Dear Planning Board, Ken,and Dave, Sandy and Conservation Board,
This is the lap full of documentation you requested after my statement was included in the last meeting on the 13th. it is voluminous because in the last week, since reading the WaPo article on new, infinitesimally small, unmeasurably so, PFOA and PFOS advisory limits, I have seen Mass. gov add these new measures to their old (2021) assessments .
The statement from DEP 3/11/21 states under 5. Miscellaneous: " Mass DEP's solar, guidance, policy, model certification, template approval letter and SOP for staff state that PWS SHALL (me) use solar panels and solar sheets that do not contain PFAS. It is the PWS 's RESPONSIBILITY (me) to ask the manufacturer about PFAS from the solar panels being considered".
This relatively obscure isolated statement was BEFORE the 20 pptrillion advisory safe limit was changed to .004 and .02ppt for PFOA and PFOS respectively.

Consider if any panel parts and sheets include PFAS "forever" chems. how extensive the thousands of panels within 4' of our sole source aquifer, draining in private wells and all water bodies, can be. I have included the test results for Mass. rivers, another of many alarming hazard only recently public knowledge although in the wind for numbers of years (see EPA press releases). It is

conceivable that industry has lobbied against widespread knowledge because the ramifications are extensive and expensive. Maura Healey has recently sued 13 companies including 3M and Dupont to cease production- production of PFAS chemicals they have known for years are toxic and continued to manufacture.

As volunteers now charged with this new aspect to protecting public health, safety and welfare, I hope you read these documents and take them as seriously as they warrant. In state recommendations, we are advised of potential risks to our gardens, to how we wash our food and where, if we think we can filter these immeasurable nanoparticles, we can dump the filtrate that won't perpetuate increased contamination.
As stated by the Saving Greene community in N.Y. , supported by Mass. DEP's statement, any solar installer must provide Certified documentation that solar panels and associated electrical equipment used do not contain per-and polyfluoroalkyl substances (PFAS) including PFOA, PFOS, and GENX chemicals." Would it not be reasonable to add that the installer also be responsible for pre and post installation testing of private wells in proximity of construction drainage groundwater to assure their statement be verified.
Sincerely, Annie Hayes

2018-19 SOLAR SCORECARD

SUNNY
PARTLY CLOUDY
RAINY

SVTC SILICON VALLEY TOXICS COALITION

	Company	Extended Producer Responsibility	Emissions Reporting & Reduction	Worker Rights, Health, and Safety	Supply Chains	Energy Use & GHGs	Water	Conflict Minerals	Module Toxicity & Recycled Content	2018-19 OVERALL SCORE	
	Maximum Score	15	15	15	15	10*	10	10	10	100	
2018-19 Leaders	Jinko	15	15	13	15	12	10	10	10	100	
	Trina	15	14	13	15	12	10	10	10	99	
	SunPower	15	15	13	13	11	10	7	10	94	
	JA Solar	14	11	13	15	9	10	10	10	92	
	Hanwha Q CELLS	10	13	13	15	12	10	7	10	90	
	CS Wismar	10	13	15	10	9	10	9	8	84	
	LG	12	11	13	15	12	10	10	1	84	
	WINAICO	8	13	13	15	8	10	7	10	84	
	Silfab	13	7	13	15	10	10	9	0	77	
	AUO	11	13	13	15	8	10	6	0	76	
Above Average	Boviet Solar	8	9	11	10	8	1	9	10	66	
	Talesun	10	5	13	13	12	2	7	0	62	
	First Solar	10	8	9	5	6	7	0	10	55	
	Astronergy	8	5	13	5	12	2	8	0	53	
	GCLSI	11	3	15	8	6	1	5	0	49	
	SolarWorld	2	5	12	4	9	2	7	0	41	
Below Average	Aleo	5	0	0	0	0	0	0	0	5	
	Avancis	0	0	0	0	0	0	0	0	0	
	BYD	0	0	0	0	0	0	0	0	0	
	Calyxo	0	0	0	0	0	0	0	0	0	
	China Sunergy-Csun	0	0	0	0	0	0	0	0	0	
	ET Solar	0	0	0	0	0	0	0	0	0	
	Gintech	0	0	0	0	0	0	0	0	0	
	Hanergy	0	0	0	0	0	0	0	0	0	
	Hareon Solar	0	0	0	0	0	0	0	0	0	
	Hyundai	0	0	0	0	0	0	0	0	0	
	Kyocera	0	0	0	0	0	0	0	0	0	
	Longi Solar	0	0	0	0	0	0	0	0	0	
	Mitsubishi	0	0	0	0	0	0	0	0	0	
	Motech	0	0	0	0	0	0	0	0	0	
	Panasonic	0	0	0	0	0	0	0	0	0	
	REC	0	0	0	0	0	0	0	0	0	
	Renesola	0	0	0	0	0	0	0	0	0	
	Risen	0	0	0	0	0	0	0	0	0	
	Solar Frontier	0	0	0	0	0	0	0	0	0	
	Suntech	0	0	0	0	0	0	0	0	0	
	Yingli	0	0	0	0	0	0	0	0	0	

*Solar companies can earn up to 2 extra credit points in the Energy Use & Greenhouse Gas Emission Section

A PROJECT OF THE **SILICON VALLEY TOXICS COALITION**

2018-19 SOLAR SCORECARD

www.solarscorecard.com

SVTC's Vision

The Silicon Valley Toxics Coalition (SVTC) believes that we still have time to ensure that the PV sector is safe for the environment, workers, and communities. SVTC envisions a safe and sustainable solar PV industry that:

1) Takes responsibility for the environmental and health impacts of its products throughout their life-cycles, including adherence to a mandatory policy for responsible recycling.

2) Implements and monitors equitable environmental and labor standards throughout product supply chains.

3) Pursues innovative approaches to reducing and work towards eliminating toxic chemicals in PV module manufacturing. For over three decades, SVTC has been a leader in encouraging electronics manufacturers to take lifecycle responsibility for their products. This includes protecting workers from toxic exposure and preventing hazardous e-waste dumping in impoverished communities in India, Ghana, China and throughout the Global South that lack the proper infrastructure to protect workers or the environment.

The PV industry's rapid growth makes it critical that all solar companies maintain the highest sustainability standards.

The Purpose

The Scorecard is a resource for consumers, institutional purchasers, investors, installers, and anyone who wants to purchase PV modules from responsible product stewards. The Scorecard reveals how companies perform on SVTC's sustainability and social justice benchmarks to ensure that the PV manufacturers protect workers, communities, and the environment. The PV industry's continued growth makes it critical to take action now to reduce the use of toxic chemicals, develop responsible recycling systems, and protect workers throughout global PV supply chains. Many PV companies want to produce truly clean and green energy systems and are taking steps to implement more sustainable practices. SVTC is committed to helping these companies achieve that goal. At the same time, we need to create and enforce policies that ensure the safety and improve environmental performance of the entire sector.

PO Box 27669 I San Francisco, CA 94127 I USA I Email: svtc@svtc.org I Web: svtc.org

the

2018–19 SOLAR SCORECARD

SVTC 2018-19 Solar Scorecard Key

Extended Producer Responsibility–15 points

Earning a sunny score means a company participates in or commits (+3) to a fully funded collection and recycling system for End of Life PV modules produced globally (+3 for EPR policy in Europe, +3 for making effort to develop EPR policy in USA). Companies can take more responsibility by clearly describing how all customers can responsibly return PV modules on their websites (+2), making sure all recycling activities take place at a facility with a documented environmental management system and worker safeguards and protections consistent with ISO 14001 (+2), and by offering design for the environment training to product designers (+2).

Emissions Reporting–15 points

A sunny score means that companies report all categories of emissions including chemical and hazardous waste (+5), criteria air pollutants (+3), ozone depleting substances (+2), landfill disposal (+2), and report any sanctions related to noncompliance with environmental regulations (+3).

Worker Rights, Health and Safety–15 points

A sunny score is for companies with a formal commitment that protects worker rights, health, and safety that goes beyond compliance with local laws and regulations (+5 for signing SEIA's commitment, or +5 for a strong company policy). Companies should be en route to paying a living wage for all workers (+2 if all employees are paid more than minimum wage), They should report and show improvements in workday case rates (+2) and recordable incident rates (+2), and adopt OHSAS for 100% of their facilities (+2 for 100% of facilities). Companies should have explicit policies forbidding prison labor (+2).

Supply Chains–15 points

Companies that have a sunny score will have an enforceable commitment from suppliers to protect workers and the environment across all tiers of the supply chain back to polysilicon production or semiconductor preparation (+10 if companies sign the SEIA commitment, have a UNGC quality commitment, or SA8000 certification). Companies could also earn points for screening their supply chain for environmental (+2) and labor & human rights (+2) issues, and ensuring the supply chain factories are OHSAS certified (+1).

Module Toxicity & Materials–10 points

A sunny score is for those companies that offer PV modules that do not contain toxic heavy metals or have them present in levels lower than the high bar for toxics regulation. Some manufacturers have been able to significantly reduce the toxicity of their modules to very low levels (+5). Some PV modules intrinsically contain toxic materials, so EPR will be very important to managing EOL risks. High recycled-content can improve the environmental performance of PV modules (+3), and companies are beginning to adopt halogen-free cables for PV modules (+2). Energy and Greenhouse Gas (GHG).

Emissions–10 points

A sunny score is for companies that report energy use (+3), GHGs (+3), and perfluorocarbons (+2) and report GHGs and/or energy use to a third party (+2).

Water–10 points

A sunny score in this category means the company recognizes the importance of reducing impacts to water. They report volume of water use (+5) and wastewater generated (+3) according to several water quality indicators (+2).

Conflict Minerals–10 points

A sunny score means that the company has undergone due diligence to check to see that tin used in PV manufacturing does not contain conflict minerals from the Democratic Republic of the Congo (DRC), Angola, Burundi, Central African Republic, Republic of the Congo, Rwanda, South Sudan, Tanzania, Uganda, Malawi and Zambia as per the guidance outlined by the OECD (+10).

the

2018–19 SOLAR SCORECARD

Solar Scorecard Analysis

The Solar Scorecard is based on SVTC's annual survey of photovoltaic (PV) module manufacturers, as well as on prior survey responses, interviews, news stories, and publicly available data.

The goal of the Scorecard is to enhance transparency around environmental health, safety, and sustainability issues for communities, workers, and the environment. In 2017 we reworked the Solar Scorecard rubric to better reflect a subset of criteria selected by a stakeholder-led sustainability leadership standard for photovoltaic modules.

In 2020, the Silicon Valley Toxic Coalition's (SVTC) Solar Scorecard will celebrate its 10th anniversary. SVTC and the Collaboratory for the Regenerative Economy (CoRE) are spearheading a process to create new content for the Solar Scorecard version 2.0.

SVTC began scoring photovoltaic manufacturers on sustainability, environmental health and safety issues in 2010 when only 6.4 GW of PV modules were produced. Solar PV has quickly increased its share of total US electrical generation-from just .1% in 2010 to more than 2% today.

Some of the results compiled from SVTC's 2018-19 survey and research include the following:

- Seventeen companies post extended producer responsibility (EPR) information on their website, down from 27 in 2016-17.
- Sixteen PV manufacturers disclose chemical emissions on their website, up from 12 in 2016-17 and four in 2015.
- Nine PV manufacturers do extensive chemical emissions disclosure and reporting on their website, up from four in 2015.
- Fourteen companies are offering PV modules with cables that are halogen-free, up from two companies in 2016-17.
- One company can provide documentation to verify that their supply chains do not contain conflict minerals based on the due diligence guidelines set by the OECD. However, 14 companies selling to the USA are engaged in or have started the process of due diligence to determine if conflict minerals are present in their supply chains.[1]

[1] https://www.seia.org/solar-industry-research-data

Recommended Actions

Commercial, government, or residential purchasers of PV modules are making a long-term financial and environmental commitment, and PV module manufacturers should make the same long-term commitment to the environment and worker safety.

Use this scorecard to help choose a manufacturer that is committed to high environmental and worker safety standards for PV module manufacturing.

Sponsors

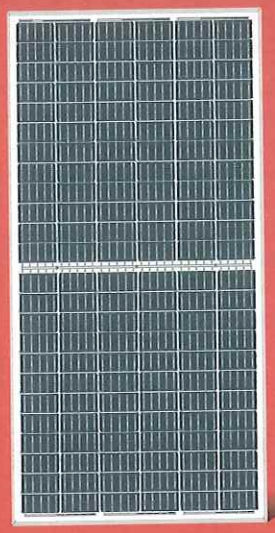
SVTC SILICON VALLEY TOXICS COALITION

BOSTON COMMON ASSET MANAGEMENT, LLC

PAX

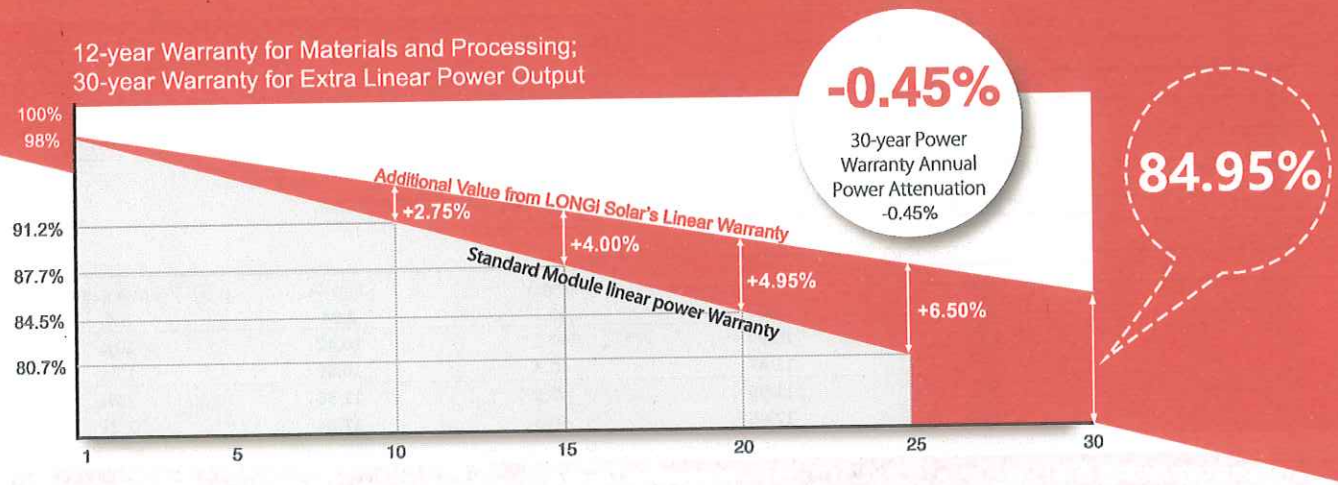
LR6-72HBD
370~390M

Hi-MO 3



High Efficiency
Low LID Bifacial PERC with
Half-cut Technology

12-year Warranty for Materials and Processing;
30-year Warranty for Extra Linear Power Output



Complete System and Product Certifications

IEC 61215, IEC 61730, UL 1703

ISO 9001:2008: ISO Quality Management System

ISO 14001: 2004: ISO Environment Management System

TS62941: Guideline for module design qualification and type approval

OHSAS 18001: 2007 Occupational Health and Safety

* Specifications subject to technical changes and tests.
LONGi Solar reserves the right of interpretation.

Front side performance equivalent to conventional low LID mono PERC:
- High module conversion efficiency (up to 19.4%)
- Better energy yield with excellent low irradiance performance and temperature coefficient
- First year power degradation <2%

Bifacial technology enables additional energy harvesting from rear side (up to 25%)

Glass/glass lamination ensures 30 year product lifetime, with annual power degradation < 0.45%, 1500V compatible to reduce BOS cost

Solid PID resistance ensured by solar cell process optimization and careful module BOM selection

Reduced resistive loss with lower operating current

Higher energy yield with lower operating temperature

Reduced hot spot risk with optimized electrical design and lower operating current

Do you know about this risk - extreme temp. deviation possible.

LONGi

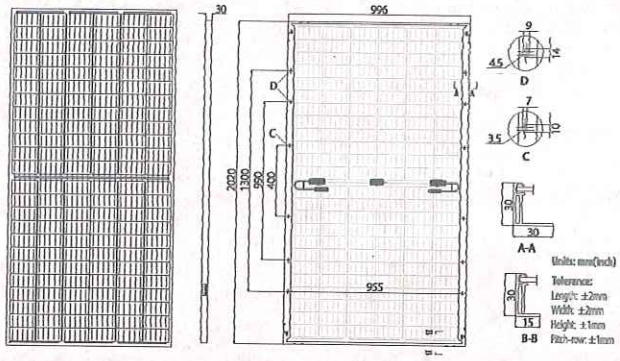
Room 801, Tower 3, Lujiazui Financial Plaza, No.826 Century Avenue, Pudong Shanghai, 200120, China
Tel: +86-21-80162606 E-mail: module@longi-silicon.com Facebook: www.facebook.com/LONGi Solar

without further notice ?

20200401V11

LR6-72HBD **370~390M**

Design (mm)



Mechanical Parameters

Cell Orientation: 144 (6×24)
Junction Box: IP67, three diodes
Output Cable: 4mm², 300mm in length, length can be customized
Glass: Dual glass
2.0mm coated tempered glass
Frame: Anodized aluminum alloy frame
Weight: 26.3kg
Dimension: 2020×996×30mm
Packaging: 35pcs per pallet
175pcs per 20'GP
770pcs per 40'HC

Operating Parameters

Operational Temperature: -40℃ ~+85℃
Power Output Tolerance: 0 ~ +5 W
Voc and Isc Tolerance: ±3%
Maximum System Voltage: DC1500V (IEC/UL)
Maximum Series Fuse Rating: 20A
Nominal Operating Cell Temperature: 45±2℃
Safety Class: Class II
Fire Rating: UL type 3
Bifaciality: Glazing 70±5%

Electrical Characteristics

Test uncertainty for Pmax: ±3%

Model Number	LR6-72HBD-370M		LR6-72HBD-375M		LR6-72HBD-380M		LR6-72HBD-385M		LR6-72HBD-390M	
Testing Condition	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT	STC	NOCT
Maximum Power (Pmax/W)	370	275.1	375	278.8	380	282.6	385	286.3	390	290.0
Open Circuit Voltage (Voc/V)	48.1	44.8	48.3	45.0	48.5	45.2	48.7	45.4	49.1	45.7
Short Circuit Current (Isc/A)	9.80	7.93	9.87	7.99	9.97	8.07	10.03	8.12	10.07	8.15
Voltage at Maximum Power (Vmp/V)	39.8	36.9	40.0	37.1	40.2	37.3	40.4	37.5	40.8	37.9
Current at Maximum Power (Imp/A)	9.30	7.45	9.38	7.51	9.47	7.59	9.53	7.63	9.56	7.66
Module Efficiency(%)	18.4		18.6		18.9		19.1		19.4	

STC (Standard Testing Conditions): Irradiance 1000W/m², Cell Temperature 25℃, Spectra at AM1.5

NOCT (Nominal Operating Cell Temperature): Irradiance 800W/m², Ambient Temperature 20℃, Spectra at AM1.5, Wind at 1m/S

Electrical characteristics with different rear side power gain (reference to 380W front)

Pmax /W	Voc/V	Isc /A	Vmp/V	Imp /A	Pmax gain
399	48.5	10.47	40.2	9.94	5%
418	48.5	10.97	40.2	10.42	10%
437	48.6	11.47	40.3	10.89	15%
456	48.6	11.96	40.3	11.36	20%
475	48.6	12.46	40.3	11.84	25%

Temperature Ratings (STC)

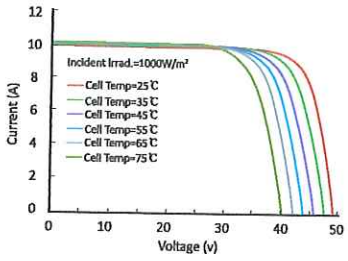
Temperature Coefficient of Isc	+0.060%/℃
Temperature Coefficient of Voc	-0.300%/℃
Temperature Coefficient of Pmax	-0.370%/℃

Mechanical Loading

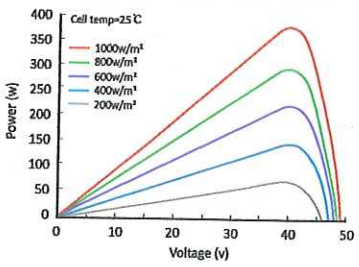
Front Side Maximum Static Loading	5400Pa
Rear Side Maximum Static Loading	2400Pa
Hailstone Test	25mm Hailstone at the speed of 23m/s

I-V Curve

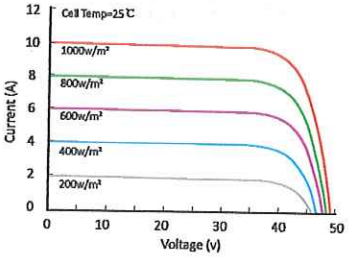
Current-Voltage Curve (LR6-72HBD-380M)



Power-Voltage Curve (LR6-72HBD-380M)



Current-Voltage Curve (LR6-72HBD-380M)



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Room 801, Tower 3, Lujiazui Financial Plaza, No.826 Century Avenue, Pudong Shanghai, 200120, China
Tel: +86-21-80162606 E-mail: module@longi-silicon.com Facebook: www.facebook.com/LONGi Solar

20200401V11

SAVING GREENE
CITIZENS FOR SENSIBLE SOLAR

PO Box 369 Coxsackie NY 12051
SavingGreene@gmail.com
SavingGreene.com

PFAS and other compounds in solar panels, wiring, and coatings

Renewable energy should offer more than promises that it is good for the environment. The solar industry promotes photovoltaic (PV) technology in the most wholesome terms: generating clean, free power from the sun. This benevolent assessment potentially omits environmental impacts during the manufacturing, operational lifetime, and disposal of solar panels and battery storage systems. Host towns need proof, not simply promises, when evaluating how solar projects may affect their residents and environment, both now and in the future.

Introduction

In July 2021, the Town of Avon, New York adopted Local Law 3 of 2021. This precedent-setting amendment to the local solar law prohibits using solar panels that "utilize or contain any amount of GenX chemicals or polyfluoroalkyl (PFAS) substances."[1] This position aligns with state and federal laws protecting our water supply. For the long-term safety of Coxsackie residents, Hecate Energy (Hecate) and its successors should agree to a Certificate condition that prior to construction, Hecate will provide documentation verifying that the solar panels and associated electrical equipment used to construct the Greene County Solar Facility (the Facility) do not contain per- and polyfluoroalkyl substances (PFAS), including PFOA, PFOS, and GenX chemicals.

[1] https://www.avon-ny.org/PDFs--Town%20Clerk/ll3-2021.pdf

We would like to believe that Hecate's commitment to our town's public health and safety, as well as their desire to avoid potential future liability, would encourage them to give these comments careful consideration. Hecate must rely on manufacturers' data, which may not be fully transparent for solar panels and lithium-ion batteries, especially when they are manufactured outside of the United States—in this case often in China.

This Certificate condition would help safeguard our soil, surface waters, and groundwater from potential contamination. While such protection would help protect Sleepy Hollow's water supply, it provides important safeguards for all residents living in the vicinity of the Facility. Hecate and the Town of Coxsackie should perform pre- and post-installation soil and water testing, with annual monitoring. In addition, the installer should fund an escrow account for the Town to hire an independent, certified third-party laboratory for soil and water testing.

