# Ground Water Rule

RWAU Annual Conference
2010

## Commonly Used Acronyms

- GWR = ground water rule
- PWS = public water system
- GWS = ground water system
- PN = public notice
- CCR = Consumer confidence report
- TCR = total coliform rule
- 4 log treatment or removal = treatment that kills 99.99% of pathogens present

## Ground Water Rule

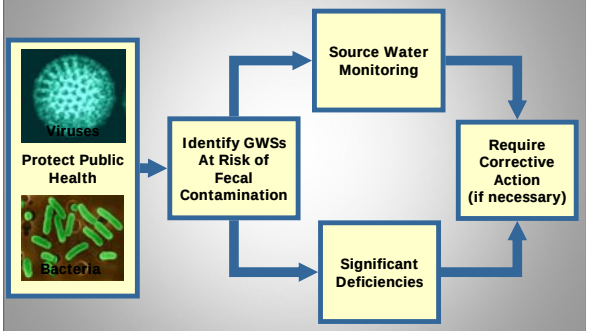
**What is IS**

- A way to investigate possible microbial contamination
- A way to define significant deficiencies throughout the US
- A BRAND NEW RULE
- NOW IN EFECT!!! → December 1, 2009

**What it is NOT**

- Not a requirement to disinfect
- Not a replacement for routine bacteria sampling for TCR compliance

## Primary Purpose of the GWR






## Key Provisions of the GWR

- Sanitary Surveys of all GWSs
- Source Water Monitoring
- Corrective Actions for Significant Deficiencies & Fecal Contamination
- Compliance Monitoring



## To Whom Does the GWR Apply?

1. Systems relying 100% on ground water
2. Consecutive systems receiving ground water
3. Mixed surface & ground water systems*

*Exception (if all ground water goes through the treatment process of surface water)

## Relationship with the TCR

### TCR and GWR work together

- TCR Rule (1991) : primary focus
  "BACTERIAL pathogens"
  - Test Indicators: COLIFORM family
    - species: fecal coliform / *E coli*
      - Report: Coliform + / Fecal +
- GWR (2009): expands to include:
  "Bacterial and VIRAL pathogens in GWSs susceptible to FECAL CONTAMINATION"
  - Test Indicators: COLIFORM family
    FECAL COLIFORM SPECIES: *E coli,* Enterococci, Coliphage
  - Report: Coliform + / E coli +



## Acceptable Fecal Indicators

## Waterborne Disease Outbreaks

- 1991-2000: 69/51% were associated with GWS
- Waterborne Disease Outbreaks
  - South Bass Island, OH (2005) 1,450/Norovirus, *Camplobacter*, *Salmonella*
  - Big Horn Lodge, WY (2003) 35/Norovirus
  - Atlantic City, WY (2003) 84/Norovirus
  - Walkerton, Ontario, CA (2000) 1,345/*E coli* O157:H7, *Campylobacter*; 7 deaths

## Waterborne Disease Outbreaks

- Brushy Creek, TX (1999) 1,300 – 1,500/*Cryptosporidium*
- Couer d'Alene, ID (1999) 117/*Arcobacter butzleri*
- Island Park, ID (1996) 82/*Shigella*
- Cabool, MO (1992) 243/*E coli* O157:H7; 4 deaths
- Northern AZ (1991) 900/Norwalk virus
- Utah County, Utah (2008) *Camplobacter*

# Water Monitoring Requirements



## Source Water Monitoring Scenarios

- Two possibilities:

ASSESSMENT SOURCE WATER MONITORING

TRIGGERED SOURCE WATER MONITORING

## Triggered Source Water Monitoring

GWSs must conduct triggered source water monitoring if they:

Are notified of a TC-positive TCR routine sample

**And**

Are NOT conducting GWR compliance monitoring for their 4-log treatment



## *TCR* Sampling Requirements after a Routine "+" TCR Sample

- Collect repeat samples
  - Site of original TC+ sample
  - Within 5 connections up stream
  - Within 5 connections down stream
  - Systems < 1000 - 4th sample in system
    - *If 4th repeat sample used for TSW – sample results also count for TCR*
- Within 24 hours of learning of the total coliform positive(s)

## *GWR* Sampling Requirements after a Routine "+" TCR Sample

- Collect a "triggered source sample" for each positive routine TCR sample
- Where?
  - At EACH ground water source in use at time of TCR+
  - Or, from a DDW approved group sample site
    - GWS must submit a GWR sample site plan for approval utilize group sample sites



