



Summary Report for MDE's PFAS Public Water System Study

Phase 4 (August 2022 – December 2022)

This document provides a summary of Phase 4 of the Maryland Department of the Environment (MDE)'s Public Water System (PWS) study for per- and polyfluoroalkyl substances (PFAS). A PWS provides water for human consumption to at least 15 service connections or serves an average of 25 people for at least 60 days a year. MDE determined that community water systems (CWS) were of the highest risk of long-term exposure, therefore the multi-phased PWS study would first focus on CWSs. A CWS is a PWS that supplies water to the same population year-round, such as a system serving a town, city, subdivision, or mobile home park.

On June 15, 2022, the EPA released interim health advisories for PFOA and PFOS in drinking water at 0.004 parts per trillion (ppt) and 0.02 ppt, respectively. In response to these lower levels, MDE initiated Phase 4 sampling, which looked at CWSs with previous detections of PFOA and PFOS (during Phases 1 through 3). From August 2022 to December 2022, MDE collaborated with the Maryland Department of Health (MDH) to collect and analyze 228 drinking water samples from 126 CWS. Phase 4 is an extension of MDE's previous PWS monitoring work (i.e., Phases 1, 2, 3). Reports and supporting documents for Phases 1, 2, and 3 are available on [MDE's PFAS website](#). PFAS concentrations from Phase 4 sampling were generally consistent with sampling results from Phases 1-3. All Phase 4 sample results can be found in **Appendix A** of this report.

MDE continues to closely monitor the Environmental Protection Agency's (EPA) work regarding PFAS in drinking water. In March 2023, the EPA announced the proposed regulatory standards for six of the most prevalent PFAS compounds: PFOA, PFOS, PFBS, PFHxS, PFNA, and HFPO-DA (GenX). This included announcing proposed maximum contaminant levels (MCLs) for PFOA (4 parts per trillion (ppt)) and PFOS (4 ppt) and a proposed hazard index for PFBS, PFHxS, PFNA, and HFPO-DA (GenX).

Based on Phase 4 results, MDE recommended that systems conduct certain actions such as notifying their customers, continuing to monitor for PFAS in their drinking water, and implementing PFAS reduction measures. MDE also worked with systems to connect them to funding for remediation through the Infrastructure Investment and Jobs Act (Bipartisan Infrastructure Law).

MDE's Previous Public Water System Monitoring

In September 2020, MDE initiated its multi-phased PWS study for PFAS in drinking water. Phases 1, 2, and 3 of MDE's PWS Study were completed between September 2020 and June 2022. Under Phases 1 and 2, water systems were selected and prioritized based on the following:

- Consumer potential for long-term exposure to PFAS (if present) (i.e., CWS customers vs Non-Transient Non-Community (NTNC) customers)



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- Drinking water source vulnerabilities (e.g., surface waters and groundwater from unconfined and semi-confined aquifers)
- Proximity and relative risk to potential PFAS sources (i.e., CWS source water is located within 1,000 ft (Phase 1) or 1 mile (Phase 2) of one or more potential sources of PFAS)

Under Phase 1, PFOA and/or PFOS were detected in approximately three-quarters of samples; about half of the samples tested during Phase 2 had PFOA and/or PFOS detections. Because of the high levels of detection for PFOA and PFOS, MDE continued its monitoring efforts under Phase 3 and tested the remaining CWSs in the state.

MDE PWS Study – Phase 4 Monitoring Approach

In August 2022, MDE initiated the fourth phase of its PWS study to evaluate and confirm the occurrence of PFAS in drinking water in CWS with previous detections of PFOA and PFOS. During this phase, 228 drinking water samples from 126 CWS were collected and tested for 18 PFAS under EPA Method 537.1 by the MDH-Laboratories Administration (MDH-LA). Samples collected under Phase 4 were finished water samples. Finished water samples are comprised of treated water entering the distribution system. These samples were considered confirmation samples for samples taken during previous phases. All samples were collected with corresponding field blanks. If systems had more than one source/treatment plant, samples were only taken from sources/treatment plants with previous detections of PFOA or PFOS. Sources/treatment plants with no detections previously were not sampled during Phase 4.



