# TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

*Protecting Texas by Reducing and Preventing Pollution*

January 6, 2016

Mr. Bruce Rogers, President
Lake Palo Pinto Area Water Supply Corporation (WSC)
P.O. Box 410
Gordon, TX 76453-0410

Re: Public Water Supply Comprehensive Compliance Investigation at:
Lake Palo Pinto Area WSC, 4500 N. Lakeview Dr., Gordon, Palo Pinto County, Texas
RN 101456911, PWS ID No. 1820069, Investigation No. 1299508

Dear Mr. Rogers:

On November 12, 2015, Mr. Steve Zawrotny of the Texas Commission on Environmental Quality (TCEQ) Dallas/Fort Worth (D/FW) Regional Office conducted an investigation of the above-referenced facility to evaluate compliance with applicable requirements for public water supply systems. No violations are being alleged as a result of the investigation.

The TCEQ appreciates your assistance in this matter and your compliance efforts to ensure protection of the State's environment. If you or members of your staff have any questions regarding these matters, please feel free to contact Mr. Zawrotny in the D/FW Regional Office at (817) 588-5859.

Sincerely,

Charles Marshall
Team Leader, Public Water Supply Program
Texas Commission on Environmental Quality
D/FW Regional Office

CM/sz

cc: Mark Griffin, Manager, Lake Palo Pinto Area WSC, P.O. Box 410, Gordon, TX 76453-0410

# DISINFECTION BYPRODUCTS IN POTABLE WATER SYSTEMS

## I. REGULATORY BACKGROUND

Disinfecting potable water is critical to protect the public from disease-causing microorganisms. Potable (drinking) water is disinfected to inactivate (or kill) bacteria, viruses, and other organisms. Disinfection of drinking water has benefited public health enormously by lowering the rates of infectious diseases (for example, typhoid, hepatitis and cholera) spread through untreated water. In Texas, public water systems are required to disinfect water delivered to customers to inactivate microbial pathogens. However, disinfectants like chlorine, chlorine dioxide, ozone and chloramines can react with naturally-occurring materials in the water to form disinfection by-products (DBPs) such as:

- Total Trihalomethanes (TTHMs)
- Haloacetic acids (HAAs)
- Chlorite
- Chlorate
- Bromate
- Nitrate

DBPs have been regulated by the Environmental Protection Agency (EPA) since 1979 to address health risks posed by a potential association between chlorinated drinking water and cancer, particularly bladder cancer. Current reproductive and developmental health effects data do not support a conclusion as to whether exposure to chlorinated drinking water or disinfection byproducts causes adverse developmental or reproductive health effects, but do support a potential health concern. Although uncertain, the combined health data warranted the EPA's promulgation of the Disinfection Byproduct Rule to mitigate potential risks posed by DBPs. These byproducts, if consumed in excess of EPA's federally imposed standards over many years (i.e., chronic exposure), may lead to increased chronic health risks.

The EPA has developed the Disinfection Byproduct Rule to protect public health by limiting exposure to disinfectant byproducts. In November 1979, the EPA set an interim maximum contaminant level (MCL) for total TTHMs of 0.10 milligrams per liter (mg/L) as an annual average for community public water systems serving 10,000 or more people. As a result, the Stage 1 Disinfectants and Disinfection Byproducts Rule (DBP-1) was promulgated in December 1998 as the first phase in a rulemaking strategy required by Congress as part of the 1996 Amendments to the Safe Drinking Water Act. DBP-1 lowered the MCL for TTHMs to 0.080 mg/L, and added an MCL for HAAs of 0.060 mg/L, both based on a four quarter running annual average. The Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP-2) of December 2005 built upon DBP-1 to provide greater protection measures beyond those required by the previous regulations. The DBP-2 rule requires systems to determine the highest risk sample sites for DBPs in its distribution system through an initial distribution system evaluation and changed the compliance calculation by determining compliance with the MCLs at each sample site individually using locational running annual averages (LRAAs), as opposed to the DBP-1 requirement for a system-wide average.

Compliance with current regulations governing the presence of DBPs in the Lake Palo Pinto Area Water Supply Corporation's (LPPAWSC's) public water system is currently determined based on two separate LRAAs calculated individually at each of the LPPAWSC's DBP sample sites. Under

DBP-2, the results of the most recent four quarterly samples from each of the LPPAWSC's DBP sample sites are averaged to obtain a locational running annual average each quarter. Under DBP-1, compliance was based on a single system-wide running annual average each quarter. Under DBP-2, the LPPAWSC's compliance is currently based on two separate LRAAs. The likelihood of public water systems experiencing compliance issues under DBP-2 is greater than under DBP-1, as distribution issues (such as water age) can increase locational TTHMs and/or HAAs.

