS when treatment technology becomes available.

In response to the growing concerns about PFAS and the potential for new PFAS water quality regulations, ACWA established a PFAS Work Group in 2019 to engage members in proactively learning about and addressing PFAS in Oregon. ACWA is collaborating with local government partners, drinking water providers, and the Oregon Department of Environmental Quality (DEQ) to align priority PFAS strategies and actions to protect human health and the environment in Oregon. The ACWA PFAS Work Group developed several strategies to address evolving local, state, and federal actions regarding PFAS, and to convey recommendations to local jurisdictions and regulators on ways to tackle PFAS pollution, rather than waiting for regulation. The strategic actions include:

1. **Summarize the state of PFAS science, policy, and recommended actions;**
2. **Grow PFAS data in Oregon to improve the scientific basis for future policies;**
3. **Coordinate research opportunities to leverage resources and improve the science on PFAS in Oregon; and**
4. **Update and provide communications and outreach tools for public clean water agencies.**

This paper lays out what we know about PFAS and recommends ways of reducing the PFAS discharged to air, land, and water. ACWA members can use this paper to support local development of risk communication strategies as well as actions to reduce PFAS water quality impacts in local communities. This paper also will be used to advocate for local government perspectives on how state and federal agencies should be developing PFAS-related scientific data, risk assessments, and policies. A summary of the conclusions and recommendations contained in this paper for Federal, State, and Local actions to address PFAS is provided below.

Tackling PFAS at the Federal, State and Local Level:

Timely Federal actions are needed.

The U.S. Environmental Protection Agency (EPA) and other federal agencies need to provide the scientific foundation for PFAS regulations and policies, and for creating a national PFAS pollution management framework through actions like these:

- Determine harmful levels of PFAS chemicals in water, land, and air, as well as in commonly used products;
- Establish new PFAS laboratory methods capable of detecting many (or all) PFAS chemicals at lower levels, and clearly explain what should happen when harmful levels are below detection levels.
- Prioritize research into the risks of PFAS in wastewater biosolids when applied to land and how those risks compare to other biosolids management options (e.g., incineration, landfilling), and work with state and local agencies to exchange information and research;
- Take a collective approach to regulating the 9,000+ types of PFAS rather than relying on a traditional chemical-by-chemical "whack-a-mole" strategy;
- Aggressively regulate and restrict PFAS used in consumer and business products to curb future pollution.
- Set limits on PFAS pollution coming from "upstream" industrial sources that discharge into municipal wastewater systems and make it straightforward for local governments to enforce them;
- Set PFAS requirements that can be met through effective flexible approaches like pollution reduction plans; and
- Regulate PFAS under the nation's hazardous waste and environmental cleanup laws to reduce the amount of PFAS waste that gets into water.

Timely State actions are needed.

The Oregon Department of Environmental Quality (DEQ) implements EPA Clean Water Act rules and has independent water quality management authority for Oregon. The Oregon Health Authority (OHA) regulates drinking water safety. ACWA recommends the following State actions that would complement EPA programs:

- With the Governor's Office leadership, create a comprehensive PFAS strategy that lays out how state agencies will work together to reduce PFAS in Oregon's air, land, and water;
- Create a DEQ water quality management plan, with input from stakeholders, that explains how potential new PFAS requirements will be developed and incorporated into permits that regulate wastewater and stormwater discharges to Oregon's waters; and
- Work with a range of groups to evaluate research on the risks of PFAS in biosolids, determine the best ways to manage biosolids in Oregon, and identify and prioritize future research needs.

Actions ACWA and local clean water agencies can take now.

At the local level, ACWA and many local agencies are taking proactive steps to assess and reduce PFAS in the water environment. With EPA toxics reduction grant funds in hand, ACWA will be supporting its members in pursuing the following priority actions:

- Sample and analyze PFAS in wastewater, stormwater, and biosolids from wastewater treatment plants to determine sources and levels of PFAS;
- Reach out to industries where PFAS have been found in wastewater and stormwater to help them identify ways to reduce or eliminate PFAS in their operations;
- Support local government efforts to buy and use safer substitutes for PFAS-containing products;
- Educate the public on how to reduce the use of PFAS-containing products and understand PFAS risks; and
- Work with biosolids researchers and professional groups in the Northwest to increase knowledge about the relative risks of PFAS in biosolids and how to minimize those risks.

Conclusion:

Responding to PFAS challenges and risks requires a collective, coordinated, collaborative effort by all levels of government, along with industry, communities, and non-governmental groups. Pollution control regulations and risk management decisions need to be based on sound science, with a focus on lowering the greatest risks to human health and the environment. The generation of sound science and data should be accelerated to provide the basis for pollution control regulations and risk management decisions.

The bottom line is that the top priority for policy makers, public agencies, and other organizations should be to reduce PFAS at the source, mainly by restricting PFAS in consumer products and use in industrial manufacturing, but also through education and technical assistance. Without eliminating - or significantly reducing – current PFAS chemical uses, it is likely not possible to meet extraordinarily low environmental standards over time. Working together, federal, state, and local agencies can and should develop and implement a feasible, affordable, and sustainable path to protecting people and the environment from PFAS threats.

I. Introduction

In 2019, the Oregon Association of Clean Water Agencies (ACWA)[1] assembled experts and regulators from around the country to present to ACWA's membership the growing public health and environmental concerns, studies, and contemplated regulatory actions regarding per- and polyfluoroalkyl substances (PFAS). An unprecedented outpouring of concern and interest followed. This was a call to action for ACWA. The ACWA PFAS Work Group, consisting of professionals from member organizations, was immediately established to engage members in proactively learning about and addressing PFAS concerns in Oregon. The PFAS Work Group has subsequently been expanded to include local government partners and drinking water providers (as represented by League of Oregon Cities, Special Districts Association of Oregon, and Oregon Water Utility Council) and the Oregon Department of Environmental Quality (DEQ).

The ACWA PFAS Work Group developed several strategies to address current local, state, and federal actions regarding PFAS, and to convey recommendations to local jurisdictions and regulators in tackling PFAS pollution. The strategic actions include:

- Summarize the state of PFAS science, policy and recommended strategic directions
- Grow PFAS data in Oregon to improve the scientific basis for future policies
- Coordinate research opportunities to leverage resources and improve the science in Oregon
- Develop and refine PFAS communication tools

This white paper is a key element of ACWA's strategies. It should be noted that this white paper and other products developed to implement ACWA's strategies are not intended to represent the perspectives of the non-ACWA partners in the PFAS Work Group. It is intended to summarize the state of PFAS science and policy, describe the concerns that PFAS pose for local wastewater and stormwater agencies, and recommend actions needed to effectively assess and reduce PFAS risks to public health and the environment. ACWA members can use the information in this paper to inform development of risk communication strategies as well as local actions to address PFAS concerns and water quality impacts in their communities. This paper also provides state and federal agencies with local perspectives on how science and policies to reduce PFAS impacts should be developed.

II. Why are PFAS an Increasing Concern?

PFAS are a class of manufactured chemicals with heat, water, and oil resistance properties and have been used in industry and consumer products since the 1940s. They are difficult to break down and are present at low levels throughout the environment, and in our homes and food. There are thousands of

[1] ACWA is a private, not-for-profit organization that serves Oregon wastewater treatment and stormwater management agencies and their consultants. ACWA's goal is to protect and enhance Oregon's water quality. By cooperatively addressing the many water quality issues facing wastewater treatment and stormwater managers, we can be more effective advocates with our federal and state regulatory agencies, can identify areas of collaboration with other water quality stakeholders, and can pool resources to meet environmental standards effectively and efficiently.

different PFAS, some of which have been more widely used and studied than others. A growing body of peer-reviewed scientific studies indicate that exposure to PFAS may lead to a wide range of adverse human health effects, including: decreased fertility and other reproductive effects; developmental effects in children; increased risk of some cancers; reduced immune system ability to fight infection (including reduced vaccine response); interference with natural hormones; and increased cholesterol levels and/or risk of obesity.[2]

The following are examples of consumer and industrial products that can contain PFAS[3, 4]:

- Stain- and water-resistant textiles (outdoor and upholstered furniture, carpets, and clothing)
- Nonstick cookware
- Cosmetics and Other Personal Care Products (lotions, nail polish, eyeliner, dental floss, shaving cream, mascara, cleansers, eyeshadow)
- Waterproof apparel (shoes, clothing, upholstery, and mattresses)
- Cleaning products, paints, and sealers that penetrate rough surfaces or promote a smooth finish
- Firefighting foam used to fight fuel-based fires
- Grease and waterproof coatings on food packaging (such as popcorn bags, fast food wrappers, and takeout containers)
- Coated paper products
- Engineered coatings used in semiconductor production
- Surfaces in food processing equipment (such as tubing in ice cream and soda dispensers)

People and ecological life are exposed and impacted by PFAS in multiple ways. Potential exposure sources and pathways include consumer product use, human and animal diets, occupational contact, drinking water, soil and sediment, and air (indoor and outdoor). Direct exposure routes for people include ingestion, inhalation, dermal contact. The relative importance of different PFAS exposure sources varies dramatically across general populations with diverse PFAS exposure sources. This large variability in the relative significance of exposure sources reflects variable concentrations in environmental matrices (e.g., air, water, food, products, soil, etc.) and differing assumptions regarding exposure sources, frequencies, duration, and consideration of PFAS precursors.[5]

