



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

Disinfectants and Disinfection Byproducts Rule (DBPR)

Monitoring Plan Template Pack



<p style="text-align: center;">Monitoring Plan Template Table of Contents</p>
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Disinfectants/Disinfection Byproducts Rule Monitoring Plan Instructions

The PA Safe Drinking Water Regulations at section 109.701(e) requires systems monitoring for disinfection byproducts or disinfection byproducts precursors under section 109.301(12) or disinfection residuals under section 109.301(13) to develop and implement a monitoring plan. Such monitoring plan must be maintained and made available for inspection by the Department and the General Public.

- Systems using surface water or groundwater under the direct influence of surface water (GUDI) sources and serving greater than or equal to 10,000 persons must submit a copy of the monitoring plan to the DEP by January 10, 2002.
- Systems using surface water or GUDI sources and serving fewer than 10,000 persons must submit a copy of the monitoring plan to the DEP by January 10, 2004.
- DEP may also require the plan to be submitted by any other system required to develop a Disinfectants/Disinfection Byproducts Rule monitoring plan. After review, the DEP may require changes in any of the plan components.

At a minimum each monitoring plan must include:

- Specific schedule and locations for collecting disinfection byproducts or disinfectant residual samples.
- Calculations for determining compliance with the MCLs, MRDLs and treatment techniques.
- Distribution sampling locations for both selling water systems and purchasing water systems (i.e. must be reflective of the entire distribution system involved in the sampling).

Water systems must notify DEP of any monitoring plan revisions when they occur and submit a revised monitoring plan within 30 days of notifying DEP of the revision. This includes any reductions in monitoring frequencies. Water systems may add a schematic drawing of sources, treatment facilities and chemicals applied, and sampling points for further clarification of the sampling plan. Please include source IDs, treatment plant IDs and sample point IDs with any such drawings.

Water systems may use the attached monitoring templates, or may develop their own format for developing and submitting a monitoring plan provided the required elements of a monitoring plan as outlined previously are met. If using an electronic format of this template, you can use the tab key to move from field to field in the various tables to enter information. To check off any of the boxes, simply click once on the box; to uncheck, click again.

An example of a completed monitoring plan, for a small water system using conventional filtration and chlorine for disinfection can be found in Appendix A.

Please submit completed PART 1, PART 2, PART 3 and PART 4 forms to the DEP. Part 4, “Compliance Determinations” have been completed for you. You may wish to delete or cross out those compliance determinations that are not applicable to your water system. Likewise, you may want to make corrections or amendments to those compliance determinations that do not accurately reflect circumstances for your water system.

Instructions For Completion of PART 1 – General System Information

Please complete the general information including your: water system name, seven digit Public Water Supply Identification Number (PWSID), mailing address, contact person, telephone number and email address. In the space provided for system type, check whether your system is a CWS (Community Water System), NTNCWS (Nontransient Noncommunity Water System), or in the case of a Transient Noncommunity Water Systems using chlorine dioxide, TNCWS. Please indicate the number of people served by your system.

Please check **all boxes for the types of sources that are used by your system, not just the primary source.** Please indicate whether your system is selling water to another water system. Also, in the space provided for treatments used, check the treatments that your system uses related to the Disinfectants/Disinfection Byproducts Rule.

Instructions For Completion of PART 2 – Sample Site Inventory

In the table labeled **Parameter Monitored**, please check the appropriate box (Yes or No) for each parameter your system is required to monitor.

TTHM and HAA5 monitoring are required for all Community Water Systems (CWS) and Nontransient Noncommunity Water Systems (NTNCWS) using chemical disinfection.¹

Chlorite monitoring is required for all CWS and NTNCWS using Chlorine Dioxide for disinfection.²

¹ Includes consecutive water systems.

² Includes consecutive water systems if consecutive system treats with chlorine dioxide.

