

CITY OF NEDERLAND

TTHM & HAA5 VIOLATION



What Are HAA5 and TTHM?

- These are disinfection byproducts (DBPs) formed when disinfectants like chlorine react with natural organic matter in drinking water:

Compound	Full Name	
HAA5	Haloacetic Acids	
TTHM	Total Trihalomethanes	



Monitoring & Compliance

- Under the **Stage 2 Disinfection Byproducts Rule**, all **community and non-transient non-community water systems** must monitor for TTHM and HAA5. The frequency and location depend on system size and source water type:
-  **Monitoring Frequency per TCEQ and EPA**

Population Served	System Type	Frequency
Surface water systems $\geq 10,000$	Large systems	4 samples/quarter per treatment plant
Surface water systems 500-9,999	Medium systems	1 sample/quarter per treatment plant
Surface water systems < 500	Small systems	1 sample/year during warmest month
Groundwater-only systems	Varies	Based on IDSE plan or TCEQ approval

Who conducts TTHM and HAA5 monitoring?

- TCEQ uses contract samplers to collect all TTHM and HAA5 samples used for compliance. TCEQ pays for the sample collection, and the public water system is responsible for paying the laboratory for the analysis of the sample. TTHM and HAA5 samples are analyzed by the Lower Colorado River Authority (LCRA) or the Department of State Health Services (DSHS).



What Constitutes a Violation?

- Under the **Stage 2 Disinfection Byproducts Rule**, a violation occurs when:
- The **Locational Running Annual Average (LRAA)** at any monitoring site exceeds:
 - **0.060 mg/L for HAA5**
 - **0.080 mg/L for TTHM**
- The LRAA is calculated using results from four consecutive quarters at each sampling location.



Public Notice: Drinking Water Violation

- **What Happened?** Our water system recently violated a drinking water standard. Routine monitoring showed that the levels of TTHM and/or HAA5 exceeded the MCL set by federal and state regulations.
- **Is This an Emergency?** No. This is not an emergency. If it had been, you would have been notified immediately. However, **long-term exposure to high levels** of these contaminants **may** pose health risks.
- **What Should You Do?** You do not need to boil your water or take other immediate action. If you have specific health concerns, consult your doctor.



What Happens After a Violation?

If a public water system exceeds these limits:

- **Public Notification** is required to inform consumers.
- The system must conduct an **Operational Evaluation Report** to identify causes and corrective actions.

Possible actions include:

- Flushing water lines
- Adjusting disinfectant levels
- Upgrading treatment processes

Operational Evaluation Level (OEL)

- Before a formal violation, systems may exceed the **OEL**, which is a predictive threshold:
- $$\text{OEL} = \frac{Q_1 + Q_2 + 2 \times Q_3}{4}$$

Previous 2 quarters plus the current quarter x 2
4
- If the OEL is exceeded:
- The system must conduct an **Operational Evaluation**.
- Submit a report to TCEQ identifying causes and corrective actions

Operational Evaluation

- The cause of our high TTHM and HAA5 sample results are due to the city's free chlorine conversion that was being done over the month of June.
- The high sample results from quarter 2 2025, are not a true representation of our normal quarterly levels.
- The last TTHM and HAA5 violation was in 2004/2005.
- The City has not exceeded the MCL since 2004/2005.



What Is a Free Chlorine Conversion?

- A **free chlorine conversion** is a temporary switch from **chloramines** (chlorine + ammonia) to **free chlorine** (chlorine only) for disinfection. It's typically done:
- As **preventive maintenance**
- To control **biofilm and nitrification**
- To improve **taste, odor, and disinfectant residuals**
- During a **free chlorine conversion**, flushing is a critical part of the process to maintain water quality and disinfect the distribution system.



Why Flushing Is Necessary

- Flushing helps:
- Remove **organic buildup** and **biofilm** from pipes
- Distribute free chlorine throughout the system
- During a **free chlorine conversion**, it's common for **TTHM (Total Trihalomethanes)** and **HAA5 (Haloacetic Acids)** levels to **temporarily increase**.