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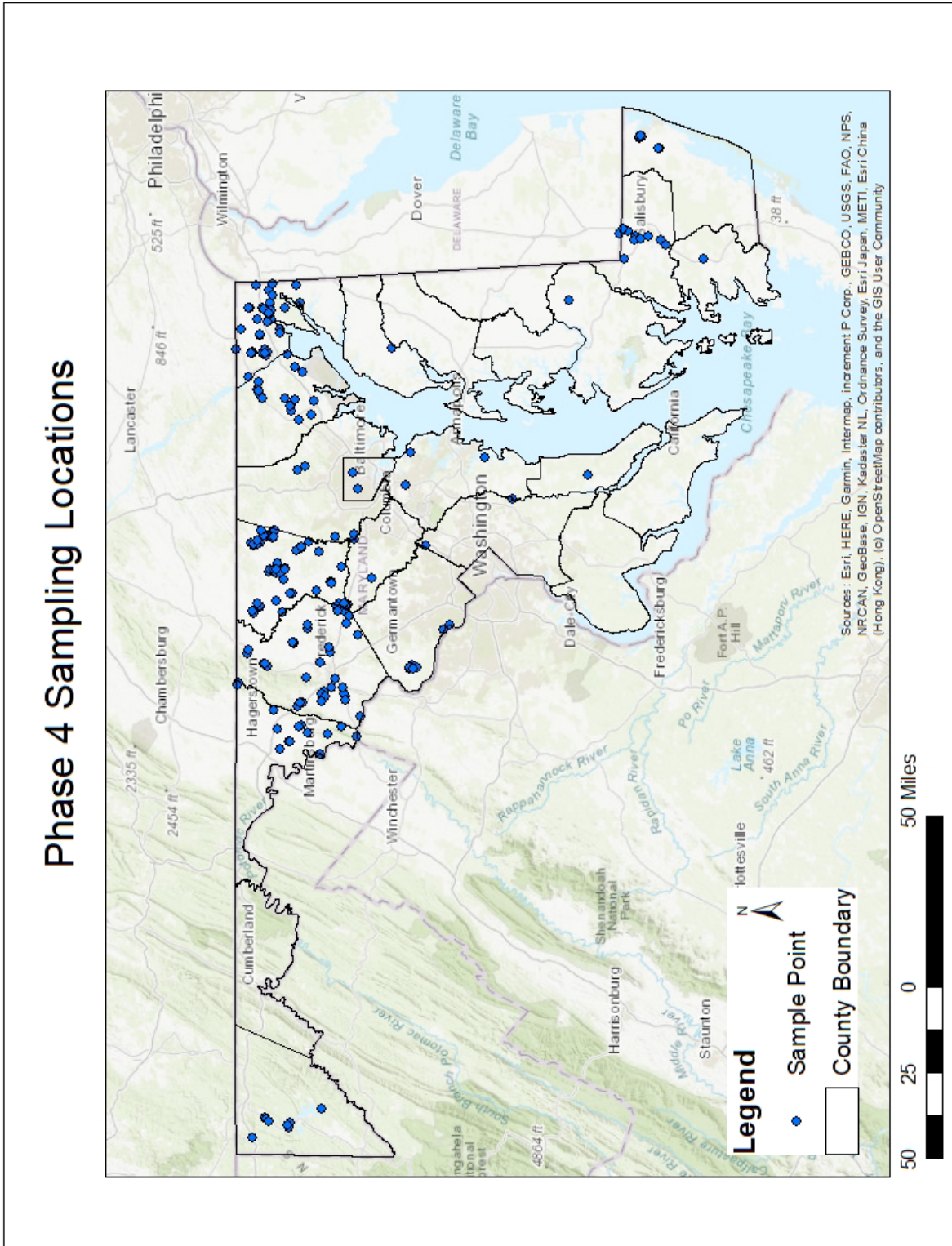


Figure 1: Phase 4 Sampling Locations. Locations were chosen based on previous detections of PFOA and PFOS concentrations during Phases 1-3



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Results Overview

Under Phase 4, 228 drinking water samples were taken from 126 CWSs. Of these, 50% of systems (63 systems) had detection levels above the proposed regulations. The 15 systems with detections above the proposed PFAS Hazard Index also had detections above the proposed PFOA and/or PFOS regulations.

Table 1 outlines the number of systems and samples with detections above the proposed regulations for the individual PFAS compounds. It should be noted that the number of systems and samples overlap between individual PFAS.

