



## TCEQ REGULATORY GUIDANCE

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Water Supply Division

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# Monitoring, Analyzing, and Reporting Chlorine Dioxide and Chlorite

Public Water Supply Supervision Program

Water Supply Division

Texas Commission on Environmental Quality

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

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# 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 chlorine dioxide and chlorite 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 chlorine dioxide and chlorite analysis. 30 TAC §290.119 adopts these federally mandated methods by reference.

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

**Chlorine Dioxide (ClO<sub>2</sub>):** A chemical compound that is an oxide of chlorine. It is a potent and useful oxidizing agent used in water treatment.

**Chlorine Dioxide Distribution Sample:** If the entry point to the distribution system chlorine dioxide residual *exceeds* the maximum residual disinfectant level of 0.8 mg/L, the treatment plant must conduct additional chlorine dioxide monitoring in the distribution system. These samples are referred to in this document as “chlorine dioxide distribution.”

**Chlorine Dioxide Entry Point Sample:** PWSs that use chlorine dioxide must monitor the chlorite and chlorine dioxide residual in water entering the distribution system *at least once each day* during normal operating conditions. PWSs collect ClO<sub>2</sub> entry point samples daily to comply with this rule requirement. “Entry Point” may also be called “Point of Entry” (POE) in other guides.

**Chlorite Entry Point Sample:** PWSs that use chlorine dioxide must monitor the chlorite concentration and chlorine dioxide residual in water entering the distribution system *at least once each day* during normal operating conditions. PWS collect chlorite samples daily to comply with this rule requirement.

**Chlorite Distribution Sample:** A sample collected as a “3-sample set” taken at designated locations in distribution system. They are collected monthly and when an entry point chlorite sample exceeds the MCL of 1.0 mg/L.

**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.

**Disinfectant:** A chemical or a treatment intended to kill or inactivate pathogenic microorganisms in water.

**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.

**N,N-diethyl-p-phenylenediamine (DPD):** A reagent used in the determination of several disinfectant residuals. DPD methods are available for both volumetric titrations and colorimetric determinations and are commonly used in the field as part of a colorimetric test kit.

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

**Ethylenediamine (EDA):** A chemical used to preserve chlorite samples. An EDA preservative solution is made by diluting EDA with reagent water. The addition of the EDA solution to a chlorite sample will preserve the concentration of the chlorite for up to 14 days.

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

**ID:** identification

**L:** liter

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

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

**Maximum Residual Disinfectant Level (MRDL):** The disinfectant concentration that cannot be exceeded in the distribution system. Addition of a disinfectant is necessary to control waterborne microbial contaminants.

**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 of 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.

**Public Notification (PN):** PN is required by the Safe Drinking Water Act (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.

**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.

**PVC:** polyvinyl chloride

**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.

**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.

**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/Site:** 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.

**Sparging:** The process of purging a distribution chlorite sample with an inert gas before a preservative is added to a sample. Sparging is performed by sample collectors at the time of sample collection.

**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.

**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.

# Introduction

All public water systems (PWSs) that use chlorine dioxide must meet regulatory requirements related to chlorine dioxide and chlorite. PWSs use chlorine dioxide to treat drinking water to improve taste, odor, and color, remove iron and manganese, and inactivate chlorine resistant microorganisms. Chlorine dioxide does not form halogenated disinfection byproducts (DBPs) like trihalomethanes and haloacetic acids and is an effective disinfectant. If the maximum contaminant level (MCL) or maximum residual disinfectant level (MRDL) is exceeded, chlorine dioxide and its principal byproduct, chlorite, can have adverse health effects.

The information provided in this program guidance is intended to help PWSs monitor, analyze, and report chlorine dioxide and chlorite sample results to the Texas Commission on Environmental Quality (TCEQ). These activities are required by 30 Texas Administrative Code (TAC) 290.110: Disinfectant Residuals; and 30 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.

The current version of this guidance is located at the [Chlorine Dioxide and Ozone](#)<sup>1</sup> webpage. For specific information related to this guidance, contact TCEQ's Drinking Water Quality Team at 512-239-4691.

**Note:** Before placing a chlorine dioxide generator into service, a PWS must submit an exception request to TCEQ as specified in 30 TAC 290.42(e)(3)(G). For information, visit [Requesting an Exception to Rules and Regulations for Public Water Systems](#)<sup>2</sup> webpage or contact TCEQ Technical Review and Oversight Team at 512-39-4691. Once the exception has been granted, the system must submit plans and specifications and receive approval for the treatment unit. For information, visit [Forms and Checklists for Submitting Plans or Specifications for Public Water Systems](#)<sup>3</sup> webpage or contact the TCEQ Plan Review 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 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.

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<sup>1</sup> [www.tceq.texas.gov/goto/clo2mor](http://www.tceq.texas.gov/goto/clo2mor)

<sup>2</sup> [www.tceq.texas.gov/goto/pws-exception](http://www.tceq.texas.gov/goto/pws-exception)

<sup>3</sup> [www.tceq.texas.gov/goto/pwsplans](http://www.tceq.texas.gov/goto/pwsplans)

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 chlorine dioxide 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 290.110: Disinfectant Residuals
  - 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

## TCEQ Resources on Chlorine Dioxide and Chlorite 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 which is approved by EPA. More information is available on the [PWSS Program](#)<sup>4</sup> webpage.

You can find information on monitoring, analysis, and reporting of chlorine dioxide and chlorite on TCEQ's webpage for systems using [chlorine dioxide and ozone](#)<sup>5</sup>. Find similar information in the Microsoft Excel form and instructions for the *Chlorine Dioxide Monthly Operating Report* (CLO2MOR) (TCEQ Form 00690) linked on that page.

TCEQ's document, [Use of Chlorine Dioxide](#)<sup>6</sup> is a guide designed to help PWSs install and operate chlorine dioxide generators. It also contains information on monitoring, analysis, and reporting of chlorine dioxide and chlorite.

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<sup>4</sup> [www.tceq.texas.gov/goto/pwss](http://www.tceq.texas.gov/goto/pwss)

<sup>5</sup> [www.tceq.texas.gov/goto/clo2mor](http://www.tceq.texas.gov/goto/clo2mor)

<sup>6</sup> [www.tceq.texas.gov/downloads/drinking-water/plan-technical-review/guidance/rg-563.pdf](http://www.tceq.texas.gov/downloads/drinking-water/plan-technical-review/guidance/rg-563.pdf)

[Texas Drinking Water Watch](#)<sup>7</sup> (DWW) is a searchable database of analytical results, schedules, and violations.

