

# A Water Quality Presentation in three parts

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September 14, 2021  
to the  
Cambridge Water Board

# Topics Covered:

- The modification of our process to remove PFAS (Per and Poly Fluoro Alkyl Substances).
- Hard Water. A Primer.
- An update on the Safe Drinking Water Act, Lead and Copper Rule

**The Regulations  
and  
The removal of Disinfection Byproducts and PFAS (Per and Poly Alkyl  
Substances)**

- The treatment plant was designed for the removal of **Dissolved Organic Carbon (DOC)** and not PFAS.
- **DOC is food for bacteria, viruses, yeasts, molds, etc.** and, hence the need for disinfection when these “critters” are present.

## The Regulations and

### The removal of Disinfection Byproducts and PFAS (Per and Poly Alkyl Substances)

- DOC reacts with chlorine to form what is called **Disinfection Byproducts (DBPs): Trihalomethanes (THM)** – Trichloromethane (chloroform as suspected carcinogen) and **Haloacetic acids (HAA)** – Trichloroacetic acid (a suspected carcinogen)
- The **Dissolved Air Floatation (DAF)** process removes approximately 40% of the DOC in the source water.
- Disinfection by Ozone breaks down long chain DOC compounds to shorter ones.
- **Granular Activated Carbon (GAC)** filtration removes approximately 5-10% of the DOC.
- Drinking water regulations require our process to remove 35% of DOC, **we remove 45-50%**

## The Regulations and

### The removal of Disinfection Byproducts and PFAS (Per and Poly Alkyl Substances)

- What's left of the DOC after filtration *reacts* with Chlorine used for disinfection to form THM and HAA compounds.
- *Drinking Water Regulations* require **Total THMs** (sum of four compounds) to be less than 80 ppb (parts per billion), **we have approximately 10 ppb.**
- *Drinking Water Regulations* require **Total HAA** (sum of five compounds) to be less than 60 ppb, **we have approximately 9 ppb.**

**The Regulations  
and  
The removal of Disinfection Byproducts and PFAS (Per and Poly Alkyl  
Substances)**

- DOC is being removed right now in our filters that are used as *bio-contactors*. The filter media is used as an ***adsorber***. A film of bacteria forms on the GAC and consumes the DOC. When filters are operated as *bio-contactors*, the filter media lasts a long time.
- **Presently** PFAS is *not removed or destroyed* by our purification process.
- PFAS needs to be ***absorbed*** by the GAC. When the GAC can no longer *absorb* PFAS it must be replaced.

**The Regulations  
and  
The removal of Disinfection Byproducts and PFAS (Per and Poly Alkyl  
Substances)**

- **Using GAC as an *absorber*: there will be competition to *absorb* both DOC and PFAS because there won't be enough time for a film of bacteria to form on the media shortening the filter media's life necessitating the need to replace the GAC often. There is much more DOC in the water –parts per million than PFAS – parts per trillion.**

# Water Hardness and Cambridge Tap Water

## Our biggest customer inquiry

- **Definition:** Hard water is water that has high mineral content (in contrast with "soft water"). Hard water is formed when water percolates through deposits of primarily calcium carbonate or limestone or chalk.
- Presently our Total Hardness is **68 milligrams per Liter (mg/L)** or Parts per million.
- Another unit of measurement is **4 grains per gallon**. This unit is commonly used on dishwasher operations manuals.



# Water Hardness and Cambridge Tap Water

## Our biggest customer inquiry

- Hard drinking water has **moderate health benefits** – think *Perrier*.
- **It can pose critical problems anytime water is heated.**
- Water hardness needs to be monitored to avoid costly breakdowns in boilers, cooling towers, and other equipment that handles hot water. **Follow the equipment's operating guidelines!**
- In domestic settings, hard water is often indicated by a lack of foam formation when soap is agitated in water, and by the formation of lime scale in kettles, humidifiers, mineral deposits on glassware and coming from water heaters. Again: **Follow the manufactures guidelines!**
- Wherever water hardness is a concern, water softening is commonly used to reduce hard water's adverse effects.