	PFOA	PFOS	PFNA	PFHxS	PFBS	HFPO-DA (GenX)	Hazard Index	Total
Proposed Regulations (ppt)	4	4	10	9	2,000	10	-	-
# of Sample Detections (out of 228)	195	170	13	151	181	1	-	214
# of Samples Above Proposed Regulation	72	70	3	18	0	0	18	90
% of Samples Above Proposed Regulations	32%	31%	1%	8%	-	-	8%	39%
# of Systems Above Proposed Regulation (out of 126)	50	50	1	15	0	0	15	63
% of Systems Above Proposed Regulation	40%	40%	0.4%	7%	-	-	7%	50%
Min Detection (ppt)	<RL	<RL	<RL	<RL	<RL	<RL	-	-
Max Detection (ppt)	27.5	181	21.7	143	34.9	1	-	-

Table 1: Breakdown of results based on individual PFAS compounds with number of samples and number of systems.



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Overview of Phase 4 Results

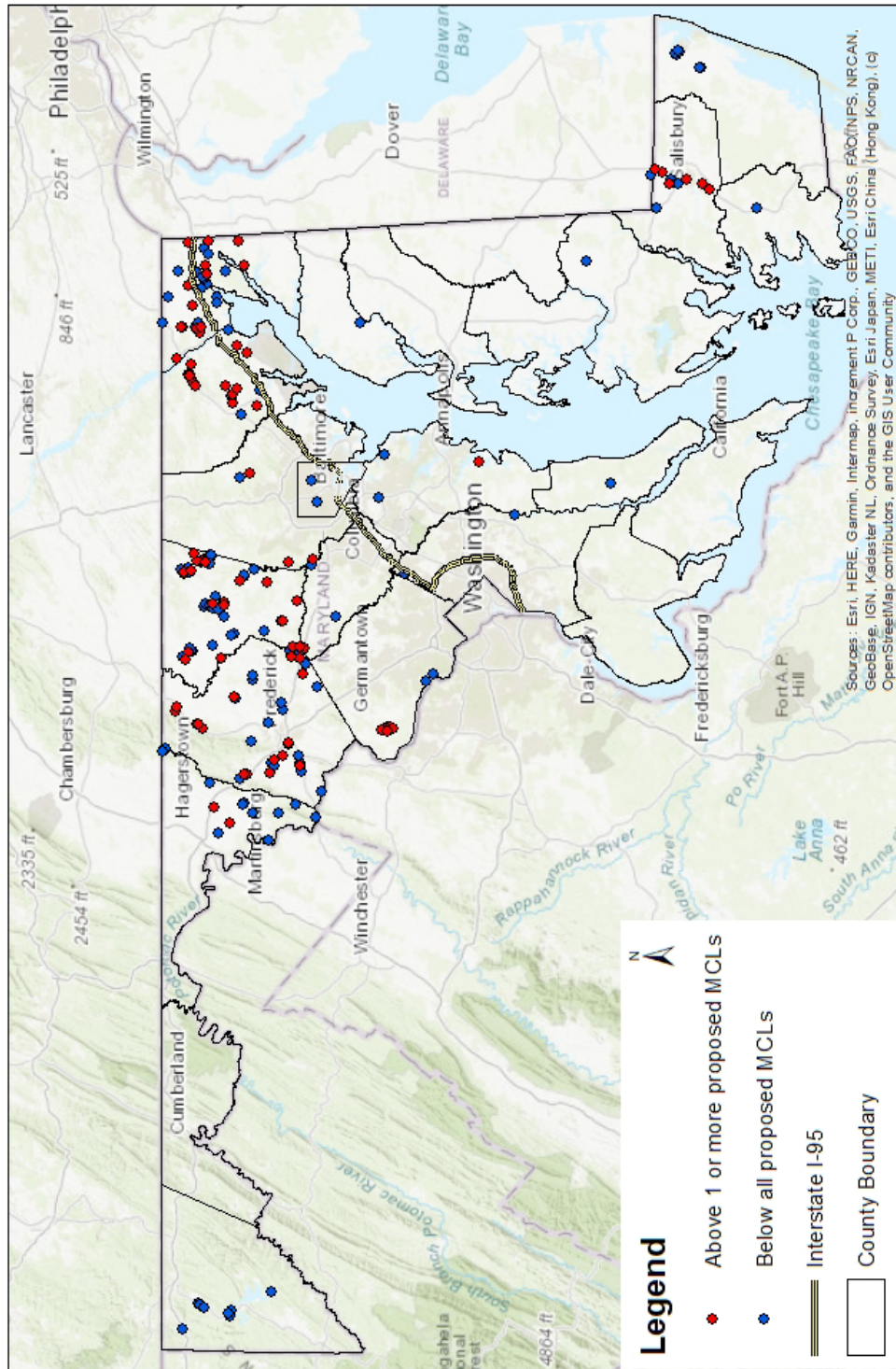


Figure 2: Overview of Phase 4 Results. Each point represents an individual sample. Several systems had more than one sample result associated with it.