PFAS and related compounds

According to the National Institute of Environmental Health Sciences, perfluoroalkyl and polyfluoroalkyl substances (PFAS) are toxic, persistent, and bioaccumulative.[2] These synthetic fluorochemicals were first developed in the 1930s and have strong carbon-flourine bonds that make the structure repel both oil and water.[3] The Green Science Policy Institute details that these manmade chemicals are widely used in building materials such as paints, cleaning products, non-stick coatings, sealants, tapes, wire coverings, glass, solar panels, and batteries.[4] PFAS is commonly found in foam used to extinguish electrical fires.[5]

These "forever chemicals" have been linked to cancer and other health issues. Certain PFAS do not break down easily, causing them to remain indefinitely in the soil and water. Their potential hazard and persistence in the environment may pose a cumulative danger to public health. PFAS comprise a group of compounds, including PFOA, PFOS and GenX chemicals. The United States Environmental Protection Agency (EPA) has

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[2] https://www.niehs.nih.gov/health/topics/agents/pfc/index.cfm

[3] https://www.nature.com/articles/d41586-019-00441-1

[4] https://greensciencepolicy.org/docs/pfas-building-materials-2021.pdf

[5] https://www.gao.gov/assets/gao-21-421.pdf

identified that the potentially toxic and carcinogenic nature of many of these chemicals demands careful evaluation.[6,7]

The disposal of PFAS-containing materials is problematic, as evidenced by the recent cleanup and lawsuits filed against Noralite Hazardous Waste Facility in Cohoes, New York.[8] In July 2021, the village of Hoosick Falls reached a $65 million settlement with Saint-Gobain, Honeywell International, 3M, and DuPont for PFOA contamination of their groundwater that affected at least 544 private wells.[9] Unfortunately the water remains contaminated, and the plant that used PFOA chemicals has been declared a Superfund site.

PFAS legislation in New York State

In 2016, the NYS Department of Environmental Conservation (DEC) issued a regulatory impact statement to 6 NYCRR Part 597 adding PFOA and PFOS as hazardous substances. This ruling was adopted by the DEC in March 2017.[10] In July 2020, NYS passed S.8817 and A.4739-C, which ban the use of PFAS in food packaging.[11] And in August 2020, the NYS Department of Public Health (DPH) voted to set the maximum contaminant levels (MCLs) at 10 parts per trillion (10 ppt) for both PFOA and PFOS in our drinking water supply.[12] NYS legislation permits the DPH to require that public water systems are tested for the contaminants and ensure that elevated levels are addressed.[13]

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[6] https://www.epa.gov/pfas/basic-information-pfas

[7] https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-and-polyfluoroalkyl-substances-pfas

[8] https://www.wamc.org/capital-region-news/2020-06-25/cohoes-residents-file-intent-to-sue-norlite-over-burning-firefighting-foam

[9] https://pfasproject.com/hoosick-falls-new-york/

[10] https://www.dec.ny.gov/regulations/104968.html

[11] https://www.nysenate.gov/legislation/bills/2019/s8817

[12] https://www.health.ny.gov/environmental/water/drinking/docs/water_supplier_fact_sheet_new_mcls.pdf

[13] https://news.bloomberglaw.com/environment-and-energy/new-york-moves-on-some-of-strictest-pfas-drinking-water-limits

PFAS legislation in other states

North Carolina is among the top three states for solar development. By February 2018, residents and the state were questioning the presence of PFAS in solar panels.[14] *The North Carolina State Journal* reported that EPA physical scientist Dr. Mark J. Strynar provided 39 records from the SciFinder database used by the EPA to identify applications of PFAS with solar panels.[15] In August 2018, *The Carolina Journal* reported that the EPA confirmed that PFAS are used in solar panel production.[16] While studies may not be conclusive, the lack of definitive conclusions and transparency raises concerns.

In December 2020, Marc Fitch of the Yankee Institute reported that the Connecticut Department for Health was concerned about PFAS in solar panels.[17] "We've asked the question, have received some information, and have also received some push-back when we ask those questions about whether these panels contain PFAS and different PFAS chemicals." It is the lack of answers and documentation that is troubling and raises questions of the long term impact of solar panels and battery storage on our soils and drinking water.

PFAS Federal legislation

Federal regulations surrounding PFAS are being adopted rapidly, and further restrictions at the national level are expected. US Representative Debbie Dingell (D-MI-12) sponsored Bill H.R.2467, PFAS Action Act of 2021, to "establish requirements and incentives to limit the use of perfluoroalkyl and polyfluoroalkyl substances, commonly referred to as PFAS, and remediate PFAS in the environment."[18] The Bill passed the House July 21, 2021 and is awaiting a vote in the Senate.[19] The Executive Office of the President and other advocacy groups such as Consumer Reports support passage of the

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[14] https://nsjonline.com/article/2018/02/solar-panels-could-be-a-source-of-genx-and-other-perflourinated-contaminants/

[15] https://nsjonline.com/wp-content/uploads/2018/02/perfluoro-and-solar-panels-Reference_02_15_2018_120238-002.pdf

[16] https://www.carolinajournal.com/news-article/epa-confirms-genx-related-compounds-used-in-solar-panels/

[17] https://yankeeinstitute.org/2020/12/03/department-of-public-health-concerned-about-pfas-in-solar-panels-near-drinking-water/

[18] https://debbiedingell.house.gov/news/documentsingle.aspx?DocumentID=2975

[19] https://www.congress.gov/bill/117th-congress/house-bill/2467

Bill. [20, 21] Additionally, the Environmental Protection Agency (EPA) proposes reporting and record-keeping requirements for PFAS under the Toxic Substances Control Act (TSCA).[22]

The August 3, 2021, *National Law Review* included an article by John Gardella of CMBG3 Law in Boston. He concludes that while the US Senate vote has not been determined, that "the pressure is on the EPA to take regulatory action well beyond just drinking water, and companies absolutely must begin preparing now for regulatory actions that will have significant financial impacts down the road."[23]

PFAS in solar panel and battery manufacturing

Despite industry and a few academic assurances to the contrary, broad research consistently indicates that PFAS chemicals are used in solar panel and battery manufacturing and installation. PFAS is found in the coatings on electrical wires, backing panels, tapes, and adhesives.

Of particular concern is the use of PFAS in anti-reflective coatings (ARC) and anti-soil coatings (ASC) that are used to increase solar panel productivity. Material and Data Safety Sheets detail the contents of products manufactured in the United States. However, at this time, China is the major supplier of polysilicon[24] solar panels and batteries.[25] Accountability and transparency for materials and products made outside of the United States is questionable. In June 2021, the Biden administration banned import and use of certain solar energy materials and products from China due to the country's use of forced labor and genocide at polysilicon mines.[26]

Two types of solar panel coatings are commonly used: anti-reflective coatings (ARC) and anti-soil coatings (ASC)

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[20] https://www.whitehouse.gov/wp-content/uploads/2021/07/HR2467.SAP-Final.docx.pdf?source=email

[21] https://advocacy.consumerreports.org/press_release/house-votes-to-approve-the-pfas-action-act-hr-2467/

[22] https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/risk-management-and-polyfluoroalkyl-substances-pfas

[23] https://www.natlawreview.com/article/congress-presses-forward-pfas-measures

[24] https://www.solarpowerworldonline.com/2021/05/no-avoiding-it-now-soon-the-top-4-polysilicon-manufacturers-will-be-based-in-china/

[25] https://www.forbes.com/sites/rrapier/2019/08/04/why-china-is-dominating-lithium-ion-battery-production/?sh=770793d23786

[26] https://www.ecowatch.com/china-solar-panels-ban-biden-2654961710.html

Anti-Reflective Coating (ARC)

A bare silicon glass surface may have a reflection index of more than 30%.[27] Anti-reflective coatings (ARC) are used to increase solar panel productivity by adding a dielectric coating on the glass surface. This coating textures the glass surface, which results in specific bands of wave lengths to be trapped inside the panel where they can generate additional electricity by coming in contact with the photovoltaic cells.

In their Application Appendix 15-A: Glare Analysis, Hecate Energy states that the panels they expect to use will have an anti-reflective coating, presumably to increase efficiency.

Anti-Soil Coating (ASC)

Dust and dirt can foul the panel surface and hinder the conversion of light to electricity. To maintain steady performance, the panel's surface must be cleaned regularly. Current manual or robotic cleaning methods are expensive and inefficient.

The hydrophobic qualities of ASCs create a non-stick surface that promotes water shedding, resulting in "self-cleaning'" solar panels. This coating is applied to the front facing glass surface at the time of manufacture. The water-repelling surface promotes water cohesions, allowing the water droplets to form fully with minimal surface contact. This enhances water droplet shedding and in the process removes dust and dirt from the surface of the panel. ASCs help decrease maintenance costs while increasing the electricity generated. It can be reapplied in the field with products such as 3M AS Liquid 600.[28]

ASC is typically manufactured with either silicon dioxide (SiO2) or titanium dioxide (TiO2) nanoparticles combined with long chains of fluoropolymers. While SiO2 may be inexpensive it is less durable to environmental elements. TiO2 appears to be more stable and is reported to be more frequently used for solar panel ASC.

There are increasing concerns about the negative impact of TiO2 on the environment and human health. In December 2020, California announced the review of titanium dioxide nanoparticle classification under their Safe Water Act Proposition 65.[29]

Gohar Dar's book *TiO2 Nanoparticles*, published in February 2020, includes a chapter on "Toxicity of TiO2 Nanoparticle". This research indicates that lung tumors are found in

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[27] https://www.pveducation.org/pvcdrom/design-of-silicon-cells/anti-reflection-coatings

[28] https://www.coatingsworld.com/issues/2012-10/view_paint-amp-coatings-manufacturer-news/3m-rolls-out-pv-anti-soiling-coating/

[29] https://www.paintsquare.com/news/?fuseaction=view&id=23184

mice that have had long term exposure to TiO2.[30] Chapter 2: "Applications in Nanobiotechnology and Nanomedicine" research indicates safety concerns regarding TiO2 nanoparticles on aquatic species.[31]

While the potential for titanium dioxide nanoparticles to contaminate our soils is not conclusive, the possibility warrants further investigation. The evidence appears to be mounting, and the developer should carry the burden of proof.

Research papers call for caution and further study of ARC and ACS on solar panels. Natatajan Shanmugam's May 2020 study "Anti-Reflective Coating Materials: A Holistic Review from PV Perspective,"[32] published in *Energies*, provides a 98-page comprehensive report. On page 67 the author states: "The implementation of ARCs on the solar cell would suppress the reflection, and in turn, enhances the PCE, [power conversion efficiency] but their durability with continuous exposure to the environment and performance degradation characteristics are some novel areas where research is required."

ARC and ASC resist some stresses, but not others:

> [T]he coatings may resist the harsh environmental stresses such as damp heat and humidity freeze, but they are susceptible to damage under UV exposure. XPS analysis revealed a clear reduction in fluorine in the composition of the coating after exposure to UV and outdoor testing.[33]

Kenan Isbilir's 2019 thesis at Loughborough University studies the "performance and durability of anti-reflective and anti-soiling coatings on solar cover glass"[34] His thesis investigated the durability of commercially available two types of single layer (ARC1 and ARC2) and one multilayer anti-reflective (MAR) commercially available coatings, as well as ASCs. After testing several coatings, he concludes that:

> The durability of these coatings against UV light and abrasion resistance would need to be improved if they are to be applied to PV cover glass.

In 2020, Gizelle C. Oehler found that certain ASC break down in as little as two weeks:

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[30] https://onlinelibrary.wiley.com/doi/abs/10.1002/9783527825431.ch2

[31] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3720578/

[32] https://www.researchgate.net/publication/341556138_Anti-Reflective_Coating_Materials_A_Holistic_Review_from_PV_Perspective

[33] https://www.researchgate.net/publication/329506058_Testing_of_an_Anti-Soiling_Coating_for_PV_Module_Cover_Glass

[34] https://repository.lboro.ac.uk/articles/thesis/The_performance_and_durability_of_anti-reflective_and_anti-soiling_coatings_on_solar_cover_glass/8132048/1

> Surprisingly, the coatings began to degrade quickly, and the effect was clear after only two weeks of exposure. Degradation resulted in decreasing water contact angle and increasing roll-off angles. As observed by Bhaduri et al., the degradation was much faster than anticipated because the outdoor environment combines the stresses tested in the laboratory [31]. Degradation was caused by a number of mechanisms including solvent release, fluorine loss, thinning of the coating, and increasing surface macro-roughness.[35]

The location or accumulated amounts of the degraded chemicals is not discussed in these studies. It is logical to assume that the chemicals sloughing off with the rainwater are deposited into the underlying soil, groundwater and aquifers. The cumulative effect of tens of thousands of solar panels for 35 or more years would most likely permanently contaminate the site's groundwater, soil, and stormwater runoff. If coatings are reapplied during the projects lifetime then additional concerns are raised. How is the ground protected during reapplication? How often is the coating reapplied to the panels on site? Improper disposal of broken and decommissioned solar panels may permanently contaminate landfills and any nearby aquifers. If regulations continue to become more restrictive, how will the panels be disposed of, and is the decommissioning fund adequate?

Millions upon millions of solar panels will be used and disposed of within New York State during the next two decades. Periodic upgrades and damage or defects will need to be addressed long before the end of the project's life.[36] Developers should carry the burden of proof that their materials and products do not contain PFAS. Towns and taxpayers should trust but verify all materials provided by the developers. The people cannot afford the risk that solar panels and storage batteries may contaminate our drinking water and soil, either upon installation, during use, or during disposal. It seems doubtful that developers' required liability coverage would be sufficient for a large-scale PFAS cleanup project.

In June 2021, Niagara County adopted an Extended Producer Responsibility (EPR) law to protect their landfills from being overburdened by the disposal of solar panel waste. The law requires "producers of solar panels sold in the county to finance and manage their safe reuse and recycling when decommissioned."[37] Phone calls to Greene and Columbia county landfills have not provided confirmation that they will accept large quantities of solar panels, either today or in the future. One company suggested contacting We Recycle Solar, which is located in Arizona. State and federal laws for PFAS are

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[35] https://repository.lboro.ac.uk/articles/journal_contribution/Testing_the_durability_of_anti-soiling_coatings_for_solar_cover_glass_by_outdoor_exposure_in_Denmark/11558853

[36] https://hbr.org/2021/06/the-dark-side-of-solar-power

[37] https://www.productstewardship.us/news/571089/Niagara-County-Passes-Nations-2nd-Solar-Panel-Producer-Responsibility-Law.htm

likely to become more numerous and stringent. The town and county should consider the possibility of PFAS contamination from solar panels deposited in our local landfills and require developers to prove that their installations will not include products containing PFAS.

Industry Response

Manufacturers of ARC and ASC may understand the environmental concerns and toxicity risks of their products. A few companies are beginning to provide non-toxic coatings. One company's solution is a proprietary nanoparticle coating that is an environmentally friendly.

> WattGlass has addressed and overcome many of the issues typical of other antireflective coatings (ARCs): things such as toxicity, shelf life, and durability. WattGlass is happy to offer a non-toxic, water based, long shelf-life solution to existing ARC technologies that is easily implemented as a drop in replacement.[38]
>
> Solar ARC surpasses the performance of conventional coatings and is resistant to particulate soiling while remaining non-hazardous and 100% water-based. Typically, these coatings result in tradeoffs between performance and functionality and utilize hazardous materials such as solvents, acids, and fluorocarbons. Not with WattGlass.

If Watt Glass feels it is important to stress their environmentally friendly non-fluorocarbon solution again and again, it raises the obvious question: what are the other companies using, and how might their products harm our soil, water, and public health?

What's next

On August 19, 2021, OxyChem announced that it was closing its Niagara Falls plant, the site of America's first major environmental disaster, Love Canal. In 1988, NYS Department of Health Commissioner David Axelrod called the Love Canal incident a "national symbol of failure to exercise a sense of concern for future generations."[39]

Solar energy resources are marketed as an environmentally-friendly way to generate electricity. However, research indicates that solar panels, coatings, wire coverings, tapes, adhesives and batteries contain PFAS that may permanently harm our soils and poison our drinking water.

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[38] https://www.wattglass.com/technology

[39] https://www.nytimes.com/1988/08/05/nyregion/after-10-years-the-trauma-of-love-canal-continues.html

An October 2020 Bloomberg Law article provides insight into upcoming PFAS regulations in relation to the Development of renewable energy in New York State.

> Overall, along with the CLCPA, the new Siting Law and the expected PFAS regulations fundamentally change long-standing environmental paradigms in New York State. The flurry of regulations expected from Albany in the next few years will usher in a new era of environmental regulation quite different from today. Those well prepared for the transition will be positioned to prosper from it, while those who are not will fall behind or find their business plans or goals outdated or not fully achievable.[40]

Conclusions

Renewable energy developers are responsible to their investors. Not the town. Not the neighbors. And not the environment. Solar projects are held by individual LLCs whose only asset may be an aging infrastructure built on leased ground. At time of decommissioning—or evidence of contaminants—it is unlikely that there will be a deep-pocketed corporation to bring the site into compliance with current or future EPA and DEC standards.

The July 2021 ruling on the Fieldwood Energy, LLC bankruptcy case sets precedent that previous oil well owners, and the insurance companies that issue them bonds, are responsible for the cleanup cost of wells.[41] Insurance company trends with oil and gas may become the standards for the renewable energy sector, making it difficult and costly to insure solar power plants.

Prior to construction, Hecate Energy should be held responsible to neighboring residents and Coxsackie's municipal government by providing documentation that the solar panels, coatings, and electrical infrastructure specified for the project do not contain PFAS or other toxic chemicals. Attempting to remedy a "forever chemical" such as PFAS contamination over more than a thousand acres of solar coverage would likely be impossible.

While there are a few alternative options that may be safer, these products are more expensive and are manufactured in smaller quantities. Utility-scale solar power plants require hundreds of thousands, if not millions, of photovoltaic panels at the time of installation. The ability to manufacture and deliver this quantity is limited to the very largest

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[40] https://news.bloomberglaw.com/environment-and-energy/impact-of-new-yorks-renewable-energy-permitting-program-pfas-regulation

[41] https://www.bondexchange.com/oil-industry-woes-lead-to-massive-changes-in-the-insurance-industry/

suppliers, most of them based in China, where Material Data and Safety Sheets are limited and if provided the information is questionable.

Reputable solar panel manufacturing companies that freely provide Material Data and Safety Sheets may be limited. Solar developers that provide toxicity guarantees on their panels being free of dangerous chemicals may be even fewer. While the level of toxicity of ARC and ASC may lack clarity, the coatings' exposure to the elements and where the sloughed-off chemicals will be deposited is not. The chemicals are likely to enter the soil and groundwater.

When reviewing this Application, the Siting Board must not rely on good intentions. As has been noted throughout this proceeding, multiple solar projects will be constructed in the watershed of Sleepy Hollow Lake. Measures should be taken to determine that panels, electrical infrastructure, and wiring for these projects is PFAS-free.

What we are discussing here is a matter of public health and safety, we encourage the Board to require developers to provide specification sheets, and to describe preventive measures, testing policies, and Material and Data Safety Sheets in order to protect Coxsackie public health and to protect the town from future liability. Preventative measures—not after-the-fact remediation—are the answer to avoiding PFAS contamination of soil, stormwater runoff, drinking water, and aquifers surrounding the project.

EPA new (regulations) advisories parts per trillion. .004/ PFOA .002 .02 ppt PFOS

The Washington Post
Democracy Dies in Darkness

3,000 to 17,000 times lower than previous 2016 health advisories

EPA warns toxic 'forever chemicals' more dangerous than once thought

The guidance may spur water utilities to tackle PFAS, but health advocates are still waiting for mandatory standards

By Dino Grandoni

Updated June 15, 2022 at 12:36 p.m. EDT | Published June 15, 2022 at 9:00 a.m. EDT

The Environmental Protection Agency warned Wednesday that a group of human-made chemicals found in the drinking water, cosmetics and food packaging used by millions of Americans poses a greater danger to human health than regulators previously thought.

The new health advisories for a ubiquitous class of compounds known as polyfluoroalkyl and perfluoroalkyl substances, or PFAS, underscore the risk facing dozens of communities across the country. Linked to infertility, thyroid problems and several types of cancer, these "forever chemicals" can persist in the environment for years without breaking down.

"People on the front-lines of PFAS contamination have suffered for far too long," EPA Administrator Michael Regan said in a statement. "That's why EPA is taking aggressive action."

The guidance aims to prompt local officials to install water filters or at least notify residents of contamination. But for now, the federal government does not regulate the chemicals. Health advocates have called on the Biden administration to act more quickly to address what officials from both parties describe as a contamination crisis that has touched every state.

"Today's announcement should set off alarm bells for consumers and regulators," said Melanie Benesh, legislative attorney at the Environmental Working Group, a nonprofit organization. "These proposed advisory levels demonstrate that we must move much faster to dramatically reduce exposures to these toxic chemicals."

Since the 1940s, chemical makers have used the highly durable compounds to make nonstick cookware, moisture-repellent fabrics and flame-retardant equipment. But that same toughness against water and fire, which made the chemicals profitable, allowed them to accumulate in nature and build up in the body — with long-term health effects.

Agency officials assessed two of the most common ones, known as PFOA and PFOS, in recent human health studies and announced Wednesday that lifetime exposure at staggeringly low levels of 0.004 and 0.02 parts per trillion, respectively, can compromise the immune and cardiovascular systems and are linked to decreased birth weights.

Those drinking-water concentrations represent "really sharp reductions" from previous health advisories set at 70 parts per trillion in 2016, said Erik Olson, a senior strategic director for the Natural Resources Defense Council, an advocacy group. The announcement, he added, sends "an important signal to get this stuff out of our drinking water."

More significantly, the EPA is preparing to propose mandatory standards for the two chemicals this fall. Once finalized, water utilities will face penalties if they neglect to meet them. The advisories will remain in place until the rule comes out. The EPA also said Wednesday that it is offering $1 billion in grants to states and tribes through the bipartisan infrastructure law to address drinking-water contamination.

The advisories' levels are so low that they are difficult to detect with today's technology. Some lawmakers, including Sen. Shelley Moore Capito (W.Va.), the top Republican on the Senate Environment and Public Works Committee, said in a statement that this meant the new guidance is impractical.

"EPA's announcement will only increase confusion for water systems' compliance efforts and further complicate risk communication to the public," she said.

The American Chemistry Council, the chemical industry's main trade group, said in a statement that it supports developing enforceable standards for these long-lasting compounds. But it faulted the EPA for issuing the advisories before outside experts on the agency's Science Advisory Board had finished reviewing the underlying research, suggesting the process is "fundamentally flawed."

"Rather than wait for the outcome of this peer review, EPA has announced new Advisories that are 3,000 to 17,000 times lower than those released by the Obama Administration in 2016," it said.

Already in the United States, manufacturers have largely replaced PFOA and PFOS with other fluorinated compounds. The EPA determined that two of those alternatives — dubbed GenX and PFBS — also are dangerous to ingest even at relatively low levels, according to a review of recent research on mice.

Among the communities hit hardest with contamination are those near military bases, where PFAS-laden foams were used for decades to fight jet-fuel fires.

Many residents in Oscoda, Mich., for instance, have heeded warnings from state health officials and stopped drinking untreated well water and eating deer hunted near the now-shuttered Wurtsmith Air Force Base.

"There still is no plan in place for the cleanup," said Anthony Spaniola, an attorney and co-chair of the Great Lakes PFAS Action Network whose family has a lakeside home in Oscoda. "The Department of Defense, quite frankly, has mismanaged this site, bordering on reckless."

Spaniola hopes the new health advisories mean the military will "change the scope of what they need to clean up."

In North Carolina, Emily Donovan's family of four started carrying around bottled water and installed a filter under their sink after PFAS were discovered in and around Cape Fear River. Instead of asking parents to donate cookies and cupcakes, schools request bottles of water for dances and other events.

"It's a layer of stress that we all live with now," said Donovan, now an activist who co-founded Clean Cape Fear and is on the leadership team of the National PFAS Contamination Coalition.

"You're constantly wondering," she added, "is there something inside of me? Is there something inside of my children?"

Regan, who served as North Carolina's top environmental official before joining the EPA, ordered the chemical company Chemours to stop the compounds from trickling into the river.

While the agency is planning to regulate two PFAS, thousands of distinct compounds have been discovered. Many health advocates say federal regulators need to crack down on the compounds as a group.

