

PFAS Compounds and Drinking Water

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January 3, 2023

Town of Poolesville, MD

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Many Unknowns and Questions

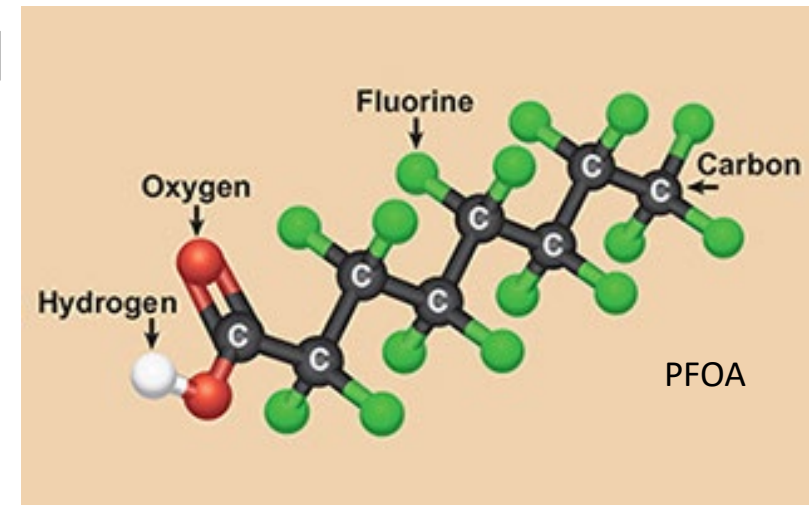
- Recently found that PFAS are commonly present in surface water and ground water in USA
 - Difficult to measure in laboratory until past few years
- PFAS compounds are of concern due to persistence in the environment and potential health effects
- There is a lot the scientific community doesn't know
- Objective is to share what we do know based on the available data

Outline

- What are PFAS?
- Where do they come from and how do they get into groundwater?
- What are the potential health effects?
- What water-quality standards apply to PFAS?
- How much PFAS is in Town wells?
 - How does this compare to other water sources?
- What is the Town doing?
- What can you do?

What are PFAS?

- Per- and Polyfluoroalkyl Substances
 - Large, complex group of > 4,000 man-made chemicals
- Used since 1940s for variety of applications – making products non-stick, waterproof, soil/stain/oil resistant; fire-fighting foams
- Carbon-fluorine bond
 - Very strong chemical bond and difficult to break
 - Thus, very persistent in the environment
- Do not degrade easily
- “Forever chemicals”
- *PFOA* and *PFOS* are PFASs



PFAS Sources

• Fire-Fighting Foams

- Military and DoD Facilities
- Training Facilities
- Municipal Fire Stations
- Airports
- Rail Yards
- Chemical Manufacturing Facilities
- Petroleum Refineries, Tankers, Storage Facilities