Bromate monitoring is required for all CWS and NTNCWS using ozone for disinfection.³

Bromide monitoring is only required if a system using ozone as a disinfectant desires to take advantage of reduced bromate monitoring.

Chlorine monitoring is required of all CWS, NTNCWS and consecutive water systems using chlorine as a disinfectant. Monitoring typically consists of free or total chlorine measurements.

Chloramine monitoring is required of all public water systems using chloramine as a disinfectant. Monitoring typically consists of total or combined chlorine residuals. Systems using both chlorine and chloramines for disinfection should monitor total chlorine residuals as these are present in the distribution system for either disinfection type.

Chlorine Dioxide (ClO₂) monitoring is required of all public water systems using ClO₂ as a disinfectant.

Total Organic Carbon (TOC) is required for all surface water and GUDI source systems that use conventional filtration treatment. All surface water or GUDI source systems serving ≥ 500 customers with a source water TOC annual average level before any treatment of 4.0 mg/L or less may qualify for reduced TTHM and HAA5 monitoring if the annual average for TTHM and HAA5 is 0.040 mg/L or less and 0.030 mg/L or less, respectively.

Specific Ultraviolet Absorbance (SUVA) is optional for surface water and GUDI source systems, which use conventional filtration treatment. These systems may use SUVA data in place of TOC removal requirements if the source water or finished water annual averages for SUVA are 2.0 L/mg-m or less.

Alkalinity is required for surface water and GUDI source systems that use conventional filtration treatment in order to determine the required TOC removal percentage.

In the table labeled **Sampling Information** please enter the parameter required to monitor (from the parameter monitored table), the name of the associated treatment plants (including the treatment plant ID), the name of the associated entry point (including the entry point ID), the sample type code (from the **Sample Information Key**), the sample site ID, location or address of the sample site, sampled by code (from the **Sample Information Key**) and analyzed by code (from the **Sample Information Key**). Note: the sample site ID can refer to the system-assigned distribution system sample point ID or the DEP-assigned plant or entry point ID, depending upon where the sample must be taken.

³ Includes consecutive water systems if consecutive system treats with ozone.

Please list the parameter required to monitor only once in the Sampling Information table. Enter all the associated treatment plants, entry points, sample types, site IDs, site locations, and codes indicating who will sample and analyze the sample for each parameter.

TTHM and HAA5 samples are collected in the distribution system. When collecting more than one sample per plant, at least of 25% of the samples must be maximum residence (M sample type) samples and the rest must be distribution (D sample type) samples. When collecting only 1 sample per plant, all samples must be maximum residence (M sample type) samples.

Chlorite samples are collected at each entry point (E sample type) treated with chlorine dioxide and in the distribution system (D sample type). The distribution samples are collected as a 3-sample set. This sample set is comprised of 1 sample near the first customer, one sample at an average disinfectant residence location, and one sample at a maximum residence location. All chlorite distribution-monitoring samples are coded as D samples.

Bromate samples are collected at each entry point (E sample type) treated with ozone. Bromide samples collected to reduce the number of bromate samples are collected at each source (R sample type) treated with ozone.

Chlorine and Chloramine samples are collected in the distribution system (D sample type) and are collected at the same locations and times as total coliform samples.

Chlorine Dioxide samples are collected at each entry point treated with chlorine dioxide. Distribution (D) samples are collected only when a chlorine dioxide entry point sample exceeds the Maximum residence Disinfectant Level (MRDL).

TOC samples are collected from the raw surface water source entering a plant (R sample type) and from each combined filter effluent (P sample type) for systems using conventional filtration. Since both raw water and plant samples must be associated with the treatment plant, the location identifier for both samples must be equal to the treatment plant ID number (3-digit number beginning with 3). If more than one source enters a plant, the raw water sample should be either a sample taken after blending or a composite sample comprised of water in proportion to the percent of the influent each comprises. If a combined filter effluent sampling point is unavailable, samples may be collected from the clearwell, entry point or top of the filters upon DEP approval. For surface water systems other than conventional filtration, which desire to qualify for reduced TTHM and HAA5 monitoring, only the raw surface source water TOC samples need to be collected.

