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Title: Deputy Cabinet Secretary
Organization: West Virginia Department of Environmental Protection
Committee: Senate Committee on Environment and Public Works
Hearing: PFAS: The View from Affected Citizens and States

Thank you, Mr. Chairman--

Good morning: Thank you for the opportunity to be here today to represent West Virginia in this dialogue about PFAS contamination and its impact on water quality. As you know, West Virginia was made a focal point of this issue in 2019 with the release of the movie *Dark Waters*, which is based on the story of an attorney who takes a stand against a large chemical company that has been contaminating a small town's drinking water with PFOA.

Per- and polyfluoroalkyl substances (PFAS) were manufactured and used in a variety of industries around the globe since the 1940s. Perfluorooctanoic acid (PFOA also known as C8) and perfluorooctane sulfonic acid (PFOS) are the most studied of several thousand PFAS compounds. These two compounds have been shown to persist in the human body. In fact, PFAS is estimated to be present in the blood of almost all United States residents. The U.S. Environmental Protection Agency (EPA) recently developed a health advisory level for the combined concentrations of PFOA and PFOS in drinking water of 70 parts per trillion (ppt) and is in the process of developing a maximum contamination level (MCL) for drinking water.

While EPA continues to study the toxicity of PFAS chemicals, West Virginia is studying the extent of potential contamination within the State. Groundwater contamination from PFAS, in excess of the USEPA's health advisory levels, has been discovered in West Virginia around industrial facilities and military installations. The West Virginia Department of Environmental Protection (WVDEP) and the West Virginia Department of Health and Human Resources (WVDHHR) understand the public concern over PFAS contamination in source water and require information on the state-wide distribution of the contamination.

In order to study the issue, the State created a West Virginia PFAS Work Group in 2019, consisting of members from the WVDEP, the WVDHHR, and the United States Geological Service (USGS) to determine a path forward for the

State. The Work Group determined early on that the most significant exposure pathway in the State is contaminated drinking water.

Source water for West Virginia's public water systems (PWS) is pumped from groundwater aquifers or withdrawn from the state's rivers and streams. These systems provide drinking water to the majority of the state's population and require constant monitoring for known and emerging contaminants.

Previously, the State worked with USGS on two projects on two projects that included testing for PFAS compounds in groundwater system along the Ohio River. The first was a National Water-Quality Assessment (NAWQA) Project. The second was a project for WVDHHR to test surface water influenced groundwater sources (SWIGS).

Based on that experience and expertise in sampling and analyzing PFAS data, and in order to understand the potential problems with drinking water, the Work Group asked the USGS to create a study plan to sample and analyze every Public Water System (PWS) regulated by the WVDHHR, including schools and day care facilities. The project analyzes untreated water from both groundwater and surface water intakes for the presence of 26 PFAS compounds, including PFOA, PFOS and GEN X, as well as a list of field parameters and inorganic elements.

While the Work Group planned its study, the West Virginia Legislature debated action on PFAS in the form of a bill named "The Clean Water Act of 2020," which requires the WVDEP to develop water quality standards and the WVDHHR to develop maximum contamination levels for at least seven PFAS compounds, including PFOA, PFOS and GEN X. Following WVDEP discussions with the State Senate about the planned testing activities for PFAS across the State, the Senate created and passed Senate Concurrent Resolution 46, directing the WVDEP and WVDHHR to cooperatively propose and initiate a public source-water supply study plan to sample for PFAS substances in all community water systems in West Virginia, including schools and day care facilities that operate treatment systems regulated by the WVDHHR.

Our drinking water study began in July 2020. The study will take two years: the first for sampling, the second to conduct data analysis and draft a report. When complete, the State's 279 public water systems will have been tested for 43 inorganic analytes and 26 PFAS compounds.

The USGS completed sampling in May 2021. Of the 277 sites sampled for PFAS, 251 were Community Public Water Systems and 26 were schools or day care facilities. Eighteen water systems were removed from the original sampling list because they were no longer in use and sixteen sampling sites were added to the list because the water system had multiple water sources with different hydrologic properties. In all, the USGS received preliminary laboratory results for 273 sites. Following final review the data will be uploaded to the USGS NWIS database and, the data will be published in a peer reviewed USGS Data Release.