Once released into the environment, PFAS pose significant human health risks and are challenging to manage. A common property of all PFAS is that they persist in the environment, or partially transform into other persistent pollutants. Extreme persistence can be an incalculable hazard itself, as some studies estimate that short-chain perfluoroalkyl acids (PFAAs), will stay in the environment for decades

[2] https://www.epa.gov/pfas/our-current-understanding-human-health-and-environmental-risks-pfas
[3] https://ecology.wa.gov/Waste-Toxics/Reducing-toxic-chemicals/Addressing-priority-toxic-chemicals/PFAS
[4] https://www.fda.gov/cosmetics/cosmetic-ingredients/and-polyfluoroalkyl-substances-pfas-cosmetics
[5] De Silva AO, Armitage JM, Bruton TA, Dassuncao C, Heiger-Bernays W, Hu XC, Kärrman A, Kelly B, Ng C, Robuck A, Sun M, Webster TF, Sunderland EM. PFAS Exposure Pathways for Humans and Wildlife: A Synthesis of Current Knowledge and Key Gaps in Understanding. Environ Toxicol Chem. 2021 Mar;40(3):631-657. doi: 10.1002/etc.4935. Epub 2021 Jan 29. PMID: 33201517; PMCID: PMC7906948. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7906948/

to centuries[6]. The long-term persistence of PFAS results in accumulation in the environment and living organisms, increasing the risk of exposure and potential harm.

PFAS uptake by plants is influenced by physicochemical properties of compounds (e.g., perfluorocarbon chain length, head group functionality, water solubility, and volatility), plant physiology (e.g., transpiration rate, lipid and protein content), and abiotic factors (e.g., soil organic matters, pH, salinity, and temperature).[7] Bioaccumulation potential varies by type of PFAS and occurs through the food chain, with top predators (e.g., whales, bald eagles, and humans) having the highest levels, and when PFAS accumulate, they can reach concentrations where hazardous effects are observed in humans and ecosystems.[8] The high mobility of many PFAS further exacerbates the concern. Many PFAS can travel long distances from their sources. Short-chain perfluoroalkyl acids (PFAAs) are highly water-soluble and mobile in water, and volatile precursors are likely to be transported to remote regions via the atmosphere and then being degraded to short-chain PFAAs.[9]

III. Role of ACWA and Local Jurisdictions in Addressing PFAS

Workers at all levels of publicly owned treatment works (POTWs) and municipal stormwater systems across Oregon work hard to protect public health and the environment. Their local government leaders are committed to their role as environmental and public health stewards, and their responsibility to address pollution to the extent feasible. PFAS challenges these efforts because POTWs are not designed to remove or treat PFAS or other persistent organic pollutants. It is currently not feasible to remove PFAS from the large volume of wastewater managed by POTWs due to the recalcitrant nature of these "forever" chemicals and due to the prohibitive cost for relatively small PFAS reduction results. Technologies such as granular activated carbon reverse osmosis can remove PFAS but are not practical methods of treatment for POTWs.

Local agencies receive PFAS and other chemical pollutants from businesses and households. They do not use or produce PFAS, but they bear the responsibility for meeting clean water requirements, and the public assumes the cost of new facilities and operations necessary to remove PFAS received from manufacturers and consumers of PFAS-containing products. Depending on both state and federal

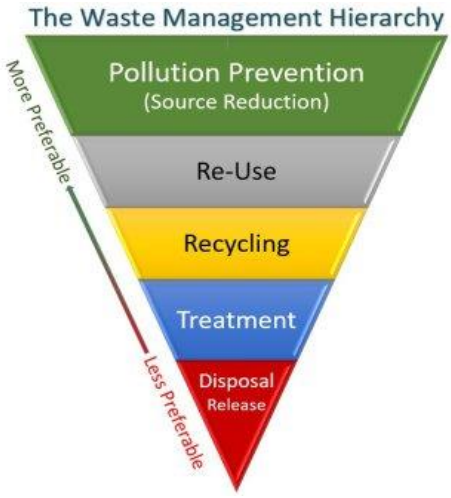
[6] Cousins IT, Vestergren R, Wang Z, Scheringer M, McLachlan MS. The precautionary principle and chemicals management: the example of perfluoroalkyl acids in groundwater. *Environ Int.* 2016;94:331–340. doi: 10.1016/j.envint.2016.04.044.
[7] Wang W, Rhodes G, Ge J, Yu X, Li H. Uptake and accumulation of per- and polyfluoroalkyl substances in plants. Chemosphere. 2020 Dec;261:127584. doi: 10.1016/j.chemosphere.2020.127584. Epub 2020 Jul 19. PMID: 32717507.
[8] Scientific Basis for Managing PFAS as a Chemical Class, Carol F. Kwiatkowski, David Q. Andrews, Linda S. Birnbaum, Thomas A. Bruton, Jamie C. DeWitt, Detlef R. U. Knappe, Maricel V. Maffini, Mark F. Miller, Katherine E. Pelch, Anna Reade, Anna Soehl, Xenia Trier, Marta Venier, Charlotte C. Wagner, Zhanyun Wang, and Arlene Blum, *Environmental Science & Technology Letters* 2020 *7* (8), 532-543 DOI: 10.1021/acs.estlett.0c0025, https://doi.org/10.1021/acs.estlett.0c00255
[9] Brendel S, Fetter É, Staude C, Vierke L, Biegel-Engler A. Short-chain perfluoroalkyl acids: environmental concerns and a regulatory strategy under REACH. Environ Sci Eur. 2018;30(1):9. doi: 10.1186/s12302-018-0134-4. Epub 2018 Feb 27. PMID: 29527446; PMCID: PMC5834591. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5834591/

regulatory approaches, public utilities could shoulder considerable economic costs for monitoring, regulating, removing, and disposing of PFAS discharged to public wastewater systems.

ACWA does not view costly treatment of persistent PFAS pollutants in wastewater and stormwater as an effective strategy, or the appropriate role for clean water utilities. Instead, ACWA asserts that controlling the sources and reducing the use of PFAS in goods is the most effective, efficient, and equitable way to manage PFAS pollution.

As long as PFAS are discharged by industries, remain in products used in our everyday lives, and persist at background levels in the environment resulting from decades of manufacturing and use, PFAS will continue to be found in water and air and on the land. Pollution prevention (i.e., source reduction) should be the first step in addressing sources of PFAS discharged to wastewater and stormwater systems. Moreover, national policy prioritizes pollution prevention as the preferred approach for managing waste and pollution, as stated in the Pollution Prevention Act (PPA) of 1990. The US Environmental Protection Agency (EPA) adopted this policy along with a waste management hierarchy (see Figure 1 below[10]) illustrating preferred waste management approaches in descending order, with disposal or other releases to the environment being the least preferred option.

Figure 1: EPA Waste Management and Pollution Prevention Hierarchy



Source: U.S. Environmental Protection Agency

ACWA and local jurisdictions can work with state and federal environmental regulators to design and implement PFAS regulatory, technical assistance, and public outreach strategies to effectively prevent pollution. Many local clean water agencies are experienced in developing and implementing industrial pre-treatment programs and stormwater management programs that focus on preventing toxic pollutants from entering municipal wastewater and stormwater systems. They also have implemented effective business and public education programs intended to reduce the use of products with toxic and persistent chemicals. Significant progress in reducing PFAS water quality pollution can be made

[10] https://www.epa.gov/trinationalanalysis/pollution-prevention-and-waste-management

through source control and pollution prevention efforts if there is collaboration between local, state, and federal agencies, as well as with industry groups and non-governmental organizations.

IV. PFAS Concerns for Wastewater and Stormwater Management

Although clean water utilities do not use or generate PFAS, they do receive discharges from domestic, industrial, and commercial sources with a wide range of concentrations of PFAS, which pass through wastewater and stormwater systems. PFAS pollutants discharged to wastewater pass through POTWs, contaminating effluent, biosolids, and recycled water. PFAS chemicals released to the environment are found in stormwater. The high level of concern regarding PFAS in wastewater and stormwater is driven by PFAS persistence, ubiquity, and low toxicity levels. The current uncertainty surrounding the science related to risks of PFAS in the environment, compounds these concerns.

Preliminary PFAS monitoring by ACWA members has shown detections in treated wastewater and its by-products. However, without scientifically valid and consistent screening values or standards, the risks to human health and impacts to the environment from discharges to surface water or land applications of biosolids associated with the detected concentrations cannot be fully determined. The absence of risk values for PFAS in treated wastewater, stormwater, and biosolids creates confusion and competing assertions about the safety of discharges with detected levels of PFAS. Addressing the scientific uncertainties related to the environmental risks and the fate and transport of PFAS in a comprehensive and collaborative way should be a top priority of federal and state agencies.

