TCEQ REGULATORY GUIDANCE
Water Supply Division
RG-544 • December 2020

Monitoring, Analyzing, and Reporting Bromate for Public Water Systems Using Ozone

Public Water Supply Supervision Program

Water Supply Division

Texas Commission on Environmental Quality

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY • PO BOX 13087 • AUSTIN, TX 78711-3087

Table of Contents

Acronyms and Definitions

Accreditation: The process by which TCEQ evaluates and recognizes a laboratory as meeting standards for accreditation and TCEQ rules.

Accredited Laboratory: A laboratory that is accredited by TCEQ. For questions about laboratory accreditation, contact TCEQ Laboratory Accreditation Program at (512) 239-3754.

Allowable Methods: Methods approved by Environmental Protection Agency (EPA) for bromate analysis which are also included in TCEQ Fields of Accreditation. The methods are included in the National Primary Drinking Water Regulations, as defined in 40 Code of Federal Regulations Part 141.131 and are approved for bromate analysis. 30 TAC 290.119 adopts these federally mandated methods by reference.

Bromate: Compound formed when ozone is used to disinfect drinking water. Its formation is affected by naturally occurring bromide concentrations, reaction times, amount of ozone used, and source water pH. EPA developed an MCL of 0.010 mg/L for bromate to protect consumers' health from long term exposure to drinking water.

Chain-of-Custody (COC): An unbroken trail of accountability that ensures the physical security of samples from sample collection until analysis.

Code of Federal Regulations (CFR): The rules and regulations published in the Federal Register by the federal government.

Consumer Confidence Report (CCR): A document sent to customers of community PWSs. CCRs provide information about drinking water quality and are also known as Annual Water Quality Reports. Requirements for CCRs are located in 30 TAC Chapter 290 Subchapter H—Consumer Confidence Reports.

Disinfection: A process which inactivates pathogenic organisms in the water by chemical oxidants or equivalent agents.

Disinfection Byproducts (DBP): Chemical compounds formed by the reaction of a disinfectant with the other chemicals present in water.

Distribution System: A system of pipes that conveys potable water from a treatment plant to consumers. The term includes pump stations, ground and elevated storage tanks, potable water mains, and potable water service lines and all associated valves, fittings, and meters, but excludes potable water customer service lines.

Drinking Water: Public and private water distributed by any entity or individual for human consumption.

Drinking Water Regulations: Regulations that establish maximum contaminant levels, treatment techniques, and monitoring and reporting requirements to ensure that PWSs provide safe water to their customers.

Drinking Water Quality Team: Team within TCEQ's Water Supply Division responsible for ensuring compliance with drinking water standards including those related to ozone and bromate monitoring, analysis, and reporting. Individuals on the DWQT can be reached by calling (512) 239-4691.

Drinking Water Standards Section: Section within TCEQ's WSD assigned to administer the SDWA and related state rules.

Ethylenediamine (EDA): A chemical used to preserve bromate samples. An EDA preservative solution is made by diluting EDA with reagent water. The addition of the EDA solution to a bromate sample will preserve the concentration of the bromate for up to 28 days.

Entry Point (EP): A point where treated water enters the distribution system.

ID: identification

L: liter

Laboratory Accreditation Program: Group within TCEQ responsible for formal recognition of environmental laboratories meeting standards established by the National Environmental Laboratory Accreditation Program. The Lab Program is organized within the Laboratory and Quality Assurance Program at TCEQ. TCEQ Laboratory Accreditation Program staff can be contacted at (512) 239-3754.

Mail Code (MC): TCEQ identifier for internal mail delivery.

Maximum Contaminant Level (MCL): The maximum allowable concentration of a regulated contaminant in drinking water.

Milligrams Per Liter (mg/L): A unit of measurement of mass concentration that shows how many milligrams of a certain substance are present in one-liter liquid.

mL: milliliters

Monitoring Plan: All PWSs are required to develop a monitoring plan, including all community, transient and non-transient water systems. Monitoring plans are a system-specific document that specifies water quality monitoring performed by the system is representative of water distributed to consumers and is consistent with regulatory requirements.

National Environmental Laboratory Accreditation Conference (NELAC): NELAC was established in 1995 with the mission to develop laboratory accreditation standards and implement a laboratory accreditation program – the National Environmental Laboratory Accreditation Program (NELAP).