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Maryland can be split into two geological regions: the fractured rock region and the coastal plain region. These two regions are separated by the Fall Line, which runs roughly along Interstate 95 (I-95). The fracture rock region in Maryland is the area west of I-95, while the coastal plain region is east of I-95. Water system wells in the fractured rock region of the state are generally more susceptible to contamination than water system wells in the coastal plain region because of the lack of deep confined aquifer layers where water is drawn from. Confined aquifers have natural barriers, called confining layers, that prevent contamination from entering the water source. This is why the majority of the water systems selected for testing during Phase 4 were in the fractured rock region (108 systems) versus the coastal plain region (18 systems). All systems sampled in the coastal plain region with results above proposed regulations have one or more water sources in shallow unconfined aquifers.

The table below gives a breakdown of the numbers of systems by county with detections above proposed regulations. Seven counties have no samples recorded for Phase 4. Systems in these counties had no detectable concentrations of PFOA or PFOS during previous sampling completed in Phases 1-3; therefore, they were not included in Phase 4.



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County	# of Systems Sampled	# of Systems Above Proposed Regulation	Maximum PFOS Detected	Maximum PFOA Detected
Allegany	0	N/A	N/A	N/A
Anne Arundel	4	1	12.4	9.01
Baltimore	5	3	7.58	11
Baltimore City	1	0	3.29	2.65
Calvert	1	0	<RL	1.24
Caroline	0	N/A	N/A	N/A
Carroll	21	13	181	20.6
Cecil	27	14	54.7	21.8
Charles	0	N/A	N/A	N/A
Dorchester	1	0	2.13	1.41
Frederick	22	11	80.1	27.5
Garrett	5	0	3.43	2.86
Harford	14	12	22	14.4
Howard	1	0	<RL	1.56
Kent	1	0	2.83	1.93
Montgomery	3	1	18.6	11.7
Prince George	0	N/A	N/A	N/A
Queen Anne	0	N/A	N/A	N/A
Somerset	1	0	<RL	<RL
St. Mary	0	N/A	N/A	N/A
Talbot	0	N/A	N/A	N/A
Washington	9	2	5.01	3.48
Wicomico	9	6	83.6	22.4
Worcester	2	0	1.89	2.74

Table 2: Breakdown of number of systems by county with detections above proposed regulations. Maximum concentrations of PFOS and PFOA detected in each county are listed.

For water systems with PFAS detections above the proposed MCLs, MDE has worked with them to implement certain actions. These actions included issuing public notice, performing additional monitoring, and developing a plan to address the PFAS concentrations. Remedial actions that systems



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can take to address PFAS include installing treatment, interconnecting with a nearby system, removing a well from service, and finding an alternative water source (typically by drilling a new well).

MDE is actively coordinating with systems to connect them with funding through the Bipartisan Infrastructure Law. In 2023, 16 systems applied for funding through MDE's Water Infrastructure Financing Administration to address elevated PFAS concentrations.

Additional Resources

Additional resources can be found through the following links:

- MDE's PFAS Webpage: <https://mde.maryland.gov/PublicHealth/Pages/PFAS-Landing-Page.aspx>
- MDE's Phase 1 Report: https://mde.maryland.gov/programs/water/water_supply/Documents/PFAS_Public_Water_System_Study-Phase1Report.pdf
- MDE's Phase 2 Report: https://mde.maryland.gov/PublicHealth/Documents/Phase2Report_Apr2022_Final.pdf
- MDE's Phase 3 Report: <https://mde.maryland.gov/PublicHealth/Documents/Phase3ReportFinal.pdf>
- EPA's Proposed PFAS Drinking Water Regulations: <https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas>
- EPA Method 537.1: https://cfpub.epa.gov/si/si_public_record_Report.cfm?dirEntryId=343042&Lab=NERL



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APPENDIX A Phase 4 Results