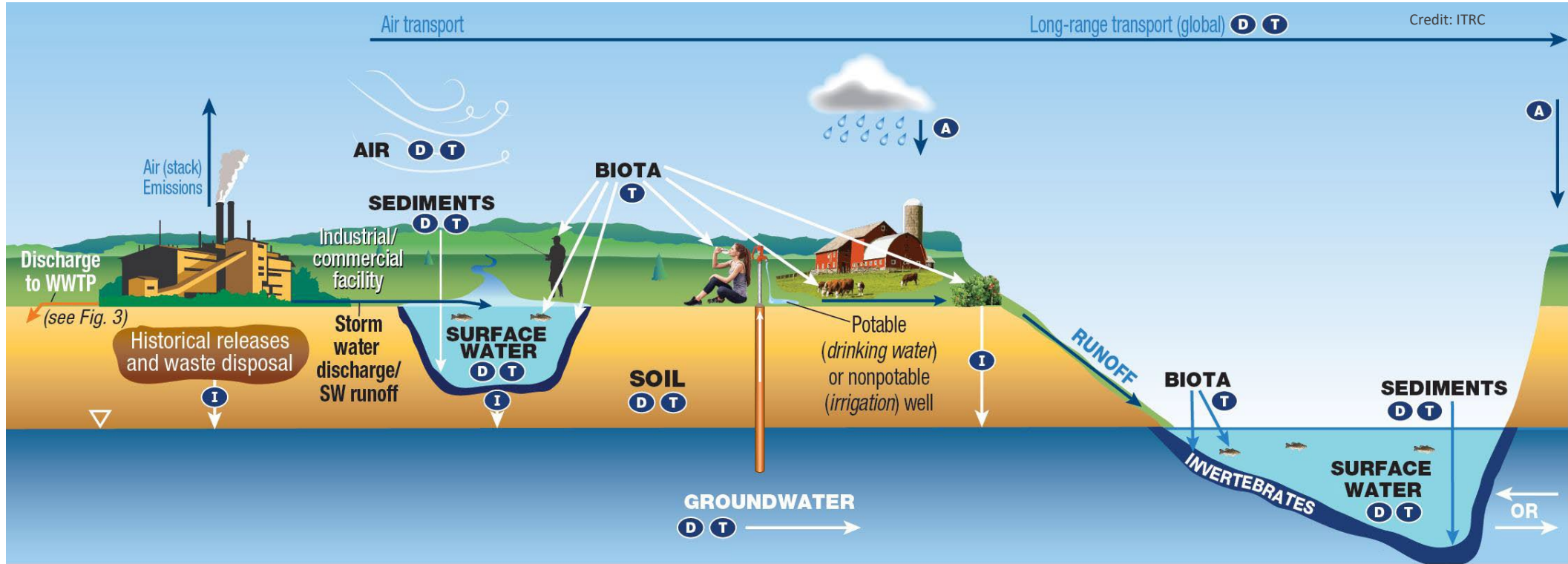
• Industrial

- Chemical Manufacturers
- Metal Plating/Coating Facilities
- Textile Manufacturers - carpets
- Electronics Manufacturers
- Mining Industry
- Paper Mills

• Other

- Wastewater Treatment Facilities
- Landfills
- Land Application of Biosolids
- Pesticides
- Residential

PFAS in the Environment



KEY **A** Atmospheric Deposition **D** Diffusion/Dispersion/Advection **I** Infiltration **T** Transformation of precursors (abiotic/biotic)

- Environmental persistence
- Compounds are mobile in water, air, biota, and soil
- Poolesville's shallow water-table aquifer = susceptible to PFAS infiltration
- Very low concentrations – measured in part per trillion (ppt)**

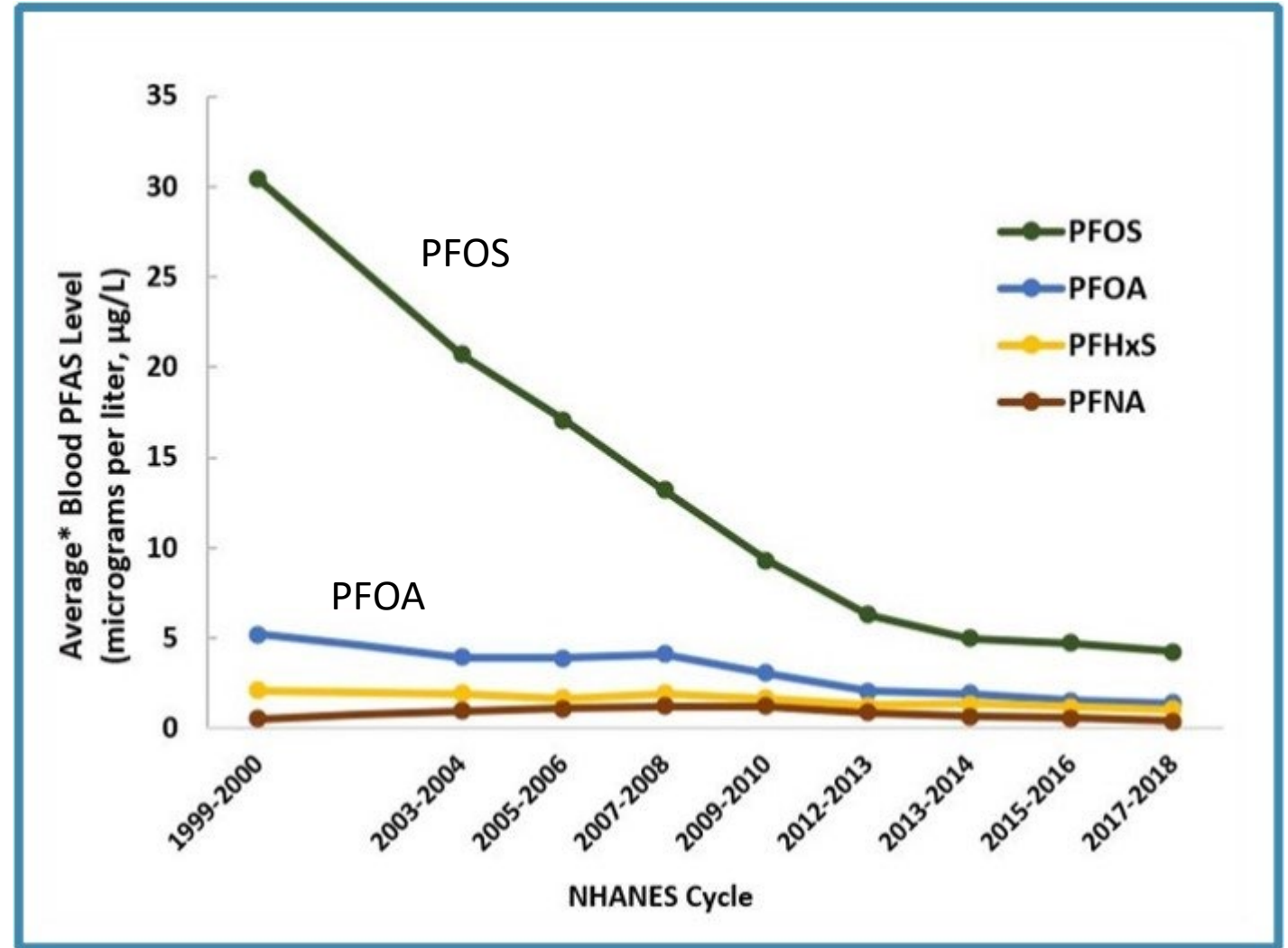
** ppt= Part per Trillion, or approx. 1 drop water in 20 Olympic-size pools