National Environmental Laboratory Accreditation Program (NELAP): NELAP is an accreditation program aimed at environmental laboratories. NELAP accreditation is performed by states that wish to participate. Participating states are required to adopt a federally recognized laboratory accreditation standard (TNI Standard) although control over scope, fees, laboratory type accepted are all within the control of the state. TCEQ manages the NELAP Program in Texas through the implementation of 30 TAC Chapter 25: Environmental Testing Laboratory Accreditation and Certification.

PDF: portable document format

Public Notification (PN): PN is required by the SDWA and ensures consumers and customers will know if there is a problem with their drinking water. The Texas system for PN is specified in 30 TAC 290.122: *Public Notification.*

Primacy: Relates to the delegation to states by EPA for the primary enforcement of the Safe Drinking Water Act (SDWA).

Program Guidance: Documents and forms developed and maintained by TCEQ's WSD. These documents and forms pertain to environmental data operations; operation, treatment, and distribution of drinking water; etc., and include citations and links to rules and regulations. TCEQ has developed program guidance related to many WSD Programs, including lead and copper, source water protection, new systems, PWS operation and treatment – just to mention a few. Most of these documents and forms are maintained on TCEQ drinking water web pages.

Public Water Supply Supervision (PWSS) Program: Program required by EPA for TCEQ to maintain primacy in Texas to enforce the SDWA in Texas.

PWSS Program quality assurance project plan (QAPP): EPA requires a QAPP for all environmental data operations funded under the PWSS Program. All work that involves the acquisition of analytical measurements must be performed in accordance with a TCEQ/EPA-approved QAPP which meets all applicable TCEQ and EPA requirements. The PWSS Program QAPP is updated annually and revised every 3 years per EPA requirements.

Public Water System (PWS): A system that provides water to the public for human consumption through pipes or other constructed conveyances that has at least 15 service connections or serves at least 25 individuals at least 60 days out of the year.

Quality Control (QC): Technical activities that measure the attributes and performance of a process against defined standards to ensure they meet the stated requirements of a method, an operational technique, or a customer.

Raw Water: Water prior to any treatment including disinfection that is intended to be used, after treatment, as drinking water.

Regulatory Guide (RG): TCEQ documents that provide policy, interpretation, applicability and/or guidance for implementing statutes, regulations, and/or rules. TCEQ maintains RG documents according to our records retention schedule and you can access them on our Search for Publications[1] webpage. They are designed to help PWSs know and understand the federal and state rules and regulations as well as TCEQ requirements that apply to PWS operation and testing, records management, and TCEQ reporting. Examples of RG documents pertaining to drinking water include RG-211—Monthly Testing and Reporting of Surface Water Treatment Plants; RG-407—Disinfectant Residual Reporting for Public Water System; RG-421—Coliform Sampling for Public Water Systems; etc.

Safe Drinking Water Act (SDWA): Federal law specified in Title XIV of the Public Health Service Act. Under the SDWA, EPA sets standards to protect drinking water quality. The Texas Health and Safety Code Section 341.031 requires TCEQ to adopt and enforce rules to implement the federal SDWA.

Safe Drinking Water Information System (SDWIS): A database that contains information about PWSs and any violations of EPA's drinking water regulations, as reported to EPA by the states.

[1] https://www.tceq.texas.gov/publications/search-pubs

Sample Acceptance Policy: Documentation of an accredited laboratory's sample acceptance procedures per Volume 1, Module 2 of the TNI Standard 5.8.6. It includes requirements related to proper sample labeling (unique ID, durable labels, indelible ink), proper sample containers, compliance with holding times, adequate sample volume, and preservation.

Sampling Location: The site where a sample is collected.

Standard Operating Procedure (SOP): A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps and is officially approved for performing certain routine or repetitive tasks.

Texas Administrative Code (TAC): A collection of all Texas state agency rules. There are 16 titles in the TAC. Each title represents a subject category and related agencies are assigned to the appropriate title. The TAC was created in 1977 by the Texas Legislature under the Administrative Code Act.

Texas Drinking Water Watch (DWW): A database that allows public access to PWS drinking water quality and PWS compliance data[2].

