

**The  
Interim Enhanced Surface  
Water Treatment Rule,  
LT1,  
and Filter Backwash  
Recycling Rule**

*October 2006*

# What Has Happened Since 1989?

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- ***Cryptosporidiosis***
  - **Carrolton, GA**
  - **Milwaukee, WI**
- **Filtration Research**
- **Disinfection Research**
- **Comprehensive Performance Evaluations**
- **Disinfection Byproducts**

# Weaknesses of SWTR

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- ***Cryptosporidium***
  - **Filtered Systems**
  - **Unfiltered Systems**
- **CFE vs. Individual Filter Effluent**
- **4 Hour Readings vs. Continuous Readings**
- **Raw Water Quality of Filtered Systems**

# Rule Summary (cont.)

- **Provisions of the Interim Enhanced SWTR**
  - **General**
    - **Subpart H Systems Serving 10,000 or More People**
    - **Prohibition of Uncovered Finished Water Storage**
    - **Disinfection Profiling and Benchmarking**
    - **Definition of GWUDI includes *Cryptosporidium***
  - **Filtered Systems**
    - **2-Log Removal of *Cryptosporidium***
    - **Strengthened Turbidity Standards**
    - **Individual Filter Monitoring/Reporting**
      - ◆ **Follow-Up Actions**
  - **Unfiltered**
    - ***Cryptosporidium* Control**

# Part 141 – NPDWR

*Subpart P –*

*Enhanced Filtration and Disinfection*

# Rule Structure

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- **Subpart P – Enhanced Filtration and Disinfection**
  - §141.170 – General Requirements
  - §141.171 – Criteria for Avoiding Filtration
  - §141.172 – Disinfection Profiling and Benchmarking
  - §141.173 – Filtration
  - §141.174 – Filtration Sampling Requirements
  - §141.175 – Reporting and Recordkeeping Requirements

# § 141.170 General Requirements

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- **Subpart H Systems  $\geq$  10,000**
- **Uncovered Finished Water Storage Facilities**
- **Treatment Technique Expanded to Address**
  - ***Cryptosporidium***
    - ◆ 2-Log Removal (Filtered)
    - ◆ Watershed Control (Unfiltered)
- **Addition of Requirements for:**
  - **Profiling and Benchmarking**

## § 141.171 Criteria for Avoiding Filtration

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- **Watershed Control Must Address *Cryptosporidium***
  - Identify Activities
  - Monitor Activities
- **Must Comply With Stage 1 MCLs and MRDLs**

# **§ 141.172 Disinfection Profiling and Benchmarking**

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- **Required of Systems With Elevated Disinfection Byproduct Levels**
- **Intended to Ensure That Changes in Disinfection Practices Consider and Balance Short-Term and Long-Term Health Risks**

