ADDRESSING FOREVER CHEMICALS

in West Virginia Waters

A blueprint for implementing the PFAS Protection Act and accompanying responses to PFAS contamination in West Virginia

WEST VIRGINIA RIVERS

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Executive Summary

PFAS, OR PER- AND POLYFLUOROALKYL SUBSTANCES, are a group of chemicals known as "forever chemicals" because they do not break down under natural conditions. Made popular because of their non-stick and water-resistant properties, these chemicals are commonly found in water, food, and consumer products. PFAS are known to have adverse health effects, as detailed in Section 1.

In order to address PFAS contamination in West Virginia, The PFAS Protection Act (House Bill 3189)[1] was passed during the 2023 legislative session. The goal of The PFAS Protection Act is to identify and address PFAS contamination at the source, to avoid undue burden on water utilities or ratepayers. Through the development of site-specific PFAS Action Plans, the state of West Virginia can address this emerging issue.

This report includes recommendations for PFAS action plan development, policies, and community engagement, and is outlined as follows:

Section 1: Introduction

Section 1 provides a brief description of PFAS, describes initial, statewide sampling efforts to understand contamination levels, and explains legislative efforts made to begin addressing PFAS contamination in the state of West Virginia.

Section 2: Developing PFAS Action Plans

Section 2 makes specific recommendations for identifying and addressing PFAS sources in the development of PFAS Action Plans. As the first step to identifying sources, this report suggests using readily available data and information and performing additional water monitoring. Once additional information has been collected, WVDEP should begin addressing PFAS sources, leveraging and reviewing manufacturing and industrial facilities, legacy industrial sites, publicly owned treatment works (POTWs), land application of biosolids, landfills, and air deposition. The final consideration in developing PFAS Action Plans will be PFAS treatment at drinking water plants.

Section 3: Policy Recommendations

Section 3 outlines policy recommendations that can ensure successful development and implementation of PFAS Action Plans, as well as adequate follow up support to ensure long-term sustainability of these practices. The policy recommendations are as follows:

1. **Use the Scientifically Grounded Definition of PFAS,** to better facilitate cleanup and encourage comprehensive policymaking.
2. **Adequately fund PFAS sampling and monitoring efforts**, to ensure effective development and implementation of PFAS Action Plans.
3. **Eliminate non-essential uses of PFAS**, as states across the United States continue to ban and/or restrict the use of PFAS chemicals in products.
4. **Adopt Statewide PFAS Water Quality Criteria**, following EPA's finalized water quality criteria under the Clean Water Act.
5. **Establish Enforceable Discharge Limitations in WV/NPDES Permits and Pretreatment Permits**, following EPA's guidance on addressing PFAS discharges in NPDES permits and any subsequent federal guidance and regulations.
6. **Restrict Contaminated Biosolid Applications**, requiring PFAS testing within NPDES permits and monitoring contamination through this existing permit.
7. **Remediate Contaminated Groundwater**, using in-situ treatment for PFAS-contaminated aquifers, paying particular attention to regions with extensive groundwater-surface water connectivity.
8. **Address PFAS in Private Drinking Water Wells**, offering easily accessible information and adequate resources for private-well owners.
9. **Update Fish Consumption Advisories** to include PFAS in West Virginia, modeled after statewide PFAS advisories for fish issued in other states.
10. **Implement PFAS Action Plans**, systematically tracking implementation of all actions required in each PFAS Action Plan and reporting to the public on progress made.
11. **Follow Up on the PFAS Protection Act**, continuing to refine knowledge of PFAS sources and evolve implementation and evaluation efforts accordingly.
12. **Update Source Water Protection Plans to Incorporate PFAS Reduction Strategies**, referencing and integrating relevant information from the site-specific PFAS Action Plan.

Section 4: Stakeholder & Community Engagement

Section 4 provides suggestions for stakeholder and community engagement to address PFAS contamination in West Virginia. With the goal of creating hyper-local PFAS Action Plans that are substantial and responsive to communities' needs, we outline steps for designing and implementing a robust community engagement process, engaging community partners, deploying community ambassadors, holding community meetings, and replicating the engagement efforts throughout the state. More thorough investments in community engagement will produce more robust PFAS Action Plans.

SECTION ONE

Introduction

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS) are a category of over 9,000 synthetic substances that are commonly used as surfactants, lubricants, and water repellents, and can be found in certain industrial and consumer products, including firefighting foams, waterproof clothing, cosmetics, food packaging, and more.[2, 3] As a result of the production of these manufactured chemicals, PFAS has been found in industrial facilities, wastewater treatment plants, and biosolids applied to agricultural fields. These manufactured chemicals can be released into the environment, where they contaminate surface water, groundwater, soil, and sediment.[4]

