

More Information on Trihalomethanes and Orange County WCID #1

What are Trihalomethanes?

Trihalomethanes are one group of drinking water Disinfection Byproducts made up of four different compounds that are formed when disinfectants used in water treatment react with bromide and/or natural organic matter present in the source water.

What are Disinfection Byproducts?

Disinfection byproducts are formed when disinfectants used in water treatment react with bromide and/or natural organic matter (i.e., decaying vegetation) present in the source water. Different disinfectants produce different types or amounts of disinfection byproducts. Disinfection byproducts for which regulations have been established have been identified in drinking water, including trihalomethanes, haloacetic acids, bromate, and chlorite.

Disinfection Byproduct Health Effects

Since the discovery of chlorination byproducts in drinking water in 1974, numerous toxicological studies (studies on the health effects from exposure to high dosages contaminants usually involving animals in a lab) have been conducted. These studies have shown several disinfection byproducts to be cancer causing in laboratory animals, including certain trihalomethanes, bromate, and haloacetic acids. Some disinfection byproducts have also been shown to cause adverse reproductive or developmental effects in laboratory animals. However, there is considerable uncertainty involved in using the results of high-dose studies of some to estimate the risk to humans from chronic exposure to low doses of these and other byproducts.

In the area of epidemiology (studies of the factors that influence disease in human populations), a number of studies have been completed investigating the relationship between exposure to chlorinated surface water and cancer. Surface water systems have been used in these studies because there is a much higher potential to form Disinfection Byproducts when treating surface water because of the relatively high concentration of naturally occurring organic matter in surface water compared to most groundwater systems. Some of these studies have suggested an increased cancer risk to those exposed to chlorinated waters while others have demonstrated none. In issuing the Disinfectants/Disinfection Byproducts rules based on evidence available, EPA stated that while the agency cannot conclude there is a causal link between exposure to chlorinated surface water and cancer, these studies have suggested an association, albeit small, between bladder, rectal, and colon cancer and exposure to chlorinated surface water. There are fewer epidemiology studies evaluating the association between exposure to disinfection byproducts and reproductive and developmental effects. Again, some have suggested an increased risk from exposure to disinfection byproducts while others have shown none. There remains considerable debate in the scientific community on the significance of these contradictory findings concerning chlorinated water and disinfection byproducts. As with cancer, EPA stated in its Disinfectants/Disinfection Byproducts rules that, based on data available, the agency can not conclude there is a causal link between exposure to disinfection byproducts and reproductive and developmental effects.

EPA believes the weight-of-evidence presented by the available epidemiological studies on chlorinated drinking water and toxicological studies on individual disinfection byproducts support a potential hazard concern and warrant regulatory action.

In the series of Disinfection Byproduct rules, EPA has continued an extensive research effort to better understand the potential risks attending exposure to disinfection byproducts. While this research was being completed, an agreement among water suppliers, environmental groups, consumer groups, and regulatory agencies has been reached, resulting in the publication of a Stage 1 and subsequently the Stage 2 Disinfectants/Disinfection Byproducts Rule. The group participants recommended that the Stage 1 and Stage 2 Disinfectants/Disinfection Byproducts Rules were considered the best course of action to reduce potential risks from disinfection byproducts.

Adapted from EPA: http://www.epa.gov/enviro/html/icr/dbp_health.html

Why are Trihalomethanes in Orange County WCID 1 water?

While Trihalomethanes are more likely found in chlorinated surface water, some well water will also produce trihalomethanes. This occurs when the water bearing aquifer that the wells are drilled into contains some naturally occurring organic matter. When the organic matter is present, it is not from recently decayed vegetation like in surface water, but is usually associated with organic material deposited in the Earth's crust over long period of geologic time. There is also recognized a relationship between higher levels of trihalomethanes formation and certain coastal groundwaters. The presence of naturally occurring bromides is also a factor.

While the exact type of organic material occurring in the District's well water is not known, it is clear that there is organic matter present which is acting as a precursor to the formation of trihalomethanes. By looking at the breakdown of the THM composition, it is also clear that the districts wells also contain a minor amount of bromide. The occurrence of both the naturally occurring organic material and the bromide produce the trihalomethanes when chlorine is added to the water as a disinfectant. Disinfection is a necessary step in the providing water to the public. Disinfection provides for protection of the water from contamination by microbes, including bacteria, viruses and parasites.

What is the District doing to reduce the levels of Trihalomethanes?

There are several ways to help reduce the levels of trihalomethanes that are produced during the disinfection process. To determine the best short term and long term solutions, a good look at from what source and how quickly the trihalomethanes are formed is the best overall approach. As the increase in trihalomethanes, to a point above the state and EPA standards, is fairly recent, a look at recent operational changes should help in finding a solution. To implement this effort, the District has and is taking a number of steps. To assist the District in our investigations, we have obtained the services of a consultant.

- We have taken steps to reduce the amount of time that water is held in each of our storage tanks and examined how that would affect the trihalomethane levels.
- We have taken steps to reduce the amount of time that water is in the water system pipe network by flushing the lines and examined how that would affect the trihalomethane levels.

- We have collected samples in a much more intricate manner to help determine which wells are producing the higher levels of trihalomethanes and over what time periods the trihalomethanes are produced.
- We are evaluating operational and potential treatment changes.

As we take these evaluation steps, we are taking additional trihalomethane samples. Between shipping and analysis time, it takes several weeks to get laboratory results. So, this is not an immediate process.

Where can I get more information on Trihalomethanes?

More information on trihalomethanes regulations and health effects can be found on the EPA's Disinfection Byproducts website at:

<http://water.epa.gov/drink/contaminants/basicinformation/disinfectionbyproducts.cfm>

BOTTOM LINE: What should Orange County WC&ID #1 customers do now?

- At the current time, no action is required.
- Use of District water for all purposes is thought to be completely safe - there is no need to avoid drinking or cooking with water from the public water supply.
- The trihalomethane issue must be, and will be, resolved long before any negative health effects have time to develop.
- Monitor this website as well as local news articles for updates on our trihalomethane reduction efforts.