Acton Water District

# Water Supply District of Acton

693 MASSACHUSETTS AVENUE
P.O. BOX 953
ACTON, MASSACHUSETTS 01720

TELEPHONE (978) 263-9107 FAX (978) 264-0148

## Board of Water Commissioners & Finance Committee
## Meeting Agenda
## Monday, December 4, 2023 @ 7:00 PM

***Due to the COVID-19 Pandemic, meetings are being held virtually via Zoom***

Please click the link below to join the webinar:

https://us02web.zoom.us/j/83502710405

Or One tap mobile :

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Or Telephone:

Dial(for higher quality, dial a number based on your current location):

+1 305 224 1968 US, +1 309 205 3325 US, +1 312 626 6799 US (Chicago)

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Webinar ID: 835 0271 0405

International numbers available: https://us02web.zoom.us/u/kbedpOWsBD

- **Comments from the public**
- **Approve minutes from the meeting of 11/20 and 11/29**
- **Appoint one Commissioner to sign warrants while conducting meetings virtually**

**NEW BUSINESS:**

- Review Draft Budget for FY '25 and proposed articles for 2024 Annual District Meeting Warrant

***Any agenda item(s) which did not come to the attention of the Board of Water Commissioners 48 hours prior to this meeting and were not reasonably anticipated.***

**OLD BUSINESS:**

- Per- and Polyfluoroalkyl Substances (PFAS)
  - Current sample data, if available
  - Discussion of Additional PFAS Upgrades
  - PFAS Public Notice
  - MassDEP Filter Study
- Update on 549 Main Street
  - Order of Taking
  - Authorize to District Manager to Execute Closing Documents
- Town of Acton's Open Space and Recreation Plan (OSRP)
- WRAC Groundwater Protection Mailing

**EXECUTIVE SESSION: --** To consider the purchase, exchange, lease of real property as an open meeting may have a detrimental effect on the negotiating position of the District.

Agenda posted on 11/30/2023 1:33 PM

Board of Water Commissioners

DRAFT

Meeting Agenda

Monday, November 29, 2023 @ 7:00 PM

# AGENDA

- Comments from the public
- Approve minutes from the meeting of 11/6 and 11/13

EXECUTIVE SESSION: -- To consider the purchase, exchange, lease of real property as an open meeting may have a detrimental effect on the negotiating position of the District.

Due to the Covid-19 stay-at-home order by Governor Charles Baker, the Board of Water Commissioners meeting was not held at the Acton Water District Office; instead, the meeting was held via Zoom Webinar and was recorded. The meeting was called to order at 7:03 PM on Monday, November 29, 2023, by Ms. Amir-Lin.

Present at Tonight's Meeting:

Commissioners: Erika Amir Lin (Chair), Barry Rosen, Stephen Stuntz
District Manager: Matt Mostoller
District Treasurer: Christine McCarthy
District Counsel: Mary Bassett
Members of the Public: none

Ms. Amir Lin in opened the meeting at 7:03

**Comments from the public**

None.

**Approve minutes from the meeting of 11/6**

Mr. Rosen motioned to approve the minutes of November 6, 2023. Mr. Stuntz seconded and the motion was unanimously approved via a roll call vote; Mr. Rosen, Mr. Stuntz, Ms. Amir Lin.

**Approve minutes from the meeting of 11/13**

Mr. Stuntz motioned to approve the minutes of November 13, 2023. Mr. Rosen seconded and the motion was unanimously approved via a roll call vote; Mr. Rosen, Mr. Stuntz, Ms. Amir Lin.

**Schedule Coordination**

Mary Bassett reminded the Board that the order of taking for 549 Main Street needs to be voted on at the meeting to be held Monday, December 4, 2023, and each Commissioner must sign the document as it will be filed with the registry of deeds. It was determined that Mr. Rosen and Ms. Amir Lin will stop by the District office on Tuesday morning to sign the document and Mary will meet them there. Mr. Stuntz will sign the document later in the day at Mary's office.

**EXECUTIVE SESSION**: -- To consider the purchase, exchange, lease of real property as an open meeting may have a detrimental effect on the negotiating position of the District.

Ms. Amir Lin motioned to close the regular open meeting currently in session, and have the Commissioners enter an executive session pursuant to General Law chapter 30A section 21a6 to consider the purchase, taking or value of real property; and will not reconvene in open session.

Mr. Rosen seconded the motion and it was unanimously approved via a roll call vote; Mr. Rosen, Mr. Stuntz, Ms. Amir Lin.