## Regulatory Limits for Chlorine Dioxide and Chlorite

### Chlorine Dioxide

The chlorine dioxide disinfectant residual of water entering a PWS's distribution system cannot exceed the maximum residual disinfectant level (MRDL) of 0.8 milligrams per liter (mg/L) [30 TAC 290.110(b)(3)]. If a chlorine dioxide entry point (EP) disinfectant residual exceeds the MRDL, the PWS must conduct additional chlorine dioxide disinfectant residual tests in the distribution system [30 TAC 290.110(c)(3)]. A PWS will incur a violation and be required to deliver a Public Notice based on one of the following:

- If additional chlorine dioxide residual tests in the distribution system are conducted, and any result is over 0.8 mg/L, the PWS incurs an **acute MRDL violation for chlorine dioxide (Tier 1)** [30 TAC 290.110(f)(5)(A)].
- If additional chlorine dioxide disinfectant residual tests in the distribution system are not conducted, the PWS incurs an **acute MRDL violation for chlorine dioxide (Tier 1)** [30 TAC 290.110(f)(5)(B)].
- If additional chlorine dioxide tests in the distribution system are conducted, and no results exceed 0.8 mg/L, the PWS incurs a **non-acute MRDL violation (Tier 2)** [30 TAC 290.110(f)(5)(C)].

**Note:** For information on public notification tiers see Section - *Violations and Public Notification*

### Chlorite

The chlorite concentration in the distribution system water cannot exceed a maximum contaminant level (MCL) of 1.0 mg/L [30 TAC 290.114(a)(1)].

A PWS will incur a **nonacute MCL violation (Tier 2)** if the average of any chlorite “3-sample set” from the distribution system exceeds 1.0 mg/L.

## Monitoring Requirements and Procedures

PWSs that use chlorine dioxide are required to measure chlorine dioxide disinfectant residuals and chlorite sample concentrations according to various rules and regulations. Samples must be collected when the chlorine dioxide 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

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<sup>7</sup> [www.tceq.texas.gov/goto/dww](http://www.tceq.texas.gov/goto/dww)

monitoring, PWSs must comply with the requirements and procedures discussed in this section.

## Monitoring Plans

PWSs that use chlorine dioxide are required to monitor levels of chlorine dioxide and chlorite in accordance with a monitoring plan. Every PWS is required to develop, maintain, and update a monitoring plan subject to TCEQ review and approval, as specified in 30 TAC 290.121. 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)]

Information on monitoring plans is located at the [monitoring plan](#)<sup>8</sup> webpage which 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 chlorine dioxide and chlorite 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, including safety. The PWS should maintain training records to document that sample collection personnel have been properly trained and formally evaluated.

**Note:** PWSs must verify that training has been provided to its employees as part of its exception request to use chlorine dioxide.

### Operator Licensing

A licensed water operator must collect chlorine dioxide and chlorite samples. To become a licensed PWS operator, an applicant must complete the required course training, meet the required education and experience requirements, complete a TCEQ application and pay the fee, and pass the applicable exam (minimum score of 70

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<sup>8</sup> [www.tceq.texas.gov/goto/pws/monitoringplan](http://www.tceq.texas.gov/goto/pws/monitoringplan)

percent). Specific information for each license level is available on [our Water Operator Licensing Requirements](#)<sup>9</sup> webpage.

The TCEQ Occupational Licensing and Registration Division of the Office of Waste implements the agency program for licensing PWS operators. The Water Supply Division assists with aspects of operator licensing in coordination with the Office of Compliance and Enforcement by identifying, whenever possible, operators misusing their licenses.

If you don't remember your water operator license number, or if you are searching for a licensed water operator in your area, The [How to Find a Licensed Water Operator](#)<sup>10</sup> webpage provides guidance on searching the licensing database. [Occupational Licensing](#)<sup>11</sup> has information on licensing and training courses. For general information on operator license requirements, contact TCEQ Occupational Licensing and Registration Division at 512-239-6133. For specific operator licensing information as it applies to chlorine dioxide treatment facilities, contact the Technical Review and Oversight Team at 512-239-4691.

## Monitoring Locations and Frequency

All public water systems must monitor the performance of the disinfection facilities to ensure that appropriate disinfectant residual levels are maintained. All monitoring must be conducted at sites designated in the PWS's monitoring plan. Chlorine dioxide compliance monitoring requires each treatment plant using chlorine dioxide to monitor and record the chlorine dioxide residual and chlorite concentrations of the water entering the distribution system as least once each day. Entry Point (EP) is the term used to describe the site where water enters the distribution system. EP is used in SDWIS, DWW and the Chlorine Dioxide Monthly Operating Report (CLO2MOR).

A public water system may need to conduct additional monitoring in the distribution system if entry point levels exceed the MRDL for chlorine dioxide or MCL for chlorite. Monitoring location and frequency requirements are summarized in Table 1 along with the rule references.

**Table 1. Monitoring Requirements for Chlorine Dioxide Treatment Systems**

Monitoring Type Code on CLO2MOR	Analyte	Sample Location	Frequency	Rule Reference
ClO <sub>2</sub> EP	chlorine dioxide	entry point to distribution system	daily	§290.110(c)(3)
ClO <sub>2</sub> Distribution	chlorine dioxide	distribution system	when ClO <sub>2</sub> EP >MRDL	§290.110(c)(3)

<sup>9</sup> [www.tceq.texas.gov/goto/pws-ntk](http://www.tceq.texas.gov/goto/pws-ntk)

<sup>10</sup> [www.tceq.texas.gov/goto/pws/findlicense](http://www.tceq.texas.gov/goto/pws/findlicense)

<sup>11</sup> [www.tceq.texas.gov/licensing](http://www.tceq.texas.gov/licensing)

Monitoring Type Code on CLO2MOR	Analyte	Sample Location	Frequency	Rule Reference
Chlorite EP	chlorite	entry point to distribution system	daily	§290.114(a)(2)(A)
Chlorite Distribution	chlorite	distribution system (3-sample set)	monthly and when chlorite EP >MCL	§290.114(a)(2)(B)(i) §290.114(a)(2)(B)(ii)

## Chlorine Dioxide Entry Point (ClO<sub>2</sub> EP)

PWSs must monitor and record the chlorine dioxide residual of the water entering the distribution system at least once each day when chlorine dioxide is being used. The chlorine dioxide entry point disinfectant residual cannot exceed the maximum residual disinfectant level (MRDL) of 0.8 mg/L or additional chlorine dioxide disinfectant residuals must be measured in the distribution system.

## Chlorine Dioxide Distribution (ClO<sub>2</sub> Distribution)

If a chlorine dioxide entry point disinfectant residual exceeds the MRDL of 0.8 mg/L, a PWS is required to measure additional chlorine dioxide residuals in the distribution system. Samples collected to fulfill this requirement are referred to in this document as “ClO<sub>2</sub> distribution.” They may also be referred to as “additional ClO<sub>2</sub>” in this and other documents.