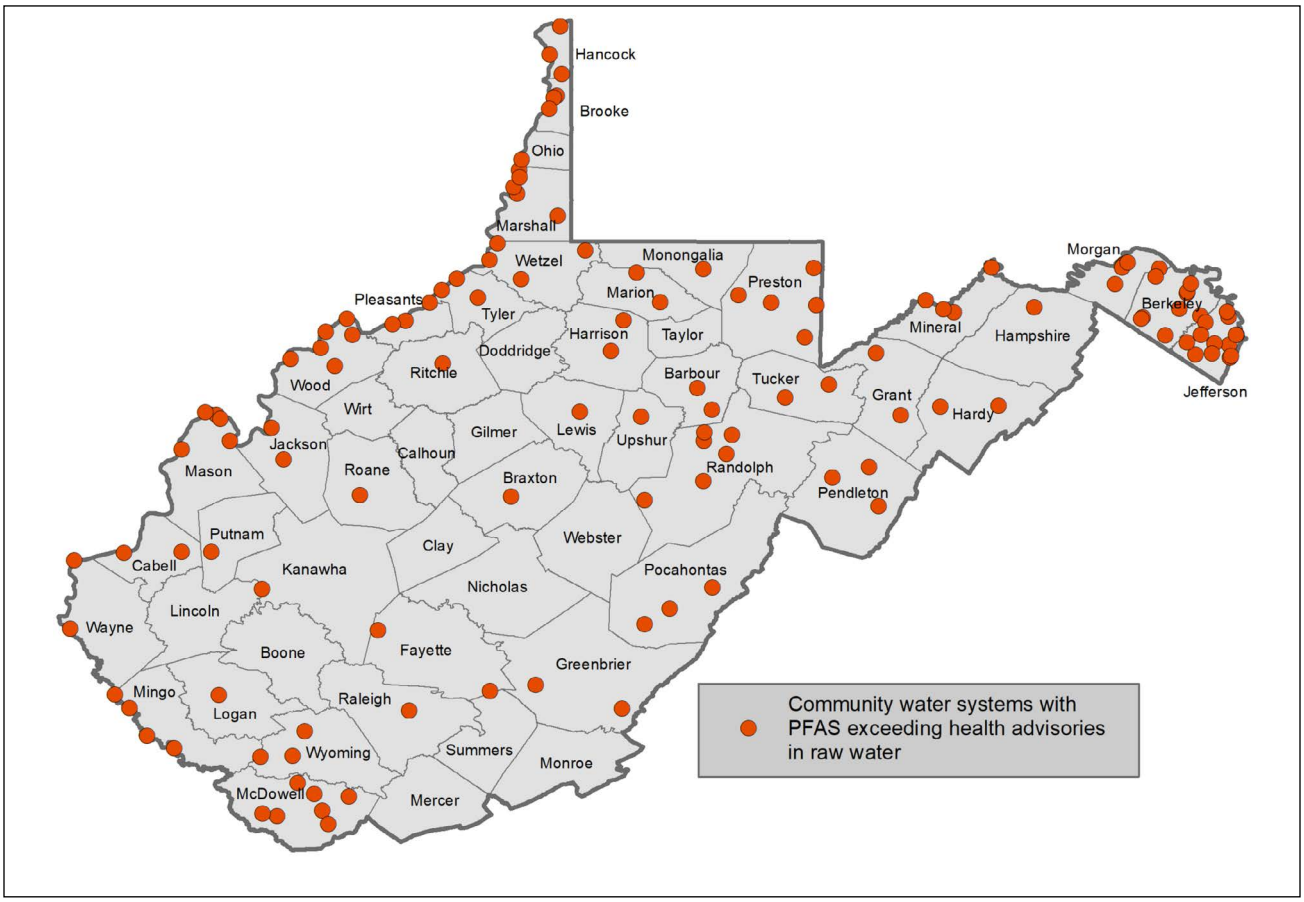
Scientific studies have shown that exposure to certain PFAS in the environment is linked to harmful health effects in humans and animals.

Known as "forever chemicals" due to their inability to break down naturally, many of these widely-used chemicals are known to cause adverse health issues at very low levels. As referenced by the United States Environmental Protection Agency (EPA), scientific studies have shown that exposure to certain PFAS in the environment is linked to harmful health effects in humans and animals, such as liver damage, thyroid disease, decreased fertility, high cholesterol, obesity, hormone suppression, and various types of cancer.[5] Two of these assessments took place in Parkersburg[6] and Martinsburg,[7] following suspected contamination.

Several large-scale studies have identified concerning levels of PFAS in both public and private drinking-water sources in the state of West Virginia. In 2019, the West Virginia PFAS Work Group was formed, consisting of members of the West Virginia Department of Environmental Protection (WVDEP), the West Virginia Department of Health and Human Resources (WVDHHR), and the United States Geological Service (USGS), with the goal of determining the best path forward for addressing PFAS.[8]

During the 2020 legislative session, the West Virginia Legislature passed Senate Concurrent Resolution 46 (SCR 46), "requesting the WVDEP and the WVDHHR to cooperatively propose and initiate a public source-water supply study to sample PFAS for all community water systems in West Virginia, including schools and daycares that operate treatment systems regulated by the WVDHHR."[9] From June 2020 through May 2021, WVDEP and WVDHHR contracted with USGS to sample untreated drinking water from 279 public water systems in West Virginia.

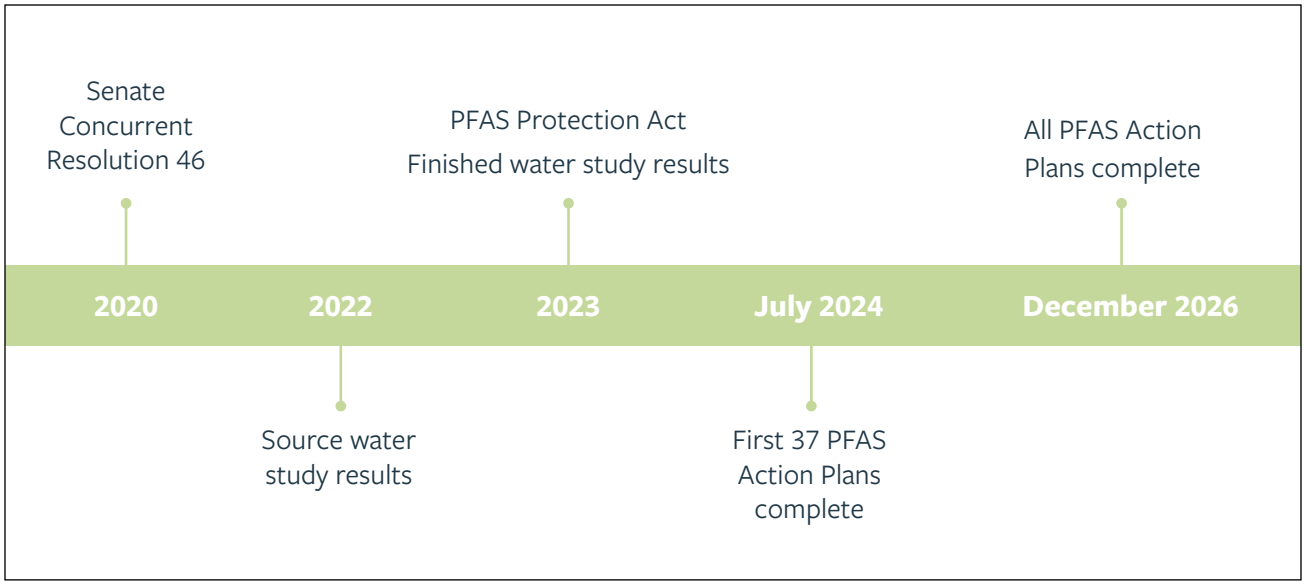
This sampling effort revealed detectable levels of PFAS in the raw water of 130 of the 279 public water systems.[10] Concerningly, in the raw water of all 130 systems, levels of perfluorooctanoic acid (PFOA) and/or perfluorooctane sulfonic acid (PFOS) exceeded EPA's 2022 interim health advisories.[11] The highest levels were generally concentrated in the Ohio River Valley and the Eastern Panhandle (Morgan, Berkeley, and Jefferson counties).[12]



Map detailing 130 community water systems in West Virginia that had detectable levels of PFAS in raw water samples.

