



PA Department of Environmental Protection  
Bureau of Water Supply and Wastewater Management

# Disinfectants and Disinfection Byproducts Rule (DBPR)



## Monitoring Plan For:

(Name of public water system)

# Monitoring Plan for the Disinfectants/Disinfection Byproducts Rule

## PART 1: GENERAL SYSTEM INFORMATION

Water System Name:		PWSID:	
Mailing Address:			
Contact Person:		Phone:	Email:
System Type:	<input type="checkbox"/> CWS <input type="checkbox"/> NTNCWS <input type="checkbox"/> TNCWS		Population Served:
Source Types: (check all that apply)	<input type="checkbox"/> Surface Water <input type="checkbox"/> Ground Water <input type="checkbox"/> GUDI (GW under direct influence of SW)	<input type="checkbox"/> Purchased Surface Water <input type="checkbox"/> Purchased Ground Water <input type="checkbox"/> Purchased GUDI (GW under direct influence of SW)	Selling finished water to any other public water system?  <input type="checkbox"/> Yes <input type="checkbox"/> No
Treatments Used: (check all that apply)	<input type="checkbox"/> Chlorine <input type="checkbox"/> Chlorine Dioxide <input type="checkbox"/> Ozone <input type="checkbox"/> Conventional Filtration		







**PART 3: PROPOSED SCHEDULE**

Parameter: **Chlorine or Chloramines**

Required if water contains chlorine or chloramines

Report to State: Monthly.

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>1,3</sup>	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> <sup>2</sup>	Distribution (D)			

<sup>1</sup> Chlorine disinfectant residuals should be measured as free or total Cl<sub>2</sub>. Chloramine disinfectant residuals should be measured as total or combined Cl<sub>2</sub>. If disinfecting with chlorine and chloramines on an alternating schedule, measure as total Cl<sub>2</sub>.

<sup>2</sup> Nontransient Noncommunity water systems using only groundwater and serving 1,000 or fewer persons per day are required to take at least 1 total coliform sample under the total coliform rule (TCR) and 1 disinfectant residual sample each calendar quarter.

<sup>3</sup> Number of samples, sample points, and sampling times are to be the same as for total coliform sampling. Surface water systems may use the same sample results as required under the original surface water treatment rule. Period is equal to frequency of monitoring.

**Calculation for determining number of Chlorine or Chloramine disinfectant residual samples**

Number of TCR samples collected in distribution system per monitoring period	=	Number of samples per period	
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Parameter: **TTHM & HAA5**

Required if water contains any disinfectant or oxidant.

Report to State: Same as monitoring frequency

Monitoring Type	Monitoring Frequency	Sample Type	Sample Sets Per Period	Schedule (Dates)	Associated Treatment Plants
Routine	Quarterly <input type="checkbox"/>	Max Res (M)			
	Annually <input type="checkbox"/>	Distrib (D)			
Altered <sup>1</sup>	Quarterly <input type="checkbox"/>	Max Res (M)			
	Annually <input type="checkbox"/>	Distrib (D)			
	3 years <input type="checkbox"/>				

<sup>1</sup> May be increased/decreased based upon meeting altered monitoring criteria, which is dependent upon system type and size.

Note: Any surface water systems serving >500 people wanting to reduce TTHM/HAA5 monitoring must demonstrate a TTHM and HAA5 running annual average of ≤0.040 and ≤0.030 respectively, and must demonstrate a running annual average of monthly raw source water TOC levels at each treatment plant <4.0 mg/L.

Calculation for determining number of TTHM and HAA5 samples

**TTHM and HAA5 – Large SW Systems (serving at least 10,000 people)**

Number of Treatment Plants Disinfecting  
  
(All plants whether treating surface water or groundwater, except booster chlorination stations.)

