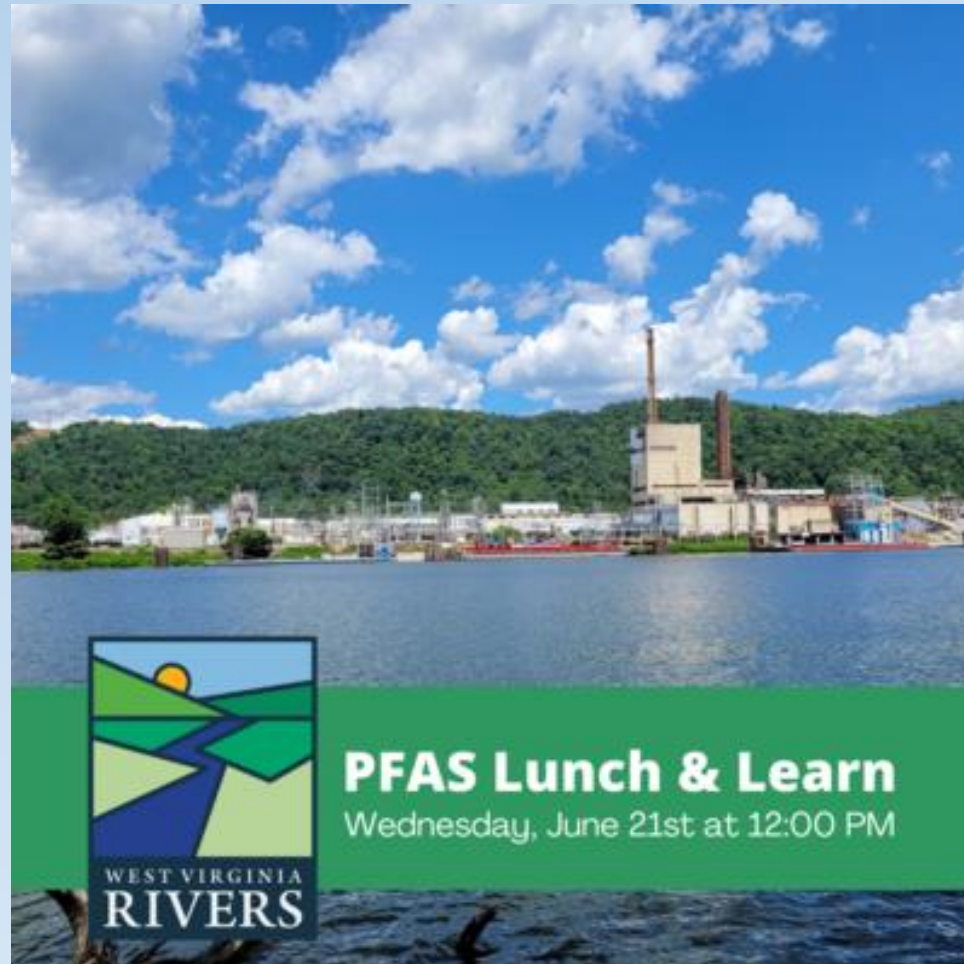


Welcome from West Virginia Rivers Coalition!



Agenda & Housekeeping

Agenda for Today:

- Welcome & Introductions
- Presentations
 - Jenna Dodson, WV Rivers Coalition
 - Dr. Alan Ducatman, WVU
 - Delegate Evan Hansen, WV House of Delegates & Downstream Strategies
 - Scott Mandirola, WVDEP
- Questions & Answers

Housekeeping:

- Please keep yourself muted during the presentations, until we open the floor for questions.
- We ask that you hold all questions until the end so our presenters may answer collaboratively.
- You may place your questions into the chat during the presentation, or raise your hand at the start of the Q&A.

