CHLORINE AND DRINKING WATER

When speaking to homeowners on municipal water supplies, their biggest concern is the chlorine used to fight bacteria. Chlorine is a concern as it has been linked to heart attacks, strokes, premature senility and hundreds of other medical conditions. Unfortunately; chlorine is very reactive and easily combines with naturally occurring organic material to form trihalomethanes. It is these trihalomethanes that you are more likely to see at the tap than you would chlorine depending on where you are located within the water distribution system. The farther away from the treatment plant the more likely you will have trihalomethanes in your water as the time the water must travel within the distribution systems allows the chlorine to react.

Trihalomethanes are a group of four chemicals—chloroform, bromoform, bromodichloromethane and dibromochloromethane. Chloroform, typically the most often found trihalomethane and usually in higher concentrations, is formed by the reaction of chlorine with humic and fulvic acids found commonly in water and distribution systems. Formation occurs during chlorination and can continue to occur as long as chlorine is available. The other THM's are formed by a reaction of chlorine with naturally occurring bromide, so depending on the characteristics of the water, the other three trihalomethanes may be formed at a higher concentration than chloroform.

A variety of chlorine-based disinfectants are used routinely by a majority of public water systems to protect their customers from waterborne diseases.   The introduction of chlorine into our water supplies as a disinfectant has nearly eliminated waterborne diseases such as cholera, typhoid, dysentery and hepatitis A. While many consumers view chlorine as something bad to be in their water, the deaths from waterborne diseases, should there be no chlorination ,would easily outweigh any fatalities that may occur as a results of a disinfection by-product or chlorine itself being present in the water.

According to studies done at Ohio State University, over 40 percent of individual wells test positive for bacteria each year. Homeowners with contaminated wells are likely to turn to chlorine disinfectants to treat their water, because it's something they can do easily. In addition, chlorine is readily available and cost-effective. Chlorine is added to the well and flushed through the household plumbing where it can react with organic matter to create by-products. The amount of by-products produced depends on a number of factors, including the season, chlorine dose and pH of the water. For example, THM levels are generally lower in winter than in summer because the amount of natural organic matter is lower and less chlorine is needed to disinfect water at colder temperatures.

In December 1998, the U.S. Environmental Protection Agency enacted the Stage 1 Disinfectants and Disinfection By-products Rule. This rule lowered the maximum contaminant level (MCL) for total trihalomethanes from 100 parts per billion (ppb) to 80 ppb. Large surface water systems were required to comply with the Stage 1 Disinfectants and Disinfection Byproducts Rule by January 2002. Ground water systems and small surface water systems were requested to comply with the Stage 1 Disinfectants and Disinfection By-products Rule by January 2004.

Since the discovery of chloroform in chlorinated drinking water supplies, various laboratory and epidemiological studies have been carried out. According to studies conducted in the United States, THM's have been linked to bladder and intestinal cancers, but opinions differ across the world; for example, the World Health Organization claims it is hard to define a correlation between cancer and drinking chlorinated water.

The next time your clients ask you about chlorine in their water, you can educate them about the disinfection by-products that are more likely to be present.

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