Favorable, Senate Bill 732 – Sewage Sludge Utilization Permits - Per- and Polyfluoroalkyl Substances - Concentration Limits

February 14, 2025

Thank you for the opportunity to submit testimony in **SUPPORT** of **SB732** on behalf of ShoreRivers, a river protection organization serving Maryland's Eastern Shore with more than 2,000 members. Our mission is to protect the waterways of Maryland's Eastern Shore through science-based advocacy, restoration, education, and engagement.

I am writing to express my strong support for SB732 which will **(1)** require testing of sewage sludge for PFOS and PFOA before its application on farmland as a fertilizer, and **(2)** to establish concentration limits for PFOS and PFOA to safeguard public and environmental health.

As this committee knows very well, PFAS are synthetic chemicals widely used in industrial processes, and consumer goods, and exposure to PFOS and PFOA has been linked to adverse health effects, including cancer, immune system suppression, and developmental issues. These chemicals enter wastewater systems through household and industrial discharges, and leachate from landfills. **Because wastewater treatment plants are not designed to remove PFAS, these persistent chemicals accumulate in sewage sludge—a byproduct of the treatment process.**

THE IMPACT OF SPREADING PFAS ON FARM FIELDS: When sewage sludge is applied to farmland as a fertilizer it presents a significant public health risk as PFOS and PFOA can contaminate soil, crops, drinking water wells, downstream waterways and fish, and wildlife. **PFAS are highly mobile in the environment and can leach into groundwater** – contaminating on-farm and nearby drinking water wells, as well as irrigation water used to water neighboring farms' crops. **PFAS can be taken up by crops grown in contaminated soil,** leading to human ingestion through the food chain. Additionally, as seen in Maine, Michigan, New Hampshire, and Wisconsin wildlife (deer, geese and turkey) and livestock consuming forage grown on affected land can accumulate PFAS in their bodies, further exposing consumers. And **PFAS are known as "forever chemicals" because they do not break down naturally and can persist for decades in soil and groundwater**, making remediation extremely difficult and costly.

THE DATA: Data on the concentration of PFOS and PFOS in sewage sludge and the impact it has when applied to farm fields is surfacing every day and even right here in Maryland:

- The Maryland Department of the Environment (MDE) conducted an initial round of sewage sludge testing at wastewater treatment facilities and found elevated levels of PFOS and PFOA in nearly all of the 55 facilities tested. Below is the statistical analysis of the sample results, highlighting the observed PFOS and PFOA levels from the survey. According to the EPA's Draft Sewage Sludge Risk Assessment for PFOA and PFOS, **sewage sludge containing 1 part per billion (ppb) of PFOA or 4–5 ppb of PFOS**

ShoreRivers
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poses a human health risk due to potential contamination of groundwater used for drinking. [1]

Statistical Value	PFOA	PFOS
Maximum	37	174
75th Percentile	10.82	25.38
Median	4.98	12.7
25th Percentile	2.38	5.74

Table 4: Observed PFOS & PFOA level from the Survey – Biosolids. Unit: Parts Per Billion (PPB). Source: September 9, 2023 Joint Chairmen's Report: PFAS Monitoring in Publicly Owned Treatment Woks, Maryland Department of Environment (Attached).

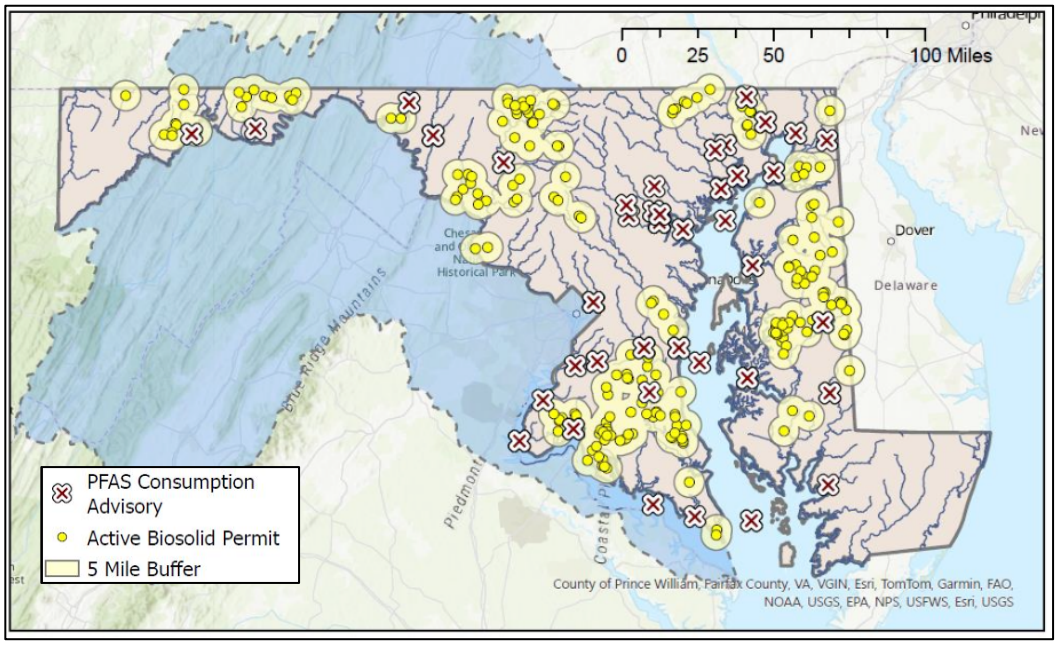
- **MDE has issued a new fish consumption advisory for certain locations due to elevated PFAS levels detected in 15 fish species found in Maryland waterways, many in rural areas around the State like the Eastern Shore.** These species include blue catfish, channel catfish, largemouth and smallmouth bass, northern snakehead, silver perch, spot, striped bass (rockfish), sunfish, and white and yellow perch.[2]

  Meanwhile, an increasing body of research indicates that the use of sewage sludge as fertilizer is a likely source of PFAS contamination in fish (attached). [3] When mapping the locations of fish consumption advisories alongside sewage sludge use permits, a clear overlap emerges. **Contaminated fish are frequently found in close proximity to upstream sewage sludge application sites, particularly on the Eastern Shore**. This correlation underscores the urgent need for stricter regulations to prevent further contamination (see attached map of sewage sludge permits and PFAS-related fish consumption advisories).