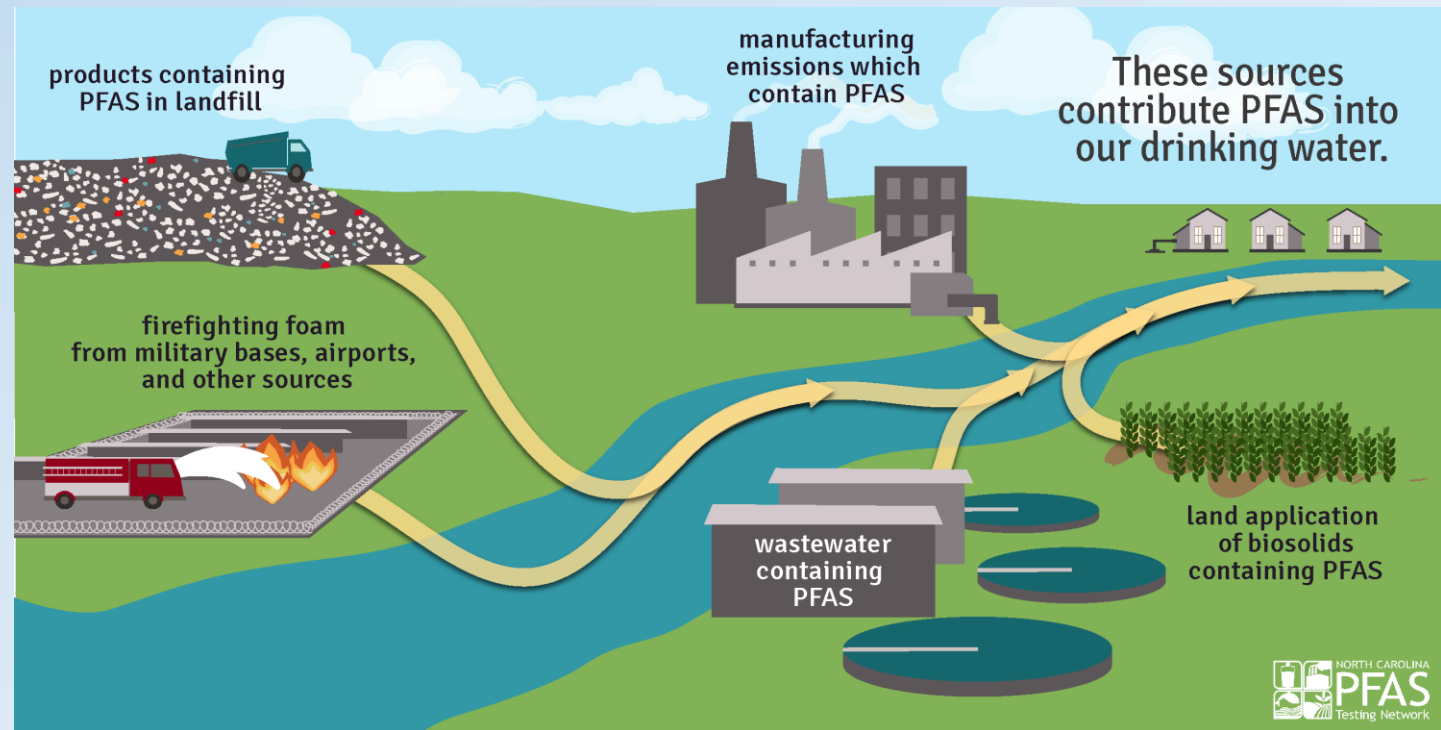
Jenna Dodson

Staff Scientist
West Virginia Rivers Coalition



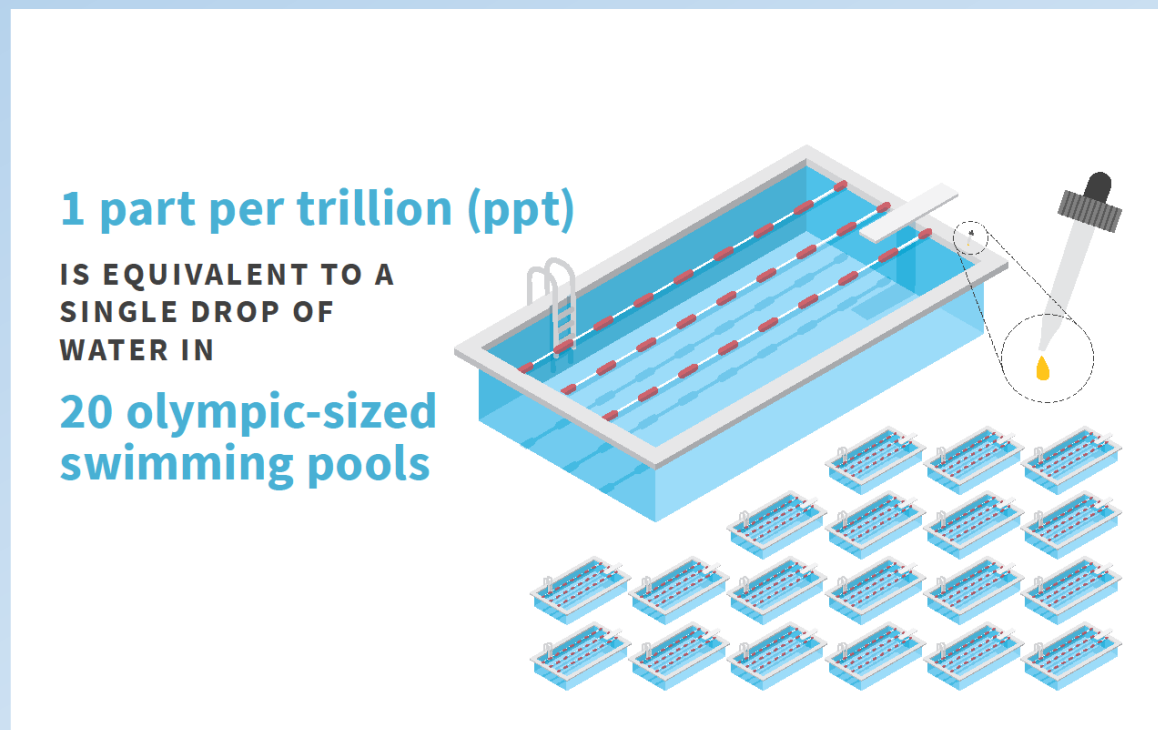
What are PFAS and how do they get into drinking water?

- Per- and poly-fluoroalkyl substances (PFAS) - group of man-made chemicals
- 10,000-12,000 types of PFAS
- “Forever chemicals” that don’t break down in the environment
- Used in manufacturing since the 1950s for non-stick, stain resistant, water resistant properties
- Examples of products with PFAS:
 - Non-stick cookware
 - Firefighting foam
 - Carpet
 - Food packaging



EPA's Draft Drinking Water Standards (MCLs)

- PFOS: 4 ppt
- PFOA: 4 ppt



- GenX, PFBS, PFNA, PFHxS: Hazard Index = 1.0

$$\text{Hazard Index} = \left(\frac{\text{GenX}}{10 \text{ ppt}} \right) + \left(\frac{\text{PFBS}}{2000 \text{ ppt}} \right) + \left(\frac{\text{PFNA}}{10 \text{ ppt}} \right) + \left(\frac{\text{PFHxS}}{9 \text{ ppt}} \right)$$

PFAS in Raw & Finished Drinking Water in WV

USGS
science for a changing world

Prepared in cooperation with the West Virginia Department of Environmental Protection, Division of Water and Waste Management and the West Virginia Department of Health and Human Resources, Bureau for Public Health

Occurrence of Per- and Polyfluoroalkyl Substances and Inorganic Analytes in Groundwater and Surface Water Used as Sources for Public Water Supply in West Virginia

USGS
science for a changing world

Per- and polyfluoroalkyl Substances in Drinking Water at Select Public Water Systems in West Virginia, 2022 [View](#)