The PFAS monitoring conducted in Oregon and other states also demonstrates that some of the source categories that are known to use or receive PFAS are contributing to PFAS detected in wastewater or stormwater. Known or potential sources of PFAS entering wastewater or stormwater systems include the following:

- Solid Waste Facilities: Some POTWs accept leachate from solid waste landfills and transfer stations. Voluntary monitoring in Oregon to date indicates that levels of PFAS in leachate are higher than the other industrial sources of PFAS analyzed. Landfills, like wastewater treatment plants, are PFAS receivers rather than sources. PFAS contaminating the solid waste handled, stored, or disposed of at these sites comes from widely used materials, like carpets, clothes, cookware, cosmetics, and chemicals. Landfills also receive some industrial or cleanup wastes containing PFAS.
- Industrial Sources: The EPA's October 2021 PFAS Strategic Roadmap identifies industrial categories for which there are enough data to propose industrial wastewater effluent limitation guidelines (ELG's), including:
    - Organic chemicals, plastics, and synthetic fibers manufacturing
    - Metal finishing
    - Electroplating

  Other industrial categories are proposed for more detailed studies by EPA prior to moving forward with rulemaking, including:
    - Electrical and electronic components (including semiconductors)

- Textile mills
- Landfills

Another category of industries identified by EPA are those where phaseout of PFAS is projected by 2024, but still require further monitoring and potential rulemaking:

- Pulp, paper, and paperboard
- Airports

- Firefighting Foam Sources: In addition to airport facilities, other potential sources of PFAS-based firefighting foam (aqueous film forming foam or AFFF) contamination include fire training centers, fire departments that store AFFF, military facilities, and ports. Because AFFFs are applied to surfaces in the environment, these potential sources pose risks to municipal stormwater systems and groundwater more than wastewater. However, some automated firefighting foam systems have been installed inside hangars or other port facilities, which could result in discharges to wastewater systems. The Department of Defense and the Federal Aviation Administration are evaluating PFAS-free fire-fighting foams and are working to replace them in military facilities with less toxic alternatives.
- Domestic Sources: Given the ubiquity of PFAS in consumer products - such as outdoor apparel, furniture, carpeting, food packaging, pesticide products, and cookware - PFAS discharges to wastewater and stormwater systems from households and non-industrial businesses and institutional facilities can collectively contribute notable loadings of PFAS to municipal wastewater.
- Air Emissions: States in the northeastern U.S. have observed PFAS in soil and groundwater from local industrial air deposition.[11] Research also has indicated global atmospheric deposition of PFAS and levels of concern in rainwater.[12] Like mercury and PCBs, these global sources of deposition may be contributing background levels of PFAS in stormwater, soils, and surface and groundwaters.

V. ACWA Principles and Perspectives on Tackling PFAS

Local government agencies provide essential public services such as safe drinking water, wastewater treatment, and water and biosolids recycling. They are committed to ensuring safe drinking water and protecting water, land, and air quality through delivery of these services. PFAS chemicals pose complex emerging contaminant issues for clean water agencies, and the scale and pace at which all levels of government and the private sector are responding to the issue is extraordinary.

Responding to the challenges and potential risks posed by PFAS in commerce and in the environment requires a collective effort by all levels of government, as well as industry, communities, and non-governmental organizations. ACWA recommends integration of the following foundational actions that should underpin PFAS assessment, management and reduction actions taken by public agencies:

[11] Tim Schroeder, David Bond, Janet Foley. PFAS soil and groundwater contamination via industrial airborne emission and land deposition in SW Vermont and Eastern New York State, USA, Environmental Science: Processes & Impacts, Issue 2, 2021. https://pubs.rsc.org/en/content/articlelanding/2021/em/d0em00427h

[12] https://phys.org/news/2022-08-rainwater-unsafe-due-chemicals.html

- Develop a plan with a prioritized sequence of actions to reduce human exposure and environmental harm. The goal should be to determine the most effective, feasible, and affordable actions
- Use scientifically valid and reproduceable data to make risk management decisions.
- Take a comprehensive, long-term approach to addressing PFAS environmental and public health risks that includes air, land, and water, and that addresses the entire class of PFAS chemicals.
- Ensure stakeholder engagement in the development and implementation of PFAS regulatory requirements.
- Focus PFAS environmental management strategies on reducing chemicals at the source, rather than relying on treatment, remediation, or restrictions on beneficial use of wastewater, biosolids, or recycled water that are not supported by regional or site-specific data.
- Provide local wastewater and stormwater management agencies with the guidance, flexibility, and funding they need to implement PFAS clean water requirements.
- Facilitate collaboration that can leverage collective resources among local, state, and federal agencies to effectively and efficiently achieve common goals.

These overarching approaches underlie recommendations and proposed actions described below. The following sections summarize current and recommended future PFAS assessment, reduction, and management actions. The actions and recommendations are organized by level of government.

VI. ACWA Recommendations for U.S. EPA and Other Federal Agency Actions

Federal, state, local, and tribal governments each have a unique set of authorities, roles, and tools to address PFAS concerns. For instance, EPA has statutory authority to restrict chemicals in products through the Toxics Substance Control Act (TSCA). This authority is not delegated to state or local governments. State and local agencies, on the other hand, are better positioned than EPA to assess industrial PFAS sources in individual communities and to reach out to businesses about pollution prevention options. The recommended actions below reflect an "all-of-government" approach to reducing PFAS risks and pollution.

EPA's role in reducing PFAS pollution is to establish a regulatory framework for PFAS pollution management, and to establish the scientific underpinnings for regulations and policies. EPA is implementing several PFAS regulatory and research initiatives that will impact states, local governments, industries, and communities across the nation. EPA developed an initial PFAS Action Plan in 2018. In October 2021, EPA released the PFAS Strategic Roadmap outlining plans to tackle the PFAS problem across its major program areas. To date, no federal PFAS pollution regulations have been finalized, although non-regulatory health advisory and toxicity screening levels have been established.

Current federal actions, and ACWA recommendations for priority actions that support reducing PFAS pollution at the local level, are summarized below. It should be noted that some of the recommended actions may also apply to Oregon DEQ actions (e.g., water quality criteria implementation).

Federal Approach to Managing PFAS

ISSUE: There are thousands of PFAS in commerce and in the environment from legacy uses and transformation products. All PFAS have certain characteristics in common, and the resource and regulatory challenges of addressing PFAS on a substance-by-substance basis are immense.

Most of EPA's current PFAS regulatory proposals focus on a small number of individual chemicals, primarily Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS). However, the number of currently identified individual PFAS compounds, is estimated at nearly 9,000[13], continues to increase. EPA should take a "class" approach to managing PFAS, which would reduce the length of time associated with developing and implementing PFAS regulations for such a large number of chemicals. In some instances, regulating PFAS sub-classes (e.g., grouped chemical structure types) may be more feasible than including all PFAS in a single regulatory action.

Although there is a need for EPA to develop toxicity values for the most widely used and detected PFAS compounds, regulating these chemicals individually would result in an inefficient "whack-a-mole" approach, which is not feasible. All PFAS compounds share the common attributes of persistence and mobility in the environment. In addition, virtually all the thousands of PFAS can be roughly subdivided into four interrelated categories: perfluoroalkyl acids (PFAAs), PFAA precursors, perfluoro-polyethers (PFPEs), and fluoropolymers. The majority of PFAS are PFAA precursors and can degrade or metabolize into PFAAs (e.g., PFOA and PFOS) in the environment or living organisms.[14]. These factors argue for a collective "class" approach rather than an individual chemical approach. Managing PFAS as a class would be more effective for state and federal regulators and the regulated community because the chemical-by-chemical approach would be highly resource-intensive and would span many years, which would result in prolonged risks to the public and greater cumulative implementation costs.

Recommended Actions:

- When feasible, ACWA recommends that EPA address PFAS as a class, or as sub-classes, because it is likely the most effective and efficient way to regulate PFAS and would save time in reducing PFAS in the environment. The key factor in making this approach workable with pollution regulations is to allow flexibility and, in some cases, require implementation of pollutant minimization plans instead of compliance with numeric "end-of-pipe" limits on a few PFAS chemicals.

Research on PFAS Toxicity and Risk

ISSUE: Many data gaps exist regarding PFAS toxicity, risks, exposures, and fate and transport in the environment. To ensure development of sound PFAS management policies and programs, these gaps need to be addressed through rigorous research and data generation.

[13] Forever Chemicals Are Widespread in U.S. Drinking Water - Scientific American

[14] (PDF) Regulating PFAS as a Chemical Class under the California Safer Consumer Products Program (researchgate.net)

EPA's Office of Research and Development has been working on PFAS toxicity, and fate and transport research, for several years, and the new PFAS Strategic Roadmap commits EPA to science-based decision-making. The purpose of EPA's research is to ensure that their decisions address known risks of PFAS in a way that optimizes the allocation of limited public resources. Understanding PFAS concentrations, toxicity levels, and occurrences when PFAS levels exceed toxicity duration and frequency thresholds is the foundation for establishing acceptable risk. There currently are gaps in our understanding of how individual PFAS and PFAS transformation products behave in the environment, including their fate, transport, toxicity, exposure routes, and associated risks. As EPA expands its data on PFAS, the toxicity information can be coupled with exposure data to determine if regulatory action is needed. In the absence of a comprehensive and definitive federal PFAS toxicity data set, states may develop, and in some cases have already developed, regulatory action levels that could vary greatly and lack a robust scientific basis.

Recommended Actions:

- ACWA recommends EPA accelerate its scientific research to fill the significant knowledge gaps about PFAS human health risks and environmental impacts and use its authority under TSCA to require chemical manufacturers to conduct toxicity testing of currently used PFAS. It is important for EPA to expand on the limited information currently available. EPA also should effectively communicate the data needed to determine whether there is a risk to public health versus data that simply documents the presence of PFAS chemicals above laboratory analytical detection limits.