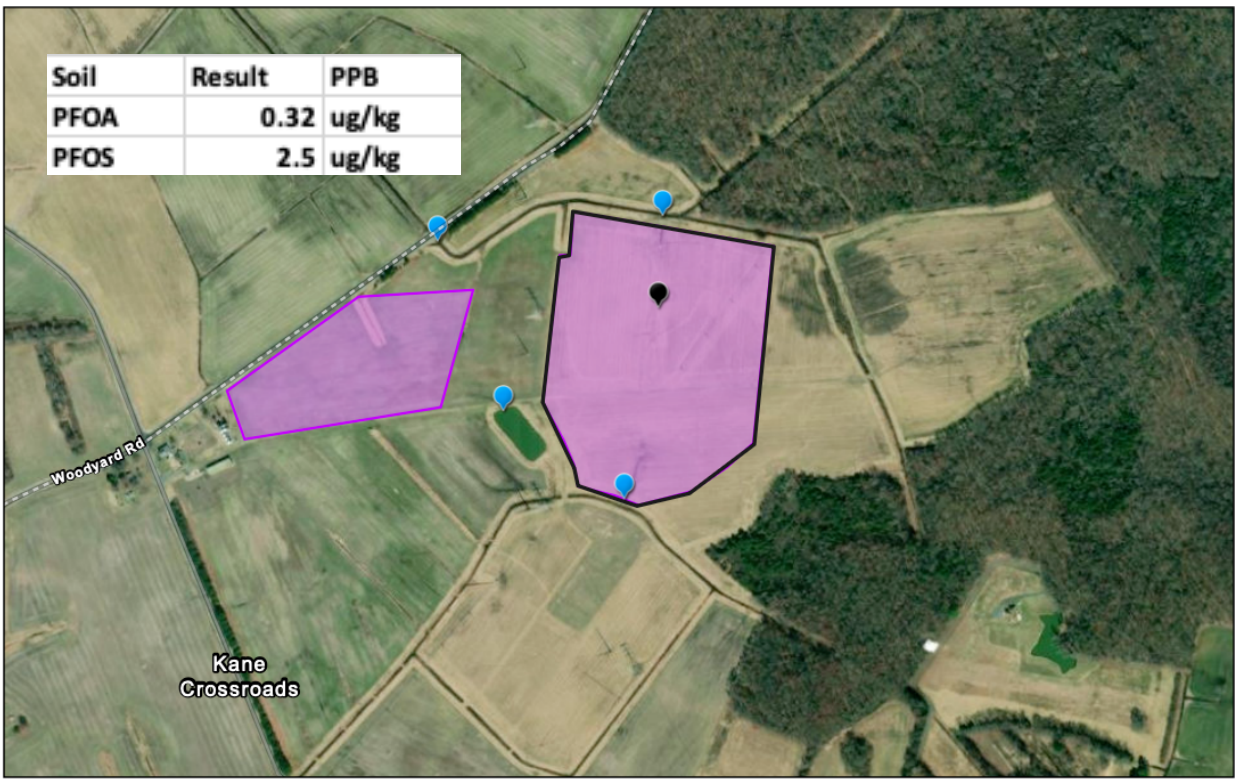
[1] US EPA Draft Sewage Sludge Risk Assessment for Perfluoro-octanoic Acid (PFOA) and Perfluoro-octane Sulfonic Acid (PFOS). January 2025. Website: https://www.epa.gov/biosolids/draft-sewage-sludge-risk-assessment-perfluorooctanoic-acid-pfoa-and-perfluorooctane

[2] MDE News Release: MDE Issues New Fish Consumption Advisory and Guidelines. December 8, 2023. Website: https://news.maryland.gov/mde/2023/12/08/maryland-department-of-the-environment-issues-new-fish-consumption-advisory-and-guidelines/

[3] Bay Journal: Study points to farmland as possible source of PFAS in fish. December 11, 2024. Website: https://www.bayjournal.com/news/fisheries/study-points-to-farmland-as-possible-source-of-pfas-in-fish/article_cb87b2f4-b176-11ef-a7d3-2b8dfd351560.html



- ShoreRivers conducted soil sampling in 2023 on a farm field on the Eastern Shore that has a history of applying sewage sludge as fertilizer, with the last application occuring in 2021. The results of the soil sample showed elevated levels of PFOS (2.5 ppb) and PFOA (0.32 ppb) in the soil.



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<u>WHY TESTING PRIOR TO LAND APPLICATION IS NECESSARY:</u> Testing within 14 days of land application is essential because **sewage sludge that has been stored off-site or mixed with other materials may experience degradation and changes over time where longer chain PFAS chemicals can form new PFOS and PFOA chemicals.** When biosolids are mixed from different wastewater treatment plants (WWTPs) and stored for extended periods—especially between December 16 and February 28 when nutrient application on farms is prohibited per COMAR 15.20.07.02, Supplement No. 7 (May 2012, amended and effective January 2, 2017) — contaminant levels can fluctuate. **Testing closer to the time of application ensures that the final material being applied to agricultural land meets safety standards and reflects its most recent composition, preventing outdated or inaccurate data from being used in regulatory compliance.**

Protecting Maryland's water, food, and agricultural land from PFAS contamination **must be a top priority**, as it is essential for safeguarding public health, preserving farmland, and preventing irreversible environmental damage. Proactive measures can also help avoid the significant financial burden of future remediation efforts for contaminated fields.

Increasing evidence continues to reveal the harmful impacts of PFAS exposure on public health, particularly from the land application of sewage sludge. I strongly urge committee members to support SB732, which mandates testing and enforces strict PFAS limits in sewage sludge, ensuring the safety and well-being of all Marylanders.

Sincerely,

Matt Pluta,
Choptank Riverkeeper on behalf of ShoreRivers.