**Open meeting Closed at 7:12 pm.**

**FY 25 Budget Draft**

| | FY 22 Actual | FY 23 Budget | FY 24 Budget | FY 24 Projection (as of end of 1st Qtr) | FY 25 Proposed | % increase/decrease from approved FY 24 Budget | Notes: |
|---|---|---|---|---|---|---|---|
| **EXPENSES** | | | | | | | |
| Audit/Accounting | 17,800 | 22,000 | 20,000 | 16,000 | 30,000 | 50% | Need- amount for single audit; Powers & Sullivan to respond |
| Auto Maint & Fuel | 50,000 | 52,000 | 52,000 | 40,000 | 53,560 | 3% | To account for potential oil market volatility |
| Short Term Debt | 505,000 | 326,550 | - | 333,612 | 46,360 | 100% | PFAS Design BAN Interest- July 2025; need amount to be borrowed for pre-purchase of equipment |
| Long Term Debt | 1,459,219 | 1,922,298 | 2,752,426 | 2,136,981 | 2,229,495 | -19% | Fy 24 Budget figure is higher than actual debt service will be |
| Chemicals | 91,772 | 120,000 | 160,000 | 135,000 | 175,000 | 9% | |
| DEP Withdrawal | 4,958 | 5,600 | 5,000 | 5,000 | 5,000 | 0% | Calculated using rate in effect and reported withdrawal on 2022 ASR |
| Employee Education | 11,695 | 17,500 | 17,500 | 17,500 | 17,500 | 0% | |
| Engineering | 50,000 | 50,000 | 60,000 | 60,000 | 60,000 | 0% | |
| Health/Life Insurance Active | 283,468 | 237,458 | 267,896 | 267,896 | 271,709 | 12% | Official increase will not be known until approx. mid-February. This is the high end of the estimated range for cost increase. |
| Health/Life Insurance Retiree | - | 82,542 | 108,899 | 108,899 | 112,443 | 12% | Medicare increased 6% for 2024- calendar year basis not fiscal. Retiree is a combination of Medex, BCBS (active plan), Dental & life insurance |
| Information Reports | 31,897 | 45,000 | 50,000 | 50,000 | 30,000 | -40% | Previously included WaterSmart software subscription- this has been moved to the Software Subscriptions line item |
| Insurance | 99,476 | 110,000 | 118,800 | 99,922 | 133,056 | 12% | Per Berry Insurance 11/7/23- anticipated increase ranges 8-15%. AWD likely on lower end |
| Laboratory Analysis | 80,000 | 100,000 | 100,000 | 100,000 | 85,000 | -15% | |
| Legal | 58,247 | 75,000 | 75,000 | 75,000 | 100,500 | 34% | To account for current District Counsel retirement and rates of new District Counsel. Old hourly rate- $250/hr; new anticipated hourly rate- $335/hr a 34% increase |
| Lights/Power/Fuel | 390,000 | 350,000 | 600,000 | 600,000 | 600,000 | 0% | |
| Maintenance & Operations | 347,667 | 471,000 | 420,000 | 420,000 | 608,000 | 45% | Includes $500k for routine M&O plus $100k NAWTP; $8k for security |
| NAWTP PFAS Filter Lease | - | - | - | - | 335,750 | 100% | Based on $27,702 per month for 6 months (July-Dec 2024)[per email from engineers] plus $28,256 per month for 6 months (Jan-June 2025) rounded up |
| Middlesex Retirement | 268,502 | 293,362 | 330,838 | 330,838 | 354,740 | 7% | per Middlesex Retirement Actuarial Valuation |
| Meters | 46,035 | 75,000 | 125,000 | 125,000 | 125,000 | 0% | |
| Office Supplies & Postage | 72,747 | 92,000 | 96,000 | 96,000 | 62,000 | | Includes 1x increase of $4k for purchase of new postage meter+ 12k for copier; software subscriptions & telephone broken out |
| Software Subscriptions/ IT Maintenance | | | - | - | 60,000 | | Previously included in Office Supplies & Postage |
| Telephone | | | - | | 21,000 | | Previously included in Office Supplies & Postage |
| Reserve Fund | 30,000 | 100,000 | 100,000 | 100,000 | 100,000 | 0% | |
| Salaries & Wages | 1,462,763 | 1,677,658 | 1,727,988 | 1,562,922 | 1,633,565 | -5% | Assumes a 3% increase for all employees |
| Total | 5,353,247 | 6,224,968 | 7,187,338 | 6,680,570 | 7,249,678 | | |
| | | | | | | | |
| **REVENUE** | | | | | | | |
| Water Revenue | 2,697,721 | 2,619,178 | 3,084,795 | 2,769,785 | 3,425,278 | | |
| Service Fee | 528,960 | 528,960 | 544,500 | 535,815 | 534,000 | | Based on $15 per unit/qtr *8,900 units |
| Debt Fee | 2,115,840 | 2,115,840 | 2,752,629 | 2,477,823 | 2,278,400 | | Based on currently projected Debt fee of $64 per unit/qtr * 8,900 units; Fy 24 amount was based on projected debt service which ended up being lower than expected due to timing |
| Total Water Revenue | 5,342,521 | 5,263,978 | 6,381,924 | 5,783,423 | 6,237,678 | | |
| Fire Protection Sprinklers | 41,643 | 40,420 | 41,000 | 41,000 | 41,000 | | |
| Rent/Lease | 122,364 | 446,570 | 493,570 | 500,000 | 115,000 | | |
| Solar Field lease revenue | 0 | 0 | 0 | 0 | 385,000 | | |
| Repairs/Installation | 84,623 | 50,000 | 50,000 | 50,000 | 50,000 | | |
| Cross Connection | 23,634 | 24,000 | 21,000 | 21,000 | 21,000 | | |
| Demand Fees | 563,300 | 300,000 | 300,000 | 250,000 | 200,000 | | |
| Mitigation Fees | 125,000 | 100,000 | 100,000 | 100,000 | 100,000 | | Revolving Fund |
| New Services Meter Installation RF | 0 | 0 | | 25,000 | 100,000 | | Revolving Fund |
| Total Other Revenue | 940,564 | 960,990 | 1,005,570 | 987,000 | 1,012,000 | | |
| Total | 6,283,085 | 6,224,968 | 7,387,494 | 6,770,423 | 7,249,678 | | |

| Proposed Warrant Articles 2024 | | Grace | OPEB | Borrow | Mitigation RF | New Meter Installation RF | Free Cash | Other |
|---|---|---|---|---|---|---|---|---|
| Grace M&O Filters | 125,000.00 | 125,000.00 | | | | | | |
| Retiree Health Insurance | 109,347.00 | | 109,347.00 | | | | | |
| Mitigation | 100,000.00 | | | | 100,000.00 | | | |
| New Meter Installation RF | 100,000.00 | | | | | 100,000.00 | | |
| Lead and Copper | 500,000.00 | | | 500,000.00 | | | | |
| Transfer from Main Street Eminent Domain | | | | | | | | (19,520.00) |
| Transfer to New Vehicles 2021 | | | | | | | | 19,520.00 |
| Transfer from Easements- Conant II | | | | | | | | (1,010.00) |
| Transfer to New Vehicles 2021 | | | | | | | | 1,010.00 |
| Clean & Rehab | 100,000.00 | | | | | | 100,000.00 | |
| Old Mains | 30,000.00 | | | | | | 30,000.00 | |
| Emergency Main Breaks | 30,000.00 | | | | | | 30,000.00 | |
| Media Replacement | 200,000.00 | | | | | | 200,000.00 | |
| NAWTP PFAS Filter Lease- 3 months FY 24 | 83,106.00 | | | | | | 83,106.00 | |
| Water Main Improvement | 500,000.00 | | | | | | 500,000.00 | |
| Vac/Trailer Truck | 200,000.00 | | | | | | 200,000.00 | |
| New Vehicles 2024 | 75,000.00 | | | | | | 75,000.00 | |
| Corrosion at Kennedy Wells | 50,000.00 | | | | | | 50,000.00 | |
| Lead & Copper Filter Appropriation | 20,000.00 | | | | | | 20,000.00 | |
| New Office Roof | 30,000.00 | | | | | | 30,000.00 | |
| Tank Upgrade | 20,000.00 | | | | | | 20,000.00 | |
| Water Rate Study | - | | | | | | - | |
| Water Supply Alternatives Study | 75,000.00 | | | | | | 75,000.00 | |
| | | $ 125,000.00 | $ 109,347.00 | $ 500,000.00 | $ 100,000.00 | $ 100,000.00 | $ 1,413,106.00 | $ - |

| | | |
|---|---|---|
| Grace Unappropriated | | 459,292.00 |
| | Less Approps | 125,000.00 |
| | Bal. | $ 334,292.00 |
| Free Cash 6.30.23 | | 1,529,072.00 |
| | Less Approps | 1,413,106.00 |
| | Bal. | $ 115,966.00 |
| Debt for Lead and Copper | | 500,000.00 |
| | Total Debt: | $ 500,000.00 |

**IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER**

***This report contains important information about your drinking water. Please translate it or speak with someone who understands it or ask the contact listed below for a translation.***

## Acton Water District has levels of PFAS6 above the Drinking Water Standard

### *What happened?*

**Our water system recently violated a drinking water standard for PFAS6 during the Quarter 3, 2023 compliance period at our North Acton Water Treatment Plant (NAWTP) with a quarterly average of 22 nanograms per liter (ng/L).** Monthly samples collected at the NAWTP during this compliance period reported levels of PFAS6 between 20 and 24 ng/L. The quarterly average of PFAS6 at the NAWTP has ranged between 17 and 27 ng/L from Quarter 1, 2021 to date. Monthly samples collected at our Central Acton Water Treatment Plant (CAWTP) during this compliance period reported levels of PFAS6 between 8 and 10 ng/L for a quarterly average of 9 ng/L, which complies with the state standard. The quarterly average of PFAS6 at the CAWTP has ranged between 7 and 29 ng/L since its operation began in Quarter 1, 2022. Our system will continue to notify consumers every 3 months with updated information.