If a PWS does **not** have additional chlorination facilities in the distribution system, additional samples must be taken at the service connection nearest the treatment plant. Three additional samples should be collected within **two-, six-, and eight-hour intervals** after detecting elevated chlorine dioxide residual at the entry point to the distribution system [§290.110(c)(3)(A)].

If a PWS does have additional chlorination facilities in the distribution system, “distribution” sampling should occur as follows:

1. Measure an additional chlorine dioxide residual at the service connection nearest the WTP where an elevated chlorine dioxide residual was detected. This additional measurement must be conducted within two hours of detecting an elevated chlorine dioxide residual at the entry point to the distribution system.
2. Measure an additional test at the first service connection after the point where the water is re-chlorinated. This additional measurement must be conducted six hours after detecting an elevated chlorine dioxide residual at the entry point to the distribution system.
3. Measure at a location in the far reaches of the distribution system. This additional measurement must be conducted eight hours after detecting an elevated chlorine dioxide residual at the entry point to the distribution system.

**Note:** The sample locations referenced in the two situations may differ from distribution system chlorite sample collection locations listed in the PWS monitoring plan.

## Chlorite Entry Point (EP)

PWSs must monitor the chlorite concentration in the water entering the distribution system at least once each day during normal operating conditions when chlorine dioxide is being used. Samples collected to comply with this requirement are referred to in this document as “chlorite entry point.” They may also be referred to as “daily chlorite” in other documents.

## Chlorite Distribution

PWSs must collect chlorite samples from the distribution system for *two reasons*:

1. Routine monthly chlorite three-sample set; and
2. Non-routine chlorite three-sample set as a result of chlorite entry point sample exceeding the MCL (if needed) as explained in following section. The samples collected to comply with these two requirements are referred to in this document as “chlorite distribution.” Chlorite distribution samples are always collected as a 3-sample set.

### *Monthly Compliance Monitoring*

Each plant that uses chlorine dioxide must collect chlorite samples from the distribution system once a month when chlorine dioxide is being used. As stated previously, these samples must always be collected as a 3-sample set. The group of three samples must be collected on the same day during normal operating conditions at the locations described in the section -*Chlorite 3-Sample Set*.

### *If Chlorite Entry Point Exceeds the MCL*

When a chlorite entry point (EP) sample exceeds the chlorite MCL of 1.0 mg/L, within 24 hours of the exceedance, the PWS must collect a 3-sample set from the distribution system [30 TAC §290.114(a)(2)(B)(ii)].

### *Chlorite 3-Sample Set*

A 3-sample set must be collected to represent each entry point for any treatment plant where chlorine dioxide is used. Distribution chlorite samples must always be collected as a 3-sample set.

A chlorite 3-sample set must be collected on the same day at the following locations:

Sample 1 - at a location in the distribution system, outside the treatment plant, near the first customer. This is referred to the “near” sample on the CLO2MOR.

Sample 2 - at a location representative of the average residence time in the distribution system. This is referred to the “middle” sample on the CLO2MOR.

Sample 3 - at a location reflecting maximum residence time in the distribution system. This is referred to as the “far” sample on the CLO2MOR.

## Sample Collection and Handling

Proper sample collection and handling is critical to achieve accurate sample results that support their intended use. The sample collection procedures described in this section are typically conducted by WTP operators; however, distribution chlorite samples may also be collected by a third party or a laboratory. Anyone collecting these samples must have a current, valid water operator license, including third party laboratory personnel. See Section - *Training and License Requirements for Sample Collectors*.

## Chlorine Dioxide and Chlorite Sample Collection and Handling Steps

The following steps apply to chlorine dioxide and chlorite sample collection and handling. These steps ensure that samples are collected correctly and consistently.

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 2 and Section - *Distribution Chlorite Sample Containers* regarding requirements. Check with the laboratory before collecting samples to ensure the sampling procedures are acceptable.

**Note:** Distribution chlorite samples should be collected at the beginning of each month. This allows the laboratory time to analyze and report the results so the PWS can submit the CLO2MOR to TCEQ by the tenth day of the following month. Prior coordination with the laboratory will help ensure this requirement is met.

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.

**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 documentation (i.e., sample labels and Chain of Custody or equivalent documentation) completely and accurately.

6. Analyze samples onsite or deliver them to the laboratory to ensure that holding times are met. See Table 2.

**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 2. Preservation, Containers, and Holding Time Requirements for Samples**

Sample Type	Sample Containers <sup>1</sup>	Preservation	Holding Time
ClO <sub>2</sub> EP	Method specific	NA	< 15 minutes
ClO <sub>2</sub> Distribution	Method specific	NA	< 15 minutes
Chlorite EP	Method specific <sup>3</sup>	NA	< 15 minutes
Chlorite Distribution <sup>2</sup>	Method specific <sup>3</sup>	Ethylenediamine (EDA), cool 4°Celsius	14 days

<sup>1</sup> Multiple methods are approved for analysis of disinfectant residuals and disinfectant byproducts. The requirements for sample containers vary, depending on the method. PWSs should follow the sample container specifications provided with the analytical method and/or test kit instructions.

<sup>2</sup> Distribution chlorite samples must be sparged immediately upon collection with an inert gas and then preserved with EDA solution. See following section.

<sup>3</sup> Sample bottles used for chlorite analysis must be opaque or amber to protect the sample from light.

## Specific Sample Collection and Handling Requirements Applicable to Distribution Chlorite

As previously stated, distribution chlorite samples may be collected by WTP personnel, third parties, or by employees of the testing laboratory as long as the individual maintains a current, valid operator license. The specific sample collection and handling requirements described in this section apply to these samples, regardless of who collects them.

### *Distribution Chlorite Sample Containers*

Sample collection personnel must use laboratory-supplied sample containers for distribution chlorite samples. Samples containers can be either opaque plastic or amber glass bottles and may vary in size. 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.

Distribution chlorite monitoring requires a 3-sample set from multiple points in the distribution system. See Section - *Chlorite 3-Sample Set*. PWSs should ensure they receive enough sample containers from the laboratory to perform all required sampling.

### *Distribution Chlorite Sample Sparging*

Allowable analytical methods for distribution chlorite samples require that the samples be “sparged” with an inert gas at the time of collection; otherwise, chlorine dioxide will continue to form chlorite. The laboratory-supplied sample containers must be filled after this step.

It is very important for sample collectors to coordinate with their testing laboratories regarding the collection of distribution samples. This ensures samplers use the right equipment and know how to properly sparge their samples according to the analytical method performed by their laboratory.

The following steps generally describe the sparging procedure.