"We can't continue this whack-a-mole approach to regulating them," Olson said. "We'll never be finished in anyone's lifetime."

Radhika Fox, who heads the Office of Water at the EPA, said the agency is considering more sweeping regulations of the class of compounds. "We are exploring options to propose a rule that is for groups, not just PFOA and PFOS," she told reporters Tuesday in a Zoom call.

EPA Acting Administrator Announces First-Ever Comprehensive Nationwide PFAS Action Plan <https://epa.gov/newsreleases/epa-acting-administrator-announces-first-ever-comprehensive-nationwide-pfas-action>

Historic plan outlines concrete steps the agency is taking to address PFAS and to protect public health

EPA News Release: EPA Acting Administrator Announces First-Ever Comprehensive Nationwide PFAS Action Plan

Release Date: February 14, 2019

EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan <https://epa.gov/newsreleases/epa-announce-first-ever-comprehensive-nationwide-pfas-action-plan>

EPA News Release: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan

Release Date: February 13, 2019

Media Advisory: EPA to Hold Press Briefing Call on PFAS Action Plan <https://epa.gov/newsreleases/media-advisory-epa-hold-press-briefing-call-pfas-action-plan>

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EPA News Release: Media Advisory: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan

Release Date: February 13, 2019

EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan <https://epa.gov/newsreleases/epa-announce-first-ever-comprehensive-nationwide-pfas-action-plan-2>

EPA News Release: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan

Release Date: February 13, 2019

EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan in Fountain, Colorado <https://epa.gov/newsreleases/epa-announce-first-ever-comprehensive-nationwide-pfas-action-plan-fountain-colorado>

EPA News Release: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan in Fountain, Colorado

Release Date: February 13, 2019

EPA to Announce First-Ever Comprehensive Nation Wide PFAS Action Plan <https://epa.gov/newsreleases/epa-announce-first-ever-comprehensive-nation-wide-pfas-action-plan>

***** MEDIA ADVISORY *** Updated Call-in Information**

EPA News Release: EPA to Announce First-Ever Comprehensive Nation Wide PFAS Action Plan

Release Date: February 13, 2019

EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan on February 14 <https://epa.gov/newsreleases/epa-announce-first-ever-comprehensive-nationwide-pfas-action-plan-february-14>

EPA News Release: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan on February 14

Release Date: February 13, 2019

EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan <https://epa.gov/newsreleases/epa-announce-first-ever-comprehensive-nationwide-pfas-action-plan-1>

EPA News Release: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan

Release Date: February 13, 2019

MEDIA ADVISORY: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan <https://epa.gov/newsreleases/media-advisory-epa-announce-first-ever-comprehensive-nationwide-pfas-action-plan>

EPA News Release: MEDIA ADVISORY: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan

Release Date: February 13, 2019

EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan <https://epa.gov/newsreleases/epa-announce-first-ever-comprehensive-nationwide-pfas-action-plan-0>

MEDIA ADVISORY

EPA News Release: EPA to Announce First-Ever Comprehensive Nationwide PFAS Action Plan

Release Date: February 13, 2019

Statement from EPA Water Chief on PFAS

<https://epa.gov/newsreleases/statement-epa-water-chief-pfas>

EPA News Release: Statement from EPA Water Chief on PFAS

Release Date: January 30, 2019

PFAS Home <https://epa.gov/pfas>

PFAS Explained <https://epa.gov/pfas/pfas-explained>

EPA actions to address PFAS <https://epa.gov/pfas/epa-actions-address-pfas>

PFAS Strategic Roadmap <https://epa.gov/pfas/pfas-strategic-roadmap-epas-commitments-action-2021-2024>

Data and Tools <https://epa.gov/pfas/pfas-resources-data-and-tools>

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EPA Awards Purdue University Nearly $900,000 to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

<https://epa.gov/newsreleases/epa-awards-purdue-university-nearly-900000-research-potential-environmental-impacts>

EPA News Release: EPA Awards Purdue University Nearly $900,000 to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

Release Date: September 18, 2019

EPA Awards $6 Million to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

<https://epa.gov/newsreleases/epa-awards-6-million-research-potential-environmental-impacts-pfas-substances-waste>

EPA News Release: EPA Awards $6 Million to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

Release Date: September 17, 2019

EPA awards $500K to University of North Dakota to advance innovation and research on PFAS <https://epa.gov/newsreleases/epa-awards-500k-university-north-dakota-advance-innovation-and-research-pfas>

Grant among $6 million nationally to research potential environmental impacts of persistent chemical compounds in waste streams

EPA News Release: EPA awards $500K to University of North Dakota to advance innovation and research on PFAS

Release Date: September 17, 2019

EPA Awards $6 Million to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

<https://epa.gov/newsreleases/epa-awards-6-million-research-potential-environmental-impacts-pfas-substances-waste-0>

New York State Department of Health to Study New York State Landfills as Sources of PFAS Groundwater Contamination

EPA News Release: EPA Awards $6 Million to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

Release Date: September 17, 2019

EPA Takes Important Step Under PFAS Action Plan <https://epa.gov/newsreleases/epa-takes-important-step-under-pfas-action-plan>

Agency Asks for Public Input on Draft Interim Recommendations for Addressing Groundwater Contaminated with PFOA and PFOS

EPA News Release: EPA Celebrates Earth Day 2019 with Video and Events

Release Date: April 25, 2019

EPA Acting Administrator Announces First-Ever Comprehensive Nationwide PFAS Action Plan <https://epa.gov/newsreleases/epa-acting-administrator-announces-first-ever-comprehensive-nationwide-pfas-action-0>

Historic plan outlines concrete steps the agency is taking to address PFAS and to protect public health

EPA News Release: EPA Acting Administrator Announces First-Ever Comprehensive Nationwide PFAS Action Plan

Release Date: February 14, 2019

Aggressively Addressing PFAS at EPA

<https://epa.gov/newsreleases/aggressively-addressing-pfas-epa>

EPA News Release: Aggressively Addressing PFAS at EPA

Release Date: January 7, 2020

EPA Releases PFAS Groundwater Guidance for Federal Cleanup Programs, Fulfilling PFAS Action Plan Commitment

<https://epa.gov/newsreleases/epa-releases-pfas-groundwater-guidance-federal-cleanup-programs-fulfilling-pfas-action>

EPA News Release: EPA Releases PFAS Groundwater Guidance for Federal Cleanup Programs, Fulfilling PFAS Action Plan Commitment

Release Date: December 20, 2019

EPA Continues Progress Under PFAS Action Plan <https://epa.gov/newsreleases/epa-continues-progress-under-pfas-action-plan>

EPA News Release: EPA Continues Progress Under PFAS Action Plan

Release Date: November 7, 2019

EPA Takes Two Important Steps Under PFAS Action Plan <https://epa.gov/newsreleases/epa-takes-two-important-steps-under-pfas-action-plan>

EPA News Release: EPA Takes Two Important Steps Under PFAS Action Plan

Release Date: September 25, 2019

EPA Announces New Method to Test for Additional PFAS in Drinking Water

<https://epa.gov/newsreleases/epa-announces-new-method-test-additional-pfas-drinking-water>

EPA News Release: EPA Announces New Method to Test for Additional PFAS in Drinking Water

Release Date: December 19, 2019

EPA Moves Forward on Key Drinking Water Priority Under PFAS Action Plan

<https://epa.gov/newsreleases/epa-moves-forward-key-drinking-water-priority-under-pfas-action-plan>

EPA News Release: EPA Moves Forward on Key Drinking Water Priority Under PFAS Action Plan

Release Date: December 4, 2019

EPA Awards North Carolina State University $900,000 in Funding to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

<https://epa.gov/newsreleases/epa-awards-north-carolina-state-university-900000-funding-research-potential>

EPA News Release: EPA Awards North Carolina State University $900,000 in Funding to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

Release Date: September 19, 2019

EPA Takes Important Step to Advance PFAS Action Plan, Requests Public Input on Adding PFAS Chemicals to the Toxics Release Inventory <https://epa.gov/newsreleases/epa-takes-important-step-advance-pfas-action-plan-requests-public-input-adding-pfas>

EPA News Release: EPA Takes Important Step to Advance PFAS Action Plan, Requests Public Input on Adding PFAS Chemicals to the Toxics Release Inventory

Release Date: November 25, 2019

EPA Announces Availability of $4.8 Million in Funding for New Research on Managing PFAS in Agriculture <https://epa.gov/newsreleases/epa-announces-availability-48-million-funding-new-research-managing-pfas-agriculture>

EPA News Release: EPA Announces Availability of $4.8 Million in Funding for New Research on Managing PFAS in Agriculture

Release Date: November 22, 2019

EPA Awards University of Florida $898,668 in Funding to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

<https://epa.gov/newsreleases/epa-awards-university-florida-898668-funding-research-potential-environmental-impacts>

EPA News Release: EPA Awards University of Florida $898,668 in Funding to Research Potential Environmental Impacts of PFAS Substances in Waste Streams

Release Date: September 19, 2019

Trump EPA Continues to Aggressively Address PFAS on the Federal, State, and Local Level <https://epa.gov/newsreleases/trump-epa-continues-aggressively-address-pfas-federal-state-and-local-level>

Building on the assistance provided to more than 30 states, Trump Administration continues its commitment to supporting state, tribal, and local communities in addressing PFAS

EPA News Release: Trump EPA Continues to Aggressively Address PFAS on the Federal, State, and Local Level

Release Date: July 28, 2020

EPA, Federal Family, and the National Academies Collaborate on Public Workshop to Review Federal Research on PFAS <https://epa.gov/newsreleases/epa-federal-family-and-national-academies-collaborate-public-workshop-review-federal>

Public Workshop is the latest action by Trump Administration to aggressively address PFAS

EPA News Release: EPA, Federal Family, and the National Academies Collaborate on Public Workshop to Review Federal Research on PFAS

Release Date: July 27, 2020

EPA Adds New PFAS Treatment Options and Scientific References to Drinking Water Treatability Database <https://epa.gov/newsreleases/epa-adds-new-pfas-treatment-options-and-scientific-references-drinking-water>

Update advances Trump Administration's aggressive plan to address PFAS, provides tools to state and local governments to help address PFAS

EPA News Release: EPA Adds New PFAS Treatment Options and Scientific References to Drinking Water Treatability Database

Release Date: July 15, 2020

EPA Takes Action to Stop Use of Certain PFAS in Products and Protect American Consumers <https://epa.gov/newsreleases/epa-takes-action-stop-use-certain-pfas-products-and-protect-american-consumers>

Agency marks 4th anniversary of amended TSCA by meeting important milestone under PFAS Action Plan

EPA News Release: EPA Takes Action to Stop Use of Certain PFAS in Products and Protect American Consumers

Release Date: June 22, 2020

EPA Settlement with Swix Sport USA Resolves TSCA Violations Involving PFAS

<https://epa.gov/newsreleases/epa-settlement-swix-sport-usa-resolves-tsca-violations-involving-pfas>

EPA News Release: EPA Settlement with Swix Sport USA Resolves TSCA Violations Involving PFAS

Release Date: May 20, 2020

EPA Takes Next Step to Implement PFAS Legislation <https://epa.gov/newsreleases/epa-takes-next-step-implement-pfas-legislation>

Certain PFAS to be added into the Code of Federal Regulations for the Toxics Release Inventory

EPA News Release: EPA Takes Next Step to Implement PFAS Legislation

Release Date: May 18, 2020

EPA Aggressively Working to Increase Research and Understand PFAS

<https://epa.gov/newsreleases/epa-aggressively-working-increase-research-and-understand-pfas>

EPA researchers work to find solutions to address PFAS in communities across the nation

EPA News Release: EPA Aggressively Working to Increase Research and Understand PFAS

Release Date: May 13, 2020

EPA Releases PFAS Action Plan: Program Update <https://epa.gov/newsreleases/epa-releases-pfas-action-plan-program-update-0>

Report highlights EPA's aggressive and unprecedented efforts to address PFAS in the environment

EPA News Release: EPA Releases PFAS Action Plan: Program Update

Release Date: February 26, 2020

EPA Continues to Act on PFAS, Proposes to Close Import Loophole and Protect American Consumers <https://epa.gov/newsreleases/epa-continues-act-pfas-proposes-close-import-loophole-and-protect-american-consumers>

EPA News Release: EPA Continues to Act on PFAS, Proposes to Close Import Loophole and Protect American Consumers

Release Date: February 20, 2020

EPA Week in Review: PFAS Edition

<https://epa.gov/newsreleases/epa-week-review-pfas-edition>

Trump Administration aggressively addresses PFAS, continues its commitment to supporting state, tribal, and local communities

EPA News Release: EPA Week in Review: PFAS Edition

Release Date: July 31, 2020

ICYMI: EPA, State, and Local Partners Team Up to Address PFAS Across the Country

<https://epa.gov/newsreleases/icymi-epa-state-and-local-partners-team-address-pfas-across-country>

EPA News Release: ICYMI: EPA, State, and Local Partners Team Up to Address PFAS Across the Country

Release Date: July 30, 2020

EPA Region 7, Kansas and Nebraska Assess PFAS Contamination

<https://epa.gov/newsreleases/epa-region-7-kansas-and-nebraska-assess-pfas-contamination>

EPA News Release: EPA Region 7, Kansas and Nebraska Assess PFAS Contamination

Release Date: July 29, 2020

EPA Supports States in Addressing PFAS Across the Southeast

<https://epa.gov/newsreleases/epa-supports-states-addressing-pfas-across-southeast-0>

Through technical assistance, grants and enforcement, EPA Region 4 assists states, tribes and local communities respond to PFAS challenges

EPA News Release: EPA Supports States in Addressing PFAS Across the Southeast

Release Date: July 29, 2020

EPA Region 8 continues to aggressively address PFAS

<https://epa.gov/newsreleases/epa-region-8-continues-aggressively-address-pfas-0>

Building on assistance provided to Colorado, South Dakota and Wyoming, Trump Administration continues to address PFAS affecting water and drinking water resources

EPA News Release: EPA Region 8 continues to aggressively address PFAS

Release Date: July 30, 2020

EPA, State and Local Partners Team up to Address PFAS in the Pacific Northwest and Alaska

<https://epa.gov/newsreleases/epa-state-and-local-partners-team-address-pfas-pacific-northwest-and-alaska>

EPA Region 10 supports Pacific Northwest and Alaskan efforts to identify and reduce toxic threats

EPA News Release: EPA, State and Local Partners Team up to Address PFAS in the Pacific Northwest and Alaska

Release Date: July 29, 2020

EPA Region 2 Continues to Address PFAS on the State and Local Level

<https://epa.gov/newsreleases/epa-region-2-continues-address-pfas-state-and-local-level>

EPA News Release: EPA Region 2 Continues to Address PFAS on the State and Local Level

Release Date: July 29, 2020

Trump EPA Continues to Aggressively Address PFAS on the Federal, State, and Local Level

<https://epa.gov/newsreleases/trump-epa-continues-aggressively-address-pfas-federal-state-and-local-level-2>

Actions benefit Mid-Atlantic Region locations

EPA News Release: Trump EPA Continues to Aggressively Address PFAS on the Federal, State, and Local Level

Release Date: July 29, 2020

EPA Continues to Aggressively Address PFAS in the Great Lakes Region

<https://epa.gov/newsreleases/epa-continues-aggressively-address-pfas-great-lakes-region>

Progress continues to be made through EPA's PFAS Action Plan

EPA News Release: EPA Continues to Aggressively Address PFAS in the Great Lakes Region

Release Date: July 29, 2020

EPA Continues to Aggressively Address PFAS in New England

<https://epa.gov/newsreleases/epa-continues-aggressively-address-pfas-new-england>

EPA News Release: EPA Continues to Aggressively Address PFAS in New England

Release Date: July 29, 2020

U.S. EPA Continues to Aggressively Address PFAS in the Pacific Southwest

<https://epa.gov/newsreleases/us-epa-continues-aggressively-address-pfas-pacific-southwest>

EPA News Release: U.S. EPA Continues to Aggressively Address PFAS in the Pacific Southwest

Release Date: July 29, 2020

EPA, U.S. Department of Defense, and State Partners Launch Technical Challenge Seeking Innovative Ways to Destroy PFAS in Firefighting Foam <https://epa.gov/newsreleases/epa-us-department-defense-and-state-partners-launch-technical-challenge-seeking>

Trump Administration continues its commitment to support state, tribal, and local communities in addressing PFAS

EPA News Release: EPA, U.S. Department of Defense, and State Partners Launch Technical Challenge Seeking Innovative Ways to Destroy PFAS in Firefighting Foam

Release Date: August 25, 2020

Administrator Wheeler, Congressman Hudson Highlight Trump Administration Action on PFAS at Roundtable in Fayetteville, N.C. <https://epa.gov/newsreleases/administrator-wheeler-congressman-hudson-highlight-trump-administration-action-pfas>

EPA News Release: Administrator Wheeler, Congressman Hudson Highlight Trump Administration Action on PFAS at Roundtable in Fayetteville, N.C.

Release Date: August 25, 2020

Administrator Wheeler Statement on Cancellation of Bipartisan PFAS Destruction Research Squashed by Obama EPA Leadership <https://epa.gov/newsreleases/administrator-wheeler-statement-cancellation-bipartisan-pfas-destruction-research>

EPA News Release: Administrator Wheeler Statement on Cancellation of Bipartisan PFAS Destruction Research Squashed by Obama EPA Leadership

Release Date: August 25, 2020

Administrator Wheeler Discusses PFAS, Engages with Agriculture Stakeholders, Tours Brownfields Redevelopment in North Carolina <https://epa.gov/newsreleases/administrator-wheeler-discusses-pfas-engages-agriculture-stakeholders-tours-brownfields>

EPA News Release: Administrator Wheeler Discusses PFAS, Engages with Agriculture Stakeholders, Tours Brownfields Redevelopment in North Carolina

Release Date: August 25, 2020

EPA Awards $3.2 Million to Purdue and Indiana Universities for Research on Managing PFAS in Agriculture and Rural Communities <https://epa.gov/newsreleases/epa-awards-32-million-purdue-and-indiana-universities-research-managing-pfas>

EPA News Release: EPA Awards $3.2 Million to Purdue and Indiana Universities for Research on Managing PFAS in Agriculture and Rural Communities

Release Date: August 20, 2020

EPA Awards Nearly $5 Million for New Research on Managing PFAS in Agricultural and Rural Communities <https://epa.gov/newsreleases/epa-awards-nearly-5-million-new-research-managing-pfas-agricultural-and-rural>

Building on technical assistance provided to more than 30 states, Trump Administration continues its commitment to supporting rural and agricultural communities in addressing PFAS

EPA News Release: EPA Awards Nearly $5 Million for New Research on Managing PFAS in Agricultural and Rural Communities

Release Date: August 20, 2020

EPA Adds New PFAS to its Drinking Water Treatability Database <https://epa.gov/newsreleases/epa-adds-new-pfas-its-drinking-water-treatability-database-0>

New Updates Empower Communities with Information about PFAS in Drinking Water

EPA News Release: EPA Adds New PFAS to its Drinking Water Treatability Database

Release Date: May 19, 2021

The U.S. Environmental Protection Agency, Department of Defense, and State Partners Announce Winners of International Challenge Seeking Innovative Ways to Destroy PFAS in Firefighting Foam <https://epa.gov/newsreleases/us-environmental-protection-agency-department-defense-and-state-partners-announce>

EPA News Release: The U.S. Environmental Protection Agency, Department of Defense, and State Partners Announce Winners of International Challenge Seeking Innovative Ways to Destroy PFAS in Firefighting Foam

Release Date: May 13, 2021

EPA Administrator Regan Establishes New Council on PFAS <https://epa.gov/newsreleases/epa-administrator-regan-establishes-new-council-pfas>

EPA News Release: EPA Administrator Regan Establishes New Council on PFAS

Release Date: April 27, 2021

EPA Releases Testing Data Showing PFAS Contamination from Fluorinated Containers <https://epa.gov/newsreleases/epa-releases-testing-data-showing-pfas-contamination-fluorinated-containers>

EPA News Release: EPA Releases Testing Data Showing PFAS Contamination from Fluorinated Containers

Release Date: March 5, 2021

EPA Takes Action to Address PFAS in Drinking Water <https://epa.gov/newsreleases/epa-takes-action-address-pfas-drinking-water>

EPA News Release: EPA Takes Action to Address PFAS in Drinking Water

Release Date: February 22, 2021

EPA Delivers Results on PFAS Action Plan <https://epa.gov/newsreleases/epa-delivers-results-pfas-action-plan>

Agency delivers on the historic commitments made in the PFAS Action Plan to address these emerging chemicals of concern and protect public health

EPA News Release: EPA Delivers Results on PFAS Action Plan

Release Date: January 19, 2021

EPA Takes Action to Investigate PFAS Contamination <https://epa.gov/newsreleases/epa-takes-action-investigate-pfas-contamination>

EPA News Release: EPA Takes Action to Investigate PFAS Contamination

Release Date: January 14, 2021

EPA Releases Interim Guidance on Destroying and Disposing of Certain PFAS and PFAS-Containing Materials <https://epa.gov/newsreleases/epa-releases-interim-guidance-destroying-and-disposing-certain-pfas-and-pfas-containing>

EPA News Release: EPA Releases Interim Guidance on Destroying and Disposing of Certain PFAS and PFAS-Containing Materials

Release Date: December 18, 2020

New Interim Strategy Will Address PFAS Through Certain EPA-Issued Wastewater Permits <https://epa.gov/newsreleases/new-interim-strategy-will-address-pfas-through-certain-epa-issued-wastewater-permits>

EPA News Release: New Interim Strategy Will Address PFAS Through Certain EPA-Issued Wastewater Permits

Release Date: November 30, 2020

EPA Enhances PFAS Research Projects through Lean Management <https://epa.gov/newsreleases/epa-enhances-pfas-research-projects-through-lean-management>

EPA News Release: EPA Enhances PFAS Research Projects through Lean Management

Release Date: November 17, 2020

Federal Partners Kick Off Workshop on Federal Government Human Health PFAS Research with the National Academies of Sciences, Engineering and Medicine

<https://epa.gov/newsreleases/federal-partners-kick-workshop-federal-government-human-health-pfas-research-national>

EPA News Release: Federal Partners Kick Off Workshop on Federal Government Human Health PFAS Research with the National Academies of Sciences, Engineering and Medicine

Release Date: October 26, 2020

EPA Responds to New Mexico Governor and Acts to Address PFAS Under Hazardous Waste Law <https://epa.gov/newsreleases/epa-responds-new-mexico-governor-and-acts-address-pfas-under-hazardous-waste-law>

EPA News Release: EPA Responds to New Mexico Governor and Acts to Address PFAS Under Hazardous Waste Law

Release Date: October 26, 2021

EPA Announces Key Step to Advance Science, Better Protect Communities from PFAS Pollution <https://epa.gov/newsreleases/epa-announces-key-step-advance-science-better-protect-communities-pfas-pollution>

EPA News Release: EPA Announces Key Step to Advance Science, Better Protect Communities from PFAS Pollution

Release Date: October 25, 2021

EPA Announces First Validated Laboratory Method to Test for PFAS in Wastewater, Surface Water, Groundwater, Soils

<https://epa.gov/newsreleases/epa-announces-first-validated-laboratory-method-test-pfas-wastewater-surface-water>

EPA News Release: EPA Announces First Validated Laboratory Method to Test for PFAS in Wastewater, Surface Water, Groundwater, Soils

Release Date: September 2, 2021

Broad Coalition of Advocates, Community Leaders, and Officials Praise EPA's New Roadmap on PFAS <https://epa.gov/newsreleases/broad-coalition-advocates-community-leaders-and-officials-praise-epas-new-roadmap-pfas>

EPA News Release: Broad Coalition of Advocates, Community Leaders, and Officials Praise EPA's New Roadmap on PFAS

Release Date: October 20, 2021

EPA Seeks Input on Proposed PFAS National Primary Drinking Water Regulation <https://epa.gov/newsreleases/epa-seeks-input-proposed-pfas-national-primary-drinking-water-regulation>

EPA News Release: EPA Seeks Input on Proposed PFAS National Primary Drinking Water Regulation

Release Date: October 19, 2021

EPA Announces $131 Million WIFIA Loan for PFAS Treatment and Removal Systems in Orange County, California <https://epa.gov/newsreleases/epa-announces-131-million-wifia-loan-pfas-treatment-and-removal-systems-orange-county>

Nationally, 57 WIFIA loans are financing over $23 billion in water infrastructure upgrades, creating 63,000 jobs

EPA News Release: EPA Announces $131 Million WIFIA Loan for PFAS Treatment and Removal Systems in Orange County, California

Release Date: August 25, 2021

EPA Administrator Regan Announces Comprehensive National Strategy to Confront PFAS Pollution <https://epa.gov/newsreleases/epa-administrator-regan-announces-comprehensive-national-strategy-confront-pfas>

EPA News Release: EPA Administrator Regan Announces Comprehensive National Strategy to Confront PFAS Pollution

Release Date: October 18, 2021

EPA Announces Plans for New Wastewater Regulations, Including First Limits for PFAS, Updated Limits for Nutrients

<https://epa.gov/newsreleases/epa-announces-plans-new-wastewater-regulations-including-first-limits-pfas-updated>

EPA News Release: EPA Announces Plans for New Wastewater Regulations, Including First Limits for PFAS, Updated Limits for Nutrients

Release Date: September 8, 2021

EPA Releases Preliminary Data for 2020 Toxics Release Inventory Reporting, Including First Ever Reporting on PFAS

<https://epa.gov/newsreleases/epa-releases-preliminary-data-2020-toxics-release-inventory-reporting-including-first>

EPA News Release: EPA Releases Preliminary Data for 2020 Toxics Release Inventory Reporting, Including First Ever Reporting on PFAS

Release Date: July 29, 2021

EPA Continues to Take Action on PFAS to Protect the Public <https://epa.gov/newsreleases/epa-continues-take-action-pfas-protect-public>

Actions include proposing first-ever reporting requirements under TSCA for a wide range of PFAS chemicals

EPA News Release: EPA Continues to Take Action on PFAS to Protect the Public

Release Date: June 10, 2021

Press Releases Related to PFAS

This page contains a list of press releases related to PFAS, sorted by most to least recent.