Federal Chemical and Product Restrictions

ISSUE: The growing number of PFAS substances found in consumer and business products is creating both legacy and future PFAS pollution. The most efficient and cost-effective way to prevent further long-term effects of PFAS in commerce and in the environment is to reduce them through federal actions that assess and manage risks at the chemical and product manufacturing level.

While some states have begun to adopt PFAS restrictions, state legislatures typically enact restrictions on a product-by-product or chemical-by-chemical basis. In some cases, manufacturers change to different types of PFAS that are unregulated but may have similar toxicity and persistence as the regulated compound(s). The ubiquitous use of PFAS throughout the nation calls for a federal approach to reducing or eliminating PFAS in consumer products. TSCA, as amended in 2016, grants EPA significant authority to evaluate and manage risks associated with chemicals used in consumer products and industrial processes through restrictions on uses and importation. In its 2021 Strategic Roadmap, EPA outlines several PFAS-related actions it plans to take under TSCA, including actions that address both new and existing chemicals. Similarly, the Food and Drug Administration (FDA) has broad authority to restrict chemical additives in food products, cosmetics, and pharmaceuticals. The FDA is engaged in testing and regulation of PFAS uses in food contact applications, as well as research and data review of PFAS uses in cosmetics.

Furthermore, without increasing restrictions on PFAS in the marketplace, relatively little progress can be made in reducing PFAS impacts on the environment. Even if massive investments in treatment and control technologies are made, effective and reasonably affordable technologies that can break down these "forever chemicals" remain elusive.

Recommended Actions:

- ACWA recommends that EPA and FDA take a more protective approach in prohibiting the non-essential use of all types of PFAS in goods and food packaging.
- ACWA recommends that EPA invest in scientific research to identify and fully assess alternatives to PFAS for specific types of essential uses. Research and assessment efforts should involve a wide range of stakeholders to evaluate the safety, performance, economic feasibility, and life cycle impacts of alternatives.

Clean Water act (CWA) Analytical Methods and Guidance

ISSUE: The extremely low concentrations of concern for PFAS in water, and the potential for contamination of samples, pose major challenges for environmental monitoring efforts. Without rigorous and well-vetted analytical methods, the data produced from environmental samples cannot be relied on to make sound policy and program decisions.

With advanced analytical techniques, PFAS compounds are being detected at the parts per trillion (ppt) level mainly through two EPA drinking water test methods. To put such levels into context, one part per trillion is one droplet in an Olympic-sized swimming pool. EPA released new single-laboratory draft validated method (1633) that includes 40 PFAS compounds for wastewater and biosolids in September 2021. In April 2022, EPA published a screening method (1621) for Adsorbable Organic Fluorine (AOF) in water and wastewater. This method generally quantifies the amount of all PFAS and non-PFAS compounds containing at least one carbon-fluorine bond.

Recommended Actions:

- ACWA recommends that EPA complete its multi-laboratory validation studies, finalize multi-lab Methods 1633 and 1621, codify them into federal rules expeditiously, and provide guidance on implementation. It will be important to resolve problems associated with laboratory equipment, contamination, and instrument sensitivity before EPA gives final approval to multi-laboratory CWA analytical methods.

Clean Water Act Regulations for "Upstream" Industrial Sources of PFAS

ISSUE: There are currently no pretreatment standards for PFAS wastewater pollution. Such standards are critical tools for municipal clean water agencies to help reduce PFAS loadings to water.

The 2021 EPA PFAS Strategic Roadmap commits to development of CWA effluent limitations guidelines (ELGs) for some industrial categories and commits to further research and monitoring for others.

Implementing source control measures for producers and users of PFAS is a necessary and the most cost-effective first step to reduce or eliminate PFAS discharges to POTWs and municipal separate stormwater systems (MS4s) and direct discharges to surface waters.

A comprehensive approach to establishing ELGs for a wide range of industries should be implemented to ensure that consistent standards are developed to achieve uniform technology-based controls nationwide. Under a national control approach, all major industrial PFAS dischargers would be identified and required to implement source control measures, thereby supporting local clean water agencies' responsibility to reduce or eliminate PFAS pollution discharged to POTWs. National guidelines also create incentives for industries to switch to less toxic and persistent alternatives or change manufacturing processes in ways that reduce PFAS use. Source reduction and pollution prevention measures are preferred over uncertain PFAS pollution treatment methods from both an economic and environmental impact perspective.

Recommended Actions:

- ACWA recommends that EPA expeditiously complete its study of PFAS use, treatment, and discharges by industrial categories specified in the 2021 Strategic Roadmap. EPA should expand the study beyond the limited list of identified industrial categories and should consult with state and local governments to collect data on other industrial sectors that would be candidates for ELGs.
- EPA should develop flexible ELGs and pretreatment standards that allow for new information and technology to be incorporated into use by industry, and that are implementable by POTWs in their industrial pretreatment programs. For example, pollution prevention or minimization management plans should be available regulatory tools rather than numeric effluent limits for industrial sectors.
- EPA should ensure that POTWs are not held responsible for enforcing unattainable industrial PFAS limits, because the chemical complexities, massive number of chemicals, and the monitoring costs of would make a "zero discharge" limitation for some industrial categories difficult, if not impossible, for local wastewater agencies to enforce.

Biosolids Risk Assessment

ISSUE: More research data is needed to answer questions about PFAS fate and transport, as well as exposures and risks, associated with biosolids applied to different types of land under variable conditions and factors.

Communities in Oregon and the across the country produce and must manage biosolids in large quantities. Many POTWs in Oregon have beneficial reuse/land application programs as part of their sustainable utility management strategies. Biosolids are beneficial for the environment and the economy as they enhance soil health, recycle nutrients, and reduce fertilizer and pesticide use.

EPA has similarly recognized the multiple benefits of biosolids land application. As stated in its Biosolids Technology Fact Sheet: *"Recycling biosolids through land application serves several purposes. It improves soil properties, such as texture and water holding capacity, which make conditions more*

favorable for root growth and increases the drought tolerance of vegetation. Biosolids application also supplies nutrients essential for plant growth, including nitrogen and phosphorous, as well as some essential micronutrients such as nickel, zinc, and copper. Biosolids can also serve as an alternative or substitute for expensive chemical fertilizers. The nutrients in the biosolids offer several advantages over those in inorganic fertilizers because they are organic and are released slowly to growing plants. These organic forms of nutrients are less water soluble and, therefore, less likely to leach into groundwater or run off into surface waters."[15]

To assess the potential health risks of biosolids land application, EPA is developing a risk assessment process involving an independent Scientific Advisory Board. EPA undertook a similar risk assessment effort in the 1980's when the 40CFR Part 503 rule was being developed. In that risk assessment, metals such as cadmium and lead were the focus and thresholds were developed for safe levels in biosolids and soil. The limits that were established resulted in wastewater agencies focusing on industrial pretreatment and source control. As a result, exceedances of the established thresholds are rare today. The new risk assessment is scheduled for completion by Winter 2024. Risk assessment findings will provide clean water utilities, policy makers, and the public with a better understanding of the potential impacts of land application of biosolids containing PFAS at specific concentrations, and under certain environmental conditions. The findings can also help to put the PFAS risks into context relative to the risks from other pollutants and other options for managing PFAS in wastewater treatment by-products. The other options for managing biosolids pose potential risks to human health and the environment. Incineration of biosolids can release PFAS to the air of surrounding communities. Disposing of biosolids at solid waste landfills likely increases the concentrations of PFAS in landfill leachate, which is typically discharged to municipal wastewater treatment plants.

The State of Michigan has determined that biosolids without direct industrial impacts are unlikely to lead to water contamination above established state drinking water standards. Wastewater and biosolids monitoring by the State of Michigan showed that POTWs receiving discharges from industrial facilities using PFAS had notably higher concentrations of PFAS in wastewater and biosolids than those POTWs without such industrial sources[16]. Land application of "industrially-impacted" biosolids was suspended and source control initiatives were undertaken. The high PFAS concentrations in wastewater and biosolids were greatly reduced in Michigan through industrial pretreatment requirements and other source control methods.

Recommended Actions:

- ACWA recommends EPA prioritize resources or its biosolids risk assessment to provide a robust scientific basis for guidance and regulation of biosolids land application practices. The current uncertainty about risks creates questions among landowners and the public about the safety of

[15] United States Environmental Protection Agency, Biosolids Technology Fact Sheet: Land Application of Biosolids, EPA 832-F-00-064, September 2000

[16] Michigan Department of Environment, Great Lakes, and Energy, Summary Report: Initiatives to Evaluate the Presence of PFAS in Municipal Wastewater and Associated Residuals (Sludge/Biosolids) in Michigan, June 2020

biosolids land application, which makes it challenging for clean water agencies to plan for future biosolids management practices and associated costs.

- EPA should provide additional funding to states, local clean water agencies, and research institutions to support field-level research that can validate and augment EPA's own research findings.

PFAS Water Quality Criteria Development Considerations

ISSUE: There are no national PFAS water quality criteria that can be used to evaluate monitoring data, determine surface water impairments, and effectively regulate pollutant discharges.

