

Disinfectants and Disinfection Byproducts Rules (DBPRs) (Stage 1 & 2)

WARWS Spring Conference
Casper, Wyoming
April 22, 2015

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Drinking Water Units

How Are DBPs Formed?

**DBP Precursor in
Water**

**Natural Organic Matter
(NOM-TOC)**

Bromide

+

Added Disinfectant

Chlorine

Chloramines

Chlorine Dioxide

Ozone

=

**Disinfection Byproducts
(DBP)**

TTHM

HAA5

Chlorite

Bromate

Key Elements of the Rule

- Disinfectant Limits – MRDLs
- DBP Limits - MCLs
- DBP Precursors Removal – Enhanced Coagulation
- Monitoring Plan

Maximum Residual Disinfectant Levels (MRDLs)

- Chlorine – 4.0 mg/L (as Cl₂)
- Chloramines – 4.0 mg/L (as Cl₂)
- Chlorine Dioxide* – 0.8 mg/L (as ClO₂)

*Adverse health effects based on short-term exposure

Chlorine and Chloramines Monitoring

- Measured in the distribution system **at the same time and same location** as the Total Coliform Rule (bacteriological) sample
- Chlorine: free or total chlorine
- Chloramine: combined or total chlorine

Chlorine Residual (MRDL) Reporting

- Record measured CR on the bacteriological chain of custody (COC) sheet
- **Ask** your lab to include the recorded CR to EPA when labs report the bacteriological test result
- **DO NOT** send a separate summary report for MRDL

Regulated Disinfection Byproduct MCLs

- Total Trihalomethanes (TTHMs)
= 0.080 mg/L
- Haloacetic Acids (HAA₅) = 0.060 mg/L
- Bromate = 0.010 mg/L
- Chlorite = 1.0 mg/L

Factors Affecting TTHM/HAA5 Formation

- Type of Disinfectant
- Disinfectant dosage
- Disinfectant contact time
- Type and level of TOC precursor
- Disinfection point
- pH and water temperature
- Residence time in the distribution system

TTHM/HAA5 Monitoring

1. You should have received an approval letter from EPA regarding TTHM/HAA5 sampling
2. Follow the EPA approval letter to take TTHM/HAA5 samples
3. Sampling schedule may be increased or decreased depends on each sampling result; EPA will inform you of this schedule change
4. Note: Quarterly schedule=90days

TTHM/HAA5 Reporting

- Clearly mark sampling address on each sampling sheet (COC form) **and** LRAA form
- Sampling address must be exact the same as stated in EPA approval letter
- One LRAA form for each location
- Include **rolling 12-month** data on the LRAA form
- Submit as a **package**- LRAA form + lab sheets+ COC form
- Report within 10 days following the end of any quarter in which samples are collected – **do not** wait till the end of the compliance cycle

Certified Laboratory

- All DBP analysis must be conducted by a certified laboratory following EPA approved methods
- Be aware of lab brokerage

TTHM/HAA5

Compliance Determination

Systems on annual or less frequent schedule:

Any sampling result exceeds MCL, NOT a MCL violation; must increase monitoring to dual sample set per quarter (90 days) at all locations.

Operational Evaluation Level (OEL)

- applies to systems monitoring quarterly
- peaks in TTHM/HAA₅ will sometimes occur, even when systems are in full compliance with the MCLs
- calculated at each monitoring location

OEL Determination

$$(A + B + (2 * C)) / 4 = D$$

A = TTHM/HAA₅ results for two quarters prior to current quarter

B = TTHM/HAA₅ results for one quarter prior to current quarter

C = TTHM/HAA₅ results for the current quarter

D = Operational Evaluation Value

If D for TTHM > 0.080 mg/L, or HAA₅ > 0.060 mg/L,
it is an OEL exceedance

When to calculate and submit an OEL form?

- Calculate OEL every quarter; must submit OEL calculation only when quarterly TTHM/HAA5 result exceeds MCL
- Submit OEL calculation form with the same package of TTHM/HAA5 report within 10 days following the end of any quarter in which samples are collected

Actions after an OEL is exceeded

OEL exceedance is not a violation; failure to take the following actions is a Tier 3 violation:

- Conduct an operational evaluation to determine the cause of exceedance
- Submit a written evaluation report to EPA within 90 days after being notified of the analytical results
- Keep a copy of the operational evaluation report for public review upon request

OEL Report

Evaluation of treatment and distribution operational practices that may contribute to TTHM/HAA5 formation in the distribution system including steps to be considered to minimize future OEL exceedances.

OEL report template is posted on the Drinking Water Online website @ www2.epa.gov/region8-waterops

OEL Report Contents

Treatment and distribution operational evaluations include the following:

- storage tank operations
- excess storage capacity
- distribution system flushing
- changes in sources
- changes in source water quality
- Treatment changes or problems

DBP Precursor Removal

- What are Precursors?
- Why Precursors must be removed?
- Who are required to remove precursors?
- What is Enhanced Coagulation (EC)?
- DBP Precursor (TOC) monitoring

What are Precursors?

- TOC – Total Organic Carbon
 - *Natural Organic Matter (NOM)
 - *Algal Organic Matter
 - *Effluent Organic Matter
- DOC – Dissolved Organic Carbon

Why Precursor Removal?

- Precursors react with disinfectants to form DBPs
- Removal of precursors will help control known and undiscovered DBPs
- Treatment technique requirements are based on precursor (TOC) removal

Who are Required to Remove Precursors?

- Subpart H systems with conventional filtration (as final filtration barrier) must achieve specific percentage reduction of TOC between the source water and the filtered water to meet the enhanced coagulation requirement

What is Enhanced Coagulation?

Addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment

TOC Monitoring

- source water TOC and alkalinity must be taken prior to any treatment, preferably before any filter backwash recycle is added
- treated water TOC must be taken at a point representing finished water, preferably before disinfection
- samples be taken by a qualified operator
- samples can be analyzed in house

Templates of TTHM/HAA5 reporting form, DBP precursor reporting form, OEL calculation form, and OEL reporting form can be obtained at EPA R8 Drinking Water Online website:

www2.epa.gov/region8-waterops

For more information, call
Safe Drinking Water Hotline at
1-800-426-4791