Where are PFAS Compounds in the Home?

- Drinking water
 - Ingestion, not dermal contact
- Household Dust – stain/water repellent used on carpets, upholstery, clothing, non-stick cookware, paints, varnish, sealants
- Food packaging – grease-resistant paper, fast food containers, microwave popcorn bags, pizza boxes, candy wrappers
- Personal care products – some shampoos, dental floss, cosmetics, sunscreen
- Cleaning products and lubricants
- Food – fish/dairy - from water contaminated by PFAS

PFAS in People

- PFOA and PFOS detected in blood serum of most Americans
- Blood levels found to be decreasing over time
- Long half-life – ~2 to 8 years in people



* National Health and Nutrition Examination Survey (NHANES)

Note: Production of PFOS phased out in early 2000's and PFOA phased out in 2015

Potential Health Effects

- Our understanding is based on exposure to high levels
- Effects not yet well understood, especially at very low dose
- Animal studies suggest animals exposed to high levels of PFAS resulted in changes in function of the liver, thyroid, pancreas, and hormone levels
- Human studies suggest PFAS exposure may lead to
 - Reproductive effects such as decreased fertility or increased high blood pressure in pregnant women
 - Developmental effects or delays in children, including low birth weight, accelerated puberty, bone variations, or behavioral changes
 - Increased risk of some cancers, including prostate, kidney, and testicular cancers
 - Reduced ability of the body's immune system to fight infections, including reduced vaccine response
 - Interference with the body's natural hormones
 - Increased cholesterol levels and/or risk of obesity
 - Highest risk for infants, pregnant/lactating women
- PFOA and PFOS better understood than other PFAS compounds – there is a lot we don't know
 - PFOA and PFOS – suppression of vaccine response in children

PFAS - Drinking Water Regulations

- No EPA Maximum Contaminant Level (MCL) for any PFAS compounds
 - The MCL is an enforceable regulatory standard - drinking water may not exceed the standard
 - Maybe EPA will establish one in 2023?
- EPA Lifetime Health Advisory Levels for combined PFOA and PFOS
 - Lifetime Health Advisory Levels “*identify the concentration below which adverse health effects are not anticipated to occur*” from a lifetime of exposure to PFOA and PFOS in drinking water, including the most sensitive populations (pregnant/lactating women, infants)
 - Non-enforceable standard
 - In 2016, LHAL = 70 ppt for combined PFOA and PFOS
 - Interim LHAL in 2022 = 0.004 ppt for PFOA and 0.02 for PFOS
 - These levels are below the laboratory detection limit for these compounds in most labs and lower than that found in rainwater
- Some other States have enforceable standard/MCL for PFAS compounds in drinking water
 - Other State’s enforceable standards – range from 20 to 70 ppt for total PFOA and PFOS
 - Maryland Department of Environment (MDE) - no enforceable standards
 - Maryland – Department Health – issued Health Advisory for PFHxS in drinking water at 140 ppt
 - Town wells – maximum PFHxS at 30 ppt in Well 3

