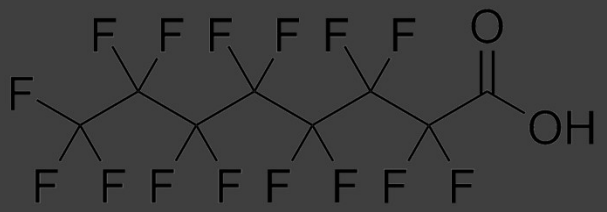
Assessment of Per- and Polyfluoroalkyl Substances (PFAS) in West Virginia's Public Source-Water Supplies

Joint Legislative Oversight Commission on State Water Resources
June 13, 2022

Per- and Polyfluoroalkyl Substances in West Virginia's Public Source Water

Mitch McAdoo, Hydrologist



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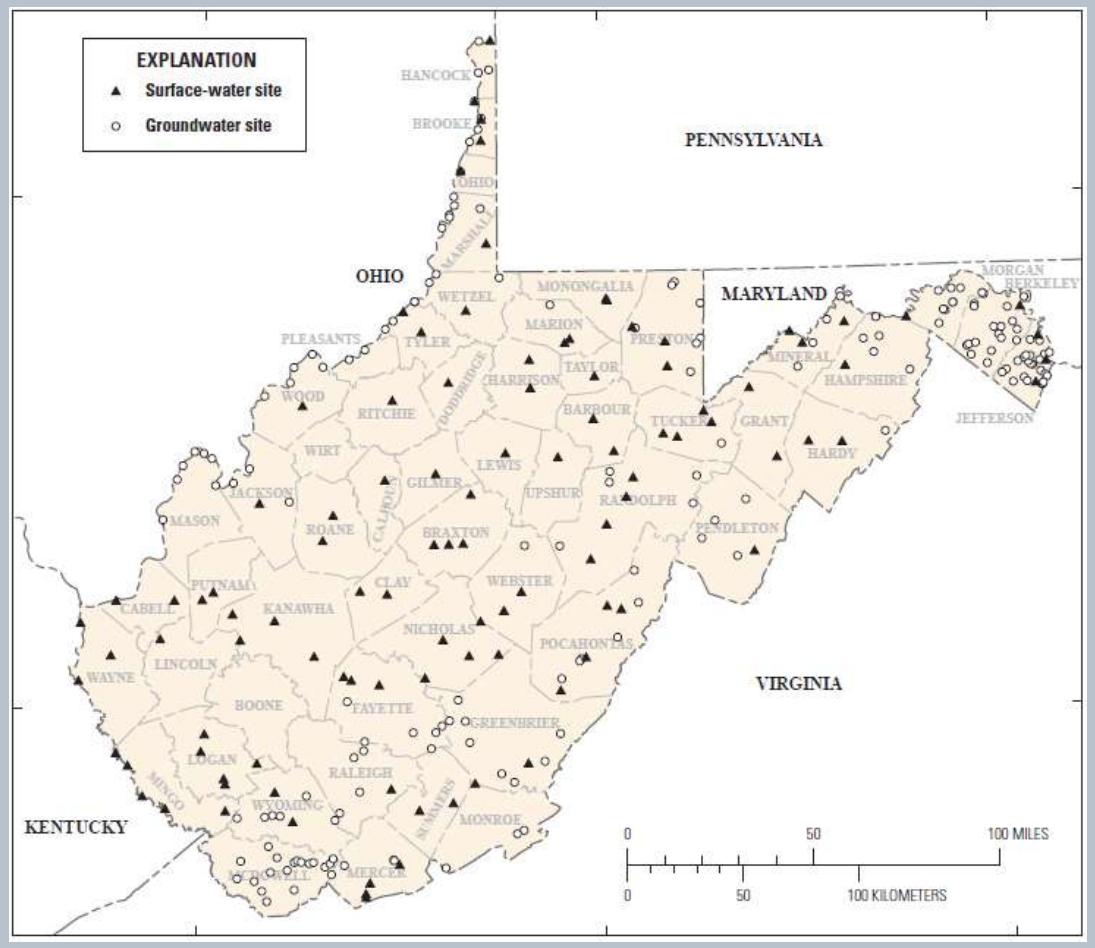
Project Objectives