### *What does this mean?*

**This is not an emergency. If it had been, you would have been notified within 24 hours.** Although this is not an emergency, as our customer, you have a right to know what happened, what you should do, and what we are doing to correct this situation.

On October 2, 2020, Massachusetts Department of Environmental Protection (MassDEP) promulgated a new drinking water regulation and maximum contaminant level (MCL) of 20 nanograms per liter (ng/L) for the sum of six per- and polyfluoroalkyl substances (called PFAS6). An MCL is the maximum permissible level of a contaminant in water which is delivered to any user of a public water system. See our latest results at www.actonwater.com/pfas.

Our results are above the MCL for PFAS6. ***Some people who drink water containing these PFAS in excess of the MCL may experience certain adverse effects. These could include effects on the liver, blood, immune system, thyroid, and fetal development. These PFAS may also elevate the risk of certain cancers.*** For more information on PFAS6, see the weblinks listed below.

### *What is PFAS6?*

PFAS6 includes perfluorooctanoic acid (PFOA), perfluorooctane sulfonic acid (PFOS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), perfluorodecanoic acid (PFDA) and perfluoroheptanoic acid (PFHpA). PFAS are man-made chemicals that have been used in the manufacturing of certain fire-fighting foams, moisture and stain resistant products, and other industrial processes.

### *What do I need to do?*

**For consumers in a sensitive subgroup (pregnant or nursing women, infants and people diagnosed by their health care provider to have a compromised immune system):**

- **Consumers in a sensitive subgroup are advised not to consume, drink, or cook with water when the level of PFAS6 is above 20 ng/L.**
- **Consumers in sensitive subgroups** are advised to use bottled water for drinking and cooking of foods that absorb water (like pasta).
- **For infant formula,** use bottled water or use formula that does not require adding 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-.
- **For older children and adults not in a sensitive subgroup,** you may continue to use water as you normally would, because the 20 ng/L value 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 being

taken to assess and lower the PFAS concentration in the drinking water, use of bottled water[1] will reduce your exposure.

- **If you have specific health concerns regarding exposure,** you should see the Centers for Disease Control's link below and consult a health professional, such as your doctor.
- **Home water treatment systems** that are certified to remove PFAS by an independent testing group such as NSF, UL, or Water Quality Association may be used to treat the water. These may include point of entry systems, which treat all the water entering a home, or point of use devices, which treat water where it is used, such as at a faucet. For information on selecting home treatment devices that are effective in treating the water for PFAS6, review the MassDEP factsheet for consumers referenced below.
- **In most situations the water can be safely used for washing foods, brushing teeth, bathing, and showering.**

**Please note: Boiling the water will not destroy PFAS6** and will somewhat increase its level due to evaporation of some of the water.

## *What is being done?*

The Acton Water District has taken the following pro-active measures:

- We are investigating and implementing additional treatment to reduce the levels of PFAS6 below the MCL.
- System operations have been modified to minimize PFAS6 levels in water being served to customers.
- Additional sources of supply have been activated and others are being pursued for connection to our system to reduce the levels of PFAS6.
- A bottled water rebate is available for those in a sensitive subgroup at https://www.actonwater.com/customer-service/bottled-water-rebate-program-for-sensitive-subgroups.
- When additional information becomes available, this public notice will be updated. More frequent updates may be available by subscribing to our PFAS Updates list (information to subscribe is on our website.)

## *Where can I get more information?*

If you have questions about your water system's operation, water quality monitoring, or response to this issue, please contact Matthew Mostoller or Alexandra Wahlstrom at 978-263-9107, wq@actonwater.com or Acton Water District, P.O. Box 953, Acton, MA 01720. If you have questions about the drinking water regulations or health risks posed by this contaminant, you can contact the MassDEP Drinking Water Program at: program.director-dwp@mass.gov or (617) 292-5770. If you have questions about specific symptoms, you can contact your doctor or other health care provider. If you have general questions about public health, you can contact the Massachusetts Department of Public Health at (617) 624-5757.

- **MassDEP Fact Sheet - Questions and Answers for Consumers**
  https://www.mass.gov/media/1854351
- **CDC ATSDR Information on PFAS for consumers and health professionals**
  https://www.atsdr.cdc.gov/pfas/index.html
- **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
- **Acton Water District – PFAS Information**
  https://www.actonwater.com/pfas

This notice is being sent to you by:

Acton Water District | System ID#: 2002000 | Date distributed: 11/29/2023

***Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.***

# Important Information about Your Drinking Water

## Third Quarter 2023 PFAS6 Update

The Acton Water District had PFAS6 levels in excess of the Massachusetts drinking water standard at one of our four water treatment plants during the July-September 2023 compliance period. For a copy of the required Public Notice containing more details about this violation, including a summary of results, recommended actions for consumers, and information on actions the District is taking to address this matter, visit *www.actonwater.com/pfaspn*.

To access the most current sampling data and information on our bottled water rebate program for the sensitive subgroup or to sign up to receive email updates about new information or future developments relating to PFAS, visit *www.actonwater.com/pfas*.

**This notice is being set to you by:**

**Acton Water District • System ID: 2002000 • Date Distributed: November 29, 2023**

Acton Water


District

P.O. Box 953
Acton, MA 01720

## Important Information about Your Drinking Water

**Third Quarter 2023 PFAS6 Update**

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For more information
and questions, contact
Matthew Mostoller
or Alexandra Wahlstrom
978-263-9107
*wq@actonwater.com.*

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# Per- and Polyfluoroalkyl Substances (PFAS) Point-of-Use Treatment System Study

FINAL REPORT

November 2023


*UMass Mobile Water Innovation Laboratory at the Townsend Water Department*

MassDEP

UMass Amherst

# ACKNOWLEDGEMENTS

This document was developed in collaboration between the MassDEP Drinking Water Program and the University of Massachusetts - Amherst, Department of Civil and Environmental Engineering. The following individuals from the University of Massachusetts - Amherst contributed to this project:

Kuhu Choudhary, Mariana Lanzarini-Lopes, Hannah Parzen, Xochitl Perez Medina, David Reckhow, Richard Rogers, John Tobiason, Patrick Wittbold

# EXECUTIVE SUMMARY

This report describes the Point of Use (POU) Treatment Study design, methods, results, and future recommendations to evaluate the effectiveness and capacity of commercially available POU water treatment devices to remove per- and polyfluoroalkyl substances (PFAS) from contaminated drinking water in the Commonwealth. The project was carried out under an Inter-Departmental Service Agreement (ISA) with the Massachusetts Department of Environmental Protection (MassDEP) using funds provided by the Massachusetts Clean Water Trust.