# § 141.172 Disinfection Profiling and Benchmarking

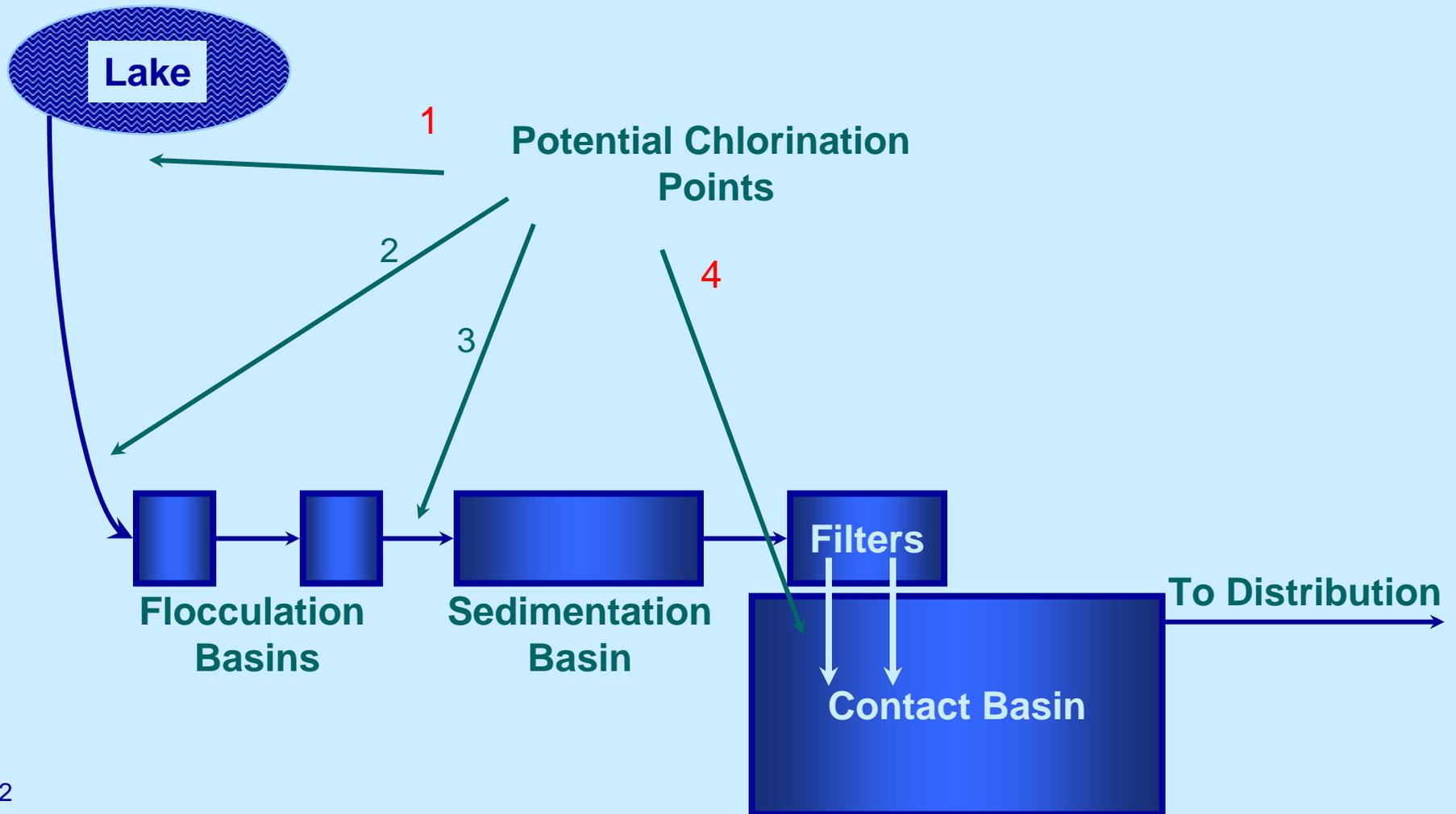
- **Background**
  - **Disinfection Requirements of the SWTR Provide a Regulatory Threshold That Must be Achieved**
  - **Many Systems Show Compliance But Don't Show Their Full Level of Inactivation**
    - **E.g., Perhaps 1.0-log Inactivation is Required**
      - ◆ **The System Records Enough Disinfection to Comply, but may Actually Have Much More Than is Needed**
  - **Therefore, the Exact Level of Disinfection is Generally Unknown**

# § 141.172 Disinfection Profiling and Benchmarking

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- **Background**
  - **More Stringent Requirements of the Stage 1 DDBPR may Cause DBP Compliance Problems for Some Systems**
  - **To Solve the Problem, They May:**
    - **Lower Disinfectant Levels**
    - **Reduce Contact Time**

# For Example:



# Why Develop a Disinfection Profile and Benchmark?

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- **Measure Benefit of Changes Against Actual Inactivation**
- **Consider:**
  - **Positive and Negative Impacts**
  - **Acute and Chronic Health Risks**
  - **Alternatives**
- **Make a Public Health-Based Decision**

# §141.172 Disinfection Profiling and Benchmarking

- **Developing a Disinfection Profile**
  - **Daily Inactivation Calculations**
    - 1 Year Minimum
    - Throughout the Plant
  - **Determining Level of Inactivation (i.e.,  $\bar{x}$ -log inactivation) During Peak Hourly Flow**
    - Temperature
    - pH (Chlorine)
    - Residual Disinfectant Concentration (C)
    - Contact Time (T)