The study revealed five sites that tested positively for the presence of PFOA and PFOS in excess of the EPA health advisory limit of 70 ng/l. The Lubeck, Vienna, and Parkersburg Public Water Systems are contaminated by PFOA related to the production and use of C8 at the nearby Washington Works DuPont facility. In Martinsburg, the Public Water System is contaminated primarily by PFOS associated with the historical use of “AFFF fire fighting foam” at a local military installation. The Glenn Dale Public Water System is contaminated by PFOS likely related to the historical use of the compounds in the metal plating industry, although further investigation is under way.

These preliminary results reveal that the two areas of known contamination in West Virginia are the area along the industrialized Ohio River corridor and the eastern panhandle of the State. Fortunately, the rest of West Virginia shows little PFAS contamination.

In summary, thanks to USGS’s work with the State, West Virginia has developed an extensive database of PFAS results to allow it to begin to address the problem areas in the State. The next step in the protection of public health is the development of safe exposure limits for PFAS compounds. Although some states have developed their own MCL and WQS, West Virginia and many other states are relying on the EPA Office of Research and Development (ORD) to develop national guidance and regulation for the protection of human health from these chemicals.

I would like to thank the committee for its efforts to protect the public from PFAS. I especially thank Senator Capito for her persistence in helping Martinsburg pursue reimbursement from the Department of Defense and for being a champion on this issue for the State of West Virginia and the nation.

Attached please find:

1. USGS Assessment of Per- and Polyfluoroalkyl Substances (PFAS) in West Virginia Public Source-Water Supplies
2. Senate Concurrent Resolution 46

Assessment of Per- and Polyfluoroalkyl Substances (PFAS) in West Virginia Public Source-Water Supplies

Virginia and West Virginia Water Science Center

Introduction

Per- and polyfluoroalkyl substances (PFAS) have been manufactured and used in a variety of industries around the globe since the 1940s. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) are the most studied of several thousand PFAS compounds. These two compounds have been shown to be persistent in the human body and PFAS is estimated to be present in the blood of almost all US residents (Calafat and others, 2007). PFOA and PFOS have caused tumors in animals and have been linked to low birth weights, disruption of the immune system, and thyroid disease (USEPA 2016a, USEPA, 2016b). The U.S. Environmental Protection Agency's health advisory level for the combined concentrations of PFOA and PFOS in drinking water is 70 parts per trillion (ppt) (USEPA, 2019).

Problem

Source water for West Virginia's public water systems (PWS) is pumped from groundwater aquifers or withdrawn from the state's rivers and streams. These systems (Fig 1.) provide drinking water to a majority of the state's population and require constant monitoring for known and emerging contaminants. Groundwater contamination from PFAS, in excess of the USEPA's health advisory levels, has occurred in West Virginia around industrial facilities and military installations. The West Virginia Department of Environmental Protection (WVDEP) and West Virginia Department of Health and Human Resources (WVDHHR) understand the public concern over PFAS contamination in source water and require information on the state-wide distribution of the contaminant.

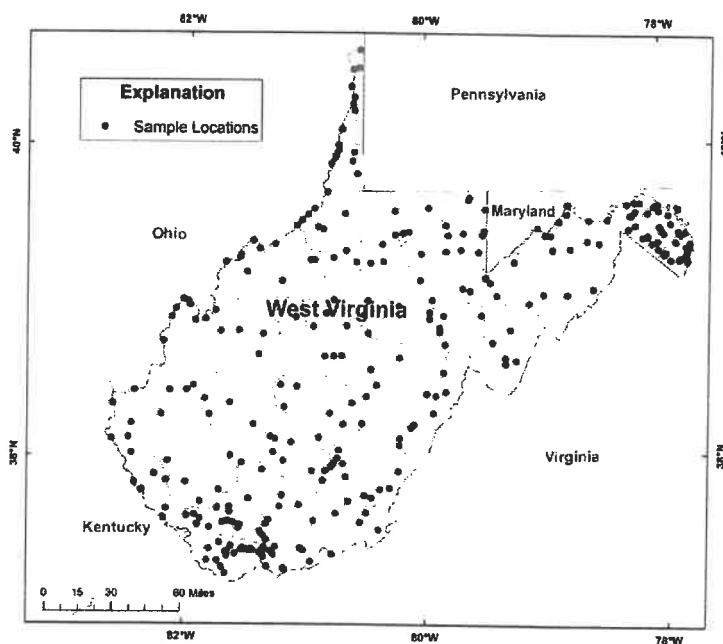


Figure 1. Map of locations to be sampled.