To find older press releases, SEARCH EPA ARCHIVE <https://archive.epa.gov/>.

EPA Adds Five PFAS Chemicals to List of Regional Screening and Removal Management Levels to Protect Human Health and the Environment

<https://epa.gov/newsreleases/epa-adds-five-pfas-chemicals-list-regional-screening-and-removal-management-levels>

EPA News Release: EPA Adds Five PFAS Chemicals to List of Regional Screening and Removal Management Levels to Protect Human Health and the Environment

Release Date: May 18, 2022

EPA Delivers on Three Water Commitments in the Agency's PFAS Strategic Roadmap

<https://epa.gov/newsreleases/epa-delivers-three-water-commitments-agencys-pfas-strategic-roadmap>

EPA News Release: EPA Delivers on Three Water Commitments in the Agency's PFAS Strategic Roadmap

Release Date: April 28, 2022

EPA Announces New Drinking Water Health Advisories for PFAS Chemicals, $1 Billion in Bipartisan Infrastructure Law Funding to Strengthen Health Protections

<https://epa.gov/newsreleases/epa-announces-new-drinking-water-health-advisories-pfas-chemicals-1-billion-bipartisan>

Agency establishes new health advisories for GenX and PFBS and lowers health advisories for PFOA and PFOS

EPA News Release: EPA Announces New Drinking Water Health Advisories for PFAS Chemicals, $1 Billion in Bipartisan Infrastructure Law Funding to Strengthen Health Protections

Release Date: June 15, 2022

EPA Continues to Take Actions to Address PFAS in Commerce <https://epa.gov/newsreleases/epa-continues-take-actions-address-pfas-commerce>

EPA News Release: EPA Continues to Take Actions to Address PFAS in Commerce

Release Date: March 16, 2022

EPA Requires Reporting on Releases and Other Waste Management of Certain PFAS, Including PFBS <https://epa.gov/newsreleases/epa-requires-reporting-releases-and-other-waste-management-certain-pfas-including-pfbs>

EPA News Release: EPA Requires Reporting on Releases and Other Waste Management of Certain PFAS, Including PFBS

Release Date: January 24, 2022

EPA Issues First Test Order Under National Testing Strategy for PFAS in Commercial Fire Fighting Foam and Other Uses

<https://epa.gov/newsreleases/epa-issues-first-test-order-under-national-testing-strategy-pfas-commercial-fire>

EPA News Release: EPA Issues First Test Order Under National Testing Strategy for PFAS in Commercial Fire Fighting Foam and Other Uses

Release Date: June 6, 2022

EPA Grants Petition to Order Testing on Human Health Hazards of PFAS

<https://epa.gov/newsreleases/epa-grants-petition-order-testing-human-health-hazards-pfas>

EPA News Release: EPA Grants Petition to Order Testing on Human Health Hazards of PFAS

Release Date: December 28, 2021

EPA Announces Nationwide Monitoring Effort to Better Understand Extent of PFAS in Drinking Water <https://epa.gov/newsreleases/epa-announces-nationwide-monitoring-effort-better-understand-extent-pfas-drinking>

EPA News Release: EPA Announces Nationwide Monitoring Effort to Better Understand Extent of PFAS in Drinking Water

Release Date: December 20, 2021

See page 4

Per- and Polyfluoroalkyl Substances (PFAS)

Learn about a group of contaminants in the environment called Per- and polyfluoroalkyl substances (PFAS). Find out where they have been found and what Massachusetts is doing to address them.

Notices & Alerts

MassDEP reception areas are open to the public 9:00 am to 5:00 pm Monday - Friday. | *Jun. 1, 2022, 12:01 am*

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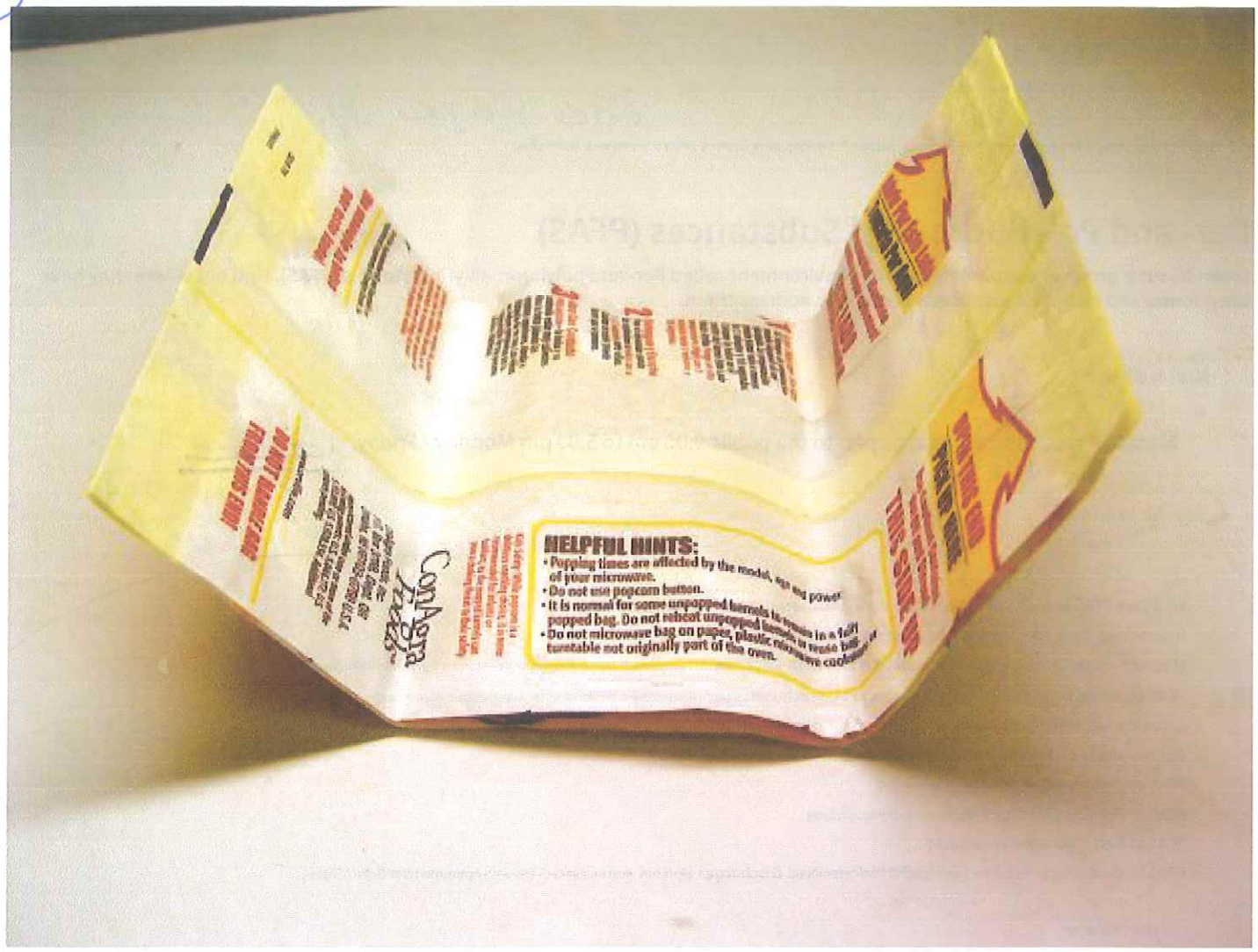
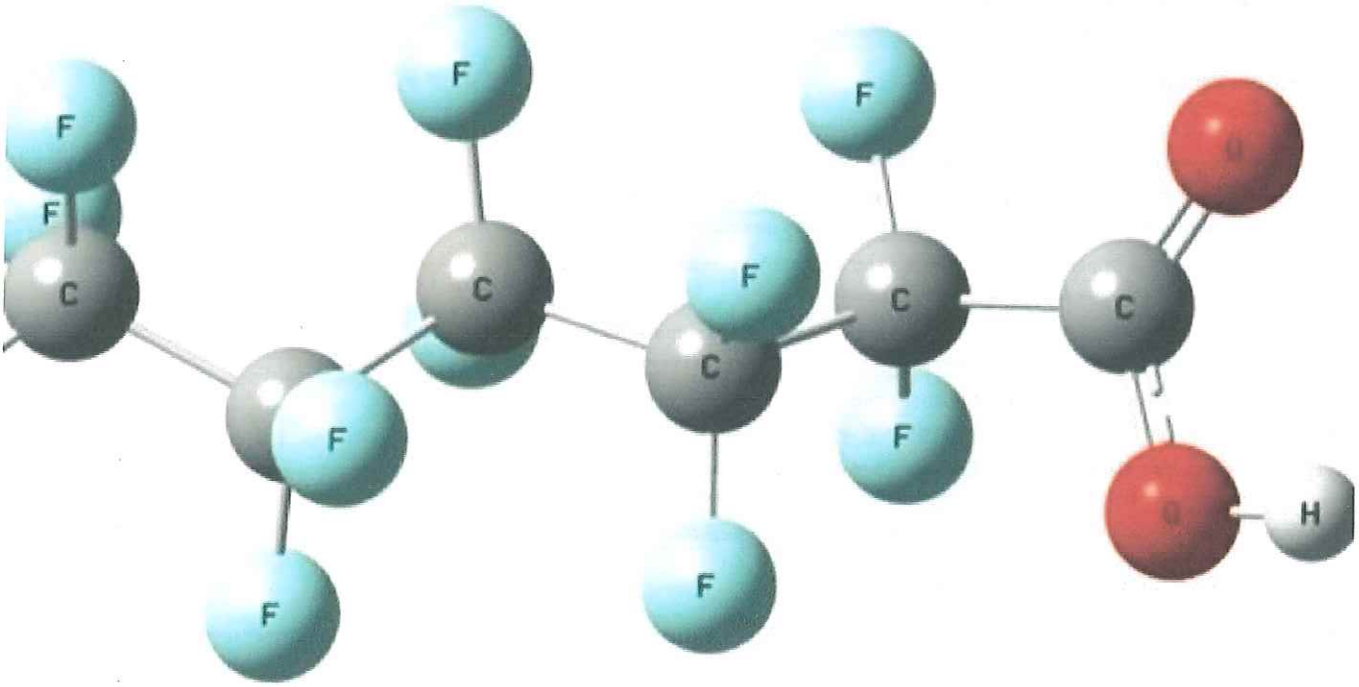
What are PFAS and why are they a problem?



Per- and polyfluoroalkyl substances (PFAS) are a family of chemicals used since the 1950s to manufacture stain-resistant, water-resistant, and non-stick products. PFAS are widely used in common consumer products as coatings, on food packaging, outdoor clothing, carpets, leather goods, ski and snowboard waxes, and more.

Certain types of firefighting foam—historically used by the U.S. military, local fire departments, and airports to fight oil and gasoline fires—may contain PFAS.

PFAS in drinking water is an important emerging issue nationwide. Because PFAS are water soluble, over time PFAS from some firefighting foam, manufacturing sites, landfills, spills, air deposition from factories and other releases can seep into surface soils. From there, PFAS can leach into groundwater or surface water, and can contaminate drinking water. PFAS have also been found in rivers, lakes, fish, and wildlife.



PFAS stay in the environment for a long time and do not break down easily. As a result, PFAS are widely detected in soil, water, air, and food. Some PFAS can accumulate in the food chain. Exposure can occur when someone uses certain products that contain PFAS, eats PFAS-contaminated food, or drinks PFAS-contaminated water. When ingested, some PFAS can build up in the body and, over time, these PFAS may increase to a level where health effects could occur.

14.

Studies indicate that exposure to sufficiently elevated levels of certain PFAS may cause a variety of health effects including developmental effects in fetuses and infants, effects on the thyroid, liver, kidneys, certain hormones and the immune system. Some studies suggest a cancer risk may also exist in people exposed to higher levels of some PFAS. Scientists and regulators are still working to study and better understand the health risks posed by exposures to PFAS, and MassDEP is following developments in this burgeoning area closely.

Interagency Task Force and AG Lawsuit

In 2020, the Massachusetts legislature appointed the PFAS Interagency Task Force to investigate water and ground contamination of per- and polyfluoroalkyl substances across the Commonwealth. The Commissioner of MassDEP was named to serve as one of the Task Force's 19 members. The Task Force held nine public hearings throughout 2021 and heard testimony from a wide range of stakeholders, including researchers, advocacy groups, community members, municipal officials, state agencies, public water systems, industry groups, and legislators.

In April 2022, the members of the Task Force adopted their final report, per their statutory charge: Learn more about the **PFAS Interagency Task Force** (https://malegislature.gov/Commissions/Detail/556/Hearings) and see the **Final PFAS Interagency Task Force Report** (https://malegislature.gov/Commissions/Detail/556/Documents)

On May 25, 2022, Attorney General Maura Healey sued 13 manufacturers of PFAS "forever chemicals" used in firefighting foam for causing millions of dollars in damages to communities across Massachusetts by knowingly contaminating drinking water sources, groundwater, and other natural resources with highly toxic PFAS chemicals that pose a serious threat to public health and the environment.

See more information about the lawsuit: **AG Healey Sues Manufacturers of Toxic 'Forever' Chemicals** (/news/ag-healey-sues-manufacturers-of-toxic-forever-chemicals-for-contaminating-massachusetts-drinking-water-and-damaging-natural-resources)

Printed last week

Massachusetts Drinking Water Standard and Health Information

PFAS Standard for Public Drinking Water Supplies

On October 2, 2020, MassDEP published its PFAS public drinking water standard or Massachusetts Maximum Contaminant Level (MMCL) of 20 nanograms per liter (ng/L), or parts per trillion (ppt) applicable to community (COM) and non-transient non-community (NTNC) systems for the sum of the concentrations of six specific PFAS. The six PFAS are: perfluorooctane sulfonic acid (PFOS); perfluorooctanoic acid (PFOA); perfluorohexane sulfonic acid (PFHxS); perfluorononanoic acid (PFNA); perfluoroheptanoic acid (PFHpA); and perfluorodecanoic acid (PFDA). MassDEP abbreviates this set of six PFAS as "PFAS6." This drinking water standard is set to be protective against adverse health effects for all people consuming the water.

Additional information on the MassDEP public drinking water standard:

- **310 CMR 22.00: The Massachusetts Drinking Water Regulations** (/regulations/310-CMR-22-the-massachusetts-drinking-water-regulations)
- **Per- and Polyfluoroalkyl Substances (PFAS) Drinking Water Regulations Quick Reference Guide** (/doc/per-and-polyfluoroalkyl-substances-pfas-drinking-water-regulations-quick-reference-guide/download)
- Technical Support Document: **Per- and Polyfluoroalkyl Substances (PFAS): An Updated Subgroup Approach to Groundwater and Drinking Water Values** (/doc/per-and-polyfluoroalkyl-substances-pfas-an-updated-subgroup-approach-to-groundwater-and/download)

and then new EPA

Additional information for consumers:

- **MassDEP Fact Sheet - PFAS in Drinking Water: Questions and Answers for Consumers** (/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers/download)
- **MassDEP Fact Sheet - PFAS in Drinking Water: Questions and Answers for Consumers (Spanish)** (/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers-spanish/download)
- **MassDEP Fact Sheet - PFAS in Drinking Water: Questions and Answers for Consumers (CV Creole)** (/doc/massdep-fact-sheet-pfas-in-drinking-water-qa-for-consumers-cv-creole/download)
- **MassDEP Fact Sheet - PFAS in Drinking Water: Questions and Answers for Consumers (Haitian Creole)** (/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers-haitian-creole/download)
- **MassDEP Fact Sheet - PFAS in Drinking Water: Questions and Answers for Consumers (Portuguese)** (/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers-portuguese/download)
- **MassDEP Fact Sheet - PFAS in Drinking Water: Questions and Answers for Consumers (Vietnamese)** (/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers-vietnamese/download)
- **CDC ATSDR information on PFAS for consumers and health professionals** (https://www.atsdr.cdc.gov/pfas/index.html)

advisory - see WA PO "EPA warns toxic forever chem more dangerous.

to PFOA .004 nano grams

PFOS .02

Additional information for Public Water Suppliers (PWS):

- **PFAS in Drinking Water - Q&A for PWS: A Collection of Frequently Asked Questions** (/doc/collated-pfas-qa-for-pws-a-collection-of-the-pfas-qa-for-pws/download)
- **PFAS monitoring flowchart for small PWS serving less than 3,300 people - COM and NTNCs** (/doc/pfas-monitoring-flowchart-for-small-public-water-suppliers-com-and-ntnc/download)
- **PFAS monitoring flowchart for PWS - COM and NTNCs** (/doc/pfas-monitoring-flowchart-for-public-water-suppliers-com-and-ntnc/download)
- **PFAS substitution request for previous testing data** (/doc/pfas-substitution-request-for-previous-testing-data-for-pws/download)

This week

Private Well Owners

If you are a **private well owner,** for more information about whether you should test, how to test and your drinking water treatment options, please see **PFAS in Private Well Drinking Water Supplies FAQ** (/info-details/per-and-polyfluoroalkyl-substances-pfas-in-private-well-drinking-water-supplies-faq).

Public Water Suppliers

Field Sampling Guide (/doc/field-sampling-guide-for-pfas/download) and video of sample collection procedures for Public Water Suppliers: **https://youtu.be/zrwhwSI-R9M** (https://youtu.be/zrwhwSI-R9M)

Drinking Water Laboratories

Drinking water samples must be analyzed for PFAS by labs using EPA Methods: 537 or 537.1.

To find a certified lab see: **MassDEP certified labs** (/certified-laboratories)

If you are a laboratory and are interested in becoming certified, see: **Laboratory certification office policy on PFAS** (/doc/memorandum-on-revised-massachusetts-regulations-for-the-certification-and-operation-of) and **Laboratory Certification Forms** (/lists/laboratory-certification-forms)

Additional Resources

How to Interpret My PFAS Laboratory Report (https://www.mass.gov/doc/how-to-interpret-my-pfas-laboratory-report/download)

Bottled water and home water filters

- PFAS waiver request for initial monitoring (/doc/pfas-initial-waiver-application-for-pws/download)
- PFAS Public Education and Public Notification templates (/lists/public-notification-forms-and-templates)

PFAS detected in drinking water supplies in Massachusetts

This story map consists of seven tabs that present interactive maps, dashboards and photographs that describe the efforts by MassDEP and Public Water Suppliers to address the PFAS contamination. Click on the full screen symbol in the bottom right corner for best viewing.

PFAS testing data

Older testing data for PFAS from Public Water Suppliers (PWS) between 2013 - 2015 is available here: Massachusetts UCMR3 testing results (/doc/unregulated-contaminant-monitoring-rule-3-data-massachusetts-only/download).

More recent PFAS sampling results from PWS are available on the Massachusetts EEA Data Portal (https://eeaonline.eea.state.ma.us/portal#!/search/drinking-water). Search under the contaminant group "PFAS".

New drinking water source approvals and PFAS

MassDEP requires PWS to test all new sources of drinking water for PFAS, including replacement sources and satellite wells, using EPA method 537 (14 compounds) or 537.1 (18 Compounds) and report all results. For more information about the new source approval process, contact your MassDEP Regional Office. List of MassDEP Regional Offices by community (/service-details/massdep-regional-offices-by-community) or email the MassDEP Drinking Water Program program.director-dwp@mass.gov (mailto:program.director-dwp@mass.gov).

Laboratories, testing and sample collection for drinking water

The Massachusetts Department of Public Health (MDPH) Food Protection Program publishes a **list of companies licensed to sell or distribute bottled water or carbonated non-alcoholic beverages in Massachusetts** (/doc/list-of-bottlers-may-12-2022-0/). The list includes bottling company weblinks to enable searches for products sold in Massachusetts. Licenses are renewed annually, and the MDPH list will be updated quarterly.

The MDPH list includes only bottlers licensed by MDPH after they provided test results which show that their bottled water or beverages comply with drinking water standards for PFAS and other contaminants established by:

- The Massachusetts Department of Environmental Protection,
- The US Environmental Protection Agency, and
- The US Food and Drug Administration.

Information from MDPH regarding bottled water, including contact information, can be found **here** (/info-details/water-quality-standards-for-bottled-water-in-massachusetts).

Home Water Filters

There are also home water treatment filters capable of removing PFAS from drinking water for the countertop or under the sink. Treatment systems and devices are not specifically designed to meet Massachusetts' drinking water standard for PFAS6. There are systems that have been designed to meet the USEPA's Health Advisory of 70 ng/L for the sum of PFOS and PFOA. Any treatment device you use should be certified to meet the **National Sanitation Foundation (NSF)** (https://www.nsf.org/consumer-resources/articles/pfoa-pfos-drinking-water) standards to remove PFOS and PFOA compounds so that the sum of their concentrations is below the USEPA Health Advisory of 70 ng/L. **Please be aware that 70 ng/L is significantly greater than the MassDEP's drinking water standard of 20 ng/L for the PFAS6 compounds.** Many of these treatment devices certified to meet NSF standards will likely be able to reduce PFAS6 levels to well below 70 ng/L, but there are no federal or

state testing requirements for these treatment devices. If you choose to install a treatment device, you should check to see if the manufacturer has independently verifiable PFAS6 monitoring results demonstrating that the device can reduce PFAS below 20 ng/L. See more detailed information on treatment systems in the Private Well Factsheet (/info-details/per-and-polyfluoroalkyl-substances-pfas-in-private-well-drinking-water-supplies-faq).