# §141.172 Disinfection Profiling and Benchmarking

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- **Calculating a Disinfection Benchmark**
  - **Before Significant Changes Can Be Made**
    - Calculate Benchmark
    - Consult With State
  - **Significant Changes Include:**
    - Point of Application
    - Disinfectant(s)
    - Process
    - Others Determined by State

# §141.172 Disinfection Profiling and Benchmarking

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- **Calculating a Disinfection Benchmark**
  - **Calculate Each Month's Average**
  - **Calculate Benchmark**
    - **Single Year's Data**
      - ◆ **Lowest Monthly Average**
    - **Multiple Years' Data**
      - ◆ **Average of Each Year's Lowest Monthly Average**

# § 141.173 Filtration

	95 <sup>th</sup> Percentile Turbidity (NTU)		Maximum Turbidity (NTU)	
	SWTR	<b>IESWTR</b>	SWTR	<b>IESWTR</b>
<b>Conventional and Direct</b>	<b>0.5</b>	<b>0.3</b>	<b>5</b>	<b>1</b>
<b>Slow Sand and DE</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>5</b>
<b>Alternative Technology</b>	<b>Slow Sand 1 NTU</b>	<b>State</b>	<b>Slow Sand 5 NTU</b>	<b>State</b>

# **§141.174 Filtration Sampling Requirements**

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- **Conventional and Direct Filtration Plants**
  - **Continuous Monitoring of Each Filter**
  - **Record Results Every 15 Minutes**
  - **Calibrate Turbidimeters per Manufacturers' Recommendations**
- **Not a Treatment Technique**
- **Turbidity Excursions Trigger Actions—Not Violations**
  - **Failure to Complete Follow-up Action Creates Violations**

# **§141.175 Reporting and Recordkeeping**

- **Turbidity Excursions That Trigger Follow-up Actions:**
  - (1) **> 1.0 NTU in 2 Consecutive Measurements**
  - (2) **> 0.5 NTU in 2 Consecutive Measurements at the End of 4 Hours of Operation After Backwashing or Taking Offline**
  - (3) **> 1.0 NTU in 2 Consecutive Measurements in 3 Consecutive Months**
  - (4) **> 2.0 NTU in 2 Consecutive Measurements in 2 Consecutive Months**

# §141.175 Reporting and Recordkeeping

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## **(1) > 1.0 NTU in 2 Consecutive Measurements**

### **– Actions:**

- **Record Filter Number, Turbidity Measurement, Date(s)**
- **Produce Filter Profile Within 7 Days (If No Obvious Reason)**
- **Report That Profile Has Been Produced (or Obvious Reason) Within 10 Days After the End of Month**