EPA is currently developing water quality criteria for certain PFAS. The PFAS Strategic Roadmap calls for EPA to develop *aquatic life criteria* for PFOA and PFOS by Winter 2022 and *human health criteria* by Fall 2024. Human health water quality criteria for other PFAS compounds will be established later when final toxicity assessments are available. The goal of the water quality criteria is to establish thresholds that enable surface waters to support beneficial uses and ensure human safety.

Given the toxicity and persistence of PFAS compounds, it is likely that the criteria EPA develops will be quite low relative to other toxic pollutants. However, PFAS also present an acute pollution control challenge due to their strong carbon-fluorine bonds, which technologies developed to date are unable to destroy in an effective and feasible way at scale. POTWs cannot treat to a zero-level of PFAS. Even if zero were possible, removing PFAS chemicals from municipal wastewater would require advanced treatment techniques such as granular activated carbon, ion exchange, or reverse osmosis – all of which are prohibitively expensive for the substantial volume of wastewater that would need to be treated to meet any CWA water quality criteria. Further, the PFAS would still exist in the treatment residuals, which would need to be managed.

In addition, the persistent and ubiquitous nature of PFAS in the environment means that there are background levels of PFAS from diffuse sources, including atmospheric deposition and rainwater, as well as continuous discharges from unregulated residences and commercial businesses into local wastewater and stormwater systems. The most recent scientific research shows that entire sub-classes of PFAS compounds could potentially pose significant environmental and public health risks. However, it is practically impossible to monitor and set criteria for hundreds of individual PFAS compounds in those sub-classes. Thus, compliance costs for POTWs, as well as implementation costs for EPA and states, could become prohibitive.

Recommended Actions:

- ACWA recommends that EPA, prior to establishing water quality criteria, act on other priority PFAS regulatory initiatives, including those related to TSCA rules, PFAS toxicity values, new analytical methods, ELGs for industry, and drinking water standards. These other regulations will help provide a sound foundation for developing stream water quality criteria. EPA also should evaluate how a class, or sub-class, approach could be feasibly integrated into future criteria development plans.

- ACWA recommends that EPA build into its water quality criteria rulemaking flexible alternative approaches for permittees to meet established criteria. This would enable collective public resources to be used most effectively to achieve the greatest environmental gain. Enforceable pollution prevention or minimization plans can achieve effective results at lower societal costs than adding advanced treatment systems. This approach has been effective in Oregon and other parts of the country in reducing mercury and other toxics in wastewater discharges and they are even more appropriate if dozens - or hundreds - of PFAS are eventually regulated.

Drinking Water Assessment and Standards

ISSUE: There are no national PFAS drinking water standards available to evaluate monitoring data for multiple PFAS, prioritize areas for pollutant source identification, and effectively ensure safety of public drinking water.

EPA required initial monitoring of a small subset of PFAS between 2013-15 as part of the Third Unregulated Contaminant Monitoring Rule ("UCMR 3") under the Safe Drinking Water Act (SDWA). Monitoring results showed that public water systems in 29 states had detected at least one PFAS compound in their water supplies.[17] No PFAS detections were recorded in Oregon as part of UCMR 3 testing. In addition, very few detections were observed in 2021 as part of state-sponsored testing of 140 public drinking systems in Oregon.

In 2016, EPA established drinking water lifetime health advisory levels (HAL) of 70 ng/l for PFOA and PFOS. Since that time, state and local governments around the nation have found multiple PFAS in more public drinking water supplies through site investigations. Some states have established their own standards or advisory levels (including Oregon) in response to evolving science on the toxicity of PFAS. Currently, there are seven states with enforceable regulatory standards for drinking water and another ten states with advisory levels.[18] In 2022, EPA revised the HALs for PFOA and PFOS, which are now thousands of times lower than the 2016 advisory levels.

States that are setting their own PFAS drinking water standards are using different policy and technical approaches for establishing those regulatory values, rather than relying on a set of uniform federal regulatory standards. As a result, there are wide variations in numeric standards for the same PFAS constituents. Other states may face significant technical and resource obstacles in setting their own standards and are looking to EPA to establish national standards for multiple PFAS that may be found in drinking water. EPA has committed to completing a final rule for maximum contaminant levels (MCL) for PFOA and PFOS in the Fall of 2023.

[17] PFAS monitoring results from Third Unregulated Contaminated Monitoring Rule can be found at https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule#3

[18] The Environmental Council of States (ECOS) has compiled a summary of state PFAS standards and advisory levels: https://www.ecos.org/documents/ecos-white-paper-processes-and-considerations-for-setting-state-pfas-standards-2021-update/

EPA also will evaluate additional PFAS and consider regulatory action on groups of PFAS under the SDWA. To accomplish this, EPA will require additional PFAS monitoring of 29 PFAS starting in 2023 as part of the proposed "UCMR 5." This will greatly expand the number of drinking water systems collecting PFAS samples, which will allow a more accurate assessment of the extent to which public drinking water supplies exceed proposed standards and advisory levels.

The additional monitoring data generated from federal and state initiatives, as well as new enforceable federal standards, can be useful to POTWs. If drinking water systems downstream from POTWs detect elevated PFAS levels, wastewater agencies will have more site-specific information with which to approach industrial sources to implement source control or pollution prevention measures.

Recommended Actions:

- ACWA recommends EPA expedite the process for establishing MCLs for all PFAS or large sub-classes of PFAS. State and local authorities are detecting several types of PFAS in drinking water and need to ensure safety of water supplies and communicate risks to the public.
- In the absence of enforceable standards for PFAS, ACWA recommends that EPA expand risk communication information and resources available to drinking water utilities to facilitate consistent messaging about PFAS risks.
- ACWA recommends EPA provide financial support to small- and medium-sized drinking water systems that have limited resources to conduct expensive PFAS sampling and analysis.

Toxic Release Inventory (TRI) Reporting of PFAS

ISSUE: Information currently available regarding the use and release of PFAS pollutants by specific industrial facilities is limited. More data on industrial PFAS uses and pollutant generation would help clean water agencies and states effectively focus their source control and pollution prevention work.

The National Defense Authorization Act (NDAA) of FY 2020 added 172 PFAS chemicals to the Toxic Release Inventory (TRI) through the Emergency Planning and Community Right-to-Know Act and Prevention Pollution Act. EPA added four more in 2021 and, at the direction of the NDAA, added another four in 2022, increasing the total number of reportable PFAS to 180. The use reporting threshold for all PFAS is 100 pounds, which is much lower than most other TRI chemicals. The data collected from industries using and releasing PFAS to the environment can help identify the types of industrial sectors using PFAS. This information can then be used by federal, state, and local regulatory agencies to identify PFAS sources, establish PFAS discharge limits, and conduct source reduction technical assistance for industries.

Industries included in the new TRI reporting requirement have been required to report air, water, and land releases of PFAS compounds since July 1, 2021. EPA released its preliminary PFAS data review of 2020 TRI reports, noting that only 38 facilities reported releases of 44 PFAS chemicals throughout the country. Although this data is still preliminary, the initial level of TRI reporting clearly does not reflect the true number and types of facilities that generate PFAS pollution based on existing knowledge of PFAS use by various industrial sectors.

Recommended Action:

- ACWA recommends that EPA rigorously enforce the PFAS TRI reporting requirement to ensure accurate reporting by sectors known to use PFAS. A complete TRI data set will inform EPA, states, and local clean water agencies regarding the types and amounts of PFAS used in various industrial sectors, thereby allowing for effective and accurate implementation of ELGs and other PFAS pollution controls and source reduction actions.

Hazardous Waste, Environmental Cleanup and Air Quality Actions

ISSUE: PFAS releases to land and air environments can eventually lead to surface and groundwater contamination, and water quality regulations cannot directly address those types of releases. Designations of PFAS under these federal regulations can have unintended consequences for the nation's clean water agencies.

In addition to addressing PFAS pollution through the CWA and SDWA, EPA can use authorities under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as the Superfund Program) and the Resource Conservation and Recovery Act (RCRA) to regulate PFAS-laden solid wastes disposed of in landfills or directly land applied where PFAS can be mobilized by stormwater into surface water or leach into groundwater. Similarly, industrial air discharges of PFAS can result in deposition to land and transported to surface or groundwater.[19]

Currently, there are no federal hazardous waste, cleanup, or air quality regulations or standards for PFAS pollutants. However, EPA is proposing a rulemaking that will designate PFOA and PFOS as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as the Superfund Program). These rules will allow EPA, and eventually states, to require responsible parties to report PFOA and PFOS releases and to compel investigations and cleanup actions if specified levels are exceeded. Defining the breadth of CERCLA liability is a critical element of this rulemaking. If there are no explicit limitations stated in the rule, POTWs could be liable for cleanups.

EPA has also initiated a rulemaking to add four PFAS chemicals as RCRA Hazardous Constituents. This RCRA action is the first step in the process of regulating PFAS as hazardous waste. Once PFAS become hazardous waste, wastewater discharges of PFAS would likely be prohibited in all, or most, circumstances. Industrial operations generating certain PFAS wastes would need to comply with RCRA rules, including ensuring destruction or disposition at permitted hazardous waste facilities with strict air, land, and water quality protections.