SUVA samples are collected at each source water (R sample type) and each finished water/entry point (E sample type) prior to any oxidant or disinfectant in the water.

Alkalinity samples are collected at each source (R sample type) at the same location and time as TOC samples for systems using conventional filtration.

Instructions for Completion of Part 3 - Proposed Schedule

The initial number of TTHM/HAA5 samples required for each parameter is based on the source of water, population served, and number of treatment plants or the number of entry points. For consecutive water systems the number of treatment plants is based upon the number of purchased water connections with another public water system that uses a disinfectant. More than one connection delivering water from the same seller may be considered a single plant.

Please indicate for Chlorite, Bromate and Chlorine Dioxide whether the treatment is used year round or seasonally by checking the appropriate box. If seasonal, please indicate the months the treatment is normally used in the lines below the seasonal check box.

Please check off the appropriate monitoring period and fill in the number of samples by sample type in accordance with the sampling frequency information described in the DEP job aid, *“Disinfectants/Disinfection Byproducts Rule (DBP Rule) Monitoring & Reporting Requirements.”* You should also fill in the dates for each monitoring period (e.g., 2nd month of qtr for quarterly monitoring or 3rd month of 3rd qtr for annual) that you anticipate conducting sampling. Please include the associated treatment plants and associated surface water sources where appropriate.

You only need to submit those proposed schedules for the parameters you are required to monitor, and those parameters you choose to monitor as an option for reduced monitoring or meeting alternative compliance criteria for TOC removal. For instance, all systems will be required to monitor for TTHM and HAA5 as well as Chlorine or Chloramine residuals. However, only systems using conventional filtration will need to monitor for TOC and Alkalinity.

Instructions For Completion of PART 4 – Compliance Calculation Information

The compliance calculations that are provided in part 4 fulfill the requirements of the D/DBP Rule and can be submitted “as is” for each required parameter.

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:

CWS

NTNCWS

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 2: SAMPLE SITE INVENTORY

Parameter Monitored

<u>Parameter</u>	<u>Required to Monitor</u>		<u>Parameter</u>	<u>Required to Monitor</u>	
TTHM (2950) & HAA5 (2456)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Chloramine (1006) *	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Chlorite (1009)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Chlorine Dioxide (1008)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Bromate (1011)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	TOC (2920)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Bromide (1004)	Yes <input type="checkbox"/>	No <input type="checkbox"/>	SUVA (2923)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Chlorine (0999) *	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Alkalinity (1927)	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Sample Information Key

<u>Sample Types</u>	<u>Sampled and analyzed by</u>
R = Raw Source Water P = Plant (post sedimentation) E = Entry Point D = Distribution System M = Maximum Residence Distribution	Op = Certified Operator Lab = Certified Lab O = Other

* Code 1012 (code for disinfectant residual under the Filter Rule) is also accepted for chlorine or chloramine until further notice.

Sampling Information

<u>Parameter</u>	<u>Associated Treatment Plant / ID</u>	<u>Associated Entry Point / ID</u>	<u>Sample Type</u>	<u>Site ID</u>	<u>Site location or Address</u>	<u>Sampled by</u>	<u>Analyzed by</u>

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 ^{1,3}	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/> ²	Distribution (D)			

¹ Chlorine disinfectant residuals should be measured as free or total Cl₂. Chloramine disinfectant residuals should be measured as total or combined Cl₂. If disinfecting with chlorine and chloramines on an alternating schedule, measure as total Cl₂.

² 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.

