



Commonwealth of Massachusetts  
Executive Office of Energy & Environmental Affairs

# Department of Environmental Protection

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## **Question and Answer Guide to TTHM & HAA5 Exceedances Town of Holliston Water Department Public Water System - May 2017 -**

The Town of Holliston Water Department recently notified customers of its public water system that their drinking water exceeded the standard for Total Trihalomethanes (TTHMs) and Haloacetic Acids (HAA5s) at one of four sample locations based on analysis of quarterly routine water samples collected by the Town during Quarter 1 of 2017. This document has been prepared for the Town to assist its customers with some common questions about TTHMs and HAA5s, drinking water standards, and operation of the public water system.

### ***Why did the Town provide the public notice?***

All public water systems are required by state and federal law to notify users of exceedences of any water quality standard and any other noncompliance events affecting their water system. The purpose of the public notice is to keep consumers informed about their water quality. MassDEP requires public notification to be repeated every three months until the public water system is in compliance with the standard.

### ***What are TTHMs?***

TTHMs are a group of chemicals known as disinfection byproducts. They form when chlorine used for disinfection reacts with naturally occurring organic material that is found in source water. They are colorless, and will evaporate out of the water into the air. Levels of TTHMs generally increase in the summer months due to the warmer temperatures, but can also be affected by seasonal changes in source water quality or by changing amounts of disinfection chemicals that are added to the water. Water systems often can experience temporary increases in TTHMs due to short-term increases in chlorine disinfection. Chlorine disinfection increases can occur when there is a water main break, when water systems are under repair, changes in source water quality, or when there is a potential microbial (example: bacteria) problem or threat.

### ***What are HAA5s?***

Haloacetic acids (HAA5s) are a group of disinfection byproducts that also form when chlorine compounds that are used to disinfect water react with other naturally-occurring chemicals in the water. There are five significant HAAs potentially found in disinfected drinking water and their combined concentration is referred to as total HAA5.

### ***Why is chlorine added to the water?***

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. The practice of disinfection has nearly eliminated most acute waterborne diseases such as dysentery, typhoid fever, and cholera in the United States, though they are still common in some other countries. These microbial diseases would otherwise be a major concern for children and other subgroups such as the elderly, immune compromised individuals, and pregnant women because of their greater vulnerabilities.

Chlorine (sodium hypochlorite) is commonly used in treatment operations and to treat the water as it travels through the pipes in the distribution system to prevent growth of microorganisms, or contamination from an outside source, such as during a water main break. The Town adds chlorine to its drinking water system to maintain effective treatment for the removal of naturally occurring iron and manganese and to minimize the potential of microbial growth in the distribution system.

### ***Where does the Town's drinking water come from?***

The Town obtains its water from five groundwater sources. Wells 4, 5, 6, 7, and 8 are constructed in sand and gravel deposits that rest on top of bedrock. The Town maintains four treatment facilities that disinfect the water. Wells 4, 6, and 7 receive filtration for the removal of iron and manganese. In addition, sodium hydroxide and zinc orthophosphate are added to control corrosion from household plumbing. Sodium fluoride is added for dental health.

### ***Where does the Town monitor for TTHMs and HAA5s?***

All water systems that use chlorine to disinfect the water are required by federal and state law to sample for TTHMs and HAA5s on a quarterly basis (once every three months) in several locations in the water distribution system. There are four locations that the Town samples each quarter evaluating compliance with TTHMs and HAA5s: 3 Peter St., 45 Orchard St., 347 Hanlon Rd., 89 Rockland St., which represent compliance for the entire Town. The sampling locations and the number of samples collected in each service area have been reviewed and approved by MassDEP.

### ***What is an MCL and how is compliance with the MCL determined?***

Drinking water standards are set to protect against potential negative health effects from drinking water containing certain chemicals. The Maximum Contaminant Level (MCL) in drinking water is set so that the amount consumed does not exceed safe levels. Some MCLs address the daily amount consumed (for chemicals that pose an immediate risk), and others address the amount averaged over a long period of time (for chemicals that pose a long-term risk). The TTHM and HAA5 MCLs are set at a level to balance the

immediate risk of bacterial contamination and the long-term risk of health effects such as cancer. The United States Environmental Protection Agency and MassDEP have set an MCL for TTHMs of 80 parts per billion (ppb) or micrograms per liter (ug/L) as an annual average, and an MCL of 60 ppb for HAA5s.

Federal and state regulations require the Town to sample the four monitoring locations cited above every three months, including the month of warmest water temperature. The average of each sample location is then calculated each quarter over the last 12-month period, and these individual site averages (Locational Running Annual Average, or LRAA) are compared to the standard to determine whether the system is in compliance. As of Quarter 1, 2017 (January – March), the highest Locational Running Annual Average (LRAA) reported for TTHMs was 88 ppb and 65 ppb for HAA5s at the Rockland Street sampling location.

***What is the TTHM and HAA5 sampling and compliance history of the Town?***

<b>Table 1: TTHM Locational Running Annual Average (LRAA) Results &amp; Compliance</b>								
<b>Sample Date</b>	<b>Sample Locations</b>							
<b>Quarter/Year</b>	<b>Quarterly Results (ug/L)</b>				<b>4-Quarter Compliance (LRAA) Per Site</b>			
	3 Peter St.	45 Orchard St.	347 Hanlon Rd.	89 Rockland St.	3 Peter St.	45 Orchard St.	347 Hanlon Rd.	89 Rockland St.
Q2 – 2016 June	16	33	85	65	16	28	55	58
Q3 – 2016 September	18	37	93	100	16	31	64	66
Q4 – 2016 December	38	37	57	80	21	33	67	76
Q1 – 2017 March	20	32	85	106	23	35	80	<b>88</b>

<b>Table 2: HAA5 Locational Running Annual Average (LRAA) Results &amp; Compliance</b>								
<b>Sample Date</b>	<b>Sample Locations</b>							
<b>Quarter/Year</b>	<b>Quarterly Results (ug/L)</b>				<b>4-Quarter Compliance (LRAA) Per Site</b>			
	3 Peter St.	45 Orchard St.	347 Hanlon Rd.	89 Rockland St.	3 Peter St.	45 Orchard St.	347 Hanlon Rd.	89 Rockland St.
Q2 – 2016 June	4.8	11	9	30	6.2	10	3.3	26
Q3 – 2016 September	5	9.4	1.8	77	5.8	10	3	40
Q4 – 2016 December	18	14	0.58	58	8.3	11	3.1	53
Q1 – 2017 March	11	12	27	94	9.8	12	9.6	<b>65</b>

The highlighted area indicates a result above the MCL. Compliance with the LRAA MCL for each location is currently determined by the numbers in the last four columns of the table, which represent an average of all samples for each location collected in the Town's water system over a 12-month compliance period.

### ***What are the health risks of HAA5s?***

The MCL for HAA5 is based on potential cancer risks following a lifetime of drinking the water. HAA5 are considered to be possibly carcinogenic to humans by USEPA because of evidence of carcinogenicity in experimental laboratory animals and limited evidence in people. Some of the individual chemicals that comprise HAA5 have also caused other effects in experimental laboratory animals following high levels of exposure, including toxicity to the liver, kidneys, neurological and reproductive systems. Various adverse reproductive and developmental effects have been observed in experimental laboratory animals following exposure to disinfection byproducts (which include HAA5). In some, but not all, studies in people, similar effects have also been reported. More research is being conducted to better understand the potential risks from using water containing HAA5.

Based on the available information, long term consumption of HAA5 in drinking water above the MCL may increase the risk of certain types of cancer and other adverse effects in some people. The degree of risk for these effects will depend on the HAA5 level and the duration of exposure. Consumption of water with HAA5 levels somewhat above the MCL for limited durations, for example, while corrective actions are being taken to lower the levels, is not likely to significantly increase risks of adverse health effects for most people. Because some data indicate that disinfection byproducts may increase the risk of developmental effects, women who are pregnant or may become pregnant may wish to avoid consuming water containing HAA5 and other disinfection byproducts exceeding the drinking water standard.

### ***How can consumers be exposed to HAA5s in drinking water?***

The main source of exposure to drinking water is from ingestion (i.e., drinking the water and ingesting it in foods and/or ice prepared with the water). It is possible that small amounts of HAA5 could be absorbed through the skin during hand washing and showering. Significant inhalation exposures during hand washing or showering of HAA5 chemicals does not occur as these chemicals do not readily vaporize into the air.

### ***If you are concerned and would like to reduce your exposure to HAA5, what can you do?***

The most significant measure that you can take to reduce your exposure to HAA5 is to use bottled water or water from another MassDEP approved source for drinking or preparing beverages and food that retain water such as oatmeal or pasta. Bottled water sold in Massachusetts must meet all federal drinking water quality standards and, if originating in Massachusetts, must also meet state drinking water quality requirements.

### ***What are the health risks of TTHMs?***

The information provided below is based on available health studies. Studies of populations that have been exposed to TTHMs suggest a possible connection between long-term TTHM exposure and certain types of cancer (e.g., bladder, colon, and rectal) and developmental (e.g. fetal growth) and reproductive effects (e.g. miscarriages, stillbirths). In general, young children may be more susceptible to the effects from any chemical exposures, such as TTHMs, because their ability to metabolize chemicals is not mature and because their exposures may be greater for their size than in adults. More research is being

conducted to better understand the potential risks between TTHM exposures and these diseases. It is important that people be aware of these potential health effects from TTHM exposure.

Cancer risks generally accrue over lifetimes and very long periods of exposure. Cancer risks are normally expressed as lifetime risks as a result of averaging daily exposure levels (associated with the lifetime daily average of ingesting 2 liters of drinking water/day) over a lifetime of 70 years. Based on these studies, and the potential for developmental and reproductive effects from TTHM exposure, women of childbearing age and pregnant women are the group that may be more susceptible to effects from TTHM exposure; however, children are always of concern with chemical exposures as noted above. To reduce this risk, this group may wish to act with caution and reduce their exposures by following the recommendations in the next section.

### ***What can customers do in the interim to reduce exposure to TTHMs?***

If you are concerned about TTHMs and want to reduce your exposure, you can do the following:

- Use bottled water or
- Install point-of-use home water treatment systems on delivery lines in the house (faucet mount, pour-through pitcher style, and plumbed-in units);

Any filter that is purchased should be certified by National Sanitation Foundation (NSF), Underwriters Laboratories (UL) or the Water Quality Association (WQA) to remove TTHMs (look for the seals on the box). The filters could be a pitcher style or a point-of-use treatment filter that can be mounted to the faucet, under the sink, or on the counter top. These treatment devices are widely available for purchase at kitchen and bath stores or hardware stores. A final option could be a whole house filter. This type of installation would likely require the services of a plumber which would increase the cost. It is important that filters be used and the filters are changed according to manufacturer's instructions.

For information on selecting a water treatment system that is right for you, visit NSF International at [www.nsf.org](http://www.nsf.org) or call their hotline at 1-800-673-8010.

Follow these links below to access water filtration systems certified by NSF to treat for TTHMs:  
(Note: products certified for VOC reduction will reduce trihalomethanes)

Go to **[www.nsf.org](http://www.nsf.org)**

- ✓ Click on 'Consumer Resources' (on top)
- ✓ Click on 'What is NSF Certification?' (on right)
- ✓ Click on 'Water Filters/Water Treatment'  
Contaminant Reduction Claims Guide
- ✓ Click on 'Volatile Organic Chemical (VOCs)' (in table)

Below are several other web sites that could be helpful.

[www.nsf.org/certified/dwtu/](http://www.nsf.org/certified/dwtu/)

[www.waterfiltercomparisons.com/water\\_filter\\_comparison.php?d=gp](http://www.waterfiltercomparisons.com/water_filter_comparison.php?d=gp)

[www.waterfiltercomparisons.com/shower\\_filter\\_comparison.php](http://www.waterfiltercomparisons.com/shower_filter_comparison.php)

[www.waterfiltercomparisons.com/whole\\_house\\_filter\\_comparison.php](http://www.waterfiltercomparisons.com/whole_house_filter_comparison.php)

You can also contact the US EPA Safe Drinking Water Hotline at 1-800-426-4791. For more information on filters please refer to US EPA Filtration Facts at: EPA Water Health – Filtration Facts:

[www.epa.gov/sites/production/files/2015-11/documents/2005\\_11\\_17\\_faq\\_fs\\_healthseries\\_filtration.pdf](http://www.epa.gov/sites/production/files/2015-11/documents/2005_11_17_faq_fs_healthseries_filtration.pdf)

***Who can I contact if I have additional questions or concerns about exposure to TTHMs and HAA5s in drinking water and my health?***

If you have health questions about exposure to TTHMs or HAA5s in drinking water you can contact the Environmental Toxicology Program at the Massachusetts Department of Public Health (617-624-5757).

If you are experiencing any symptoms or have medical care questions, you should consult with your health care provider and/or a specialist at an occupational and environmental medicine clinic (AOEC) familiar with chemical exposures. You may visit <http://www.aoec.org/> to search for an AOEC clinic in your area, or call Toll Free: (888) 347-AOEC (2632). You may also contact a Pediatric specialist at Boston Children's Hospital by calling the New England Pediatric Environmental Health Specialty Unit at 1-888-244-5314.

***What steps are being taken to correct the situation?***

TTHM and HAA5 levels can vary depending on a number of factors including the amount of chlorine used, amount of organic material in water sources, temperature, water use, water storage, and season of the year. Control of TTHM and HAA5 levels must be maintained while also applying appropriate levels of disinfectant in the water necessary to treat the water for contaminants and avoid bacterial issues.

The Town is working with MassDEP on evaluating operations, water quality and treatment plant performance with the intention of developing a corrective action plan to correct this issue. The Town is still performing interim actions including flushing to remove organic material from the water mains and reduce the age of the water in the distribution system, and installing distribution system hydrants to reduce the TTHM and HAA5 levels.

Public notification is required to be repeated every three months until the public water system is in compliance with the TTHM and HAA5 standards.

***Who should customers contact for more information about the Public Water System?***

The Town remains the primary contact for all questions regarding the Public Water System. Any questions concerning sample results, status of projects, public notice inquiries, etc. should be directed to **Sean Reese, Public Works Director, at 508-429-0603.**

Please also visit the Town website at [www.townofholliston.us](http://www.townofholliston.us)