2023 Joint Chairmen's Report: PFAS Monitoring in Publicly Owned Treatment Works

September 29, 2023

Prepared for:
The Honorable Bill Ferguson, President
Maryland Senate

The Honorable Adrienne Jones, Speaker
Maryland House of Delegates

The Honorable Guy Guzzone, Chair
Senate Budget and Taxation Committee

The Honorable Ben Barnes, Chair
House Appropriations Committee

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Introduction:

Pursuant to the 2023 Joint Chairman's Report (JCR), the Maryland Department of the Environment (MDE or the Department) presents the following report. During FY23, the Senate Budget & Taxation Committee and the House Appropriations Committee requested the Department submit a report on the actions and associated timeline needed to expand efforts to include monitoring of Per- and Polyfluoroalkyl substances (PFAS) levels in the effluent, influent, and biosolids at publicly owned treatment works.

Departmental Overview:

The Budget Committees have expressed interest in the PFAS levels associated with publicly owned wastewater treatment works and requested the Department to provide a summary of the actions taken by the Department. Municipal Wastewater Treatment Plants (WWTPs) are vital in managing wastewater from urban areas' residential, commercial, and industrial sources. These facilities are designed to eliminate contaminants, pollutants, and pathogens from wastewater before it is safely discharged into the environment through surface water or groundwater outlets. The effectiveness of WWTPs depends on the community size they serve and the technology they employ.

Background:

The potential risk of PFAS contamination in wastewater will arise if these chemicals are found in the effluent discharged by WWTPs. PFAS can enter WWTPs and the environment through several pathways:

- Industrial Discharge: Industries engaged in manufacturing, firefighting, electronics, and textiles can release PFAS into wastewater through their processes.
- Domestic and Commercial Sources: PFAS can also enter wastewater from households and businesses through consumer products such as nonstick cookware, food packaging, stain-resistant fabrics, and firefighting foams.
- Stormwater Runoff: PFAS from various land sources can enter stormwater runoff, which may eventually mix with wastewater directed to WWTPs, a scenario expected to increase due to climate change.

Conventional treatment processes utilized by WWTPs may not effectively remove PFAS, potentially leading to their release into the environment through treated wastewater discharges or the disposal of sludge/biosolids. This poses a challenge for managing PFAS contamination, underscoring the need for improved treatment technologies and regulatory measures.

PFAS contamination from WWTPs can result in several environmental and public health risks:

- Environmental Contamination: If not effectively treated, PFAS can contaminate surface water bodies, groundwater, and soil near discharge points, potentially affecting aquatic ecosystems and surrounding wildlife.
- Bioaccumulation: PFAS can accumulate in the tissues of aquatic organisms over time, leading to higher concentrations in the food chain and potentially impacting aquatic life and human health through contaminated seafood consumption.
- Drinking Water Source Contamination: In areas where surface waters are used for drinking water, WWTP discharges can contaminate drinking water supplies, posing health risks to residents.
- Human Exposure: Direct contact with contaminated water or soil, ingesting contaminated food or water, or inhaling PFAS-containing particles/aerosols can lead to human exposure.

In early 2020, the Department started conducting outreach with municipal utilities throughout the state to collaborate on sampling municipal wastewater treatment plants for PFAS data collections. Through voluntary sampling or surveys, the Department has collected and analyzed samples from more than 100 municipal wastewater facilities (Table 1). Samples were collected from several locations of the wastewater facilities to represent the influent, biosolids, and effluent waste. The locations are described below:

- The collection system's influent location, commonly considered the “raw” wastewater, is the primary location for wastewater collection from homes, businesses, and industries through a network of sewer pipes.
- The biosolids are generated from the sludge treatment process. The sludge collected during the primary and secondary treatment stages contains organic and inorganic materials. The sludge needs further treatment to stabilize and reduce the volume, usually handled by anaerobic digestion, aerobic digestion, and dewatering processes, resulting in the end product - biosolids.
- The effluent is the final treated wastewater discharged into a receiving stream or land after undergoing the required treatment.
- The recycled flow is a portion of the wastewater flow in the later stage of the wastewater treatment facility that is recycled back into an earlier stage of the treatment process. This is typically done by diverting a fraction of the partially treated wastewater generated by sludge dewatering/filter backwashing and combining it with the influent wastewater.

PFAS Data Collection:

Collected data has been meticulously gathered and subjected to statistical analysis to establish tiered baseline levels for each of the 40 PFAS chemicals scrutinized in the survey. (Table 2) These baseline tiers include Maximum, 75th percentile, Median, and 25th percentile values.

Facilities with PFAS chemicals exceeding the median tier level will be prioritized for further monitoring and source tracking/minimization efforts (Tables 3 & 4). This prioritization approach aims to effectively address and manage facilities with higher PFAS concentrations, ensuring a proactive approach to safeguarding the environment from potential contamination risks.

To identify potential “hot spots” in the state's waterways and communities that may depend on them, the Department will compare and evaluate monitoring results from WWTPs with data from ambient water quality and fish tissue surveys. This comprehensive approach proactively addresses PFAS contamination risks, ensuring the environment's and affected communities' well-being.

The survey results for each facility will be accessible to the public on the Wastewater Pollution Prevention and Reclamation Program’s website by Spring 2024, promoting transparency and public awareness. Additionally, the Department will publish tentative determinations and PFAS-specific requirements for proposed discharge permits in local newspapers to encourage public comments and requests for public hearings, fostering public engagement and allowing stakeholders to contribute valuable input to the permitting process.

Delegated Authority:

As the regulatory authority, the Department addresses PFAS contamination in WWTP discharges through the National Pollutant Discharge Elimination System (NPDES) permit program. This program, established under the Clean Water Act (CWA), regulates pollutants released into U.S. waters. The Department is granted delegation by the EPA to issue NPDES permits governing the discharge from Maryland's WWTPs. Given that PFAS is classified as a pollutant within the CWA, the NPDES permit program effectively manages PFAS discharges.

Facilities with effluent containing elevated PFAS levels will be required to conduct additional monitoring of their influent, effluent, and biosolids. The Maryland Department of Health Laboratory Administration is EPA-approved to run Method 1633[1] for quantifying 40 PFAS in wastewater. Additionally, facilities must submit comprehensive PFAS source tracking and minimization plans, potentially in coordination with the industrial pretreatment program. Additional requirements will be incorporated through the permit modifications once the EPA and the Department have finalized the ambient water quality standards and biosolid application restrictions for PFAS substances.