TNI Standard: Abbreviation for "The NELAC Institute" Standard. The NELAC Institute is a nonprofit organization dedicated to data of known and documented quality. The TNI Standard is the nationally recognized environmental laboratory standard adopted by Texas. TCEQ's Laboratory Accreditation Program audits laboratories using the TNI Standard to accredit environmental laboratories.

Technical Review and Oversight Team (TROT): Team within TCEQ's Water Supply Division responsible for providing technical assistance to the public, TCEQ staff, and other state agencies. TROT is also responsible for reviewing disinfection protocols and requests for exceptions related to the use of ozone. Individuals on the team can be reached by calling (512) 239-4691.

Water Supply Division (WSD): Lead division in TCEQ that oversees the PWSS Program, which conducts and oversees drinking water quality, operations monitoring, and compliance for PWSs.

Water Treatment Plant (WTP): A facility that improves the quality of drinking water to make it acceptable for end use in compliance with applicable rules and regulations.

[2] https://dww2.tceq.texas.gov/DWW/

Introduction

All community and non-transient, non-community public water systems (PWSs) that use ozone must meet regulatory requirements related to bromate. PWSs use ozone to treat drinking water because of its desirable disinfection and oxidation qualities. Ozone, when used in combination with other types of water treatment, is effective in enhancing disinfection, reducing disinfection byproducts, improving taste and odor, removing organic and inorganic matter, and enhancing flocculation and coagulation.

Bromate is a potential byproduct when ozone is used for treating drinking water. It forms when ozone reacts with bromide, which is found naturally in raw water. Its formation is influenced by such things as bromide concentration, raw water pH, the amount of ozone used, and reaction time. If the maximum contaminant level (MCL) defined by federal and state regulations is exceeded, bromate can have adverse health effects.

The information provided in this program guidance is intended to help PWSs monitor, analyze, and report bromate sample results to the Texas Commission on Environmental Quality (TCEQ) according to 30 Texas Administrative Code (TAC) 290.114: Other Disinfection Byproducts (Chlorite and Bromate).

It is the PWS owner's responsibility to ensure its employees and others acting on its behalf (including the laboratory) comply with requirements described in this guidance.

This guidance is not a substitute for the rules. If there is a discrepancy between this guidance and the rules, follow the rules.

For specific information related to this guidance, contact TCEQ Drinking Water Quality Team at (512) 239-4691.

Note: Before placing an ozone generator into service, a PWS must submit an exception request to TCEQ as specified in 30 TAC 290.42(e)(3)(G). For information, contact TCEQ Technical Review and Oversight Team at (512) 239-4691.

Texas Rules Associated with this Guidance

The State of Texas has primacy over the regulation of public drinking water. TCEQ is responsible for writing, adopting, and enforcing Texas rules that are at least as stringent as the rules developed by the US Environmental Protection Agency (EPA) under the Safe Drinking Water Act (SDWA). Texas rules may be more specific than, or worded differently from EPA rules, so PWSs must be familiar with Texas-specific rules.

PWSs must comply with all applicable rules pertaining to drinking water contained in various parts of 30 TAC Chapter 290. Key rules pertaining to PWSs that use ozone include but are not limited to:

- 30 TAC Chapter 25: Environmental Testing Laboratory Accreditation and Certification
- 30 TAC Chapter 30: Occupational Licenses and Certification
- 30 TAC Chapter 290 Subchapter D—Rules and Regulations for Public Water Systems

  - 30 TAC 290.42: Water Treatment
  - 30 TAC 290.46: Minimum Acceptable Operating Practices for Public Drinking Water Systems
- 30 TAC Chapter 290 Subchapter F: Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for Public Water Systems
  - 30 TAC 290.114: Other Disinfection Byproducts
  - 30 TAC 290.119: Analytical Procedures
  - 30 TAC 290.121: Monitoring Plans
  - 30 TAC 290.122: Public Notification
  - 30 TAC Chapter 290 Subchapter H: Consumer Confidence Reports

Additional rule-related information:

Rules and Guidance for Public Water Systems[3]

Rules and Regulations for Public Water Systems[4]

Additional TCEQ Information Related to Bromate Monitoring, Analysis, and Reporting

TCEQ developed this program guidance as part of its responsibilities under the State's Public Water Supply Supervision (PWSS) Program which is part of TCEQ's primacy agreement with EPA to administer the SDWA. This guidance is included by reference in TCEQ's PWSS Program's quality assurance project plan (QAPP) which is approved by EPA. Find more information on the PWSS Program and the PWSS Program QAPP[5].

