USING CHLORINE TO SAFELY DISINFECT DRINKING WATER

WHY WATER PLANTS ADD DISINFECTANTS TO DRINKING WATER

Note: This document focuses on the benefits of adding continuous disinfectant to drinking water, not the occasional disinfection of wells, water distribution piping systems, and other water systems.

Many public water systems apply chlorine to the water supply to cleanse the water and make it safe for human consumption. Chlorine kills or inactivates harmful microorganisms that form waterborne pathogens such as Legionella, Pseudomonas, Norovirus, and Giardia, which can cause serious illnesses. It also improves the taste and odor of the water, helps in the removal of iron and manganese, and minimizes biological growths in wells, water distribution pipes and storage tanks.

DOES CHLORINE CREATE HARMFUL BYPRODUCTS?

When chlorine is added to a water supply, it reacts with organic material that is naturally present in the water to create disinfection byproducts. The total number of byproducts formed depends on the amount of chlorine used and the length of time the organic material and the chlorine have been in contact.

Whether these disinfection byproducts are harmful to humans is still an open question. Some studies show there is no additional risk of human health effects. Others indicate that exposure to chlorinated water increases the risk of cancer and other reproductive and developmental side effects. Due to these potential risks, the U.S. Environmental Protection Agency (EPA) adopted the Stage 1 Disinfectants and Disinfection Byproducts Rule (DBPR), which specifies maximum allowable levels and monitoring requirements for disinfectants and disinfectant byproducts.

SECONDARY DISINFECTION

Considering the increased awareness of the dangers of waterborne pathogens like Legionella, the difficulty of maintaining aging building plumbing systems, and the potential for additional regulations for water quality monitoring, adding a secondary disinfection system can be a viable option for maintaining safe water in your building.

A study by Kuchta et. al. found that Legionella bacteria can survive in low levels of chlorine for relatively long periods of time – twice as long as other bacteria like *E. coli*.[1] In fact, the National Academies of Sciences, Engineering, and Medicine recommend the Environmental Protection Agency require the public water systems to maintain minimum disinfect residual in order to prevent the growth of Legionella bacteria.[2]

Therefore, if the chlorine residual in the incoming potable water supply is found to be less than 0.5 ppm, adding supplemental disinfectant at the building's entry point may greatly minimize the likelihood of biofilm and Legionella bacteria.[3]

MAINTAINING CHLORINE RESIDUALS WITHIN A BUILDING

All buildings have unique plumbing distribution systems that contribute to stagnation or dead legs. As chlorine flows through the system, the continual reactions with organic material and increases in temperature cause it to lose effectiveness. The water flow may also carry it to areas where water usage is low, which keeps it from circulating to other parts of the system. These factors lead to the formation of stagnant areas that have little to no protection against waterborne pathogens. In fact, water age is a major factor in water quality deterioration within piping distribution systems.[4] The best practice for minimizing stagnation is to implement scheduled flushing protocols for sinks, showers, bathtubs and other water systems. To determine which areas need the most attention, monitor the water temperature, pH and chlorine levels throughout the building and target the areas where the chlorine levels are lowest.

Regular monitoring of the water temperature, pH and chlorine residuals is a useful tool for pinpointing improvement opportunities to minimize waterborne pathogen growth.

Contact Solid Blend to help start the process.

REFERENCES

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3. CDC. *Legionella (Legionnaires’ Disease and Pontiac Fever): What Owners and Managers of Buildings and Healthcare Facilities Need to Know about the Growth and Spread of Legionella.* CDC. https://www.cdc.gov/legionella/wmp/overview/growth-and-spread.html. Updated April 30, 2018. Accessed September 4, 2019.
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