Dates

Publication Date :	2023-05-04
Start Date :	2022-07-27
End Date :	2023-01-11

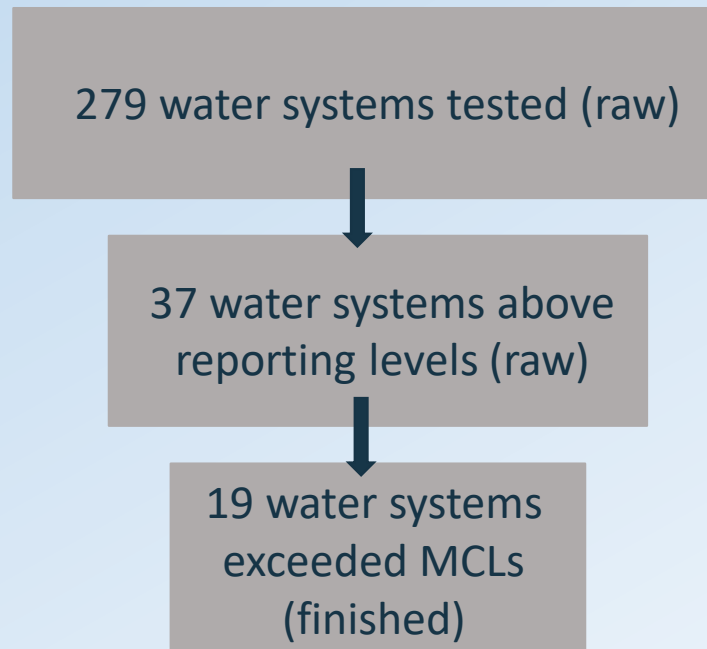
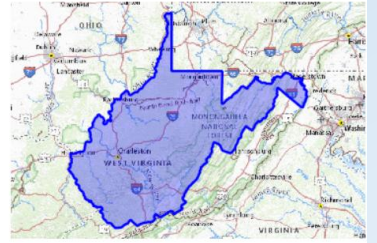
Citation

McAdoo, M.A., 2023. Per- and polyfluoroalkyl Substances in Drinking Water at Select Public Water Systems in West Virginia, 2022: U.S. Geological Survey data release, <https://doi.org/10.5066/P9WZ9Y4K>.

Summary

These data were collected to understand the occurrence of per- and polyfluoroalkyl substances (PFAS) in drinking water sampled at public water systems identified to have per- and polyfluoroalkyl substances (PFAS) or per- and polyfluoroalkyl substances (PFAS) in drinking water.

[Map >>](#)



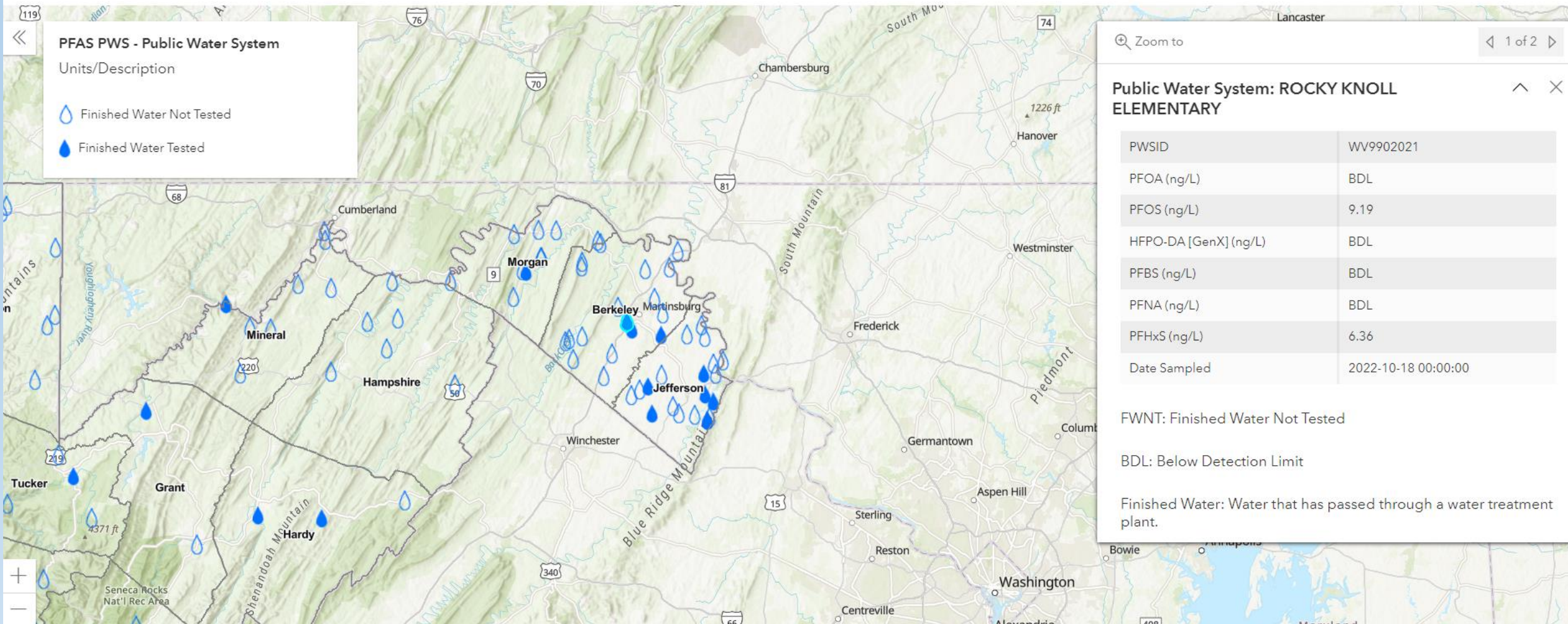
Water Systems with PFAS Exceeding Draft MCLs