1. Fill a clean wide mouth flask approximately three-quarters full of sample.
2. Insert a disposable pipette connected with PVC tubing to an inert gas supply such as helium or nitrogen. Adjust the gas regulator to produce a steady flow of bubbles.
3. Sparge the sample for approximately 10 to 15 minutes to remove any residual chlorine dioxide from the sample.
4. Transfer the sparged sample into an EDA preserved sample container filling to the neck of the sample container. Take care not to flush out preservatives and make sure the mouth of the container does not touch anything other than sample water.
5. Replace the sample container cap and tighten.
6. Invert the sample container multiple times to mix the sample and preservative.
7. Store on ice until transported to an accredited laboratory.

**Note:** Laboratories should check the chain of custody (COC) at the time of sample receipt for documentation indicating the distribution chlorite samples were sparged with an inert gas at the time of sample collection. Accredited laboratories are required to accept samples according to their *Sample Acceptance Policy* [TNI Standard, 2009 V1, M2 Section 5.8.6] that includes proper sample labeling, proper sample containers, compliance with holding times, adequate sample volume, and preservation.

### *Sample Labels*

Sample collectors must record the following information on the sample container’s label, when collecting distribution chlorite samples.

- PWS Identification (ID) Number
- Date and time sample was collected
- Sampler collector’s initials
- Address/location where the sample was collected to include the entry point number (for example EP001), as listed in [Texas Drinking Water Watch](#)<sup>12</sup>

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<sup>12</sup> [www.tceq.texas.gov/goto/dww](http://www.tceq.texas.gov/goto/dww)

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 list 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
- relinquished and received-by signatures

**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.

**Note:** On the COC form, sample collectors must provide documentation that the distribution chlorite samples were sparged upon collection. If there is not a designated spot on the COC form to record this information, sample collectors can make a note in the margin of the form.

## **Analytical Requirements**

Any laboratory that conducts analyses addressed in this guidance must conform to all of the following:

- Either is approved by the TCEQ Water Supply Division (WSD) or is accredited by TCEQ's Laboratory Accreditation Program according to The NELAC Institute (TNI) National Environmental Laboratory Accreditation Program (NELAP) Standard.
- Adheres to applicable requirements specified in EPA *Manual for the Certification of Laboratories Analyzing Drinking Water* [EPA 815-R-05-004, Fifth Edition, January 2005] located at the EPA [Laboratory Certification Manual for Drinking Water](#)<sup>13</sup> webpage.
- 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 Approval

PWS facilities and laboratories must obtain laboratory approval from the WSD before operators can analyze and report:

- ClO<sub>2</sub> entry point disinfectant residuals
- ClO<sub>2</sub> distribution disinfectant residuals
- chlorite entry point concentrations

Each PWS that analyzes one or more of these analytes is considered a laboratory and must submit a *Drinking Water Laboratory Approval Form* with its monitoring plan. If any information submitted to TCEQ on the lab approval form changes, the PWS must resubmit a corrected form. PWS drinking water laboratory approval lasts for three years. Commercial laboratory drinking water lab approval lasts for up to six months, based on proficiency testing results.

Information on laboratory approval is located at our [Public Water System Monitoring Plans](#)<sup>14</sup> webpage. For specific questions about laboratory approval, contact the WSD Laboratory Approval Coordinator at -512-239-4691.

## Laboratory Accreditation

Laboratories must be accredited by the State of Texas under NELAP to analyze distribution chlorite samples. Laboratories that analyze distribution chlorite samples must be accredited by TCEQ [30 TAC §290.114(b)(3)] and adhere to all accreditation requirements. You can find information on laboratory accreditation at our [Environmental Laboratory \(NELAP\) Accreditation](#)<sup>15</sup> webpage along with the routinely

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<sup>13</sup> [www.tceq.texas.gov/goto/dww](http://www.tceq.texas.gov/goto/dww)

<sup>14</sup> [www.tceq.texas.gov/goto/pws/monitoringplan](http://www.tceq.texas.gov/goto/pws/monitoringplan)

<sup>15</sup> [www.tceq.texas.gov/goto/labcred](http://www.tceq.texas.gov/goto/labcred)

updated list of Texas NELAP laboratories. For specific questions about laboratory accreditation, contact the TCEQ Laboratory Accreditation Program at 512-239-3754.

In addition, as per federal regulations and state rules, drinking water laboratories must adhere to EPA *Manual for the Certification of Laboratories Analyzing Drinking Water* [EPA 815-R-05-004, Fifth Edition, January 2005] located at the EPA [Laboratory Certification Manual for Drinking Water](#)<sup>16</sup> webpage.

Table 3 provides a summary of laboratory approval and accreditation requirements for each sample type and applicable rule information.

**Table 3. Laboratory Approval and Accreditation Requirements**

Sample Type	Laboratory Requirement <sup>1</sup>	Rule Reference
ClO <sub>2</sub> Entry Point	TCEQ WSD Approval	30 TAC §290.110(d)
ClO <sub>2</sub> Distribution	TCEQ WSD Approval	30 TAC §290.110(d)
Chlorite Entry Point	TCEQ WSD Approval	30 TAC §290.114(a)(3)(A)
Chlorite Distribution	NELAP Accreditation	30 TAC §290.114(a)(3)(B)

<sup>1</sup> PWSs must use an approved facility or an accredited laboratory, as applicable for each method (or test performed). TCEQ approves facilities and accredits laboratories by method. Laboratory approval and accreditation is available for all test methods included in Table 3.

## Allowable Methods

Chlorine dioxide and chlorite samples must be analyzed using an allowable method listed in Table 4. These methods are included in EPA's *List of Approved Drinking Water Analytical Methods* located at [Approved Drinking Water Analytical Methods](#)<sup>17</sup>.

They are required by the National Primary Drinking Water Regulations defined in 40 CFR Part 141. 30 TAC §290.119 adopts these federally mandated methods by reference.

**Note:** Table 4 includes the chlorite ion chromatography methods listed in TCEQ's [Recognized Fields of Accreditation](#)<sup>18</sup>.