The Department has successfully issued 13 NPDES municipal discharge permits with PFAS monitoring and source tracking requirements (Table 5), with more in progress. These permits

[1] Method 1633 for PFAS is a document currently under development by the EPA Office of Water, Engineering and Analysis Division (EAD), in collaboration with the Department of Defense (DoD), and includes the aqueous matrices results of the multi-laboratory validation study.

include specific PFAS monitoring requirements for influent, effluent, and biosolids and mandates for comprehensive PFAS source tracking and minimization plans. This proactive approach underscores the Department's commitment to minimizing PFAS contamination through municipal wastewater facilities, ensuring water quality and public health protection. These requirements align with EPA guidance published in December 2022.

The Department's issuance of NPDES municipal discharge permits places a strategic emphasis on facilities carrying a higher risk potential for the presence of PFAS compounds in their influent, effluent, and biosolids. This prioritization is complemented by a multifaceted approach encompassing source tracking and minimization measures. This holistic approach effectively addresses PFAS-related concerns and serves as a robust safeguard for designated water usage and the overall well-being of public health.

Permit Requirements:

As part of the discharge permit renewal process, facilities identified as having an elevated risk of PFAS contamination will be required to publish a notice of tentative determination. This notice will outline the proposed PFAS-specific requirements, promoting widespread awareness among stakeholders and fostering active public participation.

Additionally, the Department is committed to assisting utilities that may encounter financial challenges in meeting these requirements. MDE will provide guidance and support to these utilities, assisting them with access to financial assistance from the Clean Water and Drinking Water State Revolving Funds and utilizing the Federal funding from the Bipartisan Infrastructure Law. This financial support is intended to help cover the costs associated with mitigating PFAS risks, ensuring that these essential measures can be implemented effectively.

Conclusion:

The Department’s preliminary POTW PFAS survey conducted between 2022 and 2023 has yielded valuable insights for the NPDES municipal permit division. This information has enabled them to identify facilities with elevated PFAS levels in their effluent/biosolids and impose additional permit requirements, including monitoring and source tracking.

In 2022, the Maryland General Assembly passed the George “Walter” Taylor Act, requiring the Department to create a comprehensive State action plan to identify strategies, actions, and funding alternatives to minimize environmental exposure to PFAS chemicals. This report is due by December 31, 2023, and will also have a section on WWTPs.

Appendix:

Table 1: Survey Samples Collected and Analyzed *(as of 9/25/2023)*

Sampling Rounds	No. of Sampling Events	No. of facilities	Comments
Volunteer *(01/2020-)*	35	21	1. Samples were collected by Utilities at the request of MDE for self-evaluation or during the permit renewal process. Most samples were collected at effluent and biosolids. 2. Analytical Methods used: EPA 533, 537.1 or 537M.
MDE Round 1 *(10/2022-)*	16	12	1. Focus on facilities receiving flow from IU with activities related to PFAS chemicals. 2. Samples were collected at influent, effluent, flow recycle, and biosolids. 3. Some facilities were sampled twice due to higher PFAS results observed in the first sampling event. 4. Analytical Method used: EPA 537M.
MDE Round 2 *(04/2023-08/31/2023)*	69	69	1. Focus on facilities that generate Class B biosolids or practice spray irrigation for effluent disposal. 2. Samples were collected at influent, effluent, and biosolids 3. Analytical Method used: EPA 1633.
Total	**120**	**102**	

Table 2: Observed Median Baseline Level (MBL) in the Survey

Unit: Parts Per Trillion (PPT)

	Influent			Effluent			Biosolid			Recycle		
	Min	**Max**	**Median**	**Min**	**Max**	**Median**	**Min**	**Max**	**Median**	**Min**	**Max**	**Median**
PFBA	0.66	78.9	5.49	1.18	59.6	5.61	900	13500	2390	ND	ND	ND
PFPeA	1.54	460.0	8.16	1.71	315.0	19.6	600	33600	3445	ND	ND	ND
PFHxA	0.83	320.0	5.39	1.55	163.0	14.0	33	21100	2740	1.97	110	6.04
PFHpA	0.68	99.0	5.06	0.60	210.0	5.46	20	104000	3735	9.47	2400	35.5
PFOA	0.80	160.0	5.40	0.81	42.5	8.53	116	37000	4980	5.36	210	16.5
PFNA	0.45	20.7	1.49	0.75	10.0	1.48	249	17000	4190	0.98	11	2.91
PFDA	0.86	10.6	1.30	0.47	9.77	1.37	70	30800	5570	1.00	170	1.96
PFUnA	0.83	5.14	1.97	0.72	2.55	1.00	40	5570	840	298.0	298	298.0
PFDOA	0.51	10.2	1.36	0.58	1.83	0.82	30	31100	3110	2.81	11.1	6.96
PFTrDA	1.49	1.49	1.49	ND	ND	ND	29	2880	342	2.56	80.6	2.78
PFTeDA	0.59	1.25	0.83	0.58	1.77	1.38	57	5970	970	3.27	3.27	3.27
PFBS	0.67	100.0	5.06	0.52	62.3	5.71	38	69200	2260	3.60	610	12.0
PFPeS	1.77	86.3	5.46	5.19	63.0	7.19	150	67100	849	ND	ND	ND
PFHxS	0.80	319.0	2.39	0.93	319.0	2.28	585	5960	1105	5.40	5.40	5.40
PFHpS	0.52	180.0	3.35	0.81	76.0	2.80	66	8400	516	2.20	14.	4.37
PFOS	1.60	1670.0	6.79	1.06	694.0	3.68	120	174000	12700	1.05	55.0	9.90
PFNS	0.33	0.62	0.48	0.35	3.19	1.77	219	3729	730	ND	ND	ND
PFDS	0.81	13.6	0.98	2.15	6.74	4.45	400	16090	795	ND	ND	ND
PFDoS	ND	ND	ND	ND	ND	ND	1650	1650	1650	ND	ND	ND
4-2 FTS	3.08	3.21	3.15	ND	ND	ND	ND	ND	ND	1.23	1.23	1.23
6-2 FTS	0.33	355.0	4.10	1.23	58.20	3.88	69	8640	228	1.77	177.0	4.89