Timeline – PFAS and Poolesville Wells

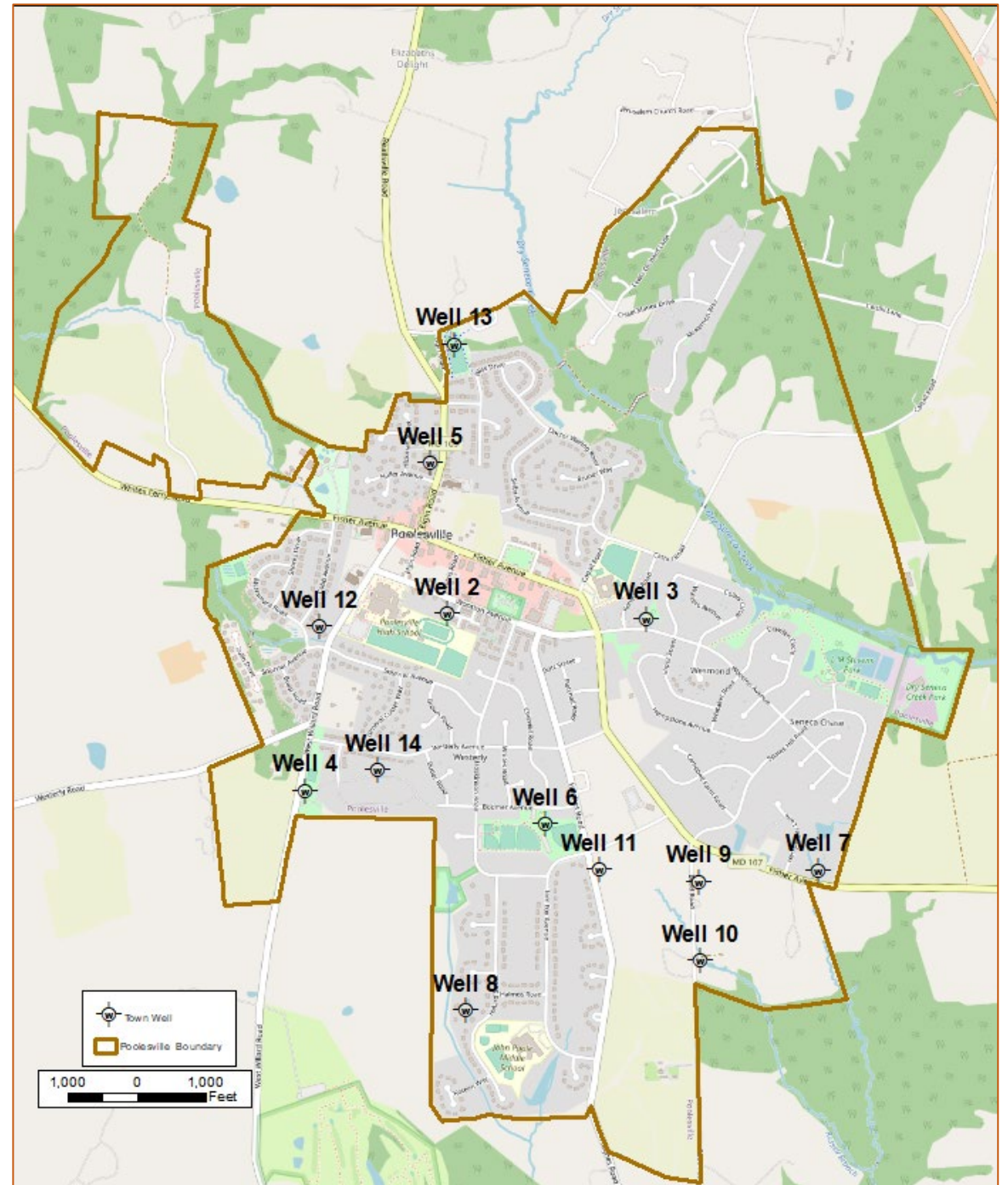
- EPA lists some PFAS in Unregulated Contaminant Monitoring Rule (UMCR3) – 2012
- Maryland Department Environment
 - Tested some water systems 2012 to 2015 – Poolesville not tested – none were above the 70 ppt level
 - Laboratory detection limits of 20-40 ppt
 - Phase 1 – 2020/21 – MDE tested 129 community systems
 - 75% of samples had measurable PFAS compounds Statewide
 - Poolesville Well 3 had 24 to 38 ppt PFOA+PFOS, other wells had ND to 11 ppt PFOA+PFOS
 - EPA Lifetime Health Advisory was 70 ppt at the time
 - Phase 4 – August 2022 – 8 Poolesville wells tested
 - Well 2 = PFOA+PFOS = 17 ppt
 - Well 3 = PFOA + PFOS = 30 ppt
 - Other Town wells ranged from 1 to 10 ppt (wells 6, 8, 7/9, 12 and 13)
- MDE alerted Town of elevated levels of PFAS in Wells 2 and 3 via letter November 2022
- Wells 2 and 3 immediately taken offline and remain offline
- Tier 2 Public Notice Letter sent to Town residents
 - Tier 2 means not an immediate risk to human health
- Town is pursuing treatment options for Wells 2 and 3 – possibly granular activated carbon/ion exchange resin removal system
- Town will be conducting additional sampling for PFAS in Town wells