The EPA PFAS Strategic Roadmap commits EPA to identifying sources of PFAS in air emissions, measuring stack emissions and ambient air concentrations, developing information on mitigation

[19] PFAS soil and groundwater contamination via industrial airborne emission and land deposition in SW Vermont and Easter New York State, USA: https://www.researchgate.net/publication/348165872_PFAS_soil_and_groundwater_contamination_via_industrial_airborne_emission_and_land_deposition_in_SW_Vermont_and_Eastern_New_York_State_USA

technologies, and increasing understanding of fate and transport to determine impacts to water. The agency could list certain PFAS as "Hazardous Air Pollutants" (HAPs) under the Clean Air Act if the results of their research and studies indicate a need for regulation.

Recommended Actions:

- ACWA recommends that EPA exempt POTWs from liability under CERCLA in the promulgation of the CERCLA designation rules for PFOA and PFOS and any additional PFAS designated in the future. This exemption would recognize that POTWs are receivers, and not generators of PFAS wastes, and that POTWs are not designed to treat them.
- ACWA recommends that EPA consider taking the following regulatory actions in addition to regulating PFOA and PFOS:
    - Designate all PFAS, or sub-classes of PFAS, as hazardous substances under CERCLA to ensure currently used PFAS do not become cleanup problems in the future.
    - List all PFAS, or sub-classes of PFAS, as hazardous wastes under RCRA to ensure that they are not disposed of in solid waste landfills, with limited protections for leachate discharged to municipal wastewater or stormwater systems.
    - List PFAS, or sub-classes of PFAS, as Hazardous Air Pollutants, under the Clean Air Act if the nationwide PFAS air emissions assessment indicates significant potential risks.

VII. ACWA Recommendations for Oregon DEQ and Other State Agency Actions

States have unique roles in assessing, regulating, and managing PFAS pollution, including implementing federal regulations and identifying statewide research, data, and policy needs. Many states, including Oregon, are tracking EPA actions closely to ensure that they do not duplicate, and remain consistent with, federal actions. The State can manage PFAS pollution through its regulatory agency programs (for example, DEQ has lead responsibility for addressing toxic pollutants and OHA has lead responsibility for regulating public drinking water safety and implements other programs focused on public health protection related to toxic pollutants, such as issuing fish consumption advisories).

DEQ and OHA created an inter-agency team in 2019 to coordinate and engage with other Oregon state agencies, the EPA, and other states. This inter-agency coordination provides a forum for future statewide PFAS policy and programmatic work. DEQ and OHA have prioritized the assessment and protection of public drinking water supplies and, in 2021, tested 140 public water systems for PFAS as part of a risk assessment plan. The monitoring showed PFAS detections in 0.2% of all sample results. The risk assessment plan will also include an initial inventory of potential PFAS sources based on existing available information about PFAS use in specific industrial and institutional sectors.

The sites in Oregon where DEQ's Environmental Cleanup Program has identified PFAS contamination are primarily related to the use of AFFF at military facilities, fire training facilities, and airports. Several other industrial sectors in Oregon likely use and release PFAS, but they have not yet been identified. DEQ has begun to evaluate State PFAS solid waste disposal policies to address impacts from the

presence of PFAS in landfills. In collaboration with other states and organizations, DEQ also is working to advance PFAS source reduction by evaluating safer alternatives to PFAS in common consumer and business products[20], as well as developing State government procurement guidelines and specifications, based on Governor's Executive Order 12-05[21] intended to reduce PFAS in state-purchased products.

DEQ's current efforts complement EPA's PFAS efforts rather than duplicating them. In the future, DEQ also will need to establish plans and policies for implementation of future federal PFAS regulations and other pollution management programs. Finally, DEQ will need to identify any gaps in federal regulations that would adversely affect Oregon, and then develop strategies to address those gaps.

ACWA's areas of interest for state policies and programs and recommended actions for DEQ and other state entities are summarized below.

Integrated Statewide Plan for Addressing PFAS

ISSUE: PFAS pose unique and multi-faceted challenges for managing water, land, and air resources, warranting an integrated and comprehensive planning effort by the State of Oregon.

As noted above, State of Oregon agencies are evaluating and developing responses to concerns about PFAS in Oregon's environment, and they are actively coordinating these efforts. However, other states are developing more comprehensive PFAS action plans in response to orders from legislatures, governors, or environmental agency directors. For instance, Wisconsin's Governor issued a PFAS executive order creating a PFAS coordinating council to develop a multi-agency PFAS action plan. Also, the Washington Department of Ecology has developed a PFAS Chemical Action Plan that prioritizes PFAS concerns and, outlines recommended actions. EPA's 2021 PFAS Strategic Roadmap takes a similar comprehensive approach. These far-reaching governmental initiatives reflect the unique challenges posed by PFAS, including the vast number of individual substances, their ubiquity in products and the environment, their persistence in the environment, and their exceedingly low toxicity levels.

Although DEQ has added PFAS to its Toxics Focus List of priority chemicals and is incorporating PFAS into some existing Toxics Reduction Strategy actions, the potential scope and significance of PFAS environmental and health impacts justify development of a more robust strategic action plan.

The State should have a prioritized work plan to address the multi-faceted challenges for managing water, land, and air resources to address PFAS risks. State action serves as a bridge between local and federal efforts in getting more information on sources and locations, focusing on source reduction opportunities, protecting drinking water sources, cleaning up contaminated properties, and getting science-based information on the benefits and risks of biosolids land application. A more strategic and transparent approach to PFAS efforts, will better allow for a broad range of prioritized research, policy,

[20] Oregon DEQ and OHA are members of the Interstate Chemicals Clearinghouse and participate in its PFAS Workgroup: https://theic2.org/workgroups#gsc.tab=0

[21] Executive Order 2012-5, Fostering Environmentally-Friendly Purchasing and Product Design: https://theic2.org/workgroups#gsc.tab=0

regulatory, and communications activities to be executed in tandem with other State and local government partners. Importantly, it also will ensure that state programs are well-coordinated and not working at cross-purposes.

Recommended Actions:

- The Governor's Office should initiate an inter-agency effort, led by DEQ, to develop an integrated and comprehensive PFAS strategic action plan. The plan should identify current and future prioritized actions related to environmental assessment, regulatory policy, pollutant source reduction, and technical assistance and outreach. The plan should provide State and external stakeholders with opportunities for input and should result in greater certainty and clarity about the PFAS-related initiatives to anticipate over time. The plan should create an institutionalized structure for intra-agency and inter-agency coordination, and should include the following elements at a minimum:
    - *An assessment of short and long-term PFAS environmental monitoring needs.* DEQ should build on the 2021 DEQ-OHA drinking water monitoring initiative by developing comprehensive monitoring objectives for land, air, and water and outline how the objectives can be achieved in partnership with EPA, local governments, and other state and federal agencies. Some monitoring actions may need to wait until EPA finalizes development of analytical methods, but the needs and plans can be described so partners and policy makers can coalesce around common monitoring goals and can identify funding.
    - *Identification of Oregon PFAS policy gaps and proposed solutions.* The plan should identify policy gaps and should prioritize them based on the likely risks to human health. An example of a potential policy gap could include addressing PFAS-using industrial sectors that are well-represented in Oregon, but not prioritized by EPA in its proposed regulatory and research initiatives. Another gap may be insufficient DEQ or OHA legal authorities to set policies to address some PFAS problems, such as policies that would reduce PFAS-containing products in commerce. Actions that are currently readily feasible and that would most directly reduce human health exposures should rank the highest. The plan also should identify any additional authority needed by the DEQ.
    - *A strategic approach for implementing prospective new federal or state PFAS regulations and permitting requirements in air, water, and land quality programs.* DEQ's strategic approach should include advisory input from local government water quality agencies and industries that would be regulated. This is necessary to ensure that strategies and proposed permitting policies are feasible, implementable, and cost-effective mechanisms to achieve meaningful PFAS reductions. This also is necessary to provide permittees with regulatory certainty and consistency so they can reliably plan for pollution reduction/minimization plans and other new programs or limitations that may be required. The DEQ PFAS strategic plan should include prioritized regulatory frameworks and permitting tools that focus on cost-effective and implementable source reduction strategies. Also, permits and policies that govern activities at solid waste management facilities should address adequate controls for PFAS waste and by-products to reduce PFAS discharges to the wastewater stream.

- *Identification of PFAS chemical source reduction activities that complement the existing Toxics Reduction Strategy actions.* Chemical source reduction work that is occurring as part of the DEQ Toxics Reduction Strategy and additional initiatives that expand on that work should be prioritized and incorporated in the action plan.
- *Identification of Agency Resource Needs for the Action Plan*. It is likely that additional funding will be needed to support the completion and implementation of a comprehensive PFAS action plan. In certain instances, reprioritization of resources within the agencies may help address some plan objectives. However, to sufficiently fund a comprehensive PFAS reduction effort, the Governor's Office and DEQ will need to build support from water environment stakeholders, local government partners, and the Legislature to secure additional resources.

State PFAS Water Quality Policy Framework and Implementation Plans

ISSUE: Federal and state PFAS water quality regulations will likely be established episodically over a long period of time. As a result, a statewide plan for how and when the state implements these regulatory actions will increase consistency, efficiency, and transparency.