³ 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

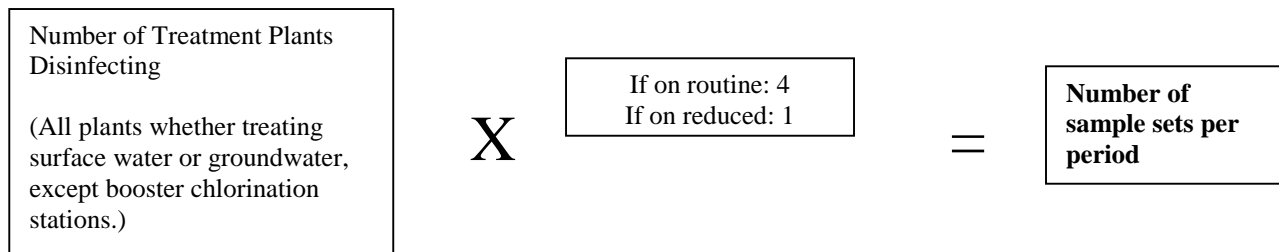
Monitoring Type	Monitoring Frequency	Sample Type	Sample Sets Per Period	Schedule (Dates)	Associated Treatment Plants
Routine	Quarterly <input type="checkbox"/>	Max Res (M)			
	Annually <input type="checkbox"/>	Distrib (D)			
Altered ¹	3 years <input type="checkbox"/>				
	Quarterly <input type="checkbox"/>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

¹ 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)



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

Number of Treatment Plants Disinfecting (All plants whether treating surface water or groundwater, except booster chlorination stations.)	X	1 sample	=	Number of sample sets per period
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TTHM and HAA5 – All GW Systems

Number of GW Treatment Plants Disinfecting	X	1 sample	=	Number of sample sets per period
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Parameter: **Total Organic Carbon (TOC)**Optional monitoring to qualify for reduced TTHM and HAA5 monitoring ¹

Report to State: Monthly

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

¹ 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.

² 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

Parameter: **Chlorine Dioxide** Plant Operation: Year-round Seasonal Please indicate months of operation
 Required if treating with chlorine dioxide
 Report to State: Monthly

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

¹ Purchased water entry points are excluded.

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

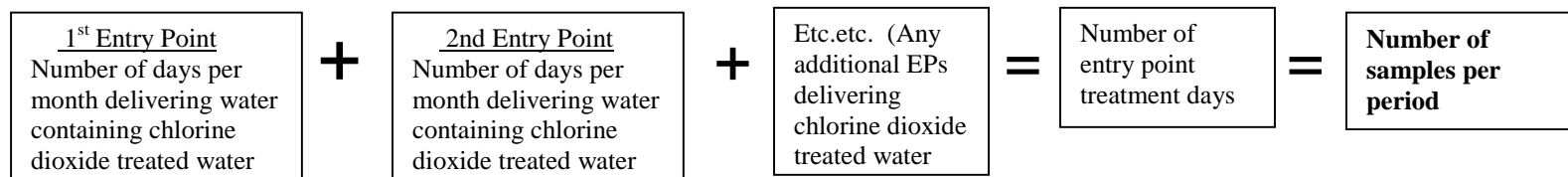
³ Distribution system samples are not required as long as the "E" samples are below the MRDL. On each day following an "E" sample result that exceeds the MRDL, 3 "D" samples must be taken. One 3-sample set will be taken for each "E" sample that exceeds the MRDL. Therefore, the total number of "D" samples 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 used)

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 ³	Schedule (Dates)	Associated Treatment Plants
Routine	Daily	Entry Point (E) ²			
	Monthly	Distrib (D)	3 ⁴		
Altered ¹	NA	Entry Point (E)			
	Quarterly	Distrib (D)	3 ⁴		

¹ 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.

² Purchased water entry points are excluded.

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

⁴ At least one 3-sample set must be taken each monitoring period. 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.

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

¹ 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.

² Purchased water entry points are excluded.

³ Period is equal to frequency of monitoring.