Key elements for the study were as follows:

1. **Public Water Systems participation:** MassDEP requested volunteer Public Water Suppliers to participate in the study on July 30th and November 11th, 2021, through its "In The Main" newsletter. MassDEP and UMass wanted to see how effectively POUs functioned in diverse water chemistries, from different sources (surface water or groundwater), and with common co-contaminants. The Town of Burlington, Townsend Water Department, Wayland DPW, and Hanover Water Department all responded to the invitation, but ultimately only the Townsend Water Department participated in the study.
2. **Device selection:** Forty devices were identified in the market using product review websites that recommend POU devices and are commonly frequented by consumers, including Popular Mechanics, Consumer Reports, and Wirecutter. For this study 17 POUs were selected for testing and categorized by installation location, media type (e.g., carbon block, spun fiber, coconut shell fiber, etc.), and whether the device was certified by the National Sanitation Foundation (NSF Standard 53) for the removal of PFOA/PFOS.
3. **The Trailer**: The "Trailer" is the UMass Mobile Water Innovation Laboratory that has the capacity to test up to ten POU units at a time. It is configured to house and operate POU devices to simulate household locations and conditions specific to the use case of each device. In the spring of 2022, the trailer was deployed to Townsend, MA, to evaluate 17 POU devices.
4. **Laboratory analysis**: A total of 51 water samples were analyzed by a commercial MassDEP-certified lab, PACE (formerly Con-test) Analytical Laboratory in East Longmeadow, MA, using U.S. Environmental Protection Agency (EPA) method 537.1 for 18 individual PFAS compounds, including the PFAS6 compounds.
5. **Budget:** The total budget for the project was $164,400. Costs included trailer set up, site deployment, device testing, and staffing.

### *Results and Conclusions*

Five of the 17 filters showed an effluent PFAS6 concentration below the Massachusetts Maximum Contaminant Level (MCL) of 20 nanograms per liter (ng/L) or parts per trillion (ppt) at 100% of the manufacturer recommended volume capacity. Three filters: 3M plumbed-in (Carbon Block), A.O. Smith plumbed-in (GAC), and ZeroWater (GAC), showed no detection (ND) for the samples run at 100% and 200% of the volume capacity. ZeroWater and A. O. Smith are GAC filters and are certified by NSF under standard 53 for the removal of PFOA/PFOS. All other devices had variable concentrations of PFAS6 above the Massachusetts MCL. The results of this analysis show that most of the filters - 12 of the 17 readily available for consumers - are not able to produce water with PFAS6 below the Massachusetts MCL of 20 ng/L at 100% of the manufacturer recommended volume capacity for Townsend Water Department's well water chemistry. However, it is important to note that none of these 12 filters possess NSF 53 certification, which means that they are not certified to remove PFAS. Additional research must be done on these devices, including a thorough breakthrough investigation of various water chemistries. Additionally, the

performance of POU devices are dependent on proper maintenance and timely replacement of POU components as specified by the manufacturer.

### *Future Recommendations*

Considering the 2022 draft EPA lifetime health advisory levels for PFOA of 0.004 ng/L and PFOS 0.02 ng/L as well as EPA's proposed National Primary Drinking Water Regulation to establish legally enforceable levels of 4 ng/L for PFOA and PFOS, and to regulate the combination of four additional PFAS – GenX, PFBS, PFHxS and PFNA, it is recommended that any future testing prioritize POU devices that maintain a non-detectable PFAS6 concentration in the effluent water at 100% of the manufacturers recommended throughput. Also, given the expected importance of water chemistry and PFAS profile on performance, a few carefully selected devices should also be tested against at least three other sources of PFAS-contaminated water. A full breakthrough analysis should be conducted on these devices across a total of four distinct water chemistries.

While MassDEP recommends that consumers use treatment devices certified to meet the NSF standards for the removal PFOS and PFOA, consumers should recognize that the NSF standard is set at EPA's former health advisory of 70 ng/L for the sum of PFOS and PFOA and is not as protective as MassDEP's drinking water standard of 20 ng/L for the sum of six PFAS (PFAS6) or EPA's proposed drinking water standards. Some of the treatment devices certified to meet NSF standards may be able to reduce PFAS6 levels to well below 70 ng/L, however there are no federal or state testing requirements for these treatment devices. Consumers who choose to install a treatment device should check to see if the manufacturer has independent, verifiable PFAS monitoring results demonstrating that the device can reduce PFAS below the all applicable drinking water standards, including the current Massachusetts PFAS6 MCL of 20 ng/L.

Given the changing scientific, health and regulatory climate for PFAS, MassDEP will share the information from this project and links from similar relevant studies as information sources for interested parties. MassDEP will continue to work with UMass to identify opportunities to utilize the mobile laboratory for further PFAS and other emerging contaminants analysis and evaluation, including a plan to potentially use the mobile laboratory for testing of emerging contaminants and treatment technologies for Small or Disadvantaged Communities with public water systems that have been contaminated by PFAS.

# INTRODUCTION

Point of Use (POU) systems provide water treatment at distributed locations where the consumer uses it. A POU system could be installed at an individual tap, faucet, or shower. POU systems include filters that connect to a water line under the sink, attach to a faucet, or are pitchers one fills with water. They can cost several hundred dollars to install which is approximately an order of magnitude lower than the cost of point of entry treatment (POET) systems which are installed on the main water supply line serving a building.

The research question for the study focuses on information for residential consumers: if one installs a POU device and follows the manufacturer's recommendations for maintenance, how effective is that device at reducing the concentration of PFAS? What extent of PFAS removal would occur if a consumer followed the manufacturer's recommendations? These questions were selected as the simplest way for consumers to determine how best to control PFAS in domestic tap water given the rapidly changing regulatory and certification climate.

This report describes the POU Treatment Study design, methods, result, and future recommendations to evaluate the effectiveness and capacity of commercially available POU water treatment devices to remove per- and polyfluoroalkyl substances (PFAS) from contaminated drinking water in the Commonwealth.

## DEVELOPMENT OF THE PROJECT

### *Trailer/apparatus:*

POU device performance is dependent on flow, concentration, and environmental conditions. The UMass Mobile Water Innovation Laboratory (the "trailer") was configured to house and operate multiple POU devices to simulate household location and conditions specific to the use case of each device.

The trailer allows for "plug and play" mode of testing. This means that devices can be quickly removed from and/or added to the trailer for operation and water quality sampling. The initial plan was to evaluate ten new devices each time the trailer was moved to a new location (initial plan for four locations).

The trailer has a capacity of testing up to ten POU units at a time. Water flow through each of ten individual POU devices connected in parallel was monitored and controlled. Flow was maintained in the range of 0.05-1.6 gallons per minute to emulate household flows while staying consistent with the manufacturer-claimed flow rate for optimum performance of the filter. Since each manufacturer sets its own flow rate, the study analyzed how well each device performed relative to the manufacturers' recommendations. The trailer set-up includes various control valves to obtain consistent and uniform flow through each device. One refrigerator unit was installed to simulate temperature conditions of the refrigerator POU units. The unit was also used to store samples after collection to comply with the sampling protocol.

