Clean drinking water is one of the great success stories of modern technology. Prior to widespread disinfection of drinking water supplies, outbreaks of waterborne illnesses were common within communities. As cities, towns and municipalities grew and expanded their ability to provide clean water, the health of the population greatly improved. However, progress can sometimes come with a price.

In cases where raw drinking water supplies are chlorinated, there is the potential to form disinfection by-products including haloacetic acids (HAAs). These groups of compounds are formed when organic material in the raw water (resulting from leaves, vegetation, etc.) reacts with the chlorine added as part of the disinfection process used in most modern drinking water treatment plants. While there are multiple haloacetic acids, HAA5 refers to those most commonly found. It includes monochloroacetic acid (MCAA), dichloroacetic acid (DCAA), trichloroacetic acid (TCAA), monobromoacetic acid (MBAA) and dibromoacetic acid (DCAA). HAA levels can change dramatically throughout the year as there are fluctuating levels of organic material entering the raw water sources (winter vs. summer, for instance).

Health Canada has established a maximum acceptable concentration (MAC) for total HAAs (HAA5) in drinking water at 80 \( \mu \text{g/L} \). Canadian guidance recommends quarterly testing for HAAs at various points along the drinking water supply chain (raw water, treated water and a sample at the end point such as a residence or commercial tap). Once sufficient data has been recorded, changes to the sampling frequency or location may be allowed based on that data. As well, when significant changes are made to the disinfection process or the treatment equipment used, drinking water testing needs to be repeated to determine the impact on the changes to the potential HAA formation.

HAA testing is undertaken at water treatment plants across the country according to their individual regulated sampling programs and in accordance with Health Canada guidelines. Residential testing is usually not required as home disinfection systems that use chlorine are not common (UV filtration, reverse osmosis or carbon filtration systems are most often used). It should be noted that home water treatment devices and systems are not regulated in Canada. Their stated benefits and results can only be verified through testing by an accredited laboratory.

**Testing Submissions**

The testing procedure for HAAs involves 3 phases: sample preparation, sample derivatization (methylation) and analysis by gas chromatography coupled with an electron capture detector (GC/ECD). Because the methylation process requires additional sample processing steps compared to other analyses, sample turnaround times (TATs) for HAAs are longer than most other tests offered by the laboratory.

In order to ensure correct testing protocols and to prevent any unnecessary delays in the laboratory, it is critical that the appropriate sample volume is submitted in the correct sample container. Samples for HAA analysis are collected in three 40 mL volatile organic compound (VOC) vials. The sample vials may be pre-charged with ammonium chloride to quench the chlorination reaction. These vials should be filled carefully to prevent headspace (no air bubbles) and safeguard against removal of the preservative. View the Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Haloacetic Acids for more information.

Bureau Veritas Laboratories has been providing HAA analysis for more than a decade. Any questions or requests for information can be directed to your local project manager or customer service team.