Why TTHM and HAA5 Levels Increase

- **Free chlorine is more reactive** than chloramines.
- It interacts more aggressively with **natural organic matter (NOM)** in the water.
- This leads to increased formation of **disinfection byproducts (DBPs)** like TTHM and HAA5.
- **According to EPA studies, this spike is expected and temporary.**



Health Risks

- **Long-term** exposure to **elevated** levels of HAA5 or TTHM **may**:
- Increase risk of cancer
- Cause liver, kidney, or nervous system problems
- Pose greater risks for vulnerable populations (infants, elderly, immunocompromised)



Short-Term Exposure

- **Duration:** Days to weeks
- **Risk Level:** Generally low for healthy individuals
- **Typical Causes:**
 - Temporary spikes due to water main breaks, source water changes, or increased chlorination
- **Health Effects:**
 - Usually **no immediate health effects** for most people
 - Sensitive groups (infants, elderly, immunocompromised) may experience mild irritation or gastrointestinal symptoms
- **Regulatory View:**
 - EPA and state agencies like TCEQ consider short-term exceedances **not an emergency** but still require public notification if MCLs are exceeded.



Long-Term Exposure

- **Duration:** Months to Years
- **Risk Level:** Higher concern
- **Health Effects:**
 - TTHM:** May increase risk of liver, kidney, or nervous system problems; linked to cancer
 - HAA5:** Associated with increased cancer risk from chronic exposure

The EPA model assumes that a 70 kg (154 lb) adult drinks 2 liters of water daily for 70 years. This assumption allows the agency to calculate a lifetime health advisory (HA), which is a concentration of a chemical in water not expected to cause adverse, non-cancerous health effects over a lifetime of exposure.



Step-by-Step: How EPA Uses Health Advisories to Inform MCLs

- **Determine Health-Based Reference Values**

- For non-carcinogens: EPA calculates a **Reference Dose (RfD)** — the daily exposure unlikely to cause harm.
- For carcinogens: EPA uses a **Cancer Slope Factor (CSF)** to estimate risk per unit of exposure.