Although the U.S. Geological Survey (USGS) has a long history of sampling for organic contaminants in the state of West Virginia (Chambers and others, 2012), PFAS was not historically included in USGS studies and until recently analytical and sampling techniques for PFAS were not readily available. Consequently, the distribution of PFAS contamination in public and domestic water supplies in West Virginia is currently unknown. With recent developments in sampling and analytical protocols, the USGS has the capability to accurately determine and document PFAS concentrations in West Virginia's public source water using consistent and reliable methods. Recent (2019) USGS sampling of water supplies along the Ohio River has detected measurable concentrations of PFAS at several locations and it is critical that all public source-water in West Virginia be tested for these compounds to devise cost effective methods to protect human health.

Purpose and Objectives

The USGS will work cooperatively with the WVDEP and WVDHHR to sample PFAS in all community water systems in West Virginia, including schools and daycares that operate treatment systems regulated by the WVDHHR. The purpose of this effort is to inform state regulatory agencies about the distribution of PFAS contamination in public drinking water sources using data of known quality. The results of this project may be used to protect public drinking water sources and inform the need for additional investigations, such as sampling of private wells in rural settings.

Specific objectives include:

1. Identify the drinking water supplies in West Virginia that have measurable amounts of PFOS, PFOA, and related PFAS compounds in their raw source-water;
2. Investigate possible geochemical, watershed, land use, or geohydrologic factors that affect the presence of these compounds in public water supplies;
3. Inform the need for additional PFAS investigations, such as sampling of domestic wells; and
4. Assist state regulatory agencies in protecting public health by providing information on state-wide PFAS distribution in source water.

Approach

Samples will be collected from all community PWS's– to include both groundwater wells and surface-water intakes – identified by the WVDHHR (Fig. 1). There are currently 279 such systems, though PFAS sampling has recently been conducted by USGS at 23 of these systems, leaving 256 sites to be sampled by this proposed effort. Public Water Systems will be notified of the project through a letter from the WVDHHR prior to sampling and USGS personnel will subsequently contact systems to answer questions and schedule sampling visits. Samples of un-treated water will be collected from raw-water taps at all locations for the inorganic analytes in Table 1, and the PFAS compounds in Table 2. The measurement of field parameters and inorganic elements, in addition to PFAS, is necessary to understand the equilibrium of the geochemical system and determine mineral phases controlling solute concentrations.

Table 1. Proposed inorganic analytes and field parameters.

Analyte	Unit	Analyte	Unit	Analyte	Unit
pH	pH	Ammonia	mg/L	Iron	µg/l
Dissolved Oxygen	mg/l	Nitrite	mg/L	Lead	ug/L
Conductivity	µS/cm	Nitrate	mg/L	Lithium	ug/L
Turbidity	NTU	Orthophosphate	mg/L	Manganese	µg/l
Water Temp	°C	Total Nitrogen	mg/L	Molybdenum	ug/L
Alkalinity	mg/l	Aluminum	ug/L	Nickel	ug/L
Calcium	mg/l	Antimony	ug/L	Selenium	ug/L
Magnesium	mg/l	Arsenic	ug/L	Silver	ug/L
Potassium	mg/l	Barium	ug/L	Strontium	ug/L
Silica	mg/l	Beryllium	ug/L	Thallium	ug/L
Sodium	mg/l	Boron	ug/L	Uranium	ug/L
Bromide	mg/l	Cadmium	ug/L	Vanadium	ug/L
Chloride	mg/l	Chromium	ug/L	Zinc	ug/L
Fluoride	mg/l	Cobalt	ug/L		
Sulfate	mg/l	Copper	ug/L		

All samples will be collected by USGS personnel in accordance with published sampling protocols (U.S. Geological Survey, variously dated). Appropriate quality assurance (QA) samples, including blanks and replicates, will be collected to understand sources of variance and potential sample contamination, for approximately 10% of all samples. Sample results will be stored in the publicly-accessible USGS National Water Information System (NWIS; waterdata.usgs.gov). Analyses for major ions will be performed at the USGS National Water Quality Laboratory (NWQL) and analysis for PFAS will be conducted at a NWQL-verified contract laboratory.

Table 2. Proposed PFAS analytes.

