# Groundwater Rule (GWR) Compliance and CT Studies

Public Drinking Water Conference

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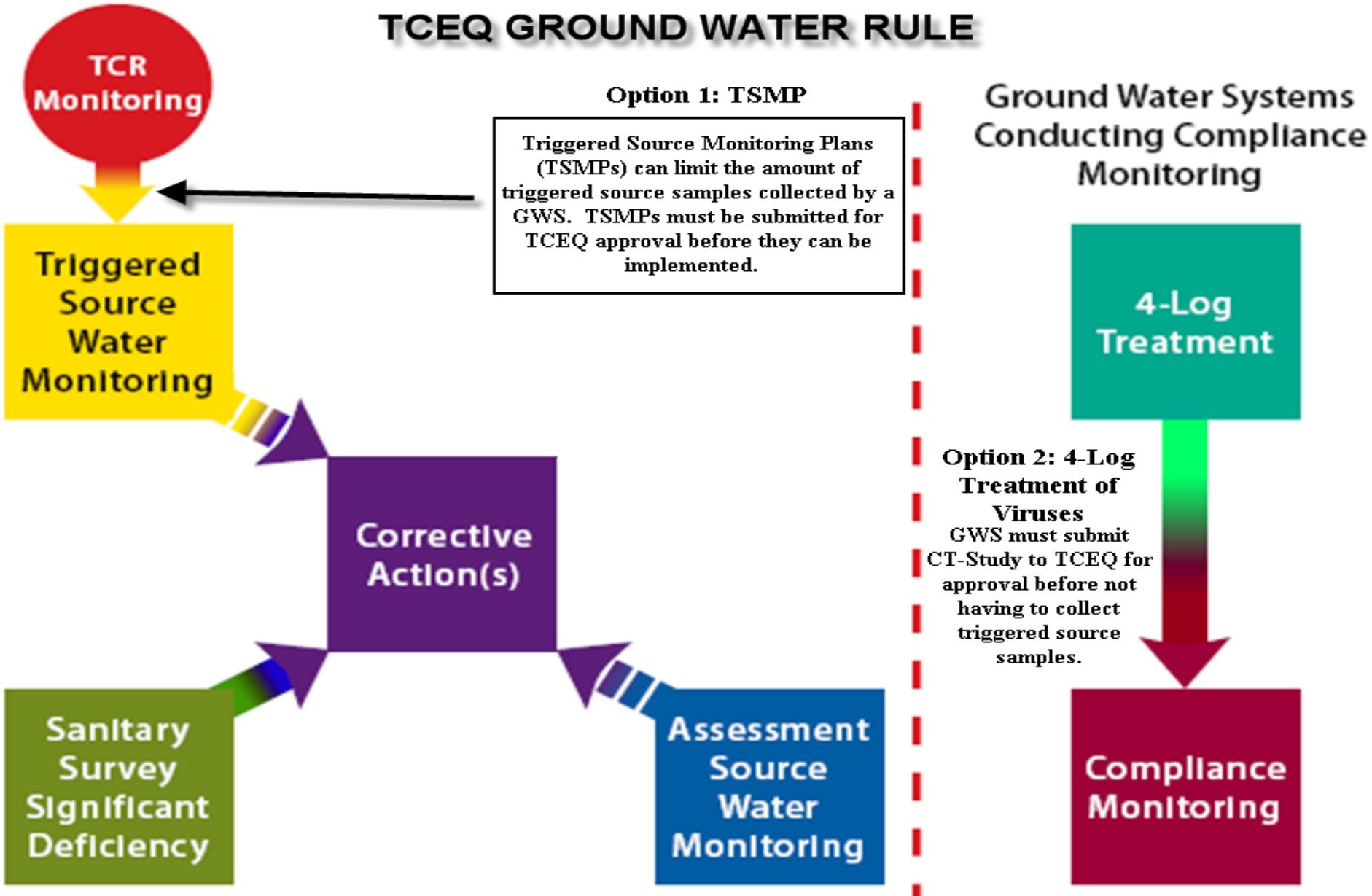
# GWR – Risk / Targeting Approach

- Periodic Sanitary Surveys
  - Identify significant deficiencies
- Triggered Source Water Monitoring
  - Identify fecal contamination
- Corrective Action (CA)
  - Compliance Monitoring
  - Reporting

# GWR Compliance Tracks



# Sanitary Surveys / Comprehensive Compliance Investigations (CCI)

# CCI Frequency

- Community Water System:
  - every 3 years
- Non-Community Water System:
  - every 5 years

# 8 Elements of a Sanitary Survey (CCI)

- Source
- Treatment
- Distribution
- Finished water storage
- Pumps, facilities, and controls
- Monitoring, reporting, data verification
- Management and operation
- Operator compliance

# Triggered Source Monitoring (TSM)

# TSM Information

- Triggered source monitoring (TSM)
  - Required after a PWS, using a groundwater (GW) source, receives a Total Coliform+ (TC+) sample result collected under the Revised Total Coliform Rule (RTCR).
- TCEQ may approve alternative raw sampling locations at a GW source.
  - If sampling location is representative of the water quality of the well source.
  - Approved on a case-by-case basis.
- TCEQ rules require each source to have a raw sample tap.

# TSM Applicability

- Applies to all GW sources not providing 4-log (99.99%) treatment of viruses.
  - TSM samples must be collected when coliform is detected in the distribution system.
- Source sample must come from each source in operation and must be collected within 24 hours.
  * Triggered Source Monitoring Plan
  * Timeframe – Notify TCEQ if faced with lab closures over weekends and/or holidays

# TSM – One-to-One

- Triggered source monitoring is a one-to-one relationship between distribution positives and required source samples.
  - For each distribution positive, at least 1 source sample must be collected from each well that was active at time of positive.
- For example:
  - PWS has 5 distribution positives; 5 source samples must be collected from each well that was in use at the time of the positive samples.

# Providers of Groundwater

- Receiver PWS must notify Provider PWS within 24 hours of distribution TC+
- Providers must collect source sample within 24 hours
- Providers must notify all Receivers of any fecal indicator positive result within 24 hours

# TSM - Exceptions

- Invalidations 30 TAC §290.109(d)(1)
  - Sample collected from location or manner that could produce false positive
- GW sources may request review of TC+ distribution sample caused by Distribution Deficiency
  - Line Break / Pressure drop

# Assessment Source Monitoring (ASM)

# ASM Information

- Assessment Source Monitoring may be required as a result of a Hydrogeological Sensitivity Assessment (HSA).
  - HSA may determine that source is susceptible to fecal contamination
- ASM may be required as a result of the rule exception process
- ASM may be required as a CA
- ASM sample may be used for TSM if collected within 24 hours of notification of distribution positive
  - TSM sample may be used for ASM as well

# Corrective Action (CA)

# CA Information

- TCEQ requires a Corrective Action when a fecal indicator (*E. coli*) is present in GW sources.
  - Identified through TSM or ASM sampling.
  - Or if a significant deficiency (SD) is identified.
- 6 possible CAs

# CA Options

- A PWS with significant deficiencies or source water fecal indicator positive samples, must implement one or more of the following:
    1. Correct all significant deficiencies
    2. Provide alternate source of water
    3. Eliminate source of contamination
    4. Provide 4-log treatment of viruses

## Additional State CAs (not in Federal GWR)

5. Disinfect well in accordance with AWWA procedure
6. Assessment Source Monitoring (ASM)

# Triggered Source Monitoring Plans (TSMP)

# Why complete a TSMP?

- Compliance option for GWR
- Decrease number of TSM samples the PWS must collect
- Save time and resources
- TSMP not recommended if PWS only has a single well

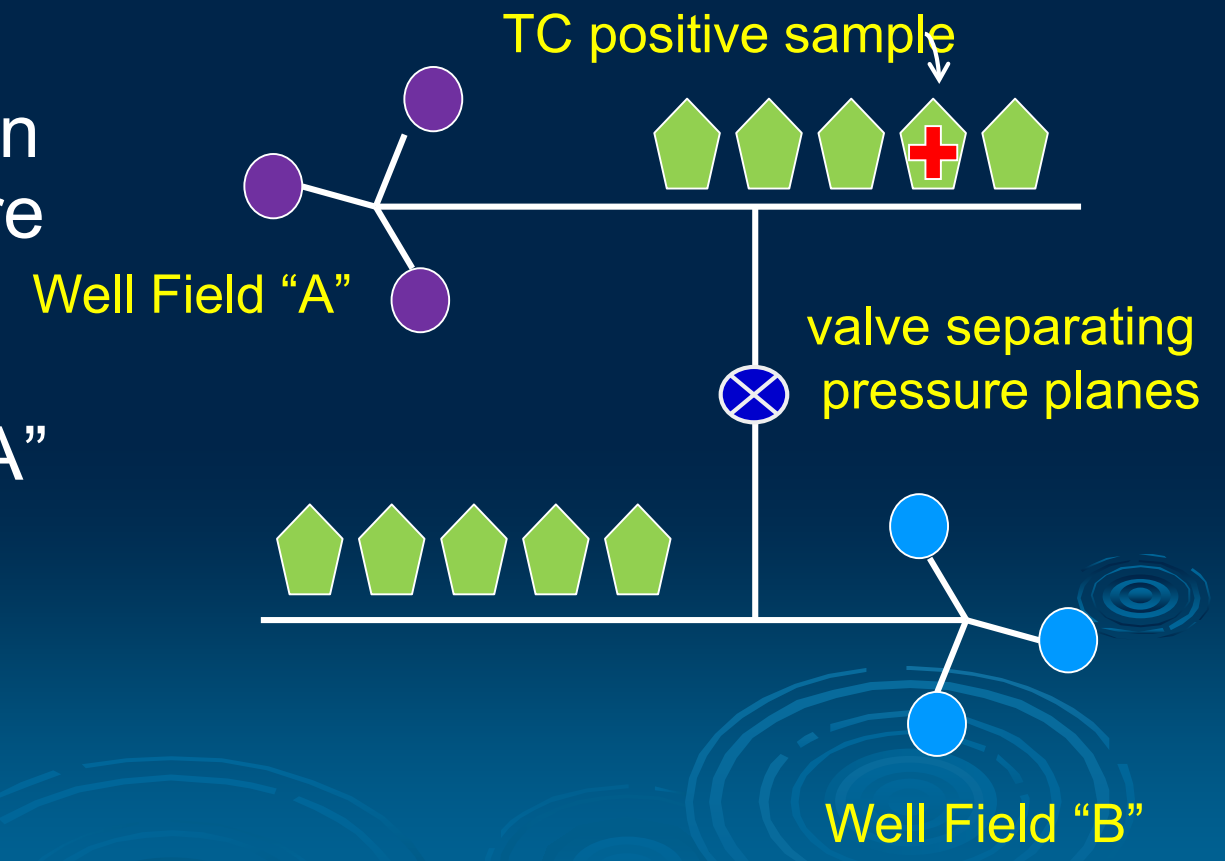
# TSMP Option 1

Option 1

- Wells representing coliform monitoring locations in distribution system
- **Relates to situations in which a PWS has multiple wells.**
  - However, not all provide water to each routine coliform sample collection site in the distribution system.

# Option 1: Wells Representing Monitoring Locations

With this type of plan, Well Fields "A" and "B" are on separate pressure planes. With a TSMP in place, only Well Field "A" would require triggered source sampling.



# Option 1: Wells Representing Monitoring Locations

PWS must have:

- Separate pressure planes; and / or
- Physically separate distribution areas; or
- Hydraulic model

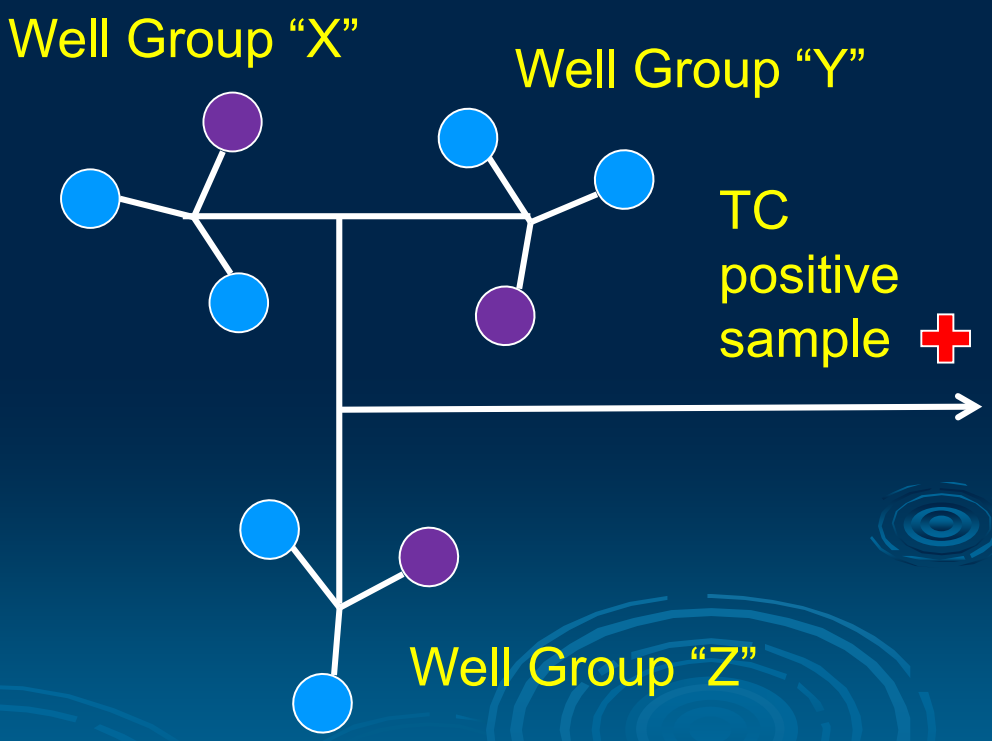
# TSMP Option 2

Option 2

- Wells representative of other wells in a similar hydrogeologic setting.
- PWS has multiple wells; some are so similar in construction and use the same aquifer that a reasonable case could be made that one well may be representative of other wells.

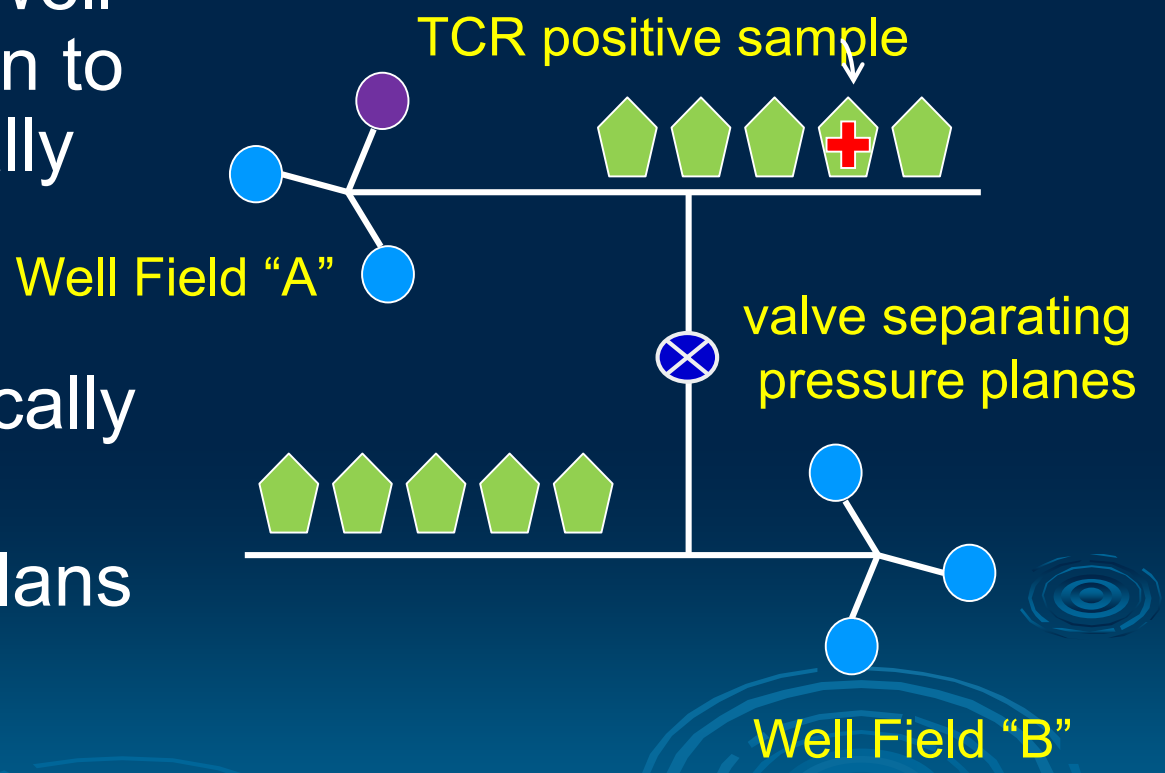
# Option 2: Wells Representing Other Wells

With this type of plan, if each Well Group contains wells in the same aquifer with similar depth and construction, then one well may represent the entire group.