A follow up study of treated water for 37 of the affected systems[13] found that 19 had levels of PFAS that exceeded EPA's proposed drinking water standards.[14,15] These studies documented widespread contamination of PFAS and the need to swiftly address PFAS at the source to protect public health. The remainder of the public water systems' treated water testing was still being conducted as of December 2023.

During the 2023 session, the West Virginia Legislature passed legislation that focuses on addressing PFAS at its source. Following the passage of House Bill 3189, the PFAS Protection Act, the WVDEP will develop site-specific PFAS Action Plans to identify and address sources of PFAS.[16] The first 37 action plans, for water systems where PFOA, PFOS, PFBS, or HFPO-DA were detected above the reporting level in the raw water, will be completed in 2024. Action plans for the remaining water systems with detectable levels of PFOA, PFOS, PFBS, or HFPO-DA in the finished water will be completed by December 31, 2026.



Timeline detailing actions taken to respond to PFAS contamination in West Virginia from 2020-present.

This report provides guidance and support for WVDEP to consider as it starts to write PFAS Action Plans. Section 2 makes specific recommendations for identifying and addressing PFAS sources in the development of PFAS Action Plans. Section 3 includes policy recommendations, and Section 4 provides suggestions for stakeholder and community engagement to address PFAS contamination in West Virginia.

SECTION TWO

Developing PFAS Action Plans

THE OVERARCHING GOAL OF THE PFAS PROTECTION ACT is to identify and address PFAS contamination at the source, so as to avoid undue burdens on water utilities or ratepayers. The Act does this by, among other things, requiring WVDEP to write PFAS Action Plans where water monitoring has identified concerning levels of PFAS in public water systems' untreated or treated water. As stated in the PFAS Protection Act:

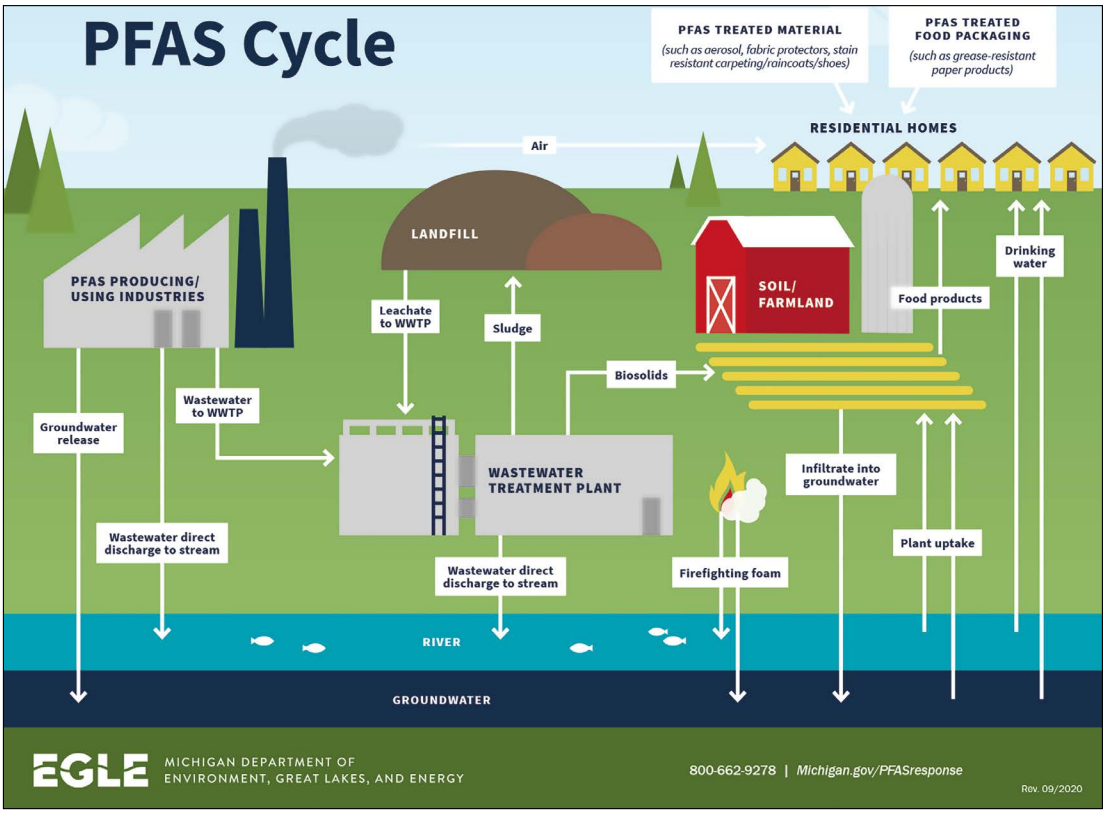
> "The PFAS action plans, to the extent that data are available, shall identify the source or sources of PFAS in the raw water source, and regulatory and non-regulatory options for addressing each identified source of PFAS and minimizing the impacts on public water systems."[17]

This section provides suggestions for the two major tasks required to draft PFAS Action Plans: identifying and addressing PFAS sources. It also provides suggestions for installing PFAS treatment at drinking water plants, when advisable.

Identifying PFAS Sources

There has been a great deal of research nationwide on PFAS occurrence in drinking water sources, with recent findings showing that at least 45% of tap water could have one or more PFAS.[18] Research has also broadly identified the types of sources that may discharge PFAS into drinking water sources. As illustrated below, PFAS-producing industries are only one of many potential sources. When writing PFAS Action Plans, WVDEP will need to consider a wide range of sources that also includes other manufacturing and industrial facilities, legacy industrial sites, publicly owned treatment works, land application of biosolids, landfills, and air deposition.

In West Virginia, some PFAS sources are known, and others are yet to be identified. Likely the most notable PFAS source is the Chemours (formerly DuPont) Washington Works facility near Parkersburg, WV. In 2005, a settlement in a class action lawsuit required DuPont to pay for the installation of state-of-the-art water treatment technology for six impacted water districts



Graphic Source: Michigan Department of Environment, Great Lakes, and Energy

and private wells to remove PFAS to safe levels.[19] Almost 20 years later, in 2023, the EPA took the first-ever federal Clean Water Act enforcement action to address PFAS discharges at the facility.[20] This action ordered Chemours to take corrective measures to address PFAS pollution and to characterize the extent of PFAS contamination from discharges. As quoted by EPA's Mid-Atlantic Regional Administrator, "The Parkersburg community has a long history with this facility and the ever-present threat of PFAS pollution."[21]

Another known source of contamination is the Shepherd Field Air National Guard Base in Martinsburg, where fire-fighting foam that contained PFAS migrated through the groundwater and contaminated the community water supply.[22] There have also been reports of groundwater contamination from military activities at the Yeager Airport in Charleston.[23] These and several other sources of PFAS in numerous locations across the state are known through the PFAS water monitoring performed since 2020, while other locations will require additional research to identify the sources.