Calculation for determining number of Bromate samples

Bromate

When ozone treatment is in use

Number of entry points containing water treated with ozone	X	1 sample	=	Number of samples per period
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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 ²	Schedule (Dates)	Associated Treatment Plants
Routine ¹	Monthly ¹	Raw Source (R)			

¹ 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, ≥ 0.05 mg/L, bromate monitoring returns to routine.

² 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 ²	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Plant (P)			
	Monthly	Raw Source (R)			
Altered ¹	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.

¹ 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.

² 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

$$\begin{array}{|c|} \hline \text{Number of Treatment Plants} \\ \hline \text{using Conventional Filtration} \\ \hline \end{array} \times \begin{array}{|c|} \hline 1 \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Number of raw water (R)} \\ \hline \text{samples per period} \\ \hline \end{array}$$

Plant Samples

$$\begin{array}{|c|} \hline \text{Number of Treatment Plants} \\ \hline \text{using Conventional Filtration} \\ \hline \end{array} \times \begin{array}{|c|} \hline 1 \text{ post-sedimentation} \\ \hline \text{sample} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Number of plant (P) samples} \\ \hline \text{per period} \\ \hline \end{array}$$

Alkalinity¹

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 ¹	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Raw Source (R)			
Altered	Quarterly	Raw Source (R)			

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

² 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.

³ 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

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 ¹	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Raw Source (R)			
	Monthly	Plant (P)			

¹ 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

PART 4: COMPLIANCE CALCULATION INFORMATION

Parameter	Compliance Type	Maximum Level
Chlorine or Chloramines	MRDL – System Level	4.0 mg/L
<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
TTHM	MCL – System Level	0.080 mg/L
HAA5	MCL – System Level	0.060 mg/L
<p>Compliance Calculation:</p> <p>Quarterly Monitoring: 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>Monitoring Less Than Quarterly: 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
Chlorine Dioxide	MRDL – System Level	0.8 mg/L
<p>Compliance Calculation:</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 ≥ 1 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
Chlorite	MCL – System Level	1.0 mg/L
<p>Compliance Calculation:</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
Bromate	MCL – System Level	0.010 mg/L
<p>Compliance Calculation:</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
Disinfection Byproduct Precursors (TOC)	TT	Percent removal of TOC based on chart below
<p>Compliance Calculation:</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 <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 <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 ₃ (in percentages))		
	0-60	>-60-120	>120 ¹
>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

¹ Systems practicing softening must meet the TOC removal requirements in this column.

Appendix A

Example of a Completed DBP Rule Monitoring Plan for a Small System

Township Water Company (PWSID 1231234) at 821 Town Road, White Water, PA 11000 wishes to complete a Disinfectants/Disinfection Byproducts (DBP) Rule monitoring plan. Jerome Everpure, the operator, (telephone number 999-555-8000) knows the following information about his water system.

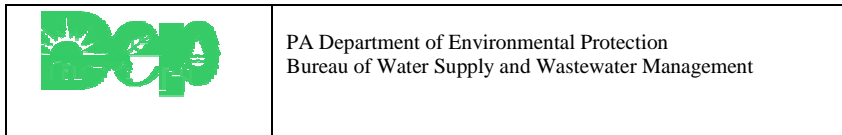
The Township Water Company is a community water system serving a population of 5,500 persons. The system uses two sources of water.

Well # 1 is a groundwater source, which is treated with chlorine disinfection at the Well#1 well house (treatment plant ID 302) and enters into the distribution system at entry point 102 east of Smith's Farm along Route 115.

Hidden River is a surface water source, which is treated at the Reservoir treatment plant (treatment plant ID 301) using coagulation, flocculation, sedimentation, filtration, and chlorine disinfection. The treated water enters into the distribution system at entry point 101 at 123 Spillway Road.

Township Company does not purchase water from any other water system, nor sells water to any other public water system. This is initial monitoring under the DBP Rule for Township Water Company.

Using this information, Jerome can complete the monitoring plan as follows.