Learn about monitoring, analysis, and reporting of bromate[6].

Search the database for analytical results, schedules, and violations at Texas Drinking Water Watch (DWW)[7].

Regulatory Limit for Bromate for PWSs that use Ozone

As specified in 30 TAC 290.114(b)(1), the bromate concentration at the PWS's distribution system entry point (EP) cannot exceed a maximum contaminant level (MCL) of 0.010 milligrams per liter (mg/L). A PWS will receive a nonacute MCL violation

[3] https://www.tceq.texas.gov/drinkingwater/pdw_rulesGuide.html

[4] https://www.tceq.texas.gov/drinkingwater/pdw_rules.html

[5] https://www.tceq.texas.gov/drinkingwater/pwss.html

[6] https://www.tceq.texas.gov/drinkingwater/chemicals/dbp/dbp_risk.html

[7] https://dww2.tceq.texas.gov/DWW/

(Tier 2) if, at the end of any quarter, the bromate running annual average of monthly averages, computed quarterly, exceeds 0.010 mg/L [30 TAC 290.114(b)(5)(C)].

If a PWS fails to complete 12 consecutive months of monitoring, compliance with the MCL for the last four-quarter compliance period is based on an average of the available data [30 TAC 290.114(b)(5)(E)].

Monitoring Requirements and Procedures

PWSs that use ozone are required to measure bromate concentrations at the EP at least once per month [30 TAC 290.114(b)(2)]. Samples must be collected when the ozone system is operating under normal conditions, and at locations and intervals specified in the PWS's monitoring plan. To ensure compliance with these rules and regulations related to monitoring, PWSs must comply with the requirements and procedures discussed in this section.

Monitoring Plans

PWSs that use ozone are required to monitor levels of bromate in accordance with a monitoring plan. As specified in 30 TAC 290.121, every PWS is required to develop, maintain, and update a monitoring plan subject to TCEQ review and approval. Monitoring plans must include items such as:

- All sampling locations defined and designated on a plant schematic or map. [30 TAC 290.121(b)(1)]
- Sampling frequency and schedule described [30 TAC 290.121(b)(2)]
- Laboratory and test methods used to analyze samples [30 TAC 290.121(b)(4) and (5)]

The Public Water Systems Monitoring Plans[8] webpage includes a Monitoring Plan Template, a TCEQ submittal address, and revision information.

Training and License Requirements for Sample Collectors

All PWS personnel (including third party personnel) who conduct bromate monitoring must be properly trained on the required sampling procedures and have a current, valid water operator license, as described in this section. PWSs are responsible for ensuring that sample collectors are properly trained and licensed.

Training

All personnel who perform monitoring/sample collection as described in this section must have the qualifications, education, and training to perform the work correctly, according to specified guidelines and requirements. Monitoring personnel should be trained on this guidance as well as other materials deemed relevant by the PWS,

[8] https://www.tceq.texas.gov/drinkingwater/monitoring_plans

including safety. The PWS should maintain training records to document that sample collection personnel have been properly trained and formally evaluated.

Operator Licensing

Collection of bromate samples must be performed by a licensed water operator. TCEQ administers four levels of water operator licenses — A, B, C, and D.

To become licensed as a public water system operator, an applicant must:

- complete the required course training,
- meet the required education and experience requirements,
- complete TCEQ application and criminal history background check,
- pay the fee, and
- pass the applicable exam (minimum score of 70 percent).

TCEQ Occupational Licensing and Registration Division of the Office of Waste implements the agency program for licensing PWS operators at PWSs, including a list of current licenses in accordance with the requirements of 40 Code of Federal Regulations (CFR) Parts 141 and 142, and 30 TAC 290.46(e)(2)(C)]. The WSD assists with aspects of operator certification in coordination with TCEQ Office of Compliance and Enforcement by identifying, whenever possible, operators misusing their licenses.

For general information on operator license requirements, contact TCEQ's Occupational Licensing and Registration Division at (512) 239-6133. For specific operator licensing information as it applies to ozone treatment facilities, contact the Technical Review and Oversight Team at (512) 239-4691.