Two methods may be used to identify PFAS sources that cause or contribute to the unhealthy levels of PFAS found in a public water system's raw water or finished water: 1) readily available data and information, and 2) water quality monitoring. PFAS Action Plans may require both methods.

Identifying PFAS Sources Using Readily Available Data and Information

Readily available data and information should be used as a first step to identify potential sources. It is suggested that WVDEP reference all of these data sources.

WVDEP Databases. WVDEP already maintains databases that should be used to identify potential PFAS sources. These include, for example, West Virginia/National Pollutant Discharge Elimination System (WV/NPDES) permit holders, sites on which biosolids are land-applied, and oil and gas wells. A wide range of potential PFAS sources can be identified from these sources, including manufacturing and industrial facilities, farm fields upon which biosolids have been land-applied, military bases, airports, publicly owned treatment works (POTWs), landfills, and oil and gas wells that have been hydraulically fractured.

Fifth Unregulated Contaminant Monitoring Rule.[24] Once every 5 years, EPA issues a list of unregulated contaminants to be monitored by public water systems. The first set of fifth Unregulated Contaminant Monitoring Rule (UMCR 5) data was released August 2023, and includes occurrence data for 29 PFAS in treated water for thirty-one public water systems in West Virginia. This dataset is the first of 12 datasets that will be released quarterly until 2026. These datasets may be used in conjunction with the ongoing treated water PFAS testing[25] to identify water systems whose treated water is contaminated by nearby PFAS sources.

Pretreatment Customers. In some locations, POTWs with pretreatment customers may discharge upstream (or upgradient) of locations at which high levels of PFAS have been measured. If such a situation exists, POTWs should be consulted to identify their pretreatment customers, which should then be investigated further as potential PFAS sources.

Environmental Working Group's Suspected Industrial Discharges of PFAS.[26] This interactive online map identifies known users of PFAS, suspected users of PFAS, airports previously required to use aqueous film-forming foam, landfills and waste disposal facilities, and sewage and waste treatment plants.

Environmental Working Group's 710 Military Sites With Known or Suspected Discharges of PFAS.[27] This interactive online map identifies suspected military sites and confirmed military sites, several of which are in West Virginia.

Environmental Protection Agency's PFAS Analytic Tool.[28] To most effectively use this interactive online map, filter to West Virginia, click on "Legend and Layers," uncheck the various types of environmental data, and check all of the "Other Locations with Known or Suspected PFAS." The map will then identify the following locations: PFAS manufacturer or importer, water discharger with PFAS monitoring, Superfund (private), Superfund (federal), federal site with known or suspected PFAS, and several other types of industries/facilities.

Aerial Photographs. A review of aerial photographs upstream (or upgradient) from raw water intakes with high levels of PFAS can help identify sites for further investigation. Aerial photograph review can be done using Google Maps or Google Earth.

Windshield Surveys. Windshield surveys are conducted by driving upstream (or upgradient) from raw water intakes with high levels of PFAS to help identify sites for further investigation.

Local Knowledge. Representatives of the local water system and community members should also be consulted to identify potential PFAS sources for further investigation.

After compiling the readily available data and information listed above, and any other data and information at WVDEP's disposal, a list of potential PFAS sources should be generated. Confirming whether these potential sources are actual sources may require additional data. Some potential PFAS dischargers covered under WV/NPDES permits, for example, may already be monitoring for PFAS and reporting results to WVDEP in discharge monitoring reports.

For other potential PFAS dischargers, however, there may be no current source of data. Additional monitoring requirements may need to be included in WV/NPDES permits or in pretreatment permits to ascertain whether the site is, indeed, discharging PFAS. The PFAS Protection Act requires certain PFAS monitoring for facilities that have self-reported that they manufacture or knowingly use or have used certain PFAS in their production process since 2017.[29]

Identifying PFAS Sources Through Water Quality Monitoring

The second method to identify PFAS sources is to perform surface water or groundwater monitoring upstream (or upgradient) from the raw water intake at which PFAS has been detected—and which triggered the requirement to write the PFAS Action Plans.

If PFAS were found in surface water, additional monitoring can be conducted to identify the most-upstream tributaries or stream segments with elevated PFAS concentrations. A carefully designed monitoring program would take samples at the confluence of major tributaries and/or downstream from suspected PFAS sources. For instance, the USGS StreamStats application for West Virginia provides flow statistics[30] and mapping tools[31] that may be useful in developing a spatial sampling design.

If PFAS were found in groundwater, potential sources and contaminant pathways should be identified from hydrological and geological research if available for the region of interest. For example, groundwater levels and trends are monitored by the USGS, and these data are available online.[32] In some cases, groundwater dye-tracing studies may also be available to address the connectivity of contaminated aquifers. For example, a dye-tracing study by USGS revealed extensive connectivity of aquifers in karst terrain in Jefferson County[33] that could help explain PFAS fate and transport processes. Likewise, groundwater flow modeling for the alluvial aquifers along the Ohio River[34] could inform an assessment of PFAS found in groundwater. In some cases, PFAS in groundwater may be traceable to discrete point sources such as military installations,[35] but the broad spatial distribution of PFAS observed in groundwater statewide suggests that diffuse nonpoint sources are also important.

Addressing PFAS Sources

After the PFAS sources are identified, the methods and funding available for addressing the sources will depend on the type of source.

Manufacturing and Industrial Uses

Manufacturing and industrial facilities that are sources of PFAS will typically be classified as point sources under the Clean Water Act. As such, they will already be regulated with a WV/NPDES permit if they discharge to a river or stream or a pretreatment permit if they discharge to a POTW. These PFAS sources would typically be facilities that use, or have used, PFAS in their production processes.

To address PFAS discharges from manufacturing and industrial uses, the permitting agency (usually WVDEP, but sometimes the POTW for certain pretreatment permits) will be responsible for updating the permit to include monitoring requirements, best management practices, and enforceable discharge limitations, as appropriate. It will then be up to the facility to take the necessary steps to reduce or eliminate their PFAS discharges in compliance with the permit.