Disinfectants and Disinfection Byproducts Rule (DBPR)

Monitoring Plan Template



Monitoring Plan for the Disinfectants/Disinfection Byproducts Rule

PART 1: GENERAL SYSTEM INFORMATION

Water System Name: **Township Water Company** PWSID: **1234567**

Mailing Address: **821 Town Road**
White Water, PA 11000

Contact Person: **Jerome Everpure** Phone: **999-555-8000** Email: **jeverpure@townwater.gov**

System Type: CWS NTNCWS TNCWS Population Served: **5,500**

Source Types: (check all that apply)	<input checked="" type="checkbox"/> Surface Water <input checked="" 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 checked="" type="checkbox"/> No
Treatments Used: (check all that apply)	<input checked="" type="checkbox"/> Chlorine <input type="checkbox"/> Chlorine Dioxide <input type="checkbox"/> Ozone <input checked="" type="checkbox"/> Conventional Filtration		

PART 2: SAMPLE SITE INVENTORY

Parameter Monitored

Parameter	Required to Monitor		Parameter	Required to Monitor	
TTHM (2950) & HAA5 (2456)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Chloramine (1006) *	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Chlorite (1009)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Chlorine Dioxide (1008)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Bromate (1011)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	TOC (2920)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Bromide (1004)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	SUVA (2923)	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Chlorine (0999) *	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Alkalinity (1927)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

Sample Information Key

Sample Types	Sampled and analyzed by
R = Raw Source Water P = Plant (post sedimentation) E = Entry Point D = Distribution System M = Maximum Residence Distribution	Op = Certified Operator Lab = Certified Lab O = Other

* Code 1012 (code for disinfectant residual under the Filter Rule) is also accepted for chlorine or chloramine until further notice.

Sampling Information

Parameter	Associated Treatment Plant / ID	Associated Entry Point / ID	Sample Type	Site ID	Site location or Address	Sampled by	Analyzed by
Chlorine			D	001	329 Mulberry Street, Black Residence	Certif. Oper.	Certif. Oper.
			D	002	Jones Hardware, West 57 th Street	Certif. Oper.	Certif. Oper.
			D	003	54 South Street, Brown Residence	Certif. Oper.	Certif. Oper.
			D	004	231 Sycamore Lane, Green Residence	Certif. Oper.	Certif. Oper.
			D	005	Healthy Crust Restaurant, 40 E. Blvd.	Certif. Oper.	Certif. Oper.
			D	006	Joe's Barbar Shop, 29 Main Street	Certif. Oper.	Certif. Oper.
TTHM / HAA5	Reservoir TP (301)		M	004	231 Sycamore Lane, Green Residence	Certif. Oper.	Certif. Lab
	Well 1 chlorine (302)		M	005	Health Crust Restaurant, 40 E. Blvd.	Certif. Oper.	Certif. Lab
TOC	Reservoir TP (301)		R	301	Reservoir TP Raw Water Intake	Certif. Oper.	Certif. Lab
			P	301	Reservoir TP - Post Sedimentation	Certif. Oper.	Certif. Lab
Alkalinity	Reservoir TP (301)		R	301	Reservoir TP Raw Water Intake	Certif. Oper.	Certif. Oper.

PART 3: PROPOSED SCHEDULEParameter: **Chlorine or Chloramines**

Required if water contains chlorine or chloramines

Report to State: Monthly.

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period ^{1,3}	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly <input checked="" type="checkbox"/> Quarterly <input type="checkbox"/> ²	Distribution (D)	6	First 3 Mondays of each month	Reservoir TP (301) Well 1 Chlorine (302)

¹ Chlorine disinfectant residuals should be measured as free or total Cl₂. Chloramine disinfectant residuals should be measured as total or combined Cl₂. If disinfecting with chlorine and chloramines on an alternating schedule, measure as total Cl₂.

² 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.

³ 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

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Number of samples per period

Parameter: **TTHM & HAA5**

Required if water contains any disinfectant or oxidant.