Sample Collection and Handling

Proper sample collection and handling is critical to achieve accurate sample results that support their intended use. The following steps apply to bromate sample collection and sample handling. These steps ensure that samples are collected and handled correctly and consistently, using established protocols.

Note: Anyone collecting these samples must have a current, valid water operator license, including third party laboratory personnel.

Bromate Sample Collection and Handling Steps

The following steps apply to bromate sample collection and handling. These steps ensure that samples are collected correctly and consistently, using established protocols.

1. Prepare a standard operating procedure (SOP) with detailed instructions for collecting and handling samples. Sampling locations, numbers, and types of samples should be included per the PWS's Monitoring Plan.

   Note: Sample Collection SOPs should be available at the location where samples are collected.

2. Obtain required forms and sample containers from the laboratory. See Table 1 and Section – *Sample Containers* regarding requirements. Check with the laboratory before collecting samples to ensure the sampling procedures are acceptable.

   Note: PWSs should collect bromate samples early in the month, to the extent possible. This allows the laboratory time to analyze and report the results so the PWS can submit bromate results to TCEQ within the first ten days following the end of the compliance period, i.e. your January results need to reach TCEQ by February 10th.

3. Collect samples in an area free of contamination, including dust. Select a faucet or tap for sampling that is in good repair and free of contaminating devices such as screens or hoses.

4. Flush the faucet or tap before collecting the sample. Typically, the water temperature stabilizes when flushing is complete. Once lines are flushed, adjust the flow so the water does not splash and collect the samples, making sure not to rinse out the preservative.

   Note: PWSs should coordinate with the laboratory regarding the collection of field duplicates. Field duplicates are two separate samples collected at the same time and treated the same throughout field and laboratory procedures. Analysis of field duplicates indicate the precision associated with sample collection, preservation and storage, as well as laboratory procedures. The testing laboratory may or may not require the collection of field duplicate samples.

5. Fill out the sample label and chain of custody form completely and accurately.

6. Deliver samples to the laboratory to ensure that holding times are met. See Table 1.

   Note: EPA establishes holding times for regulatory analytes to protect sample integrity and provide sufficient time for analyses. Samples should always be analyzed as soon as possible after collection. The holding time is the maximum amount of time that a sample may be held before the start of analysis and still be considered valid.

Table 1. Preservation, Containers, and Holding Time Requirements for Bromate Samples

Analyte	Sample Containers	Preservation	Holding Time
Bromate	Method specific	Ethylenediamine (EDA)	28 days

Sample Containers

Sample collection personnel must use laboratory-supplied sample containers. Sample containers can be either opaque plastic or amber glass bottles and may vary in size, depending on the collection method. The container size must be sufficient to ensure a representative sample, allow for replicate analysis, if required, and minimize waste disposal. Each container provided by the laboratory must contain ethylenediamine

(EDA) as a preservative. PWSs should coordinate sample container specifications with the laboratory and comply with specific analytical method requirements.

Sample Labels

Sample collectors must record the following information on the sample container's label, when collecting bromate samples.

- PWS Identification (ID) Number
- Date and time sample was collected
- Sample collector's initials
- Address/location where the sample was collected to include the entry point number (for example EP001), as listed in Drinking Water Watch[9]

PWSs may obtain sample labels from the laboratory when they get their containers. Alternatively, PWSs may develop their own labels, or write the sample label information directly on the bottle. These alternatives are acceptable if all items in the bulleted listed above are included. Sample label information should be completed by sampling personnel at the time of collection. Label information must be recorded legibly with indelible ink.

Chain of Custody (COC)

The COC documents activities related to proper sample handling and accounts for a sample's physical security. The COC is the primary process for tracking the samples through collection, handling, and analysis.

Sample custody begins immediately after sample collection. The sample collector is responsible for the preservation and sample integrity until that responsibility is transferred to someone else and documented on the COC form.

A COC form is used to document the information identifying the sample and record the relinquishing and receiving individuals and associated information, which must include all of the following:

- sample location(s),
- analyses requested,
- date and time of sample collection for each sample,
- sample collector signature,
- type, size, and number of containers,
- any added preservative, and
- relinquished and received by signatures.