### *Device Selection*

Forty devices were identified in the market, 17 of which were selected for study based on the process below. They were further divided into four categories: faucet mounted, refrigerator, plumbed-in, which includes filters that can be connected under the sink or placed on the countertop near the sink, and standalone.

The categories maintain the distinction between different types of filters while still encompassing the devices available on the market, including those found in hardware and home improvement stores. Several factors were considered when selecting the 40 devices, including certification, claims by the manufacturer to remove PFAS, and cost to the consumer. The first step was to identify generally used consumer review businesses that recommend POU devices. Three websites were selected: Popular Mechanics, Consumer Reports, and The Wirecutter.

Once the recommended POUs (Table 1) were identified, those certified under the National Sanitation Foundation's Standard 53, "Drinking Water Treatment Units – Health Effects" were selected for this study. Additional POUs where the manufacturer's advertising included a claim to remove PFOA and PFOS were also included in the study. These were included in order to provide information about the effectiveness of recommended POU devices, regardless of certification status. The POU filter models, media type (carbon block, spun fiber, coconut shell fiber, etc.), along with the manufacturer-claimed throughput volume (total gallons that can be treated before the filter has to be replaced) and replacement frequency were noted to aid in designing the sampling matrix.

### *Sampling protocol*

The volume of water treated and the collection of samples for each filter was based on the manufacturer-rated throughput volume capacity. This information is available to the POU consumer. Samples were collected at 100% and 200% of the throughput volume capacity. Triplicate samples of treated water from each device at each selected capacity point were collected along with samples of raw water (to establish the influent PFAS6 concentration), resulting in three unique samples for each device. All samples were

collected in certified pre-cleaned polypropylene 250-mL containers preserved with Trizma and were kept refrigerated.

The study was designed to evaluate the performance of POU device in removing PFAS6 (PFHxS, PFHpA, PFOA, PFOS, PFNA, PFDA) compounds from water. The treated water goal is to produce water with PFAS6 levels below the Massachusetts MCL of 20 ng/L. The results for the study are generated based on analysis of raw water and the 100% and 200% manufacturer-rated throughput capacity samples. Raw water was sampled for PFAS6 at uniform intervals and testing revealed a deviation of approximately 15% for all samples from the reported value of 122.6 ng/L.

*Table 1. List of point of use devices and the ones included in this study highlighted.*

| | Brand | Model | Category | Media Type | NSF 53 |
|---|---|---|---|---|---|
| 1 | GE | GXK185KBL | Plumbed-in | Spun Fiber | NO |
| 2 | Whirpool | WHKF-DUF | Plumbed-in | Carbon Block | NO |
| 3 | Samsung | HAF-CIN | Refrigerator | Carbon Block | NO |
| 4 | GE | RPWFE | Refrigerator | Carbon Block | YES |
| 5 | PUR | RF9999 | Faucet | Carbon Block | NO |
| 6 | Brita | SAFF-100 | Faucet | Carbon Block | NO |
| 7 | Zero Water | ZD018 | Standalone | GAC | YES |
| 8 | HDX | | Standalone | | NO |
| 9 | Ispring | | Plumbed-in | GAC | NO |
| 10 | PUR | DS1800ZV5 | Standalone | GAC | NO |
| 11 | AO Smith | AOMFB | Plumbed-in | GAC | YES |
| 12 | LG | | Refrigerator | Carbon Block | NO |
| 13 | Clear Choice | CLCH105 DA29-00020B | Refrigerator | Carbon Block | NO |
| 14 | WaterDrop | WD-FC-01 | Faucet | Carbon Block | NO |
| 15 | Culligan | FM-15RA | Faucet | Carbon Block | NO |
| 16 | Brita | OB03 | Standalone | GAC | NO |
| 17 | Clear2o | GRP200 | Standalone | Carbon Block | NO |
| 18 | 3M Aqua-Pure | AP-DWS1000LF | Plumbed-in | Carbon Block | NO |
| 19 | DrinkPod | | Standalone | Carbon Block | NO |
| 20 | WaterDrop | WD-CTF-01 | Plumbed-in | Carbon Block | No |
| 21 | Brondell | UC100 | Plumbed-in | Carbon Block | YES |
| 22 | CuZn | UC-200 | Plumbed-in | GAC | NO |
| 23 | Home Master | TMJRF2E | Plumbed-in | GAC | NO |
| 24 | HDX | FMS-2 | Refrigerator | Carbon Block | NO |
| 25 | Brita | WFRF104 | Refrigerator | GAC | NO |
| 26 | Ispring | DF2 | Faucet | GAC | NO |
| 27 | DuPont | WFFM350CH | Faucet | Carbon Block | NO |
| 28 | Vitapur | | Standalone | Carbon Block | NO |
| 29 | LifeStraw | | Standalone | GAC | NO |
| 30 | Naki | | Standalone | GAC | NO |
| 31 | IVO | B08KSH2QQ3 | Faucet | GAC | NO |
| 32 | Wingsol | 6.54070892364E+11 | Faucet | Spun Fiber | NO |
| 33 | Apec Water Syst | CS-2500 | Plumbed-in | GAC | NO |
| 34 | Kohler | 77686-NA | Plumbed-in | GAC | YES |
| 35 | EveryDrop | W10295370A | Refrigerator | Carbon Block | NO |
| 36 | AquaFresh | WF3CB | Refrigerator | Carbon Block | NO |
| 37 | Epic Water | | Standalone | Carbon Block | NO |
| 38 | PUR | CR1100CV | Standalone | Carbon Block | NO |
| 39 | Brita | 36261 | Standalone | Carbon Block | NO |
| 40 | Apec Water Syst | WD-CTF-01 | Plumbed-in | Carbon Block | NO |

### *Analysis Protocol*

Raw water samples as well as treated samples collected after each device was in service for a period resulting in 100% of the manufacturer's recommended throughput volume, and a second treated sample at twice that throughput volume (i.e., 200%). Each of these samples were sent to a commercial lab for PFAS analysis. These volume capacities were analyzed to understand the performance of the filter at the recommended throughput volume and at twice that volume in recognition that some consumers may not perform required maintenance according to manufacturers' recommendations. Samples were analyzed by a commercial MassDEP-certified lab, PACE (formerly Con-test) Analytical Laboratory in East Longmeadow, MA by EPA method 537.1 for 18 individual PFAS compounds, including the PFAS6 compounds.

## PROJECT FINDINGS

In the spring of 2022, the mobile water innovation laboratory (the "trailer", designed and built by UMass) was deployed to Townsend, MA where it was placed adjacent to the Harbor Trace well house for access to this PFAS-contaminated groundwater supply. The initial study design was to evaluate 10 separate POU devices with this well water. When the other PWS volunteers dropped out of the project, the decision was made to keep the trailer in Townsend and evaluate the performance of 20 different POU devices using Townsend raw water. Samples of raw water (device influent) and treated water (device effluent) were collected for subsequent PFAS laboratory analyses. Water samples were collected at various percentages of the manufacturers' recommended capacity for the device.