**Table 4. Allowable Methods for the Analysis of Chlorine Dioxide and Chlorite**

Sample Type	Method	Organization	Method Description
Chloride Dioxide <sup>2,11</sup> Entry Point (EP)	4500-ClO <sub>2</sub> D <sup>4</sup>	Standard Methods	DPD <sup>3</sup>
	4500-ClO <sub>2</sub> C <sup>5</sup>	Standard Methods	Amperometric titration
	4500-ClO <sub>2</sub> E <sup>5</sup>	Standard Methods	Amperometric titration
	ChlordioX Plus <sup>7</sup>	Palintest, Ltd.	Amperometric titration

<sup>16</sup> [www.epa.gov/dwlabcert/laboratory-certification-manual-drinking-water](http://www.epa.gov/dwlabcert/laboratory-certification-manual-drinking-water)

<sup>17</sup> [www.epa.gov/dwanalyticalmethods/approved-drinking-water-analytical-methods](http://www.epa.gov/dwanalyticalmethods/approved-drinking-water-analytical-methods)

<sup>18</sup> [www.tceq.texas.gov/downloads/compliance/labs/tceq20132a.pdf](http://www.tceq.texas.gov/downloads/compliance/labs/tceq20132a.pdf)

Sample Type	Method	Organization	Method Description
and Distribution	327.0 Rev 1.1	EPA	Lissamine Green Spectrophotometry
	4500-ClO <sub>2</sub> E <sup>6</sup>	Standard Methods	Amperometric titration
	4500-ClO <sub>2</sub> D <sup>4</sup>	Standard Methods	DPD <sup>3</sup>
	4500-ClO <sub>2</sub> C <sup>5</sup>	Standard Methods	Amperometric titration
<b>Chlorite</b> <sup>11</sup> Entry Point (EP)	ChlordioX Plus <sup>7</sup>	Palintest, Ltd.	Amperometric titration
	300.0 Rev 2.1	EPA	Ion chromatography
	300.1 Rev 1.0	EPA	Ion chromatography
	317.0 Rev 2.0	EPA	Ion chromatography
	326.0 Rev 1.0	EPA	Ion chromatography
	D 6581-00 <sup>1</sup>	ASTM	Ion chromatography
<b>Chlorite</b> <sup>8,9,10</sup> Distribution	300.0 Rev 2.1	EPA	Ion chromatography <sup>9</sup>
	300.1 Rev 1.0	EPA	Ion chromatography <sup>9</sup>
	317.0 Rev 2.0	EPA	Ion chromatography <sup>9</sup>
	326.0 Rev 1.0	EPA	Ion chromatography <sup>9</sup>
	D 6581-00 <sup>1</sup>	ASTM	Ion chromatography <sup>9</sup>

<sup>1</sup> Annual Book of ASTM Standards, 2001 or any year containing the cited version of the method, Vol 11.01.

<sup>2</sup> Chlorine dioxide must be measured to a minimum accuracy of plus or minus 0.05 mg/L [§290.110(d)(2)].

<sup>3</sup> The DPD-glycine method using a colorimeter or spectrophotometer may be utilized only with the written permission of TCEQ [§290.110(d)(2)].

<sup>4</sup> The 19th or 20th edition of Standard Methods for the Examination of Water and Wastewater, American Public Health Association may be used.

<sup>5</sup> N,N-diethyl-p-phenylenediamine (DPD). The 21st or 22nd edition of Standard Methods for the Examination of Water and Wastewater, American Public Health Association may be used.

<sup>6</sup> The 19th, 20th, 21st, and online editions of Standard Methods for the Examination of Water and Wastewater, American Public Health Association may be used. The Standard Methods Online version that is approved is indicated by the last two digits of the method number. This represents the year of Standard Method Committee approval. Standard Methods Online are available at [Standard Methods](#)<sup>19</sup>.

<sup>7</sup> Palintest ChlordioX Plus Method—ClO<sub>2</sub> and Chlorite in Drinking Water by Amperometry using Disposable Sensors. November 2013.

<sup>8</sup> Accredited laboratories that analyze distribution chlorite samples must achieve recovery of performance evaluation samples as described in 40 CFR 141.131.

<sup>9</sup> Ion chromatography must be used for distribution chlorite monitoring. Amperometric titration or spectrophotometry may be used to analyze entry point chlorite samples.

<sup>10</sup> The minimum reporting level (MRL) for distribution chlorite by ion chromatography is 0.020 mg/L. See Section - *Minimum Reporting Accuracies and Levels*.

<sup>11</sup> The minimum accuracy for entry point chlorite and chlorine dioxide and distribution chlorine dioxide is 0.05 mg/L. See Section - *Minimum Reporting Accuracies and Levels*.

<sup>19</sup> [www.standardmethods.org](http://www.standardmethods.org)

## Minimum Reporting Accuracies and Levels

Accuracy is a reflection of bias and precision of a product or measurement, which reflects the closeness of the product or measurement to a true value. Minimum accuracy is used for chlorite entry point concentration and chlorine dioxide entry point and distribution residual analysis by approved TCEQ WSD laboratories. Minimum reporting level (MRL) is used for chlorite distribution concentration analysis by accredited NELAP laboratories. Minimum reporting accuracies and levels for chlorine dioxide and chlorite are provided in Table 5.

**Table 5. Minimum Reporting Accuracies and Levels**

Analyte	Sample Location	Minimum Accuracy	Minimum Reporting Level
Chlorine dioxide <sup>1</sup>	Entry Point (EP)	0.05 mg/L	*
Chlorine dioxide <sup>1</sup>	Distribution	0.05 mg/L	*
Chlorite <sup>2</sup>	Entry Point (EP)	0.05 mg/L	*
Chlorite <sup>3</sup>	Distribution	*	0.020 mg/L

\* not applicable

<sup>1</sup> 30 TAC §290.110(d)(2)

<sup>2</sup> 30 TAC §290.114(a)(3)(A)

<sup>3</sup> 40 CFR 141.131(b)(2)(iv)

Data may be reported for concentrations lower than the regulatory minimum reporting limit (MRL) if the precision and 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  $\pm 50\%$  of the expected value, if any field 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) Footnote 1].

**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. An MRL Verification involves spiking a sample of deionized water with verified known amounts of analyte at a concentration equivalent to the MRL. The results are used to assess the performance of the measurement system at the lower limits of analysis. The percent recovery of the “MRL Verification” is calculated by dividing the actual MRL verification sample results by the reference concentration. The percent recovery of the MRL Verification or the MRL Check Standard (however named) must be included on the Laboratory Analytical Test Report. See Section - *Laboratory Analytical Test Reports*.

## Laboratory Analytical Test Reports

PWSs are required to provide TCEQ with the laboratory's analytical test reports for distribution chlorite results [30 TAC 290.114(b)(4)]. See Section - *TCEQ Reporting Requirements*.

The reports must be attached to the *Chlorine Dioxide Monthly Operating Report* (CLO2MOR). The laboratory's test report must document the analytical results clearly and accurately and include the information necessary for the review, verification, and validation of data by TCEQ. At a minimum, test reports must include the following information consistent with requirements for 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 (or electronic equivalent) of person authorized to approve report

**Note:** Distribution chlorite 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 with the CLO2MOR. *Do not provide a transcription of the results.*

PWS must ensure laboratory result requirements are being met and communicate any deficiencies with the laboratory.

# TCEQ Reporting Requirements

Both the “Disinfectant Residuals Rule” and the “Other Disinfection Byproducts Rule” requires PWSs to report information to TCEQ related to chlorine dioxide and chlorite within required timeframes. Reporting requirements related to chlorine dioxide and chlorite are summarized in Table 6 along with their TAC reference. The table also includes resources available to facilitate reporting the required information to TCEQ.