Public Water System Name	Sample Date	PFOA	PFOS	HFPO-DA (GenX)	PFBS	PFNA	PFHxS	Hazard Index Preliminary Calculation	Units/Description
BENWOOD WATER DEPARTMENT	12/5/2022	BDL	8.56	BDL	5.32	BDL	21.4	2.38	ng/L (BDL=Below Detection Limit)
BLUE RIDGE ELEMENTARY	10/17/2022	3.72	5.9	BDL	BDL	6.51	BDL	0.65	ng/L (BDL=Below Detection Limit)
CHESTER	12/6/2022	BDL	12.2	BDL	2.65	BDL	9.47	1.05	ng/L (BDL=Below Detection Limit)
DEPARTMENT OF VETERANS AFFAIRS	10/17/2022	BDL	34.3	BDL	2.09	BDL	22	2.45	ng/L (BDL=Below Detection Limit)
FAIRVIEW TOWN OF	12/16/2022	BDL	4.41	BDL	BDL	BDL	3.3	0.37	ng/L (BDL=Below Detection Limit)
GLEN DALE WATER WORKS	12/5/2022	BDL	7.87	BDL	3.2	BDL	11.8	1.31	ng/L (BDL=Below Detection Limit)
HARPERS FERRY CAMPSITES-CARDINAL	11/14/2022	5.48	11	BDL	5.89	BDL	13	1.45	ng/L (BDL=Below Detection Limit)
HUGHES RIVER WATER	10/13/2022	8.57	2.12	BDL	BDL	BDL	BDL	0	ng/L (BDL=Below Detection Limit)
LUBECK PSD	8/1/2022	2.77	BDL	34	BDL	BDL	BDL	3.4	ng/L (BDL=Below Detection Limit)
NEW HAVEN WATER DEPT	2/1/2022	6.81	<1.97	<4.92	<1.97	BDL	BDL	0	ng/L (BDL=Below Detection Limit)
PARKERSBURG UTILITY BOARD	2/1/2022	12	3.33	BDL	4	4	BDL	0.002	ng/L (BDL=Below Detection Limit)
ROCKY KNOLL ELEMENTARY	10/18/2022	BDL	9.19	BDL	BDL	BDL	6.36	0.71	ng/L (BDL=Below Detection Limit)
SAINT MARYS	8/2/2022	5.8	BDL	BDL	3.33	BDL	2.11	0.24	ng/L (BDL=Below Detection Limit)
SHENANDOAH MINI HOMES	12/14/2022	2.13	11.6	BDL	2.18	BDL	4.22	0.47	ng/L (BDL=Below Detection Limit)
SOUTH JEFFERSON ELEMENTARY	10/17/2022	3.64	7.81	BDL	2.84	4.02	BDL	0.4	ng/L (BDL=Below Detection Limit)
UNION WILLIAMS P S D	8/2/2022	5.22	BDL	BDL	2.46	BDL	BDL	0.0012	ng/L (BDL=Below Detection Limit)
WALNUT GROVE UTILITIES	11/14/2022	BDL	9.3	BDL	2.5	BDL	3.07	0.34	ng/L (BDL=Below Detection Limit)
WEIRTON AREA WATER BOARD	12/6/2022	2.52	6.43	BDL	BDL	BDL	7.58	0.84	ng/L (BDL=Below Detection Limit)
WILLIAMSTOWN WATER DEPT	8/1/2022	27.8	BDL	BDL	8.49	BDL	18.3	2.04	ng/L (BDL=Below Detection Limit)