The PFAS Protection Act requires WVDEP to modify WV/NPDES permits for facilities that have self-reported that they manufacture or knowingly use or have used certain PFAS in their production process since 2017.[36] Whether or not a facility has self-reported, WVDEP should follow EPA's 2022 guidance on this topic, entitled "Addressing PFAS Discharges in NPDES Permits and Through the Pretreatment Program and Monitoring Programs,"[37] and any subsequent federal guidance or regulations.

Steps that may be taken at the facilities to reduce or eliminate PFAS discharges include, for example, stopping the production of PFAS, stopping the use of PFAS in production processes, improving best management practices, and/or installing PFAS treatment.

Oil and Gas Operations

Specific attention should be given to oil and gas operations that have used PFAS in hydraulic fracturing (fracking) in West Virginia.[38] PFAS has been used widely in fracking operations across Ohio,[39] Colorado,[40] and Texas.[41a] Most recently, Physicians for Social Responsibility (PSR) published "Fracking with 'Forever Chemicals' in West Virginia,"[41b] which outlines the risks associated with the use of toxic chemicals in fracking operations. While some use of PFAS is visible in the industry reporting mentioned in the report, much of the information is shielded behind intellectual property protections. On page 8 of their report, PSR provides a detailed map of the location of horizontal gas wells fracked between 2013-2022 in West Virginia using PTFE / Teflon (a known PFAS), trade secret chemicals, and/or trade secret surfactants.

It is imperative that all usage of PFAS within the oil and gas industry, including trade secret chemical information and intellectual property protections, be disclosed to regulatory agencies and incorporated into PFAS Action Plans, so that all direct sources of PFAS may be comprehensively addressed in West Virginia.

Legacy Industrial Sites

Legacy industrial sites are facilities that have closed and that likely do not have active WV/NPDES permits. Addressing PFAS pollution from a legacy site cannot be done by adjusting the production process or by upgrading the site's existing water treatment facility because production and treatment are no longer occurring.

The West Virginia Voluntary Remediation Program is an option for some legacy sites. This program encourages companies to voluntarily remediate sites and return them to productive use. The program uses risk-based cleanup standards that consider site-specific conditions and future land use. Decisions on how to remediate a site are made based on risks the site may pose to human health and the environment.[42]

There is evidence that PFAS has been used widely in fracking operations across Ohio, Colorado, and Texas, and additional information should be gathered regarding the extent of the use of PFAS in West Virginia's oil and gas operations.

Another option would be to enter the site into the Brownfields Program. Significant federal funding is available for Brownfields assessments and for Brownfields cleanups. According to the EPA, more than $48 million in federal funds have been awarded through 114 Brownfields grants in 43 West Virginia communities since 1997. This funding has leveraged an additional $1.7 billion in public and private investment, returned almost 1,800 acres to readiness for reuse, and created more than 5,400 new jobs.[43]

Lastly, EPA is expected to finalize its proposed designation of PFOA and PFOS as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or Superfund, by February 2024.[44] This rule can increase transparency around releases of these chemicals and help to hold polluters accountable for cleaning them up. EPA is also considering potential future designations of additional PFAS as hazardous substances under CERCLA.[45] The designation of certain PFAS as hazardous substances will allow EPA to use its CERCLA enforcement authorities to clean up legacy sites contaminated with PFAS. There are multiple opportunities for state agencies to participate in the Superfund process, including but not limited to, identification of potentially responsible parties, development of studies and reports, and selection of remedial actions.[46,47]

Publicly Owned Treatment Works (POTWs)

While they are not direct sources of PFAS, POTWs may nonetheless be identified in PFAS Action Plans as PFAS sources that must be addressed in order to reduce PFAS concentrations in source water to safe levels.

POTWs are regulated as point sources under the Clean Water Act, and their discharges to surface waters are regulated under WV/NPDES permits. However, addressing POTWs in the same manner as manufacturing and industrial facilities is not appropriate because the POTWs are simply passing along PFAS received from their customers.

Some PFAS sources—like industrial facilities tied into the sanitary sewer system or landfills that truck effluent to POTWs—operate under pretreatment permits. Other sources discharge PFAS to POTWs without pretreatment permits.

While POTWs are already responsible for funding their own treatment systems for a variety of pollutants, adding the cost of PFAS treatment to many of these facilities would be expensive and, in most cases, would result in increased costs borne by ratepayers. This is why the PFAS Action Plans required by the PFAS Protection Act are meant to target the original sources of PFAS so that the pollution can be addressed at its source.

If a POTW is identified as a source of PFAS, WVDEP should work with the POTW to identify the original sources. For facilities discharging under a pretreatment permit, the permitting agency (WVDEP or the POTW) should modify the pretreatment permit to include monitoring requirements, best management practices, and enforceable discharge limitations for PFAS, as appropriate. It will then be up to the discharger to take the necessary steps to reduce or eliminate their PFAS discharges to the POTW in compliance with the permit.

As mentioned above, the PFAS Protection Act requires WVDEP to modify WV/NPDES permits for facilities that have self-reported that they manufacture or knowingly use or have used certain PFAS in their production process since 2017—and that discharge to a POTW.[48] Whether or not they self-report, WVDEP or the POTW, as appropriate, should follow EPA's 2022 guidance[49] and any subsequent federal guidance or regulations.

Land Application of Biosolids

Land application of biosolids, or sewage sludge from POTWs, has been recognized as a significant source of PFAS into soil and groundwater, leading to concern of long-term land application operations.[50] Long-utilized for their nutrient-rich properties, 60% of biosolids are applied to land as an agricultural amendment in the United States, potentially contaminating crops and grazing animals.[51]

In Maine, state-testing starting in 2019 revealed concerns about levels of PFAS in biosolids applied to land, contaminating soil, water, crops, and cattle, and eventually leading farmers to

cease operations. This led to the allocation of $30 million for additional testing of over 700 sites and clean-up.[52] Maine has since become the first state to ban the practice of spreading PFAS-contaminated sewage sludge as fertilizer.[53]

USEPA is currently conducting a risk analysis to consider biosolid standards for PFAS, which is expected to be published in winter of 2024.[54]

In West Virginia, the land application of biosolids is regulated under WV/NPDES permits.[55] The biosolids are required to be tested for a variety of parameters, including pathogens, nutrients, and metals, but testing is not required for PFAS.[56] Similarly, the land upon which the biosolids are to be applied is subject to testing for certain parameters, but not for PFAS.[57]

Should a farm field be identified as a PFAS source in a PFAS Action Plan, an immediate first step would be to test the biosolids and the field for PFAS and then to stop applying biosolids to that site. Additional actions will also be needed to remediate the PFAS at the site. It would also be prudent to test the other fields upon which biosolids from the same POTW have been applied. If PFAS contamination is found at these other locations, similar remediation steps must be taken there as well.