**Table 6. Reporting Requirements for Chlorine Dioxide and Chlorite**

Report	PWS Reporting Requirement	Rule Reference
CLO2MOR	Submit the CLO2MOR to TCEQ by the tenth day of the following month. <b>Note:</b> PWSs that did not use ClO <sub>2</sub> for one month are still required to submit a CLO2MOR.	30 TAC §290.110(e)(3) 30 TAC §290.114(a)(4)(A)
Laboratory test reports for distribution chlorite sample results	Submit laboratory test reports for distribution chlorite 3-sample sets attached to the CLO2MOR.	30 TAC §290.114(a)(4)(b)

All systems that use chlorine dioxide must complete and submit a CLO2MOR monthly. The CLO2MOR (TCEQ-00690) is a Microsoft Excel spreadsheet that automatically performs calculations. You can download an electronic copy of the form and instructions for completing it at the webpage [Public Water Systems Using Chlorine Dioxide or Ozone](#)<sup>20</sup>. Appendix A also includes the instructions for completing the CLO2MOR and Appendix B includes the CLO2MOR.

A CLO2MOR must be submitted for each treatment plant that provides chlorine dioxide treated water regardless of the number of entry points to the distribution system. A digital version of the CLO2MOR must be completed, printed, and signed before submission. Hand-written copies will not be accepted. This is necessary so that the form may calculate violations and reporting dates. Always include the treatment plant “TP” number on the report.

**Note:** The CLO2MOR automatically adds two decimal places when results are entered.

PWSs must ensure TCEQ is provided with the CLO2MOR, copies of all distribution chlorite 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. **The CLO2MOR, copies of distribution chlorite laboratory 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**

<sup>20</sup> [www.tceq.texas.gov/goto/clo2mor](http://www.tceq.texas.gov/goto/clo2mor)

**the first 10 days following the end of the required monitoring period as provided by this section, whichever occurs first [30 TAC §290.114(a)(4)].**

Submit by regular mail:

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

Or certified mail:

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

Documents 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 chlorine dioxide and chlorite 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.

### Public Notification Tiers

TCEQ public notification rules include three categories, or tiers, of public notification. Each tier has different methods and time frames for issuing a public notice 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. Within 24 hours of the violation, per 30 TAC §290.122(a), the PWS must issue the notice by:

- Publishing a notice of Tier 1 violation in various media outlets such as television, radio, and newspapers;
- posting the notice in public places; and/or
- personally delivering the notice to customers.

## Tier 2

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

- mail or other direct delivery to each customer receiving a bill, and to other service connections to which water is delivered.
- 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 chloride dioxide and chlorite monitoring, analysis, and reporting are summarized in Table 7 according to the public notice tier.

**Note:** This table only summarizes chlorine dioxide and chlorite violations specified in 30 TAC 290.110 and 30 TAC 290.114. Other rule violations may apply.

**Table 7. Summary of Compliance Violations**

Public Notice Tier	Violation
Tier 1 (acute)	A PWS violates the MRDL for chlorine dioxide if, the CLO <sub>2</sub> EP exceeds the MRDL, and any of the three additional distribution samples exceeds the MRDL. The PWS must notify TCEQ within 24 hours of the event. [30 TAC §290.110(f)(5)(A)].
	A PWS violates the MRDL for chlorine dioxide if, the CLO <sub>2</sub> entry point exceeds the MRDL, and the PWS fails to collect each of the three additional distribution samples. The PWS must notify TCEQ within 24 hours of the event. [30 TAC §290.110(f)(5)(B)].
Tier 2 (nonacute)	A PWS violates the MRDL for chlorine dioxide if, the CLO <sub>2</sub> entry point exceeds the MRDL, but none of the three additional distribution samples exceeds the MRDL. The PWS must notify TCEQ by the end of the next business day and customers within 30 days [30 TAC §290.110(f)(5)(C)].
	A PWS violates the MCL for chlorite if, the arithmetic average of any three-sample set collected in the distribution system exceeds the MCL. The PWS must notify TCEQ by the end of the next business day and customers within 30 days [30 TAC §290.114(a)(5)(C)].
Tier 3  (monitoring and reporting)	A PWS that fails to monitor in accordance with the rules commits a monitoring violation [30 TAC §290.110(f)(2) and 30 TAC §290.114(a)(5)(A)].
	A PWS that fails to report the results of the monitoring tests required by the rules commits a reporting violation [30 TAC §290.110(f)(3) and 30 TAC §290.114(a)(5)(B)].
	A PWS that fails to do a required public notice or certify that the public notice has been performed commits a public notice violation [30 TAC §290.110(f)(10) and 30 TAC §290.114(a)(5)(D)].

## Public Notification Format and Posting Requirements

A PWS that incurs a MRDL, MCL, monitoring, or reporting violation must notify its customers as specified in 30 TAC 290.122: *Public Notification*. The format and posting of public notification (PN) vary, 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.

You can find information on PNs at the webpage [Public Notice Language for Drinking Water Compliance](#)<sup>21</sup> 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 the TCEQ Environmental Crimes Unit for investigation.

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<sup>21</sup> [www.tceq.texas.gov/goto/pws/notices](http://www.tceq.texas.gov/goto/pws/notices)

# APPENDIX A

## How to Complete the Chlorine Dioxide Monthly Operating Report (CLO2MOR)



### TCEQ FORM 00690 INSTRUCTIONS

TCEQ Water Supply Division

Revised April 2021

## Instructions for Completing the Chlorine Dioxide Monthly Operating Report for Public Water Systems

### Abbreviations

CLO<sub>2</sub>: Chlorine dioxide

CLO2MOR: Chlorine Dioxide Monthly Operating Report

EP: Entry Point to the distribution system. Basically, a sample-tap on the water main that leaves the water treatment plant

### Instructions

The TCEQ webpage, [Public Water Systems Using Chlorine Dioxide or Ozone](#)<sup>1</sup> has additional information and the *Monitoring, Analyzing and Reporting Chlorine Dioxide and Chlorite* regulatory guide (RG-503). [Texas Drinking Water Watch](#)<sup>2</sup> (DWW) is a database that drinking water operators and the public can use to find information about public water systems. It may be used to find your system and plant information.