8-2 FTS	6.30	75.1	10.32	2.18	2.18	2.18	1540	1740	1640	ND	ND	ND
PFOSA	0.26	4.05	0.53	0.26	4.55	0.42	381	21930	1741	ND	ND	ND
NMeFOSAA	0.23	6.98	0.84	0.25	5.36	0.96	37	40290	6527	1.04	2.72	1.27
NEtFOSAA	0.56	6.20	0.83	0.56	5.39	0.96	112	26310	3310	6.78	6.78	6.78
	Influent			**Effluent**			**Biosolid**			**Recycle**		
	Min	**Max**	**Median**	**Min**	**Max**	**Median**	**Min**	**Max**	**Median**	**Min**	**Max**	**Median**
NMeFOSA	0.43	1.23	0.57	0.47	0.47	0.47	554	847	714	ND	ND	ND
NEtFOSA	0.21	1.19	0.30	0.28	0.84	0.56	1680	1680	1680	ND	ND	ND
NMeFOSE	10.0	10.0	10.0	11.0	11.0	11.0	1970	31930	13950	ND	ND	ND
NEtFOSE	10.7	173.0	30.9	9.49	9.49	9.49	1320	13140	7230	ND	ND	ND
HFPO-DA	4.37	23.8	14.09	7.45	11.1	9.28	ND	ND	ND	10.6	10.6	10.6
ADONA	5.51	5.51	5.51	ND	ND	ND	42	2340	1191	1.56	1.56	1.56
9Cl-PF3ONS	4.67	4.67	4.67	ND	ND	ND	54	54	54	ND	ND	ND
11Cl-PF3OUdS	5.48	5.48	5.48	ND	ND	ND	50	50	50	ND	ND	ND
PFEESA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFMPA	1.12	3.24	1.69	3.96	3.96	3.96	ND	ND	ND	2700	2700	2700
PFMBA	1.04	23.3	1.21	1.16	3.09	1.16	626	2560	1350	ND	ND	ND
NFDHA	10.7	744	18.3	11.0	16.8	15.3	1626	8720	1920	ND	ND	ND
3-3FTCA-FPrPA	ND	ND	ND	ND	ND	ND	1290	1540	1415	ND	ND	ND
5-3FTCA-FPePA	22.8	144	68.2	218	218	218	5500	212710	49016	1200	1200	1200
7-3FTCA-FHpPA	655	655	655	64.1	64.1	64.1	14700	44500	39000	ND	ND	ND

* Multiple samples/sampling events were conducted at several facilities.

115 Influent samples were collected from 80 facilities.

127 Effluent samples were collected from 81 facilities.

83 Biosolid samples were collected from 51 facilities.

25 Recycle samples were collected from 16 facilities.

Overall, 120 sampling events were conducted at 82 facilities.

Table 3: Observed PFOS & PFOA levels from the Survey -Effluents

Unit: Parts Per Trillion (PPT)

Statistical Value	PFOA	PFOS
Maximum	42.5	694
75th percentile	11.5	5.74
Median	8.53	3.68
25th percentile	5.6	2.61

Table 4: Observed PFOS & PFOA levels from the Survey - Biosolids

Unit: Parts Per Billion (µg/kg or PPB)

Statistical Value	PFOA	PFOS
Maximum	37	174
75th percentile	10.82	25.38
Median	4.98	12.7

25th percentile	2.38	5.74

Table 5: Permits with PFAS Monitoring Requirements
(As of 9/25/2023)

Facility Name	Ownership	County	Receiving Water	Issuance Date
Naval Support Facility Indian Head WWTP	Naval Support Facility Indian Head, Department of the Navy	Charles	Potomac River	**09/01/2021**
Piscataway WWTP	Washington Suburban Sanitary Commission	Prince George's	Potomac River	**11/01/2022**
Sod Run WWTP	Harford County DPW	Harford	Bush River	**11/01/2022**
Western Branch WRRF	Washington Suburban Sanitary Commission	Prince George's	Western Branch	**04/01/2023**
Salisbury WWTP	City of Salisbury DPW	Wicomico	Wicomico River	**06/01/2023**
Maryland City WRF	Anne Arundel County DPW	Anne Arundel	Patuxent River	**07/01/2023**
Patuxent WRF	Anne Arundel County DPW	Anne Arundel	Little Patuxent River	**07/01/2023**
La Plata WWTF	Town of La Plata	Charles	Unnamed Tributary of Port Tobacco Creek	**09/01/2023**
Naval Support Activity Annapolis WWTP	Naval Support Activity Annapolis	Anne Arundel	Carr Creek	**09/01/2023**
Parkway WRRF	Washington Suburban Sanitary Commission	Prince George's	Patuxent River	**10/01/2023**

Bowie WWTP	City of Bowie	Prince George's	Patuxent River	**11/01/2023**
Damascus WRRF	Washington Suburban Sanitary Commission	Montgomery	Magruder Branch (a tributary of Great Seneca Creek)	**11/01/2023**
Meadowview WWTP	Cecil County DPW	Cecil	West Branch Christina River	**12/01/2023**

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Maryland Department of the Environment Issues New Fish Consumption Advisory and Guidelines

Recommended meal limits issued based on testing results as part of Maryland's comprehensive response to PFAS risks; testing shows blue crabs and oysters do not appear to be affected, vast majority of fish may still be eaten in moderation

BALTIMORE (Dec. 8, 2023) – The Maryland Department of the Environment has issued a new fish consumption advisory for certain locations based on levels of a chemical compound in a class known as PFAS (per- and polyfluoroalkyl substances) for 15 fish species found in Maryland waterways.

"Fish is an important part of a healthy diet, but it is important to share what we've learned to help people—including subsistence anglers in underserved communities— make informed decisions about what they and their families eat," said Maryland Department of the Environment Secretary Serena McIlwain. "Maryland is committed to informing the public, following the science, and providing data as part of our comprehensive response to PFAS as an emerging national concern."

Though the vast majority of fish from Maryland waters may be eaten in moderation, the advisory provides updated guidelines for recommended consumption for certain recreationally-caught fish species in Maryland's fresh, estuarine, and marine waters.

PFAS refers to a group of more than 4,000 human-made chemicals that have been used since the 1940s in a range of products, including stain- and water-resistant fabrics and carpeting, cleaning products, paints, cookware, food packaging and fire-fighting foams. The uses have led to PFAS entering the environment, where they have been measured in soil, surface water, groundwater and seafood. Most people have been exposed to PFAS because of its use in so many common consumer goods.

