



The preferred method of THM control is precursor removal; however **any method used to control THM levels must not compromise the effectiveness of water disinfection.**

One method of THM control is reservoir management, consisting of the following:

- select the best possible source;
- control an adequate buffer zone around a reservoir;
- remove leaf dropping trees, shrubs and weeds from the buffer zone;
- maintain short grass in the immediate runoff area;
- replace shoreline silt with gravel, if feasible;
- steepen the shoreline for aquatic weed control; and
- guard against pollution sources such as industry, agriculture and accidental spills.

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Trihalomethanes (THMs)

Surface water treatment plant operators must be diligent in their plant operations to minimize the formation of trihalomethanes (THMs). THMs are formed when chlorine, which is generally used for disinfection, reacts with naturally occurring organic compounds (called precursors) present in the raw water. Surface water typically has higher levels of these precursors. THMs formed as by-products of disinfection have been detected in chlorinated water supplies throughout the world.

The Interim Maximum Acceptable Concentration (IMAC) for total trihalomethanes in drinking water is 0.1 mg/l (100 µg/l), expressed as a running annual average of quarterly samples. This IMAC is based on the risk associated with chloroform, which is classified as probably carcinogenic to humans by Health Canada and is interim until such time as the risks from other disinfection by-products are ascertained. Drinking water with THMs at the IMAC level of 0.1 mg/l represents a 1 in 1,000,000 carcinogenic risk based on a consumption rate of 1.5 litres for 70 years.

There are several factors that increase the THM formation and/or formation rate in drinking water. They are increased time, higher temperatures, higher pH values, larger amounts of precursors, higher free chlorine residuals and higher concentrations of bromide or iodide.

There are a number of options to control THM concentrations in drinking water including reservoir management, treatment to remove THM precursors, treatment to remove THMs after formation and the use of alternative disinfectants.

The major and preferred mechanism for THM control in a conventional surface water treatment plant is THM precursor removal in the coagulation and sedimentation processes. Water treatment plants should optimize all their unit processes to increase precursor removal. Other technologies that may be effective at removing THM precursors are oxidation, adsorption, membrane filtration and biological degradation. However if precursor removal techniques fail or are unfeasible, it is possible to remove THMs after they are produced.

THMs can be removed by diffused air or tower aeration or possibly by other technologies. However, all proposed technological solutions should be pilot tested and approved by Saskatchewan Environment (SE) to ensure their efficiency before full-scale implementation.

Changing disinfection practices, such as replacing chlorine with an alternative disinfectant is another possible method of THM control. Ozone, chlorine dioxide, chloramines and ultraviolet light are all alternatives to conventional chlorine disinfection. These alternatives produce significantly less THMs, however other disinfection by-products may be formed. Little is known about the toxicity and nature of these by-products. Another change in disinfection practice that may be effective in controlling THM formation is moving the point of chemical (chlorine) addition during the treatment of water. Like any technological solutions, alternative disinfection practices would have to be bench tested, properly designed by an engineering consultant and approved by SE.

If you have any questions, please contact your Environmental Project Officer.