One potentially challenging aspect of managing emerging contaminants like PFAS in water is the phase-in of new federal or state regulations or guidance across the entire state. Many State agency staff are unfamiliar with PFAS as a class of pollutants, the challenges associated with monitoring and evaluating them, and the technological limitations for managing them. A comprehensive water quality policy framework and an implementation plan for developing State environmental policies would provide staff with the information and tools they need to incorporate PFAS conditions in permits and rules effectively and appropriately. Striking the appropriate balance between consistency and flexibility in permit implementation is important, and the statewide framework should provide State agency regional offices with the flexibility needed to accommodate local circumstances and needs.

A State comprehensive regulatory framework and implementation plan to address PFAS in water quality permitting and rule development also will enable organizations like ACWA to educate and provide peer support to permittees regarding compliance with the monitoring, pollutant management and other requirements. A PFAS condition added to a single permit in one part of the state without being thoroughly reviewed by the statewide policy group can become precedent setting, even if it does not effectively and affordably minimize PFAS pollutant discharges. Robust and inclusive review of new water quality permit conditions within state regulatory agencies, in consultation with stakeholders will help to avoid such unintended consequences.

Recommended Actions:

- Oregon DEQ's Water Quality Program should develop a clear statewide framework for the development and implementation of any prospective PFAS regulations, standards, and limits and/or conditions in municipal wastewater and stormwater permits. This framework should describe how and when regulatory and permitting policies will be developed and rolled out. It also should identify major milestones in the process and how and when stakeholders will be engaged.

- Based on the statewide framework, DEQ's Water Quality Program should also develop an implementation plan that clearly articulates how prospective water quality requirements will be incorporated into permits. The plan should provide implementation specifics for each element of the policy framework. The objective of this plan would be to ensure that PFAS are managed effectively across the state through clear, actionable guidance that is applied consistently and is well understood by regulators and permittees.

PFAS-in-Biosolids Assessment and Management Approaches

ISSUE: Several concurrent biosolids risk assessment efforts are underway at the federal level and throughout the U.S. The State or Oregon needs to determine how the research findings will apply to existing or future biosolids management policies.

EPA is researching the risks posed by PFAS in treated wastewater and biosolids and is establishing scientifically supported toxicity values, ELGs, and management approaches. Although EPA is leading the biosolids work, states play a major role in evaluating data on PFAS in biosolids and wastewater effluent. The benefit of active state agency involvement in data review is to help determine relative risks of biosolids land application in various parts of the state with varied soil, hydrology, and crop types. The resource recovery and land productivity benefits of biosolids in Oregon needs to be considered relative to sources, concentrations and risks associated with detected PFAS in biosolids, which can vary greatly across different "sewersheds" throughout the state. Therefore, a state risk evaluation that focuses on individual sewersheds is key and should consider the relative fate and transport of PFAS, alternative agricultural practices (such as increased use of synthetically derived fertilizers), costs, and the risks associated with biosolids management alternatives like landfill disposal and incineration.

Recommended Actions:

- ACWA recommends that DEQ actively engage in PFAS risk evaluations and management approaches for biosolids. DEQ should collaborate with partners, like ACWA and university researchers, to identify research/data needs, and to establish new research projects. DEQ should determine how additional research and risk evaluations will inform State actions to ensure that biosolids management policies are protective and based on sound science and data. DEQ should communicate proactively with the legislature, public, and others regarding the agency's biosolids land application program.

VIII. ACWA Strategies to Address PFAS Water Pollution

Federal and state PFAS research and regulatory programs will provide the foundation for regulations that will reduce PFAS impacts and risks. Local governments also play a role in establishing programs and engaging with the public and businesses in reducing PFAS. In Oregon, ACWA and its members can advance actions that can help lower overall PFAS usage by homes and businesses. This will not only

reduce the impacts to water quality from municipal wastewater and stormwater pathways but will also reduce other routes of human and aquatic life exposure to PFAS.

Since the fall of 2019, the ACWA PFAS Work Group has engaged with a range of stakeholders on PFAS issues including local government partners, drinking water providers, DEQ and OHA, policy makers, and other national, and state, and non-profit organizations. ACWA's actions have included: developing communications materials for ACWA members; creating a PFAS resource page on the ACWA web page (https://oracwa.org/resources/pfas-resources/); convening regular meetings to exchange information and maintain coordination amongst participating agencies; hosting an educational forum for members (https://oracwa.org/mp-files/acwa-pfas-clean-water-connections-november-15-2021.pdf/); and presenting PFAS information to legislators and other interested groups. Additionally, ACWA members created preliminary sampling guidelines and initiated voluntary PFAS monitoring in wastewater influent, effluent, biosolids, and selected industrial discharges to their wastewater systems.

Although there currently are no PFAS water quality standards or regulations in Oregon, some wastewater agencies have chosen to proactively assess the types and levels of PFAS entering their collection systems and to communicate sampling results with their elected officials and customers. ACWA distributed the preliminary sampling methodology, developed as a collaboration among Clean Water Services, Oregon State University (OSU), and the DEQ laboratory, and encouraged ACWA members to contemplate proactive wastewater, biosolids, landfill leachate and industrial sampling. ACWA also has been tracking federal developments and has provided input to Oregon congressional delegation members on proposed federal PFAS legislation. ACWA continues to keep members aware of evolving national PFAS initiatives.

There are several areas where ACWA and local utilities can initiate additional activities to assess and reduce PFAS in the water environment. Recommended strategies are described below. In 2022, ACWA was selected to receive a grant award through the Columbia River Basin Restoration Grant Program to support work on several of these strategies.

Monitoring and Industrial Source Identification

ISSUE: Currently, there are insufficient data on the occurrence in PFAS in wastewater and stormwater, and the major sources of PFAS in municipal systems is not determined well enough to assess the magnitude of the problem and inform policy development and other PFAS reduction actions.

As summarized above, several ACWA members have voluntarily tested wastewater influent, effluent, the wastewater collection system, biosolids, the soils where biosolids have been applied, and selected industrial discharges. This monitoring is intended to characterize the concentrations of certain PFAS, and to identify and inventory industrial and commercial sources of PFAS discharges in communities around the state. Additional monitoring data is needed to provide clean water agencies with a better understanding of the types of industries and businesses that discharge PFAS, and to better understand levels of PFAS coming from residential and commercial sources. This data would also improve DEQ's and OHA's science-based information on which to develop future regulatory requirements. With more data, DEQ can prioritize program responses to the most significant sources and risks in Oregon.

Strategies and Recommended Actions:

- ACWA recommends that local clean water agencies consider targeted voluntary PFAS monitoring for wastewater influent, effluent, biosolids, soils where biosolids are applied, industrial wastewater discharges, municipal stormwater, and industrial stormwater discharges. EPA recently selected an ACWA toxics reduction and assessment proposal for funding under the Columbia River Basin Restoration Act Grant Program. ACWA will use these funds to support strategic PFAS monitoring by small-to-mid size ACWA member communities. In addition to directing members to the PFAS sampling plan on the ACWA website, ACWA will inform members regarding EPA laboratory analytical methods that contract labs should use.
- ACWA will seek opportunities to collaborate with DEQ, EPA, and other possible partners to leverage resources and prioritize monitoring efforts through a strategic and coordinated approach. For example, ACWA can coordinate with DEQ and OHA to access and make available public drinking water system monitoring data and PFAS risk screening information to help focus voluntary wastewater and stormwater monitoring activities.

Industrial Source Outreach and Technical Assistance

ISSUE: Public clean water agencies need access to information to help identify industrial, commercial, and institutional sources of PFAS, as well as resources that will assist them in reducing PFAS discharges to municipal systems.

Some Oregon wastewater agencies that conducted industrial effluent monitoring for PFAS are following up with facilities where PFAS were detected to identify potential source reduction opportunities. Providing outreach and technical assistance to these facilities may facilitate reduction of PFAS loadings reaching POTWs before federal or state regulations go into effect. Proactive industrial PFAS load reductions can decrease the need for regulations and lower the future resource burden on public utilities from implementing and enforcing industrial effluent limits. Some of the voluntary sampling results showed levels of PFAS in a few industrial dischargers that exceeded EPA's drinking water health advisory level for PFOA and PFOS, which is a threshold value that can be used to prioritize industrial outreach. EPA's plans to establish ELGs for certain industries and to develop federal water quality criteria for PFAS are an incentive for PFAS-using industries to collaborate with clean water agencies to reduce or eliminate PFAS discharges. Successful industrial PFAS reduction efforts will show EPA and DEQ that a pollutant minimization plan approach to meet water quality criteria can work.

Strategies and Recommended Actions:

- ACWA will encourage wastewater agencies to reach out to industrial facilities where elevated PFAS levels have been detected to inform them of the test results and encourage them to identify the sources of PFAS in wastewater and stormwater. Local agencies can then work with industries to reduce or eliminate discharges through pollution prevention and informed chemical substitution, and/or installation of controls on discharges containing PFAS. Industries can be motivated to get ahead of new PFAS regulations that could be costly and challenging to implement.

- ACWA will use EPA Columbia River Basin Restoration Act Grant funds to synthesize national and state research and data on industrial PFAS sources and prioritize industrial sectors for outreach and technical assistance.
- Basic pollution prevention assistance materials will be developed for members to customize and share with local industries.
- As resources allow, ACWA will develop model ordinances and other regulatory tools local jurisdictions can use to require industries to implement PFAS pollution reduction measures. At a minimum, ACWA will provide current examples from other parts of the country.