PFAS and waste sites

PFAS are considered to be "hazardous material" subject to the notification, assessment and cleanup requirements of the Massachusetts Waste Site Cleanup Program (/topics/cleanup-of-sites-spills). A detailed Fact Sheet (below) provides guidance regarding when and how to sample and analyze for Per- and Polyfluoroalkyl Substances at disposal sites regulated under the Massachusetts Contingency Plan ("MCP", 310 CMR 40.0000 (/regulations/310-CMR-4000-massachusetts-contingency-plan)).

Final PFAS-related MCP Revisions

Revisions to the Massachusetts Contingency Plan establishing notification requirements and cleanup standards for PFAS in soil and groundwater are now final, effective December 27, 2019. Documents related to these regulations are now available (/lists/preview-of-the-final-pfas-related-revisions-to-the-mcp-2019).

Additional Resources

Private Wells PFAS Sampling Program 21E Questions and Answers (https://www.mass.gov/doc/private-wells-pfas-sampling-program-21e-questions-and-answers/download)

Interim Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated under the Massachusetts Contingency Plan (October 2020) (https://www.mass.gov/doc/interim-guidance-on-sampling-and-analysis-for-pfas-at-disposal-sites-regulated-under-the/download) (PDF 426.35 KB)

PFAS in Fire Fighting Foam

Takeback Program

MassDEP, in partnership with the Massachusetts Department of Fire Services (MassDFS), initiated a legacy "Aqueous Film-Forming Foam" (AFFF) collection and destruction program in 2018 that has collected (to date) more than 203,000 pounds (over 23,000 gallons) of legacy foam from 120 fire departments and facilities across

A PWS in violation of the PFAS6 MCL must comply with 310 CMR 22.23 if seeking to use home treatment devices a to comply with the PFAS6 MCL. For more information see https://www.mass.gov/doc/self-guide-for-point-of-use-and-point-of-entry-treatment-devices/download.

A PWS delivering water with PFAS6 concentrations below 20 ng/L and following MassDEP guidance at https://www.mass.gov/doc/per-and-polyfluoroalkyl-substances-pfas-in-public-drinking-water-supplies-questions-and-answers/download (see question 14, "Can a PWS support customer use of Point of Use (POU) or Point of Entry (POE) devices to reduce PFAS?") and https://www.mass.gov/service-details/home-water-treatment-devices-point-of-entry-and-point-of-use-drinking-water may offer rebates and other assistance with home treatment systems or devices without obtaining prior MassDEP Drinking Water Program approval for such programs.

For more information contact your MassDEP regional PFAS contact or the Drinking Water Program at program.director-dwp@mass.gov.

OTHER USEFUL RESOURCES

MassDEP fact sheets "Per- and polyfluoroalkyl Substances (PFAS) in Drinking Water Supplies - Questions and Answers for Public Water Systems" and "PFAS in Drinking Water: Questions and Answers for Consumers" describe the drinking water standards, sources of PFAS compounds, health effects, and MassDEP recommendations to reduce consumer exposure. The PWS factsheet is available at https://www.mass.gov/doc/per-and-polyfluoroalkyl-substances-pfas-in-public-drinking-water-supplies-questions-and-answers/, and the consumer factsheet is available at https://www.mass.gov/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers.

CONTACT INFORMATION

My questions were not answered here. Who should I contact?

Contact the MassDEP Drinking Water Program at **program.director-dwp@mass.gov**, Subject: PFAS.

Who are the MassDEP Drinking Water Program Regional PFAS contacts?

Region	Name	Phone #	Email
Western	Catherine Wanat	413-755-2216	Catherine.Wanat@mass.gov
Central	Paula Caron	508-767-2719	Paula.Caron@mass.gov
Northeast	Amy LaPusata	978-694-3291	Amy.lapusata@mass.gov
Southeast	William Schwartz	508-946-2818	William.Schwartz@mass.gov
Boston	Margaret Finn	617-292-5746	Margaret.Finn@mass.gov

Boston: Program.director-dwp@mass.gov, Subject: PFAS

PFAS Drinking Water Regulations implementation questions are continuing to be received so this Q&A will be updated periodically. Please continue to send all questions to program.director-dwp@mass.gov

solar panels and solar sheets that do not contain PFAS. It is a PWS's responsibility to ask the manufacturer about PFAS from the solar panels being considered.

We have also been approached by a company that is marketing thin, flexible solar sheets that they adhere to infrastructure and they were specifically asking about adhering solar sheets to PWS drinking water storage tanks. After reviewing data, talking with the company and the manufacturer, we decided to allow such an installation under our Policy #98-01 which is titled Antennas & Other Appurtenances Attached to Public Drinking Water Storage Tanks with one condition: that if the drinking water storage tank is located within the Zone I, the project proponent clearly demonstrates, possibly through testing, that there is no PFAS in the solar sheets, adhesives, other components of the solar installation or maintenance practices. A copy of the written documentation must be maintained in the PWS's files for MassDEP review when requested. Additionally, the PWS have been made aware through the updated policy that solar sheeting on drinking water storage tanks may increase the temperature of the water in the tank. Care should be taken in selecting the type of solar sheeting to be used, managing the water in the tank and preventing detrimental impacts to the structural integrity of the tank.

The most up-to-date DWP solar guidance, solar Zone I policy and Antenna & Other Appurtenances on Drinking Water Storage Tanks solar policy for PWS posted at https://www.mass.gov/service-details/drinking-water-policies-and-guidance. As new information becomes available, MassDEP will update this and other relevant documents.

2. ***Can a Public Water Supplier offer home treatment systems or devices, or incentives for homeowner treatment systems to remove PFAS?***

Yes. A PWS may offer home treatment systems or devices or incentives for homeowner for treatment systems to remove PFAS under the following conditions:

- **A PWS must be aware and inform consumers that home treatment systems and devices are not specifically designed to meet Massachusetts' drinking water standard for PFAS6.** Currently available home treatment systems or devices have been designed to meet the USEPA's Health Advisory of 70 ng/L for the sum of PFOS and PFOA. At a minimum, any such treatment system or device should be certified to meet the National Sanitation Foundation (NSF) standard P473 to remove PFOS and PFOA compounds so that the sum of their concentrations is below the USEPA Health Advisory of 70 ng/L. **Please be aware that 70 ng/L is significantly greater than the MassDEP's drinking water standard of 20 ng/L for the PFAS6 compounds.** Many of these treatment systems and devices certified to meet NSF standard P473 will likely be able to reduce PFAS6 levels below 70 ng/L, but there are no federal or state processes to confirm this possibility.
- A PWS offering incentives for homeowner PFAS treatment systems or devices must inform the homeowners of the above information and whether or not the PWS has evaluated the efficacy of specific devices to remove and maintain PFAS6 below the MassDEP MCL. The PWS should also inform all consumers who chooses to install a treatment device, that they should check to see if the manufacturer has independently verifiable monitoring results demonstrating that the device can reduce PFAS6 below 20 ng/L. See more detailed information on treatment systems in the Private Well Factsheet.
- MassDEP is aware that some homeowners will decide to install a home treatment unit despite the current lack of certification by a national organization to treat water to levels below the MassDEP PFAS6 MCL. Therefore, if a PWS mentions home treatment as an option to reduce PFAS6 levels in a PFAS public notices or educational information the PWS should also inform all consumers who choose to install a home treatment system or device, that they should check to see if the manufacturer has independently verifiable monitoring results demonstrating that the device can reduce PFAS6 below 20 ng/L. For more detailed information on home treatment systems see https://www.mass.gov/service-details/home-water-treatment-devices-point-of-entry-and-point-of-use-drinking-water and Private Well Factsheet.

A PWS delivering water with PFAS6 concentrations over 20 ng/L (as measured at any entry point to the system) must obtain MassDEP Drinking Water Program approval before offering any assistance, such as rebates, for home treatment systems or devices to remove PFAS6.

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Section 4: PFAS and Data Usability

1. ***PFAS data variability can be 30 %, which seems like a lot, how can MassDEP accept that range?***

There is always some variability in drinking water testing results from one certified laboratory to another. This is true whether labs are analyzing drinking water for PFAS or for any other contaminant. Testing results will vary within a lab as well as across labs. In accordance with 310 CMR 42.00 each laboratory is certified to ensure that their results meet the accepted laboratory standards set by the MassDEP Laboratory Certification Program. The same is true if a lab has been reviewed by another certification authority. Labs must pass Quality Assurance/Quality Control criteria in order to receive certification and pass periodic performance tests and audits to retain certification. The certification is subject to revocation if MassDEP finds problems. Also, a PWS can report a lab to MassDEP for review if they experience problems. In addition, MassDEP has temporarily contracted UMass Amherst to do the Quality Control review of all the PFAS lab reports we receive from PWS. As in all analytical monitoring programs, confidence in the PFAS testing results being reported by labs and the best indication of the levels of PFAS6 in the water, will increase after looking at numerous testing results over time.

Some PWS have chosen to split samples and sent them to different labs for PFAS testing. If the PWS reports several sampling results taken from the same location within the same monitoring period, whether they are analyzed by the same lab or different labs, and the results meet quality control requirements, in accordance with 310 CMR 22.07G(10)(b)(1) MassDEP averages them for compliance purposes.

If a PWS wishes to take a split sample and send it to two different labs, the PWS must follow proper PFAS collection techniques, including sending Field Reagent Blanks to both labs. The PWS should contact their regional drinking water program contact or the Drinking Water Program at program.director-dwp@mass.gov prior to initiating split samples for PFAS to ensure that correct split sampling procedures are followed.

2. ***Does the lab calculate PFAS6 total and submit via eDEP or is that up to PWS?***

Labs will calculate the PFAS6 value and submit it, along with the individual PFAS data, to MassDEP using eDEP.

3. ***Is there a mechanism that a user could see if their utility has tested for PFAS as well as get the results?***

Yes, data that are quality control approved by MassDEP and data entered are available through the EEA data portal. The data quality control review process may take two weeks. Currently data is being manually data entered, which may also take about two weeks. Once eDEP is up and running, data quality control will still take up to two weeks, but once that process has been completed and the results approved, results should be available on the EEA data portal in about 24 hours. Drinking water data is searchable at: https://eeaonline.eea.state.ma.us/Portal/#!/search/drinking-water.

4. ***Will EEA show all results or only results after they are averaged with confirmatory samples?***

The EEA data portal displays all of the PFAS analysis results submitted and accepted; the data portal does not average confirmatory samples.

Section 5: Miscellaneous

1. ***Can public water supplies be contaminated by per- and polyfluoroalkyl substances (PFAS) washing off solar panels and solar sheets installed at public water systems?***

PFAS may be generated as a waste during the manufacture of the panels. We have not identified any water sampling results that have detected PFAS coming off solar panels or that PFAS is present on panels.

MassDEP's solar guidance, policy, model certification, template approval letter and SOP for staff state that PWS shall use

Section 3: Public Notification, Public Education, and Consumer Confidence Reports

1. ***If a COM PWS provided PN and PE before the regulations were promulgated, is it still required to mail the education and notification?***

Yes, under the regulations at 310 CMR 22.07G(7)(e) a PWS must deliver Public Education materials after a confirmed detection of PFAS6 > 20 ng/L as soon as practical and within 30 days of receipt of those confirmed results. The PWS must continue to provide those materials quarterly until the water being delivered is below the PFAS6 MCL or the contaminated source(s) is taken off-line. Public notice must be provided when the MCL is violated and repeated quarterly as long as the violation persists (as long as the quarterly average exceeds the PFAS6 MCL). MassDEP has template documents available, including a template for a combined Public Education materials and Public Notice. The delivery requirements for Public Education materials are in the regulations at 310 CMR 22.07G(7)(e) and delivery requirements for Public Notice are found at 310 CMR 22.16.

2. ***Where is the public education information on the DEP website?***

The templates are being finalized with revisions based on the first rounds of public education materials sent by PWSs. While the templates are being finalized, PWSs will be provided with the templates as needed by the regional MassDEP office.

3. ***Do raw water results for PFAS need to be reported in the Consumer Confidence Report?***

The requirements for the Consumer Confidence Report include any PFAS detected in finished water, and health effects language must be included if the MCL is exceeded. A PWS may choose to report raw water results for PFAS in the Consumer Confidence Report to provide information to consumers. Reporting raw water results for PFAS in the Consumer Confidence Report is not a MassDEP requirement.

4. ***What happens if a PWS has detected PFAS6 over 20 ppt in its only water supply and cannot meet any of the short-term solutions?***

PWS should review the resource information below, consider what they should do and in accordance with 310 CMR 22.04 (13) update their emergency response plan with a plan of action for when/if they detect PFAS over the MCL. PWS may have opportunities for interconnections to purchase water that is below the MCL. PWS may also consider providing bottled water that has been tested for PFAS for their consumers in sensitive sub-groups. Public education materials and the Public Notification requirements can help to inform the consumers about their drinking water and options for reducing their exposures, such as using bottled water that has been tested for PFAS for drinking and cooking of foods that absorb water (like pasta).

5. ***Can a PWS limit the distribution of PFAS Public Education materials if the affected source(s) provide water to a portion of the distribution system?***

The PFAS regulations require that Public Education (PE) materials "be provided to all persons served by the affected Public Water System" (310 CMR 22.07G(7)(e)2.). However, if the PWS can document to MassDEP's satisfaction based, for example, on a hydraulic model or due to physical isolation, that elevated levels of PFAS were only delivered to a distinct portion of the distribution system, then MassDEP may limit the PE mailing to consumers within the affected portion of the distribution system and may approve the use of alternative delivery methods (as per 310 CMR 22.07G(7)(e)5.) for consumers outside the affected portion of the distribution system. These alternative delivery methods may include a combination of: telephonic messages (e.g. Reverse 911), web and social media posts, print and broadcast media announcements, physical postings, electronic sign boards, hand delivery and/or other methods approved by MassDEP.

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no longer required unless required by MassDEP due to results outside the historic range. A PWS may choose to confirm the first results over 20 ng/L during monthly monitoring.

3. ***If confirmation samples are required, when does the 14 day deadline start?***

The confirmation samples must be collected within 14 days of the receipt of the analytical results from the lab or notification from MassDEP. The deadline for collecting confirmation samples can be extended if the PWS applies for and receives up to 14 additional days from MassDEP as allowed under the regulations.

4. ***What are the regulations when a raw water source is above the MCL but the finished water is below?***

The PFAS6 MCL applies to finished water. If there is existing treatment or blending that is allowing a source that is high in PFAS6 to deliver finished drinking water that is below the MCL, MassDEP may require increased monitoring at the source, the finished water entry point, or both.

5. ***Are MWRA communities required to test at each entry point even though MWRA tests for PFAS at the source?***

If the PWS is a fully consecutive system that purchases all of its water from the Massachusetts Water Resources Authority (MWRA) or another PWS, then that PWS is *not required* to sample for PFAS as long as the PWS that they purchase the water from has completed the required sampled for PFAS.

6. ***Will the PWS be specifically notified of what resampling is needed through eDEP?***

The eDEP system is for submitting monitoring results, it does not notify a PWS what resampling is needed. Any correspondence related to required actions will come from the local MassDEP regional office. The regional PFAS coordinators follow up with PWS about any sampling issues. (see below for regional coordinator contact information).

7. ***If we are contracted by a town to operate their PWS, are we still eligible for PWS PFAS analysis and PFAS design grants, or does the town have to apply for the grants?***

Grants and financing are dictated by the legislation and program requirements for that specific opportunity.
Free PWS analysis: Contract operators are welcome to apply on behalf of the PWS that authorized them to apply for the free PWS PFAS analyses program.
PFAS design grants: As of Jan 27th 2021, the PFAS design grants for municipal systems have provided $2M of funding, with an additional $3M in funding anticipated in 2021. The deadline for the second round of grant applications was Dec 31, 2020; they were available to municipal and non-municipal community and non-transient non-community PWSs.

8. ***Can labs sub out the PFAS work?***

Subcontracting may be allowed in certain circumstances to fulfill the requirement of reporting through eDEP. However, generally, labs that are not certified with MassDEP cannot subcontract to labs that are certified by MassDEP. We understand that PWS have ongoing relationships with labs that may not be certified for PFAS analysis.

9. ***How much will each test cost the PWS?***

Laboratories set their prices for PFAS analysis based on a variety of factors. The prices that PWS have reported range from approximately $200 per drinking water sample to $400 per sample for analysis using USEPA Method 537.1. We encourage PWS to apply for MassDEP's free PFAS analysis program if they have not yet received a round of PFAS sampling through the program.

(1) Even Dated 3/11/21 This is no longer contaminant level accepted. FACT

MassDEP

MassDEP Fact Sheet

On June 15, 2022 EPA advisory of .004 PFOA .002 PFOS ppt are MASS Drinking Water Standard "non enforceable" but tech. info to state agencies"

Q&A for PWS on Per- and Polyfluoroalkyl Substances (PFAS) Regulations

Introduction

This fact sheet includes general questions and answers about PFAS Drinking Water Standard Implementation for Public Water Suppliers from Training Sessions ***"Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water and the new Massachusetts Drinking Water Regulations"***.

PFAS Drinking Water Regulations implementation questions are continuing to be received so this Q&A will be updated periodically.

see pages 4-5 (Section 5 Misc) about DEP policy NOT to use solar panels on sheets containing PFAS

Section 1: Standard or Maximum Contaminant Level (MCL)

1. ***When is the PFAS6 standard exceeded?***

A sampling location exceeds the MCL if the average of 3 months of PFAS6 concentrations is greater than 20 ng/L within the same quarter (for instance, Quarter 2 includes April, May and June) or any one sample would cause the quarterly average to exceed 20 ng/L. For example, if a first month sample has PFAS6 levels confirmed at greater than 60 ng/L, that would cause the quarterly average concentration to exceed the 20 ng/L MCL.

The new EPA regs are "3,000 – 17,000 X more stringent than 2016

2. ***Why has Massachusetts set a MCL for 6 PFAS at 20 ppt while all other states (except VT) are setting higher thresholds and the EPA has a standard of 70ppt?***

The USEPA Health Advisory is an advisory, there is not yet a federal maximum contaminant level (MCL) standard. When there is no federal MCL each state develops its own standards and procedures. The MassDEP Office of Research and Standards has determined through an in-depth review of recent scientific peer-reviewed research and in consultation with their Health Effects Advisory Committee that 20 ppt for PFAS6 was the appropriate level to protect consumers in sensitive subgroups such as pregnant or nursing women, infants, and people with compromised immune systems.

Section 2: Monitoring and Sampling

1. ***When a PWS has multiple sources that combine in one source before treatment and there is only one entry point to distribution, is only one sample required?***

Yes, a PWS that draws water from more than one source, with sources combined before distribution, must collect samples that are representative of all combined sources after treatment. The entry point to the distribution system is the sample location. If all sources are not operated simultaneously under normal operating conditions, then additional samples shall be collected representing each source when operated.

2. ***Are confirmation samples required every time a sample is above the MRL, or just on the initial hit for that site?***

A confirmation sample is required after the initial detection of any PFAS compound above the MRL in finished water. Confirmation samples are also required when PFAS6 is detected > 10 ng/L for the first time during initial or routine PFAS monitoring. If a location is on an increased monitoring schedule due to concentrations > 10 ng/L, confirmation samples are

04-29-22 see update limits EPA p. 5

MassDEP Fact Sheet

Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water: Questions and Answers for Consumers

1. What are PFAS and how are people exposed to them?

Per- and Polyfluoroalkyl Substances are a group of chemical compounds called PFAS. Two PFAS chemicals, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), were extensively produced and are the most studied and regulated of these chemicals. Several other PFAS that are similar to PFOS and PFOA exist. These PFAS are contained in some firefighting foams used to extinguish oil and gas fires. They have also been used in a number of industrial processes and to make carpets, clothing, fabrics for furniture, paper packaging for food and other materials (e.g., cookware) that are resistant to water, grease and stains. Because these chemicals have been used in many consumer products, most people have been exposed to them.

While consumer products and food are the largest source of exposure to these chemicals for most people, drinking water can be an additional source of exposure in communities where these chemicals have contaminated water supplies. Such contamination is typically localized and associated with a specific facility, for example, an airfield at which they were used for firefighting or a facility where these chemicals were produced or used.

2. What is the Massachusetts drinking water standard?

On October 2, 2020, MassDEP published its PFAS public drinking water standard or Massachusetts Maximum Contaminant Level (MMCL) of 20 nanograms per liter (ng/L), or parts per trillion (ppt) applicable to community (COM) and non-transient non-comminuty (NTNC) systems for the sum of the concentrations of six specific PFAS. The six PFAS are: perfluorooctane sulfonic acid (PFOS); perfluorooctanoic acid (PFOA); perfluorohexane sulfonic acid (PFHxS); perfluorononanoic acid (PFNA); perfluoroheptanoic acid (PFHpA); and perfluorodecanoic acid (PFDA). MassDEP abbreviates this set of six PFAS as "PFAS6." This drinking water standard is set to be protective against adverse health effects for all people consuming the water. For information on the PFAS6 drinking water standard see: 310 CMR 22.00: The Massachusetts Drinking Water Regulations. For more information about the technical details behind the MMCL, see MassDEP's technical support document at: Per- and Polyfluoroalkyl Substances (PFAS): An Updated Subgroup Approach to Groundwater and Drinking Water Values.

3. What health effects are associated with exposure to PFAS6?

The MassDEP drinking water standard is based on studies of the six PFAS substances in laboratory animals and studies of exposed people. Overall, these studies indicate that exposure to sufficiently elevated levels of the six PFAS compounds may cause developmental effects in fetuses during pregnancy and in breastfed infants. Effects on the thyroid, the liver, kidneys, hormone levels and the immune system have also been reported. Some studies suggest a cancer risk may exist following long-term exposures to elevated levels of some of these compounds.

It is important to note that consuming water with PFAS6 above the drinking water standard does not mean that adverse effects will occur. The degree of risk depends on the level of the chemicals and the duration of exposure. The drinking water standard assumes that individuals drink only contaminated water, which typically overestimates exposure, and that they are also exposed to PFAS6 from sources beyond drinking water, such as food. To enhance safety, several uncertainty factors are additionally applied to account for differences between test animals and humans, and to account for differences between people. Scientists are still working to study and better understand the health risks posed by exposures to PFAS. If your water has been found to have PFAS6 and you have specific health concerns, you may wish to consult with your doctor.

4. How can I find out about contaminants in my drinking water?

If you get your water from a public water system, you should contact them for this information. For a contact list for all public water systems in the Commonwealth you may visit: https://www.mass.gov/lists/drinking-water-health-safety#contacts then under "Contacts" click on "MA Public Water Supplier contacts sorted By Town."

For private well owners see the Per- and Polyfluoroalkyl Substances (PFAS) in Private Well Drinking Water Supplies FAQ for more information.

5. What options should be considered when PFAS6 in drinking water is above MassDEP's drinking water standard?

- ✓ Sensitive subgroups, including pregnant or nursing women, infants and people diagnosed by their health care provider to have a compromised immune system, should consider using bottled water that has been tested for PFAS6, for their drinking water, cooking of foods that absorb water (like pasta) and to make infant formula. Bottled water that has been tested for PFAS6, or formula that does not require adding water, are alternatives.
- ✓ For older children and adults, the MMCL is applicable to a lifetime of consuming the water. For these groups, shorter duration exposures present less risk. However, if you are concerned about your exposure while steps are taken to assess and lower the PFAS6 concentration in your drinking water, use of bottled water that has been tested for PFAS6 will reduce your exposure.
- ✓ Water contaminated with PFAS6 can be treated by some home water treatment systems that are certified to remove PFAS6 by an independent testing group such as NSF, UL, or Water Quality Association. These may include point of entry (POE) systems, which treat all the water entering a home, or point of use (POU) devices, which treat water where it is used, such as at a faucet.
- ✓ In most situations the water can be safely used for washing and rinsing foods and washing dishes.
- ✓ For washing items that might go directly into your mouth, like dentures and pacifiers, only a small amount of water might be swallowed and the risk of experiencing adverse health effects is very low. You can minimize any risk by not using water with PFAS6 greater than the MMCL to wash such items.
- ✓ The water can be safely used by adults and older children for brushing teeth. However, use of bottled water should be considered for young children as they may swallow more water than adults when they brush their teeth. If you are concerned about your exposure, even though the risk is very low, you could use bottled water for these activities.
- ✓ Because PFAS are not well absorbed through the skin, routine showering or bathing are not a

significant concern unless PFAS6 levels are very high. Shorter showers or baths, especially for children who may swallow water while playing in the bath, or for people with severe skin conditions (e.g. significant rashes) would limit any exposure from the water.

