PFAS Update

City of Cambridge

Water Board Meeting

February 21, 2023

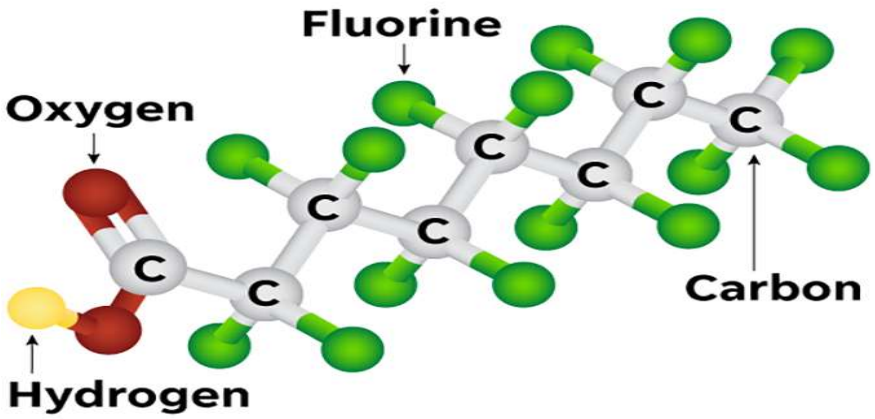
OUTLINE

- PFAS Background and regulations
- Cambridge PFAS results
- CWD PFAS Treatment Option
  GAC Filter Media Changeouts
- Timeline & Future Goals
- Questions/Discussion

PFAS Background and regulations

What are PFAS?

Per- and **P**oly **F**luoro **A**lkyl **S**ubstances



- A group of persistent synthetic compounds used to make fluoropolymer coatings and products that resist:

HEAT

GREASE

OIL

STAINS

WATER

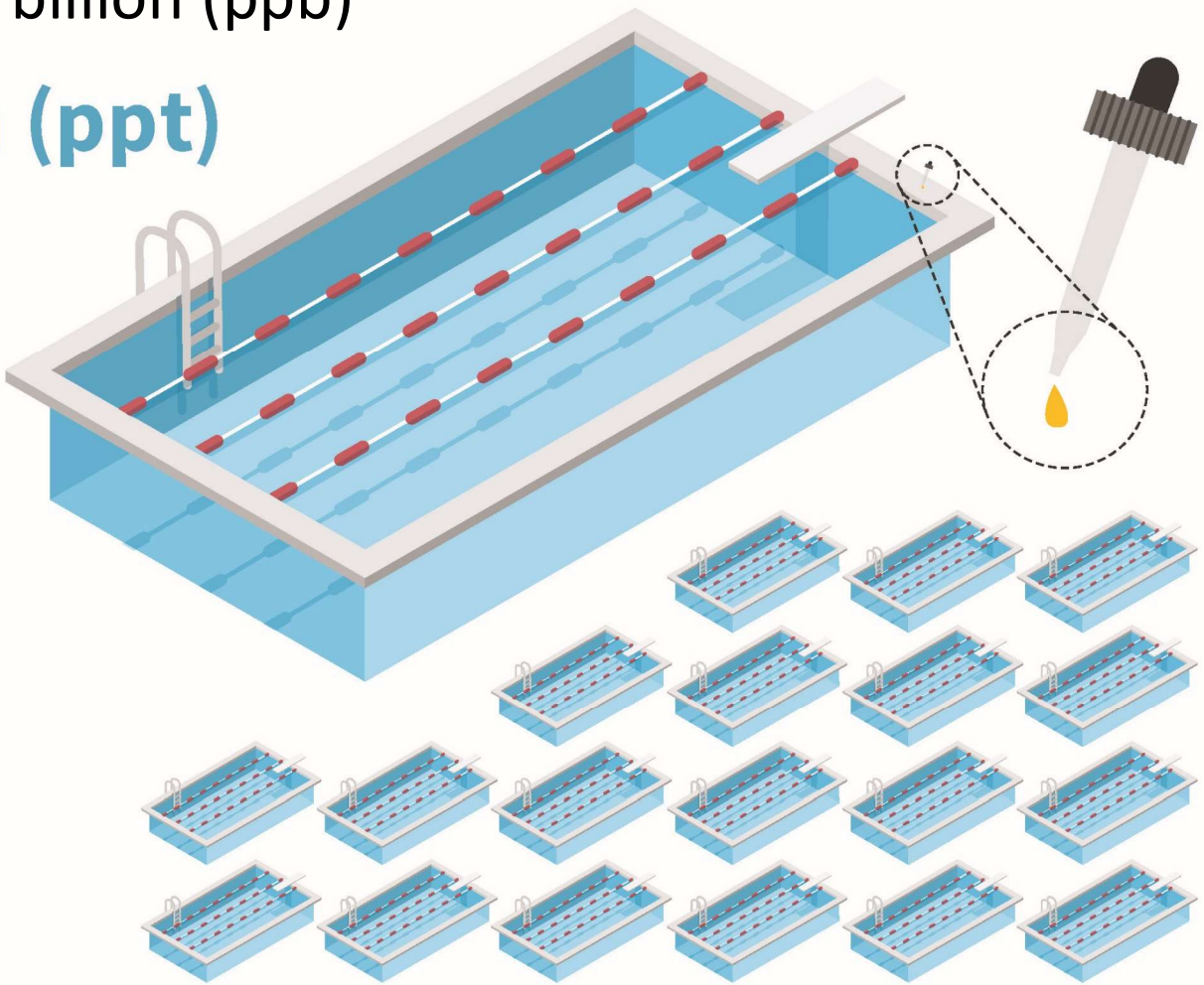
Early History of PFAS

- Invented in the 1930s
- First produced by 3M in 1949
- Approved for food packaging in 1967
- Production of aqueous film forming foams (AFFF) increased in the late 1960s
- 2002 3M voluntarily phases out long chain PFAS (PFOS and PFOA)

http://www.defence.gov.au/Environment/PFAS/pfas.asp

PFAS Analysis

- Part per trillion (ppt) = nanogram per liter (ng/L) = 1/1000th of a part per billion (ppb)



Courtesy of https://www.michigan.gov/documents/pfasresponse/1ppt_is_Equal_to_1_Drop_of_Water_in_20_Olympic_Swimming_Pools_664966_7.pdf

PFAS Maximum Contaminant Level (MCL)

- Massachusetts Department of Environmental Protection (MassDEP) drinking water standard = Maximum Contaminant Level (MCL)

PFOS+PFOA+PFHxS+PFNA+PFHpA+PFDA =

PFAS6

Its maximum contaminant level (MCL) is **MCL=20 ppt**

- Pregnant women
- Nursing women
- Infants
- Compromised Immune Systems

- MassDEP recommends individuals from sensitive populations avoid consuming water with PFAS6 above the MCL
- CWD has not had a PFAS6 MCL exceedance

EPA PFAS Drinking Water Regulations

- Currently - No Federal Standard – *in the works*
- EPA Health Advisory(HA) Level 70 ppt
- EPA "PFAS Strategic Roadmap" announced October 2021
- EPA's **Lifetime** Health Advisory(HA) Levels, measured in parts per trillion (ppt), offer protection for people from adverse health effects resulting from exposure throughout their **lives** to these individual PFAS in drinking water:
  - Interim updated health advisory for PFOA = 0.004 ppt
  - Interim updated health advisory for PFOS = 0.02 ppt
  - Final health advisory for GenX chemicals = 10 ppt
  - Final health advisory for PFBS = 2,000 ppt
- Final rule Fall 2023