Further action would then be needed to ensure that the POTW does not continue to land-apply biosolids that contain PFAS. WVDEP will need to modify the POTW's WV/NPDES permit to no longer allow the land-application of sludge from the POTW, at least until monitoring shows safe PFAS levels in the sludge. See below in the "Policy Recommendations" section for efforts to address the sources of PFAS discharging into the POTW.

Landfills

Landfills are not direct sources of PFAS, but they may be identified in PFAS Action Plans as PFAS sources that must be addressed. Some landfills discharge effluent to surface waters under NPDES permits, and others truck effluent to nearby POTWs under pretreatment permits.

One reason that landfills are particularly challenging to address is that they accept waste from a large area. Stopping the disposal of PFAS into landfills will require action across its entire collection area and would require new laws and policies that reduce or eliminate PFAS from the multitude of products that currently use PFAS. A second challenge is that, even if the supply of new PFAS were eliminated, landfills already hold a significant amount of PFAS, which will continue to pollute the effluent for a considerable amount of time. For the handling industrial solid waste known to contain PFAS, protective measures should be taken to prevent PFAS from polluting effulent.

Air Deposition

It is possible that PFAS Action Plans may identify air deposition as a confirmed or suspected source of PFAS found in raw water samples. In such a case, WVDEP should clearly document the data and information leading the agency to this conclusion and should outline steps that the agency will take to address the PFAS air pollution at its source, including, for example, permitting and enforcement mechanisms under the Clean Air Act. Cross-border air deposition may require coordination with agencies in other states.

PFAS Treatment at Drinking Water Plants

PFAS Action Plans should focus on addressing PFAS at its source; however, in some cases, it may be appropriate for a drinking water plant to switch to an uncontaminated source water or to install treatment. PFAS can be treated with activated carbon treatment, ion exchange treatment, or high-pressure membranes such as nanofiltration or reverse osmosis.[58]

The federal Bipartisan Infrastructure Law includes $50 billion to strengthen the nation's drinking water and wastewater systems plus $5 billion for the Emerging Contaminants in Small or Disadvantaged Communities grant program, which focuses on addressing emerging contaminants, including PFAS, in drinking water served by public water systems in small or disadvantaged communities.[59a] Other funding sources may also be available to install PFAS treatment at drinking water plants.

SECTION THREE

Policy Recommendations

IN RECENT YEARS, WEST VIRGINIA has taken several important first steps in addressing PFAS contamination of public water supplies. Agencies conducted initial rounds of raw and treated water monitoring, and the Legislature passed the PFAS Protection Act. With the implementation of the Act, WVDEP will write PFAS Action Plans, and certain facilities will self-report their use of PFAS, triggering new permit requirements.

While these efforts are important, more remains to be done. This section includes policy recommendations for additional steps that should be taken to provide further protection from PFAS exposure.

Use the Expanded and Growing Definition of PFAS

The knowledge and understanding of PFAS is growing rapidly, and it is necessary to ensure that our definitions are evolving as the findings surrounding PFAS contamination continue to emerge. Safer States, a national alliance of environmental health organizations at the forefront of the national movement to address PFAS, advocates for the widespread usage of the most comprehensive definition of PFAS in state legislation. In their definition factsheet,[59b] Safer States encourages the use of a "scientifically grounded definition of PFAS as organic chemicals containing at least one fully fluorinated carbon atom," which includes polymers, fluorotelomers or fluoro-gasses. Non-comprehensive definitions of PFAS exclude many uses of this omnipresent category of toxic chemicals, thereby harming impacted people and communities. Using an expanded definition of PFAS in West Virginia will ensure that we address PFAS in all places where exposure may occur, including manufacturing, distribution, and general use of these dangerous chemicals. This will ensure cleanup and move us towards policies that fully safeguard food, air, and drinking water for all.

Fund PFAS Sampling/Monitoring

The extent of PFAS contamination in WV reaches all corners of the state. As such, additional sampling and monitoring of PFAS is critical in developing Action Plans and monitoring the effectiveness of the Action Plans once implemented. Costs of PFAS analyses in surface and groundwater will add up quickly, especially when taking multiple samples within a watershed to locate the source of contamination, and once action plans are implemented, ensuring PFAS reductions are occurring. Additional funds may need to be acquired. Where possible, if a responsible party can be identified, they should be required to contribute funds for Action Plan development and implementation.

Eliminate Non-essential Uses of PFAS

Over the last few years, at least 106 laws have been passed in over 24 states that ban or restrict the use of PFAS chemicals in products.[60] Maine leads these efforts, becoming the first state to enact a more sweeping law that bans any product to be sold in the state that has intentionally added PFAS, unless the products are deemed to be essential for health, safety, or the functioning of society.[61]

In 2022, Colorado passed HB22-1345 to restrict the sale of PFAS in consumer products and fluids used in the extraction of oil and gas products.[62] Starting in 2024, it will be illegal to sell or distribute products in Colorado with intentionally added PFAS in:

- carpets or rugs,
- fabric treatments,
- food packaging,
- juvenile products, and
- oil and gas products.

In 2025, the restrictions on sales and distribution will be extended to include:

- cosmetics,
- indoor textile furnishings, and
- indoor upholstered furniture.

In 2027, two additional categories will be included:

- outdoor textile furnishings and
- outdoor upholstered furniture.[63]

In 2023, Minnesota passed similar legislation, HF 2310, to eliminate the non-essential use of PFAS.[64] The law includes a full ban on intentionally added PFAS in products, which is scheduled to take effect in 2032. However, starting in 2025, it will be illegal to sell or distribute products in Minnesota with intentionally added PFAS in 11 categories:

- carpets or rugs,
- cleaning products,
- cookware,
- cosmetics,
- dental floss,
- fabric treatments,
- juvenile products,
- menstruation products,
- textile furnishings,
- ski wax, and
- upholstered furniture.

Between 2025 and 2032, the Minnesota Pollution Control Agency may conduct rulemaking to add additional categories and will evaluate "currently unavoidable uses," which will be exempted from the 2032 ban. Also, by January 1, 2026, product manufacturers must provide a

list of products with intentionally added PFAS, and it will be illegal to sell or distribute products containing intentionally added PFAS that have not been reported.[65]

Many states are taking action to eliminate the non-essential use of PFAS, and West Virginia can do the same.