- ✓ For pets or companion animals, the health effects and levels of concern to mammalian species, like dogs, cats and farm animals, are likely to be similar to those for people. However, because these animals are different sizes, have different lifespans, and drink different amounts of water than people it's not possible to predict what health effects an animal may experience from drinking water long-term with PFAS6 concentrations greater than the MMCL. There is some evidence that birds may be more sensitive to PFAS6. There is little data on PFAS6 effects on other species like turtles, lizards, snakes and fish. As a precaution, if you have elevated levels of PFAS6 in your water, you may wish to consider using alternative water for your pets. If you have concerns, you may also want to consult with your veterinarian.
- ✓ For gardening or farming, certain plants may take up some PFAS6 from irrigation water and soil. Unfortunately, there is not enough scientific data to predict how much will end up in a specific crop. Since people eat a variety of foods, the risk from the occasional consumption of produce grown in soil or irrigated with water contaminated with PFAS6 is likely to be low. Families who grow a large fraction of their produce would experience higher potential exposures and should consider the following steps, which should help reduce PFAS6 exposures from gardening:
    - Maximize use of rainwater or water from another safe source for your garden.
    - Wash your produce in clean water after you harvest it.
    - Enhance your soil with clean compost rich in organic matter, which has been reported to reduce PFAS uptake into plants.
    - Use raised beds with clean soil.

- **NOTE ON BOILING WATER:** Boiling water will not destroy these chemicals and will increase their levels somewhat due to water evaporation.
- **NOTE ON BOTTLED WATER:** Bottled water should only be used if it has been tested. The Massachusetts Department of Public Health requires companies licensed to sell or distribute bottled water or carbonated non-alcoholic beverages to test for PFAS. See https://www.mass.gov/info-details/water-quality-standards-for-bottled-water-in-massachusetts#list-of-bottlers-
- **NOTE ON POU and POE TREATMENT DEVICES:** Point of Use (POU) and Point of Entry (POE) treatment devices are not specifically designed to meet Massachusetts' drinking water standard for PFAS6, there are systems that have been designed to meet the USEPA's Health Advisory of 70 ng/L for the sum of PFOS and PFOA. Any treatment device you use should be certified to meet the National Sanitation Foundation (NSF) standard P473 to remove PFOS and PFOA compounds so that the sum of their concentrations is below the USEPA Health Advisory of 70 ng/L. **Please be aware that 70 ng/L is significantly greater than the MassDEP's drinking water standard of 20 ppt for the PFAS6 compounds.** Many of these treatment devices certified to meet NSF standard P473 will likely be able to reduce PFAS6 levels to well below 70 ppt, but there are no federal or state testing requirements for these treatment devices. If you chose to install a treatment device, you should check to see if the manufacturer has independently verifiable PFAS6 monitoring results demonstrating that the device can reduce PFAS6 below 20 ppt. See more detailed information on POU/POE treatment systems in the Private Well Factsheet at https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas-in-private-well-drinking-water-supplies-faq.

6. Where can I get more information on PFAS?

MassDEP PFAS Information. https://www.mass.gov/info-details/per-and-polyfluoroalkyl-substances-pfas

Per- and Polyfluoroalkyl Substances (PFAS) in Private Well Drinking Water Supplies FAQ

Massachusetts Department of Public Health PFAS webpage: https://www.mass.gov/service-details/per-and-polyfluoroalkyl-substances-pfas-in-drinking-water

Interstate Technology and Regulatory Council (ITRC) PFAS resources. https://www.itrcweb.org/Team/Public?teamID=78

Association of State Drinking Water Administrators PFAS webpage https://www.asdwa.org/pfas/

EPA's Drinking Water Health Advisories for PFOA and PFOS can be found at: https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos

The Centers for Disease Control and Prevention's Public Health Statement for PFOS and PFOA can be found at: https://www.atsdr.cdc.gov/pfas/index.html

7. Where can I find more information about Treatment Devices for PFAS?

MassDEP information on drinking water treatment devices: https://www.mass.gov/service-details/home-water-treatment-devices-point-of-entry-and-point-of-use-drinking-water

NSF PFAS information: https://www.nsf.org/knowledge-library/perfluorooctanoic-acid-and-perfluorooctanesulfonic-acid-in-drinking-water

USEPA information on PFAS and treatment devices: https://www.epa.gov/sciencematters/reducing-pfas-drinking-water-treatment-technologies

UL information on PFAS and treatment devices: https://www.ul.com/offerings/testing-and-certification-water-filtration-products

The Water Quality Association information on PFAS, including treatment: https://www.wqa.org/Portals/0/WQ&A%20sheets/WaterQA%20PFAS.pdf

For further information on PFAS in drinking water, including possible health effects, you may contact the Massachusetts Department Environmental Protection, Drinking Water Program at program.director-dwp@state.ma.us or 617-292-5770.

Studies indicate that exposure to sufficiently elevated levels of certain PFAS may cause a variety of health effects including developmental effects in fetuses and infants, effects on the thyroid, liver, kidneys, certain hormones and the immune system. Some studies suggest a cancer risk may also exist in people exposed to higher levels of some PFAS. Scientists and regulators are still working to study and better understand the health risks posed by exposures to PFAS, and MassDEP is following developments in this burgeoning area closely.

Interagency Task Force and AG Lawsuit

In 2020, the Massachusetts legislature appointed the PFAS Interagency Task Force to investigate water and ground contamination of per- and polyfluoroalkyl substances across the Commonwealth. The Commissioner of MassDEP was named to serve as one of the Task Force's 19 members. The Task Force held nine public hearings throughout 2021 and heard testimony from a wide range of stakeholders, including researchers, advocacy groups, community members, municipal officials, state agencies, public water systems, industry groups, and legislators.

In April 2022, the members of the Task Force adopted their final report, per their statutory charge: Learn more about the **PFAS Interagency Task Force** (https://malegislature.gov/Commissions/Detail/556/Hearings) and see the **Final PFAS Interagency Task Force Report** (https://malegislature.gov/Commissions/Detail/556/Documents)

On May 25, 2022, Attorney General Maura Healey sued 13 manufacturers of PFAS "forever chemicals" used in firefighting foam for causing millions of dollars in damages to communities across Massachusetts by knowingly contaminating drinking water sources, groundwater, and other natural resources with highly toxic PFAS chemicals that pose a serious threat to public health and the environment.

See more information about the lawsuit: **AG Healey Sues Manufacturers of Toxic 'Forever' Chemicals** (/news/ag-healey-sues-manufacturers-of-toxic-forever-chemicals-for-contaminating-massachusetts-drinking-water-and-damaging-natural-resources)

Drinking Water Standards and Health Information

Massachusetts PFAS Standard for Public Drinking Water Supplies

On October 2, 2020, MassDEP published its PFAS public drinking water standard or Massachusetts Maximum Contaminant Level (MMCL) of 20 nanograms per liter (ng/L), or parts per trillion (ppt) applicable to community (COM) and non-transient non-community (NTNC) systems for the sum of the concentrations of six specific PFAS. The six PFAS are: perfluorooctane sulfonic acid (PFOS); perfluorooctanoic acid (PFOA); perfluorohexane sulfonic acid (PFHxS); perfluorononanoic acid (PFNA); perfluoroheptanoic acid (PFHpA); and perfluorodecanoic acid (PFDA). MassDEP abbreviates this set of six PFAS as "PFAS6." This drinking water standard is set to be protective against adverse health effects for all people consuming the water.

EPA Health Advisories for PFAS

On June 15, 2022, EPA released four drinking water health advisories for PFAS contaminants. These health advisories are:

- Interim updated Health Advisory for PFOA = 0.004 nanograms per liter (ng/L), or parts per trillion (ppt)
- Interim updated Health Advisory for PFOS = 0.02 ng/L
- Final Health Advisory for GenX chemicals = 10 ng/L
- Final Health Advisory for PFBS = 2,000 ng/L

Drinking water health advisories provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water. EPA's health advisories are non-enforceable and non-regulatory and provide technical information to states agencies and other public health officials on health effects, analytical methods, and treatment technologies associated with drinking water contamination. EPA's lifetime health advisories identify levels to protect all people, including sensitive populations and life stages, from adverse health effects resulting from exposure throughout their lives to these PFAS in drinking water.

At this time, MassDEP is working to review the new EPA Interim Health Advisories and will determine next steps based upon that review.

For more information about EPA Health Advisories for PFAS see **Drinking Water Health Advisories for PFAS Fact Sheet for Communities** (https://www.epa.gov/system/files/documents/2022-06/drinking-water-ha-pfas-factsheet-communities.pdf) and **Questions and Answers: Drinking Water Health Advisories for PFOA, PFOS, GenX, PFBS FAQs** (https://www.epa.gov/sdwa/questions-and-answers-drinking-water-health-advisories-pfoa-pfos-genx-chemicals-and-pfbs).

Massachusetts is home to some of strictest PFAS standards in the country, strengthened by the Baker-Polito Administration promulgation and implementation of nation-leading rules for drinking water systems and cleanups of contaminated sites, and investment of substantial funding to assist communities as they address PFAS contamination in drinking water systems.

Additional information on the MassDEP public drinking water standard:

- **310 CMR 22.00: The Massachusetts Drinking Water Regulations** (/regulations/310-CMR-22-the-massachusetts-drinking-water-regulations)
- **Per- and Polyfluoroalkyl Substances (PFAS) Drinking Water Regulations Quick Reference Guide** (/doc/per-and-polyfluoroalkyl-substances-pfas-drinking-water-regulations-quick-reference-guide/download)
- Technical Support Document: **Per- and Polyfluoroalkyl Substances (PFAS): An Updated Subgroup Approach to Groundwater and Drinking Water Values** (/doc/per-and-polyfluoroalkyl-substances-pfas-an-updated-subgroup-approach-to-groundwater-and/download)

Additional information for consumers:

Per- and Polyfluoroalkyl Substances (PFAS) in Private Well Drinking Water Supplies FAQ

What you need to know about the possibility of PFAS in your well water.

Notices & Alerts

MassDEP reception areas are open to the public 9:00 am to 5:00 pm Monday - Friday. | *Jun. 1, 2022, 12:01 am*

TABLE OF CONTENTS

Introduction

This fact sheet provides answers to questions frequently asked by private well owners about per- and polyfluoroalkyl substances (PFAS) in a private drinking water supply. A separate MassDEP fact sheet, "**MassDEP Fact Sheet - PFAS in Drinking Water: Questions and Answers for Consumers** (/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers/download)", describes the sources of PFAS compounds, health effects, and MassDEP recommendations to reduce consumer exposure.

What are PFAS?

PFAS are a group of man-made chemicals used in a variety of consumer products and industries throughout the world. Two PFAS chemicals, perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), were extensively produced and are the most studied and regulated of these chemicals. Many other PFAS exist. These PFAS are contained in some firefighting foams used to extinguish oil and gas fires. They have also been used in a number of industrial processes, and to make carpets, clothing, fabrics for furniture, paper packaging for food, and other materials (e.g., cookware) that are resistant to water, grease, and stains. Because these chemicals have been used in many consumer products over the past 50 years, most people have been exposed to them.

What are the levels of concern for PFAS chemicals?

Massachusetts Drinking Water Standard

On October 2, 2020, MassDEP published its PFAS public drinking water standard of 20 nanograms per liter (ng/L) (or parts per trillion(ppt)) – individually or for the sum of the concentrations of six specific PFAS: perfluorooctane sulfonic acid (PFOS); perfluorooctanoic acid (PFOA); perfluorohexane sulfonic acid (PFHxS); perfluorononanoic acid (PFNA); perfluoroheptanoic acid (PFHpA), and perfluorodecanoic acid (PFDA). MassDEP abbreviates this set of six PFAS as "PFAS6." This drinking water standard is set to be protective against adverse health effects for all people consuming the water. For information on the PFAS6 drinking water standard see: **310 CMR 22.00: The Massachusetts Drinking Water Regulations** (/regulations/310-CMR-22-the-massachusetts-drinking-water-regulations). See MassDEP's technical support document **Per- and Polyfluoroalkyl Substances (PFAS): An Updated Subgroup Approach to Groundwater and Drinking Water Values** (/doc/per-and-polyfluoroalkyl-substances-pfas-an-updated-subgroup-approach-to-groundwater-and/download).

EPA Health Advisories for PFAS

On June 15, 2022, EPA released four drinking water health advisories for PFAS contaminants. These health advisories are:

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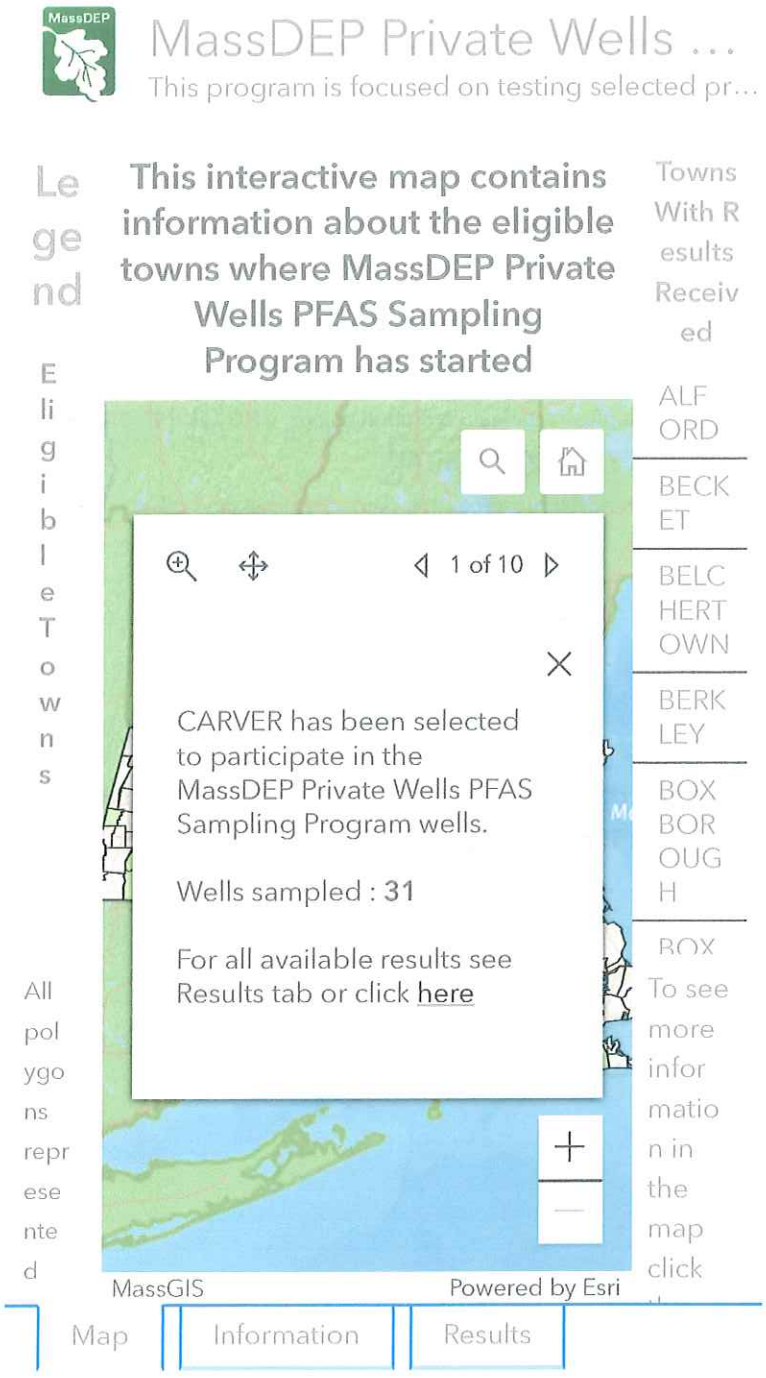
Drinking water health advisories provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water. EPA's health advisories are non-enforceable and non-regulatory and provide technical information to states agencies and other public health officials on health effects, analytical methods, and treatment technologies associated with drinking water contamination. EPA's lifetime health advisories identify levels to protect all people, including sensitive populations and life stages, from adverse health effects resulting from exposure throughout their lives to these PFAS in drinking water.

At this time, MassDEP is working to review the new EPA Interim Health Advisories and will determine next steps based upon that review.

For more information about EPA Health Advisories for PFAS see **Drinking Water Health Advisories for PFAS Fact Sheet for Communities** (https://www.epa.gov/system/files/documents/2022-06/drinking-water-ha-pfas-factsheet-communities.pdf) and **Questions and Answers: Drinking Water Health Advisories for PFOA, PFOS, GenX, PFBS FAQs** (https://www.epa.gov/sdwa/questions-and-answers-drinking-water-health-advisories-pfoa-pfos-genx-chemicals-and-pfbs).

PFAS Testing in Private Wells

MassDEP conducted free PFAS testing for a limited number of private wells, focusing on Massachusetts towns where 60% or more of residents are served by private wells. This Story Map presents the results to date.



How do PFAS get into private well water supplies?

While consumer products and food can be sources of exposure to PFAS, private drinking water can be a significant source of exposure at locations where these chemicals have contaminated water supplies. Such contamination is often localized and associated with a specific facility; for example, an airfield where PFAS were used for firefighting or a facility where these chemicals were produced or used.

Should I test my private well for PFAS?

If your well is located within one to two miles of a known source of PFAS or of other water supplies where PFAS has been detected, you may wish to consider sampling your water source. Sources of PFAS may include airfields where certain firefighting foams were used in the past, firefighting training areas, certain manufacturing facilities, and some waste disposal sites. Your local health department may have information on historical or potential sources of PFAS, or other PFAS impacted water supplies, that may be in proximity to your private well. Because PFAS have been widely used in consumer products, it is possible that some septic systems and landfills may also be a source of PFAS in groundwater.

How can I test my well water for PFAS?

- Currently, there are three U.S. EPA testing methodologies for testing drinking water for PFAS. Laboratories will analyze drinking water for PFAS using either USEPA Method 537, 537.1, or 533. These methods test for multiple PFAS compounds, including the PFAS6 compounds that are part of the current MassDEP Drinking Water Standard. Please note that Method 533 is not yet approved for public water supply testing in Massachusetts.
- Use the **Online Searchable Laboratory Certification Listing** (https://eeaonline.eea.state.ma.us/DEP/Labcert/Labcert.aspx) (Search for Analyte = PFAS and Matrix = Potable (Drinking Water) to find laboratories that have been certified by MassDEP to test for PFAS in drinking water.
- When collecting the sample, to avoid contaminating it we encourage you to carefully follow the **PFAS sample collection procedures** (/doc/field-sampling-guide-for-pfas) or those provided by the laboratory that will be doing the analysis.

Can I use a Point of Use (POU) or a Point of Entry (POE) water treatment device to remove PFAS6?

Point of Use (POU) water treatment devices treat the water at one fixture in a home, such as a kitchen faucet. Point of Entry (POE) water treatment devices treat all of the water for the main water line serving a whole house.

- Yes. You may use a POU or POE treatment device to remove PFAS6. However, before installing any treatment device for drinking water, you should get your water tested, because the type of treatment device you select will depend on the level of specific PFAS in the water. You should also test your water

after the treatment device is installed to verify that it is removing PFAS to levels less than 20 ppt for the sum of PFAS6.

- Ingestion of water with elevated PFAS is the main health concern, rather than other uses such as showering or use of the water for laundry. Therefore, installing a POU treatment device for drinking or food preparation in the kitchen, e.g., under a kitchen sink, may be a good option and location for a treatment device.

Although POU and POE treatment devices are not specifically designed to meet Massachusetts' drinking water standard for PFAS6, there are systems that have been designed to reduce the sum of PFOS and PFOA to below EPA's former Health Advisory of 70 ng/L. Any treatment device you use should be certified to meet the **National Sanitation Foundation (NSF)** (https://www.nsf.org/consumer-resources/articles/pfoa-pfos-drinking-water) standards to remove PFOS and PFOA compounds so that the sum of their concentrations is below 70 ng/L. **Please be aware that 70 ng/L is significantly greater than the MassDEP's drinking water standard of 20 ng/L for the PFAS6 compounds.** Many of these treatment devices certified to meet NSF standards will likely be able to reduce PFAS6 levels to well below 70 ng/L, but there are no federal or state testing requirements for these treatment devices. If you choose to install a treatment device, you should check to see if the manufacturer has independently verifiable PFAS6 monitoring results demonstrating that the device can reduce PFAS below 20 ng/L. In addition, to verify that the device achieves PFAS6 levels less than 20 ng/L you may need to resample your water after the treatment device has been installed.

Additional Resources

EPA Researchers Investigate the Effectiveness of Point-of-use/Point-of-entry Systems to Remove Per- and Polyfluoroalkyl Substances from Drinking Water
(https://www.epa.gov/sciencematters/epa-researchers-investigate-effectiveness-point-usepoint-entry-systems-remove-and)

What types of POU and POE treatment systems are available to treat for PFAS6?

There are several treatment technologies that are capable of removing PFAS from drinking water, including granulated activated carbon (GAC), ion-exchange resin, and reverse-osmosis (RO). It is recommended that you evaluate the pros and cons for each type of treatment device to determine what is best for you.

- **GAC** treatment devices trap the PFAS inside the filter so that the PFAS is not discharged back into the environment. GAC has proven effective in removing PFAS contaminants, particularly the longer chain PFAS.
- **Ion-exchange** treatment devices also trap the PFAS inside the filter and are effective in removing PFAS.
- **Maintaining GAC or ion-exchange treatment devices.** These treatment devices must be maintained by replacing the filters periodically in accordance with the manufacturer's instructions. Some manufacturers will recycle spent filter cartridges. Check the website of the manufacturer for recycling locations and disposal options.

- **RO** treatment devices remove and then discharge the PFAS in a concentrated wastewater stream.
  - Discharge of the RO wastewater stream must comply with local and state requirements and may be costly; as such, cost may be a significant concern in determining which treatment device you choose.
  - Options for discharging a PFAS wastewater stream depend on where the private well is, and include municipal sewer system, an onsite Title 5 septic system, or an installed Underground Injection Control (UIC) dry well.
  - All wastewater disposal options will ultimately result in some treated wastewater reaching the ambient groundwater or surface water. **As such, MassDEP does not recommend RO treatment as your primary treatment option if your wastewater disposal method is to a UIC dry well.**

Can wastewater containing PFAS from RO treatment systems go to a Title 5 septic or UIC dry well?

The discharge of wastewater from an RO treatment system to a Title 5 septic system is prohibited under MassDEP Title 5 regulations (310 CMR 15.000).

For other RO wastewater discharge options the answer depends upon the type of RO treatment system; and the concentration of the PFAS in the water.

- Prior to installing a RO treatment device, you may estimate the concentration of PFAS6 that will be in your RO wastewater and compare it with the PFAS6 drinking water standard:
  - You will need the following information: a) the total amount of PFAS6 chemicals in your untreated water from your laboratory results, and b) the percentage of water entering your RO device that will be discharged as wastewater.
  - If specific PFAS6 removal efficiencies are not available from the manufacturer of the RO device, you should assume that all of the PFAS6 is being concentrated into the wastewater, to avoid underestimating the wastewater concentration.
  - If specification sheets for the RO devices do not provide information on the percent of water entering the device that is discharged as wastewater, you may assume 80%.
  - You may use the following equation for estimating the concentration of PFAS6 in the wastewater from the RO device:
    [concentration of PFAS6 in your well water] X [100% / % of water entering the device that is discharged as wastewater].