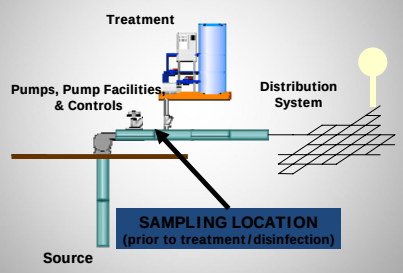
## *GWR* Sampling Requirements after a Routine "+" TCR Sample

- Sample must be taken before treatment, disinfection, or at a DDW-approved location before treatment
- When?
  - Within 24 hours of learning of the total coliform positive(s)
- Must analyze for fecal indicator

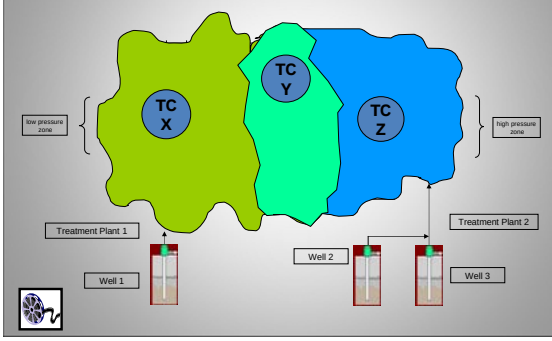
## GWR Triggered Source Reduced Monitoring Validation

- Initial TC+ Sample
  - Three or Four – TCR repeats
- Ground Water source(s) sample - Verification
  - Bacterial Source plan approval – YES ___ NO ___
  - Number of Wells in the system
    - Explanation of wells not being sampled – email or letter
    - Janet Lee - 801-536-0088 JJKELLER@utah.gov
  - Consecutive system
    - Notified Wholesaler

## Groundwater Rule Triggered Source Sampling Location

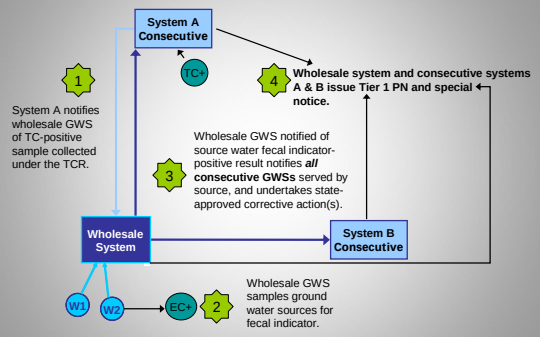


## Triggered Source Water Monitoring Plan Schematic






## Consecutive and Wholesale GWSs






## Consecutive & Wholesale Systems Request from Wholesalers

- Sample early in the week
- Take care when collecting TCR samples
  - Sampler errors
    - If in doubt discard sample bottle and use a new one

# Sample Results

## Triggered Source Sample

- Negative (-) Coliform, (-) *E coli*
- Positive (+) Coliform, negative (-) *E coli*
- No GWR violation



# Additional Source Water Monitoring

## Triggered Source Samples

- Positive (+) *E coli*
- Collect: 5 additional SOURCE water samples
- Where:
  - From the SAME ground water source(s) or approved group sample site used for triggered source water monitoring that had the fecal indicator-positive sample(s)
  - Sample must be taken before treatment or at a DDW-approved location after treatment



## Triggered Source Samples

- Provide Tier 1 Public Notification to customers within 24 hours (Same as ACUTE TCR violation)
  - Radio, Television, Hand or direct delivery
  - Posting in conspicuous locations
    - "BOIL YOUR WATER BEFORE USING……"

## Positive (+) Coliform, (-) *E coli*

Additional Source Samples

- No GWR violation -- no Fecal Indicator
- TCR violation: NON-ACUTE QUALITY If 4th repeat used as Source sample
- TCR PN Requirement:
- Provide Tier 2 Public Notification to customers
- Within 30 days after you learn of the violation
- Description of violation
- Corrective action

## Positive (+) *E coli*

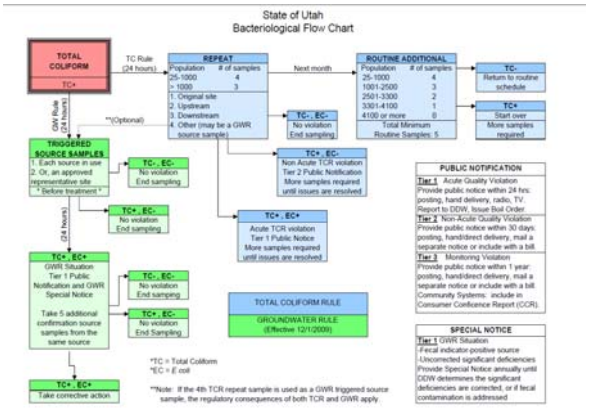
Additional Source Samples

- TCR Violation: if 4th repeat sample used for triggered source sample **ACUTE QUALITY**
- TCR Requirements:
  - Provide Tier 1 Public Notification to customers within 24 hours
    - Radio, Television, Hand or direct delivery
    - Posting in conspicuous locations
      - "BOIL YOUR WATER BEFORE USING……"