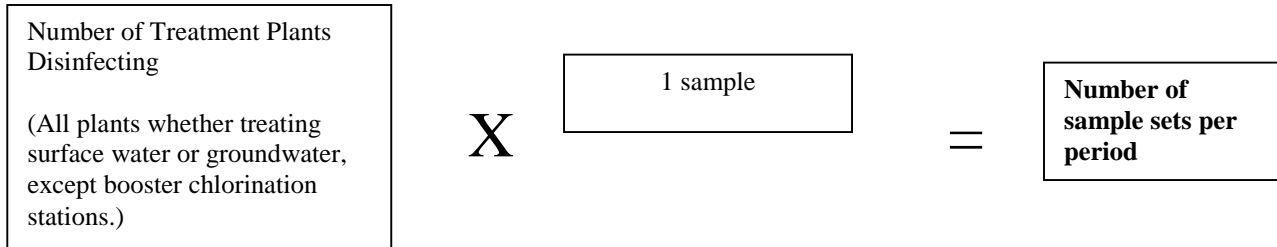
X

If on routine: 4  
If on reduced: 1

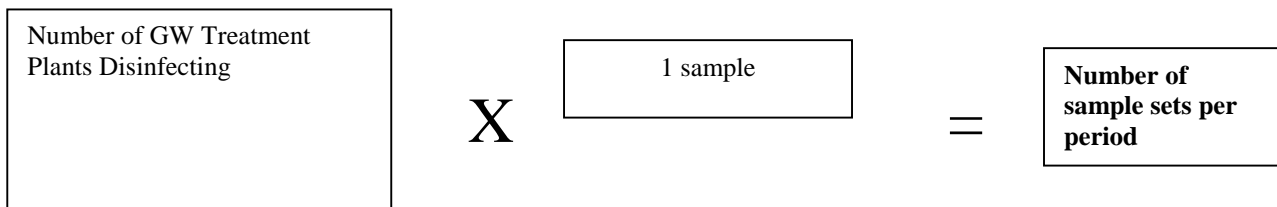
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**Number of sample sets per period**

**TTHM and HAA5 – Small and very small SW Systems (serving < 10,000 people)**



**TTHM and HAA5 – All GW Systems**





Parameter: **Total Organic Carbon (TOC)**

Optional monitoring to qualify for reduced TTHM and HAA5 monitoring <sup>1</sup>

Report to State: Monthly

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>2</sup>	Schedule (Dates)	Associated Surface Water Sources
Routine	Monthly <input type="checkbox"/> Not Monitored <input type="checkbox"/>	Raw (R)			

<sup>1</sup> This schedule is for systems **not** required to conduct TOC monitoring but desiring to reduce TTHM and HAA5 monitoring. No monitoring is necessary when on reduced TTHM/HAA5 monitoring (accept for systems with conventional filtration. Systems using conventional filtration and required to monitor for TOC should fill out the TOC proposed schedule on page 12.

<sup>2</sup> This represents the total number of samples for all surface water treatment plants. Period is always monthly when attempting to qualify for reduced TTHM/HAA5 monitoring.

Calculation for determining number of TOC samples

**TOC for reduced TTHM and HAA5 Monitoring**

Number of surface water treatment plants	X	1 sample	=	Number of samples per period
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Parameter: **Chlorine Dioxide** Plant Operation: Year-round  Seasonal  Please indicate months of operation

Required if treating with chlorine dioxide

Report to State: Monthly

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Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>2</sup>	Schedule (Dates)	Associated Treatment Plants
Routine	Daily	Entry Point (E) <sup>1</sup>		Each day of the month that ClO <sub>2</sub> is in use	
	Per each "E" > 0.8 mg/L	Distribution (D) <sup>3</sup>	See footnote #3	Day after E > 0.8 mg/L	

<sup>1</sup> Purchased water entry points are excluded.

<sup>2</sup> Period is expressed in terms of a month. The number of samples is expressed as "entry point treatment days" (see formula below).