Cambridge Water Department

LCR Historical Data

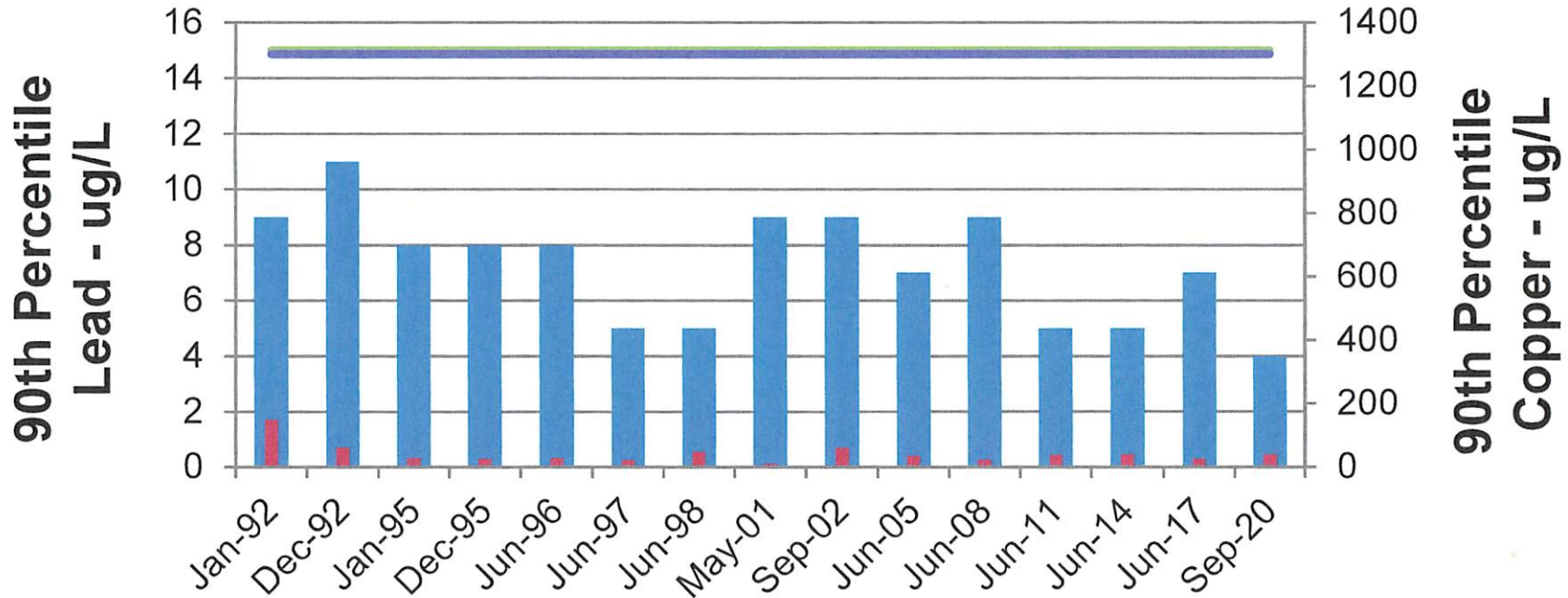
And

Lead and Copper Rule Revision



**Cambridge Water Department  
Safe Drinking Water Act - Lead and Copper Rule  
90th Percentile Lead and Copper Levels  
1992 - 2020**

- Lead, ug/L ppb
- Copper, ug/L ppb
- Lead Action Level, ug/L
- Copper Action Level, ug/L



# The New Lead and Copper Rule

First major update in nearly 30 years

Expected in fall 2024

## Better Protecting Children at Elementary Schools and Child Care Facilities

For first time, the new proposed LCR requires that community water systems test for lead in drinking water in elementary schools and childcare facilities that they serve.

## Getting the Lead Out

Trigger level of 10 ppb

New collection procedure

Replacing Lead Service Lines

## Empower Communities

Public Inventory of Lead Service Lines

Timely Testing Notification and Lead Reduction Options for Homeowners

Information on Funding Resources to Support Lead Service Line Replacement