[9] https://dww2.tceq.texas.gov/DWW/

Note: If samples are analyzed by an "in-house" laboratory, a COC may not be used when they are delivered to the laboratory. In these cases, an equivalent document should be used to record the information specified in the bulleted list above.

At the laboratory, sample collectors (or couriers) relinquish custody of their samples to laboratory personnel. Laboratory personnel inspect the sample(s) and sample documentation at the time of receipt. After the laboratory inspects and approves the sample and sample documentation, the sample collector (or courier) and the laboratory representative will sign and date the COC with the date and time of delivery.

Analytical Requirements

All analyses addressed in this guidance must be conducted at a laboratory that:

- Is accredited by TCEQ's Laboratory Accreditation (LA) Program according to The NELAC Institute (TNI) National Environmental Laboratory Accreditation Program (NELAP) Standard;
- Adheres to applicable requirements specified in EPA's *Manual for the Certification of Laboratories Analyzing Drinking Water*[10] [EPA 815-R-05-004, Fifth Edition, January 2005]; and
- Complies with relevant TCEQ and/or EPA drinking water rules requirements specified in this program guidance.

It is the responsibility of each individual PWS to ensure its laboratory complies with the program-specific analytical requirements described in this document. To maintain compliance with rules and regulations, TCEQ reserves the right to refuse data and analyses from PWSs that do not comply with the analytical requirements described in this document.

Laboratory Accreditation

Laboratories that analyze bromate samples must be accredited by TCEQ [30 TAC 290.114(b)(3)] and adhere to all accreditation requirements. See our Lab accreditation webpage[11] for information or for specific questions contact TCEQ Laboratory Accreditation Program at (512) 239-3754.

In addition, pursuant to federal regulations and state rules, drinking water laboratories must adhere to EPA's *Manual for the Certification of Laboratories Analyzing Drinking Water*[12] [EPA 815-R-05-004, Fifth Edition, January 2005].

[10] https://www.epa.gov/dwlabcert/laboratory-certification-manual-drinking-water

[11] https://www.tceq.texas.gov/agency/qa/env_lab_accreditation.html

[12] https://www.epa.gov/dwlabcert/laboratory-certification-manual-drinking-water

Allowable Methods

Bromate samples must be analyzed using an allowable method listed in Table 2. These methods are included in EPA's *List of Approved Drinking Water Analytical Methods*[13]. They are required by the National Primary Drinking Water Regulations defined in 40 CFR Part 141. 30 TAC 290.119 adopted these federally mandated methods by reference.

Note: Table 2 is not inclusive of methods approved by EPA for bromate analysis; it only includes those in TCEQ's list of NELAP-recognized *Fields of Accreditation* (Table 1c Drinking Water Matrix)[14]. A laboratory may want to use a bromate method on EPA's list that is not included in Table 2. If so, it should contact the Drinking Water Quality Team to discuss the process for adding the method to Table 2 in the future.

Table 2. Allowable Methods for the Analysis of Bromate

Method [i]	**EPA**	**ASTM**
Ion chromatography	300.1 [ii]	D 6581 [iii]
Ion chromatography & post-column reaction	317.0 Rev 2.0 [iv] 326.0 [v]	N/A
IC/ICP-MS	321.8 [ii]	N/A

[i] Laboratories accredited to run an allowable method for bromate in drinking water must analyze performance evaluation (PE) samples that are acceptable at least once during each consecutive 12-month period. The acceptance limit is ± 30% of the true value [40 CFR 141.131(b)(2)(iii].

[ii] Methods 300.1 and 321.8 are in *Methods for the Determination of Organic and Inorganic Compounds in Drinking Water*, Volume 1, USEPA, August 2000, EPA 815-R-00-014 (available through NTIS, PB2000-106981).

[iii] ASTM International, 2001 or any year containing the cited version of the method, Vol 11.01.

[iv] EPA Method 317.0, Revision 2.0, *Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis*, USEPA, July 2001, EPA 815-B-01-001.

[v] EPA Method 326.0, Revision 1.0, *Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis*, USEPA, June 2002, EPA 815-R-03-007.