Meet the Requirements of SCR46 (2019)

1. Identify drinking water sources with measurable amounts of PFAS
2. Determine processes or land use factors affecting PFAS concentrations
3. Inform state agencies of any need for additional PFAS investigation
4. Assist state regulatory agencies in protecting public health by providing information on statewide PFAS distribution in source water

Study Area

- Data collected from May 2019 to May 2021
- 279 environmental samples
- GW and SW sites are not evenly distributed throughout the state



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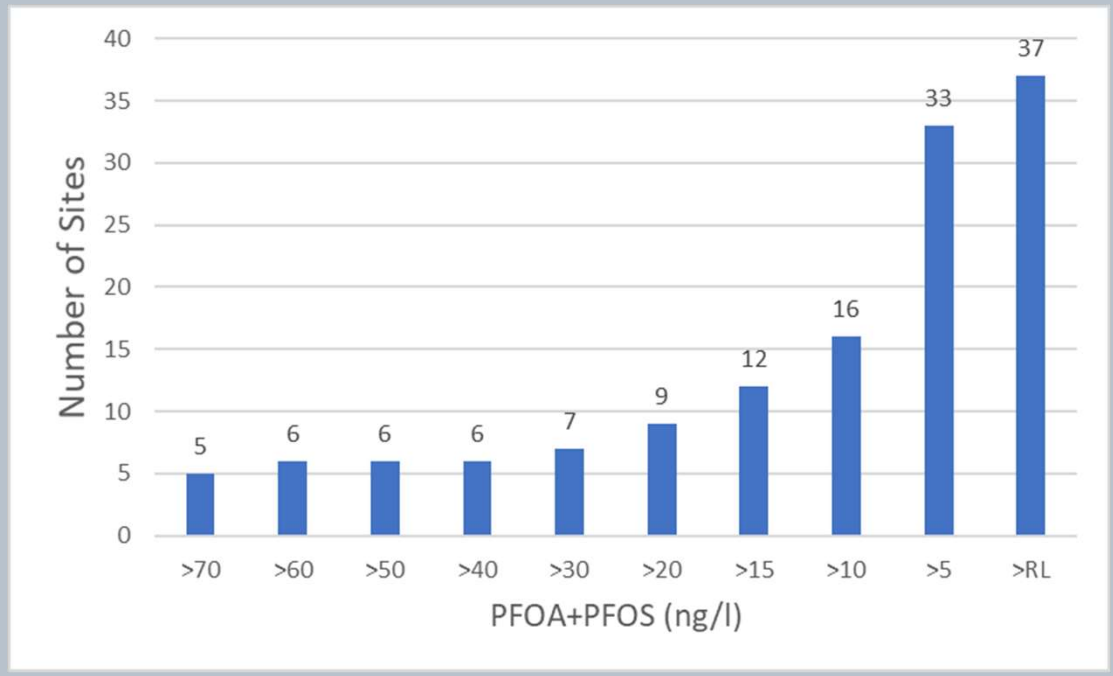
PFOA and PFOS

- Concentrations at five sites exceeded HA for combined concentrations PFOA and PFOS of 70 ng/l
- 37 sites had detections above the reporting level for PFOA, PFOS, or both
- Current project with DHHR to sample finished water at all 37 sites



