

# Overview and Purpose of Total Coliform Rule Monitoring Requirements

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# Presentation Overview

- Purpose of TCR
- Overview of Monitoring Requirements
- Basis of Requirements
- Potential limitations

# Purpose of 1989 TCR

- Improves upon 1975 TC standards
  - '75 rule based on density of TC
- Complements SWTR
  - Source treatment efficacy
  - Distribution system protection
- Identifies potential contamination in ground water systems
  - from contamination in source water and distribution system

# Relationship to other Microbial Regulations

- SWTR (1989)
  - Source treatment, disinfectant residuals measured at TCR site locations in DS
- IESWTR/LT1(1998/2001)
  - Source treatment and sanitary surveys
- Stage 1 DBPR (1998)
  - Disinfectant residuals measured at TCR monitoring sites
- LT2 (2005)
  - Source treatment
- GWR (2006)
  - TC detection triggers source water monitoring for fecal contamination; sanitary surveys for all GWs

# Overview of Monitoring Requirements

- Routine monitoring of Total Coliforms
  - Frequency determined by size and type of systems
  - Sample siting plan approved by State
- If TC is detected, test sample for *E. coli* or fecal coliforms and take repeat samples
  - Within same month in areas near initial hit
  - During next month for systems taking fewer than 5 samples per month

# TCR Monitoring Requirements by System Size

## (All System Types - 2005)

System size	<= 100	101-500	501-1K	1,001-3,300	3,301-10K	10,001 – 50K	50,001 – 100K	100,001 – 250K	250,001 – 500K	500,001 - 1M	>1M
<b>No. of samples/Month</b>	1	1	1	2 - 3	4 - 10	10 - 50	60 - 100	100 - 150	150 - 210	210 - 300	300 - 480
<b>% of Systems</b>	54.74	27.17	6.21	6.17	3.14	2.02	0.32	0.17	0.04	0.02	0.01
<b>No. of systems</b>	86,453	42,908	9,806	9,740	4,961	3,185	502	267	68	34	21
<b>% of Population</b>	1.41	3.40	2.40	6.03	9.50	23.08	11.34	13.49	7.70	8.05	13.61
<b>Population</b>	4,250,900	10,255,680	7,227,705	18,192,435	28,670,962	69,640,708	34,204,978	40,705,256	23,233,690	24,278,814	41,081,047

- About 139,000 (88%) systems serving 21.7 million people (7.2%) are required to take 1 sample per month
  - can be reduced by States to 1 sample/quarter for CWS and 1 sample/year for NCWS among GWS
- Repeat sampling is important to identify location of contamination

# Monitoring Requirements -- Compliance Determinations

- The results of ROUTINE and REPEAT samples are used to calculate compliance
  - Determined each month a system serves water to the public or each month that sampling occurs (for those systems on reduced monitoring)

# Monitoring Requirements -- MCL Violations

- Monthly MCL violation if:
  - A system collecting <40 samples per month has >1 ROUTINE or REPEAT sample per month which is TC-positive
  - A system collecting at least 40 samples per month has greater than 5.0 percent of the ROUTINE/REPEAT samples in a month TC positive
- Acute MCL violation if:
  - Both a routine and a repeat sample are TC-positive and at least one of the follow-up samples for Fecal Coliform or E. Coli is positive

# Public Notice and Reporting Requirements

- Monthly MCL violation
  - Notify State by end of next business day after the system learns of the violation
  - Notify public per Public Notification Rule: Tier 2 (30-day notice)
- Acute MCL violation
  - Systems with routine or repeat samples that are fecal coliform or E.coli positive must notify State by the end of the day they are notified of the result
  - Notify public per Public Notification Rule:, Tier 1 (within 24 hours) where fecal contamination is found
- Monitoring violations must be reported to the State within 10 days after the system discovers the violation

# Purpose of Monitoring Requirements

- Required Monitoring Indicate:
  - Potential breakdowns in integrity of distribution systems (e.g., contamination entering DS from outside)
  - Potential fecal contamination
    - from outside into DS
    - from source/treatment shortcomings
  - Potential bacterial growth in DS that may
    - compromise the effectiveness of indicators
    - influence presence of opportunistic pathogens

# Basis of Requirements -- TC as Indicator

- Coliform bacteria originate as organisms in soil or vegetation and in the intestinal tract of warm-blooded animals
  - Presence within DS means they have entered either through treatment barrier or through DS pathway and that pathway for pathogens to enter also exists
- Total coliforms are more prevalent than *E. coli* or fecal coliforms
  - good screening indicator for potential contamination and bacterial growth
- Coliform bacteria are relatively simple to identify with inexpensive methods

# Basis of Requirements

## Fecal Coliforms or *E. coli* as Indicator of Acute Risk

- Detection in drinking water sample is a direct indication of fecal contamination presence
  - Large number of pathogens are of fecal origin
  - Presence of fecal coliforms or *E. coli* indicates high likelihood of sometime presence of fecal pathogens
  - > 80% of microbial outbreaks from 1991-1998 had fecal coliforms present when measured during the outbreak (Craun et al 2004)
- Simple and inexpensive to measure
  - Can be measured from same TC sample

# Basis of Requirements -- Repeat Sampling

- Improve diagnostic capability for where contamination may be occurring
- Improve diagnostic capability for detecting whether fecal contamination is occurring

# Potential Limitations of Requirements

- Sampling frequency and locations may limit indicator sensitivity for microbial contamination in some systems
- TCR indicators may not be suitable for some fecal pathogens (e.g. *Giardia*, *Cryptosporidium*) and non-fecal pathogens (e.g., *Legionella*, MAC)
- Rule has limited indicator value for chemical contamination
- Limited understanding of public health risk in systems with frequent TC but no *E. coli* detection