## TWO (+) Fecal Indicator Results Additional and Source Samples

- If the triggered source water sample AND 1 or more of the five additional source samples fecal indicator +, the GWS must:
- Take Corrective Action





## Bacteriological Sampling Procedures

- Laboratory sample forms filled out correctly
  - If sample type is not correctly identified some labs will run it as a routine TCR sample
  - Labeling sample correctly
    - TCR - Repeat – RP
    - TCR - Additional - RT
    - GWR - Triggered - TG
    - GWR - Confirmation – CO
    - GWR - Routine Assessment - RT

## Bacteriological Sampling Procedures

- Sample Location
  - Water System number Utah _ _ _ _ _
  - Facility ID WS_ _ _ (water source) or
  - SS_ _ _ (approved group sample site)
  - Sample Point ID (duplicate facility ID) WS_ _ _ or SS_ _ _

## Bottom Line Protect Your Source(s), System & Samples

- Source(s)
  - Maintain integrity
  - Source protection (DWSP)
- Distribution system
  - Preventive maintenance
  - Cross-connection control program
- Good sample technique critical

## Exemptions from "Triggered Source Monitoring"

## What is an Exemption?

- GWSs that treat to 4-log can receive an exemption
  - Not required to conduct triggered source monitoring
- What is 4-log treatment?
  - 99.99% virus inactivation or removal
  - Mathematical calculation



**Determine CT in Meeting 4-Log Virus Inactivation** — Enter only the green field.

(Trigger Source Monitoring Exemption in Ground Water Rule)

| Water System Name | Water System # | File # |
|---|---|---|
| | | |

Pipe Volume Estimate

| Pipe Description | Length (ft) | Diameter (in) | Diameter (ft) | Volume (ft3) | Volume (Gal) | % Full | Effective Volume |
|---|---|---|---|---|---|---|---|
| | | | 0.00 | 0.0 | 0.0 | 50% | 0.0 |
| | | | 0.00 | 0.0 | 0.0 | | 0.0 |
| | | | 0.00 | 0.0 | 0.0 | | 0.0 |
| | | | 0.00 | 0.0 | 0.0 | | 0.0 |
| | | | 0.00 | 0.0 | 0.0 | | 0.0 |
| | | | 0.00 | 0.0 | 0.0 | | 0.0 |
| | | | 0.00 | 0.0 | 0.0 | | 0.0 |
| | | | | Total Pipe Effecive Volume (gallons) | | | 0.0 |

Pipe CT Calcuation

| Residual Conc. (C) (mg/L) | * pH | ** Temp. (Celsius) | Peak Flow (GPM) | Effective Volume (gal) | Total Detention Time (min) | Contact Time (T) (min) | Total Pipe CT (C*T) |
|---|---|---|---|---|---|---|---|
| 0 | 6.9 | 0.5 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Storage Reservoir Volume Estimate and CT Calculation

| Tank Description | Residual Conc. (C) (mg/L) | * pH | ** Temp. (Celsius) | Peak Flow (GPM) | Baffling Factor, BF (Table A) | Minimum Effective Storage Volume (gal) | Total Detention Time, TDT (min) | Contact Time (T) (min) | Calc CT (C*T) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Vol/Peak Flow | TDT x BF | C*T |
| | | 6.9 | 0.5 | 1 | | | 0.0 | 0.0 | 0.0 |
| | | 6.9 | 0.5 | 1 | | | 0.0 | 0.0 | 0.0 |
| | | 6.9 | 0.5 | 1 | | | 0.0 | 0.0 | 0.0 |
| | | 6.9 | 0.5 | 1 | | | 0.0 | 0.0 | 0.0 |
| | | 6.9 | 0.5 | 1 | | | 0.0 | 0.0 | 0.0 |
| | | 6.9 | 0.5 | 1 | | | 0.0 | 0.0 | 0.0 |
| | | | | | | | Total Tank CT | | 0.0 |

| | |
|---|---|
| Total Calculated CT | 0.0 |
| CT Req'd for 4-Log Virus Inactivation | 12 |
| Meeting 4-Log Virus Inactivation | No |

* Assuming pH between 6 and 9

** Assuming worst scenario of water temperature of 0.5 degrees Celsius in winter

Table A
Tank Baffling Factors

| Factor | Description |
|---|---|

TABLE B
EPA FREE CHLORINE CT VALUES
4- LOG INACTIVATION OF VIRUSES

## To Maintain Exemption

- Must continue to effectively monitor and REPORT for 4-log virus inactivation or removal or will lose exemption and be subject to triggered source monitoring.