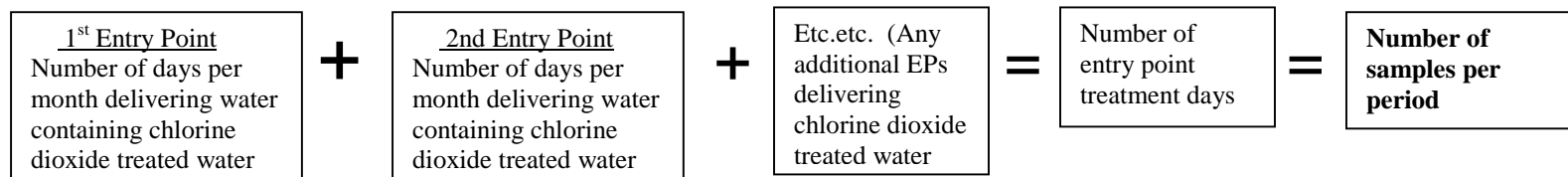
<sup>3</sup> Distribution system samples are not required as long as the "E" samples are below the MRDL. On each day following an "E" sample result that exceeds the MRDL, 3 "D" samples must be taken. One 3-sample set will be taken for each "E" sample that exceeds the MRDL. Therefore, the total number of "D" samples per month equals 3 times the number of "E" sample that exceed the MRDL.

### Calculation for determining number of Chlorine Dioxide samples

#### Chlorine Dioxide

Daily Entry Point (when chlorine dioxide is in use)

Add up total number of days all entry points are delivering chlorine dioxide treated water each month.



Note: One 3-sample set will be required in the distribution system for each "E" sample that exceeds the MRDL of 0.8 mg/L

Parameter: **Chlorite** Plant Operation: Year-round  Seasonal  Please indicate months of operation  
 Required if treating with chlorine dioxide. \_\_\_\_\_  
 Report to State: Entry point monitoring is reported monthly. \_\_\_\_\_  
 Distribution monitoring is reported same as the monitoring frequency. \_\_\_\_\_

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>3</sup>	Schedule (Dates)	Associated Treatment Plants
Routine	Daily	Entry Point (E) <sup>2</sup>		Each day of the month that ClO <sub>2</sub> is in use	
	Monthly	Distrib (D)	3 <sup>4</sup>		
Altered <sup>1</sup>	NA	Entry Point (E)			
	Quarterly	Distrib (D)	3 <sup>4</sup>		

<sup>1</sup> Distribution system monitoring may be reduced to one 3-sample set per quarter after one year of monitoring where no individual chlorite sample (E & D) has exceeded the chlorite MCL value.

<sup>2</sup> Purchased water entry points are excluded.

<sup>3</sup> Period is equal to frequency of monitoring except when the frequency is daily; then the period is expressed in terms of a month.

<sup>4</sup> At least one 3-sample set must be taken each monitoring period that ClO<sub>2</sub> treatment is used. However, for any daily EP sample that exceeds the chlorite MCL value, a 3-sample set of "D" samples must be taken the following day. One such set may meet the requirement of taking one 3-sample set during the month.

Calculation for determining number of chlorite samples

Chlorite

Daily Entry Point (when chlorine dioxide treatment is in use)

Number of **chlorite** entry point samples per period is equal to the same number of **chlorine dioxide** samples per period. (See chlorine dioxide calculation on previous page.)

Monthly/quarterly Distribution (when chlorine dioxide treatment is in use)

3-sample set	X	1	=	Number of samples per period
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Note: An additional set is required each day following a daily EP Chlorite sample result >1.0 mg/L.

Parameter: **Bromate** Plant Operation: Year-round  Seasonal  Please indicate months of operation

Required if treating with ozone

Report to State: Quarterly. Report data for all 3 months.

May report monthly, but monitoring compliance will be computed quarterly.

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Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>3</sup>	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Entry Point (E) <sup>2</sup>			
Altered <sup>1</sup>	Quarterly	Entry Point (E) <sup>2</sup>			

<sup>1</sup> Frequency may be reduced to quarterly if average source water bromide <0.05 mg/L based on monthly bromide samples for 1 year. However, there is little financial incentive to monitor for bromide to reduce bromate monitoring.

<sup>2</sup> Purchased water entry points are excluded.

<sup>3</sup> Period is equal to frequency of monitoring.