Fish consumption advisories provide recommended limits on how often certain fish may be eaten to help minimize health risks. Consumption guidelines offer recommendations on the number of meals per month by species for the general population, women of childbearing age, and children. If a person were to eat more than the recommended meals every month for 30 years, then they have an increased risk of 1 in 10,000 of having a health outcome due to that level of consumption.

Of the species with a new PFAS-based advisory, large and smallmouth bass (13 advisories), sunfish, including bluegill (12 advisories) and white perch (11 advisories) had the highest numbers of advisories based on location and accounting for more conservative recommendations for women of childbearing age and children. None of the results from this round of PFAS sampling led to an advisory for all populations to completely avoid any fish from any Maryland waterway. Testing revealed no PFAS levels of concern or need to recommend meal limits for blue crabs or oysters.

A previous round of testing and resulting advisories for meal limits based on PFAS were issued in 2021 for three species of fish caught in Piscataway Creek in Prince George's County.

Maryland has monitored levels of certain chemicals, including polychlorinated biphenyl and mercury, in the state's recreational fishing for decades. Findings from such monitoring are the basis for the department's fish consumption advisories.

Surveillance will continue as needed.

More information:

Fish consumption advisories

Guidance for Fish Consumption: Monitoring PFAS Levels in Maryland (video)

PFAS in Maryland: Monitoring and Mitigation is a Priority for Maryland (story map)

Maryland and PFAS

# # #

Wes Moore
Governor

Aruna Miller
Lt. Governor

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The Maryland General Assembly's Office of Legislative Audits operates a toll-free fraud hotline to receive allegations of fraud and/or abuse of State government resources. Information reported to the hotline in the past has helped to eliminate certain fraudulent activities and protect State resources.

More Information

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Study points to farmland as possible source of PFAS in fish

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Biologist Vicki Blazer of the U.S. Geological Survey extracts tissue from a smallmouth bass to determine if a buildup of "forever chemicals" makes the fish unsafe to eat.

USGS

A mostly Pennsylvania-based study of smallmouth bass, a popular gamefish, found that the family of chemicals known PFAS — officially called per– and polyfluoroalkyl substances — do build up in parts of the fish. Those parts are not normally eaten, though, making them safe for the dinner plate.

But the examination of 380 adult smallmouth bass also found significant levels of PFAS in those collected from waters that flow through farmland.

Researchers had expected to find the chemicals near military bases, airports and in industrial and urban areas. And they did. But they did not expect to find significant contamination in undeveloped areas, especially agricultural areas.

Though researchers stress that follow-up research is necessary, they suspect PFAS are running off farm fields and into waterways from the use of pesticides and the application of biosolids from sewage treatment plants that are used as fertilizer.

The use of livestock manure as fertilizer may also be sending PFAS into creeks and rivers if the livestock are eating forage grown on contaminated soil, said Vicki Blazer, the USGS fishery biologist with the U.S. Geological Survey who led the study.

The buildup of PFAS in the environment, wildlife and humans is an increasing concern and relatively new discovery. Because the chemicals are resistant to grease, stains and water, they are widely used in such products as firefighting foams, nonstick cookware, cosmetics, and carpet and clothing treatments.

Among the potential health risks to humans are kidney and testicular cancer, thyroid disease, liver damage, slow developmental growth in children, high cholesterol and immune system dysfunction.

The chief goal of the USGS study, recently published in the journal *Environmental Science and Pollution Research*, was to determine where PFAS accumulate in smallmouth bass and whether it makes them unsafe to eat.

As luck would have it, the plasma of adult bass collected from 2014–2019 had been stored from a USGS study of, among other concerns, population declines, skin lesions and fish that were exhibiting both male and female characteristics.

The bass were collected from 10 sites. Five are in Pennsylvania: Pine Creek, Chillisquaque Creek, West Branch Mahantango Creek, Swatara Creek, Little Neshaminy Creek, and the West Branch Susquehanna River. They also came from Antietam Creek in Maryland and three sites in West Virginia. All but Little Neshaminy Creek are in the Chesapeake Bay watershed.

Researchers found that PFAS build up mostly in a fish's blood and liver, and not in the fillets that people generally consume.

Follow-up testing is underway with lab-raised bass to see if exposing them to PFAS at the levels found in the wild bass affects their health over time.

To date, the Pennsylvania Fish and Boat Commission has only issued one fish consumption advisory based on PFAS contamination. That is in the Neshaminy Creek basin in Bucks and Montgomery counties, where several military bases are known to have used firefighting foam high in PFAS. No fish of any species in the Neshaminy watershed should be consumed, the commission advised.

The agency noted that PFAS are "emerging" contaminants, meaning that their risks to the environment and human health are not yet completely understood. Examination of fish tissues in waters found to have high PFAS levels has been conducted since 2019.

But the USGS study raised red flags when at least four PFAS compounds were found in every bass. Two of the sites had 28 compounds.

"This suggests that PFAS may be widespread in Chesapeake Bay waters and in smallmouth bass," the USGS concluded.

Moreover, the study says that agricultural land may be associated with PFAS.

"There are certain pesticides that are considered PFAS-containing and also that can be precursors for certain of the PFAS we measure," Blazer of the USGS said in an interview.

"There is a lot of concern about municipal biosolids and their levels of PFAS. It also makes sense that animal manure could also contain PFAS as plants they may be eating can certainly absorb PFAS from the soil. Just like with humans, diet can certainly be a major exposure pathway."

Biosolids, also called sewage sludge, come mainly from municipal sewage treatment plants or private firms that process septic tank and industrial sewage. In Pennsylvania, nearly 40% of biosolids end up spread on farmland as a soil nutrient booster.

The state Department of Environmental Protection prohibits the spreading of biosolids containing high levels of nutrients, PCBs and such heavy metals as arsenic, cadmium, copper, lead and mercury.

But neither the state agency nor the U.S. Environmental Protection Agency yet requires testing for PFAS in biosolids.

The Pennsylvania-based Stroud Water Research Center and the Center for PFAS Solutions in Delaware have been studying how much biosolids are contaminating farmland and adjacent waters since 2021.

Researcher Diana Oviedo Vargas of the Stroud Water Research Center collects samples of biosolids from a Pennsylvania farm to test the fertilizer booster for the presence of PFAS or “forever chemicals.”

