The Ground Water Rule

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Background
Contamination Health Risks

• What is a pathogen?
  • Disease-causing organism
  • Not generally found growing and reproducing in the environment
  • Concentrations can be small, and the number of different pathogens large
  • Examples of pathogens:
    • Giardia
    • Cryptosporidium
    • Salmonella
    • Norovirus
    • E. coli O157:H7

• Pathogens may cause serious injury or death
  • Children, elderly, and immuno-compromised populations are especially vulnerable
**E. coli As An Indicator Species**

- **Escherichia coli (E. coli)**
  - Most common species in the fecal coliform group
  - Rare strains of *E. coli* are pathogenic
    - *E. coli* O157:H7
  - *E. coli* comes from the same sources as pathogenic organisms
    - ‘indicator’ species for pathogenic contamination
History of the Ground Water Rule (GWR)

- Proposed on May 10, 2000 (65 FR 30194)
  - Purpose: to establish a multiple-barrier approach to protect against waterborne pathogens in drinking water from ground water sources
  - Distribution samples collected after treatment were not indicative of source water quality
  - Five major components
    1. periodic sanitary surveys
    2. hydrogeologic assessments
    3. source water monitoring for ‘sensitive’ wells
    4. correction of known fecal contamination
    5. compliance monitoring

- Published on November 8, 2006 [40 CFR §141.400-405 (Subpart S)]
  - State of North Carolina Regulatory Code: 15A NCAC 18C .2202
  - Compliance date of December 1, 2009
Water Systems Under the GWR

- **Subject to the GWR**
  - Ground water only
  - Ground water purchase

- **Not subject to the GWR**
  - Ground water combined with surface water
  - Ground water under the direct influence of surface water

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### 4 Key Provisions

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<th><strong>Sanitary Surveys</strong></th>
<th>• Check deficiencies in 8 specific operational elements</th>
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<td><strong>Source Water Monitoring</strong></td>
<td>• In response to a total coliform positive routine sample collected under the Revised Total Coliform Rule (RTCR)</td>
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<td><strong>Corrective Actions</strong></td>
<td>• For systems with significant deficiencies or fecal-contaminated source</td>
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<td><strong>Compliance Monitoring</strong></td>
<td>• For systems performing 4-log treatment</td>
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TCR Monitoring

Triggered Source Water Monitoring

Additional Source Water Monitoring

Corrective Action(s)

Ground Water Systems Conducting Compliance Monitoring

4-Log Treatment

Compliance Monitoring

Sanitary Survey Significant Deficiency

Assessment Source Water Monitoring

Compliance Tracks
Sanitary Surveys

(40 CFR §141.401)

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What is a Sanitary Survey?

• Performed by the State
  • Regional offices throughout the State
• Onsite review of the following:
  • Water sources: identifying sources of contamination via results of source water assessments or other available information
  • Facilities
  • Equipment
  • Operation
  • Maintenance
  • Monitoring Compliance
  • Etc.
• Used to determine if the water system has any significant deficiencies requiring corrective action

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# Components of a GWR Sanitary Survey

<table>
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<th>Source</th>
<th>Treatment</th>
<th>Distribution System</th>
<th>Finished water storage</th>
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<td>Pumps, pump facilities and controls</td>
<td>Monitoring, reporting, and data verification</td>
<td>System management and operation</td>
<td>Operator compliance with State requirements</td>
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Source Water Monitoring

(40 CFR §141.402)

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Source Water Monitoring

Triggered

• Required for ‘present’ RTCR routine sample
• For systems not conducting 4-log compliance monitoring

Assessment

• Required after an *E. coli* positive sample is collected from the source
Triggered Monitoring

• Sampling Requirements
  • Within 24 hours of learning of RTCR positive routine sample
  • At least 1 sample per positive RTCR routine sample at each ground water source
    • Exceptions: Common Headers, Representative Monitoring Plans, Compliance Monitoring
  • Analyze for fecal indicator (E. coli)
  • Systems without treatment (transient non-communities, etc.) may use a dual-purpose distribution sample for upstream repeat sample under the RTCR and triggered source sample under the GWR

• Consecutive/Purchase Systems
  • Water system that collected the positive must notify wholesale system within 24 hours
  • Wholesale system responsible for collecting triggered samples from sources

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Representative Monitoring Plans

- Comprehensive analysis to determine which wells contribute to sections of the distribution system
  - Tracers
  - Geographical isolation
  - Disconnected sections
  - Etc.

- Must be approved by the State
Compliance Monitoring

- Systems that provide at least 4-log treatment (99.99% removal or inactivation of viruses) before or at the first customer
- Must always maintain minimum State-determined residual disinfectant concentration

For systems serving:

- Greater than 3,300 people:
  - Required continuous monitoring
  - Continuous monitoring allowed
  - Following a failure in equipment:
    - Grab samples required every 4 hours
    - Continuous monitoring must be resumed within 14 days

- Fewer than 3,300 or fewer people:
  - Daily grab samples during hour of peak flow
  - Following a residual disinfectant concentration below allowable minimum:
    - Grab samples required every 4 hours until level is restored
Assessment Monitoring

• Triggered if fecal indicator (*E. coli*) is found in source water

• Requirements
  • 12 ground water source samples representative of each month the system provides ground water to the public
    • Testing for fecal indicator (*E. coli*)
  • Collection from each well, unless contamination determined to be isolated
    • Check valves, representative monitoring plans, etc.
  • Sample must be collected prior to any treatment for the system
  • If sample cannot be collected from the well itself, the State may approve an alternative sampling location.
Treatment Techniques

(40 CFR §141.403-404)
Corrective Actions

• Required when the water system has:
  • A significant deficiency, as identified in the sanitary survey
  • An *E. coli* positive sample collected from the source

• Significant deficiencies include:
  • Defects in design, operation, or maintenance
  • Failure/malfunction of sources, treatment, storage, or distribution
  • Anything else that the State determines to be causing/could cause the introduction of a contaminant into drinking water
30 days:
• The ground water system must consult with the State regarding the appropriate corrective action 30 days after being informed of significant deficiency or fecal indicator in source water

120 days:
• Must either:
  • Have completed all State-approved corrective actions
  • Be in compliance with State-approved corrective action plan/schedule
Water systems with significant deficiencies/fecal indicator in source water must implement one or more of the following corrective action alternatives:

- Correct all significant deficiencies
- Provide an alternate source of water
- Eliminate the source of contamination
- Provide reliable 4-log treatment before or at the first customer
Treatment Technique Violations

• Failure to complete corrective action:
  • The system did not complete State-specified corrective action within 120 days
  • The system is noncompliant with the State-approved corrective action plan and schedule within 120 days

• Failure to maintain 4-log treatment before or at the first customer
  • Residual disinfectant concentration falls below State-determined minimum and is not restored within 4 hours of determination

• Tier 2 Violation
  • 30 days to post public notice
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