# Combining Triggered Source Monitoring Plans

- All of the wells in Well Field “A” are shown to be hydrogeologically similar
- The distribution system is hydraulically separated
- With both TSMP plans in place only one sample is required instead of six.



# Concentration Time (CT) Studies

## 4-log Treatment of Viruses

# 4-log Treatment

- 99.99% inactivation/removal of viruses
  - chlorine (chlorine gas or hypochlorite),
  - chlorine dioxide,
  - ozone
  - chloramines (possibly)
- It should be noted that a system must maintain a free (0.2 mg/L) or total chlorine (0.5 mg/L) minimum residual in the distribution system
- The GWR does not require 4-log treatment for **all** groundwater sources

# Why provide 4-log treatment?

- GW system may already provide, or have the capability to provide, 4-log treatment through its existing treatment process.
- The system does not want to have to conduct triggered source monitoring related to a positive distribution sample.
  - Useful for systems with a lot of wells.
- May be required by the TCEQ as a CA.

# 4-log Treatment Requirements

- Compliance Monitoring for approved system to show they are providing consistent and sufficient treatment.
- Maintain a record of the approval letter on-site that approves a Minimum Specified Residual (MSR).
- Maintain a Monthly Operating Report (MOR) on-site and record residuals daily, to be made available upon request.
- Systems approved for 4-log treatment are not required to conduct triggered source water monitoring.

# How to Apply for Approval of 4-log Treatment?

- Cover letter including reason for submittal.
  - CA compliance requirement.
  - Exemption from triggered source monitoring.
- Complete GW MSR Template
  - http://www.tceq.texas.gov/drinkingwater/swmor/swmor/ct_info
- List all sources supplying the entry point
- Schematic including well ID numbers, flow, units, injection points, & sample point location

# Groundwater CT Template

## Groundwater CT Study Template (MS Excel version)

**This Template is used to determine the Minimum Specified Residual (MSR) at a plant using free chlorine to achieve a 4.0-log viral inactivation**

**PWS Name:** _____ **PWS ID No.:** _____

**Plant Name:** _____ **Date Completed:** _____

| | | | | | |
|---|---|---|---|---|---|
| 1 | Total capacity (maximum) of all storage tanks at this site | | | | gallons |
| 2 | Minimum volume/water level | | gallons (or feet) | | |
| 3 | Maximum volume/water level | | gallons (or feet) | | |
| 4 | Actual Min/Max Ratio (line 2 divided by line 3) | | | | |
| 5 | Maximum allowable ratio | | 0.50 | | |
| 6 | Allowable ratio (minimum of line 4 and line 5) | | | | |
| 7 | Allowable Volume (line 1 times line 6) | | | | gallons |
| 8 | Baffling Factor | | | 0.1 | |
| 9 | Effective Volume (line 7 times line 8) | | | | gallons |
| 10 | Total capacity (maximum) of the wells feeding these tanks | | gpm | | |
| 11 | Total capacity (maximum) of all the service pumps fed by these tanks | | gpm | | |
| 12 | Flow rate (minimum of line 10 and line 11) | | | | gpm |
| 13 | $T_{10}$ for this site (line 9 divided by line 12) | | | | minutes |
| 14 | CT required for a 4-log viral inactivation if the water temperature is at least 10°C and the pH is not greater than 9.5. | | | 6.0 | mg/L-min |

**Assuming that you are using free chlorine, your water temperature does not drop below 10°C (50°F), and the pH is always below 9.5 . . . The Minimum Specified Residual (MSR) for this Entry Point will be:** (line 14 divided by line 13) **mg/L**

If the $T_{10}$ is less than 1.5 minutes, the TCEQ cannot approve a Minimum Specified Residual for this site because it would be greater than 4.0 mg/L under worst-case operating conditions.

Note: Enter data in the yellow cells. The values in the orange cells will automatically be calculated by the spreadsheet.

# Approval of CT Study

- Technical Review and Oversight Team (TROT) will notify the system, in writing, on approval status for 4-log treatment.
  - Includes compliance monitoring conditions required by the system in order to achieve 4-log credit.

# Approval of CT Study (cont.)

- A **minimum specified residual (MSR)** will be set by the TCEQ and must be maintained prior to the first customer.
- MSR may be lower than the required residual disinfectant concentration in the distribution system:
  - The system **must still maintain** 0.2 mg/L for free chlorine or 0.5 mg/L for chloramines in the distribution system

# Approval of CT Study (cont.)

- GW 4-log MSR is required to be maintained on a daily basis.
  - Including nights, weekends, and holidays.
  - In addition to the GW/PW MOR (production), the DLQOR, and any other rule requirements.

# Where to sample for chlorine residual?

- After treatment and storage.
- Prior to the first customer.
  - Actual location determined on a case-by-case basis after review and approval of the GW MSR Template/CT Study.
- If the continuous chlorine monitoring equipment fails, the system must take grab samples every 4 hours until the equipment is repaired.
  - The equipment must be repaired within 14 days.

# Compliance Monitoring of Chemical Disinfection

For GW Systems that provide 4-log treatment:

- PWS with population >3,300
  - Must continuously monitor disinfectant
  - Must maintain minimum residual
- PWS with population <3,300
  - Must monitor disinfectant daily
  - Must maintain minimum residual

# Compliance Monitoring Requirements

- Systems must notify the TCEQ any time the required MSR concentration is not restored within **4 hours**.
- The system must notify the TCEQ as soon as possible, but no later than **24 hours**.

Drinking Water Assessment Team

512-239-4691

GWRData@tceq.texas.gov

# How to discontinue 4-log treatment

- The system must notify TCEQ in writing immediately *and* conduct triggered source water monitoring in the future.
- If the GW system is providing 4-log for an exception, the system must notify the TCEQ in writing and the exception will be revoked.

# When to update CT study?

If plant has operational changes that AFFECT the DISINFECTION PROCESS

**Request an Updated CT Study through the Technical Review and Oversight Team (TROT)**

# Treatment Technique Compliance Determination, Public Notification

# GWR Treatment Technique Violations

- Corrective action not completed in 120 days
- Not in compliance with CA plan / schedule
- Fails to maintain 4-log treatment of viruses

# When is 24 Hour Public Notice (PN) Required?

GW PWS collects source sample that is fecal indicator positive

- Includes results from:
  - Provider PWS
  - Triggered Source Monitoring
  - Assessment Source Monitoring

# When is 30 Day PN Required?

GW PWS fails to:

- Implement corrective action
  - Fecal indicator positive
  - Significant deficiency
- Comply with CA schedule / plan
- Maintain 4-log treatment of viruses

# When is 12 Month PN Required?

GW PWS fails to:

- Conduct TSM
- Conduct ASM
- Conduct monitoring to demonstrate compliance with 4-log treatment requirement

# When is Consumer Confidence Report (CCR) Notice Required?

GW PWS has:

- Uncorrected significant deficiency
- Corrected significant deficiency
- Fecal indicator positive source sample (*E. coli*)

# Conclusion

- GWR is a valuable regulation
  - Estimated to prevent over 43,000 waterborne illnesses per year.
- 4-log treatment and Triggered Source Monitoring Plan options can reduce triggered source (raw) samples.
- Contact the TCEQ!
  - Communication between the TCEQ, your purchasers, and wholesalers is vital.

# Financial, Managerial and Technical (FMT) Assistance

If you would like to arrange for free financial, managerial, or technical assistance, contact our Financial, Managerial and Technical (FMT) program team:

FMT@tceq.texas.gov

https://www.tceq.texas.gov/drinkingwater/fmt

(512) 239-4691

# Water Supply Division / Drinking Water Assessment Team:

512-239-4691

Drinking Water Watch:

https://dww2.tceq.texas.gov/DWW/

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