>70	>60	>50	>40
GLEN DALE WATER WORKS	GLEN DALE WATER WORKS	GLEN DALE WATER WORKS	GLEN DALE WATER WORKS
VIENNA	VIENNA	VIENNA	VIENNA
LUBECK PSD	LUBECK PSD	LUBECK PSD	LUBECK PSD
PARKERSBURG UTILITY BOARD	PARKERSBURG UTILITY BOARD	PARKERSBURG UTILITY BOARD	PARKERSBURG UTILITY BOARD
MARTINSBURG CITY OF	MARTINSBURG CITY OF	MARTINSBURG CITY OF	MARTINSBURG CITY OF
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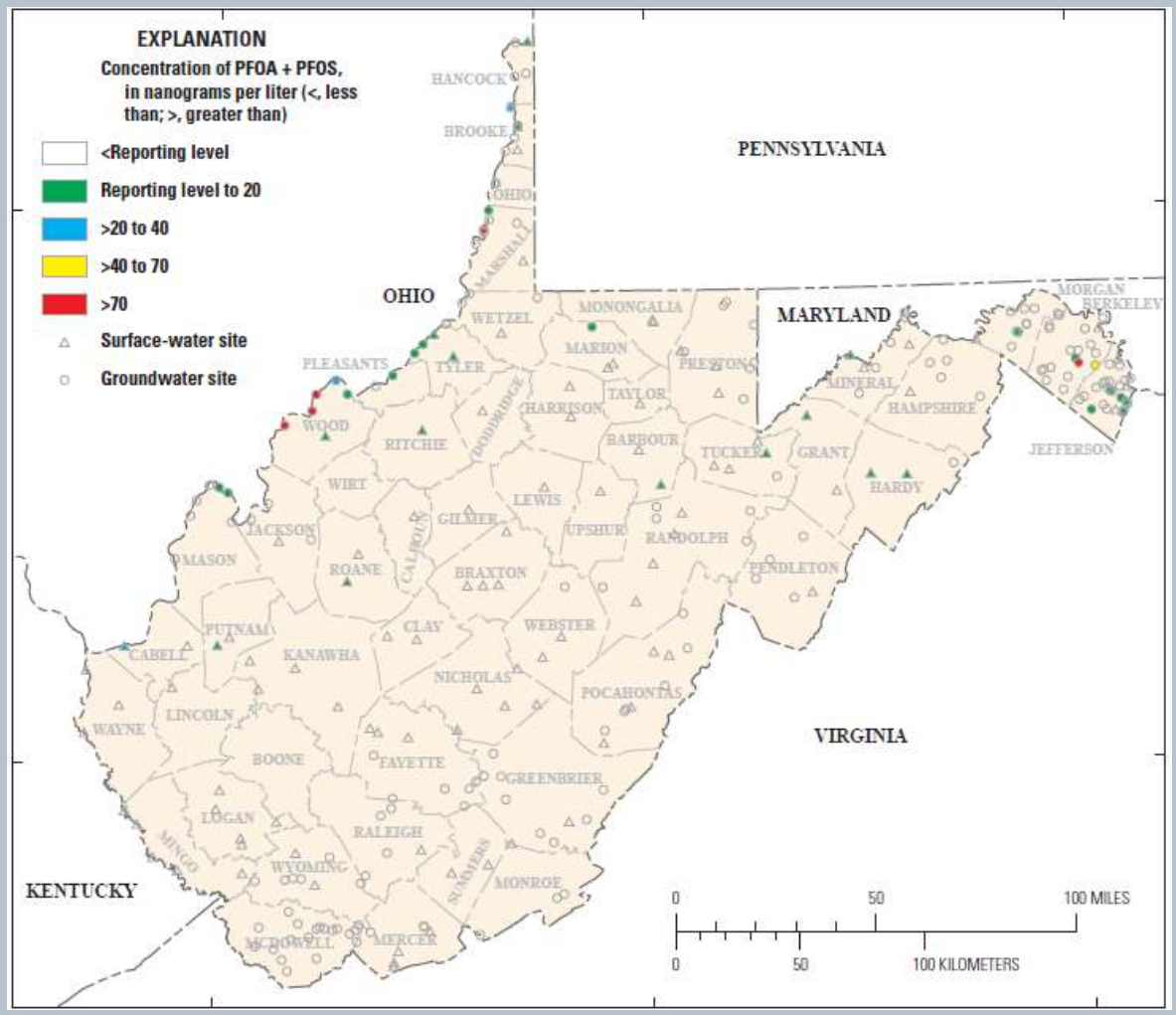
GLEN DALE WATER WORKS	GLEN DALE WATER WORKS	GLEN DALE WATER WORKS	GLEN DALE WATER WORKS
VIENNA	VIENNA	VIENNA	VIENNA
LUBECK PSD	LUBECK PSD	LUBECK PSD	LUBECK PSD
PARKERSBURG UTILITY BOARD	PARKERSBURG UTILITY BOARD	PARKERSBURG UTILITY BOARD	PARKERSBURG UTILITY BOARD
MARTINSBURG CITY OF	MARTINSBURG CITY OF	MARTINSBURG CITY OF	MARTINSBURG CITY OF
DEPARTMENT OF VETERANS AFFAIRS	DEPARTMENT OF VETERANS AFFAIRS	DEPARTMENT OF VETERANS AFFAIRS	DEPARTMENT OF VETERANS AFFAIRS
WILLIAMSTOWN WATER DEPT	WILLIAMSTOWN WATER DEPT	WILLIAMSTOWN WATER DEPT	WILLIAMSTOWN WATER DEPT
	WEIRTON AREA WATER BOARD	WEIRTON AREA WATER BOARD	WEIRTON AREA WATER BOARD
	WVAWC - HUNTINGTON DIST	WVAWC - HUNTINGTON DIST	WVAWC - HUNTINGTON DIST
		SISTERSVILLE MUNICIPAL WATER	SISTERSVILLE MUNICIPAL WATER
		PIEDMONT MUNICIPAL WTR WKS	PIEDMONT MUNICIPAL WTR WKS
		BENWOOD WATER DEPARTMENT	BENWOOD WATER DEPARTMENT
			BLUE RIDGE ELEMENTARY
			CHESTER
			DAVIS WATER WORKS
			BENS RUN INDUSTRIAL PARK

PFOA and PFOS

- 18 sites were in counties that border Ohio River
- 13 sites were in the eastern panhandle



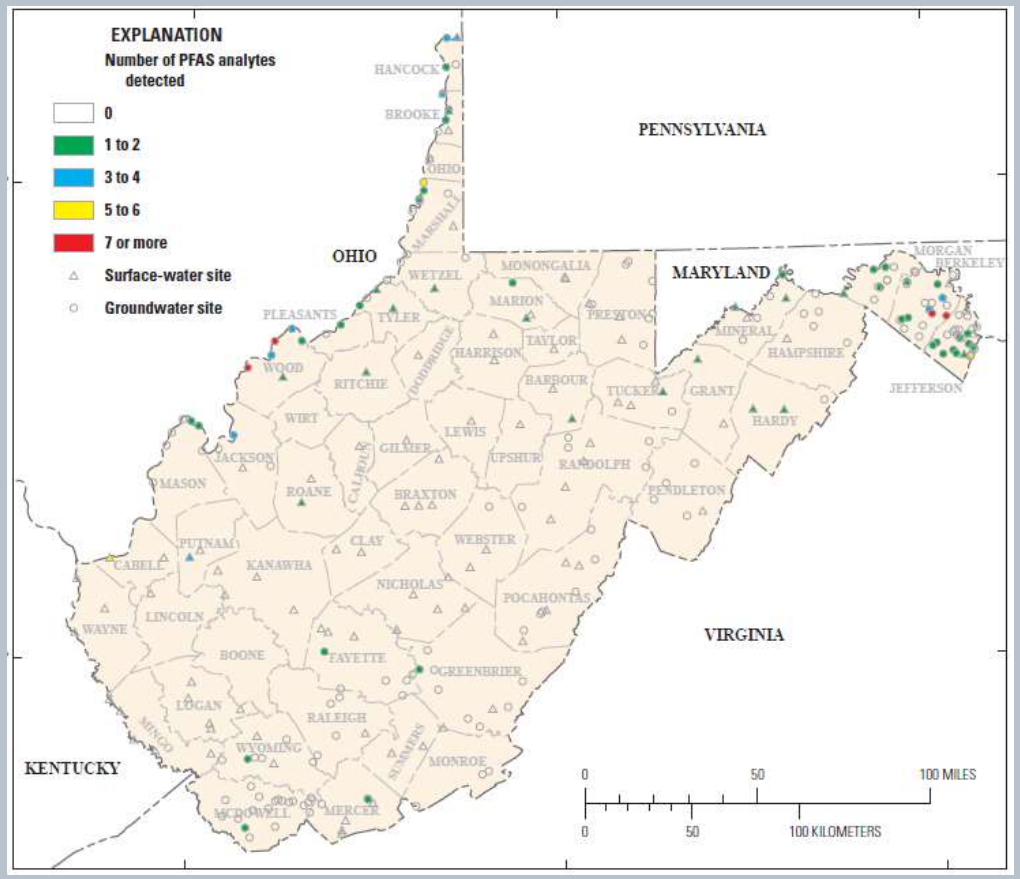
Summary of PFAS Detections

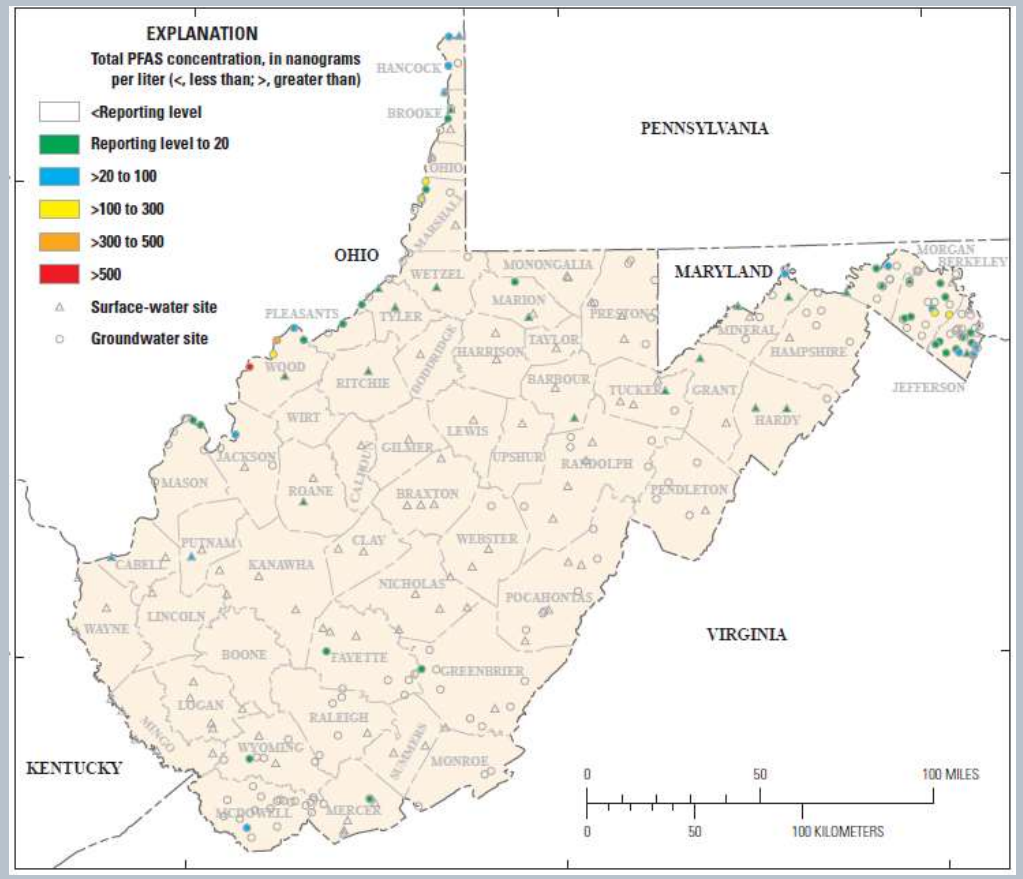
- 24% of sites had at least one PFAS detected
- 13% of sites had either PFOA, PFOS or both
- 12 analytes were detected above the reporting level
- PFOA had the highest number of detections for any individual analyte
- PFOA had the highest measured concentration of any individual analyte