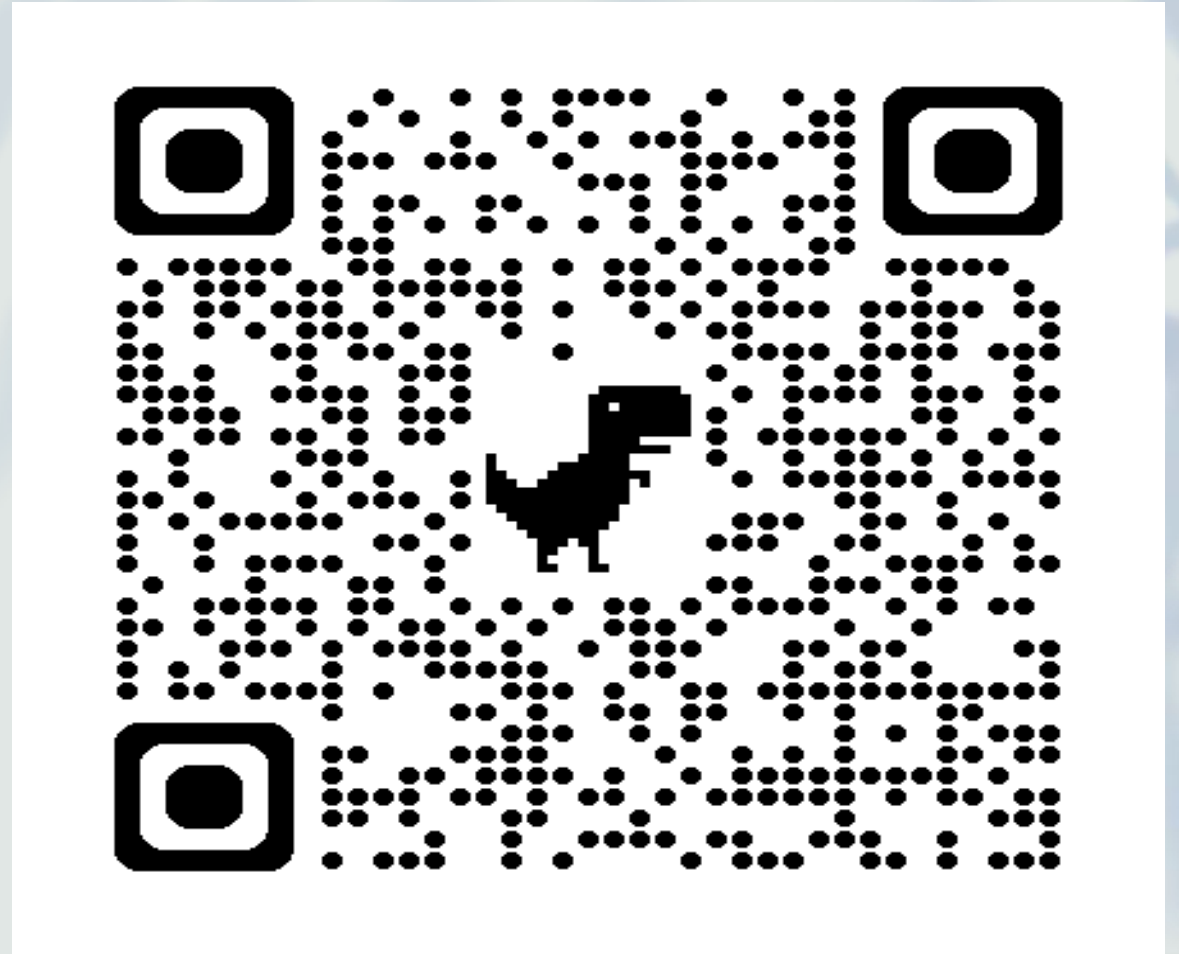
- **Apply Exposure Assumptions**

- **Water ingestion:** 2 liters/day
- **Body weight:** 70 kg
- **Exposure duration:** 70 years (lifetime)
- **Relative Source Contribution (RSC):** Assumes a portion of total exposure comes from drinking water (often 20%–80%)

City of Nederland - Violation

- The samples taken in quarter 1 on February 26, 2025, were all in compliance.
- The samples taken in quarter 2 on June 24, 2025, exceeded the maximum contaminant level for both TTHM and HAA5.
- The samples taken in quarter 3 on July 29, 2025, were all in compliance.
- The ongoing violation is due to the Locational Running Annual Average (the last 4 quarter samples) and is not related to the current water or most recent samples.

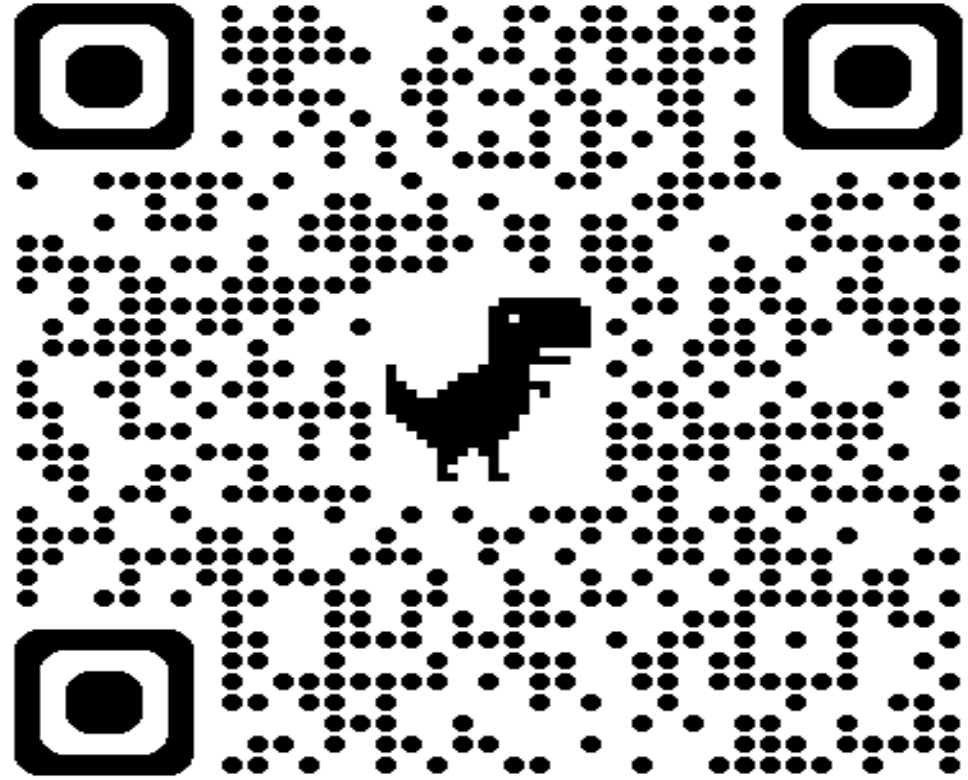
TCEQ
Texas
Drinking
Water Watch
Water System
No. 1230006