## II. DATA REVIEW

eHT's approach to identifying the source of DBPs in the LPPAWSC water system followed the basic approach recommended by the EPA. eHT began its operational evaluation by obtaining DBP sample results for the LPPAWSC's public water system. Figure 1 graphically presents TTHMs at all DBP sample sites in the LPPAWSC public water system from 2004 to present. Figure 2 graphically presents HAAs at the same sample sites over the same time period.

**Figure 1 – TTHMs (ppb) in LPPAWSC's Water System 2004 – Present**

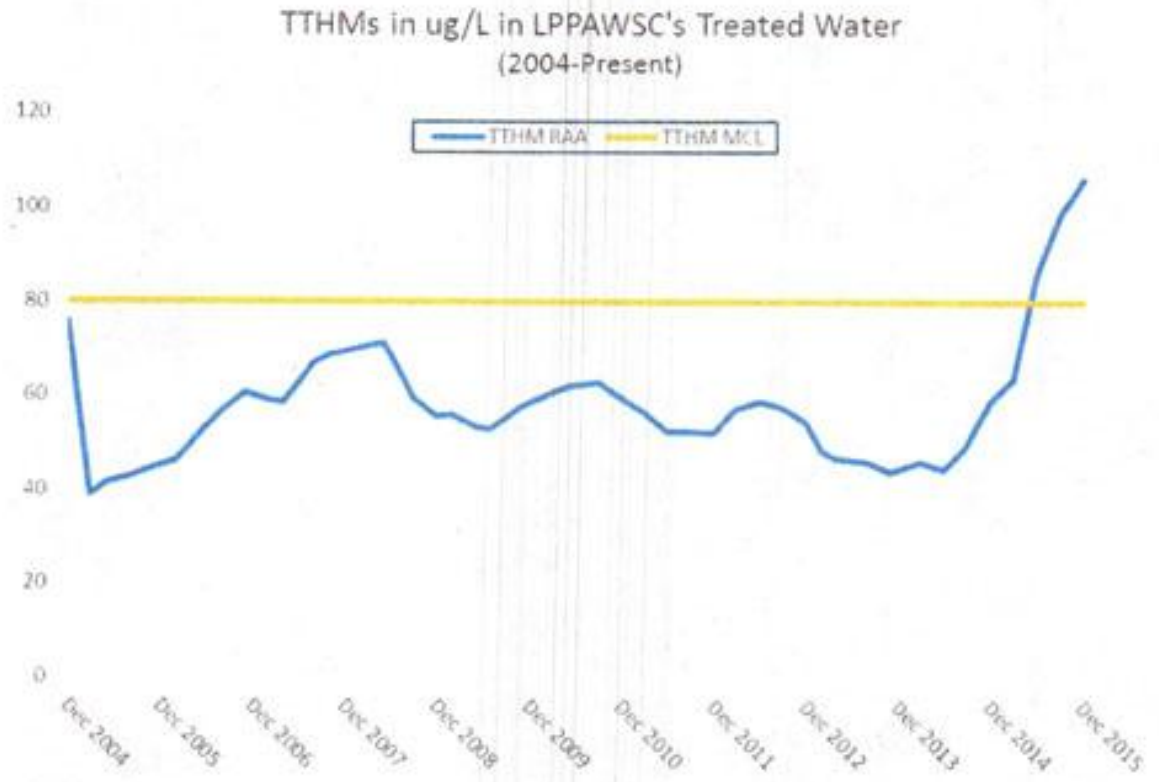
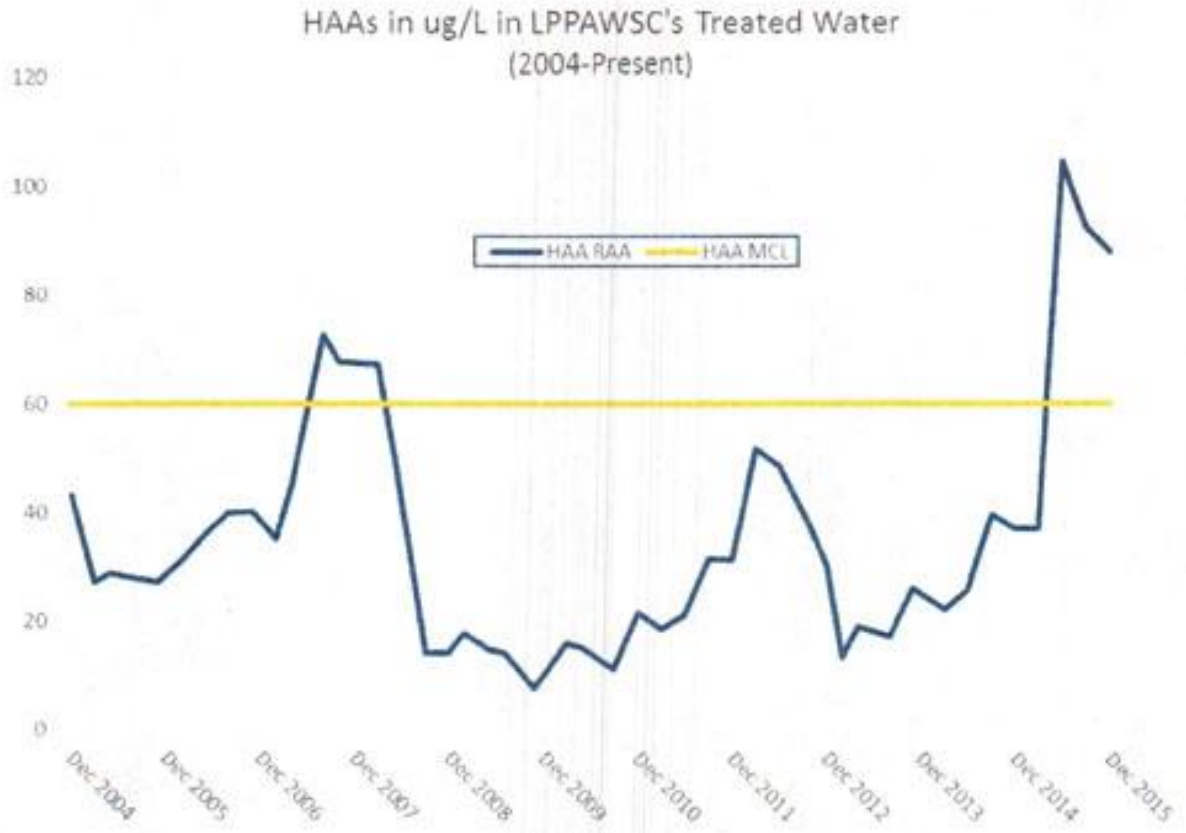