Well Locations

Large Area:
Wellhead
Protection
Area and
general
direction of
groundwater
flow



Town
View:



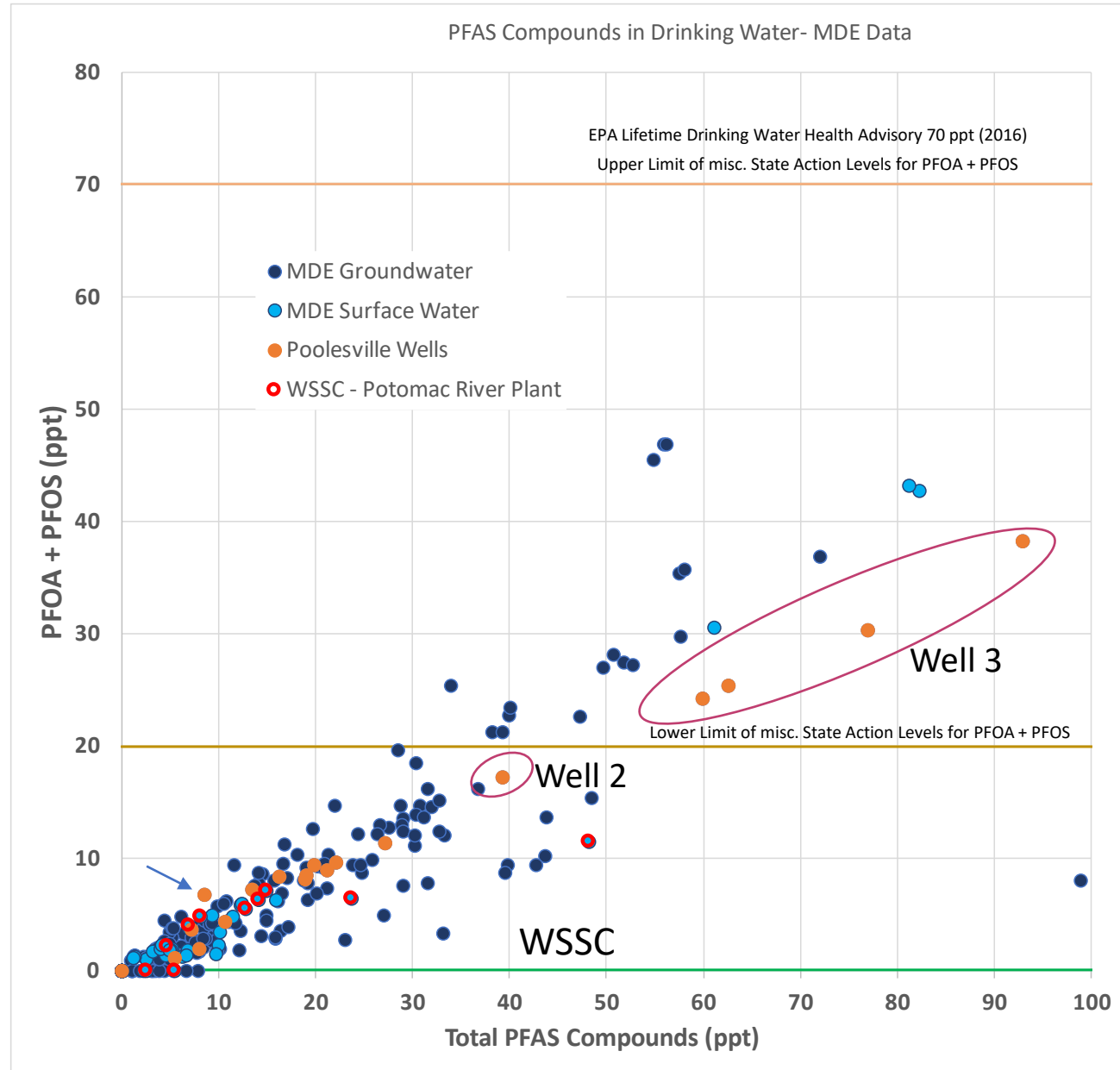
PFAS in Maryland Drinking Water and Town Wells