[13] https://www.epa.gov/dwanalyticalmethods/approved-drinking-water-analytical-methods

[14] https://www.tceq.texas.gov/assets/public/compliance/compliance_support/qa/tceq20132a.pdf

Laboratory Minimum Reporting Limits (MRL)

The calibration curve for the analysis of bromate must encompass the regulatory MRL concentration. The regulatory MRL for laboratories using EPA method 300.1 or ASTM D6581 for bromate analysis is 0.0050 mg/L. The MRL for laboratories that use EPA Method 317.0, 326.0, or 321.8 is 0.0010 mg/L for bromate [40 CFR 141.131(b)(2)(iv)].

Data may be reported for concentrations lower than the regulatory MRL if the accuracy criteria are met. Accuracy criteria are met by analyzing an MRL Check Standard at the lowest reporting limit chosen by the laboratory.

The laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL Check Standard with a concentration less than or equal to 110% of the MRL with each batch of samples. The measured concentration for the MRL check standard must be ±50% of the expected value, if any bromate sample in the batch has a concentration less than 5 times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement [40 CFR 141.131(b)(2)(iv)].

Note: The PWSS Program does not use J flagged (estimated) data for compliance purposes. Therefore, the laboratories must comply with the MRL requirements defined in this section and report data as "less than (<)" the MRL, as applicable. The MRL Check Standard is also known as an "MRL Verification" and involves the process of running a laboratory fortified blank at the MRL. The percent recovery of the MRL Verification or the MRL Check Standard (however named) must be included on the Laboratory Analytical Test Report.

Laboratory Analytical Test Reports

PWSs are required to provide TCEQ with the laboratory's analytical test reports for bromate results [30 TAC 290.114(b)(4)].

The Laboratory Test Report must document analytical results clearly and accurately and include information necessary for TCEQ data review, verification, and validation. At a minimum, test reports must include the following information consistent with program-specific and laboratory accreditation.

- Laboratory name, laboratory ID number, address, and phone number
- PWS name, address, PWS identification number (ID), and phone number
- Sample location address(es)
- Report date
- Date and time of sample collection
- Date and time of sample receipt
- Laboratory sample ID
- Analytical results with units, dilution factors (if applicable), and relevant data flags

- Date and time of sample preparation and analysis, and initials of analysts who performed the work
- Identification of the analytical methods used
- Analytical results with units, dilution factors (if applicable), and relevant data flags
- Numerical results for the MRL and minimum detection limit (MDL)
- Quality control results, including percent recovery of the MRL Verification Check Standard
- Name, function, date and signature of person authorized to approve report

Note: Bromate samples may be collected on behalf of a PWS by a third party who submits them to an accredited laboratory for analysis. In these cases, the PWS should provide the laboratory's original test report to TCEQ. *Do not provide a transcription of the results.*

TCEQ Reporting Requirements for Bromate

PWSs must ensure TCEQ is provided with copies of all bromate analytical test reports received from the laboratory as well as relevant COCs (or equivalent documents). Include a cover letter with PWS ID, PWS Name, monitoring period, and a description of the attached information.

Copies of test reports and cover letters must be submitted by mail within 10 days following the month in which the result is received by the PWS, or the first 10 days following the end of the required monitoring period, whichever occurs first [30 TAC 290.114(b)(4)].

Submit by regular mail:

TCEQ Water Supply Division
MC 155, Attn: Bromate
P.O. Box 13087
Austin, Texas 78711-3087

Or certified mail:

TCEQ Water Supply Division
MC-155, Attn: Bromate
12100 Park 35 Circle
Austin, TX 78753

Results will not be accepted by email or fax.

PWSs are required to maintain reports and related records according to 30 TAC 290.46: Minimum Acceptable Operating Practices for Public Drinking Water Systems. PWSs should refer to the rules and confer with TCEQ as requirements related to bromate records and reports may apply.

Violations and Public Notification

A PWS that fails to comply with rule requirements is in violation and may need to notify the public [30 TAC 290.122: Public Notification]. The purpose of Public Notification (PN) is to notify consumers of situations that may pose a health risk. Rule violations and PN requirements are summarized in this section. If a PWS knows or suspects it has a violation, it should contact the Drinking Water Quality Team immediately at (512) 239-4691 to confirm what rules and requirements apply, and what actions should be taken.

PN Tiers

TCEQ PN rules include three categories, or tiers, of public notification. Each tier has different methods and time frames for issuing a PN depending on the type of violation and the health risk involved.