### *Results*

In total, 17 point of use (POU) devices were examined; these included four faucet-mounted filters, five plumbed-in filters (including under-sink and countertop filters), three refrigerator filters and five stand-alone filters. The filters were operated in a mobile laboratory with influent water coming from Harbor Trace well in Townsend, MA.

Triplicate water samples were collected after treatment of specified volumes of water. Volumes were based on selected fractions or percentages of the manufacturers' stated volume capacity for each device. The flow rate was set to mimic a household flowrate and was kept between 0.05-1.6 gallons per minute (gpm). The effluent concentrations of PFAS6 (in ng/L) for each filter are illustrated in Figure 1, which also indicates the MassDEP PFAS public drinking water standard, or the Massachusetts MCL of 20 ng/L.

The six PFAS comprising the PFAS6 MCL are: perfluorooctane sulfonic acid (PFOS); perfluorooctanoic acid (PFOA); perfluorohexane sulfonic acid (PFHxS); perfluorononanoic acid (PFNA); perfluoroheptanoic acid (PFHpA); and perfluorodecanoic acid (PFDA).

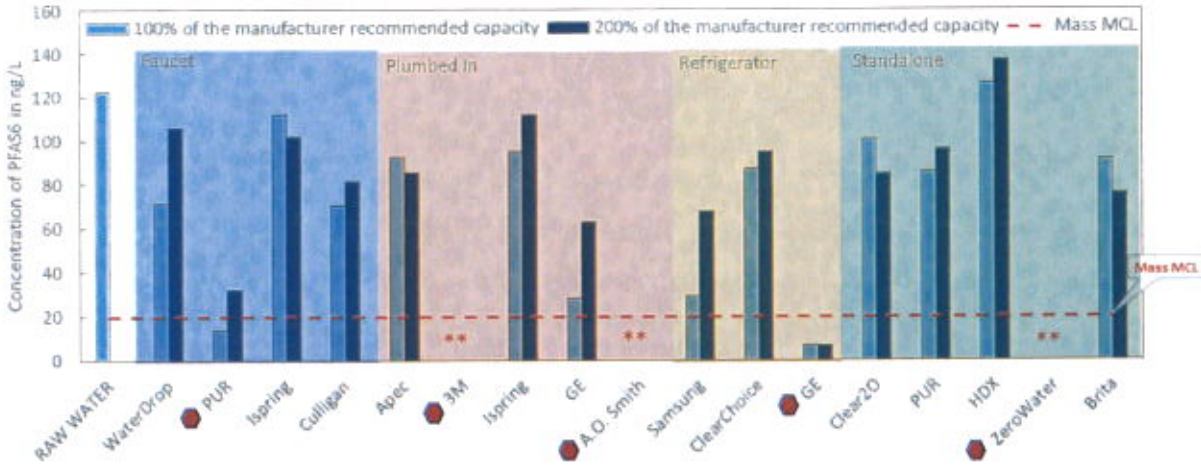


***Figure 1.*** *PFAS6 concentrations in effluent of tested filters at 100% (light blue) and 200% (dark blue) volume capacity based on manufacturer recommendations. Devices are divided by category. Asterisk (*) denotes no PFAS6 was detected in the sample. Devices marked with ⬢ had less than 20 ng/L PFAS6 detected in the effluent sample at 100% volume capacity based on manufacturer recommendations for the water tested in this study.*

Five of the 17 filters showed an effluent PFAS6 concentration below the Massachusetts MCL of 20 ng/L at 100% of the manufacturer recommended volume capacity. The effluent concentrations of samples collected from the PUR faucet and GE refrigerator were 13.8 and 6.8 ng/L, respectively. There was no concentration detected (ND) for the samples run at 100% and 200% of the volume capacity for the 3M plumbed-in, A.O. Smith plumbed-in, and ZeroWater standalone filters.

The detection limits for EPA method 537.1 are different for each analyte and range from 0.71 to 2.8 ng/L. All other devices had concentrations of PFAS6 above the Massachusetts MCL. At 200% of the manufacturer recommended volume capacity, the GE refrigerator, 3M plumbed-in, A. O. Smith plumbed-in and ZeroWater standalone had effluent concentrations below the MCL and comparable to levels at 100% of their volume capacities with concentrations at 6.4 ng/L, ND, ND, and ND, respectively. However, the effluent concentration of the PUR faucet increased above the MCL to 32 ng/L. In this case, the device effluent reached levels above 20 ng between the 100% and 200% of the PUR faucet volume capacity. The study demonstrated that most of the filters – 12 of the 17 readily available for consumers – are not able to produce water with PFAS6 below the Massachusetts MCL of 20 ng/L at 100% the recommended volume throughput capacity for the Harbor Trace well water chemistry. It is important to note that none of these devices has an NSF 53 approval and therefore is not been certified to remove PFAS.

Two of the devices that maintained an effluent concentration below 20 ng/L limit were dual stage filters (3M plumbed-in and A.O. Smith plumbed-in). The 3M plumbed-in device contains a multi-composite media filter followed by a solid pressed powdered activated carbon block. The A.O. Smith dual stage filtration includes two Claryum® carbon block filters. Three of the five filters that maintained an effluent concentration below the Massachusetts MCL for the 100% recommended throughput are certified by NSF under NSF certification 53 for the removal of PFOA/PFOS. POU devices that comply with NSF 53 are able to maintain PFOS and PFOA levels below the prior EPA health advisory level of 70 ng/L (for the sum of PFOS and PFOA) under standard NSF water quality conditions. These filters include A.O Smith plumbed-in, G.E. refrigerator, and Zero Water standalone filter. The 3M plumbed-in filter was the only non-NSF certified filter to maintain a non-detect PFAS6 concentration at 200% of the recommended throughput.

Figure 2 illustrates the gallons of water filtered through each device at 100% of the manufacturer recommended throughput, or the amount of water the manufacturer states the device can filter before the filter needs replacement. These values range from 20 gallons for the ZeroWater standalone to 1000 gallons for the Apec plumbed-in device. Of the devices that maintained PFAS6 levels below the Massachusetts MCL for the tested water source, the 3M plumbed-in had the largest throughput at 650 gallons followed by the A.O. Smith plumbed-in (500 gallons), the GE refrigerator (170 gal), the PUR faucet (100 gal) and the ZeroWater standalone (20 gallons). In general, standalone devices have the lowest recommended throughput capacity ranging from 20 – 60 gallons. Figure 3 illustrates the concentration of PFAS6 against the gallons passed through the filter at 100% and 200% of the manufacturer rated capacity. This information helps the consumer visualize device performance with water consumption. Figure 4 shows images of each of the five devices that maintained an effluent concentration below the Massachusetts MCL at the recommended throughput. Devices outlined in green maintained non-detect PFAS6 effluent concentrations for both the 100% and 200% throughput samples.