- Most MDE drinking water systems had some PFAS
 - ~ 60% of systems
 - Groundwater generally higher than surface water sources
- Most are below 70 ppt
- Well 3 and Well 2 exceed lower end of other State's enforceable action levels
- Remaining Town wells are below other State's enforceable action levels
 - No MCL from EPA or Maryland



A Closer Look – PFAS in Poolesville and MD

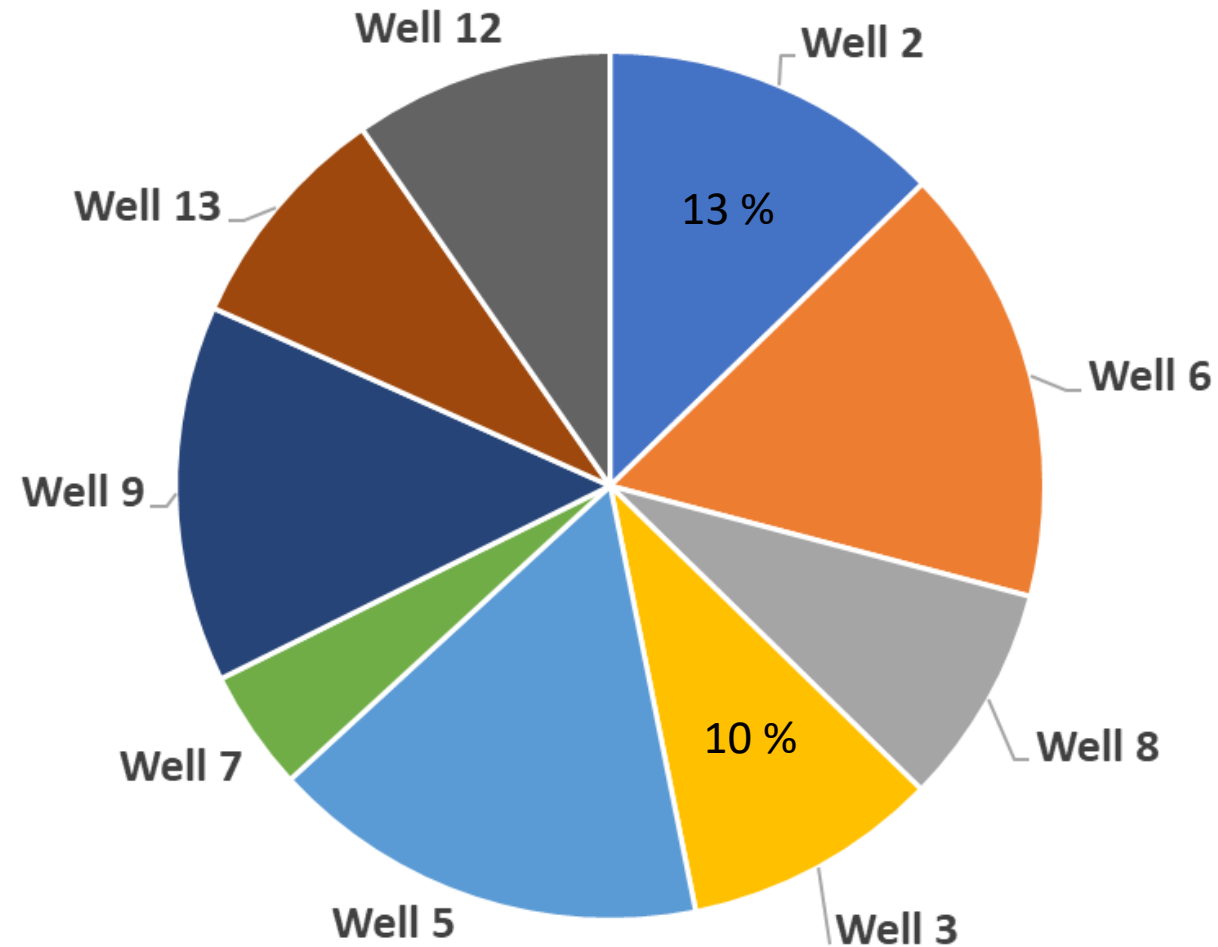
- PFAS in most Town wells are similar to other drinking water sources in MD (except wells 2 and 3)
 - Other Town wells below 12 ppt, similar to groundwater sources
 - Below Other State's enforceable standards
 - Point of Use PFAS from 2020 in Town residence = ~7 ppt PFOA+PFOS
- WSSC – PFOA + PFOS ranges from ND to ~ 11.5 ppt
 - Town wells similar range of PFAS as WSSC (except wells 2 and 3)