Tier 1

Tier 1 violations have significant potential to cause serious adverse effects on human health resulting from short-term exposure. Please note that neither the bromate MCL nor a bromate monitoring and reporting violation triggers a Tier 1 PN. Only Tier 2 and 3 are applicable to bromate.

Tier 2

Tier 2 violations have the potential to cause serious adverse human health effects. PWSs must issue PN, per 30 TAC 290.122(b) as soon as possible, but in no case later than 30 days after the Tier 2 violation is identified. The PWS must issue the notice by:

- mail or other direct delivery to each customer receiving a bill, and to other service connections to which water is delivered; and
- any other method (for example, newspaper posting, posting in a conspicuous location, Internet, electronic delivery) determined to reach other persons regularly served by the PWS), if they might not receive the notice by mail or other direct delivery (for example, house renters, apartment dwellers, university students, nursing home patients, prison inmates).

Tier 3

Tier 3 applies to other PWS violations and situations that do not have a direct impact on human health. The initial Tier 3 public notice can be issued in the same way as a Tier 2 violation no later than 12 months after the public water system learns of the violation or situation. The extra time gives community PWSs an opportunity to consolidate these notices and include them with their annual Consumer Confidence Report (CCR). The CCR may be used by community PWSs for the initial Tier 3 public notices and all required repeat notices, under the following conditions:

- The CCR is provided to consumers no later than 12 months after the PWS learns of the violation.

- The Tier 3 notice contained in the CCR follows the requirements in 30 TAC 290.272 related to the content of CCRs.
- The CCR is distributed following the requirements in 30 TAC 290.274 relating to report delivery and recordkeeping.

Compliance Violations

Specific violations related to bromate monitoring, analysis, and reporting are summarized in Table 3 according to the PN Tier.

Note: This table only summarizes bromate violations specified in 30 TAC 290.114. Other rule violations may apply.

Table 3. Summary of Compliance Violations

Tier	Violation
Tier 1 (acute)	Not applicable
Tier 2 (nonacute)	A PWS violates the MCL for bromate if, at the end of any quarter, the running annual average of monthly averages, computed quarterly, exceeds the MCL [30 TAC 290.114(b)(5)(C)].
Tier 3 (monitoring)	A PWS that fails to monitor in accordance with this section commits a monitoring violation. Failure to monitor will be treated as a violation for the entire period covered by the annual average [30 TAC 290.114(b)(5)(A)]
Tier 3 (reporting)	A PWS that fails to report the results of the monitoring tests required commits a reporting violation [30 TAC 290.114(a)(5)(B)].
Tier 3 (reporting)	A PWS that fails to do a required PN or certify that the PN has been performed commits a PN violation [30 TAC 290.114(b)(5)(D)].

PN Format and Posting Requirements

A PWS that incurs an MCL violation, a monitoring, or a reporting violation must notify its customers as specified in 30 TAC 290.122: *Public Notification*. The format and posting of a PN varies, depending on the severity of the health threat involved. Each PN must include the following items as specified in 30 TAC 290.122(d).

- A clear and readily understandable explanation of the violation,
- The monitoring period the violation occurred,
- Description of potential adverse health effect (especially to vulnerable populations) and mandatory language, as applicable.
- Actions the PWS is taking to correct the violation and when it expects to return to compliance.
- Whether alternative drinking water sources should be used, and what other actions consumers should take, including when they should seek medical help, if known.

- Name, business address, and telephone number for consumers to contact the PWS owner, operator, or designee for additional information concerning the notice.
- Multilingual language, as appropriate. A multilingual PN must explain its importance or provide a telephone number or address where consumers can contact the PWS for a translated copy or assistance in the appropriate language.
- A statement encouraging the notice recipient to share the PN with other persons served.

Find more information on PNs on the Public Notice Language[15] webpage which includes step-by-step instructions for notifying customers of specific violations. The page also includes links to templates for completing mandatory language forms and certificates of delivery.

Falsification and Fraud

Falsification of analytical results or tampering with water samples used for compliance with the SDWA is a crime punishable under state and/or federal law [Texas Penal Code, Title 8, Chapter 37.10]. Evidence of falsification or fraud is referred to TCEQ's Environmental Crimes Unit for investigation.

[15] https://www.tceq.texas.gov/drinkingwater/public_notice.html