www.tceq.texas.gov/drinkingwater/instructions-for-texas-drinking-water-watch

TCEQ

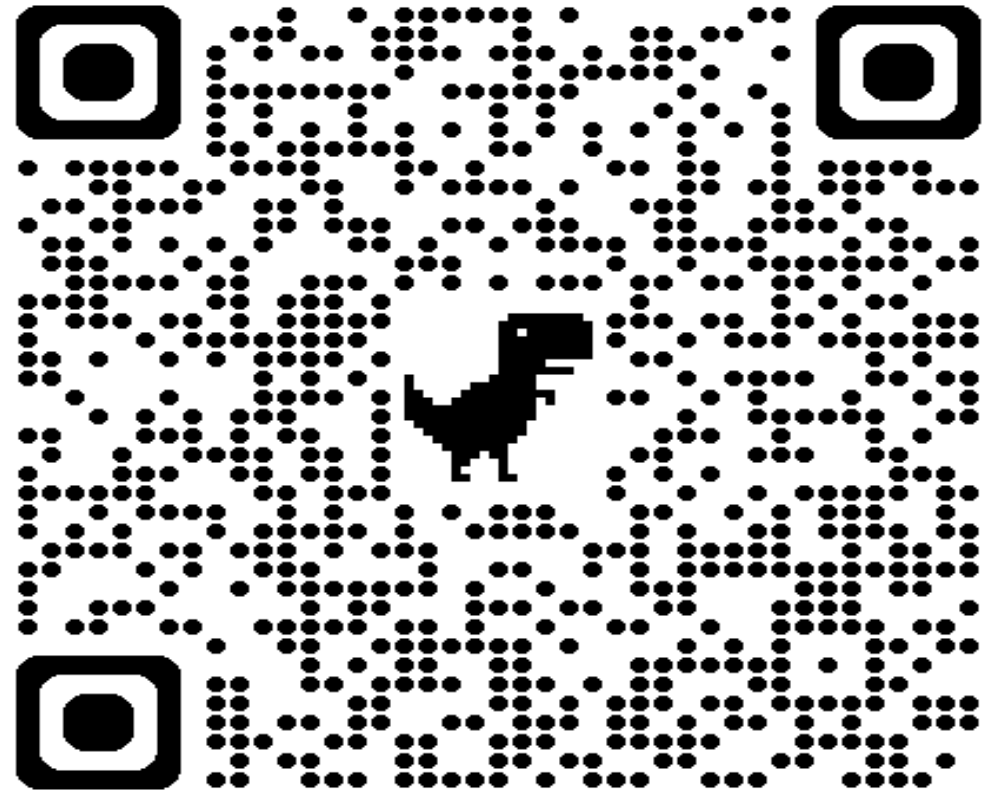
Disinfection
Byproducts in Public
Water Systems



www.tceq.texas.gov/drinkingwater/chemicals/dbp

EPA

Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rules



www.epa.gov/dwreginfo/stage-1-and-stage-2-disinfectants-and-disinfection-byproducts-rules

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TCEQ - AUSTIN

TCEQ WATER QUALITY DIVISION

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