* Most WSSC data from River Road Filtration Plant

What about Wells 2 and 3?

- Well 2 only used during summer months ~ 13% of total Town water
- Well 3 ~ 10% of total Town water
- All users receive a blend of water from multiple wells
- Wells 2 and 3 will remain offline until treatment



Percentage of Total Water Supply per Well

What can you do if concerned?

- Install activated carbon or reverse osmosis under-the-counter water filter in kitchen
 - The unit should specify that it removes PFAS
 - Certified by NSF/ANSI Standards 53 or 58
 - Reverse osmosis filter – more effective for PFAS removal
 - Carbon filter – removal probably ~ 50-99% PFAS
 - Follow manufacturers recommendations on filter care and upkeep
 - Or pitcher-style carbon filter
- If you use bottled water – ask for information on PFAS concentrations
 - International Bottled Water Assoc. – PFAS Standards allow up to 5 ppt for a single PFAS and up to 10 ppt total
- Avoid PFAS-containing consumer products
 - Check out PFAS-Free products listed at <https://pfascentral.org/pfas-free-products/>

Summary

- What are PFAS?
 - Large, complex group of man-made chemicals used since 1940s
- Where do they come from and how do they get into groundwater?
 - Manufacturing, fire-fighting foams, sewage, biosolids, consumer products
 - Resistant to degradation and are mobile in the environment
- What are the potential health effects?
 - Not well understood, but potential impact on reproduction, development, liver, kidney, immunologic, thyroid, cancer
- What water-quality standards apply to PFAS in drinking water?
 - No enforceable standard in MD or Federal
 - Can be compared to other State's enforceable standards and EPA Lifetime Drinking Water Health Advisory – range from 20 to 70 ppt for PFOA + PFOS
- How much PFAS is in Town wells?
 - Wells 2 and 3 exceed some other State's enforceable standards; both wells offline
 - Other Town wells are below other State's enforceable standards

Summary - continued

- How does this compare to other water sources?
 - 60% Maryland Water Systems had measurable PFAS, including WSSC
 - PFAS in Town wells is similar to other MD sources of drinking water (except wells 2 and 3)
- What is the Town doing?
 - Wells 2 and 3 offline
 - Pursuing treatment for Wells 2 and 3
 - Sampling of Town wells for PFAS in 2023
- What can you do?
 - Install under sink filter in kitchen or pitcher-type carbon filter
 - Reverse osmosis removes more PFAS but higher cost and maintenance; Carbon-based filters remove possibly 50-99% of PFAS
 - Bottled water ?
 - Avoid using products with PFAS

Questions?