    Example: If the concentration of PFAS6 chemicals in your untreated well water equals 10 ppt and 80% of the water entering the RO filter is discharged as wastewater, then the above equation results in:

    10 ppt PFAS6 X [100% / 80%] = 12.5 ppt PFAS6.
  - If your RO device is more efficient than the example above and discharges less than 80% of the water entering it, then the calculation will show a higher concentration of PFAS6 in the wastewater.

- **If PFAS6 concentration in the wastewater stream from the RO device exceeds MassDEP PFAS6 drinking water standard, you may not discharge to a UIC dry well.** Note: If the water entering your RO for treatment has a PFAS6 concentration exceeding the drinking water standard, then the PFAS in your RO wastewater will also exceed the drinking water standard.
- **If PFAS6 concentration in the wastewater stream from the RO device is** less than the drinking water standard and the estimated or tested PFAS concentrations in the wastewater are also below the drinking water standard, then on-site and other options for discharging the wastewater may be considered under the conditions mentioned in the following table.

Municipal Waste Water System Allowed?	UIC/Dry Well Allowed?	Title 5 Septic System Allowed?
Yes, but be advised that discharges other than sanitary waste to municipal sewer systems may require sewer authority approval. Check with your local sewer authority. If you are serviced by a private sewer system, check with your treatment plant operator about discharging RO wastewater.	Yes, but only if the PFAS concentrations in the wastewater also remain below the drinking water standard. In accordance with 310 CMR 27.00, discharge to a dry well may be considered. The discharge to a dry well requires the submittal of a MassDEP Underground Injection Control (UIC) registration application with the exception of properties that are only used for a one unit residence. UIC application information is located at https://www.mass.gov/underground-injection-control-uic (/underground-injection-control-uic) For questions on UIC, contact program.director-dwp@mass.gov (mailto:program.director-dwp@mass.gov): Subject UIC	**No.** In accordance with 310 CMR 15.000, discharge to a Title 5 system is not allowed.

Can I use bottled water if I have concerns about PFAS in my private well water?

If PFAS has been detected in your private well and you are a consumer in one of the groups considered most sensitive to PFAS (pregnant women, nursing mothers, and infants) you can minimize your exposure by using bottled water that has been tested for PFAS for drinking, making infant formula, and cooking of foods that absorb water.

The Massachusetts Department of Public Health (MDPH) Food Protection Program publishes a **list of companies licensed to sell or distribute bottled water or carbonated non-alcoholic beverages in**

Massachusetts (/doc/list-of-bottlers-may-6-2021). The list includes bottling company weblinks to enable searches for products sold in Massachusetts. Licenses are renewed annually, and the MDPH list will be updated quarterly.

The MDPH list includes only bottlers licensed by MDPH after they provided test results which show that their bottled water or beverages comply with drinking water standards for PFAS and other contaminants established by:

- The Massachusetts Department of Environmental Protection,
- The US Environmental Protection Agency, and
- The US Food and Drug Administration.

Information from MDPH regarding bottled water, including contact information, can be found here (/info-details/water-quality-standards-for-bottled-water-in-massachusetts).

Who can I contact for more information on PFAS in drinking water?

Private well owners or users should contact their local board of health or town government for information regarding groundwater quality issues in the area. For any additional PFAS drinking water inquires, contact the MassDEP Drinking Water Program at: Program.director-dwp@mass.gov (mailto:Program.director-dwp@mass.gov), Subject: PFAS.

Where can I get more information on PFAS?

For health-related questions/contact:

Environmental Toxicology Program
Bureau of Environmental Health, MDPH
250 Washington Street
7th Floor
Boston, MA 02108
Phone: 617-624-5757
Fax: 617-624-5777
TTY: 617-624-5286

The Centers for Disease Control and Prevention's webpage on PFAS (https://www.atsdr.cdc.gov/pfas/index.html)

Additional Resources

MassDEP PFAS Information (/info-details/per-and-polyfluoroalkyl-substances-pfas)

MassDEP Fact Sheet - Questions and Answers for Consumers
(https://www.mass.gov/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers)

MassDEP Fact Sheet - Home Water Treatment Devices - Point of Entry and Point of Use Drinking Water Treatment
(https://www.mass.gov/service-details/home-water-treatment-devices-point-of-entry-and-point-of-use-drinking-water)

310 CMR 22: The Massachusetts Drinking Water Regulations
(/regulations/310-CMR-22-the-massachusetts-drinking-water-regulations)

MassDEP PFAS Technical Support Document: Per- and Polyfluoroalkyl Substances (PFAS): An Updated Subgroup Approach to Groundwater and Drinking Water Values
(https://www.mass.gov/doc/per-and-polyfluoroalkyl-substances-pfas-an-updated-subgroup-approach-to-groundwater-and)

Massachusetts Department of Public Health Information about PFAS in Drinking Water
(https://www.mass.gov/service-details/per-and-polyfluoroalkyl-substances-pfas-in-drinking-water)

U.S. EPA: PFAS (https://www.epa.gov/pfas)

U.S. EPA: Drinking Water Health Advisories for PFOA and PFOS
(https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos)

Association of State Drinking Water Administrators: PFAS (https://www.asdwa.org/pfas/)

Contact

MassDEP Drinking Water Program

Phone

Program Director 617-292-5770 (tel:+16172925770)

Online

MassDEP Drinking Water Program

program.director-dwp@mass.gov (mailto:program.director-dwp@mass.gov)

Address

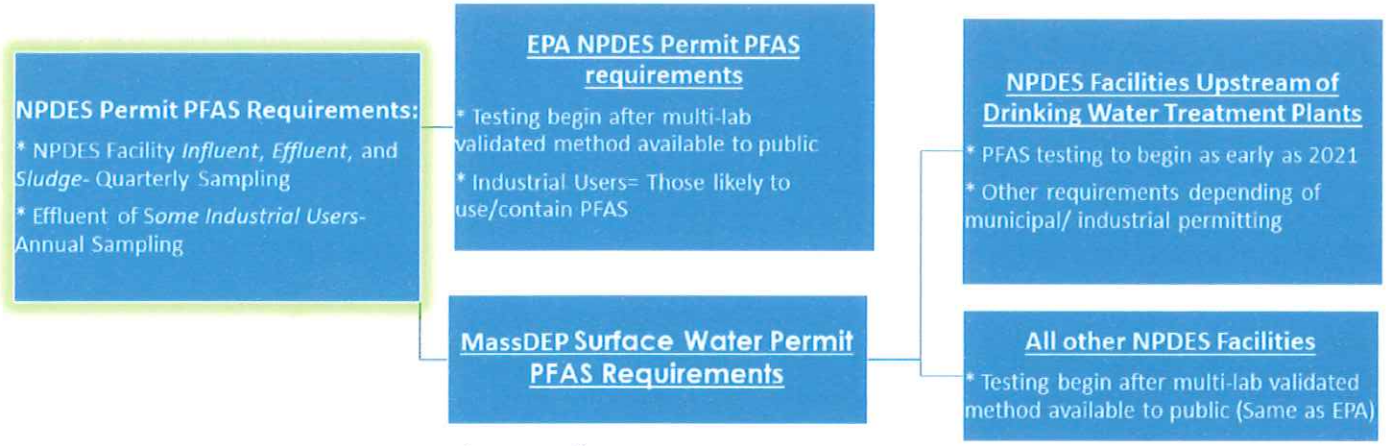
MassDEP Boston
1 Winter Street
Boston, MA 02108

MassDEP is also participating in the following regarding PFAS in wastewater:

Participation in sludge capacity study with NEIWPCC, EPA and other New England states
PFAS Pollution Prevention - Collaborative effort of MassDEP, EEA Office of Technical Assistance (OTA), and EPA.

The Office of Technical Assistance and Technology (/orgs/office-of-technical-assistance-and-technology-ota) is a non-regulatory agency within the Executive Office of Energy and Environmental Affairs. OTA provides free, confidential, onsite technical assistance to Massachusetts manufacturers, businesses, and institutions.

For testing of PFAS in Wastewater, MassDEP is reviewing and approving lab SOPs & performing QA/QC reviews of lab results. Please refer to this page (/info-details/testing-of-pfas-in-wastewater-and-residuals) for more details on approved laboratories and laboratory methods.



PFAS in Massachusetts Rivers

MassDEP jointly funded a U.S. Geological Survey (USGS) water quality study to evaluate the presence of PFAS in Massachusetts' rivers and streams. USGS conducted three rounds of sampling at each of 64 sites in 27 rivers from August to November 2020 and analyzed the samples for 24 individual PFAS. Sampling sites were located upstream or downstream of discharges from 24 wastewater treatment facilities and at 16 other stream sites, including sites downstream of suspected nonpoint and industrial sources and at sites not associated with suspected PFAS sources.

PFAS were detected in all 27 of the rivers sampled. Individual PFAS concentrations ranged from not detected in the laboratory to 109 parts-per-trillion (ppt), and the sum of all 24 PFAS at a sampling location ranged between 0.3 and 399 ppt. The highest concentrations were observed downstream of wastewater effluent discharges, but PFAS were also found in rivers upstream of these discharges. The lowest concentrations were observed in rivers located in less populated areas.

Public drinking water supplies for seven communities withdraw from the rivers included in this study. However, riverine PFAS concentrations do not pose an immediate threat to these water supplies based on the drinking water supply sampling conducted to date. Billerica, Tewksbury, Methuen, Lawrence, Andover, Lowell, and INIMA USA in Brockton have all sampled their supplies, and data from these samples indicate compliance with MassDEP's drinking water standard of 20 ppt for the sum of six PFAS ("PFAS6").

Multiple sources, including wastewater discharges, may contribute to riverine PFAS concentrations. MassDEP will continue to identify future monitoring objectives, potential studies, and other actions to better understand and address the distribution of PFAS in surface waters, relative contributions of different sources, and implications for public health and aquatic life.

Additional Resources

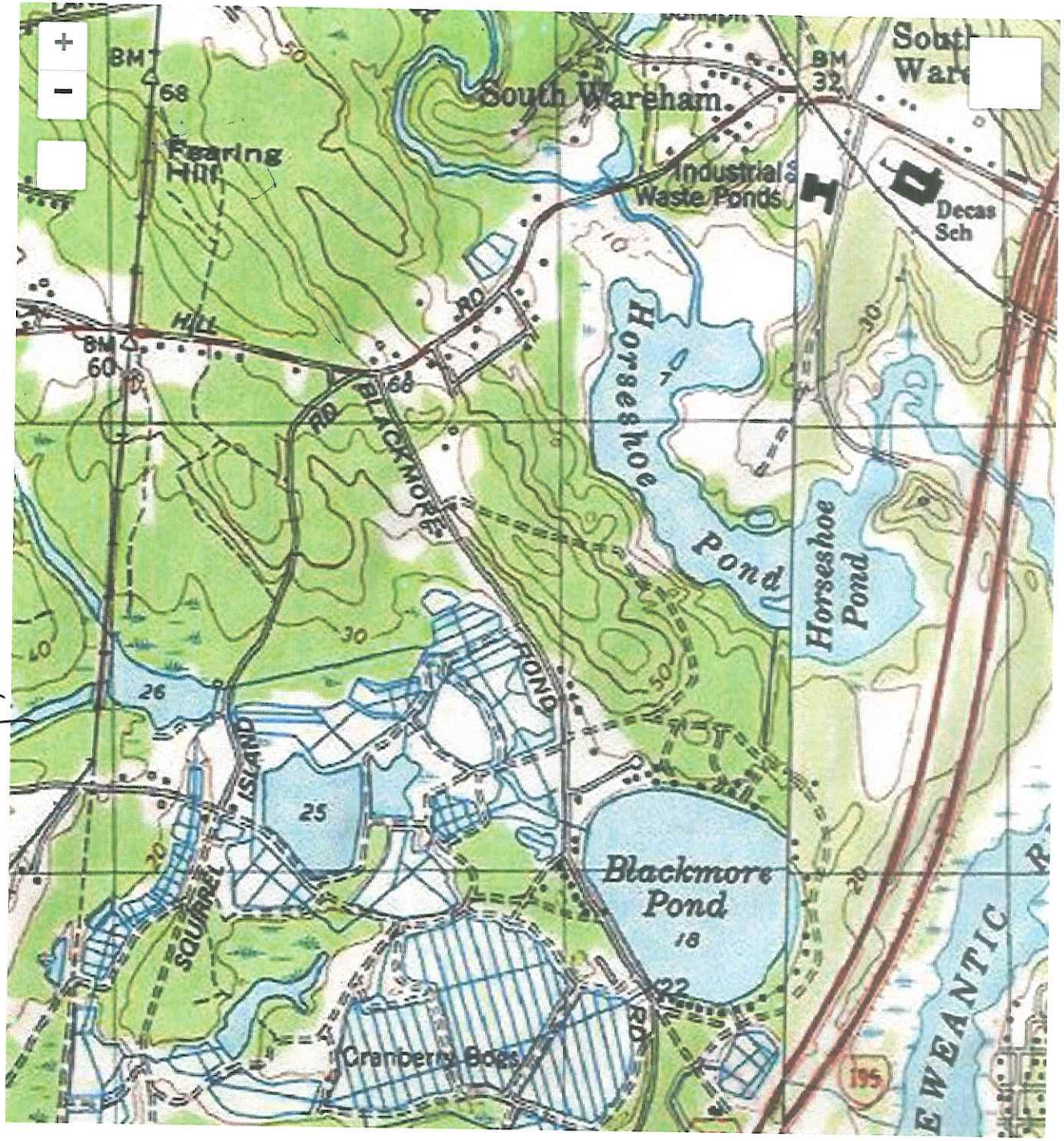
PFAS in Massachusetts Rivers - Study Data
(https://nwis.waterdata.usgs.gov/nwis/qwdata?state_cd=ma&obs_date_range=1&qw_begin_date=08/01/2020&qw_end_date=2020-12-15&multiple_parameter_cds=53961%2C53962%2C54113%2C54116%2C54117

PFAS in Massachusetts Rivers - Presentation (https://www.mass.gov/doc/pfas-in-massachusetts-rivers-presentation/download) (PDF 18.04 MB)

Pesticide products/mosquito control

PFAS contamination was identified in September 2020 through citizen science testing of a pesticide product for mosquito control. The U.S. EPA worked with MassDEP to investigate the source of the contamination. EPA determined that fluorinated high-density polyethylene (HDPE) containers that were used to store and transport a mosquito control pesticide product contained PFAS compounds that were leaching into the product.

Weweantic River Topo Map in Plymouth County Massachusetts

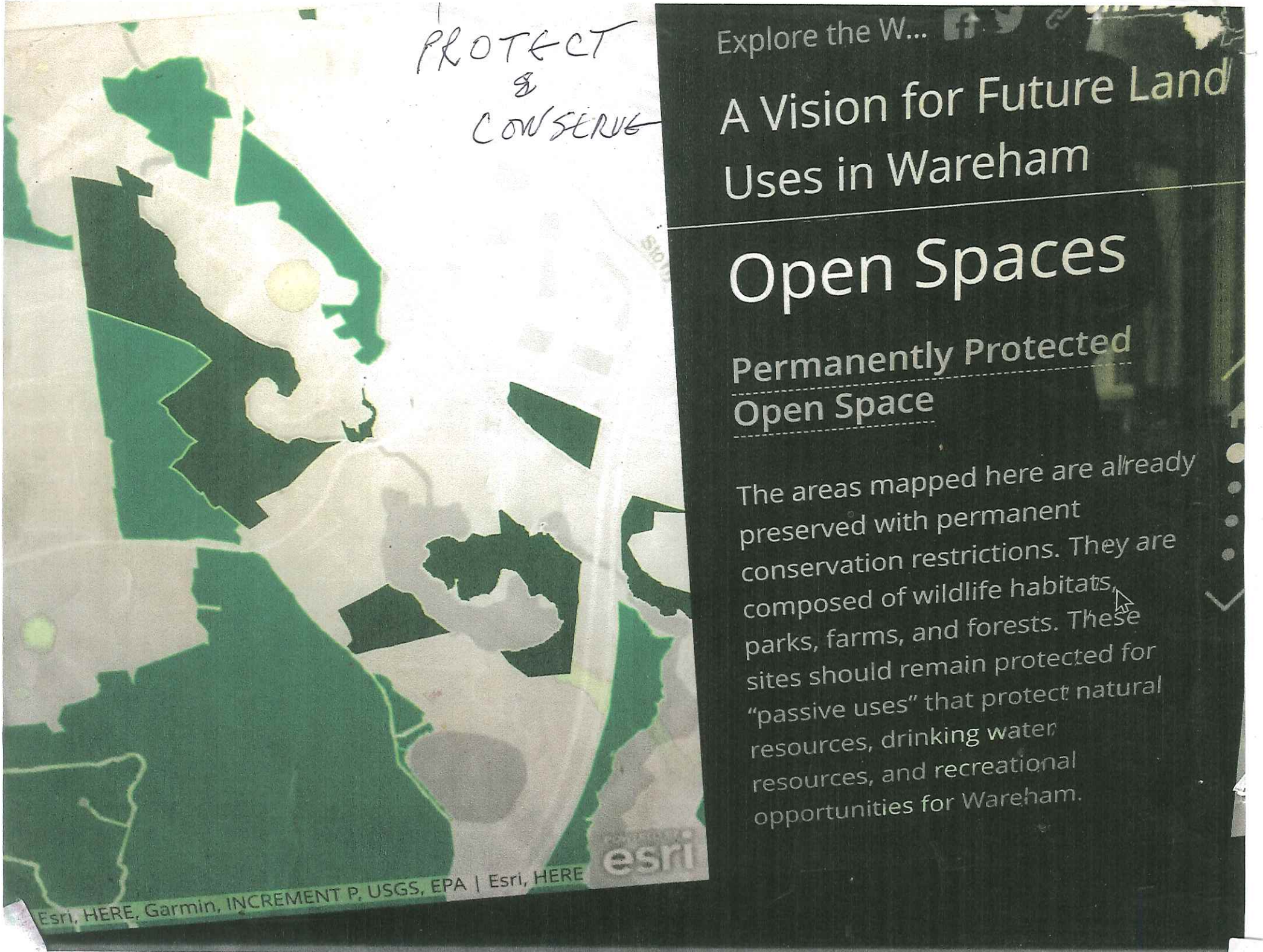


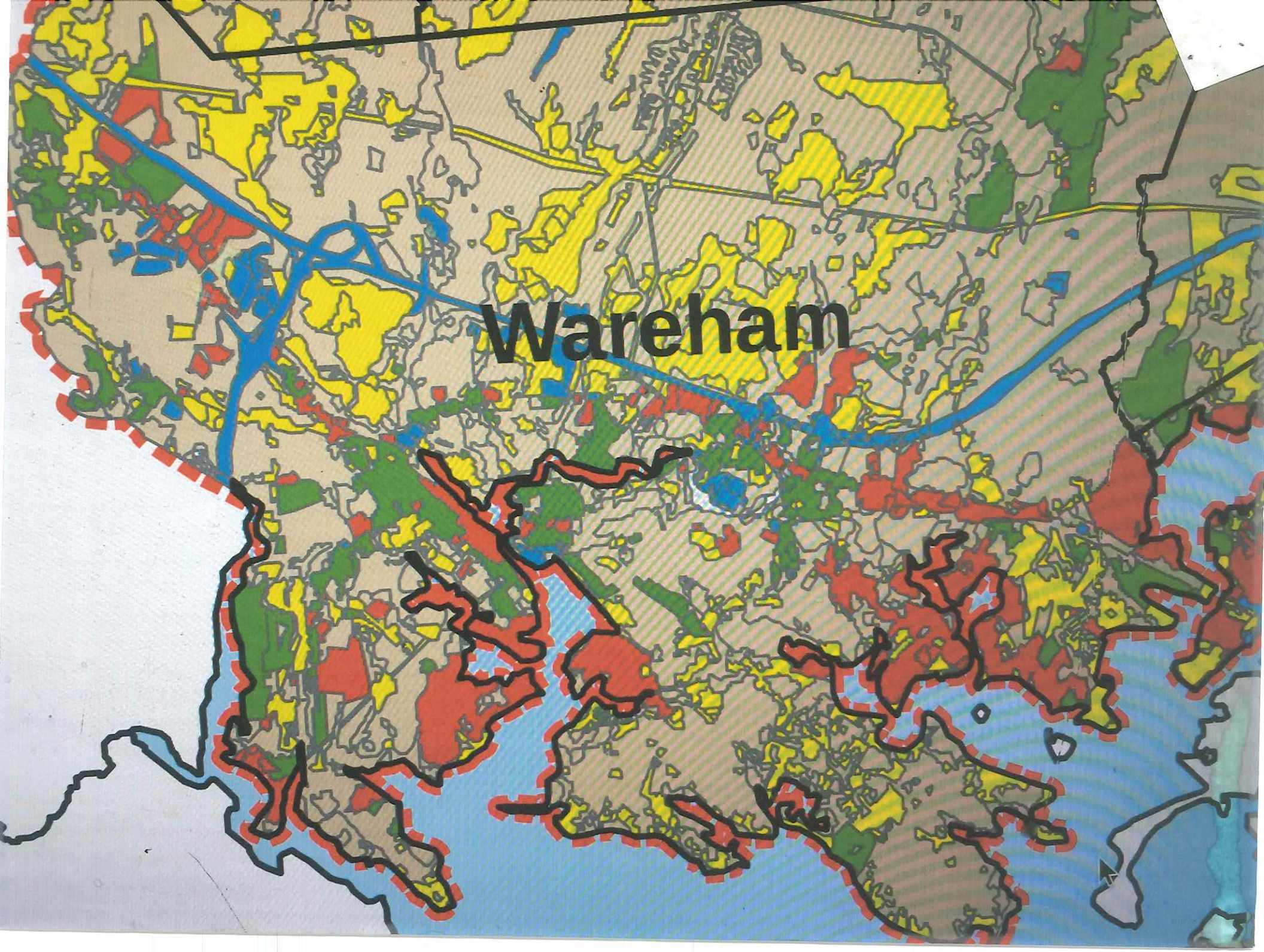
People
Animals
Rivers
Ponds
Wells
Aquifer
Watershed

