Microbial Compliance Sample Collection, Analysis, and Data Reporting under the Revised Total Coliform and Groundwater Rules

Addendum 4

(Revision 4)

to the

Quality Assurance Project Plan for the Texas Commission on Environmental Quality Public Water System Supervision Program Relating to the Safe Drinking Water Act

Effective Date:

November 10, 2022

List of Acronyms

CA	Corrective Action
CFR	Code of Federal Regulations
COC	chain of custody
DQI	data quality indicator
EC+	*E. coli* positive
EC-	*E. coli* negative
E2	Electronic Environmental Drinking Water Reporting System
GWR	Groundwater Rule
IR	infrared
MF	membrane filter
MRF	Microbial Reporting Form
MTF	multiple tube fermentation
MUG	4-methylumbelliferyl-β-D-glucuronide
PA	presence absence
PWSS	Public Water System Supervision
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RTCR	Revised Total Coliform Rule
SOP	standard operating procedure
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System
TAC	Texas Administrative Code
TC+	Total Coliform positive
TC-	Total Coliform negative
TNI	The NELAC Institute
UV	ultraviolet
WSD	Water Supply Division

(A) Project Management

A1 Approval

A1.1 TCEQ

The following individuals are signatories on this Addendum because they are responsible for the management and assurance of quality of the work described.

Claire Carlton, Team Leader

TCEQ/OW/WSD/DWSS/Drinking Water Assessment Team (DWAT)

Signature: Claire Carlton Date: 09/16/2022

Michele Risko, Section Manager

TCEQ/OW/WSD/Drinking Water Standards Section (DWSS)

Signature: Michele Risko Date: 09/16/2022

Jessica Hoch, Program Lead Quality Assurance Specialist

TCEQ/Office of Water (OW)/Water Supply Division (WSD)

Signature: Jessica Hoch Date: 09/16/2022

A1.2 Laboratory Acknowledgment and Agreement

All laboratories participating in the Public Water System Supervision (PWSS) Program must submit Laboratory Acknowledgement and Agreement documentation. The current version can be obtained on the TCEQ PWSS Program[1] webpage or directly by request to PWSQA@tceq.texas.gov.

[1] www.tceq.texas.gov/drinkingwater/pwss.html

A2 Table of Contents

A3 Distribution

The PWSS Program Lead Quality Assurance Specialist (QAS) ensures the individuals on the distribution list in Section A3 of the QAPP Programmatic (main) document receive a copy of the QAPP and Addenda. Redistribution occurs when amendments or revisions are approved and published.

The Team Leader of the Drinking Water Assessment (DWA) Team ensures the QAPP is distributed, or otherwise made available to all participants specified in Section A4 of this Addendum.

The current, approved version of the PWSS Program QAPP is maintained on the TCEQ PWSS Program[2] webpage.

Note: References to the PWSS Program QAPP include all addenda as a whole document. References to the Programmatic QAPP, for the purposes of the addenda, is a reference to the main QAPP document.

A4 Project Organization

The Water Supply Division (WSD) DWA Team administers most activities related to microbial sample collection, analysis, and data reporting. This team is organized within the WSD's Drinking Water Standards Section (DWSS). Section A4 of the Programmatic QAPP describes roles and responsibilities of key individuals in TCEQ WSD and management positions, including the Lead QAS, Deputy, Assistant Deputy, Section Manager, Team Leader, etc. The individuals and groups listed below administer and/or participate directly in activities related to microbial sample collection, analysis, and reporting.

A4.1 WSD Drinking Water Standards Section

A4.1.1 Drinking Water Assessment Team

- Maintains a working knowledge of RTCR and GWR regulations.
- Issues and maintains standardized requirement documents, procedures, instructions, TCEQ webpages, and forms related to microbial sample collection, analysis, and data reporting.
- Provides support and oversees PWS and participating laboratories to ensure adherence to microbial monitoring requirements.
- Coordinates with TCEQ data migration staff and accredited laboratories for oversight of activities to ensure data is of known and defensible quality.
- Notifies Team Leader if there are deviations from required protocols specified in this Addendum, referenced documents, or other standard procedures and initiates corrective actions, as required.
- Performs applicable personnel responsibilities per the TCEQ Quality Management

[2] www.tceq.texas.gov/drinkingwater/pwss.html

Plan[3] (QMP), Appendix C.

In addition to the activities described above, the DWA Team Leader is responsible for maintaining lines of communication with WSD Management related to activities specified in this Addendum and elevating issues when identified.

Information for the RTCR[4] and GWR[5] compliance programs on the Drinking Water Assessment Team is located on the TCEQ's website.

Email proxy boxes are available for assistance with RTCR at TCRDATA@tceq.texas.gov and GWR at GWRDATA@tceq.texas.gov.

A4.1.2 Drinking Water Quality Team

The Laboratory Approval Coordinator provides guidance to the regulated community regarding the laboratory approval process, maintains the laboratory approval database, and edits, maintains, and publishes the forms and instructions PWS use to apply for and maintain laboratory approval. For specific questions about laboratory approval, contact the TCEQ at (512) 239-4691 and ask for the Laboratory Approval Coordinator.

A4.2 Public Water Systems (PWS)

- Maintains knowledge and adheres to all applicable rules and requirements described in this Addendum.
- Ensures samplers are properly licensed and adequately trained to collect samples according to sampling procedures consistent with this Addendum. See note below.
- Ensures samplers review and verify sample forms and labels following sample collection to verify they are filled out accurately and completely.
- Ensures proper sample containers, applicable forms, and labels are available to samplers.
- Coordinates with the laboratory to ensure it adheres to applicable requirements in this Addendum.
- Ensures the laboratory reports results to the TCEQ in the formats and within required turnaround times defined in this Addendum.
- Immediately reports any identified deviations from this Addendum to PWSQA@tceq.texas.gov. Works with the TCEQ to address deviations, as applicable.
- Maintains records per Section A9 of this Addendum.

Note: In this document "samplers" refers to any person who collects, handles, and relinquishes custody of microbial compliance samples for a PWS. Depending on the PWS, a single employee may perform all the sample collection and handling steps described. Alternatively, multiple people may be involved, including contracted samplers working on behalf of the PWS. In these instances, samplers act as representatives for the PWS. PWS management is responsible for ensuring all individuals perform work in accordance with this Addendum and applicable rules.

[3] www.tceq.texas.gov/agency/qa
[4] www.tceq.texas.gov/drinkingwater/revised-total-coliform-rule
[5] www.tceq.texas.gov/drinkingwater/gwr_main.html

A4.3 Laboratory

A laboratory performing work under this addendum is responsible for implementing the following requirements.

- Maintains TNI accreditation with TCEQ in the Drinking Water Matrix for EPA approved methods described in this Addendum (Section A8.2).
- Adheres to laboratory requirements described in this Addendum and the current edition of the EPA's Manual for the Certification of Laboratories Analyzing Drinking Water (MCLADW).
- Signs and submits adherence documentation.
- Receives, analyzes, and reports sample results per this Addendum.
- Reports deviations from this Addendum to TCEQ immediately and initiates corrective actions as required.
- Maintains microbial testing records per Section A9 of this Addendum.

A5 Problem Definition/Background

Congress passed the SDWA in 1974 to protect public health by regulating the nation's public drinking water supplies. The SDWA authorizes the EPA to set national health-based water quality standards for drinking water to protect against both naturally-occurring and man-made contaminants. The EPA issued the GWR in 2006 and TCEQ adopted state rules for GWR compliance in 2010. The EPA issued the RTCR in 2013 and TCEQ adopted state rules for RTCR microbial compliance in 2017. Microbial compliance rules require that PWS perform routine microbial monitoring and as warranted, implement corrective action and public notification to ensure the safety of drinking water. These requirements increase public health protection by reducing the potential pathways of fecal contamination into distribution systems. The TCEQ implements the SDWA via a primacy agreement with the EPA to maintain a PWSS Program consistent with federal regulations.

As one part of the primacy agreement, the TCEQ WSD is responsible for determining PWS compliance with requirements related to drinking water standards contained in 30 TAC §290 Subchapter F: *Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for PWSs*. This Addendum describes the technical and quality activities related to the sample collection, analysis, and reporting of microbial compliance data.

A6 Project/Task Description

Under this Addendum, microbial compliance samples are collected, analyzed, and data is reported to TCEQ's WSD to determine if microbial contaminants (total coliform and *E. coli*) are present in public water supplies. TCEQ implements the microbial monitoring requirements of the SDWA in accordance with 30 TAC §290.109: Microbial Contaminants and §290.116: Groundwater Corrective Actions and Treatment Techniques. These rules are referred to in this Addendum as the RTCR and the GWR, respectively.

In addition to the RTCR and GWR, TCEQ implements additional applicable rules that require microbial monitoring as described in this section. Regulations, requirements, and

backgrounds of applicable microbial compliance rules are described in TCEQ RG-421 Coliform Monitoring, Analyzing, and Reporting[6] found on the RTCR webpage.

TCEQ regulates microbial compliance for RTCR and GWR based on results of total coliform and *E. coli* analysis of samples collected within the distribution system or from a raw well. Samplers are licensed, as applicable, and collect samples and deliver them to TCEQ accredited laboratories who have agreed to adhere to the requirements of the QAPP (Section A4.3).

Microbial compliance regulations require the following for microbial sample collection, analysis, and reporting activities related to compliance monitoring for the RTCR and the GWR.

- Development and implementation of a Sample Siting Plan (SSP). The SSP designates the PWS collection schedule and identifies locations for microbial compliance sample collection (i.e., routine, repeat, and raw water samples). The SSP must be included with the Monitoring Plan. (30 TAC §290.121)
- Collection of monthly routine microbial samples along with concurrent measurement of disinfectant residuals. (30 TAC §290.109(d)(2)(A) and 290.110(c)(4)(D))
- Including microbial samples for seasonal systems.
- Including microbial samples for water haulers for every month when water is hauled. (30 TAC §290.44(i)(2)(J))
- Analysis of samples for the presence of total coliforms and *E. coli* by a TCEQ accredited laboratory that has agreed to adhere to the requirements of this QAPP (See Section A4.3). Further testing for *E. coli* is required for samples that are total coliform positive.
- Sample result reporting by laboratories to the TCEQ for compliance determinations.
- Collection of repeat samples after notification of total coliform positive (TC+) or *E. coli* (EC+) sample results.
- As applicable, a raw groundwater sample from each active well, for each TC+ sample is also collected.

In addition to the routine, repeat, and raw well monitoring described above, microbial monitoring requirements also apply to other circumstances that may occur within a PWS. These include, but are not limited, to, the following situations.

- Collection of special microbial samples related to seasonal start-up requirements. (30 TAC §290.109(g)(12))
- Distribution line construction. (30 TAC §290.44(f)(3))
- Rescinding a boil water notice. (30 TAC §290.44(q)(6)(E))
- Assessment source monitoring in support of a rule exception. (30 TAC §290.39(l)(4))
- Following well disinfection per a GWR corrective action. (30 TAC §290.116)
- To collect investigative samples. (30 TAC §290.44(q)(6)(E))

[6] www.tceq.texas.gov/drinkingwater/revised-total-coliform-rule

Microbial compliance samples are delivered to TCEQ accredited laboratories that have agreed to adhere to the requirements of this QAPP (See Section A4.3). The laboratories analyze the samples for total coliforms and *E. coli* according to approved methods and report the results to TCEQ. TCEQ staff manage data reported, make compliance determinations, and communicate requirements that must be taken after positive sample results are determined.

This Addendum specifies requirements for microbial sample collection, sample analysis, and data reporting by project participants described in Section A4 of this Addendum. To use microbial compliance data collected under RTCR, GWR, and other applicable regulations, all participants must comply with the requirements and specifications described.

A7 Quality Objectives and Criteria for Measurement Data

The TCEQ's objective for implementation of the microbial compliance rules is consistent with the overall objective of the SDWA to protect drinking water and public health. Consequently, as the state's environmental agency, the TCEQ can provide better protection of the health of all Texas citizens currently served by PWS and all those who consume water from the systems. The specific objectives related to microbial compliance sample data as described below reflect the objectives specified in the Programmatic QAPP.

Quality Objectives and Criteria

The following data quality objectives apply to the sample collection, analysis, reporting, and use of microbial compliance sample data. A combination of management oversight, peer review, staff training, staff experience, staff coordination, standardized review processes, data and documentation quality control checks, and strict adherence to monitoring timeframes ensure the data quality indicators (DQI) described are met.

The microbial data generated under this Addendum is used to determine compliance with the RTCR and GWR, as well as with other applicable rules. The data can be used to ensure PWS implement corrective actions or issue public notification, as applicable, to control microbial contaminants and safeguard public health. To meet this objective, the requirements (i.e., methods, procedures, specifications, etc.) in this Addendum are followed to ensure the microbial compliance data produced for this project possess the DQIs listed below. These terms are defined in Section A7.1 of the Programmatic QAPP.

- sensitivity
- bias
- precision
- comparability
- completeness
- representativeness
- data integrity
- compliance

A8 Special Training Requirements/Certification

A8.1 Personnel Training/Certification

Staff on the TCEQ's DWA Team possess the experience and training necessary to perform the tasks specified in Section A4 of this Addendum. The TCEQ maintains staff training documentation as specified in Section A8 of the Programmatic QAPP.

The TCEQ provides training guidance to PWS and laboratories on microbial sample collection at training events throughout the year including the TCEQ Public Drinking Water Conference[7]. Following events, the TCEQ makes training materials/presentations available on the RTCR and GWR websites.

PWS management ensures samplers are trained prior to sampling in the sample collection, sample handling, and sample submittal procedures described in this Addendum, Section A4.2. PWS management also ensures that samplers are licensed per 30 TAC §290.38 and as described in TCEQ RG-421 Coliform Monitoring, Analyzing, and Reporting[8] found on the RTCR webpage.

A8.2 Laboratory Accreditation

Laboratories that analyze microbial compliance samples for compliance determinations are accredited for the methods they use in accordance with 30 TAC §25: Environmental Laboratory Accreditation and Certification. PWS ensure the analytical laboratories/facilities they use meet these criteria.

Information on laboratory accreditation is provided in Section A8 of the Programmatic QAPP document. The rules, checklists, and procedures by which the LQAS operates the TCEQ Accreditation Program are on the TCEQ Environmental Laboratory (NELAP) Accreditation[9] webpage.

Procedures related to laboratory accreditation are not addressed within the PWSS Program QAPP.

A8.3 Laboratory Approval for Field Measured Residual Chlorine

PWS obtain approval from the TCEQ to ensure appropriate, approved methods are used to measure the disinfectant residual at the microbial sampling site when collecting microbial samples. The laboratory approval process must be completed by the sampler (i.e., PWS, operations company, laboratories, etc) since the sampler collects field measured chlorine residuals during microbial compliance sample collection.

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[7] www.tceq.texas.gov/drinkingwater/conference.html
[8] www.tceq.texas.gov/drinkingwater/revised-total-coliform-rule
[9] www.tceq.texas.gov/agency/qa/env_lab_accreditation.html

The requirements and process for getting laboratory approval is described on the TCEQ webpage about Public Water System Monitoring Plans[10]. For specific questions about laboratory approval contact the TCEQ at (512) 239-4691 and ask for the Laboratory Approval Coordinator.

A9 Documents and Records

Documents that specify quality-related instructions and requirements of the PWSS Program are consistent with regulatory requirements and are designed to serve their intended use per the TCEQ QMP, Chapter 5. Records also fulfill regulatory requirements and are prepared and maintained to reflect the required quality described in Section A7 of the Programmatic QAPP.

Section A9 of the Programmatic QAPP main document describes the TCEQ quality-related documents and records, by environmental data operation and in general, related to the PWSS Program QAPP.

A9.1 QA Project Plan Distribution

The process for distributing the QAPP is described in Section A3 of this Addendum.

A9.2 PWS Documentation and Records

PWS documents and records associated with sample collection may include but are not limited to, the items below.

- Sample Siting Plan, TCEQ Form 20900 (Section B1)
- Microbial Compliance Sampling SOP (Section B2)
- TCEQ Microbial Reporting Form (MRF), TCEQ Form 10525 (Section B3.2)

PWS representatives complete required forms when they prepare for and conduct sample collection events. PWS maintain copies of documents and completed records, as well as results/reports per 30 TAC §290.46(f).

If a PWS requests invalidation of a total coliform positive sample result, the TCEQ may approve the request under specific circumstances (30 TAC §290.109(e)(1)). To request an invalidation, the PWS must complete the Positive Invalidation Request Form, provide detailed supporting documentation, and maintain all documentation associated with the invalidated sample.

- Positive Invalidation Request Form (TCEQ Form 20629).

A9.3 Laboratory Documentation and Records

Laboratory documents and records specific to microbial compliance include, but are not limited to, the items listed below.

- Laboratory QA manuals and SOPs

[10] www.tceq.texas.gov/drinkingwater/monitoring_plans

- Sample receipt documentation and records
- QC records
- Sample preparation and analysis records
- Data review and verification records
- Laboratory reports including MRFs, analytical test reports, and Laboratory Positive Result Form (TCEQ Form 20894)

Laboratories maintain documents and records per their internal operating procedures. At a minimum, labs must maintain accessible records related to microbial compliance sample analysis for a minimum of five years from generation of the last entry in the record, per the TNI Standard. Adequate information must be available to reconstruct the final results for compliance purposes. Changes in ownership, mergers, or closures of laboratories do not eliminate these requirements.

The laboratory must notify the PWS before disposing of records which are less than five years old so they may request copies, if needed. This includes all raw data and quality control information. If the laboratory changes its computer hardware or software, it will make provisions for maintaining access to old data to ensure it remains retrievable.

(B) Data Generation and Acquisition

B1 Sampling Design

All Texas PWS must conduct monthly microbial monitoring to check for the presence of coliform bacteria in their distribution systems. Repeat monitoring is required when coliform bacteria are found in routine samples. Collection of raw well samples may be required, as applicable. PWS develop sample siting plans and distribution maps to indicate the number of routine coliform samples they collect per month, the sampling schedule to be followed, and the routine and repeat coliform sample locations.

PWS base their sampling design, sample numbers, and locations for coliform monitoring on the following factors.

- type of water system (i.e., operator licensing requirements)
- number of people served
- source water (i.e., surface water, groundwater, and/or GUI)
- distribution system design (i.e., line size, dead-end mains, entry points)

PWS also monitor for the presence of coliform bacteria for other purposes as described in Section A6 of this Addendum. PWS collect, analyze, and report these samples as required, at locations and at frequencies described in TCEQ RG-421 Coliform Monitoring, Analyzing, and Reporting[11] found on the RTCR webpage.

[11] www.tceq.texas.gov/drinkingwater/revised-total-coliform-rule

B2 Sampling Methods

B2.1 Microbial Sample Collection

Samples must be collected in sterile bottles provided by the accredited laboratory. Sample volume must be sufficient for the laboratory to confirm the absence of a chlorine residual and ensure a volume of 100 mL is present for analysis.

Samplers should collect microbial samples according to internal SOPs that describe the procedures that reflect operations and sampling that is conducted for their system. When collecting a sample, the sampling SOP should direct samplers to fill the bottle slightly over the 100 mL fill line. The volume collected should leave ample space (approximately 1 inch) to facilitate homogenizing the sample by shaking at the laboratory prior to determining the absence of a chlorine residual.

Note: The TCEQ provides an example Microbial Sample Collection SOP[12] on the RTCR webpage. The TCEQ provides this SOP for assisting PWS in preparing their own sampling SOPs. It contains procedures samplers should follow to collect a microbial sample.

B2.2 Sample Preservation and Hold-Time

Samples submitted for compliance with RTCR/GWR presence/absence requirements have a hold time of 30 hours. The time from sample collection to initiation of incubation may not exceed 30 hours. Samplers must ensure samples are submitted to the laboratory with sufficient time to initiate analysis. If the laboratory receives the sample late in the day, the sample may be refrigerated overnight if incubation begins within 30 hours of sample collection. The sample must be refrigerated at a temperature above the freezing point of water.

Due to hold-time requirements, it is important that samples are delivered to the laboratory with sufficient time for the laboratory to set up the sample for incubation. Samplers should work with the laboratory to determine how much time the laboratory requires for set up.

There is no temperature preservation requirement for presence/absence samples submitted for compliance with the RTCR/GWR. Samplers are encouraged, but not required, to hold samples below 10°C during transit. Samplers must ensure samples are not frozen. Additionally, samplers should ensure samples are protected from exceptionally high temperatures. Laboratories may implement sample acceptance policies that limit high temperatures measured at receipt. These policies may require sample rejection and recollection.

B3 Sample Handling and Custody

During and following sample collection, samplers handle samples and complete required sample documentation. Additional information and specifications related to sample

[12] www.tceq.texas.gov/drinkingwater/revised-total-coliform-rule

documentation (i.e., sample labels and MRFs) applicable to samplers and laboratories is provided in the following sections. Laboratories should address specific requirements within their sample acceptance policies and communicate these to clients.

B3.1 Sample Label

Laboratories should supply sample labels with sample bottles designed to accommodate the following information.

- PWS ID Number
- Address/location of sample collection
- Date and time sample was collected
- Sampler's initials
- Chlorine residual and type (recommended, not required)

Samplers must ensure the information listed above is recorded legibly with waterproof ink. If laboratories do not provide a sample label with the sample bottle, samplers are responsible for recording the information noted above on the sample bottle.

Laboratories should ensure sample acceptance policies reflect the minimum information for sample labeling listed above. This information may be written on a sample label attached to the bottle or directly on the bottle. (MCLADW A-1, B.2)

B3.2 Sample Documentation

The TCEQ designed the MRF to meet reporting requirements related to the SDWA. It includes information for compliance sampling that laboratories might not routinely include on their own COC forms.

The TCEQ RTCR webpage contains guides for how to complete the MRF. The video How to Complete the MRF and the document How to Complete the Microbial Reporting Form provide guidance for samplers. The document Laboratory Guidelines to Complete the MRF provides instructions for laboratories on how to complete the MRF.

Laboratories provide the MRF with each sample bottle for samplers to complete at the time of sample collection. Laboratories sometimes modify this form to accommodate their own operations. The degree to which a laboratory may modify the MRF is based on how it reports microbial sample results (manually or electronically) as described in the next two sections.

B3.2.1 MRF Requirements for Laboratories Reporting Sample Results Manually

If a laboratory has not yet transitioned to electronic reporting and still reports sample results manually to the TCEQ, then the laboratory must use the MRF. The current version of the form with instructions for use can be found on the TCEQ PWSS Program[13] webpage.

Laboratories reporting manually are only allowed to customize the MRF to add their

[13] www.tceq.texas.gov/drinkingwater/pwss.html

name/logo, contact information, and TCEQ Laboratory ID number in the upper right portion of the form. Reporting requirements are described under section Exhibit 1.

The TCEQ Laboratory ID Number on the top, right-hand corner of the MRF is a laboratory specific, ten-digit ID number associated with SDWIS. It is the same as the NELAP Accreditation Number, minus the last four digits. Use of this TCEQ Laboratory ID for reporting will be required starting January 2023.

Note: The TCEQ is taking steps for implementing required electronic reporting using the Compliance Monitoring Data Portal (CMDP) for all compliance programs. This transition to CMDP will ensure compliance with the Cross Media Electronic Reporting Rule (CROMERR) and all labs reporting manually should take steps now to develop electronic reporting procedures in preparation for CMDP implementation.

B3.2.2 MRF Requirements for Laboratories Reporting Results Electronically

If a laboratory has a laboratory-modified MRF, it must resemble the general format of the TCEQ MRF, include all information listed below, and be approved by the Lead QAS (or designee) prior to use. Laboratory-modified forms are not official TCEQ forms; therefore, laboratories must remove the TCEQ form number from their modified MRF forms. Laboratories shall direct requests and questions about modifying forms to PWSQA@tceq.texas.gov.

PWS Information

- PWS name, PWS ID number, county, contact name, phone #
- Sample collector name, signature, operator license number, and position (owner, operator, other)
- Sample location
- Sample type
- Date and time of sample collection
- Replacement indicator check box
- Original laboratory sample ID and original sample collection date, for all previously rejected samples, repeat samples, and triggered raw water samples
- Field measured chlorine residual for both distribution and raw well samples
- Relinquished by signature line(s) including date and time
- The following legal statement in its entirety: "*Falsification of this form or tampering with water samples is a crime punishable under state and/or federal law. (Texas Penal Code, Title 8, Chapter 37.10) By signing this form, the sampler acknowledges that samples were collected according to the systems established sample collection procedures, and that all information is accurate*."

Laboratory Information

- Laboratory name and contact information.
- TCEQ Laboratory ID Number
  - Nine-digit Laboratory Accreditation ID number, minus the last four digits
  - Example: T123456789, see note below

- Sample condition information
  - Whether the sample was iced.
  - Sample temperature (actual and corrected)
- Date and time sample results were reported to PWS
- Sample analysis information including analyst and beginning and ending date and time of incubation
- Test Method
- Individual sample information, including
  - Check box indicating the absence of a laboratory measured chlorine residual
  - Sample results
  - Laboratory sample ID
  - Rejection code
- Laboratory approval signature
- Laboratory comments
- Received by signature line(s) including date and time

Note: The TCEQ Laboratory ID Number on the top, right-hand corner of the MRF is a laboratory specific, ten-digit ID number associated with SDWIS. It is the same as the NELAP Accreditation Number, minus the last four digits. Use of this TCEQ Laboratory ID for reporting will be required starting January 2023.

B3.3 Sample Receipt

B3.3.1 Custody Transfer

Following sample collection, samplers deliver their microbial samples to the laboratory and relinquish custody to a laboratory sample custodian. Samplers and the laboratory custodian sign and date the MRF with the date and time it was delivered. The laboratory custodian carefully inspects the sample(s) and sample documentation at the time of receipt for any issues. If any issues are found, but cannot be resolved during receipt, it may necessitate sample rejection as described in Section B3.4.

Note: All compliance samples must be received, rejected, and reported regardless of sample or documentation issues. Rejected samples must be assigned a laboratory ID number and reported to TCEQ. Rejected samples are used to link replacement samples. This process is important to ensure samples can be tied to the appropriate monitoring period and is further described in Section B3.4 and E1.3.

If laboratory staff are not present to receive the samples, samples and sample documentation must be locked in a designated area of the laboratory to prevent tampering. The sampler signs and dates the MRF to relinquish custody, makes a log entry identifying the samples that were delivered, the date and time of delivery, and where and how the samples were delivered and secured. Laboratory staff then receive custody by noting in a logbook the absence of evidence of tampering, unlocking the secured area, signing the logbook, and then receive and inspect the sample and documentation as described above.

Samplers may use a courier service to deliver the microbial samples to the laboratory. Samplers should inspect the samples and sample documentation for any issues **prior to** relinquishing custody of the samples and documentation to the courier, as couriers cannot make changes to sample documentation. After inspection and ensuring any issues are resolved, the samplers and courier must sign and date the MRF with the date and time custody was transferred. Once the courier delivers the samples to the laboratory, the laboratory will follow the steps for custody transfer described above.

B3.3.2 Sample Temperature

Laboratories must check the temperature of microbial samples when they are received. They can use an infrared sensor, a bottle blank, a cooler thermometer, or another technique to obtain a temperature measurement. The laboratory records both the recorded temperature and the corrected thermometer temperature on the MRF, as applicable.

A temperature for each sample is not required; therefore, only a field for a representative temperature is provided on the MRF. Sample containers are never opened at sample receipt to measure the temperature of an actual sample.

As stated in Section B2.2, there is no requirement for thermal preservation. However, samples received frozen, or with evidence of freezing, must be rejected using rejection codes specified in Section B3.4 and E1.3.

Although there is no temperature preservation requirement for presence/absence samples, laboratories should take into consideration exceptionally high temperature at receipt. Exceedingly high temperatures at receipt could indicate improper sample handling and impact result validity. Laboratories may implement sample rejection criteria to address this. Procedures related to this should be detailed in sample acceptance policies.

B3.3.3 Subcontracting/Transferring Samples

To transfer a sample, the initial receiving laboratory shall generate a new MRF obtained from the second laboratory and document custody transfer as described.

The initial receiving laboratory shall:

- Receive custody of the sample(s) and document on the original MRF sample conditions at receipt (iced and temperature information).
- Indicate in the Lab Comments field that sample(s) will be transferred.
- Strike through the results portion of the original MRF and indicate where results will be found (e.g., "Refer to [Lab Name] MRF/ Report" or similar).
- Generate a new MRF and tie it to the original MRF.
    - New MRF is obtained from second laboratory.
    - Strike through the PWS portion of the new MRF and write "Refer to original MRF" and include identifiable information from original MRF such as PWS ID or project ID.
- Provide the second laboratory both the original MRF and the new MRF with the sample(s).
- Document sample custody transfer on new MRF by signing and dating the

"Relinquished by Courier" field.

The second receiving laboratory shall:

- Receive custody of the sample(s) and document on the new MRF the sample conditions at receipt (iced and temperature information).
- Ensure the new MRF includes its laboratory-specific information on it, including laboratory name and TCEQ Laboratory ID.
- Complete sample analysis and report sample results to the PWS and TCEQ.
  - Report positive sample results as described in Exhibit 1.
  - Ensure reported results include both the original and subcontracted MRFs.

All aspects of this Addendum apply to both laboratories. This includes, but is not limited to, sample receipt, custody transfer, documentation requirements, sample rejection, methodology, reporting, positive sample reporting, records, and corrective action.

B3.4 Sample Rejection

Samples that are improperly collected, handled, or insufficiently documented, if unresolved, are rejected by the laboratory. The reasons a laboratory may reject a sample at the time of sample receipt include, but are not limited to, the following reasons. Rejection codes are listed in Table 1 under section E1.3.

- Excessive volume
- Sampling documentation issues (insufficient documentation)
- No measured chlorine residual recorded
- Sample bottle broken in transit
- Sample bottle leaked in transit
- Disinfectant residual present in sample
- Sample hold time exceeded
- Insufficient volume
- Frozen sample

Some reasons for sample rejection involve frequently encountered issues and are described in detail below. Samplers and laboratories should take the steps described to resolve these issues during sample collection or at receipt, as applicable, to avoid having to collect replacement samples or incurring violations.

If a laboratory rejects a sample outright at the time of receipt, the laboratory custodian documents the reason on the MRF and requests a replacement sample while samplers is still on the premises. If samplers are not on premises when rejection occurs, the laboratory must notify the PWS within 24 hours from the time rejection occurs. Samplers should collect replacement samples within 24 hours of notification of rejection, per 30 TAC §290.109(e)(1)(E).

Laboratories must assign rejected samples laboratory sample ID numbers and report them to TCEQ with rejection codes as described in Section E1.3. This enables replacement samples to be tied back to the original sample and ensures the PWS gets proper monitoring credit.

B3.5 Additional Information on Sample and Documentation Issues

Excessive Sample Volume

Samples received with excessive volume that do not leave ample space (approximately 1 inch) to allow for homogenizing the sample by shaking must be rejected, unless the laboratory has a procedure for transfer to a larger volume sterile sample container as described in Section B4.2.1.

Sample Documentation Issues

This section describes microbial sample documentation issues that laboratories may encounter at the time of receipt. The laboratory should mention any errors (missing or incorrect) in sample documentation to the sampler to allow corrections, if feasible, while still on site. For example, if a PWS ID number is incorrect or missing on the MRF at the time of sample receipt, the laboratory should inform samplers while still onsite so they can add or correct the information. Corrections must be completed prior to initiation of incubation.

If laboratories request that samplers correct required information at the time of sample receipt, they must ensure the corrections are initialed and dated. Laboratories are not allowed to correct or complete the PWS portion of the MRF (see exception above under Originating Sample Information). It is the responsibility of samplers to fill out the form (and correct it, if necessary), sign, and date it. Issues identified after incubation has been initiated need TCEQ approval.

Frequently encountered documentation issues are listed and described in the following bullets. Each item includes a description of how the laboratory should address each issue.

- **No Chlorine Residual Recorded on MRF:** The laboratory must confirm that a field measured chlorine residual is documented on the MRF for all samples prior to arrival at the laboratory per 30 TAC §290.110(c)(4)(D).

  In order to help the PWS prevent a violation, the laboratory must reject any compliance samples (i.e., routine distribution, repeat, and raw well) without a documented field measured chlorine residual recorded on the MRF. If the chlorine residual is recorded on the sample bottle label, the laboratory may work with the sampler to update this information on the MRF at the time of receipt.
- **Sample Type:** The laboratory must confirm the sample type is documented on the MRF. If a sample type is not checked, checked incorrectly, or more than one sample type is checked at the time of sample receipt, then the laboratory must request that the sampler check the appropriate sample type while still on site.

  If this error is not corrected by the sampler at the time of sample receipt, then the laboratory must reject the applicable sample and request a replacement. All sample types may also be replacement samples, if they have previously been rejected. Sample types for compliance under RTCR/GWR are routine (distribution), raw well, and repeat samples.
- **Originating Sample Information:** Repeat, replacement, and triggered source monitoring (raw well) samples require the originating sample ID and collection date to be completed on the MRF. This information is required to link samples back to an original positive or rejected sample. Failure to provide this information can result in

monitoring violations for the PWS.

If the originating sample information is missing, the laboratory may fill in the information for the PWS with their permission. This is the only information the laboratory is allowed to modify on the PWS-completed portion of the MRF.

- **Sampler Name and Signature:** The sampler's first and last name and signature must be filled in on the MRF. If this information is not included on the form when samples are received, the laboratory should request that the information be completed, as long as the sample collector and courier are the same person. Otherwise, the laboratory must reject the samples.
- **Operator License Number:** The TCEQ requests the operator license number on the MRF to confirm the sample collector is licensed as required by regulation. Samples collected for community and nontransient, noncommunity water systems must be collected by an individual holding a valid water operator's license.

  There is no licensing requirement for transient, noncommunity water systems. In this case, "N/A" is the correct response in this field. Laboratories cannot confirm the accuracy of this information, only that it is included. The laboratory should not reject the samples if the operator license number is not included on the form.
- **Groundwater Well Identification (ID) Numbers:** Groundwater well source ID numbers are used to properly identify the specific well sampled. These well source ID numbers begin with the letter G, followed by the 7-digit PWS ID, then a letter specific to the well; such as, "A", "B", "C", etc.

  Samplers often list raw well locations as addresses or well numbers (Well A or Well 1), rather than reporting the raw well source ID numbers on the MRF. Laboratories should ensure that groundwater well source ID numbers are recorded and request that samplers address these types of issues while still on site. Raw well water samples received by TCEQ without well source ID codes will be rejected and may result in monitoring violations for the PWS.

B4 Analytical Methods

B4.1 Field Analysis Methods

Samplers measure the disinfectant residual using EPA approved methods specified in the PWS' Monitoring Plan and Laboratory Approval form(s). Samplers collect microbial samples according to the internal sample collection SOP. Prior to sample collection, samplers measure and document the disinfectant residual on the MRF.

B4.2 Laboratory Analysis Methods

B4.2.1 Allowable Methods

All drinking water samples collected for microbial compliance must be analyzed using TCEQ-accredited methods which are approved by the EPA under the SDWA. These methods are subject to change at any time as methodology and technology advance. Laboratories are responsible for maintaining accreditation under the drinking water matrix for the methods they use.

For current information on EPA approved methods for compliance, refer to the Code of

Federal Regulations (CFR) Title 40, Part 141[14]. A summary of EPA approved analytical methods[15] is available on EPA's website.

Laboratory accreditation staff confirm the use of appropriate methodology when performing onsite assessments. Methods accepted for microbial compliance under this addendum meet the following criteria.

- Approved by EPA for analysis under the RTCR or GWR.
- Included in current TCEQ Fields of Accreditation[16] for Drinking Water listed on the TCEQ Laboratory Accreditation webpage.

For any questions related to method acceptability, please reach out to PWSQA@tceq.texas.gov.

B4.2.2 Analytical Requirements

Sample Volume

Regardless of method used, the sample volume for the analysis of total coliforms in drinking water is 100 mL.

Samplers are directed to leave ample air space in the bottle (approximately 1 inch) to facilitate mixing by shaking at the laboratory. Samples must be mixed prior to removing a small aliquot to determine the absence of a chlorine residual or removing sample to ensure 100 mL volume prior to analysis.

If a sample bottle is too full to allow for proper mixing, the laboratory must reject the sample. Alternatively, if the laboratory has documented procedures and adequate supplies, they may pour the entire sample into a larger sterile container, mix properly, and proceed with confirming the absence of a chlorine residual and perform the analysis.

Chlorine Residual

Samples must be absent of a chlorine residual.

The laboratory confirms and documents the absence of a chlorine residual in every sample prior to analysis. This confirmation is required for all sample types (i.e., routine/distribution, repeats, raw water, special, etc.). Confirmation may be completed at the time of receipt or prior to analysis, depending on laboratory operations.

This requires removing a very small aliquot of well-mixed/shaken sample leaving at least 100 mL of the sample remaining for coliform analysis. The absence of a chlorine residual can be confirmed using test strips. Samples determined to have a chlorine residual present must be rejected.

Sample Confirmation

There is no requirement to confirm a TC+ or EC+ result using Colilert, Colilert-18, Colisure, MI agar, E*Colite, m-ColiBlue24, Chromocult, Readycult/Fluorocult, Coliscan, or

[14] www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-141
[15] www.epa.gov/dwanalyticalmethods/approved-drinking-water-analytical-methods
[16] www.tceq.texas.gov/agency/qa/env_lab_accreditation.html

Colitag test. A TC+ result is based on the confirmed phase if the Multiple Tube Fermentation Technique or Presence-Absence Coliform Test is used. A TC+ result can also be based on the verified test for the Membrane Filter Technique if M-Endo medium or LES Endo agar is used. In those rare cases where a presumptive TC+ culture does not confirm/verify as such, but is found to be EC+, the sample is considered TC+ and EC+.

B4.2.3 Rejecting Samples at the Time of Analysis

The laboratory may encounter issues with samples at the time of analysis that do not allow analysis to begin or complete. These issues lead to samples deemed as "unsuitable for analysis." Issues include, but are not limited to, the following issues.

- cloudy or turbid samples
- lab accidents such as spilled samples
- exceeding hold time

The laboratory must notify the PWS on the same day it detects the issue and rejects the sample (or the next business day, if after hours) so the PWS can collect another sample within 24 hours of notification. The laboratory reports rejected samples to the TCEQ as described in Exhibit 1.

Laboratory Invalidation of Samples Unsuitable for Analysis

A laboratory cannot reject a sample that has been determined to be TC+ or EC+. Only TCEQ has the authority to invalidate a TC+ sample.

Note: EC+ samples can never be invalidated.

If there are problems with the analysis that do not allow the lab to come to a conclusive result, such as potential interference, then the sample result shall be determined invalid.

The reasons for invalidating a total coliform sample (unless total coliforms are detected) include the following reasons, per 290.109(e)(1)(D). Contact TCRData@tceq.texas.gov for notification of samples determined to be invalid.

- Production of a turbid culture in the absence of gas production using an analytical method where gas formation is examined (e.g., Multiple Tube Fermentation Technique). Use rejection code ST to invalidate sample.
- Production of a turbid culture in the absence of an acid reaction in the P-A Coliform Test. Use rejection code ST to invalidate sample.
- Exhibiting confluent growth or producing colonies too numerous to count (TNTC) with an analytical method using a membrane filter (e.g., Membrane Filter Technique). Use rejection code HB to invalidate sample.

Another possible reason for rejecting a sample (unless total coliforms are detected) is the production of a turbid culture after incubation but not exhibiting a color change when using an enzyme-substrate media in Standard Methods 9223 (e.g., Colilert). This has been reported as an issue by some laboratories. In these circumstances, the inhibitors in the media may be overwhelmed by heterotrophic bacteria present in the sample and the target organisms may not be allowed to grow. If the laboratory opts for rejection of samples in these cases, use rejection code HB to reject sample.

If a laboratory invalidates a sample for these conditions, the laboratory must notify the PWS on the same day it invalidates the sample (or the next business day, if after hours) so the PWS can collect another sample within 24 hours of notification. The laboratory also reports these occurrences to the TCEQ as described in Exhibit 1.

B5 Quality Control Requirements

B5.1 Field Sampling Quality Control

Samplers run QC checks according to the disinfectant residual measurement method in their PWS's monitoring plan, and in accordance with 30 TAC 290.109 and 290.110.

Addendum 5 describes the QC check performed by TCEQ field staff concurrently with PWS Operators to confirm disinfectant residual measurements recorded in the field.

B5.2 Laboratory Analysis Quality Control

Laboratories run QC checks with microbial samples and conform to the frequency requirements and acceptance criteria defined in approved analytical methods, the TNI Standard, EPA Manual for the Certification of Drinking Water Laboratories, and other relevant laboratory standards or procedures. This includes the identification of out-of-control data and corrective actions taken to address it.

B6 Instrument/Equipment Testing, Inspection, and Maintenance

B6.1 Field Measurement Instruments/Equipment

Samplers maintain their disinfectant measurement instruments according to the measurement method specified in their PWS's monitoring plan.

B6.2 Laboratory Analysis Instruments/Equipment

Laboratories maintain their instruments and equipment according to the approved analytical method and other relevant laboratory standards and procedures.

B7 Instrument/Equipment Calibration and Frequency

B7.1 Field Measurement Instruments/Equipment

Samplers calibrate their disinfectant measurement instruments according to the measurement method specified in the PWS monitoring plan. (30 TAC §290.46(s)(2)(C))

B7.2 Laboratory Analysis Instruments/Equipment

Laboratories calibrate their instruments and equipment according to the approved analytical method and other relevant laboratory standards and procedures. Temperature measuring devices must be calibrated in accordance with the requirements of the TNI Standard and MCLADW.

B8 Inspection/Acceptance Requirements for Supplies and Consumables

B8.1 Sampling Supplies and Consumables

B8.1.1 Sample containers

Samplers must use laboratory-supplied containers to collect coliform samples. Laboratory-supplied containers are typically 120 mL, plastic, and disposable.

Each container provided by the laboratory must be sterile and contain sodium thiosulfate in either powder, pill, or liquid form to neutralize 5 milligrams per liter (mg/L) of residual chlorine. Each container must have a 100 mL graduation mark.

If sample containers are sterilized in the laboratory, then one sample bottle per batch must be tested for sterility using non-selective media. If any growth occurs during a sterility check, the batch must be re-sterilized. If sample containers are purchased as pre-sterilized, then one bottle per lot purchased, or a set percentage (such as 1 to 4%) must be tested for sterility using single strength non-selective media.

Laboratories are required to check and record the effectiveness of the dechlorinating agent. If water having residual chlorine (measured as free, combined, or total chlorine) is to be analyzed, sufficient sodium thiosulfate must be added to the sample bottle before sterilization to neutralize any residual chlorine in the water sample.

Laboratories are also required to check the accuracy of the container's 100 mL mark and auto-fluorescence properties (if used for fluorescence testing) once per lot. The results of all quality control (QC) checks must be documented and maintained by the lab.

A certificate of analysis provided by a vendor may be used to address some of the container testing requirements of this section. The certificate must include lot-specific language; a specification sheet for a product type is not sufficient. A certificate may not be used to verify sterility. If lot-specific certificates are not supplied with the containers from the vendor, or laboratories prepare their own containers, then the bottle testing requirements described in this subsection apply.

B8.1.2 Other Sampling Supplies and Consumables

The requirements for other field supplies and consumables are specific to the method used to measure disinfect residuals. Samplers should follow the requirements specified in the analytical method, manufacturer's instructions, or their field sampling SOP.

B8.2 Laboratory Analyses Supplies and Consumables.

Laboratories inspect and accept supplies and consumables (other than the sample bottles described above) according to the approved analytical method and other relevant laboratory standards and procedures, such as the TNI Standard.

B9 Non-Direct Measurements

This Addendum does not include the acquisition of non-measurement data.

B10 Data Management

The management of microbial data from the time it is generated in the field until it is reported to the TCEQ is a shared responsibility of the samplers and the laboratory. The sections below summarize the record keeping, document control, data review, and data entry requirements of these parties. The data management protocols described in this section ensure data are reported accurately and in a timely manner; as well as comply with regulatory requirements and the programmatic requirements of the TCEQ.

TCEQ staff on the DWAT use the data after it is received from the laboratory to determine PWS compliance with the RTCR and the GWR. The steps TCEQ staff perform to process and analyze the data are described in Section B10 of the Programmatic QAPP.

B10.1 Samplers

Following the collection of a sample at each sample site, samplers ensure all required information (Section B3) is recorded on the sample label and MRF submitted to the laboratory. Samplers review all documentation before relinquishing the sample to the laboratory to ensure all information is complete and accurately reported. Samplers then deliver and relinquish the sample to the laboratory for analysis, with all required sample documentation, within the required 30 hour holding time (Section B3).

Corrections completed to the MRF after sample incubation has begun (or results determined) must have TCEQ approval. The sampler will perform the corrections on the MRF as directed by TCEQ. The corrected MRF shall be retained by the PWS as required by §290.46(f)(3)(D)(i). See section B10.5 for additional information regarding corrections.

PWS management are responsible for maintaining records associated with microbial compliance monitoring that are generated by samplers

B10.2 Laboratory

Minimum requirements for data management are addressed within the TNI Standard. Upon receipt, the laboratory inspects the samples and reviews the sample label and MRF, following relevant laboratory sample acceptance procedures as described in Section B3. After analyzing the samples and reviewing the data, the laboratory reports the data and information to TCEQ and the PWS.

- MRF
- sample results, positive or negative
- rejected or invalidated samples

The specifications and requirements for data reporting are detailed in Exhibit 1 of this Addendum.

Corrections to the MRF that are identified after sample incubation has begun (or results are determined) must have TCEQ approval for making corrections. See next section, B10.3, for additional information. Laboratories must report data associated to the corrected MRF to the TCEQ.

Note: Samples used for compliance determinations must be reported to TCEQ according to requirements defined in Exhibit 1. Program-specific requirements may apply to other types of microbial samples. Laboratories report sample results, as appropriate.

B10.3 TCEQ

Microbial compliance data reported to the TCEQ for RTCR and GWR is managed within the Safe Drinking Water Information System (SDWIS) database. The database is used to determine compliance with monitoring requirements for each PWS required to monitor under the RTCR and GWR.

All records associated with PWS compliance, including MRF that are received, are submitted to the Central File Room in accordance with TCEQ Records Management and Retention policies described in the TCEQ QMP and Agency Operating Policies and Procedures.

B10.4 Falsification and Fraud

Falsification of the MRF or 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] By signing the MRF, the sample collector acknowledges that the water samples were collected according to the PWS's established sample collection procedures, and that all information on the form is accurate. Evidence of falsification, fraud, or improper laboratory practices is turned over to the TCEQ Environmental Crimes Unit or the EPA Inspector General for investigation.

B10.5 Corrections to the MRF (Compliance Documentation)

Corrections to the MRF after sample incubation has begun (or results are determined) are limited and **must have TCEQ approval**. Corrections to the MRF must be completed by the sampler. The fields required to be completed by the PWS cannot be corrected by the laboratory.

To request a correction, the PWS must contact the TCEQ at TCRData@tceq.texas.gov and include the following information:

- Sample IDs and fields that require corrections.
- Contact information for PWS and sampler (if different)
- Attach MRF that requires corrections,
- Attach corroborating documentation to support correction(s).

After the correction request has been received and reviewed, the TCEQ will contact the PWS and sampler (if different) with the approval or denial for the request. If approved, the TCEQ will provide instructions on how to complete the corrections and a due date

when the corrections must be completed. After the corrected MRF has been submitted to TCEQ, it will be reviewed to ensure that corrections were completed appropriately. The TCEQ will send the corrected MRF to the PWS and the lab to confirm the acceptance of the corrected MRF. The PWS and lab must retain the corrected MRF with their records. The lab will submit the corrected data to the TCEQ in the same manner that the lab reports data.

The following corrections are NOT allowed.

- Changing sample type from noncompliance to compliance or vice-versa.
- Adding a missing date of collection.
- Adding a missing time of collection.
- Adding a missing field-measured chlorine residual.
- Adding missing COC "Relinquished By" signature, date and/or time

Only corrections that do not change the sample intent or results are allowed. TCEQ reserves the right to determine if corrections will be allowed.

(C) Assessment and Oversight

C1 Assessments and Response Actions

Assessments and oversight associated with microbial compliance monitoring are discussed in Section C1 of the Programmatic QAPP. Types of TCEQ audits and oversight applicable to this Addendum include the following activities.

- project oversight
- peer review and coordination
- laboratory accreditation audits

C1.1 Corrective Actions (CA)

All project participants (i.e., laboratory, TCEQ) involved with work associated with this QAPP are responsible for identifying deficiencies when there are nonconformances with required procedures specified in it, including referenced documents. Deficiencies may be identified internally or externally during the performance of routine work or during audits and oversight, such as:

- Routine quality control procedures
- Observations
- Audits
- Management reviews
- Feedback from customers

Most nonconformances are not "deficiencies" as addressed in this section. Project participants routinely encounter, document, and correct technical or procedural nonconformances at the point of origin using established procedures. These nonconformances are documented at the point of origin and are maintained with the applicable project records.

However, the level of corrective action described in this section may be warranted if established procedures don't prevent a situation from recurring, if the error is a unique nonconformance, or if it is determined to be a significant deviation.

C1.1.1 Deficiencies Requiring a Corrective Action Plan (CAP)

Deficiencies are nonconformances that cannot be corrected by established procedures and will require actions to be defined and documented in a corrective action plan (CAP). Upon detection of a deficiency, project participants are responsible for notifying their management.

Deficiencies requiring a CAP may be identified and initiated by a project participant or a CAP may be requested by the PWSS Program Lead Quality Assurance Specialist, or designee.

When deficiencies are identified by the laboratory or contractor, the TCEQ must be notified of the circumstances by email within 24 hours. CAPs must be documented and submitted to PWSQA@tceq.texas.gov within 14 days of notification.

Deficiencies requiring a CAP may involve, but are not limited to, the following:

- Integrity of results are jeopardized
- Intentional misrepresentation of data or information
- Nonconformances with state or federal regulations
- Repeat nonconformances or deviations from standard practices
- Result in significant recollection of samples

The preparation of CAPs is assigned to appropriate staff by managers (e.g., laboratory, contractor, TCEQ) who are responsible for assuring that CAPS are:

- Appropriately prepared, reported, implemented, and verified effective.
- Implemented in ways that will most likely eliminate the problem and prevent recurrence.
- Forwarded to PWSQA@tceq.texas.gov within 14 days of initial notification.

The PWSS Program Lead Quality Assurance Specialist, or designee, receives and reviews CAPs to determine if actions planned to resolve the deficiency are acceptable, provides feedback on any items determined to be insufficient, tracks reported CAPs, and may monitor implementation. Appropriate staff may be designated to review and track corrective actions that are not deemed significant, as described in C1.1.3.

If CAPs submitted by a laboratory are determined to be unacceptable, the PWSS Program may withhold samples until such time that an acceptable CAP is submitted.

Note: If a laboratory is required to issue an amended analysis report as part of a CAP, they are required to submit a copy to TCEQ in electronic form. All corrected reports and data must be clearly marked to identify them as "corrected" or "amended" and shall include the reason for the correction. Electronic data must be clearly identified as corrected in order to avoid duplicated data in the database of record.

C1.1.2 Required Content for a CAP

The procedure for preparing a CAP following the identification of a deficiency begins with an investigation to determine the root cause(s). Procedures for CAPs are specified in laboratory, contractor, or PWSS Program SOPs. Management selects and implements CAPs that will mostly like eliminate the problem, prevent recurrence, and are appropriate for the magnitude and degree of risk of the deficiency.

CAPs must include the following information:

- Description of the deficiency
  - What happened, how was it identified, and the date identified?
- Root cause
  - What was the underlying cause? Why did the deficiency occur?
- Programmatic or data impact(s)
  - How did the deficiency affect data or program decisions and what was reviewed (including timeframe) to determine the impact?
- Corrective action taken
  - What was done to correct the deficiency?
- Timeline for corrective action(s)
- Documentation
  - How will the corrective action(s) be documented?
- Actions to prevent recurrence
  - What actions will be taken to prevent the deficiency from occurring again? These must be distinctly different from the corrective actions.
- Timeline for action(s) to prevent recurrence
- Documentation
  - How will the preventative action(s) be documented?
- Verification of effectiveness
  - Who will verify effectiveness, when will verification occur, and how will verification be documented?

The TCEQ QA Program has developed a standardized template form that may be used, TCEQ QAF-005. This template can be accessed through the TCEQ Quality Assurance[17] webpage under the Corrective Action Process section. The form is also available by request at PWSQA@tceq.texas.gov.

C1.1.3 Significant Deviations

The PWSS Program Lead Quality Assurance Specialist determines whether an identified or reported deficiency is a significant deviation as defined by, but not limited to, any of the following:

- It jeopardizes the integrity of results or conclusions.
- Results in non-conformance with state or federal regulations.
- Was associated with the intentional misrepresentation of data or information.

The Lead Quality Assurance Specialist will forward information related to CAPs for

[17] www.tceq.texas.gov/agency/qa

significant deviations as described within the Programmatic QAPP, Section C1.1.3.

C1.2 Authorization to Stop Work

TCEQ management will authorize work stoppage if conditions are identified that indicate compliance is in jeopardy or if primacy requirements are not being met. The PWSS Program Lead Quality Assurance Specialist, Grant Manager, or TCEQ QA Manager may also request a work stoppage.

C2 Reports to Management

This section documents how the TCEQ program staff keeps TCEQ management, and the EPA, informed of project oversight, assessment activities, and findings. This information is described in Section C2 of the Programmatic QAPP.

(D) Data Review and Usability

D1 Data Review, Verification, and Validation Requirements

In order to use the data generated under this Addendum for microbial compliance determinations, data are reviewed to ensure they are of known and verifiable quality and adhere to the DQIs specified in Section A7. This involves both the verification and validation of data as described below.

Data verification involves the evaluation of completeness, correctness, and conformance of both field and laboratory data to the criteria and specifications defined in this Addendum and referenced procedures, methods, standards, etc.

Data validation extends the evaluation of data beyond method and procedural compliance (i.e., data verification) to determine the quality of each specific data set. The validation of microbial data is a responsibility of the TCEQ Drinking Water Assessment Team in coordination with the Data Support Group. The criteria TCEQ staff use to validate data are discussed in the Programmatic QAPP document.

D2 Verification and Validation Methods

Prior to relinquishing microbial samples to the laboratory, samplers verify the data and information on both the sample label and the MRF. Samplers perform this process manually by checking each documented item to ensure it is correct, complete, and complies with this Addendum. Sampling SOPs should define the steps samplers take to verify their data.

Prior to reporting sample results, laboratories also verify the data and information against the criteria and requirements defined in this QAPP. Laboratories perform this process manually or electronically (or a combination of the two) depending on the way they report data and other situations unique to the laboratory. Laboratories verify their data according to internal SOPs for reviewing, verifying, and validating data which should include the project-specific criteria defined in this Addendum.

The methods TCEQ uses to validate data are discussed in the Programmatic QAPP document.

D3 Reconciliation with User Requirements

The data and information collected under this Addendum conform to the user requirements defined by regulations, rules, and TCEQ requirements related to microbial compliance sample collection, analysis, and reporting. Conformance to this QAPP ensures that the TCEQ can use the data to determine compliance with SDWA requirements. Only data and information that have been validated by TCEQ staff as discussed in the Programmatic QAPP document is used for this determination and EPA reporting. Qualified data are not used for LCR compliance determinations.

Exhibit 1 Reporting Requirements and Specifications

This exhibit contains the requirements and specifications for microbial compliance data quality control and reporting.

E1.1 Electronic Result Reporting

The E2 reporting system allows laboratories to report microbial data electronically to the TCEQ utilizing the following two options.

- Online Data Entry
- Data Upload

It is highly encouraged that laboratories submit microbial data on a weekly or bi-weekly basis or submit data using small batches. These steps will help mitigate the occurrence and impact of reporting errors and allow errors to be identified early and corrected, as needed. Laboratories must submit electronic microbial data to the TCEQ by the 10th day of the month following sample analysis through E2.

User and System Requirements

E2 users must have an authorized user account, be granted an association with their laboratory, and fill out a participation agreement. An E2 Lab User Guide for both options listed above is located on the TCEQ Electronic Reporting for Public Water Systems and Labs[18] webpage. Laboratories must submit all required data indicated in the E2 Lab User Guide. Submissions or samples that lack required fields are subject to rejection by TCEQ.

Laboratories must be able to access the TCEQ E2 website through the internet. Typically, such access is available either through a dedicated connection (i.e. local area network) or a modem connection to an Internet Service Provider.

To ensure that all features of the E2 system are available, laboratories must use a browser compatible with the E2 system. The performance of the E2 system will vary based on the computer internet connection speed, CPU, Operating System, and available memory.

For questions or concerns regarding E2, please reach out to ESubData@tceq.texas.gov

Corrected Data

Data submitted electronically using E2 may not be modified by TCEQ staff. Corrected data must be resubmitted in a separate file from previously submitted data. The laboratory must notify the TCEQ by email to TCRData@tceq.texas.gov in advance to prevent duplication in the database of record.

[18] www.tceq.texas.gov/drinkingwater/e2-reporting-system

E1.2 Manual Reporting using the MRF

Electronic reporting is highly encouraged, although manual reporting is still allowed if electronic reporting is not available. The method for reporting manual (or hard copy) results requires that laboratories use the current version of the MRF located on the TCEQ PWSS Program[19] webpage.

If results are not reported using the current MRF, the samples will be rejected and the PWS may incur a violation.

It is highly encouraged that laboratories email the MRFs to TCEQ on a weekly or bi-weekly basis to allow enough time for TCEQ staff to review and enter the sample data. Laboratories must submit copies of MRFs to the TCEQ by the 10th day of the month following sample collection by emailing the MRFs to TCRDATA@tceq.texas.gov.

Note: The TCEQ is taking steps for implementing required electronic reporting using the Compliance Monitoring Data Portal (CMDP) for all compliance programs. This transition to CMDP will ensure compliance with the Cross Media Electronic Reporting Rule (CROMERR). All labs reporting manually should take steps now to develop electronic reporting procedures in preparation for CMDP implementation.

E1.3 Reporting Rejected Samples

If the laboratory rejects a sample (see Section B3) or invalidates a sample (see Section B4), it must report these occurrences to the TCEQ through E2 or manually if applicable. It is highly encouraged that laboratories report rejected or invalidated samples on a weekly or bi-weekly basis. This will ensure the replacement samples can be tied to the originals in case of a positive result.

The replacement sample is tied/associated to the original sample and must remain the same sample type as the original sample. In other words, if the rejected sample is a routine sample, the replacement will also be a routine sample. Correct association will ensure the PWS receives proper monitoring credit.

Table 1 lists the Rejection Codes and the reasons for using each code. These codes are used for both electronic and manual reporting.

[19] www.tceq.texas.gov/drinkingwater/pwss.html

Table 1. Rejection Codes

CODE	DESCRIPTION	USE
BR	Broken in transit	When sample bottles are broken or cracked.
CL	Chlorine present (in sample)	When chlorine is present in the sample during the absence of chlorine check.
EH	Exceeded hold time	When the sample has exceeded the 30-hour hold time.
EV	Excessive volume	When the sample volume does not allow for homogenous mixing through shaking.
FZ	Frozen sample	When the sample is partially or completely frozen.
HB	Heavy bacterial growth	When a sample result cannot be determined due to either a turbid culture with no color change when using SM 9223 or confluent growth or producing colonies TNTC when using a membrane filter analytical method.
ST	Heavy silt or turbidity present	When heavy silt is present in the sample. When turbidity is present in the sample prior to analysis. When a sample result cannot be determined due to either a turbid culture in the absence of gas production when using an analytical method where gas formation is examined or a turbid culture in the absence of an acid reaction when using the P-A Coliform Test.
IN	Insufficient information	When the MRF is missing required information about the sample, PWS, or sampler. See note below.
LA	Lab accident	When a sample cannot be analyzed due to a lab accident.
LR	Lab rejected Before using "LR", the lab must notify TCEQ at TCRData@tceq.texas.gov	When a sample is deemed not suitable for analysis. When results are not valid due to equipment malfunctions. When a sample needs to be rejected but does not fit another available rejection code.
LT	Leaked in transit	When a sample leaked during transport to the lab.
NC	No chlorine residual	When the MRF is missing the chlorine residual measurement. See note below.
TH	Temperature too high	When rejecting samples at receipt for exceptionally high temperature.
VO	Volume insufficient	When the sample volume is less than required for analysis and chlorine residual check.

Note: Samples that are rejected for missing a field-measured chlorine residual, PWS ID, sample type, or date of collection cannot be reported to TCEQ electronically using E2. In these cases, the MRF must be submitted to TCEQ indicating the rejection to TCRData@tceq.texas.gov.

E1.4 Reporting Positive Sample Results

Laboratories must report positive results to the PWS as soon as possible on the same day they are determined, see note below. Timely notification of positive results provides the PWS the ability to take swift actions to ensure protection of public health (i.e., initiate repeat sample collection, investigative sampling, boil water notice, etc.).

The laboratory should make every attempt to verbally inform the PWS or PWS water operator of the positive sample result. An email or voicemail notification does not ensure the system is properly notified.

The laboratory must report positive sample results (total coliform and/or *E. coli)* to the TCEQ as soon as possible on the same day they are determined. Laboratories must email the completed MRF and Laboratory Positive Result Form to the TCEQ at RTCRPOS@tceq.texas.gov. Laboratories can find the current TCEQ Form 20894 Laboratory Positive Result Form[20] on the RTCR webpage.

The TCEQ uses the MRF to manually enter positive result data into SDWIS to determine compliance. When reporting positive result data, laboratories must ensure all fields on the MRF are completed. Section B3.2.2 describes required fields on a laboratory-modified MRF.

The TCEQ uses the Laboratory Positive Result Form to confirm whether the laboratory has informed the PWS of the positive results and who was contacted. The TCEQ may use the Laboratory Positive Result Form when handwriting legibility issues are present on the MRF to verify data entries such as PWS Name and ID, TCEQ Laboratory ID, laboratory sample ID, and sample collection location.

After notification of positive sample results, TCEQ initiates a notification process that informs the PWS of repeat sampling requirements. The notification occurs in direct response to the positive results reported from laboratories.

Note: If a positive result is determined over a weekend or holiday, the laboratory must send the results to the TCEQ as soon as possible on the day results are determined. The laboratory can follow up with the finalized and approved documentation during the next day of normal business hours.

E1.5 Reporting Repeat Sample Results

Laboratories must report all repeat results following an *E. coli* positive sample as soon as possible on the same day results are determined.

The laboratories can assist TCEQ in the protection of public health and determining compliance by submitting the results of all repeat samples on the same day results are determined.

The laboratory should email the completed MRF to the TCEQ at RTCRPOS@tceq.texas.gov. If repeat results are positive, the lab should also include the Laboratory Positive Result Form in the notification.

[20] www.tceq.texas.gov/drinkingwater/revised-total-coliform-rule