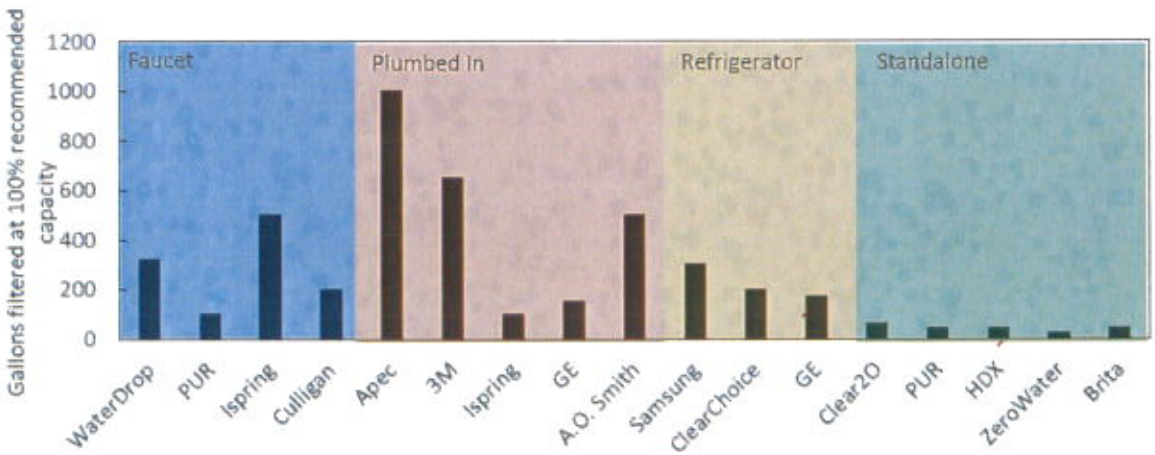


***Figure 2.*** *Manufacturer recommended volume capacity (gallons).*

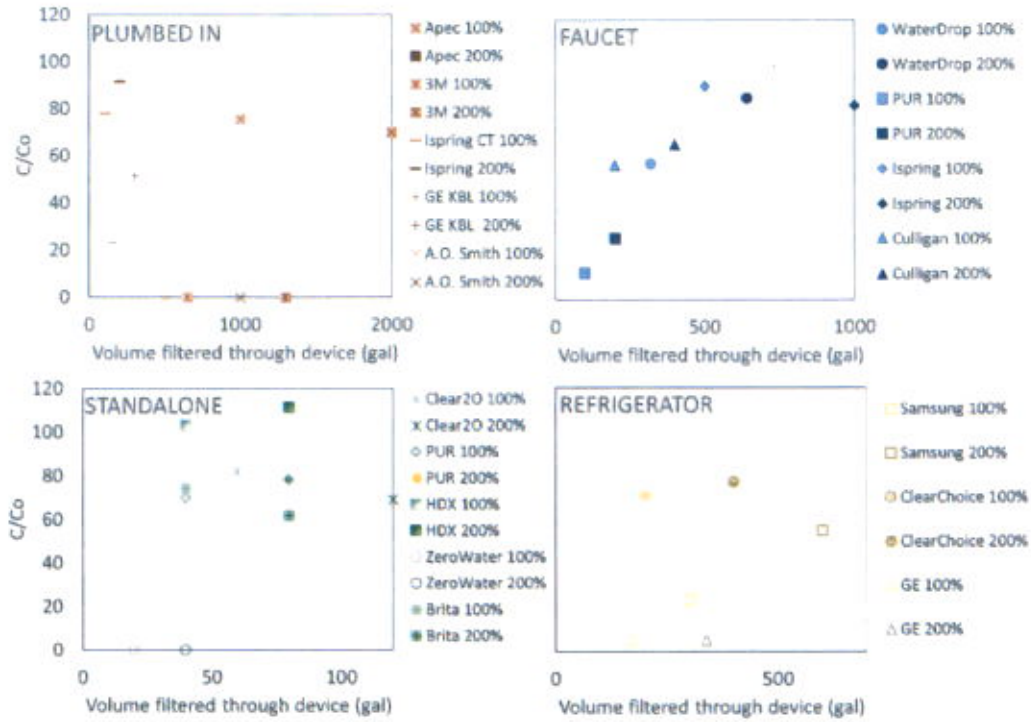


***Figure 3.*** *PFAS6 effluent concentrations as percent of influent concentration versus volume of water filtered at 100% and 200% recommended throughput volume for each device.*


***Figure 4.*** *Devices that maintained effluent concentration below the MassDEP MCL at 100% throughput.*

### *Cost Considerations*

For comparison purposes, an equivalent uniform annual cost was computed for each POU device. This cost incorporated the annualized value of purchasing the device housing and the recurring cost of replacing the filter cartridge following the manufacturer's time-based recommendations (*e.g.*, every three months). On average, the cartridge replacement costs comprise 65% of the overall equivalent uniform annual cost. Changing the cartridges more frequently than recommended (due to increased consumption) will increase the costs.

Figure 5 presents these costs by category of device. The costs range from $46 – $176 per year. The least expensive device that met the Massachusetts PFAS6 MCL costs $62 per year. Within this set of devices, there was not a strong association between cost and either category of device or ability to remove PFOA/PFOS to the MMCL of 20 ng/L. Higher cost did not correlate with removal for the set of devices analyzed.

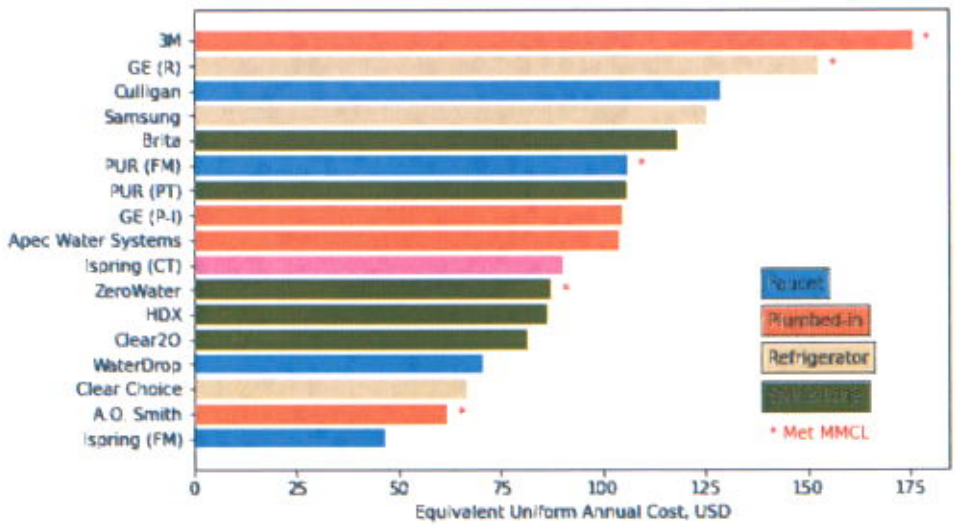


***Figure 5*** *Illustrates the annualized cost of the POU devices in this study when filter cartridge changes occur at manufacturer-recommended intervals. Bar colors indicate the device category; asterisks denote devices that meet the MMCL at the 100% recommended throughput.*

## *OTHER CONSIDERATIONS:*

The original project design was to develop and build a mobile laboratory that would process samples from up to 10 POU devices at a time, deploy that mobile laboratory at 4 different MA communities with drinking water exceeding the Massachusetts PFAS6 standard of 20 ng/L for the sum of six PFAS, gather multiple samples from each device as the PFAS contaminated drinking water flowed through the devices, use newly installed "in-house" analytical equipment at UMass Amherst to analyze the samples based on EPA method 537.1, and then publish the results for consumers.