# §141.175 Reporting and Recordkeeping

**(2) > 0.5 NTU in 2 Consecutive Measurements at the End of 4 Hours of Operation After Backwashing or Taking Offline**

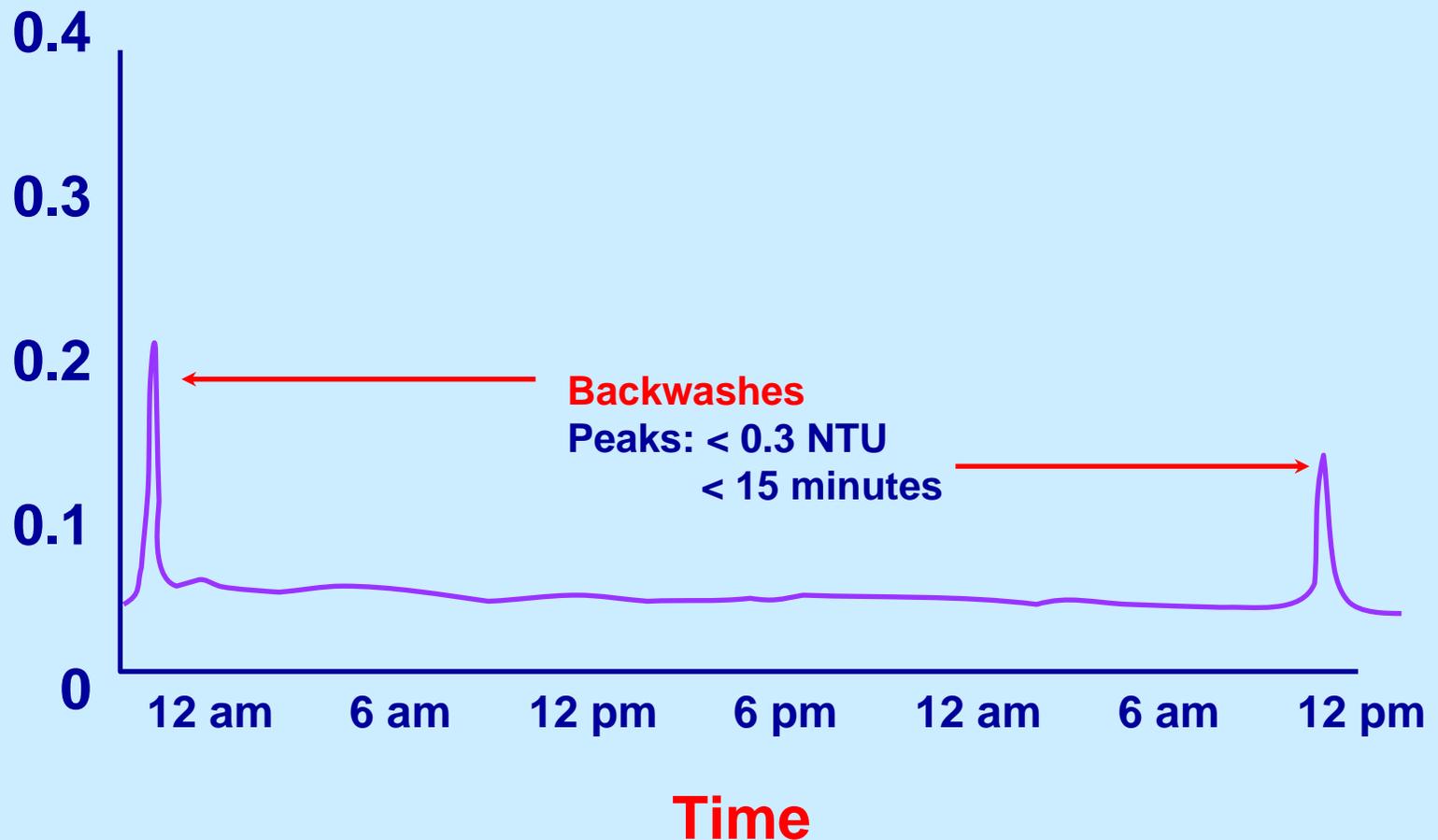
**– Actions:**

- Record Filter Number, Turbidity Measurement, Date(s)
- Produce Filter Profile Within 7 Days (If No Obvious Reason)
- Report That Profile Has Been Produced (or Obvious Reason) Within 10 Days After the End of Month