Local Government Purchasing of Safer Products

ISSUE: PFAS are contained in a wide range of products that local governments may purchase, thereby making government agencies a potential source of PFAS discharges.

Many local governments in Oregon have developed local product-purchasing contracts or have joined state purchasing agreements that incorporate environmental preferences. Some of these contracts include low toxicity product guidelines intended to reduce purchases of products containing toxic chemicals like PFAS and increase demand for safer alternatives. For instance, products like carpets and furniture can contain PFAS for stain resistance, which are not essential because there are alternative products available made from naturally stain repellent fibers. A 2012 Governor's Executive Order, promoting green chemistry and environmentally friendly government purchasing, provides the policy support for incorporating PFAS-free specifications and guidelines.

Collectively, Oregon cities, counties and special districts have significant purchasing power to influence market demand for products with less-toxic chemicals. Their purchasing practices also can serve as a model for businesses and residential customers. These efforts can reduce the number of PFAS-containing products PFAS in homes and businesses, thereby reducing PFAS-related water pollution.

Strategies and Recommended Actions:

- ACWA will provide resources to members, including the information on the State's Oregon Cooperative Procurement Program, which is available to support local jurisdictions' efforts to reduce their use of toxic chemical containing products and substitute their use with lower toxicity products. ACWA will use Columbia River Basin Restoration Act Grant funds to work with other local government partners and the State to develop model procurement guidelines and specifications for local jurisdictions.
- ACWA will coordinate with DEQ, the State Fire Marshal's Office, local drinking water providers, and local fire agencies to support the transition away from PFAS-based firefighting foams (AFFF), which are responsible for much of the known soil, groundwater, and surface water contamination in the U.S. There are now dozens of PFAS-free firefighting foams available, several of which have been evaluated to determine their environmental hazard characteristics. At a minimum, fire agencies can use available, safer alternatives for training purposes while they further assess product

effectiveness. As some municipal members also provide fire suppression services, ACWA will support outreach communications regarding safer alternatives.

Public Education, Outreach, and Advocacy

ISSUE: The public is largely unaware of PFAS risks, fate and transport, impacts to water quality, and the types of products that contain PFAS, and it is important for the public and policy makers to take appropriate actions based on the most current an accurate information available.

Public education and outreach are needed to increase awareness about PFAS concerns and risks and encourage reduced use of PFAS-containing products. It is also important to keep Oregon legislators up to date with the state of the science and the collaborative efforts underway to assess PFAS sources, risks and management strategies in Oregon. ACWA provides educational information about PFAS on its website, including sample PFAS communications available for use by ACWA members. The PFAS page contains links to information from federal, state, and local government agencies, as well as other reputable sources. There is a growing body of readily available information on PFAS-free consumer products (e.g., https://pfascentral.org/pfas-free-products/) that can inform individuals and business owners who are interested in reducing the use of PFAS. In addition, existing risk communication resources (e.g., https://pfas-1.itrcweb.org/14-risk-communication/) can help clean water agencies convey accurate and understandable facts about PFAS in the water environment to customers and stakeholders. This information can help provide context for the public to understand the relevance of emerging environmental data. Additional outreach communications are needed to target statewide policy makers.

Strategies and Recommended Actions:

- ACWA plans to develop a PFAS-related public education and outreach toolkit for members. The toolkit will support efforts to inform customers on how to reduce the use of PFAS-containing products. The toolkit will include key messages regarding known health risks from product use, limitations on the ability to treat/reduce PFAS water pollution, biosolids land application information, ratepayer costs associated with management of PFAS pollution, and actions underway to identify and reduce PFAS at the source.
- ACWA is developing outreach communications targeted at local and statewide policy makers.
- ACWA will encourage wastewater and stormwater agencies to proactively provide public information on PFAS issues. Materials provided in the education and outreach toolkit can be customized for use by individual jurisdictions.
- As resources allow, ACWA will maintain and update its PFAS web page to provide members with the most current, relevant, and useful PFAS information related to toxicity and environmental fate, known risks, industrial and commercial sources, and source reduction strategies.

Research and Policy Needs for PFAS In Biosolids

ISSUE: More information is needed on the impacts of land-applied biosolids containing PFAS to water quality, animal, and human health, relative to other biosolids management methods. Regulatory and policy decisions about biosolids need to be science-based using rigorous sampling and analytical methods.

ACWA is tracking the research related to PFAS in biosolids and associated land application risks. ACWA also is exploring ways to support university-led research on PFAS impacts of biosolids land application specific to Oregon. The objective of this work would be to identify and quantify potential risks to groundwater and surface water of varying levels of PFAS in biosolids that are land-applied, as well as to determine the types of soils and crop types that can reduce potential risks.

EPA recently validated a draft analytical test method[22] applicable to biosolids and wastewater effluent. This method will help produce more reliable data on PFAS in biosolids. However, without scientifically valid and consistent risk values or standards, the land application risks associated with detected concentrations cannot be definitively determined. The absence of risk values for PFAS in biosolids creates uncertainty about the safety of biosolids land application practices relative to other PFAS management methods. Some states, like Michigan, have identified levels of PFAS that indicate significant industrial impacts in some biosolids. This caused POTWs in Michigan with industrially impacted biosolids to divert biosolids to landfills temporarily until they were able to work with the industrial facilities to reduce PFAS discharges.

Oregon's industrial base differs significantly from Michigan's, and Oregon's 2021 public water system monitoring does not suggest widespread PFAS contamination from industrial, institutional, and commercial sources. PFAS were detected in only 0.2% of all sample results from 140 public water systems. In addition, other biosolids management methods (e.g., incineration and landfilling) pose risks that require rigorous evaluation. Therefore, until federal and Oregon-specific research is completed, diversion of biosolids to other management systems would be premature and possibly result in unintended adverse consequences.

Strategies and Recommended Actions:

- ACWA plans to coordinate with ACWA member agencies conducting biosolids research, as well as biosolids researchers at Oregon State University, University of Washington, Washington State University, and Northwest Biosolids, to understand and support their efforts to expand on existing scientific data on PFAS in biosolids. ACWA also will track and provide comments to EPA on its development of risk values for PFAS detected in biosolids.
- ACWA will engage with DEQ on state policy development issues and questions related to PFAS in biosolids. ACWA also will coordinate with DEQ on reviewing and evaluating any possible new sewershed-based PFAS monitoring of biosolids and associated monitoring data evaluations.

[22] https://www.epa.gov/newsreleases/epa-announces-first-validated-laboratory-method-test-pfas-wastewater-surface-water

- ACWA will encourage members to further assess local biosolids programs to ensure that PFAS risks are minimized through testing, careful land application site selection and management, and consideration of other factors that may influence risks.

IX. Summary - A collaborative, science-driven response to PFAS is needed

Local wastewater and stormwater utilities in Oregon are committed to their role as environmental and public health stewards, and their responsibility to address pollution to the extent feasible. Federal and state lawmakers, agencies like EPA, ODEQ and OHA, and our local clean water agencies must work collaboratively to examine how to manage PFAS holistically, with science driving the decision making to achieve common goals.

This paper provides a framework for such an approach. It is intended to summarize the state of PFAS policy, the need for more scientific study and data, and the concerns that PFAS pose for local wastewater and stormwater agencies, and recommend actions needed to effectively assess and reduce PFAS risks to public health and the environment. This paper also provides state and federal agencies with local perspectives on how science and policies to reduce PFAS risks should be developed. It is a starting point and must evolve as the understanding of PFAS risk grows, and as actions to reduce that risk are implemented.

A comprehensive, long-term approach is needed to address the entire class of PFAS chemicals and the environmental and public health risks they pose to air, land, and water. The overarching goal of any PFAS action plan, policy, or regulation should be to reduce exposure to the primary sources of pollution. To accomplish that, the focus should be on human health, and implementing effective, feasible, and affordable actions at all levels of government to eliminate the greatest risks to humans and the environment.

This starts with agencies using their authority to eliminate PFAS used in commerce. As long as PFAS remain in products used in our everyday lives, and background levels resulting from decades of manufacturing and use persist, PFAS will continue to be found in receiving streams and in our wastewater treatment byproducts.

The science is still evolving to understand the levels and fate of PFAS in the environment and the exposure risks. Agencies are working hard to produce scientifically valid and reproducible data on which to base risk management decisions. This emphasizes the need to better understand the science of PFAS exposure and impacts, and real-world risks before setting policies.

For public utilities who are receivers of PFAS pollution, including clean water agencies, drinking water utilities, and solid waste facilities, source reduction and pollution prevention are the only effective means of addressing the persistent background presence of PFAS and effectively limiting exposure to PFAS going forward. Actions should focus on reducing PFAS chemicals at the source, rather than relying on treatment, remediation, or restrictions on beneficial use of wastewater, biosolids, or recycled water that are not supported by regional or site-specific data. Ratepayers should not shoulder the burden of removing pollution caused by those that profit from using PFAS.

Lawmakers and regulatory agencies must ensure stakeholder engagement in the development and implementation of PFAS regulatory requirements, and leverage resources in implementing actions with the greatest impact in reducing the risks that PFAS pose to public health and the environment.