Report to State: Same as monitoring frequency

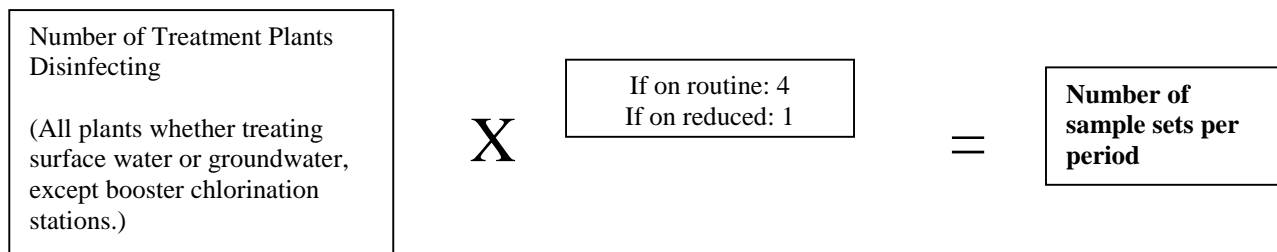
Monitoring Type	Monitoring Frequency	Sample Type	Sample Sets Per Period	Schedule (Dates)	Associated Treatment Plants
Routine	Quarterly <input checked="" type="checkbox"/>	Max Res (M)	2	15 th of Feb, May, Aug, & Nov	Reservoir TP (301) Well 1 Chlorine (302)
	Annually <input type="checkbox"/>	Distrib (D)			
Altered ¹	3 years <input type="checkbox"/>	Max Res (M)			
	Quarterly <input type="checkbox"/>	Distrib (D)			
	Annually <input type="checkbox"/>	Max Res (M)			
	3 years <input type="checkbox"/>	Distrib (D)			

¹ 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)



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

<p>Number of Treatment Plants Disinfecting</p> <p>(All plants whether treating surface water or groundwater, except booster chlorination stations.)</p>	X	1 sample	=	Number of sample sets per period
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TTHM and HAA5 – All GW Systems

<p>Number of GW Treatment Plants Disinfecting</p>	X	1 sample	=	Number of sample sets per period
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Parameter: **Total Organic Carbon (TOC)**

Optional monitoring to qualify for reduced TTHM and HAA5 monitoring ¹

Report to State: Monthly

Monitoring Type	Monitoring Frequency	Sample Type	Samples Per Period ²	Schedule (Dates)	Associated Surface Water Sources
Routine	Monthly <input checked="" type="checkbox"/> Not Monitored <input type="checkbox"/>	Raw (R)	1	First Monday of each month	Reservoir TP (301)

¹ 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.

² 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

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

¹ Purchased water entry points are excluded.

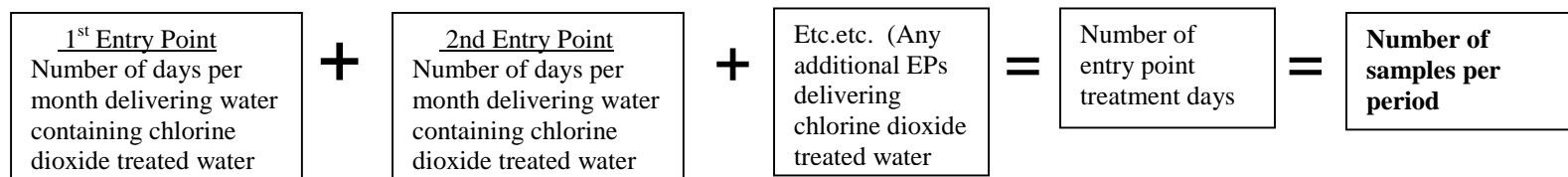
² Period is expressed in terms of a month. The number of samples is expressed as "entry point treatment days" (see formula below).