PFAS Analytes	Abbreviation	Unit
Perfluorobutanoate	PFBA	ng/l
Perfluoropentanoate	PFPeA	ng/l
Perfluorohexanoate	PFHxA	ng/l
Perfluoroheptanoate	PFHpA	ng/l
Perfluorooctanoate	PFOA	ng/l
Perfluorononanoate	PFNA	ng/l
Perfluorodecanoate	PFDA	ng/l
Perfluoroundecanoate	PFUnA	ng/l
Perfluorododecanoate	PFDoA	ng/l
Perfluorotridecanoate	PFTTrDA	ng/l
Perfluorotetradecanoate	PFTeDA	ng/l
Perfluorobutanesulfonate	PFBS	ng/l
Perfluoropentanesulfonate	PFPeS	ng/l
Perfluorohexanesulfonate	PFHxS	ng/l
Perfluoroheptanesulfonate	PFHpS	ng/l
Perfluorooctanesulfonate	PFOS	ng/l
Perfluorononanesulfonate	PFNS	ng/l
Perfluorodecanesulfonate	PFDS	ng/l
Perfluorooctanesulfonamide	PFOSA	ng/l
N-Methylperfluorooctanesulfonamidoacetate	N-MeFOSAA	ng/l
N-Ethylperfluorooctanesulfonamidoacetate	N-EtFOSAA	ng/l
4:2 Fluorotelomersulfonate	4:2 FTS	ng/l
6:2 Fluorotelomersulfonate	6:2 FTS	ng/l
8:2 Fluorotelomersulfonate	8:2 FTS	ng/l
Perfluoro-2-propoxypropanoate (GEN X)	HFPO-DA	ng/l
4-Dioxa-3H-perfluorononanoate	ADONA	ng/l

Pertinent information from each of the sampling sites, including if the site uses surface water or groundwater, aquifer used, well depth, watershed, and primary land use at the well or water intake (urban, suburban, rural, residential, industrial, natural, agricultural), production rate, and treatment type(s) will be compiled by the USGS in consultation with the WVDHHR and during site visits.

USGS personnel will compile and analyze all collected data, including QA and quality-control (QC) data. Results of the analysis will include figures depicting the concentration of selected PFAS (including PFOS and PFOA) at the sampling locations and statistical summaries of the data for each analyte such as number of samples, frequency of detection, maximum, minimum, mean concentration, and percent of

samples exceeding Health Advisory Level. In addition, an assessment of PFAS detections (mean concentration of total PFAS, frequency of detection of PFOS and PFOA) by hydrogeologic, geochemical, and land-use factors will be done.

Deliverables

Multiple deliverables will be provided through this effort. Throughout the course of the project all sampling results will be provided through NWIS as they become available from the lab and have gone through proper QA. Data that needs to be released quickly or is not accessible through NWIS will be provided in a USGS Data Release when sampling and QA is completed. Preview of provisional data, prior to public release, may be provided to the cooperators upon request. If sample results exceed federal or state contaminant level recommendations, the PWS, WVDHHR, and WVDEP will be notified of the exceedance as soon as possible. Quarterly progress reports will be provided to cooperating agencies, and annual project updates will be provided as a presentation at the annual USGS-WVDEP-WVDHHR meeting. The final deliverable will include a peer-reviewed and professionally-published USGS interpretive report containing a description of the study, characterization of the sampling locations, and analysis of the sampling results as described above. All products will be served to the public free of charge via the internet for the foreseeable future.

Funding and Timeline

Funding for this effort includes salaries, supplies, lab analyses, travel expenses, and publication costs necessary to accomplish the stated objectives and provide the deliverables described. The total cost to complete the project is \$1,690,000 (Table 3). Of this total, USGS will provide \$90,000 in matching funds with the remaining \$1,600,000 provided by cooperating state agencies (WVDEP and WVDHHR).

Table 3: Proposed Budget.

	Year 1	Year 2	Total
USGS Funds	\$45,000	\$45,000	\$90,000
WVDEP Funds	\$400,000	\$400,000	\$800,000
WVDHHR Funds	\$400,000	\$400,000	\$800,000
Total	\$845,000	\$845,000	\$1,690,000

The effort is proposed on a two-year timeline, with sampling in year 1 and data analysis and report preparation occurring in year 2 (Table 4). The year and quarter in which the project begins will depend on when funding is secured, and final agreements have been signed but the overall timeframe will be 2 years from start date.

Table 4: Proposed Timeline.

Task	QTR	Year 1				Year 2			
		1	2	3	4	1	2	3	4
Develop sampling plan		X							
Site access and coordination		X	X	X	X				
Sampling		X	X	X	X				
QA/QC data as analyses are completed			X	X	X				
Data analysis				X	X	X			
Prepare and Publish Data Release				X		X			
Prepare initial draft of investigative report				X		X	X		
Report review and approval							X	X	
Publish investigative report									X

References

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- USEPA, 2019, EPA’s Per- and polyfluoroalkyl substances (PFAS) action plan: EPA823R18004, 72 p., https://www.epa.gov/sites/production/files/2019-02/documents/pfas_action_plan_021319_508compliant_1.pdf
- U.S. Geological Survey, variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water Resources Investigations, book 9, chaps. A1–A9, <http://pubs.water.usgs.gov/twri9A>.