Public Water System PFAS Results Map

West Virginia Public Water System PFAS Results

Test results will be posted as additional Public Water Systems finished water is tested



Resources

- USGS – PFAS in Drinking Water at Select Public Water Systems in West Virginia, 2022
 - <https://www.sciencebase.gov/catalog/item/6401ff0dd34e6929881229c1>
- WV DHHR – Finished Water Sampling Results MCL Exceedances Table
 - https://oehs.wvdhhr.org/media/aotbii4w/pfas-finished-water-sampling-results_mcl-exceedances.pdf
- WV DHHR – Public Water System PFAS Results Map
 - <https://oehsportal.wvdhhr.org/pwspfas/>
- WV DHHR
 - <https://oehs.wvdhhr.org/eed/source-water-assessment-wellhead-protection/>
- EPA's Proposed PFAS Drinking Water Regulation Frequently Asked Questions and Answers
 - https://www.epa.gov/system/files/documents/2023-04/Public%20FAQs_PFAS_NPDWR_Final_4.4.23.pdf
- EPA's How to Calculate the Hazard Index
 - https://www.epa.gov/system/files/documents/2023-03/How%20do%20I%20calculate%20the%20Hazard%20Index._3.14.23.pdf

Dr. Alan Ducatman

Professor emeritus
West Virginia University



Alan Ducatman, MD, MS

Professor emeritus, West Virginia University
aducatman@hsc.wvu.edu

Washington Works, WV



Declarations:

- Contributed to Design; Led Participant Health communications for “C8 Health Project” in contaminated water districts, WV and Ohio beginning 2005
- **COI declaration:** participate as paid and unpaid consultant to communities seeking medical monitoring benefits following PFAS water contamination

Array of Historic Sources, Uses

Surfactants/Dispersants; Industrial manufacturing Aid in numerous commercial products :

Food packaging (including pet food). Food preparation bags. Example: microwave popcorn

Medical device (including coatings for stents), eyedrops, contacts, implantable surface coat

Home barrier insulation and specialty paints – future spray on roof applications proposed

Specialty Paper coatings – “Take out” and disposable plates/containers, pizza box,

Treatments for Fabrics and Carpets, Outdoor wear and Leather

Adhesives (including carpet backing)

Ski wax, bike lube

Electronics, solar panels, elastomeric coating for electrical cables.

Cleaners, treatments: gun cleaners, chain cleaners, engine coaters, auto detailing, piano tuning (2 uses)

Hydraulic fracturing lubricant and tracer technology

Chrome plating and photolithography

AFFFs – most prevalent source in groundwater and drinking water, may contain a complex mixture, and each batch can vary to meet a standard (“MilSpec”)

Shaving, cosmetics, flosses

C8 Science Panel 2005-13

(PFOA-contaminated water,
N=69,030, and literature review)

*There are now > 1000 peer
review papers concerning
this chemical class, human
exposures, and health
effects*

- “Probable Link” Findings
 - Hypercholesterolemia¹
 - Thyroid Disease²
 - Ulcerative Colitis²
 - Testicular Cancer
 - Kidney Cancer¹
 - Pregnancy-induced Hypertension

1. Substantially Increased Evidence since 2015 2. Nuances since 2015

Examples of Outcomes other than probable links that
have become clearer since the Science Panel
Deliberated

Liver Disease

Hyperuricemia

California Basis for PFAS Health Goals

	PFOA	PFOS
Health Effects in Humans	<ul style="list-style-type: none">• Kidney cancer• Liver toxicity• Immune system toxicity• Increases in cholesterol• Suggestive evidence of preeclampsia	<ul style="list-style-type: none">• Increases in cholesterol• Immune system toxicity• Suggestive evidence of preeclampsia
Health Effects in Animals	<ul style="list-style-type: none">• Liver, pancreatic, and testicular cancer• Liver toxicity• Immune system toxicity• Thyroid toxicity• Developmental and reproductive toxicity	<ul style="list-style-type: none">• Liver and pancreatic cancer• Liver toxicity• Immune system toxicity• Thyroid toxicity• Developmental and reproductive toxicity