Courtesy of the Stroud Water Research Center

"It’s very clear that biosolids do bring PFAS contamination to the soils,” said Diana Oviedo Vargas, assistant research scientist at Stroud.

Scientists reached this conclusion after studying the soil at 10 farms in Berks, Adams, Bedford and Chester counties. Each farm had areas where biosolids were spread and areas where they were not.

“We know very little about the dangers to crops,” Vargas said. “You cannot use biosolids on plants for direct human consumption, such as tomato plants. But does that mean they won’t end up in animals and our food as well, and at what point is it a concern? We don’t know any of those things.”

That concerns Matt Ehrhart, Stroud’s director of watershed restoration. “There are wastewater treatment plants with very low PFAS-related compounds and treatment plants with high loads,” he said.

“It would not be logistically challenging to understand which [wastewater] plants have low loads and only [use] those for land application. This would also create pressure on the other plants to require pretreatment from their load sources,” he said.

“The regulatory system is obviously still trying to catch up with the science, but it seems like some simple steps could make a significant impact.”

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The E.P.A. Promotes Toxic Fertilizer. 3M Told It of Risks Years Ago.

The agency obtained research from 3M in 2003 revealing that sewage sludge, the raw material for the fertilizer, carried toxic “forever chemicals.”

Credit...Tim Gruber for The New York Times

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By Hiroko Tabuchi

Hiroko Tabuchi reviewed thousands of pages of decades-old documents to report this article.

- Dec. 27, 2024Updated 12:09 p.m. ET

In early 2000, scientists at 3M, the chemicals giant, made a startling discovery: High levels of PFAS, the virtually indestructible “forever chemicals” used in nonstick pans, stain-resistant carpets and many other products were turning up in the nation’s sewage.

The researchers were concerned. The data suggested that the toxic chemicals, made by 3M, were fast becoming ubiquitous in the environment. The company’s research had already linked exposure to birth defects, cancer and more.

That sewage was being used as fertilizer on farmland nationwide, a practice encouraged by the Environmental Protection Agency. The presence of PFAS in the sewage meant those chemicals were being unwittingly spread on fields across the country.

3M didn't publish the research, but the company did share its findings with the E.P.A. at a 2003 meeting, according to 3M documents reviewed by the The New York Times. The research and the E.P.A.'s knowledge of it has not been previously reported.

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Today, the E.P.A. continues to promote sewage sludge as fertilizer and doesn't require testing for PFAS, despite the fact that whistle-blowers, academics, state officials and the agency's internal studies over the years have also raised contamination concerns.

"These are highly complex mixtures of chemicals," said David Lewis, a former E.P.A. microbiologist who in the late 1990s issued early warnings of the risks in spreading sludge on farmland. The soil "becomes essentially permanently contaminated," he said in a recent interview from his home in Georgia.

The concerns raised by Dr. Lewis and others went unheeded at the time.

The country is starting to wake up to the consequences. PFAS, which stands for per- and polyfluoroalkyl substances, has been detected in sewage sludge, on land treated with sludge fertilizer across the country, and in milk and crops produced on contaminated soil. Only one state, Maine, has started to systematically test its farms for PFAS. Maine has also banned the use of sludge on its fields.

Editors' Picks

David Lewis, a former E.P.A. microbiologist, issued early warnings.Credit...Will Crooks for The New York Times

In a statement, 3M said that the sewage study had been shared with the E.P.A., and was therefore available to anyone who searched for it in the agency's archives. The agency had sought 3M's research into the chemicals as part of an investigation in the early 2000s into their health effects.

3M also said it had invested in "state-of-the-art water treatment technologies" at its manufacturing operations. The company is on track to stop PFAS manufacturing globally by the end of 2025, it said.

The E.P.A. did not respond to detailed questions for this article, including about the 3M research. It said in an earlier statement that it "recognizes that biosolids may sometimes contain PFAS and other contaminants" and that it was working with other agencies to "better understand the scope of farms that may have applied contaminated biosolids" and to "support farmers and protect the food supply."

Farmland contamination has become a contentious environmental issue in both red and blue states.

In Oklahoma, Republican voters ousted a longtime incumbent in a state house primary in August after the lawmaker drew criticism for the use of sewage sludge fertilizer on his fields. The victor, Jim Shaw, said he planned to introduce legislation to ban sludge fertilizer across the state.

"There are other ways to dispose of excess waste from the cities," Mr. Shaw said in an email. "Contaminating our farmland, livestock, food and water sources is not an option and has to stop."

A New York Times Investigation

This year the E.P.A. designated two kinds of PFAS as hazardous substances under the Superfund law, and it mandated that water utilities reduce levels in drinking water to near zero and said there is no safe level of exposure to PFAS. It also designated PFAS as "an urgent public health and environmental issue" in 2021, and has said it will issue a report on the risks of PFAS contamination in sludge fertilizer by the end of the year.

The decades-old research by 3M and the record of the company's interaction with the E.P.A. were found by The Times in a cache of tens of thousands of pages of internal documents that the company released as part of settlements in the early 2000s between the federal government and 3M over health risks of the chemicals.

Reusing human waste to fertilize farmland, a practice that dates back centuries, keeps the waste from needing other ways of disposing of it, such as incineration or landfill dumping, both of which have their own environmental risks.

But the problem, experts say, is that sewage today contains a host of chemicals, including PFAS, generated by businesses, factories and homes. The federal government regulates certain heavy metals and pathogens in sludge that is reused as fertilizer; it has no limits on PFAS.

“There’s absolutely enough evidence, with the high levels of contaminants that we see in the sludge, for the E.P.A. to regulate,” said Arjun K. Venkatesan, director of the Emerging Contaminants Research Laboratory at the New Jersey Institute of Technology.

A step in the process of separating sludge from wastewater at a facility in Fort Worth, Texas.Credit...Jordan Vonderhaar for The New York Times

‘It’s Insidious’

The turn of the century was a turbulent time for 3M. After decades of hiding the dangers of PFAS — a history outlined in lawsuits and peer-reviewed studies based on previously secret industry documents — in 1998 it alerted the E.P.A. about the potential hazards.

The company had already found high levels of PFAS in the blood of its employees, and was starting to detect the chemicals in the wider population. It had also long tracked PFAS in wastewater from its factories.