## Understanding "log"

- "Log" refers to the percent of microorganisms that is removed or inactivated by treatment

| Log | % removal/inactivation |
|---|---|
| 0.5-log | 68.4% |
| 1-log | 90% |
| 2-log | 99% |
| 3-log | 99.9% |
| 4-log | 99.99% |
| 5-log | 99.999% |



## Compliance Monitoring for 4-log Treatment



## Systems Serving > 3,300 People Using Chemical Disinfection

- Systems must:
  - Monitor the residual disinfectant concentration continuously
    - At a location approved by the state (e.g., entry point)
  - Maintain a state-determined minimum disinfectant residual
  - Record the lowest daily value for residual disinfectant concentration



## Systems Serving ≤ 3,300 People Using Chemical Disinfection

- Systems must:
  - Take daily grab samples during peak hourly flow at a location approved by the state

  OR
  - Meet all the continuous monitoring requirements described for systems serving more than 3,300 people



## Systems Using Membrane Filtration

- Systems using membrane filtration for 4-log treatment of viruses must meet state-specified requirements for:
  - Monitoring the membrane filtration process
  - Operating the membrane filtration

**CONTACT BRAD HOLDAWAY @ 801-536-0063 FOR QUESTIONS REGARDING DBP STAGE 1 & 2 REPORTING REQUIREMENTS**

## Requirement to Notify State

- Systems using treatment for compliance must notify the state any time they fail to meet state-specified compliance criteria:
  - If not operating according to criteria and operation is not restored within 4 hours, system must report any failure to:
    - Maintain the minimum residual disinfectant concentration at state-determined monitoring location



## New Sources

- New ground water sources that provide at least 4-log treatment must meet the same criteria as existing sources
  - Receive exemption
  - Must begin compliance monitoring within 30 days of the source being put into service

  OR
  - Be subject to triggered source water monitoring

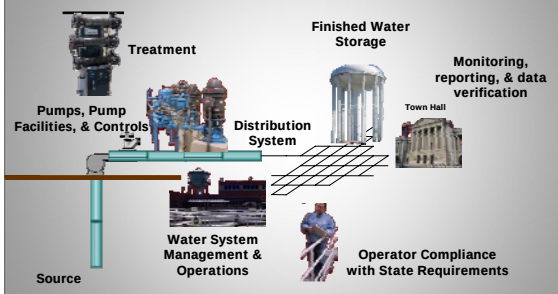


## Sanitary Surveys
## &
## Significant Deficiencies

## Sanitary Surveys

- Conducted every 3 years
- Identifies significant deficiencies in GWS
- GWSs must be notified of all significant deficiencies with 30 days of completion of survey
- GWS must address significant deficiencies

## Eight Elements



# Corrective Actions



## Treatment Technique Requirements

- Treatment technique is a required process intended to reduce the level of a contaminant in drinking water
- GWS is subject to treatment technique requirements if
  - Significant deficiency AND/OR Fecal Contamination has been identified
  - Must take corrective action

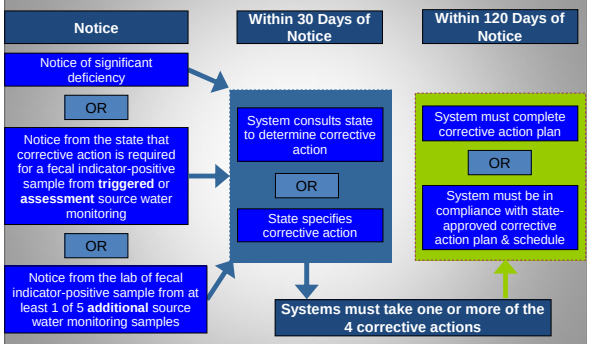


## 4 Corrective Action Options

- Correct all significant deficiencies
- Provide an alternate source of water
- Eliminate the source of contamination
- Provide treatment that reliably achieves 99.99% (4-log) inactivation &/or removal of viruses

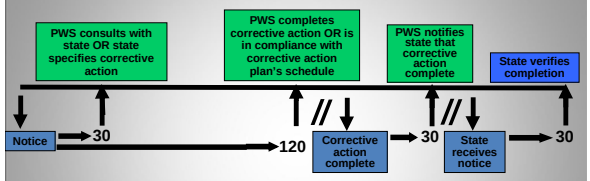


## Corrective Action Timeline






## Completed Corrective Action Schedule






## Corrected Significant Deficiencies

(Sanitary Surveys)

- Corrections reported to DDW
  - Utah Division of Drinking Water IPS Deficiency Correction Notice
  - Physical verification
    - *IPS Deficiency Correction Notice*
    - Site visit, photos, letters, emails, etc
  - Cannot be reported with a telephone call!

