**Cambridge Water Department is committed to enhanced drinking water testing.**
In March of 2008 the Cambridge Water Department (CWD), in collaboration with the Cambridge Public Health Department (CPHD), established a voluntary biannual monitoring program of 86 PPCPs. Samples are collected from both untreated (raw) water and treated (finished) water. The analysis is performed by a laboratory using analytical methods with very low detection limits, measured in parts per trillion. There are no EPA-approved standard methods for detection of these chemicals and there are no water quality standards for these compounds in drinking water at this time. This monitoring program will provide additional assurance that the CWD and CPHD will continue to be aware of PPCP-associated chemicals in the water supply, even if they remain unregulated by EPA.

**Cambridge drinking water results**
In the very first round of samples (March 2008) from the Cambridge drinking water supply were found to have no measurable levels of dozens of chemical contaminants targeted in this study, but did reveal trace concentrations of two compounds in the treated (finished) water in the second round of testing. Nicotine and acetaminophen (e.g. Tylenol) were found at levels that are barely detectable (parts per trillion). These two chemicals were included in surveys of water systems across the country, though nicotine is not associated with any medication. A total of six chemicals were found in the untreated (raw) water samples; all but two chemicals, cited above, were destroyed by the treatment process or were reduced below measurable levels. The Cambridge Water Department (CWD) employs ozonation to treat raw water, a latest-generation technology that effectively kills bacterial contaminants and has been found to destroy many PPCP's. Ozone is used along with traditional treatment processes, e.g. pre-treatment with alum based dissolved air floatation (DAF), biological filtration, chlorination, pH adjustment and chloramination. Together all these processed contribute to the high quality of Cambridge drinking water.

The monitoring program test results are listed below in Table 1. The list will be up-dated as the monitoring program continues. CWD and CPHD encourage exploring the link at the bottom of this page for more information and perspective on PPCP's in drinking water and your health.

Questions about the health impact of these results on the water supply should be addressed to the Cambridge Public Health Department at 617-665-3838. Questions about the protection, monitoring, treatment or distribution of the Cambridge drinking water supply should be addressed to the Cambridge Water Department at 617-349-4773.

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Table 1

**Cambridge Raw and Finished Water PPCP Test Results**

| | | | |
|---|---|---|---|
| March 2008 Raw Water | | March 2008 Drinking Water | |
| Carbamazepine | 0.001ug/L | none | |
| Cotinine | 0.002 ug/L | | |
| DEET | 0.008 ug/L | | |
| September 2008 Raw Water | | September 2008 Drinking Water | |
| Acetaminophen | 0.012 ug/L | Acetaminophen | 0.019 ug/L |
| Carbamazepine | 0.003 ug/L | Nicotine | 0.007 ug/L |
| Cotinine | 0.002 ug/L | | |
| DEET | 0.016 ug/L | | |
| Nicotine | 0.011 ug/L | | |
| Paraxanthine | 0.007 ug/L | | |
| March 2009 Raw Water | | March 2009 Drinking Water | |
| Carbamazepine | 0.001 ug/L | Cotinine | 0.001 ug/L |
| Cotinine | 0.002 ug/l | | |
| September 2009 Raw Water | | September 2009 Drinking Water | |
| DEET | 0.010 ug/L | none | |
| March 2010 Raw Water | | March 2010 Drinking Water | |
| Atenolol | 0.005 ug/L | Atenolol | 0.003 ug/L |
| Carbamazepine | 0.003 ug/L | | |
| Cotinine | 0.001 ug/L | | |
| DEET | 0.008 ug/L | | |
| Sulfamethoxazole | 0.002 ug/L | | |
| September 2010 Raw Water | | September 2010 Drinking Water | |
| Carbamazepine | 0.001 ug/L | Cotinine | 0.001 ug/l |
| Cotinine | 0.003 ug/L | | |
| DEET | 0.014 ug/L | | |
| March 2011 Raw Water | | March 2011 Drinking Water | |
| Carbamazepine | 0.003 ug/L | Cotinine | 0.001 ug/L |
| Cotinine | 0.002 ug/L | Theobromine | 0.060 ug/L |
| DEET | 0.009 ug/L | | |
| Lasalocid | 0.003 ug/L | | |
| Nicotine | 0.005 ug/L | | |
| Paraxanthine | 0.012 ug/L | | |
| Simvastatin | 0.006 ug/L | | |
| Sulfamethoxazole | 0.002 ug/L | | |
| Theobromine | 0.070 ug/L | | |
| April 2012 Raw Water | | April 2012 Drinking Water | |
| Cis-Testosterone | 0.0002 ug/L | Theobromine | 0.190 ug/L |
| Carbamazepine | 0.002 ug/L | | |
| DEET | 0.007 ug/L | | |
| Sulfamethoxazole | 0.002 ug/L | | |
| Theobromine | 0.090 ug/L | | |