Then in a 2000 study, 3M researchers noticed something alarming. While testing for PFAS in cities with “no known significant industrial use” of the chemicals, including Cleveland, Tenn., and Port St. Lucie, Fla., they found surprisingly high concentrations in sewage sludge.

A question weighed on the researchers’ minds: If there were no PFAS manufacturers present, where were the chemicals coming from?

Hints lay in 3M’s other research. The company had been studying how the chemicals could be released by PFAS-treated carpets during washing. And they were also studying how PFAS could leach from food packaging and other products.

In an interview, Kris Hansen, a former chemist at 3M who was involved in the research, said the presence in sludge “meant this contamination was probably occurring at any city” that was using 3M’s products.

The study showed, moreover, that PFAS was not getting broken down at wastewater treatment plants. “It was ending up in the sludge, and that was becoming biosolids, being mixed into soil,” Dr. Hansen said. “From there it can run into the groundwater, go back into people. It’s insidious.”

In September 2003, 3M officials met with the E.P.A. to discuss the company’s study of sludge contamination and other research, according to the internal records. At the end of the meeting, the E.P.A. requested “additional background information supporting this monitoring data,” the records show.

Sewage sludge has now been spread on millions of acres across the country. It’s difficult to know exactly how much, and E.P.A. data is incomplete. The fertilizer industry says more than 2 million dry tons were used on 4.6 million acres of farmland in 2018. And it estimates that farmers have obtained permits to use sewage sludge on nearly 70 million acres, or about a fifth of all U.S. agricultural land.

“If we really wanted to figure this problem out because we believe it’s in the interest of public health, we really needed to share that data widely,” said Dr. Hansen, who has become a whistle-blower against 3M. “But my memory is that the corporation was kind of caught up in the, ‘Oh my gosh, what do we do about this?’”
Image

Kris Hansen, a former 3M chemist who became a whistle-blower.Credit...Tim Gruber for The New York Times

Early Warning, Unheeded

Dr. Lewis was a rising star in the late 1990s as a microbiologist at the E.P.A. He discovered how dental equipment could harbor H.I.V., winning him kudos within the scientific community.

Then he turned his attention to sewage sludge.

The E.P.A. was encouraging farmers to use sludge as fertilizer. Human beings had used waste to fertilize the land for millenniums, after all. But, as Dr. Lewis pointed out with his research, modern-day sewage most likely contained a slew of chemicals, including PFAS, that made it a very dangerous fertilizer.

He collected and examined sewage samples. He investigated illnesses and deaths he said could be linked to sludge. He started presenting his findings at scientific conferences.

“The chances that serious adverse effects will occur from a complex and unpredictable mixture of tens of thousands of chemical pollutants is a virtual certainty,” he said at the time. His research prompted the Centers for Disease Control and Prevention to issue guidelines protecting workers handling processed sewage sludge.

The E.P.A. eliminated his job in 2003.

He was a prominent voice on the issue at the time, but not the only one.

Rolf Halden, a professor at the School of Sustainable Engineering at Arizona State University and an early researcher of contamination in biosolids, met with E.P.A. officials at least nine times since 2005 to warn about his own research, according to his records.

“The history of biosolids is that it was a toxic waste,” he said. For decades, he noted, sludge from New York City “was loaded on trains and shipped to the back corners of the country,” he said. Farmers often took the sludge without knowledge of its possible contamination.

In 2006, an E.P.A. contractor offered him samples of municipal sewage sludge left over from earlier agency testing. The E.P.A. had been about to throw them out.

Those samples led to a study that confirmed elevated PFAS levels in sludge nationwide. (The early research into sewage samples eventually led to wastewater testing that has helped researchers track the virus that causes Covid.)

Another researcher, Christopher Higgins, was starting his academic career in the early 2000s when he began looking at sludge. He presented his work to E.P.A. officials, he said, and was left with the impression that it wasn't a priority. "I was really surprised by how few people were working for E.P.A. on the topic," said Dr. Higgins, who is now a professor at the Colorado School of Mines.

Image

Signs at a lake near Dr. Hansen's Minnesota home warn of PFAS contamination in fish.Credit...Tim Gruber for The New York Times

Betsy Southerland, a former director of science and technology in the E.P.A. Office of Water, which oversees biosolids, said the program had been hurt by staffing shortages as well as an arduous process for setting new restrictions. Action has been slow, she said, even though E.P.A.'s surveys of sludge had shown "all kinds of pollutants — flame retardants, pharmaceuticals, steroids, hormones," she said. "It's the most horrible story," she said.

A 2018 report by the E.P.A.'s inspector accused the agency of failing to properly regulate biosolids, saying it had "reduced staff and resources in the biosolids program over time, creating barriers."

The Biden administration has said it would publish a risk assessment of PFAS in biosolids by the end of 2024. That would be a first step toward setting limits on PFAS in sewage sludge used as fertilizer.

There is another solution, experts say. Under the Clean Water Act, wastewater treatment plants have a legal authority to limit PFAS pollution from local factories. It's known as the Clean Water Act "pretreatment program," preventing chemicals from reaching sewage in the first place.

In the past two years, two cities — Burlington, N.C., and Calhoun, Ga. — have ordered industries to clean up the effluent they send to wastewater treatment plants. In one instance, a textile producer decided to stop using PFAS entirely.

Those actions came after a local environmental group sued the cities. "Industry is in the best position to control their own pollution, rather than treating wastewater treatment plants like industrial, toxic dumping grounds," said Kelly Moser, an attorney at the Southern Environmental Law Center, which filed the lawsuits.

The National Association of Clean Water Agencies, which represents wastewater treatment plants, said more than 1,600 utilities already had pretreatment programs in place, though not necessarily for PFAS. (The group also said research showed that the chemicals were coming from household waste, including human waste, not just factories.)

Adam Krantz, the group's chief executive, said many utilities were waiting for the E.P.A. to set standards. That would strengthen treatment plants' ability to hold the ultimate polluters responsible, he said. "If these chemical companies were aware of PFAS' potential dangers and kept it quiet," he said, "then these polluters have to pay."

Hiroko Tabuchi covers pollution and the environment for The Times. She has been a journalist for more than 20 years in Tokyo and New York. More about Hiroko Tabuchi