These instructions are provided for the use of the Microsoft Excel Chlorine Dioxide Monthly Operating Report (TCEQ Form 00690). The fillable form will perform the needed calculations and compliance determinations once you have entered the appropriate raw data. These instructions are also included in the form, simply click on a cell and instructions will appear. The CLO2MOR should be organized in the following sections and should be completed in this order:

- PWS Information and Reporting Period
- RAW DATA
- Disinfection and Violation Information, General Remarks
- DATA SUMMARY
- Operator and Report Submission Information

<sup>1</sup> [www.tceq.texas.gov/drinkingwater/chemicals/dbp/dbp\\_risk.html](http://www.tceq.texas.gov/drinkingwater/chemicals/dbp/dbp_risk.html)

<sup>2</sup> [dww2.tceq.texas.gov/DWW/](http://dww2.tceq.texas.gov/DWW/)

### PWS Information and Reporting Period

CHLORINE DIOXIDE MONTHLY OPERATING REPORT FOR PUBLIC WATER SYSTEMS			
PWS NAME:		TREATMENT PLANT NAME:	
PWS ID Number:		TREATMENT PLANT NUMBER:	
Report Month:		Year:	

Figure 1. PWS Information and Reporting Period Section of CL2MOR

**PWS NAME:** Enter the name of your public water system.

**PWS ID Number:** Enter the public water system's 7-digit PWS identification number.

**Report Month:** Using the drop-down list, select the month that the data was collected. Do not enter the month that you are sending the report. Once the Report Month is selected, the RAW DATA section will populate the appropriate number of rows (for the days in the month) for your raw data.

**TREATMENT PLANT NAME:** Enter the name of the water treatment plant. Each treatment plant that uses ClO<sub>2</sub> must complete a separate CLO2MOR.

**TREATMENT PLANT NUMBER:** Enter the name of the water treatment plant.

### RAW DATA

RAW DATA									
DATE	ClO <sub>2</sub> Used?	ClO <sub>2</sub> EP	ClO <sub>2</sub> Distribution			Chlorite EP	Chlorite Distribution		
			First	Sec.	Third		Near	Mid	Far
1									
2									

Figure 2. RAW DATA Section of CLO2MOR

**ClO<sub>2</sub> Used?:** Use the dropdown list, select "Yes" or "No" to indicate whether ClO<sub>2</sub> was used on a given day. You must select "Yes" before you can enter any daily data. The form will always automatically show 31 rows for the table but not all months have 31 days. The form will grey out date rows depending on the month selected. You do not need to select "Yes" or "No" on greyed out date rows. Once you make the selection the form cells in the next columns will change shading to remind you to enter data in those cells, see Figure 3.

Note: We incorporated a feature that allows you to record data (especially distribution system data) on a day that you did not use your generator. To use this feature, you must use the following data entry sequence:

- First select "Yes"
- Then enter any of the data that you collected
- Finally, change the selection to "No"

**ClO<sub>2</sub> EP:** Record the ClO<sub>2</sub> residual level in milligrams per liter (mg/L) at the EP for each day the ClO<sub>2</sub> generator is used. All EP ClO<sub>2</sub> data is used to determine the Maximum Residual Disinfectant Level (MRDL) ClO<sub>2</sub> compliance. Failure to collect ClO<sub>2</sub> data is a monitoring and reporting (M/R) violation. When more than one test was conducted, report the highest test result for the day. You may leave all other cells blank if no ClO<sub>2</sub> was not used on that date. Input of results ≥0.8 mg/L will change shading in subsequent cells (Figure 3).

**ClO<sub>2</sub> Distribution (First, Sec., Third):** When any of the ClO<sub>2</sub> daily results at the EP is 0.8 mg/L or higher, you must collect three ClO<sub>2</sub> samples in the distribution system (Refer to RG-503 for further instruction). All three samples (first, second, third) must be collected at TCEQ approved sampling sites in the distribution system that are represented in the system’s Monitoring Plan. These distribution system sample results will be used to determine ClO<sub>2</sub> MRDL compliance. Enter sample results in First, Sec., Third column in the form on date of sample collection in mg/L. When more than one sample was collected for each test, report the highest test result for the day. When EP results were below 0.8 mg/L, you do not have to sample for ClO<sub>2</sub> in the distribution system.

**Chlorite EP:** Enter the chlorite concentration in mg/L at the EP for each day the ClO<sub>2</sub> generator is used. Failure to collect chlorite data is a Monitoring and Reporting (M/R) violation. When more than one test was conducted, enter the highest test result for the day. You may leave all other cells blank if no ClO<sub>2</sub> was used on that date and chlorite was not tested.

**Chlorite Distribution (Near, Mid, Far):** This is your three sample-set for chlorite. Enter the number of samples in the Near (nearest the treatment plant), Mid (first service connection), Far (far reaches of the distribution system) cells that were collected at the approved chlorite sampling points in the distribution system. For example, if you collected 1 sample from each of three sampling sites (Near, Mid, Far) on the 10th, put a 1 in each of three cells for that day. You may leave all other cells blank if no sample was collected on that date.

RAW DATA									
DATE	ClO <sub>2</sub> Used?	ClO <sub>2</sub> EP	ClO <sub>2</sub> Distribution			Chlorite EP	Chlorite Distribution		
			First	Sec.	Third		Near	Mid	Far
1	Yes	0.50				1.50			
2	Yes	0.90							
3	No								
4	Yes	0.10							
5	Yes								
6									

Figure 3. RAW DATA Section of CLO2MOR with Example Data and Shading

### Disinfection and Violation Information, General Remarks

<b>Chlorite Stock Solution</b>	
	g/L chlorite
	g/L chlorate
<b>Booster Chlorination?</b>	
<b>Chlorite Distribution Monitoring</b>	
Samples Collected	

Figure 4. Disinfection Section of CLO2MOR

**(Optional) Chlorite Stock Solution:** The purity of the sodium chlorite feedstock can be reduced by high temperatures or exposure to sunlight. Each plant should test the purity of the chlorite solution in the bulk storage tank at least monthly. Enter the chlorite and chlorate concentrations, in grams per liter (g/L), of the sodium chlorite solution used to supply the ClO<sub>2</sub> generator. If you analyzed the stock solution more than once during the reporting month, record the average value of all the tests.

**Booster Chlorination?:** Using the drop-down list, select “Yes” if your system has booster chlorination facilities in the distribution system. If not, select “No”.

**Chlorite Distribution Monitoring Samples Collected:** This count will be calculated automatically based on how many samples were entered in the RAW DATA table for Near, Mid, Far.

<b>Chlorine Dioxide Violations</b>		<b>Chlorite M/R Violations</b>	
Number of Violations		Note: MCL Violations TBD by the TCEQ	
Acute MRDL		Number of Violations	
Non Acute MRDL		Monitoring	
Monitoring		TCEQ Notified?	
TCEQ Notified?		Date:	
Date(s):	03/08/21	Public Notified?	
Public Notified?		Date:	
Date(s):			
<b>GENERAL REMARKS ABOUT ClO<sub>2</sub> GENERATOR</b>			

Figure 5. Violation Section of CLO2MOR

**Chlorine Dioxide Violations:**

**Acute MRDL:** This will be calculated automatically. If you have an Acute Maximum Residual Disinfectant Level MRDL violation, you must notify both the TCEQ and your customers within 24 hours.