# Violations, Reporting, & Recordkeeping for GWSs



## Treatment Technique Violations

Violation occurs after 120 days if:

GWS with significant deficiency does not correct deficiency or is not in compliance with corrective action plan

OR

GWS required to take corrective action in response to a fecal indicator-positive source water sample, does not complete corrective action, or is not in compliance with corrective action plan



## Treatment Technique Violations

GWSs conducting compliance monitoring (including state specified monitoring) that:

Fail to maintain at least 4-log treatment of viruses at or before the first customer

AND

Fail to correct within 4 hours

Treatment Technique violation occurs! (Tier 2 PN)



## Monitoring Violations

Can result from failure to adhere to:

- Triggered source water monitoring requirements
- Additional source water monitoring requirements
- Assessment source water monitoring requirements
- Compliance monitoring requirements for GWSs conducting compliance monitoring



## Contacts


| | |
|---|---|
| John Oakeson | 801-536-0057<br>JOAKESON@UTAH.GOV |
| Elden Olsen | 801-536-4097<br>Eldenolsen@utah.gov |
| Janet Lee | 801-536-0088<br>JJKELLER@utah.gov |
| Ying-Ying Macauley | 801-536-536-4188<br>ymacauley@utah.gov |


# THANK YOU

# Consumer Confidence Reports, Public Notification, & Special Notice Requirements



## Required Notices to the Public

- GWR requires several categories of notification
  - Public Notification (PN)
    - Community and Noncommunity GWSs
  - Consumer Confidence Report (CCR)
    - Community GWSs
  - Special Notice (SN)
    - Community GWSs – Notice included in CCR
    - Noncommunity GWSs



## PN Requirements: All GWSs

- Tier 1:
  - Fecal indicator-positive source water samples
- Tier 2: Treatment techniques
  - Failure to complete required corrective action or be in compliance with a state approved schedule
  - Failure to maintain 4-log treatment of viruses (more than 4 hours)
- Tier 3:
  - Failure to conduct required source water monitoring (triggered, additional, or assessment) or compliance monitoring



## CCR Requirements:

CWSs

- Treatment Techniques
  - Failure to complete required corrective action or be in compliance with a state approved schedule
  - Failure to maintain 4-log treatment of viruses (more than 4 hours)
- Water Quality Data Table
  - All detects from source water monitoring results
  - Range of results for chemical disinfectants
- Monitoring Violations
- Special Notice



## Special Notice Requirements:

CWSs

- Must be included in annual CCRs for:
  - Fecal indicator-positive source water samples
  - Uncorrected significant deficiencies
    - Only those deficiencies still uncorrected at the end of the CCR calendar year

## Special Notice for Fecal Indicator-Positive

CWSs

- Information included:
  - Source of fecal contamination (if known) and dates of the positive samples
  - Whether source of contamination has been addressed and dates of action
    - If not, the state-approved corrective action plan and schedule
  - Potential health effects language

**Note: If the system does not know the source of fecal contamination, then the system should say they do not know**



## Special Notice for Significant Deficiencies

CWSs

- Information included:
  - If significant deficiency not addressed:
    - Significant deficiency & when state identified it
    - State-approved corrective action plan & schedule
  - If significant deficiency was addressed:
    - State may require the GWS to communicate how & when the significant deficiency was corrected



## Special Notice Requirements

CWSs

- Must provide special notice annually until state determines significant deficiency is corrected or fecal contamination is addressed

## Special Notice Requirements

NCWSs

- Must inform the public served by their water system using a state-approved method for:
  - Any significant deficiencies not corrected within 12 months of state-notification



## Special Notice for Significant Deficiencies

NCWSs

<u>Information included</u>:

- If significant deficiency not addressed:
  - Significant deficiency & when state identified it
  - State-approved corrective action plan & schedule
  - Information for non-English speaking residents
- If significant deficiency was addressed:
  - State may require the GWS to communicate how & when the significant deficiency was corrected



## Special Notice Requirements:

NCWSs

- Must inform public with special notice annually until state determines significant deficiency is corrected