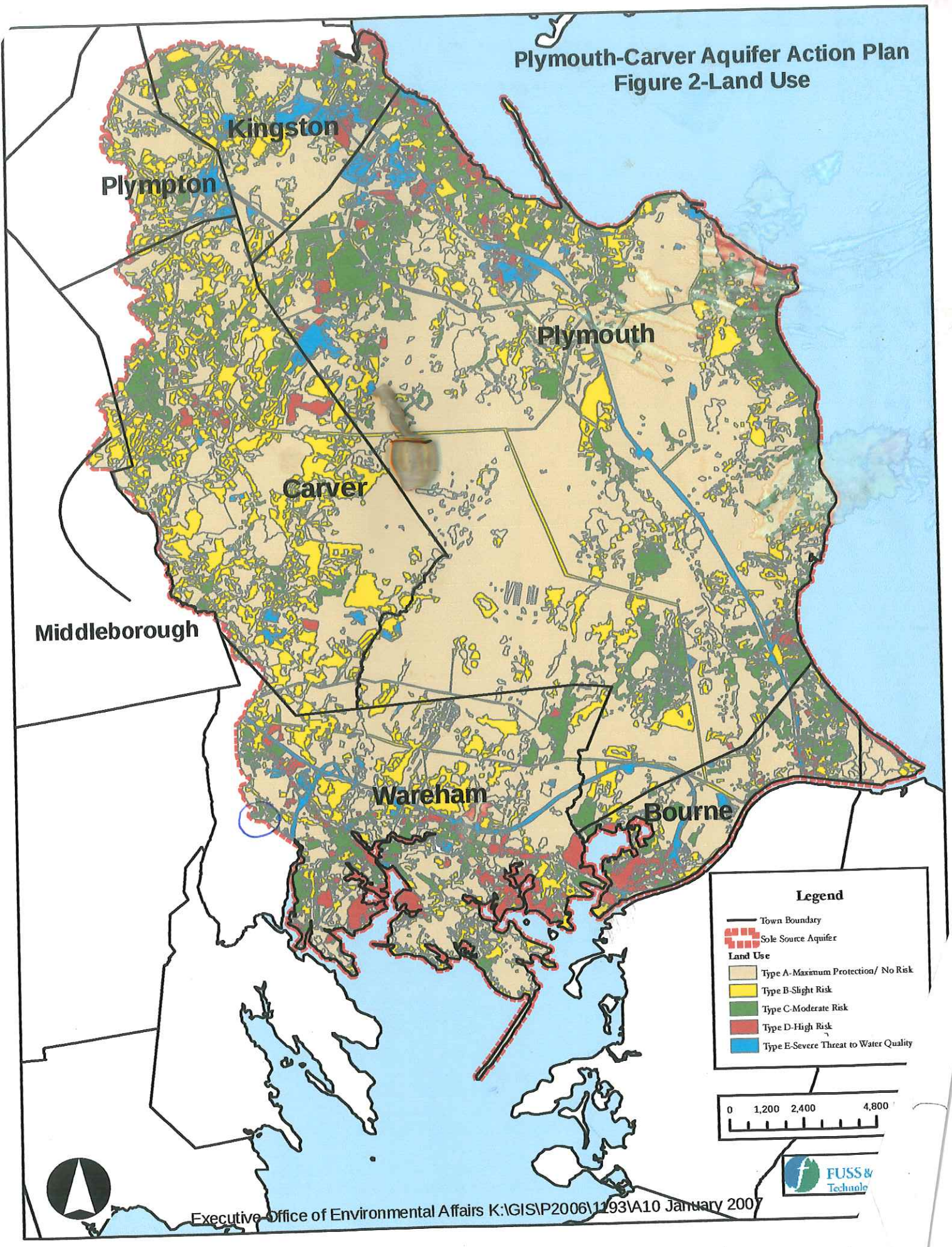
GROUNDWATER

Print this map

Map provided by TopoZone.com


PROTECT
&
CONSERVE
Explore the W...
A Vision for Future Land Uses in Wareham
Open Spaces
Permanently Protected Open Space
The areas mapped here are already preserved with permanent conservation restrictions. They are composed of wildlife habitats, parks, farms, and forests. These sites should remain protected for "passive uses" that protect natural resources, drinking water resources, and recreational opportunities for Wareham.
esri
Esri, HERE, Garmin, INCREMENT P, USGS, EPA | Esri, HERE


Wareham


Plymouth-Carver Aquifer Action Plan
Figure 2-Land Use
Kingston
Plympton
Plymouth
Carver
Middleborough
Wareham
Bourne
Legend
Town Boundary
Sole Source Aquifer
Land Use
Type A-Maximum Protection/ No Risk
Type B-Slight Risk
Type C-Moderate Risk
Type D-High Risk
Type E-Severe Threat to Water Quality
0 1,200 2,400 4,800
FUSS &
Executive Office of Environmental Affairs K:\GIS\P2006\1193\A10 January 2007

2007. Since then deforestation
sand mining to within aquifer area.
JK's plan - then we build houses.
(how close to Aquifer)

Per- and Polyfluoroalkyl Substances and Alternatives in Coatings, Paints and Varnishes (CPVs)

Report on the Commercial Availability and Current Uses

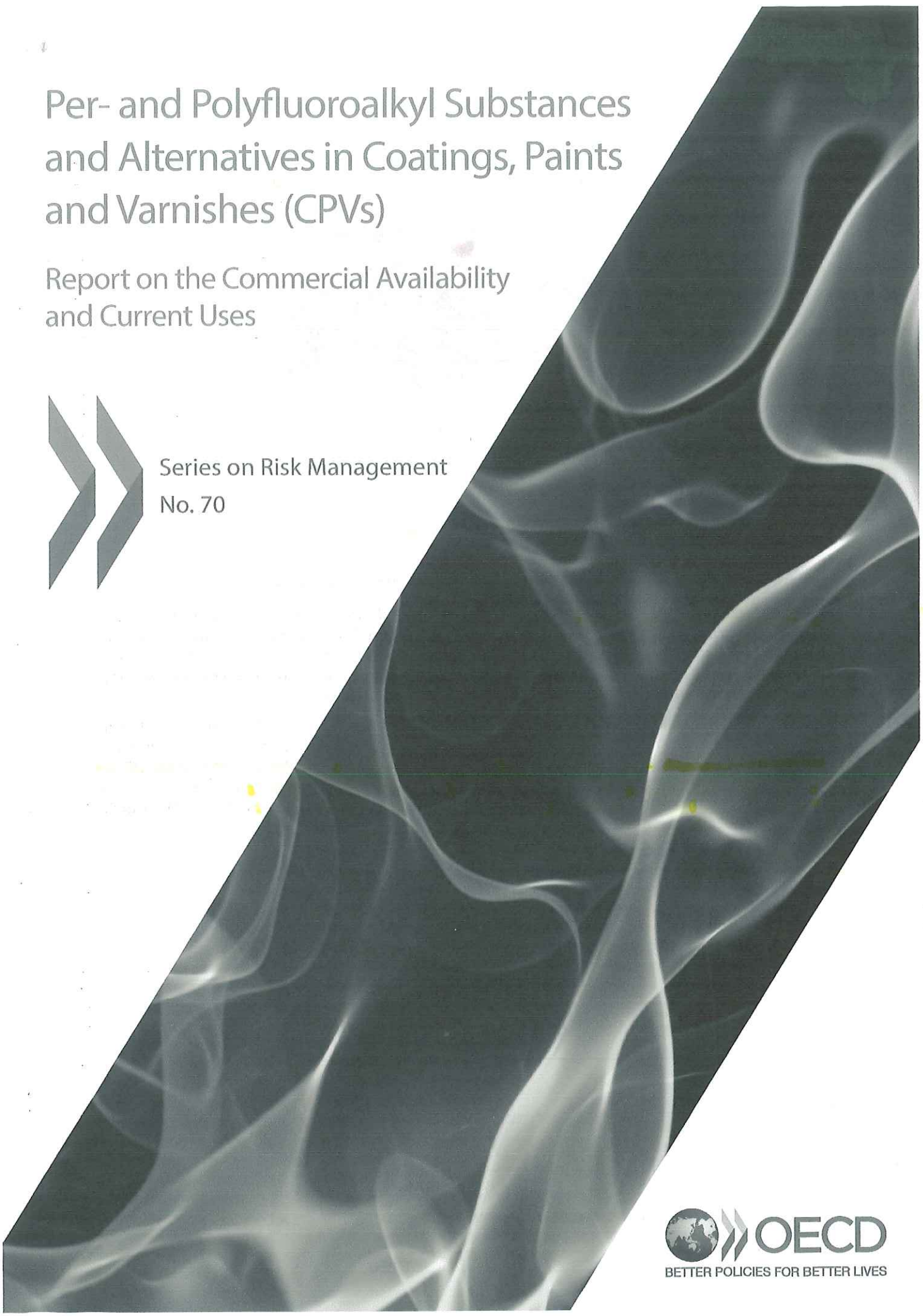


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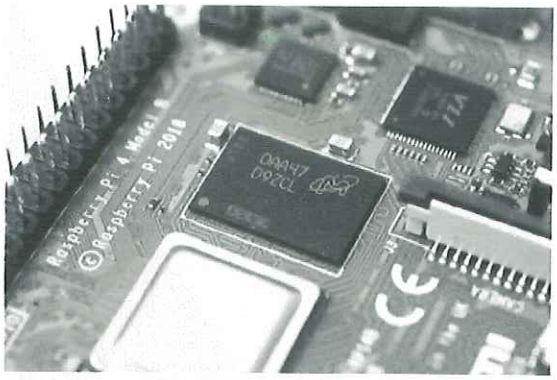
Figure 4.1. Anti-reflective Coatings Used in the Manufacture of Semi-conductors For Example Memory Chips



Source: Raspberry Pi 4 8GB Memory Chip by geerlingguy is used royalty-free from CC BY 2.0.

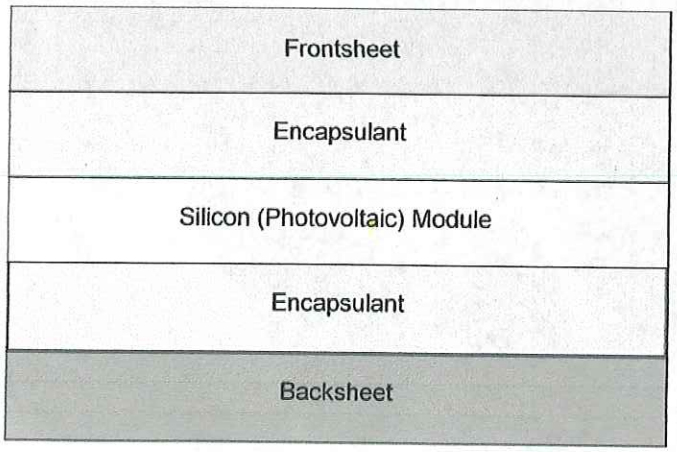
4.5. Coatings in the Renewable Energy Industry

4.5.1. PFAS Coatings Used in the Renewable Energy Industry

PFAS FPs are one choice of material in the renewable energy industry such as in solar panel (photovoltaic (PV) module) coatings. Solar panels work by converting light energy from sunlight into electricity, therefore this can be impacted by the amount of light reaching the photovoltaic cells in solar panels. This in turn is impacted by either internal factors, such as the reflectivity of the solar panels or by external factors such as temperature, wind, pollution, shading and cleanliness of the solar panel.

PV modules are made up of monocrystalline or polycrystalline silicon wafers which are embedded in encapsulants, placed between frontsheets, traditionally glass, or backsheets for additional protection. PFAS are used as both frontsheets, replacing glass and/or backsheet applications. In frontsheets, PFAS are used to increase the amount of light reaching the solar panel, whereas in backsheets they protect the PV modules from moisture, UV degradation and act as an electrical insulator, (STO, 2020 - 21[17]), (Dunmore, 2021[78]). A cross-section through a solar panel is shown in Figure 4.2.

Figure 4.2. Solar Panel Cross-Section



Currently, commercial solar panels only harness around 20% of the light energy due to energy loss through reflection or the build-up of dust (Mozumder et al., 2019[79]). The build-up of dust, dirt or air pollution impacts the ability of light to reach the photovoltaic cells, therefore reducing energy output. For example after several months without cleaning, air pollution can deteriorate the energy production of the solar panels up to 6.5% (Hussain, Batra and Pachauri, 2017[43]). In deserts, the accumulation of sand and dust can reduce the energy output much more, up to 40%, and therefore mechanisms to prevent this are employed (Hussain, Batra and Pachauri, 2017[43]). Overall, it is important for solar panel coatings to have high transparency, a low cleaning requirement or a self-cleaning ability.

So-called 'self-cleaning' coatings or films are used which improve the energy efficiency of solar panels by removing deposited dust, either by being hydrophilic, or through hydrophobic properties (Mozumder et al., 2019[79]). In hydrophilic coatings, water is attracted to the surface of the solar panels and spreads across it to form a 'film' on top. During the process of spreading (wetting), the contaminants on the surface are washed away. In hydrophobic coatings, such as PFAS coatings, water is repelled by the surface of the solar panels and washes away along with dust and dirt – the so-called 'lotus effect' (Mozumder et al., 2019[79]).

Coatings for solar panels are also aimed at being transparent coatings which work to reduce the reflectivity of solar panels, thereby capturing more of the incident solar energy. The frontsheets of solar panels are usually made of silicon and glass and therefore have high refractive indices meaning more than 30% of the light reaching the solar panels is reflected back. It is therefore important that these coatings are transparent to visible light to avoid any further losses (Mozumder et al., 2019[79]).

FP films in the front and backsheets of solar panels have been used to improve the performance of solar panels in these respects because of their hydrophobic properties. FEP and ETFE coatings are commercially available for frontsheet use that are supplied in a film form and can be directly applied to the solar panels, replacing glass (DuPont, 2020a[80]). These coatings can be used in a range of sizes of solar panels, from grid-connected systems to portable units. Additionally, ECTFE-based coatings for frontsheet applications have been identified, specifically for use on solar panels on boat decks, due to their ability to withstand harsh marine conditions (Amcor, 2021[81]).

In backsheet applications, a range of FP-based films have been identified that have been used such as FEVE, FEP and ETFE. Stakeholders in this project have noted that for backsheet applications it is important for the coating to be lightweight to be used on structures or roofs, easier to install and flexible so that they can be formed to the curvature of roofs (STO, 2020 - 21[17]). Other parameters such as durability, resistance to corrosion and UV light deterioration are also critical performance parameters that have been assessed (see Section 7.1.1).

4.5.2. Non-Fluorinated coatings used in the renewable energy sector

Many alternatives for hydrophobic PFAS coatings exist, for example silicones, carbon nanotubes, polystyrene, PU urea copolymer, polymethylmethacrylate, polycarbonate (PC) and PVC.

In relation to hydrophilic coatings, alternatives have been identified that are also photoactive. These react with ultraviolet light from the sun to decompose dirt and other impurities on the surface of the solar panels and are referred to as 'super hydrophilic' coatings. Most of these are reported to be made up of titanium dioxide nanoparticles (Mozumder et al., 2019[79]) and titanium dioxide is used due to its high physical and chemical stability, low toxicity and excellent photoactivity (Mozumder et al., 2019[79]).

PS has been identified as an alternative that is commercially available specifically for backsheets, for example, 'Mylar UVHPET' developed by DuPont Teijin Films (DuPont Teijin Films, 2021[82]), has been used not only as an alternative to FP based films, but also to traditional PS films. This film has been described to offer enhanced UV protection and moisture resistance. Comparison has also been made by DuPont between fluorinated backsheets and this PS film, with results suggesting that fluorinated backsheet

materials may present environmental and health issues in relation to disposal, whereas the 'Mylar UVHPET' backsheet may not generate hazardous materials in high-temperature disposal processes (DuPont Teijin Films, 2021[82]).

In addition to PS, other alternatives include polyamides (PA) and polyethylene terephthalate (PET) which have been used for at least the last 10 years in the field (DuPont, 2020b[83]).

In wind turbine coatings, several alternatives exist. For example, 'Hempadur 4774D' is an epoxy-based paint used for its corrosion and abrasion resistance (Hempel, 2021[84]). Additionally, 'Hempathane HS 5561 B' is a PU-based coating, used specifically a topcoat in corrosive environments as it is suggested to have good gloss and colour retention. This coating is cured with aliphatic isocyanate and can be applied via spray method or a brush, however it has been suggested that more coats may need to be applied if using a brush, to attain the same result (Hempel, 2020[85]).

Notes

[1] Skim thin layers from a FP to create a thin sheet of film.

[2] For example unsintered tape is wrapped around a cable which is then sintered at a high temperature by means of infrared or a salt bath to create a protective harness to the cable.

[3] I.e. without fluorine, chorine etc content.

[4] A curtain wall system is an outer covering of a building in which the outer walls are non-structural, utilized only to keep the weather out and the occupants in.

[5] It has been noted that FP coating is not present in the final chip and is spun out and goes to waste or destroyed in the etching process.

for PFAS
Substitute in panel products mentioned also toxic.

Review Biol Trace Elem Res. 2016 Jul;172(1):1-36. doi: 10.1007/s12011-015-0550-x. Epub 2015 Nov 11.

Toxicity of Nano-Titanium Dioxide (TiO2-NP) Through Various Routes of Exposure: a Review

Muhammad Shakeel [1], Farhat Jabeen [2], Samina Shabbir [1], Muhammad Saleem Asghar [1], Muhammad Saleem Khan [1], Abdul Shakoor Chaudhry [3]

Affiliations
PMID: 26554951 DOI: 10.1007/s12011-015-0550-x

Abstract

Nano-titanium dioxide (TiO2) is one of the most commonly used materials being synthesized for use as one of the top five nanoparticles. Due to the extensive application of TiO2 nanoparticles and their inclusion in many commercial products, the increased exposure of human beings to nanoparticles is possible. This exposure could be routed via dermal penetration, inhalation and oral ingestion or intravenous injection. Therefore, regular evaluation of their potential toxicity and distribution in the bodies of exposed individuals is essential. Keeping in view the potential health hazards of TiO2 nanoparticles for humans, we reviewed the research articles about studies performed on rats or other mammals as animal models. Most of these studies utilized the dermal or skin and the pulmonary exposures as the primary routes of toxicity. It was interesting that only very few studies revealed that the TiO2 nanoparticles could penetrate through the skin and translocate to other tissues, while many other studies demonstrated that no penetration or translocation could happen through the skin. Conversely, the TiO2 nanoparticles that entered through the pulmonary route were translocated to the brain or the systemic circulation from where these reached other organs like the kidney, liver, etc. In most studies, TiO2 nanoparticles appeared to have caused oxidative stress, histopathological alterations, carcinogenesis, genotoxicity and immune disruption. Therefore, the use of such materials in humans must be either avoided or strictly managed to minimise risks for human health in various situations.

Keywords: Exposure; Routes; TiO2 nanoparticles; Toxicity.

Related information

PubChem Compound (MeSH Keyword)

LinkOut - more resources

Full Text Sources
Springer

Miscellaneous
NCI CPTAC Assay Portal

BUSINESS, LAW, POLITICS, STATE GOVERNMENT

Policymakers demand answers about GenX-like compounds in solar panels

DAN WAY

JULY 16, 2018

As state and federal agencies investigate GenX in groundwater, *Carolina Journal* has learned GenX and its family of unregulated emerging contaminants are present in some of the solar panels increasingly dotting North Carolina's landscape.

GenX chemicals are classified as perfluorinated alkylated substances, commonly called PFAS. Responding to a *CJ* query, the U.S. Environmental Protection Agency said, "Publicly available information indicates that PFAS are used in the production of fluoropolymer Teflon film that is marketed for use in photovoltaics, which could include components of solar cells/panels."

Chemical manufacturer Chemours makes GenX at its Fayetteville Works plant. The state and others have sued the company for releasing the chemical into the Cape Fear River, contaminating drinking supplies.

Mark J. Strynar, an EPA scientist whose research helped to identify Chemours' GenX pollution, has said the EPA compiled 39 records showing PFAS related to solar panel components. Chemours uses GenX to make Teflon. Its marketing materials say Teflon film is used as the front coating in many solar panels.

Politicians and activist groups are demanding answers — and action against the company.

Sens. Michael Lee, R–New Hanover; Bill Rabon, R–Brunswick; and Wesley Meredith, R–Cumberland, filed Senate Bill 724 ordering Chemours to be shut down if it didn't stop releasing GenX. Reps. Ted Davis, R–New Hanover; Holly Grange, R–New Hanover; Frank Iler, R–Brunswick; and William Brisson, R–Bladen, filed an identical House Bill 972.

CJ asked all the lawmakers if they had any concerns about the possible presence of GenX in solar panels. Only Lee responded. "I have heard that GenX is in solar panels, but never anything confirming it," Lee said. He referred to a *Fortune* magazine article about GenX used in many consumer and commercial purposes.

During debate on the House override of Gov. Roy Cooper's budget bill veto, Rep. Deb Butler, D–New Hanover, said budget writers didn't spend enough to address GenX concerns.

"We seem to want to put the blinders on instead of addressing this in a comprehensive fashion," Butler said from the House floor.

Asked by *CJ* if she was concerned about potential GenX contamination from solar panels, Butler said: "This is the first I am hearing about this. I am absolutely interested in learning more about this matter."

Republican U.S. Rep. Richard Hudson, whose 8th Congressional District includes areas affected by GenX, is concerned about potential contamination from GenX in solar panels.

"[Hudson] takes it very seriously, including any potential GenX contamination," said Hudson spokeswoman Tatum Gibson. Hudson directly questioned former EPA Administrator Scott Pruitt about the issue, Gibson said.

"[Hudson] will continue to work with federal, state, and local officials to encourage the swift collection and evaluation of data, and to help ensure appropriate measures are taken."

CF asked DuPont which solar companies used Teflon film and how many solar panels in North Carolina might contain GenX. "This product line has been divested and is now part of the Chemours Company," a DuPont statement said, directing queries to Chemours.

Chemours has not responded to numerous requests for an interview or answered questions about GenX in solar panels. It did forward a copy of a June 11 status report submitted to the court as part of the state's lawsuit over discharges at the plant.

Utility companies built and operate numerous solar energy plants, and purchase solar power from many more.

"We do not have the GenX product on any of the panel materials at our sites," said Bonita Billingsley Harris, a Dominion Energy spokeswoman.

"This is an emerging discussion Duke Energy is following. We will monitor any guidance given by the Department of Environmental Quality or the EPA," said Randy Wheeless, a Duke Energy spokesman, neither confirming nor denying solar panels at Duke facilities have components containing GenX.

David Drooz, chief counsel of the N.C. Utilities Commission Public Staff, said it doesn't have information on the chemical composition of solar panels.

"Environmental and health scientists — who are not part of the personnel at the Public Staff — would have to determine if GenX and similar chemicals are an unreasonable environmental or health hazard," Drooz said.

"The amount of GenX in the Cape Fear River, and the risk of it in intakes for drinking water supplies, may be a very different risk from that in solar panels. That is a scientific question outside the scope and capability of the Public Staff," Drooz said.

Neighbors opposing the industrial-scale Wilkinson Solar Plant in Beaufort County have raised fears in state Utilities Commission proceedings that GenX could be in solar panels.

"As that matter and the issues raised therein are still before the commission, I cannot comment on the merits of that case," said Ed Finley, Utilities Commission chairman. "Those issues will be addressed by the commission panel that heard the case in its decision along with the other issues raised in that proceeding."

The Utilities Commission doesn't track locations or numbers of solar panels containing GenX .

The state Department of Environmental Quality hasn't given *CF* answers about any GenX research related to the compound's use in solar panels. Nor has DEQ responded to a May 24 public records request seeking departmental communications involving GenX in solar panels.

Alan Ducatman, who teaches environmental health sciences at West Virginia University's School of Public Health, has studied the health effects of GenX. He has noted studies show GenX displays biological effects like the C8 compound it replaced in Teflon production.

Chemours and DuPont in 2017 settled lawsuits from more than 3,500 claimants for $670.7 million Production of Teflon using C8 at Chemours' Parkersburg, West Virginia, factory was linked to kidney and testicular cancer, thyroid disease, hypertension, and other health problems.

Ducatman told *CJ* chemists are best suited to answer whether GenX in solar panels poses a health risk.

"[It] may depend on the durability of the film coating, and especially on the nature of the product," Ducatman said.

Cobey Culton, a state Department of Health and Human Services spokesman, said GenX and related compounds are used in a wide variety of consumer products that could be a source of human exposure.

"However, research has suggested that exposure to PFOA and PFOS (compounds related to GenX) from today's consumer products is usually low, especially when compared to exposures from contaminated drinking water," Culton said. "There has been no research to date about how much exposure to GenX comes from consumer products in general or any type of consumer product specifically."

The EPA warns "PFOA and PFOS can cause reproductive and developmental, liver and kidney, and immunological effects in laboratory animals."

In late May the EPA announced it is collaborating with federal and state partners to develop toxicity values for GenX. None exist. North Carolina has set a safe limit of 140 parts per trillion in drinking water.

Chemours and its predecessor DuPont have been under a consent order since 2009 to conduct health and environmental testing on GenX.

"EPA reviewed these data as they were submitted to EPA. Testing of solar panels which may contain fluoropolymers that were potentially created using the GenX chemicals was not part of the testing included in EPA's consent order," the EPA told *CJ*.

The EPA's GenX research to develop PFAS toxicity testing will apply across industries, the statement said.

EPA scientists are "developing and validating laboratory methods to detect and quantify selected PFAS — including GenX chemicals — in water and soil," the statement said, including how the chemicals might migrate into soil and water.