**Non Acute MRDL:** This will be calculated automatically.

**Monitoring:** This will be calculated automatically.

**TCEQ Notified? Dates:** Use the drop-down list, select "Yes" if you had any ClO<sub>2</sub> violation and notified the TCEQ and public as required. Enter date(s). Select "No" if you failed to do the proper notification.

**Public Notified? Dates:** Use the drop-down list, select "Yes" if you had any ClO<sub>2</sub> violation and did the required public notification. Enter date(s). Select "No" if you did not have a ClO<sub>2</sub> violation that required public notification or failed to do proper notification. If you have already issued the notice, attach a copy of the notice and the Certificate of Delivery.

**You must contact the TCEQ's Drinking Water Standards Section (DWSS) following an MRDL violation.**

- You must notify the DWSS of an Acute MRDL violation within 24 hours.
- You must notify the DWSS of a Non-acute MRDL by the end of the next business day.
- The DWSS may be contacted by email at [pdws@tceq.texas.gov](mailto:pdws@tceq.texas.gov) or telephone at (512) 239-4691.

**Chlorite M/R Violations:**

**Monitoring:** The **Number of Violations** will be calculated automatically.

**TCEQ Notified?/Date:** Use the **drop-down list**, select "Yes" or "No" if the TCEQ was notified. Date and TCEQ notification is indicated by the submission of the MOR.

**Public Notified? / Date:** Use the drop-down list, select "Yes" if you had a chlorite M&R violation and have already issued the required public notice. Enter the date(s). Select "No" if you will issue the notice later. If you issued a public notice, attach a copy of the notice(s) and certificate of delivery.

**GENERAL REMARKS ABOUT ClO<sub>2</sub> GENERATOR:** Enter any required maintenance and feed adjustments made to the ClO<sub>2</sub> generator during the reporting month.

<b>Total water treated this Month</b>	<b>Sodium Chlorite used this Month</b>
MG	lbs.

**Figure 6. Water Treatment and Sodium Chlorite Section of CLO2MOR**

**(Optional) Total Water Treated this Month:** Enter the total amount of water, in million gallons (MG), treated during the reporting month.

**(Optional) Sodium Chlorite Used this Month:** Enter the total amount of sodium chlorite, in pounds (lbs.), used by the water treatment plant during the reporting month.

DATA SUMMARY					
	ClO <sub>2</sub> EP	ClO <sub>2</sub> Distribution			Chlorite EP
		No. of Sets:			
		First	Sec.	Third	
# > Limit					
Max.					
Min.					
Avg.					

**Figure 7. DATA SUMMARY Section of CLO2MOR**

**DATA SUMMARY:** All data in the DATA SUMMARY table will auto populate based on the data that is entered in the RAW DATA. Review the data that auto populates in the table to ensure accurate and complete data is reflected.

## Operator and Report Submission Information Section

I declare that I am familiar with the information contained in this report and that, to the best of my knowledge, the information is true, complete, and accurate.

Operator's Signature: \_\_\_\_\_

License No. & Class: \_\_\_\_\_ Date: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Submit Report to TCEQ Water Supply Division/Drinking Water Standards Section(MC-155), ATTN: Monthly Reports, P.O. Box 13087, Austin, TX 78711-3087  
The report is due the 10th of the following month.

**Figure 8. Operator Information Section of CLO2MOR**

**Operator's Signature:** Sign your name By signing this report, you are certifying that to the best of your knowledge the information contained within this report is complete and accurate. The operator completing this report must hold a Class C or higher certification.

**License Number and Class:** Enter your valid Water Operator License number and class.

**Date:** Enter the date you completed and signed the report.

**Telephone Number:** Enter the best phone number to get in contact with a water operator familiar with the submitted CLO2MOR.

**Reporting Requirements:** Laboratory analytical test reports must be attached to the CLO2MOR. **Mail the CLO2MOR and distribution chlorite results to TCEQ by the tenth day of the following month.** Systems that did not use chlorine dioxide for one month are still required to mail a CLO2MOR. Send to:

**Regular mail:**

TCEQ  
MC-155, Attn: Chlorine Dioxide  
PO BOX 13087  
Austin, TX 78711-3087

**Certified mail:**

TCEQ  
MC-155, Attn: Chlorine Dioxide  
12100 Park 35 Circle  
Austin, TX 78753

# APPENDIX B

## Chlorine Dioxide Monthly Operating Report

The CLO2MOR Form (00690) should be completed digitally in Microsoft Excel to complete required calculations.

CHLORINE DIOXIDE MONTHLY OPERATING REPORT FOR PUBLIC WATER SYSTEMS									
PWS NAME: _____					TREATMENT PLANT _____				
PWS ID Number: _____					TREATMENT PLANT _____				
Report Month: _____					Year: _____				
RAW DATA									
DATE	ClO <sub>2</sub> Used	ClO <sub>2</sub> EP	ClO <sub>2</sub> Distribution			Chlorite EP	Chlorite Distribution		
			First	Sec.	Third		Near	Mid	Far
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									
Chlorite Stock Solution									
q/L chlorite _____									
q/L chlorate _____									
Burette Chlorinetti _____					Chlorite Distribution Monitoring Sampler Collected _____				
Chlorine Dioxide Vi									
ber of Violations									
Acute MRDL _____					Chlorite MFR Violations				
Max Acute MRDL _____					Note: MCL Violations TBD by the TCEQ				
Monitoring _____					Number of Violations				
TCEQ Notified? _____					Monitoring _____				
Date(s): _____					TCEQ Notified? _____				
Public Notified? _____					Date: _____				
Date(s): _____					Public Notified? _____				
Date: _____					Date: _____				
GENERAL REMARKS ABOUT ClO <sub>2</sub> GENERATOR									
DATA SUMMARY									
	ClO <sub>2</sub> EP	ClO <sub>2</sub> Distribution			Chlorite EP				
		No. of Sats:							
		First	Sec.	Third					
\$ Limit									
Max.									
Min.									
Avg.									
Total water treated this Month _____ MG					Sodium Chlorite used this Month _____ lbs.				
I certify that I am familiar with the information contained in this report and that, to the best of my knowledge, the information is true, complete, and accurate.									
Operator's Signature: _____					Date: _____				
License No. & Class: _____					Telephone Number: _____				
Reader Mail: Submit report to TCEQ (MC-155), ATTN: Monthly Reports, P.O. Box 13887, Austin, TX 78714-3887 Scenic Mail: Submit report to TCEQ (MC-155), ATTN: Monthly Reports, 12100 Park 35 Circle, Austin, TX 78753 The report is due the 10th of the following month.									
TCEQ-00690 (04/00/2024)									
CLO2MOR									