All concentrations are in Nanogram per liter

Analyte	Number	Percent	Min	Median	Max
PFOA+PFOS	37	13	4.4	7.6	1570
PFOA	29	10	4.4	6.2	1570
6:2 FTS	19	7	4.9	19	60
PFBA	18	7	4.4	6.6	24
PFOS	16	6	4.5	9.6	98
PFPeA	16	6	4.9	6.7	19
PFHxS	15	5	5.2	11.0	81
PFBS	12	4	4.2	6.6	24
PFHxA	8	3	4.9	9.1	37
HFPO-DA	3	1	5.8	8.9	9.5
PFHpA	3	1	7.4	15.0	58
PFPeS	3	1	5.1	8.1	12
PFNA	1	0.4	8		8

Spatial Distribution





Report Summary

- 279 sites were sampled between 2019 -2021
- 24% (67) of sites had at least one PFAS detected (10% with 2 PFAS, 6% with 3 PFAS)
- Only 12 of the 28 analytes were detected throughout the study
- 5 sites were above the EPA HA level of 70 ng/l PFOA+PFOS
- Most of the source water in West Virginia is potentially susceptible to PFAS contamination if a source of PFAS exists within the source area
- Ohio River Valley is the most vulnerable region to PFAS contamination in the state of West Virginia for surface water and groundwater
- Three counties of Morgan, Berkely, and Jefferson in the Eastern Panhandle of West Virginia are also highly vulnerable to PFAS contamination
- Abandoned underground coal-mine aquifers are intrinsically susceptible to anthropogenic contamination, but they do not appear to be particularly vulnerable to PFAS contamination. These aquifers in southern West Virginia may lack sufficient PFAS contamination sources in their recharge areas.

Report Summary Continued

- Fractured rock aquifers in the Appalachian Plateaus and Valley and Ridge generally lack sufficient yield to supply public water systems, and this area of the state is generally dominated by surface-water sites for public supply. Therefore, very little information was gained about PFAS contamination throughout the fractured rock aquifers in much of the state.

- 84 surface-water sites were sampled in the Appalachian Plateaus and Valley and Ridge; 8 of these sites had detections for PFAS and the total PFAS concentrations for these sites were generally low suggesting the surface water sites in Appalachian Plateaus and Valley and Ridge are not vulnerable to PFAS contamination. This may be due to a lack of PFAS contamination sources but could be related to variability in surface water concentrations over time.

Future Questions and Possible Investigations

- What is the PFAS concentration in treated finished water at sites that had detections for PFAS?
  - Sample finished water at public-water systems. (in progress)
- What is the distribution of PFAS in domestic wells in areas of contamination or where there is a lack of groundwater data?
  - Sample domestic wells in specified locations.
- What are the major sources and exposure pathways of PFAS in West Virginia?
  - Sample suspected sources contributing PFAS to public-water supplies and understand how those PFAS sources affect drinking water, fish tissue, and other pathways of human exposure.
- What are influences on transformation and change in PFAS concentrations over time in surface water and groundwater?
  - Long-term monitoring for PFAS in groundwater, surface water, sediment, and tissues to understand PFAS fate and transport in areas of known contamination.

Questions?

Scott Mandirola
scott.g.mandirola@wv.gov

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