However, the project ran into three problems which delayed progress. First, the budget estimate developed in 2019 for designing and building this unique mobile testing laboratory did not anticipate the added time, expense, and difficulty of doing this work in COVID times. Second, the analytical equipment installed at UMass in 2020 that UMass intended to use for analysis of samples for this project encountered a series of problems that rendered it unusable for low-level PFAS analysis. Third, as the project timeline stretched into 2021 and as Massachusetts Public Water Systems (PWS) began constructing PFAS treatment, only one

PWS remained available to host the trailer. These considerations resulted in a more scaled down study than originally anticipated.

## CONCLUSIONS AND RECOMMENDATIONS

Seventeen point of use (POU) devices were examined. Five of them showed an effluent PFAS6 concentration below the Massachusetts MCL of 20 ng/L at 100% of the manufacturer recommended volume capacity and of these five, three showed no detection (ND). Out of the 12 devices that exhibited PFAS6 concentrations in their effluents, none possesses NSF 53 approval, which indicates that they have not been certified to be able to remove PFAS to 70 ng/L.

The on-site mobile laboratory approach demonstrated the proof-of-concept at one source of contaminated drinking water to simultaneously evaluate multiple POU devices. Once the mobile laboratory was outfitted with its POU devices and controls, it was used to collect treated water samples from 17 POU devices with; laboratory analyses completed for selected samples.

Considering the recent update to the EPA lifetime health advisory levels for PFAS compounds, including a health advisory level for PFOS of 0.004 ng/L and PFOA 0.02 ng/L as well as EPA's proposed National Primary Drinking Water Regulation to establish legally enforceable levels of 4 ng/L for PFOA and PFOS, and to regulate the combination of four additional PFAS – GenX, PFBS, PFHxS and PFNA, it is recommended that future testing prioritize POU devices that maintain a non-detectable PFAS6 concentration in the effluent water at 100% of the manufacturers recommended throughput. Also, given the expected importance of water chemistry and PFAS profile on performance, the devices should also be tested against at least three other types of PFAS-contaminated water. A full breakthrough analysis would be conducted on these devices at a total of four distinct water chemistries.

While MassDEP recommends that consumers use treatment devices certified to meet the NSF standards for the removal PFOS and PFOA, consumers should recognize that the NSF standard is set at EPA's former health advisory of 70 ng/L for the sum of PFOS and PFOA and is not as protective as MassDEP's drinking water standard of 20 ng/L for the sum of six PFAS (PFAS6) or EPA's proposed drinking water standards. Some of the treatment devices certified to meet NSF standards may be able to reduce PFAS6 levels to well below 70 ng/L, however there are no federal or state testing requirements for these treatment devices. Consumers who choose to install a treatment device should check to see if the manufacturer has independently verifiable PFAS6 monitoring results demonstrating that the device can reduce PFAS below the Massachusetts PFAS6 MCL of 20 ng/L. In addition, to verify that the device achieves PFAS6 levels less than 20 ng/L, consumers may need to resample their water after the treatment device has been installed. For more information see MassDEP's PFAS POU information here: https://www.mass.gov/info-details/pfas-in-private-well-drinking-water-supplies-faq.

Given the changing scientific, health and regulatory climate for PFAS, MassDEP will share the information from this project and links from similar relevant studies as information sources for interested parties. MassDEP will continue to work with UMass to identify opportunities to utilize the mobile laboratory for further PFAS and other emerging contaminants analysis and evaluation, including a plan to potentially include use of the mobile laboratory for testing of emerging contaminants and treatment technologies for Small or Disadvantaged Communities.

For information on this project please contact:

MassDEP Drinking Water Program at program.director-dwp@mass.gov
UMass POU Research Team at marianalopes@umass.edu

Property Address: 549 Main Street, Acton, MA 01720

# ORDER OF TAKING

Whereas the Water Supply District of Acton under authority of Article 18 of the Official Warrant of the Annual Meeting, as unanimously voted on March 15, 2023, the Special Acts of 1912, Chapter 326, as amended, and Chapter 40 and Chapter 79 of the General Laws and by all of the laws enabling, did, by eminent domain take, in fee simple that certain parcel of vacant land, containing 56.85 acres, more or less, now or formerly owned by Phoebe M. Conant and Patricia D. Popov, as Trustees of The Brewster Conant Trust – 2017, under a declaration of trust dated July 27, 2017, situated on Main Street and Brook Street in Acton, Middlesex County, Massachusetts, being known as Parcel C but is shown as Parcel 2A on a plan entitled "Plan of Land in Action, Mass. (Middlesex County) For: Water Supply District of Acton" dated February 13, 1995, drawn by Stanski and McNary, Inc., recorded with Middlesex South District Registry of Deeds as Plan No. 1168 of 1995 in Book 25911, Page 35. Said Lot 2A is also shown as Lot 2A containing 56.85 acres, more or less, on a new plan recorded herewith, entitled "Plan of Land Main & Brook Streets, Acton, Mass.," prepared for Water Supply District of Acton, dated _____ 2023, drawn by Goldsmith, Prest & Ringwall, Inc., with all the trees thereon and all groundwater sources of supply therein, for the purpose of protection and conservation of groundwater aquifers and recharge areas, for water supply, well protection and development, watershed protection purposes and for the purpose of collecting, storing, holding, purifying and treating water, conveying the same to other parts of the district, and for all things pertinent to its duties as a Massachusetts water district.

For damages sustained by Phoebe M. Conant and Patricia D. Popov, Trustees of The Brewster Conant Trust – 2017, or its successors in title by reason of the aforesaid taking and in accordance with the provisions of General Laws, Chapter 79, section 6, as amended, an award has been made. The Water Supply District of Acton reserves the right to amend the award or to increase the amount of damages to be paid at any time prior to payment thereof where good cause is shown.

Dated at Acton, Massachusetts this 5th day of December 2023.

WATER SUPPLY DISTRICT OF ACTON
By its Commissioners,

_____
Erika Amir-Lin

_____
Stephen C. Stuntz

_____
Barry Rosen

COMMONWEALTH OF MASSACHUSETTS

Middlesex, ss December 5, 2023

On this 5th day of December 2023 before me, the undersigned notary public, personally appeared, Erika Amir-Lin, Stephen C. Stuntz and Barry Rosen, Commissioners of the Water Supply District of Acton and proved to me through satisfactory evidence of identification, which were MA drivers licenses, to be the persons whose name is signed on the preceding or attached document, and each one acknowledged to me that he or she signed it voluntarily for its stated purpose.

_____
Notary Public:
My Commission Expires: