Massachusetts Department of Environmental Protection

f a c t s h e e t

Total Trihalomethane In Drinking Water Information for Consumers

What is TTHM?

Total trihalomethanes (TTHM) are a group of disinfection byproducts that form when water disinfectants such as chlorine or ozone react with other naturally occurring chemicals in the water. They are colorless and will evaporate out of the water into the air. There are four significant TTHM potentially found in disinfected drinking water and their combined concentration is referred to as Total THM (TTHM).

Levels of TTHM 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 added. Water systems often can experience temporary increases in TTHM due to short-term increases in disinfectants which can occur when there is a water main break, when water systems are under repair, or when there is a potential microbial (example: bacteria) problem or threat.

All water systems that disinfect the water with chlorine or ozone are required by federal and state law to sample for TTHM on a regular basis (quarterly, or once every three months).

Why are Disinfectants Added?

Disinfection of water supplies with chlorine or ozone is necessary to prevent illness. The practice of disinfection has nearly eliminated most acute waterborne diseases in the United States.

Reducing the levels of byproducts of disinfection while maintaining effective disinfection of the water is challenging and may require several process and treatment modifications that take time to install and get working effectively. Stopping disinfection is not an option as the risk of illness from drinking untreated surface water and many groundwaters is often greater than the risks from the byproducts.

What is the Drinking Water Standard for TTHM and How is Compliance Determined?

Drinking water standards are called maximum contaminant levels (MCLs). The TTHM MCL is set at a level to protect against the long-term risk of potential adverse health effects and to limit the possibility of bacterial contamination.

The US EPA and MassDEP have set an MCL for TTHM of 80 ug/L (also referred to as parts per billion, ppb)[1] as an annual average. The running annual average of four samples (i.e., quarterly, or once every three months over a year) must not exceed the MCL at each sampling location.

How Can Consumers Be Exposed to TTHM in Drinking Water?

People may be exposed to TTHM in drinking water from ingestion (i.e., drinking the water and ingesting it in foods and/or ice prepared with the water). In addition, TTHM vaporize readily into the air so inhalation exposure to TTHM can be significant, especially when showering and bathing, as can exposure from absorption through the skin.

What Are the Health Risks Associated with Using Water Containing TTHM?

TTHM are possibly carcinogenic to humans based on evidence of carcinogenicity in laboratory animals and limited evidence in people.

Some of the individual chemicals that comprise TTHM have also caused other effects in laboratory animals following high levels of exposure, including toxicity to the liver, kidneys, and to neurological and reproductive systems. The significance of these effects is uncertain as some studies of people have reported similar effects while others have not. Scientists are working to address these differences.

Pregnant women or those who may become pregnant may be more susceptible to effects from chemicals such as those comprising TTHM. Children (including infants)

[1] µg/L = mg/L / 1000

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are generally considered more sensitive to the effects of chemicals like those of TTHM than others in the general population and typically also consume more water for their size than adults[2].

The degree of risk for these effects will depend on the TTHM level and the duration of exposure. Consumption of water with TTHM 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.

What Should Mothers Who Are Breastfeeding Infants Know?

Breast milk can also be a source of TTHM exposure for infants. However, those infants will benefit from any exposure reductions experienced by the mother, and they also gain a substantial health benefit from breastfeeding. The Centers for Disease Control and Prevention recommend that nursing mothers continue to breastfeed their babies because of the numerous protective health benefits despite the potential presence of environmental contaminants.

If You Are Concerned and Would Like to Reduce Your Exposure to TTHM, What Can You Do?

Women who are pregnant or may become pregnant and anyone concerned with exposure (including parents of young children) can avoid consuming water containing TTHM and other DBP exceeding their respective drinking water standards. One option is bottled water.

An effective way to reduce exposures is to also use bottled water for preparing formula, beverages, or food that retains water (e.g., hot cereals, rice, or pasta). This approach also lessens the exposure for bottle-fed infants. Water can be left overnight in a pitcher to allow the TTHM chemicals to leave the water. Most TTHM are volatile and will easily evaporate from the water at room temperature.
Other ways to reduce exposures are to:

- Ventilate the bathroom when bathing or showering
- Reduce the length of showers and baths
- Operate room exhaust fans or ventilate room (open window) when boiling water, washing with hot water, or running the dishwasher
- Reduce the temperature on hot water heaters
- Limit time spent in or around chlorinated pools or hot tubs

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.

Another option for reducing exposure to TTHM in drinking water is to use a home filter. Various types of home water filters, including reverse osmosis and granular

[2] https://www.mass.gov/guides/drinking-water-standards-and-guidelines

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activated carbon treatment technologies, will reduce exposure to DBP. Look for packaging that indicates that the product will remove trihalomethanes (THM). For consumers who choose to use a home treatment device, it is very important to follow the operation and maintenance specifications carefully to make sure that the device works as intended. For additional general information on home water treatment devices, please refer to: https://www.mass.gov/service-details/home-water-treatment-devices-point-of-entry-and-point-of-use-drinking-water-treatment. Use water filters (e.g., a pitcher style or a point of use treatment filter that can be mounted to the faucet, under the sink, or on the countertop) or install a point-of-entry whole-house filtration system.

Where can I get additional information?

If you have questions about your water system's operation, water quality monitoring, or water quality, please contact the system operator directly. If you have questions about the drinking water regulations or health risks posed by these contaminants[3], you can contact the MassDEP Drinking Water Program at: program.director-dwp@mass.gov. If you have questions about specific symptoms, you can contact your doctor or other health care provider. If you have general questions about your health, you can contact the Massachusetts Department of Public Health at 617-624-5757.

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[3] https://www.mass.gov/doc/supporting-documentation-for-drinking-water-standards-and-guidelines/download