Calculation for determining number of Bromate samples

**Bromate**

When ozone treatment is in use

$$\boxed{\begin{array}{l} \text{Number of entry points} \\ \text{containing water} \\ \text{treated with ozone} \end{array}} \times \boxed{1 \text{ sample}} = \boxed{\begin{array}{l} \text{Number of} \\ \text{samples per} \\ \text{period} \end{array}}$$

Parameter: **Bromide**

Sampling required only if system desires to demonstrate eligibility for reduced bromate monitoring. When system is on reduced (quarterly) bromate monitoring frequency, monthly bromide monitoring is mandatory. There is little financial incentive to monitor for bromide to reduce bromate monitoring.

Report to State: Quarterly

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>2</sup>	Schedule (Dates)	Associated Treatment Plants
Routine <sup>1</sup>	Monthly <sup>1</sup>	Raw Source (R)			

<sup>1</sup> No sampling required if system does not want to reduce bromate monitoring frequency from monthly to quarterly. Monthly bromide monitoring is required only when on reduced (quarterly) bromate monitoring frequency. If RAA of monthly bromide, computed quarterly,  $\geq 0.05$  mg/L, bromate monitoring returns to routine.

<sup>2</sup> Period is equal to frequency of monitoring.

Calculation for determining number of Bromide samples

**Bromide**

$$\boxed{\text{Number of sources that feed ozone treatment}} \times \boxed{1 \text{ sample}} = \boxed{\text{Number of samples per period}}$$

Parameter: **Disinfection Byproduct Precursors**

Required of systems using conventional filtration

Report to State: Quarterly. Report data for all 3 months. May report monthly, but monitoring compliance will be computed quarterly.

**Total Organic Carbon (TOC)**

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>2</sup>	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Plant (P)			
	Monthly	Raw Source (R)			
Altered <sup>1</sup>	Quarterly	Plant (P)			
	Quarterly	Raw Source (R)			

Note: Source water samples must be taken at the same time as the treated “plant” or post-sedimentation samples.

<sup>1</sup> Monitoring may be reduced to quarterly if annual average post-sedimentation TOC is < 2.0 mg/L for 2 consecutive years or <1.0 mg/L for 1 year.

<sup>2</sup> This represents the total number of samples for all conventional treatment plants. Period is equal to frequency of monitoring.

**Calculation for determining number of TOC samples for conventional filtration plants.**

**TOC**

Raw Water Samples

$$\boxed{\text{Number of Treatment Plants using Conventional Filtration}} \times \boxed{1} = \boxed{\text{Number of raw water (R) samples per period}}$$

Plant Samples

$$\boxed{\text{Number of Treatment Plants using Conventional Filtration}} \times \boxed{1 \text{ post-sedimentation sample}} = \boxed{\text{Number of plant (P) samples per period}}$$

**Alkalinity**<sup>1</sup>

Required of systems using conventional filtration

Report to State: Quarterly. Report data for all 3 months. May report monthly, but monitoring compliance will be computed quarterly.

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>1</sup>	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Raw Source (R)			
Altered	Quarterly	Raw Source (R)			

<sup>1</sup> Source water alkalinity samples must be taken at the same time as the source water TOC samples.

<sup>2</sup> Monitoring may be reduced to quarterly if annual average post-sedimentation TOC is < 2.0 mg/L for 2 consecutive years or <1.0 mg/L for 1 year.

<sup>3</sup> Period is equal to frequency of monitoring.

Calculation for determining number of alkalinity samples.

**Alkalinity**

Number of treatment plants using conventional filtration	X	1 source water sample	=	Number of samples per period
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**SUVA**

Optional for system using conventional filtration and wishing to meet alternative compliance criteria for TOC removal.  
 Report to State: Quarterly. Report data for all 3 months. May report monthly, but monitoring compliance will be computed quarterly.

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period <sup>1</sup>	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Raw Source (R)			
	Monthly	Plant (P)			

<sup>1</sup> Period is equal to frequency of monitoring.

Calculation for determining number of SUVA samples.