Establish PFAS Water Quality Criteria

The PFAS Protection Act requires WVDEP to initiate rulemaking on PFAS water quality criteria as soon as they are finalized by EPA:

> "After the USEPA establishes final water quality criteria under the Clean Water Act for any PFAS, DEP shall propose adopting appropriate criteria by rule, which criteria may be no more stringent than the criteria established by USEPA, as part of the next regular legislative rulemaking cycle in accordance with §29A-3-1 et seq of this code."[66]

Establishing PFAS water quality criteria in West Virginia will play an important role in holding polluters accountable for their discharges.

To date, EPA has published draft aquatic life water quality criteria for PFOA and PFOS but has not yet finalized these criteria.[67] EPA has not yet released human health criteria for any PFAS, though human health criteria for PFOA and PFOS are expected Fall 2024.

Establishing PFAS water quality criteria in West Virginia will play an important role in holding polluters accountable for their discharges. After criteria have been established, they will be used to judge whether streams are impaired. Impaired streams will then be included on the state's 303(d) list of impaired streams, and total maximum daily load (TMDL) analyses will be written to allocate loads to sources, including point sources with WV/NPDES permits. Even for unimpaired receiving streams, PFAS water quality criteria may also be used to ensure that discharge permits are stringent enough to protect water quality.

Establish Enforceable Discharge Limitations in WV/NPDES Permits and Pretreatment Permits

The PFAS Protection Act requires WVDEP to modify WV/NPDES permits for facilities that have self-reported that they manufacture or knowingly use or have used certain PFAS in their production process since 2017— and that discharge to a receiving stream or to a POTW.[68] Whether or not they self-report, WVDEP should establish enforceable discharge limitations in WV/NPDES permits for PFAS discharges by following EPA's 2022 guidance, "Addressing PFAS Discharges in NPDES Permits and Through the Pretreatment Program and Monitoring Programs,"[69] and any subsequent federal guidance or regulations.

After West Virginia adopts PFAS water quality criteria, additional mechanisms will be available for PFAS permitting in WV/NPDES permits, such as calculating permit limits consistent with wasteload allocations in TMDLs.

Restrict Contaminated Biosolid Applications

In West Virginia, the land application of biosolids is regulated under WV/NPDES permits.[70] Biosolids are required to be tested for a variety of parameters, including pathogens, nutrients, and metals, but testing is not required for any PFAS.[71] WVDEP should begin to require testing for PFAS, and land-application should not be allowed for contaminated biosolids.

Remediate Contaminated Groundwater

The water supply for about 53 percent of West Virginians is derived from groundwater sources—wells, springs, coal mines, and limestone mines.[72] POTWs may be able to remove PFAS from contaminated groundwater sources in a centralized manner as they have, for example, in Berkeley County.[73] However, this does not address contamination of the underlying aquifers supplying water for private wells. Therefore, in-situ groundwater decontamination may be necessary. Technologies are available for in-situ treatment of PFAS-contaminated groundwater[74,75] and initial applications indicate their capacity to successfully remove PFAS in-situ for decades.[76] Such decontamination efforts may be particularly important for rural communities lacking public drinking water where the majority of residents use private wells. Remediation of contaminated groundwater may be especially essential for long-term PFAS treatment in regions with extensive groundwater-surface water connectivity, such as in the karst terrain of the Eastern Panhandle of West Virginia. These efforts will require funding, which should come from responsible parties when possible.

Address PFAS in Private Drinking Water Wells

The previously-mentioned raw water study by USGS found higher PFAS concentrations in groundwater relative to surface water, with the highest concentrations of contamination generally concentrated in the Ohio River Valley and the Eastern Panhandle.[77] With an estimated 23 percent of West Virginians drawing their drinking water from private wells, contamination of private wells is a policy gap, with limited resources currently supporting this population.[78] The current funding for PFAS remediation is available only to individuals connected to or who are in the process of getting connected to public water systems.

To begin addressing this rising concern, it is recommended that DHHR add a "PFAS and Private Wells" section to their PFAS web page, and create easily accessible information for people who utilize private wells. The web page should identify commercially available filters that can be installed on household faucets to remove PFAS. This can be modeled using resources from

EPA[79] and other states, such as Connecticut[80] and New York.[81]

West Virginia Rivers Coalition is currently working with community groups in highly contaminated areas around the state to develop a PFAS Well Testing Pilot Program. While this additional data will be helpful in identifying sources and levels of contamination, additional authority, attention, and resources are needed from the State to address widespread private drinking water well contamination.

Update Fish Consumption Advisories

Fish consumption advisories are science-based advisories issued by states to help the public make an informed decision about limiting their consumption of contaminated fish. Advisories can be statewide or focused on a specific waterbody. West Virginia's existing statewide fish consumption advisories are based on mercury, and polychlorinated biphenyls (PCBs), but no fish consumption advisories have been issued for PFAS in West Virginia.[82]

At least 14 other states including Maryland,[83] Pennsylvania,[84] North Carolina,[85] Wisconsin,[86] Massachusetts,[87] Michigan,[88] and Minnesota[89] have begun to issue PFAS advisories. Many of the states with PFAS advisories follow the guidelines set forth by the Great Lakes Consortium for Fish Consumption Advisories which places a "do not eat" advisory on fish with PFOS levels > 200 µg/kg.[90]

Eating just one meal of wild-caught freshwater fish a year is equivalent to drinking water 2,400 times the EPA's recommended health advisory for a month.

A recent study determined that eating just one meal of wild-caught freshwater fish a year is a significant source of PFAS exposure, equivalent to drinking water contaminated with PFOS at 2,400 times the EPA's recommended health advisory for one month.[91] A West Virginia study analyzed 13 different PFAS in the plasma of smallmouth bass from the South Branch Potomac River (Moorefield, WV) and mainstem Potomac River at the confluence of Antietam Creek (border of WV and MD).[92] Four types of PFAS were detected in every fish sampled (n=70), including PFOS, PFDA, PFUnA, and PFDoA. A land-use analysis revealed that waterbodies with higher percentages of agriculture, development, and domestic wastewater treatment plants nearby also had the highest levels of PFOS.

These findings are consistent with other studies that have detected fish with higher PFAS concentrations at sample sites surrounded by high development[93] or downstream from a PFAS manufacturing facility.[94] Thus, it will be important to consider land use and point sources of PFAS contamination in West Virginia in the development of fish consumption advisories.

It is imperative that WVDEP, DHHR, and partner agencies ensure that fish tissue samples are tested for PFAS in a timely manner, and that statewide and local fish consumption advisories are updated, as appropriate, to protect the public from ingesting unhealthy amounts of PFAS in locally caught fish. These agencies should stay up-to-date on EPA fish tissue sampling results,[95] along with any other federal fish consumption advisories.

