TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

March 20, 2018

Mr. Thomas W. Kula
Executive Director
North Texas Municipal Water District
501 E. Brown Street
P.O. Box 2408
Wylie, Texas 75098-2408

Re: Use of Chloramines for Surface Water Treatment and Distribution

Dear Mr. Kula:

Thank you for your letter to the Texas Commission on Environmental Quality (TCEQ) requesting clarification related to public water systems' use of chloramines as a disinfectant for surface water treatment. Disinfection is a fundamental treatment step historically and presently applied by public water systems to make drinking water potable and safe for human consumption. Disinfection kills or inactivates disease-causing organisms such as bacteria and viruses that can be present at any time and at variable amounts in sources (wells, rivers, lakes) used for drinking water.

Chloramine has been in use in Texas and other states for many years and included in Texas regulations since 1988. Historically, public water systems used chloramines to maintain stable and more persistent residuals. There are approximately 7,000 public water systems in Texas, serving approximately 27 million people. Approximately 1,200 of these systems, mostly those treating surface water, use chloramine for disinfection.

The TCEQ's responses to your questions are provided below.

1) **Does the use of chloramines as residual disinfectant in a public water system present negative public health risks when used in conformance with state and federal requirements?**

   No. The Centers for Disease Control and Prevention (CDC) ranks water chlorination and treatment as one of the top ten greatest public health achievements of the twentieth century. According to the CDC, current studies indicate that using or drinking water with small amounts of chloramine does **not** cause harmful health effects while providing protection from waterborne disease vectors like *Legionella*, *Giardia*, and viruses. These studies reported no observed harmful health effects from drinking water with chloramine levels of less than 50 parts per million (ppm) in drinking water. A normal level for drinking water disinfection can range from 1 to 4 ppm which is similar to

chlorine levels found in swimming pools. Regulatory and public health agencies worldwide agree that chloramine treatment of drinking water is beneficial. The Environmental Protection Agency (EPA) chloramine standard is set at a level where no adverse human health effects are expected to occur. This is the standard adopted and regulated by Texas.

2) **For public water systems using chloramines for residual disinfectant, is the temporary use of free chlorine a safe and acceptable practice for proactive management of nitrification for the water utilities seeking to minimize the flushing of treated water?**

There are many approaches and operational practices that can be used to maintain water quality in the distribution system for systems that use chloramines as a disinfectant. The American Water Works Association (AWWA) *Nitrification Prevention and Control in Drinking Water* guidance manual highlights temporary free chlorine conversions as a common practice for routine operational maintenance for nitrification prevention.

Many utilities throughout the state and country, commonly in states with warmer climates, that use chloramines for their distribution disinfectant convert to free chlorine on a routine or as-needed basis. Free chlorine is a stronger oxidant than chloramines. The use of free chlorine coupled with flushing of distribution lines ensures adequate disinfection and mechanical scouring and removal of organic matter. Temporary conversion to free chlorine in conjunction with distribution line flushing has been shown to be an effective strategy to improve water quality.

3) **Is there any practicable alternative to the use of chlorine or chlorine compounds (i.e., chloramines) for residual disinfection in a public water system?**

TCEQ rules require primary disinfection treatment to take place at water treatment plants (Title 30 of the Texas Administrative Code (30 TAC) Chapter 290, §290.42), and a minimum level of disinfectant residual (secondary disinfection) is required to be present throughout the water system's entire distribution at all times (30 TAC Chapter 290, §290.46(d) and §290.110). In Texas, primary disinfectants that are allowed by regulation include chlorine, chloramine, chlorine dioxide, ultraviolent light, and ozone.

Secondary disinfection provides additional water treatment as water leaves the treatment plant and moves through the distribution system to consumers. Secondary disinfection maintains water quality by killing potentially harmful organisms or contaminants that may enter the distribution lines through events such as cross-connections or leaks. In Texas, secondary disinfectants that are allowed by regulation include chlorine or chloramine (30 TAC Chapter 290, §290.110).

While primary disinfectants such as chlorine dioxide and ozone are much stronger disinfectants than chloramine, TCEQ rules do not allow the use of chlorine dioxide and ozone as secondary treatment due to the limited ability to

measure disinfectant residual in the distribution system. Chloramine is often chosen as the option for a secondary disinfectant because of its resiliency, ease of residual monitoring and lower affinity for producing disinfection byproducts such as total trihalomethanes (TTHMs) and haloacetic acids (HAA5), as compared to free chlorine.

4) **Are the presence of biofilm, including nitrifying bacteria, and sediments in water distribution system piping common to all water distribution systems? If properly managed, does the presence of biofilm or sediment present any specific health risks requiring mitigation activities beyond compliance with water quality regulations?**

Biofilm often forms in distribution system piping; however, public water systems must be proactive in minimizing biofilm. All distribution systems harbor some biofilm. The more biofilm, the easier for bacteria to survive and grow. Bacteria can 'hide' in the biofilm. Among these microbes may be coliform bacteria. Public water systems are required to monitor for total coliform bacteria on a routine basis to determine water quality and respond to any indicator of microbial growth. As discussed above, TCEQ regulations require public water systems in Texas to maintain minimum disinfectant residual throughout their distribution systems and this treatment is another safeguard against the growth and/or spread of bacteria and other disease-causing organisms. Based on TCEQ records and as of March 20, 2018, the NTMWD public water system has had no detections of total coliform bacteria in their monthly testing during the last year, is in compliance with the Revised Total Coliform Rule, and has met the requirements for disinfectant residuals in their distribution system.

5) **Do the TCEQ's records show that North Texas Municipal Water District is in compliance with TCEQ Stage 2 Disinfection Byproduct Rule and disinfectant residual requirements?**

As of March 20, 2018 and after review of TCEQ's drinking water compliance data, the NTMWD Wylie Water Treatment Plant public water system has no current violations under the Revised Total Coliform Rule, Stage 2 Disinfection Byproducts Rule and Surface Water Treatment Rule. TCEQ's records show that the system is in compliance with these regulations and also meets the TCEQ's requirements for disinfectant residuals.

6) **Does meeting all requirements for the TCEQ Texas Optimization for Surface Water Treatment Plants indicate that a public utility is meeting the highest recognized standard for surface water treatment in Texas?**

The TCEQ's Texas Optimization Program (TOP) Recognition Program for Surface Water Treatment Plants is a voluntary, non-regulatory program with the mission to protect public health by helping surface water treatment plants to optimize their removal of potential pathogens. The TOP Recognition Program is the highest level of recognition for conventional surface water treatment plants in the State of Texas. Optimization is a process that sets stringent performance

targets for surface water treatment plants beyond the minimum regulatory standards. To achieve recognition as a TOP plant, a plant must meet specific criteria for a minimum of six consecutive months. The NTMWD Wylie Water Treatment Plant IV has consecutively met the TOP requirements for turbidity levels since February 2017.

More information about controlling nitrification in public water systems with chloramines can be found on TCEQ's webpage: https://www.tceq.texas.gov/drinkingwater/disinfection. If you have any further questions or need additional assistance concerning this matter, please contact Ms. Cari-Michel La Caille, Director of the Water Supply Division at (512) 239-6479 or by e-mail at cari-michel.lacaille@tceq.texas.gov.

Sincerely,

Richard A. Hyde, P.E., Executive Director
Texas Commission on Environmental Quality