Turbidity Monitoring

Regulatory History

- Surface Water Treatment Rule (SWTR)
  - All Surface Water Systems
  - June 29, 1993
- Interim Enhanced SWTR (IESWTR)
  - Surface Water Systems **serving ≥10,000**
  - January 1, 2002
- Long Term 1 Enhanced SWTR (LT1)
  - Surface Water Systems **serving <10,000**
  - January 14, 2005

Pathogen Reduction Requirements

Microorganism	Required Log Reduction	Treatment
Giardia	3-log (99.9%)	Removal and/or Inactivation
Viruses	4-log (99.99%)	Removal and/or Inactivation
Cryptosporidium	2-log (99%)	Removal

Process	Suggested Log Removal Credits		Required Removal
	Giardia *(3.0 log total reduction required)*	**Viruses** *(4.0 log total reduction required)*	***Crypto*** *(2.0 log removal required)*
Conventional	2.5	2.0	2.0
Direct	2.0	1.0	2.0
Slow Sand	2.0	2.0	2.0
Diatomaceous Earth	2.0	1.0	2.0
Alternative	Demonstration		

Turbidity Monitoring - SWTR

Surface Water Treatment Rule

- CFE sampled every four hours
- May be reduced to once per day for:
  - Systems serving # 500 persons,
  - Systems using slow sand filtration and
  - Systems using alternative filtration
- No IFE monitoring required

CFE Turbidity Standards - SWTR

- Conventional and Direct
  - 95th% # 0.5 NTU Max # 5.0 NTU
- Slow Sand and DE
  - 95th% # 1.0 NTU Max # 5.0 NTU
- Alternative
  - Must demonstrate effectiveness
  - 95th% # 1.0 NTU Max # 5.0 NTU

CFE Turbidity Standards – SWTR, IESWTR and LT1

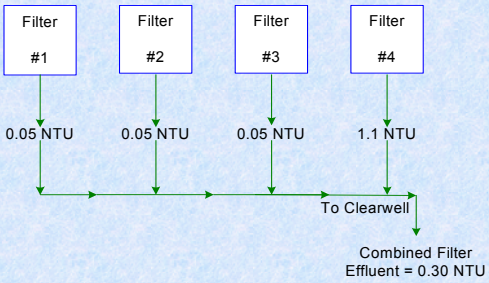
- Conventional and Direct
  - 95% # 0.3 NTU Max # 1.0 NTU
- Slow Sand and DE
  - 95% # 1.0 NTU Max # 5.0 NTU
- Alternative
  - Demonstrate effectiveness – added Crypto
  - 95th% set by State (not to exceed 1 NTU)
  - Max set by State (not to exceed 5 NTU)

CFE Reporting and Recordkeeping

- Report by the 10th of the following month (regardless of size or technology):
  - Total number of measurements taken during the month
  - Number and percentage of measurements meeting 95th% value
  - Date and value of any measurements that exceeded Maximum

Individual Filter Effluent Turbidity Monitoring

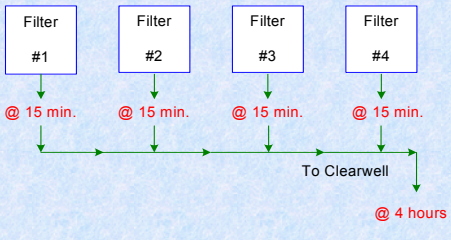
Why Monitor IFE?



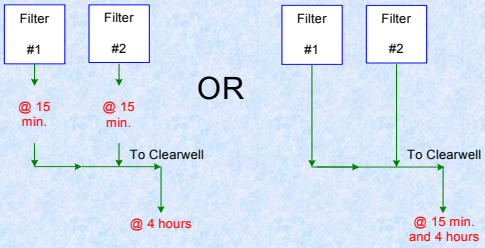
IFE Turbidity Monitoring

- Conventional and Direct Filtration Only
- Conduct continuous monitoring
- Record results at least every 15-minutes

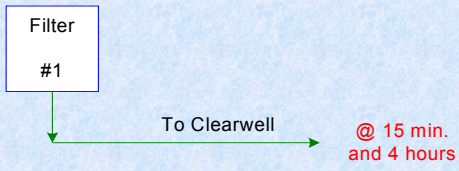
Typical IFE and CFE Monitoring



IFE and CFE Monitoring for Two Filters – LT1 only



IFE and CFE Monitoring for One Filter



IFE Reporting and Recordkeeping

- Report by the 10th of the following month:
  - That IFE monitoring was conducted
  - Trigger values exceeded
    - Information
    - Follow-up actions
- Maintain records for at least 3 years

IFE Trigger Value (1,2)

- >1.0 NTU
- 2 consecutive 15-min. recordings
  - LT1
    - Report to State with reason (if known)
  - IESWTR
    - Report to State
    - Filter Profile (unless obvious reason) within 7 days of trigger

IFE Trigger Value (1,2,3)

- >1.0 NTU
- 2 consecutive 15-min. recordings
- 3 consecutive months
  - LT1 and IESWTR
    - Report to State with reason (if known)
    - Filter Self Assessment
      - –14 days

IFE Trigger Value (2,2,2)

- > 2.0 NTU
- 2 consecutive 15-min. recordings
- 2 consecutive months
  - Report to State with reason (if known)
  - Arrange for CPE
    - LT1 – 60/120
    - IESWTR – 30/90

IFE Trigger Value (2@4)

- >0.5 NTU
- two consecutive 15-min. recordings
- after 1st four hours of operation
  - Report to State
  - Filter Profile (unless obvious reason)
    - Within 7 days of trigger
  - Interim Enhanced Only

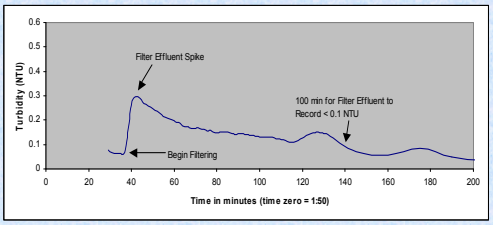
IFE Trigger Exceedances and Follow-up Actions

- Report to the State
  - Filter number, date of exceedance, turbidity value
  - Follow-up actions and/or reason for exceedance

IFE Follow-up Actions

- Filter Profile
- Filter Self-Assessment
- Comprehensive Performance Evaluation (CPE)

Filter Profile



Filter Self-Assessment

- Assessment of filter performance
- Filter profile
- Identification and prioritization of limiting factors
- Applicability of corrections
- Filter self-assessment report

Comprehensive Performance Evaluation (CPE)

- Assessment of plant performance
- Evaluation of major unit processes
- Identification and prioritization of performance limiting factors
- Assessment of applicability of Comprehensive Technical Assistance (CTA)
- Preparation of CPE report

Violations & Public Notification- SWTR, IESWTR and LT1ESWTR

Violation	Violation Type	PN Requirements
Failure to meet 95th percentile	Treatment Technique	Tier 2
Exceedance of maximum daily limit	Treatment Technique	Tier 1 or 2
Failure to meet any required monitoring or reporting	Monitoring/ Reporting	Tier 3

Turbidity Monitoring

- Calibration and Verification

Turbidity Monitoring

- Calibrate turbidimeters according to manufacturer's specifications and EPA-approved method
- EPA approved methods for primary calibration
  - EPA Method 180.1
  - Standard Method 2130B
  - Great Lakes Instrument Method 2

Reference Material

- SWTR GM for Compliance with the Filtration and Disinfection
- Interim Enhanced Turbidity Provisions Technical GM
- LT1 Turbidity Provisions Technical GM