Implement PFAS Action Plans

The PFAS Action Plans will identify one or more PFAS sources, which could include manufacturing and industrial uses (with WV/NPDES permits or pretreatment permits), legacy industrial sites, POTWs, landfills, land upon which biosolids have been applied, air deposition sources, or other sources. Implementing the PFAS Action Plans will require different actions and funding, depending on the sources identified. Section 2 provides specific recommendations for addressing each of these categories of PFAS sources.

The PFAS Protection Act does not explicitly assign responsibility to track implementation of the plans to any single entity. Because of its direct or indirect involvement in so many of the implementation activities, it is recommended that WVDEP systematically track implementation of the actions required in each PFAS Action Plan and report to the public on the progress made. Adequate funding needs to be allocated to effectively implement the plans.

Follow Up on the PFAS Protection Act

The PFAS Protection Act became effective in June 2023, and WVDEP should be given ample time and funding to implement the measures as stated in the bill. However, addressing PFAS is a rapidly evolving and increasingly urgent process.

At the federal level, EPA has committed to taking numerous steps over the coming months and years, and Congress may provide further federal requirements. Further, PFAS science is rapidly evolving, which can lead to changes in everything from regulatory thresholds to testing methods. In West Virginia, WVDEP and partner agencies will continue to refine their knowledge of PFAS sources as they perform additional water sampling and write PFAS Action Plans. Once plans are written, there will need to be resources in place for their implementation and ongoing evaluation. As these components unfold over the coming months and years, careful consideration should be given to whether the PFAS Protection Act should be improved and/or expanded upon, similar to what has been implemented across many other states.[96]

Update Source Water Protection Plans to Incorporate PFAS Reduction Strategies

State code requires public water utilities that draw water from surface waters, or from groundwater under the influence of surface water, to submit source water protection plans to protect its public water supplies from contamination.[97] These plans must be updated every three years.

If PFAS has been detected in its raw water supplies above an EPA human health advisory or drinking water standard, the source water protection plan for the public water system should be updated to address the PFAS contamination. The update should reference and integrate information from the relevant PFAS Action Plan that was written to comply with the PFAS Protection Act.

SECTION FOUR

Stakeholder & Community Engagement

THROUGHOUT THE PROCESS OF DEVELOPING PFAS ACTION PLANS, it will be imperative for WVDEP to work with community groups, local businesses, water utilities, county health departments, impacted community members, and other stakeholders to design and implement a community engagement process for areas with PFAS contamination. By leveraging transparent information sharing, collaborative problem-solving, and environmental justice efforts to protect public health, WVDEP will be better equipped to develop responsive, adaptable plans that benefit all West Virginia residents.

Extensive and meaningful community collaboration will ensure that the voices of impacted community members are centered in decision-making processes. Initially, it is recommended for WVDEP to focus on the most highly contaminated regions: the Eastern Panhandle and the Ohio River Valley. Ultimately, statewide community engagement will result in better-informed identification of PFAS sources and reduction solutions, which will directly improve public health, in addition to the development of policy preventing further PFAS contamination throughout the state.

Toward the goal of developing responsive, hyper-local PFAS Action Plans, we recommend the following goals and activities:

1. **Design a Community Engagement Process Specific to PFAS Action Plans.**
   We recommend WVDEP engage identified stakeholders such as statewide organizations, local community groups, and impacted community members in designing a meaningful community engagement process to inform local PFAS Action Plans. This will include activities such as researching best methods and practices of engagement, convening and coordinating a design committee, and developing an engagement framework focusing on public outreach, education, facilitation of community input, and evaluation. It should also specifically outline how public input will then be incorporated into and addressed by PFAS Action Plans.

2. **Implement the Community Engagement Process.**
   Once consensus has been reached to finalize the design process, WVDEP and collaborators should implement the community engagement process as designed. While the specific engagement strategies may be further developed over time, three key activities should be included:

a. **Inform and Engage Community Partners.** Partners should receive, at a minimum, quarterly updates on the process and outcomes of the engagement process.

b. **Deploy Community Ambassadors.** Local community leaders should be trained and empowered to serve as community ambassadors, providing direct PFAS education and outreach on the ground in local communities.

c. **Hold Community Meetings.** Multiple public meetings in each impacted community should be held to provide ample opportunity for dialogue, allowing affected community members to weigh in on the process and outcomes of the PFAS Action Plans. These meetings should inform community members of levels of PFAS contamination found in their water supply and possible health impacts and risks associated with PFAS exposure. These meetings should be held in a variety of formats to ensure equitable engagement and access.

3 **Identify and Confirm Sources of PFAS Contamination.** Much of the information relevant to this topic can be found above, in Section 2 of this document. WVDEP will be able to expand PFAS data collection by leveraging community knowledge and input.

4 **Develop PFAS Action Plans.** Informed by data garnered through the community outreach and sampling outlined above, WVDEP will work with technical experts to develop

PFAS Action Plans for impacted communities across West Virginia. Updates on Action Plans should be communicated to stakeholders and community members as appropriate, including when published and any milestones of implementation (e.g. when treatment methods are deployed, when reduction of PFAS contamination levels occur, etc.).

5 **Refine and Replicate the Community Engagement Process in All PFAS-Impacted Communities.** While WVDEP may initially focus on highly impacted areas such as the Eastern Panhandle and the Ohio River Valley, WVDEP ultimately intends to expand this work to all PFAS-impacted communities in the state, prioritizing those with environmental justice concerns first, and implement this community engagement process for other regular WVDEP activities. In order to do so effectively, WVDEP should evaluate the effectiveness of engagement along the way, replicate the beneficial process in all impacted communities, and expand and apply the model to help environmental justice communities with other emerging contaminant investigations and during more common agency activities, including issuing permits and modifications and conducting remedial actions.

6 **Ensure consistent and thorough implementation of PFAS Action Plans.** See above in Section 3: Policy Recommendations section for more information on this recommendation. As stated above:

> "The PFAS Protection Act does not explicitly assign responsibility to track implementation of the plans to any single entity. Because of its direct or indirect involvement in so many of the implementation activities, it is recommended that WVDEP systematically track implementation of the actions required in each PFAS Action Plan and report to the public on the progress made."

West Virginia Rivers Coalition is committed to working as a collaborative partner through various steps in the development of PFAS Action Plans, including assisting with designing a community engagement process, engaging community partners, holding public meetings, and more.

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Endnotes

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