**Figure 2 – HAAs (ppb) in LPPAWSC's Water System 2004 – Present**




Figures 1 and 2 graphically represent total trihalomethanes and haloacetic acid concentrations from 2004 – 2015. Concentration values are represented on the y-axis in micrograms per liter (µg/L) or parts per billion (ppb) and the sample collection date on the x-axis.

Data from both TTHMs and HAAs in samples collected from LPPAWSC's system indicates, with few exceptions, system-wide trends that show routine compliance for a number of years. DBP concentrations at all LRAA sample sites tend to reflect very similar concentrations. The expectation with this trend pattern is that either the source water formation potential is affecting the system-wide concentration of DBPs and causing the trend pattern, or that conditions at the point of treatment are contributing to the pattern of DBPs in the distribution system, or a combination of both. In LPPAWSC's case, the recent jump in DBP levels coincides with the lake refilling after significant drought. It is anticipated that changes to disinfection practices at the Water Treatment Plant will be required to reduce DBP levels to compliance levels.

## III. TREATMENT PROCESS UPGRADE PROJECT

LPPAWSC is presently undertaking a plant upgrade project that will increase the capacity of the WTP to address continuing growth in the system. In an effort to address the current issues with DBP, LPPAWSC modified the bidding documents for the Water Treatment Plant Improvements

Project to include the installation of a chlorine dioxide generation system at the raw water pump station. Chlorine dioxide serves a variety of water treatment purposes including that of disinfectant. Unlike free chlorine which is one of the current disinfectants used at the WTP, chlorine dioxide has the advantage of forming fewer DBPs. LPPAWSC has also coordinated with the Texas Commission on Environmental Quality (TCEQ) to obtain an exception request for the use of chlorine dioxide. It is anticipated that this exception request will be approved in April, and once approved, LPPAWSC can begin the installation and operation of the chlorine dioxide system.

In an effort to address the issues with DBP prior to the completion of the installation of the chlorine dioxide system, LPPAWSC worked with the TCEQ to develop an interim treatment protocol. This protocol reduces DBP formation by limiting the use of free chlorine while maintaining adequate inactivation of bacteria and viruses.