Contacts

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SENATE CONCURRENT RESOLUTION 46

(By Senators Trump, Hardesty, Rucker, Lindsay,
Romano, Beach, Weld, Takubo, Clements, Baldwin,
Pitsenbarger, Smith, Jefferies, Cline, and Woelfel)

[Originating in the Committee on the Judiciary;
reported on February 20, 2020]

Requesting the Department of Environmental Protection and the Department of Health and Human Resources cooperatively propose and initiate a public source-water supply study plan to sample perfluoroalkyl and polyfluoroalkyl substances for all community water systems in West Virginia, including schools and daycares that operate treatment systems regulated by the West Virginia Department of Health and Human Resources.

Whereas, The Legislature recognizes the prevalence and potential health risks of certain perfluoroalkyl and polyfluoroalkyl substances (PFAS). These compounds have been manufactured and are used in thousands of applications in a variety of industries and are an ingredient in some fire-fighting foams, food packaging, cleaning products, nonstick pots and pans, and various other household items. These compounds are very stable and accumulate in the environment, and many are highly water soluble, easily transferring through soil to groundwater. Some are associated with adverse health effects; and

Whereas, The United States Environmental Protection Agency's lifetime drinking water health advisory level for the individual or the combined concentrations of two of the most studied of the PFAS compounds, perflouroctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) in drinking water is currently 70 parts per trillion; and

Whereas, The United States Environmental Protection Agency is moving forward with the Maximum Contaminant Level process for PFOA and PFOS two of the most well-known and prevalent PFAS chemicals. The United States Environmental Protection Agency is also gathering and evaluating information to determine if regulation is appropriate for a broader class of PFAS; and

Whereas, In accordance with §7321 of the National Defense Authorization Act for Fiscal Year 2020 (P.L. 116-92), the United States Environmental Protection Agency added 160 per-and polyfluoroalkyl substances (PFAS) to the Emergency Planning and Community Right-to-Know Act's §313 list of reportable chemicals. Since January 1, 2020, Industry reporters have been required to track and collect data on the listed PFAS with the first Toxics Release Inventory (TRI) report due by July 1, 2021. Federal law requires industry to report this information to: (1) The State Emergency

Response Commission, which in West Virginia is the West Virginia Division of Homeland Security and Emergency Management; (2) the Local Emergency Planning Committee; and (3) the fire department with jurisdiction over the affected facility; and

Whereas, It is in the public interest for West Virginia to identify the presence and prevalence of specific PFAS chemicals in and near drinking water supplies to protect the health of West Virginians; therefore, be it

Resolved by the Legislature of West Virginia:

That the Legislature hereby requests the Department of Environmental Protection and the Department of Health and Human Resources cooperatively propose and initiate a public source-water supply study plan to sample perfluoroalkyl and polyfluoroalkyl substances for all community water systems in West Virginia, including schools and daycares that operate treatment systems regulated by the West Virginia Department of Health and Human Resources; and, be it

Further Resolved, That the purpose of the PFAS public source-water supply study plan is to inform state regulatory agencies about the distribution of PFAS contamination and potential PFAS contamination in public drinking water sources using data of known quality. Specific objectives of the PFAS public source-water supply study plan shall include: (1) Identifying the drinking water supplies in West Virginia that have measurable amounts of PFOS, PFOA, and related PFAS compounds in their raw source-water; (2) Determining if there are geochemical, watershed, industrial use, land use, or geohydrologic factors or processes that affect the presence of these compounds in public source-water supplies; (3) Informing state agencies and the public of any need for additional PFAS investigation, such as sampling of domestic wells; and (4) Assisting state regulatory agencies in protecting public health by providing risk-based information on statewide PFAS distribution in source water; and, be it

Further Resolved, That any entity required to report PFAS compounds based on the TRI reporting requirements listed above shall also report that information to the Department of Environmental Protection by July 1, 2021.

Further Resolved, That the Department of Environmental Protection and the Department of Health and Human Resources report to the Joint Legislative Oversight Committee on State Water Resources semi-annually beginning in the fiscal year 2021, on its findings, conclusions, and recommendations.