**SUVA**

Number of treatment plants using conventional filtration	X	1 source water sample and 1 finished water sample	=	Number of samples per period
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**PART 4: COMPLIANCE CALCULATION INFORMATION**

Parameter	Compliance Type	Maximum Level
<b>Chlorine or Chloramines</b>	<b>MRDL – System Level</b>	<b>4.0 mg/L</b>
<p>Compliance Calculation:</p> <p>It is an MRDL violation if the running annual average, computed quarterly, of monthly arithmetic averages of all samples exceeds the MRDL.</p>		

Parameter	Compliance Type	Maximum Level
<b>TTHM</b>	<b>MCL – System Level</b>	<b>0.080 mg/L</b>
<b>HAA5</b>	<b>MCL – System Level</b>	<b>0.060 mg/L</b>
<p>Compliance Calculation:</p> <p><b>Quarterly Monitoring:</b> It is an MCL violation if the running annual average, computed quarterly, of quarterly arithmetic averages of all samples exceeds the MCL.</p> <p>MCL compliance is demonstrated if the running annual average covering any consecutive 4-quarter period is less than the MCL (0.080 mg/l for TTHM and 0.060 for HAA5).</p> <p><b>Monitoring Less Than Quarterly:</b> Compliance is demonstrated if the average of samples taken that year does not exceed the MCLs.</p> <p>If the average of these samples exceeds the MCL, monitoring must increase to one sample per quarter per treatment plant, and there is no violation of the MCL until one year of quarterly monitoring is completed, unless the result of fewer than 4 quarters will cause the running annual average to exceed the MCL.</p>		

Parameter	Compliance Type	Maximum Level
<b>Chlorine Dioxide</b>	<b>MRDL – System Level</b>	<b>0.8 mg/L</b>
<p><b>Compliance Calculation:</b></p> <p><u>Acute Violation:</u> It is an acute MRDL violation if any daily “E” sample exceeds the MRDL, and on the following day <math>\geq 1</math> of the 3 “D” samples exceed the MRDL, or if the system fails to take the 3 required “D” samples the following day.</p> <p><u>Nonacute Violation:</u> It is a nonacute MRDL violation if any 2 consecutive daily “E” samples exceed the MRDL and all “D” samples are below the MRDL. Failure to conduct “E” sample monitoring the day following an “E” sample exceedance of the chlorine dioxide MRDL is also an MRDL violation.</p>		

Parameter	Compliance Type	Maximum Level
<b>Chlorite</b>	<b>MCL – System Level</b>	<b>1.0 mg/L</b>
<p><b>Compliance Calculation:</b></p> <p>It is an MCL violation if the arithmetic average of any 3-sample set in the distribution system exceeds the MCL.</p>		

Parameter	Compliance Type	Maximum Level
<b>Bromate</b>	<b>MCL – System Level</b>	<b>0.010 mg/L</b>
<p><b>Compliance Calculation:</b></p> <p>It is an MCL violation if the running annual average, computed quarterly, of monthly or quarterly arithmetic averages of all bromate samples exceeds the MCL.</p>		

Parameter	Compliance Type	Level
<b>Disinfection Byproduct Precursors (TOC)</b>	<b>TT</b>	<b>Percent removal of TOC based on chart below</b>
<p><b>Compliance Calculation:</b></p> <p>It is a treatment technique violation if the system does not achieve the percent reduction of TOC specified in 141.135(b)(2) (step 1), unless the state approves a request for alternate minimum TOC removal under 141.135(b)(3) (step 2). If required to meet step 1 TOC removals, it is a treatment technique violation if the value calculated under 141.135(c)(1)(iv) is &lt;1.00 (running annual average of monthly results computed quarterly). If using the DEP Enhanced Coagulation Calculator spreadsheet program, it is a treatment technique violation if the performance ratio is &lt;1.00.</p>		

**Step 1 Required Removal of TOC by Enhanced Coagulation and Enhanced Softening**

Source-water TOC (mg/L)	Source-water alkalinity (mg/L as CaCO <sub>3</sub> (in percentages))		
	0-60	>-60-120	>120 <sup>1</sup>
>2.0-4.0	35.0	25.0	15.0
>4.0-8.0	45.0	35.0	25.0
>8.0	50.0	40.0	30.0

<sup>1</sup> Systems practicing softening must meet the TOC removal requirements in this column.