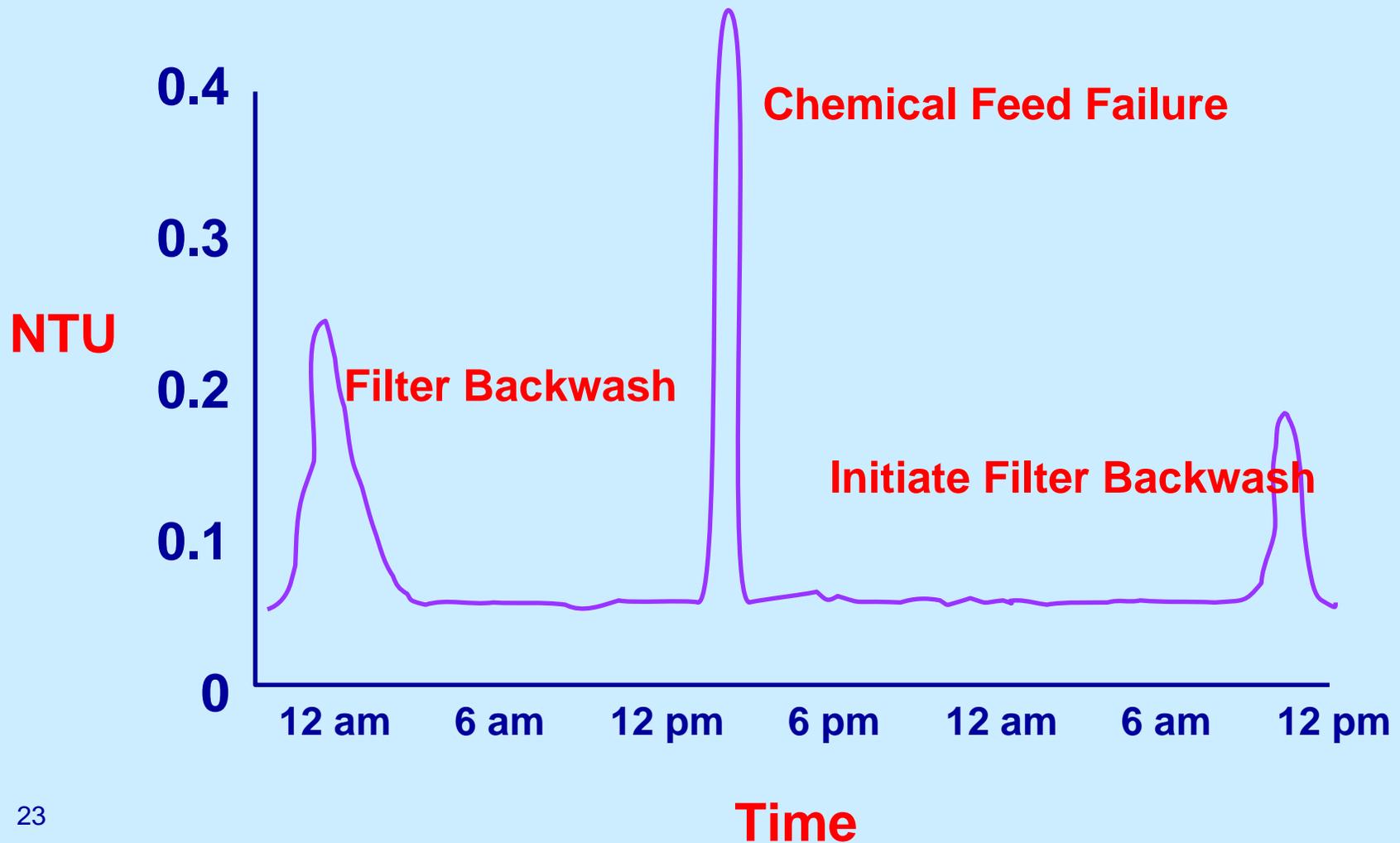
**– Identical to Actions for Trigger No. 1**

# Filter Profile — Good Performance

**Turbidity (NTU)**



# Filter Profile — Turbidity Excursion



# §141.175 Reporting and Recordkeeping

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## **(3) > 1.0 NTU in 2 Consecutive Measurements in 3 Consecutive Months**

- Actions:**
- Record Filter Number, Turbidity Measurement, Date(s)**
- Self-Assessment of Filter Within 14 Days**
  - Assessment of Filter Performance**
  - Filter Profile**
  - Identification/Prioritization of Factors Limiting Performance**
  - Assessment of Applicability of Corrections**
  - Preparation of Report**

# Filter Self-Assessments

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- **A Filter Self-Assessment Should Include:**
  - **Filter Description**
  - **Filter Profile**
  - **Hydraulic Loading Conditions**
  - **Media Condition and Placement**
  - **Support Media**
  - **Backwash Practices**
  - **Filter Rate-of-Flow Controllers**
- **More Information on Filter Self-Assessments Will be Provided**

# §141.175 Reporting and Recordkeeping

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## **(4) > 2.0 NTU in 2 Consecutive Measurements in 2 Consecutive Months**

- Actions:**
- Record:**
  - Filter Number**
  - Turbidity Measurements**
  - Date(s)**
- Comprehensive Performance Evaluation**
  - Arrangements Within 30 Days**
  - Completed and Submitted Within 90 Days**