³ 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 used)



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 ³	Schedule (Dates)	Associated Treatment Plants
Routine	Daily	Entry Point (E) ²			
	Monthly	Distrib (D)	3 ⁴		
Altered ¹	NA	Entry Point (E)			
	Quarterly	Distrib (D)	3 ⁴		

¹ 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.

² Purchased water entry points are excluded.

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

⁴ At least one 3-sample set must be taken each monitoring period. 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.

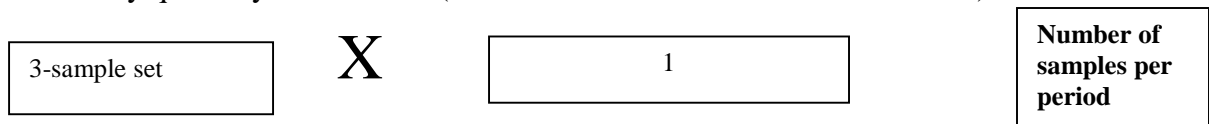
Calculation for determining number of chlorite samples

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)



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.

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

¹ 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.

² Purchased water entry points are excluded.

³ Period is equal to frequency of monitoring.

Calculation for determining number of Bromate samples

Bromate

When ozone treatment is in use

Number of entry points containing water treated with ozone	X	1 sample	=	Number of samples per period
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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 ²	Schedule (Dates)	Associated Treatment Plants
Routine ¹	Monthly ¹	Raw Source (R)			

¹ 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, ≥ 0.05 mg/L, bromate monitoring returns to routine.

² Period is equal to frequency of monitoring.

Calculation for determining number of Bromide samples

Bromide

Number of sources that feed ozone treatment

X

1 sample

=

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 ²	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Plant (P)	1	First Monday of each month	Reservoir TP (301)
	Monthly	Raw Source (R)	1		
Altered ¹	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.

¹ 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.

² 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

$$\begin{array}{|c|} \hline \text{Number of Treatment Plants} \\ \text{using Conventional Filtration} \\ \hline \end{array} \times \begin{array}{|c|} \hline 1 \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Number of raw water (R)} \\ \text{samples per period} \\ \hline \end{array}$$

Plant Samples

$$\begin{array}{|c|} \hline \text{Number of Treatment Plants} \\ \text{using Conventional Filtration} \\ \hline \end{array} \times \begin{array}{|c|} \hline 1 \text{ post-sedimentation} \\ \text{sample} \\ \hline \end{array} = \begin{array}{|c|} \hline \text{Number of plant (P) samples} \\ \text{per period} \\ \hline \end{array}$$

Alkalinity¹

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 ¹	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Raw Source (R)	1	First Monday of each month	Reservoir TP (301)
Altered	Quarterly	Raw Source (R)			

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

² 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.

³ 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

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 ¹	Schedule (Dates)	Associated Treatment Plants
Routine	Monthly	Raw Source (R)			
	Monthly	Plant (P)			

¹ 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
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=

Number of samples per period

PART 4: COMPLIANCE CALCULATION INFORMATION

Parameter	Compliance Type	Maximum Level
Chlorine or Chloramines	MRDL – System Level	4.0 mg/L
<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
TTHM	MCL – System Level	0.080 mg/L
HAA5	MCL – System Level	0.060 mg/L
<p>Compliance Calculation:</p> <p>Quarterly Monitoring: 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>Monitoring Less Than Quarterly: 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
Chlorine Dioxide	MRDL – System Level	0.8 mg/L
<p>Compliance Calculation:</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 ≥ 1 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
Chlorite	MCL – System Level	1.0 mg/L
<p>Compliance Calculation:</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
Bromate	MCL – System Level	0.010 mg/L
<p>Compliance Calculation:</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
Disinfection Byproduct Precursors (TOC)	TT	Percent removal of TOC based on chart below
<p>Compliance Calculation:</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 <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 <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 ₃ (in percentages))		
	0-60	>-60-120	>120 ¹
>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

¹ Systems practicing softening must meet the TOC removal requirements in this column.