-Continued next page-

**Cambridge Raw and Finished Water PPCP Test Results – continued.**

| October 2012 Raw Water | |
|---|---|
| Carbamazepine | 0.001 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.013 ug/L |
| Theobromine | 0.050 ug/L |

| October 2012 Drinking Water | |
|---|---|
| Cotinine | 0.001 ug/L |
| Theobromine | 0.130 ug/L |

| May 2013 Raw Water | |
|---|---|
| Acetaminophen | 0.014 ug/L |
| Carbamazepine | 0.003 ug/L |
| DEET | 0.010 ug/L |
| Nicotine | 0.087 ug/L |
| Sulfamethoxazole | 0.002 ug/L |
| Theobromine | 0.160 ug/L |

| May 2013 Drinking Water | |
|---|---|
| Cotinine | 0.001 ug/L |
| Nicotine | 0.007 ug/L |
| Theobromine | 0.012 ug/L |

| October 2013 Raw Water | |
|---|---|
| Progesterone | 0.0001 ug/L |
| Carbamazepine | 0.002 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.013 ug/L |
| Sulfamethoxazole | 0.001 ug/L |

| October 2013 Drinking Water | |
|---|---|
| Cotinine | 0.001 ug/L |

| June 2014 Raw Water | |
|---|---|
| Progesterone | 0.0003 ug/L |
| Cis-Testosterone | 0.0006 ug/L |
| Carbamazepine | 0.002 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.010 ug/L |
| Nicotine | 0.006 ug/L |
| Sulfamethoxazole | 0.002 ug/L |

| June 2014 Drinking Water | |
|---|---|
| Cotinine | 0.001 ug/L |

| October 2014 Raw Water | |
|---|---|
| Progesterone | 0.2 ng/L |
| Carbamazepine | 0.001 ug/L |
| Cotinine | 0.003 ug/L |
| DEET | 0.012 ug/L |
| Sulfamethoxazole | 0.001 ug/L |

| October 2014 Drinking Water | |
|---|---|
| Cotinine | 0.002 ug/L |

| June 2015 | |
|---|---|
| Progesterone | 0.2 ng/L |
| Cis-Testosterone | 0.1 ng/L |
| Carbamazepine | 0.003 ug/L |
| Cotinine | 0.001 ug/L |
| DEET | 0.005 ug/L |
| Sulfamethoxazole | 0.001 ug/L |

June 2015 Drinking Water
No Detects

-Continued next page-

**Cambridge Raw and Finished Water PPCP Test Results – continued.**

| December 2015 Raw Water | |
|---|---|
| Carbamazepine | 0.001 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.013 ug/L |
| Lincomycin | 0.0002 ug/L |
| Nicotine | 0.007 ug/L |

| December 2015 Drinking Water | |
|---|---|
| Cotinine | 0.001 ug/L |
| DEET | 0.005 ug/L |
| Nicotine | 0.006 ug/L |

| March 2016 Raw Water | |
|---|---|
| Cis-Testosterone | 0.1 ng/L |
| Carbamazepine | 0.002 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.007 ug/L |
| Sulfamethoxazole | 0.001 ug/L |
| Tris (chloropropyl) phosphate | 0.03 ug/L |

| March 2016 Drinking water | |
|---|---|
| Cotinine | 0.001 ug/L |
| Tris (chloropropyl) phosphate | 0.03 ug/L |

| September 2016 Raw Water | |
|---|---|
| Carbamazepine | 0.001 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.014 ug/L |
| Acesulfame-K | 0.63 ug/L |
| Sucralose | 0.250 ug/L |

| September 2016 Drinking water | |
|---|---|
| Cotinine | 0.001 ug/L |
| DEET | 0.010 ug/L |
| Acesulfame-K | 0.18 ug/L |
| Sucralose | 0.146 ug/L |

| April 2017 Raw Water | |
|---|---|
| Carbamazepine | 0.002 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.008 ug/L |
| Tris (chloropropyl) phosphate | 0.04 ug/L |
| Acesulfame-K | 1.00 ug/L |
| Sucralose | 0.250 ug/L |
| Sulfamethoxazole | 0.001 ug/L |

| April 2017 Drinking water | |
|---|---|
| Cotinine | 0.002 ug/L |
| Tris (chloropropyl) phosphate | 0.03 ug/L |
| Acesulfame-K | 0.42 ug/L |
| Sucralose | 0.222 ug/L |

| October 2017 Raw Water | |
|---|---|
| Carbamazepine | 0.002 ug/L |
| Cotinine | 0.003 ug/L |
| DEET | 0.014 ug/L |
| Tris (chloropropyl) phosphate | 0.01 ug/L |
| Acesulfame-K | 0.74 ug/L |
| Sucralose | 0.269 ug/L |

| October 2017 Drinking water | |
|---|---|
| Cotinine | 0.002 ug/L |
| Tris (chloropropyl) phosphate | 0.01 ug/L |
| Acesulfame-K | 0.27 ug/L |
| Sucralose | 0.152 ug/L |

| June 2018 Raw Water | |
|---|---|
| Carbamazepine | 0.003 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.011 ug/L |
| Tris (chloropropyl) phosphate | 0.02 ug/L |
| Acesulfame-K | 0.93 ug/L |
| Sucralose | 0.316 ug/L |
| Progesterone | 0.1 ng/L |
| Atenolol | 0.001 ug/L |
| Diltiazem | 0.0002 ug/L |
| Nicotine | 0.01 ug/L |
| Sulfamethoxazole | 0.002 ug/L |

| June 2018 Drinking water | |
|---|---|
| Cotinine | 0.001 ug/L |
| Tris (chloropropyl) phosphate | 0.01 ug/L |
| Acesulfame-K | 0.36 ug/L |
| Sucralose | 0.184 ug/L |

**Cambridge Raw and Finished Water PPCP Test Results – continued.**

| November 2018 Raw Water | |
|---|---|
| Carbamazepine | 0.002 ug/L |
| Cotinine | 0.003 ug/L |
| DEET | 0.013 ug/L |
| Tris (chloropropyl) phosphate | 0.03 ug/L |
| Acesulfame-K | 0.67 ug/L |
| Sucralose | 0.145 ug/L |

| November 2018 Drinking water | |
|---|---|
| Cotinine | 0.002 ug/L |
| Tris (chloropropyl) phosphate | 0.02 ug/L |
| Acesulfame-K | 0.28 ug/L |
| Sucralose | 0.096 ug/L |
| DEET | 0.006 ug/L |

| April 2019 Raw Water | |
|---|---|
| Carbamazepine | 0.003 ug/L |
| Cotinine | 0.002 ug/L |
| DEET | 0.006 ug/L |
| Tris (chloropropyl) phosphate | 0.02 ug/L |
| Acesulfame-K | 0.64 ug/L |
| Sucralose | 0.249 ug/L |
| Sulfamethoxazole | 0.001 ug/L |

| April 2019 Drinking water | |
|---|---|
| Cotinine | 0.001 ug/L |
| Tris (chloropropyl) phosphate | 0.02 ug/L |
| Acesulfame-K | 0.17 ug/L |
| Sucralose | 0.182 ug/L |

**Is there any cause for concern?**
The extremely low concentrations of PPCP's found in Cambridge water are not associated with human health effects. The fact that they are present in the water supply is not surprising and serves as a reminder that there is simply no way to separate ourselves from the geological, chemical and biological systems that support human life. Research into the impact of trace concentrations of complex synthetic chemicals on our ecosystem is now underway. While some chemicals do not interact with biological systems at such low levels some engineered chemicals are thought to be capable of effecting living organisms even at these trace levels. Fortunately the treatment process can effectively eliminate many of these chemicals, or reduce them to undetectable levels, in the water supply.

Why are these chemicals in our drinking water?
The simple explanation is that humans use these chemicals in all sorts of personal care products and medications. These chemicals may then enter the groundwater, surface water or coastal water after they pass through septic and municipal wastewater treatment systems. These chemicals have been present in groundwater for as long as we have used them, but our ability to measure them at such infinitesimal concentrations is recent. Furthermore, the effort to evaluate the presence of these chemicals in drinking water (both treated and raw) was only recently initiated by the EPA.

**What is being done about these findings nationally?**
The Cambridge drinking water results were typical, though many large water systems had more PPCPs at higher concentrations. There is no compelling evidence that the chemicals found have any measurable health effects whatsoever at these levels and there is no way to rule out similar trace exposures through food or air.

The EPA continues to evaluate the need for new drinking water contaminant regulations through a program called the Contaminant Candidate List (CCL). This program periodically identifies contaminants that may be present in public water supplies, and that may adversely impact public health. The EPA and other organizations are conducting and/or supporting a large amount of research on this topic. Research areas include development and improvement of testing methods,

monitoring water quality, evaluating the effectiveness of treatment processes for pharmaceutical removal, and potential environmental and human health impacts.

Once a contaminant is identified as being of national concern from the CCL list, the contaminant is placed under the Unregulated Contaminant Monitoring Rule (UCMR). At this point, local water supply systems may be asked to test for the contaminant. The test results we do as part of this rule are reported to the EPA. A final round of tests for dozens of chemicals will soon be completed and they may eventually mandate testing for some of these chemicals in regulated drinking water systems.

The EPA continues to be concerned about these unmonitored chemicals and seeks to improve the protection of water sources. The Cambridge Water Department has an ambitious watershed protection program already in place to guarantee the purity of its source waters and has taken voluntary steps to screen for PPCPs, as described above.

**Further information about PPCPs in drinking water**

US Environmental Protection Agency (US EPA) link to PPCP information and frequently asked questions: http://www.epa.gov/ppcp/

Water Research Foundation (formerly AWWARF) research activities related to PPCP's: http://www.waterresearchfoundation.org/theFoundation/ourPrograms/ResearchProgramSIEDCPPCP.aspx

Another water department's (Philadelphia Water Department) discussion of PPCP's: http://www.phila.gov/water/Pharmaceuticals_in_D.html

American Water Works Association (AWWA) PPCP information: http://www.drinktap.org/consumerdnn/Home/WaterInformation/WaterQuality/PharmaceuticalsPPCPs/tabid/73/Default.aspx

Massachusetts Department of Environmental Protection (MA DEP) PPCP information: http://www.mass.gov/dep/toxics/stypes/ppcpedc.htm