# Composite Correction Program

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- **A 2-Step Process**
  - **Step 1: CPE**
    - **Identify Performance Limiting Factors (4 Areas)**
      - ◆ Design
      - ◆ Operation
      - ◆ Maintenance
      - ◆ Administration
  - **Step 2: CTA**
    - **Address Identified Performance Limiting Factors**
      - ◆ Scientific Process

# Comprehensive Performance Evaluation

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- **Identify Performance Limiting Factors**
  - Design
  - Operation
  - Maintenance
  - Administration
- **Prioritize “Factors”**
  - A Factors
  - B Factors
  - C Factors

# Comprehensive Technical Assistance

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- **Designed to Correct Factors Identified in a CPE**
- **Transfer Key Skills to Plant Staff**
  - Attempts to Teach Problem Solving Skills
- **Long-term Capability**
  - 6 - 12 Months
  - Site Visits
  - Weekly Phone Consultation

# Available Guidance Documents for IESWTR

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- **Seven Technical Guidance Manuals**
  - **Disinfection Profiling and Benchmarking**
  - **Alternative Disinfectants and Oxidants**
  - **Enhanced Coagulation and Precipitative Softening**
  - **Turbidity**
  - **M-DBP Simultaneous Compliance**
  - **Sanitary Surveys**
  - **Uncovered Finished Water Reservoirs**

30 ([www.epa.gov/safewater/mdbp/implement.html](http://www.epa.gov/safewater/mdbp/implement.html))

# Available Guidance Documents (cont.)

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- **Implementation Guidance Manual for the IESWTR**
  - [www.epa.gov/safewater/mdbp/implement.html](http://www.epa.gov/safewater/mdbp/implement.html)
  
- **Others**
  - **Surface Water Treatment Rule Guidance Manual**

# **Long Term 1 Enhanced Surface Water Treatment Rule**

*Subpart T*

*Addresses Subpart H Systems Serving  
<10,000 Persons*

# LT1 -- Seven Requirements

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1. Covered Finished Water Storage Reservoirs
2. Watershed Control Requirements for Unfiltered Systems
3. Disinfection Profile
4. Disinfection Benchmark
5. CFE Requirements
6. IFE Requirements
7. Reporting and Recordkeeping Requirements

# LT1 -- Requirements

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**Generally the Same as IESWTR  
Requirements With Some Exceptions**

# LT1 -- Disinfection Profile

- **Required of all Community and Nontransient Noncommunity Subpart H Systems<sup>1</sup>**
  - **Once per week**
  - **On the Same Calendar Day**
  - **For 12 Consecutive Months**

***<sup>1</sup> Unless the State Determines Your Profile is Unnecessary***

# LT1 -- Disinfection Benchmark

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- **Average Each Month's *Giardia lamblia* Log Inactivation Values**
- **Benchmark is:**
  - **Lowest Monthly Average Value out of the Twelve Average Values**

# LT1 -- Disinfection Benchmark

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- **Must calculate the benchmark if**
  - System has developed a disinfection profile and
  - Plans on significant change to disinfection practices
- **System must consult with State for approval prior to making changes**

# LT1 IFE Triggers and Follow-Up Actions

Trigger	Follow-up Action
>1.0 NTU in 2 Consecutive Readings	Report to the State
>1.0 NTU in 2 Consecutive Readings for 3 Consecutive Months	Filter Self-Assessment
>2.0 NTU in 2 Consecutive Readings for 2 Consecutive Months	Arrange for CPE <ul style="list-style-type: none"><li>- Within 60 Days</li><li>- Submitted in 120 Days</li></ul>

# **Filter Backwash Recycling Rule**

*Subpart H*

# FBRR

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- **Designed to Reduce Risks From Concentrating Contaminants in Recycle Streams**
- **Applicability:**
  - **Conventional or Direct Filtration That Recycle**
    - Spent filter backwash water
    - Thickener supernatant and/or
    - Liquids from dewatering Processes
- **Must Return Recycle Flows Through the Head of the Plant**
- **Reporting and Recordkeeping Requirements**