Cambridge PFAS results

Cambridge PFAS results

Below, is an example of PFAS data that appears on the City's web page for 2021

Updated: 02/09/22

Cambridge Water Department Per- and Polyfluoroalkyl Substances (PFAS) Montoring - Analytes detected

Entry Point to the Distribution System (EPDS) aka Finish Water

Compound Name	1/6/2021 ng/L (ppt)	2/3/2021 ng/L (ppt)	3/29/2021 ng/L (ppt)	4/1/2021 ng/L (ppt)	5/3/2021 ng/L (ppt)	6/2/2021 ng/L (ppt)	7/7/2021 ng/L (ppt)	8/4/2021 ng/L (ppt)	9/1/2021 ng/L (ppt)	10/4/2021 ng/L (ppt)	* n/a ng/L (ppt)	** 12/20/2021 ng/L (ppt)
Perfluorooctane Sulfonic Acid (PFOS)	1.7	1.7	1.9	2.2	2.4	3.0	4.3	4.3	4.7	3.5	n/a	2.40
Perfluorooctanoic Acid (PFOA)	6.9	6	8.5	7.9	6.8	7.8	7.9	8.3	9.6	8.5	n/a	7.65
Perfluorohexane Sulfonic Acid (PFHxS)	2.1	2.3	3.03	3.57	2.5	3	2.8	2.9	3	2.9	n/a	3.10
Perfluorononanoic Acid (PFNA)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	0.00
Perfluorohepatanoic Acid (PFHpA)	3.2	3	2.4	3.4	2.3	2.9	2.9	3	3.4	2.9	n/a	3.15
Perfluorodecanoic acid (PFDA)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	n/a	0.00
Sum of PFAS6	12.2	11.3	15.8	17.1	14.0	16.7	17.9	18.5	20.7	17.8	n/a	16.30
Quarterly Compliance Average		13.1			15.9			19.0			17.1	

ng/L = nanograms per Liter or ppt, parts per trillion

2.0 ng/L Minimum Reporting Limit (MRL) The lowest quantitated value for a target analyte in a sample. Typically the lowest calibration standard used.

* November data lost by contract lab

** December data is avarage of two samples collected in December (Pace Lab and Eurofin Lab)

Cambridge PFAS results 2022

Cambridge Water Department Per- and Polyfluoroalkyl Substances (PFAS) Montoring - Analytes detected
Entry Point to the Distribution System (EPDS) aka Finish Water

C.A.S.#	Compound Name	MasDEP MCL	1/5/2022 ng/L (ppt)	2/2/2022 ng/L (ppt)	3/1/2022 ng/L (ppt)	4/4/2022 * ng/L (ppt)	5/25/2022 ** ng/L (ppt)	6/1/2022 ** ng/L (ppt)	7/6/2022 ** ng/L (ppt)	8/26/2022 ** ng/L (ppt)	Sep-22 ng/L (ppt)	Oct-22 ng/L (ppt)	11/19/2022 *** ng/L (ppt)	12/20/2022 ng/L (ppt)
1763-23-1	**Perfluorooctane Sulfonic Acid (PFOS)**	x	2.2	2.0	2.1		2.9	3.7	3.5	3.5			0.0	ND
335-67-1	**Perfluorooctanoic Acid (PFOA)**	x	6.7	5.7	6.2		7.6	8.5	7.7	8.4			**3.4**	ND
355-46-4	**Perfluorohexane Sulfonic Acid (PFHxS)**	x	2.5	2.1	2.4		2.8	2.9	2.8	2.6			0.0	ND
375-95-1	**Perfluorononanoic Acid (PFNA)**	x	0.0	0.0	0.0		0.0	0.0	0.0	0.0	MWRA	MWRA	0.0	ND
375-85-9	**Perfluorohepatanoic Acid (PFHpA)**	x	2.2	1.9	2.6		2.8	2.8	2.3	2.6			0.0	ND
335-76-2	**Perfluorodecanoic acid (PFDA)**	x	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	ND
	Sum of **PFAS6** detected		13.6	11.7	13.3		16.1	17.9	16.2	17.1	ND	ND	3.4	ND
	Quarterly Compliance Average			**12.9**			**17.0**			**16.7**			**ND**	

ND= Not detected
ng/L = nanograms per Liter or ppt, parts per trillion
2.0 ng/L Minimum Reporting Limit (MRL) The lowest quantitated value for a target analyte in a sample. Typically the lowest calibration standard used.
MassDEP Regulation requires quarterly compliance for PFAS6 MCL: ≤20 ng/L for sum of PFOA, PFOS, PFHxS, PFNA, PFDA, and PFHpA,

MassDEP PFAS Regulations if PFAS6 is detected monthly monitoring is required:

- If the average of a PFAS6 result and its associated confirmatory sample is greater than 10 ppt, the sampling location must be sampled monthly .
- Monthly Sampling continues until the source is shown to be Reliably and Consistently ≤ 10 ng/L.
- Any PWS that is performing monthly PFAS6 monitoring the regulation requires quarterly averaging for compliance.
- If any PFAS6 monthly monitoring value exceeds 20 ppt, the PWS shall provide public education materials regarding the exceedance.

* April result was rejected by DEP because did not meet Reporting Limits.
**Average of Split sampling sent to 2 separate certifired Laboratories
***Unofficial result from returning to CWD water per MassDEP

Cambridge PFAS results 2023

UPDATED 2-9-2023

Cambridge Water Department Per- and Polyfluoroalkyl Substances (PFAS) Montoring - Analytes detected

Entry Point to the Distribution System (EPDS) aka Finish Water

C.A.S.#	Compound Name	MasDEP MCL	1/23/2023 ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)	ng/L (ppt)
1763-23-1	**Perfluorooctane Sulfonic Acid (PFOS)**	x	ND											
335-67-1	**Perfluorooctanoic Acid (PFOA)**	x	*TRACE											
355-46-4	**Perfluorohexane Sulfonic Acid (PFHxS)**	x	ND											
375-95-1	**Perfluorononanoic Acid (PFNA)**	x	ND											
375-85-9	**Perfluorohepatanoic Acid (PFHpA)**	x	*TRACE											
335-76-2	**Perfluorodecanoic acid (PFDA)**	x	ND											
	Sum of **PFAS6** detected		**ND**											
	Quarterly Compliance Average													

ND= Not detected

*TRACE = trace amounts are present, but they are below the minimum concentration that can be reported as a quantified value.

ng/L = nanograms per Liter or ppt, parts per trillion

2.0 ng/L Minimum Reporting Limit (MRL) The lowest quantitated value for a target analyte in a sample. Typically the lowest calibration standard used.

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Cambridge tap water:
Current information about PFAS testing (January 2023)
Test Results

PFAS Analyte PFAS6 (regulated)	Result ng/L (ppt)
Perfluorooctane Sulfonic Acid (PFOS)	ND
Perfluorooctanoic Acid (PFOA)	*TRACE
Perfluorohexane Sulfonic Acid (PFHxS)	ND
Perfluorononanoic Acid (PFNA)	ND
Perfluorohepatanoic Acid (PFHpA)	*TRACE
Perfluorodecanoic acid (PFDA)	ND
Sum of PFAS6 - compare to MassDEP MCL of 20 ng/L	**ND**

MCL = Maximum Contaminant Level

ng/L = nanogram per liter

ppt = parts per trillion

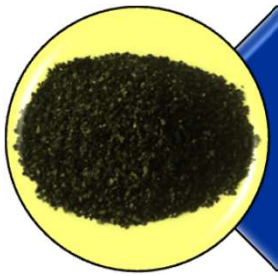
ND= not detected

PFAS = Per and Poly Fluoroalkyl Substances

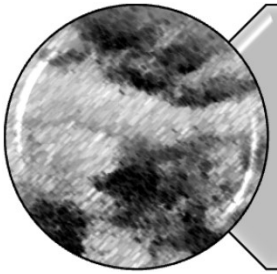
*TRACE = trace amounts are present, but they are below the minimum concentration that can be reported as a quantified value.

CWD PFAS Treatment Option
GAC Filter Media Changeouts

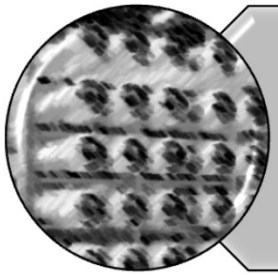
Most Suitable Treatment Option for Cambridge



Granular Activated Carbon (GAC)



Anion Exchange (AIX)



High Pressure Membranes

- ✓ Water quality (e.g., low organics)
- ✓ Compatible with existing treatment
- ✓ City's familiarity with GAC operation
- ✓ Comparatively lower cost

Granular Activated Carbon(GAC)

- Granular activated carbon is made from organic materials with high carbon contents such as:

- Filtering with granular activated carbon(GAC) is the most common form of treatment used for PFAS removal.

- Activated carbon is commonly used to adsorb:

  natural organic compounds

  taste and odor compounds

  synthetic organic chemicals

“Eductor” pipe – GAC Removal and Installation

Fines De-watering Bag

Timeline & Future Goals

PFAS Timeline

August 2019 thru February 2023

- ✓ **January 2021**: New PFAS6 Regulations in effect
- ✓ In MA action is required - **QUARTERLY AVERAGE** over - **20ppt**
- ✓ CWD Pilot study performed, completed and approved -2020
- ✓ Developed bid specification, bid out and awarded contract for changeout of granular activated carbon(GAC) filter media
- ✓ **October 2022**: 2 Filters Removal and installation
- ✓ **November 2022**: First 2 Filters PASS ALL TESTING REQUIRMENTS
  - *November 19th – Due to PFAS concentration under 10ppt, CWD goes back on-line
- ✓ **December 2022**: Start Next 2 filters
  - *Received First Official Not Detected(ND) for December 2022 DEP PFAS6 Monitoring
- ✓ **December 19th, 2022** – appropriation to fund the purchase PFAS testing equipment - APPROVED
- ✓ **January 2023**: final removal and installation of last 2 filters(Total of 6 Filters)
  - ✓ Received another Not Detected(ND) for January 2023 DEP PFAS6 Monitoring
- ✓ **February 2023**: Final 2 Filters PASS ALL TESTING REQUIREMENTS

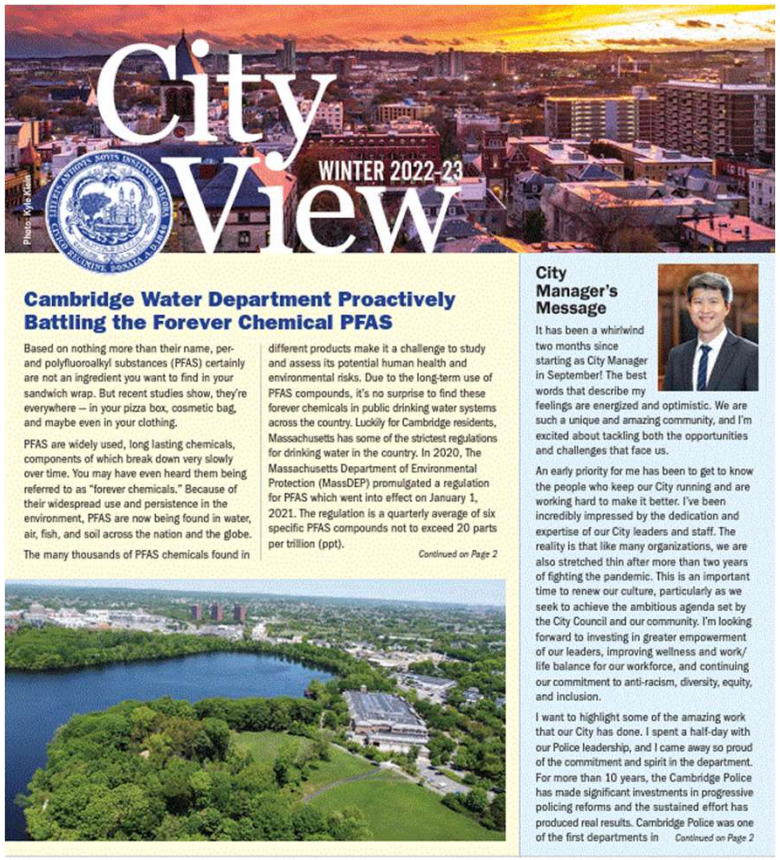
PFAS Timeline continued

FEBRUARY 2023 and on...

- ✓ Monitoring stage – individual filters(1-6) & Finished water
  - ❑ PFAS
  - ❑ TOC & UV254
- ✓ Future GAC filter media changeouts
  - ❑ Frequency
  - ❑ Looking at possible operational changes
  - ❑ August 2023 – future GAC changeout meeting scheduled w/Calgon
- ✓ Reviewing PFAS Instrument Bids - Liquid Chromatography Tandem Mass Spectrometer (LCMS)
- ❑ Training and testing can begin once instrument is ordered
- ❑ Site preparation
- ❑ Delivery and installation
- ❑ Certification takes 12 -24 months depending on the method and availability of instrument. Consumables
- ❑ Working on other forms of communication (next slide)

Communication efforts

Communication efforts


City View

WINTER 2022-23

Cambridge Water Department Proactively Battling the Forever Chemical PFAS

Based on nothing more than their name, per- and polyfluoroalkyl substances (PFAS) certainly are not an ingredient you want to find in your sandwich wrap. But recent studies show, they're everywhere – in your pizza box, cosmetic bag, and maybe even in your clothing.

PFAS are widely used, long lasting chemicals, components of which break down very slowly over time. You may have even heard them being referred to as "forever chemicals." Because of their widespread use and persistence in the environment, PFAS are now being found in water, air, fish, and soil across the nation and the globe.

The many thousands of PFAS chemicals found in different products make it a challenge to study and assess its potential human health and environmental risks. Due to the long-term use of PFAS compounds, it's no surprise to find these forever chemicals in public drinking water systems across the country. Luckily for Cambridge residents, Massachusetts has some of the strictest regulations for drinking water in the country. In 2020, The Massachusetts Department of Environmental Protection (MassDEP) promulgated a regulation for PFAS which went into effect on January 1, 2021. The regulation is a quarterly average of six specific PFAS compounds not to exceed 20 parts per trillion (ppt).

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City Manager's Message

It has been a whirlwind two months since starting as City Manager in September! The best words that describe my feelings are energized and optimistic. We are such a unique and amazing community, and I'm excited about tackling both the opportunities and challenges that face us.

An early priority for me has been to get to know the people who keep our City running and are working hard to make it better. I've been incredibly impressed by the dedication and expertise of our City leaders and staff. The reality is that like many organizations, we are also stretched thin after more than two years of fighting the pandemic. This is an important time to renew our culture, particularly as we seek to achieve the ambitious agenda set by the City Council and our community. I'm looking forward to investing in greater empowerment of our leaders, improving wellness and work/life balance for our workforce, and continuing our commitment to anti-racism, diversity, equity, and inclusion.

I want to highlight some of the amazing work that our City has done. I spent a half-day with our Police leadership, and I came away so proud of the commitment and spirit in the department. For more than 10 years, the Cambridge Police has made significant investments in progressive policing reforms and the sustained effort has produced real results. Cambridge Police was one of the first departments in

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QUESTIONS/DISCUSSION

Thank you for your time!