PFAS Outcome Examples – my View

Strong Evidence

Immunotoxicity, ↓ vaccine uptake

Lipids /Sterol interference, Associated Codeable conditions and longitudinal diagnoses and medications

Kidney cancer

Liver Functions and Steatosis

Thyroid Alterations/Binding proteins

Uric Acid - Hyperuricemia/Gout

Birthweight

Substantial Evidence

Breast Feeding, diminished capability

Insulin Resistance/Diabetes

Kidney Disease

Osteoporosis

Preeclampsia/PIH

Testicular Cancer

Some or conflicting evidence

Asthma, Allergy

Cardiovascular/BP

Childhood adiposity

Fecundity diminished (with physiology evidence for ovarian, testicular function and sperm morphology motility)

Liver cancer & Breast cancer

Infections, notably in early childhood

Thyroid disease

Developmental: Intrauterine Growth Retardation (IUGR), Preterm birth

Ulcerative Colitis



WEST VIRGINIA
RIVERS

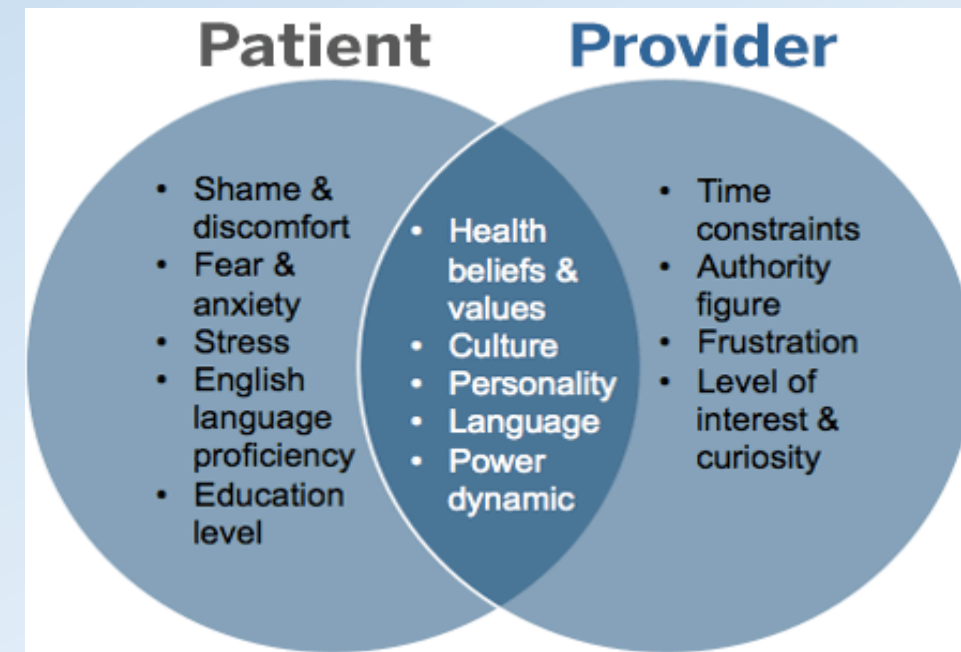
Clinician-Patient Communications About Exposures and Health

AHRQ SOCIO ECOLOGICAL MODEL for Prevention

CLINICAL MODEL

*Others Interested (and Influencing); Water manager, well owner, insurers, health/environment agencies,

.....



Our Most Difficult Communication Group



Water utility managers are:

- Caught in the middle
- Worried about another large task, and
- (In)sufficient Funds to do the task and
- Costs that will be passed to consumers

Evan Hansen

Delegate, West Virginia House of Delegates
Principal, Downstream Strategies

Scott Mandirola

Deputy Cabinet Secretary,
West Virginia Department of
Environmental Protection (WVDEP)



Questions?

We will take questions asked in the chat first.

Please raise your hand if you would like to be called on to ask your question aloud to the presenters.

Thank you for joining us!

Please look out for the follow up email, which will include the recording from today's meeting and any resources discussed. You can join our mailing list at wvrivers.org and any additional questions can be directed to wvrivers@wvrivers.org.