

Implementation Guidance for the Stage 1 Disinfectants and Disinfection By-Products Rule

**Idaho Department of Environmental Quality
January 2003**

Preface

The *Disinfectants and Disinfection Byproducts Rule (DDBP Rule)* was promulgated by EPA on December 16, 1998. The State of Idaho has adopted this rule in its *Rules for Public Drinking Water Systems*. This Guidance outlines the approach that DEQ will take in implementing the *DDBP Rule*.

EPA has prepared several Guidances that will be used extensively in implementing the rule in Idaho. These are listed below. If these documents are mentioned in this Guidance, they will be identified by the shortened name that is in brackets following each citation.

Alternative Disinfectants and Oxidants Guidance Manual. EPA 815-R-99-014, April 1999. [Alternative Disinfectants and Oxidants Manual]

Microbial and Disinfection Byproduct Rules Simultaneous Compliance Manual. EPA 815-R-99-011, August 1999. [Simultaneous Compliance Manual]

Enhanced Coagulation and Enhanced Precipitative Softening Guidance Manual. EPA 815-R-99-012, May 1999. [Enhanced Coagulation Manual]

Disinfection Profiling and Benchmarking Guidance Manual. EPA 815-R-99-013, August 1999. [Profiling and Benchmarking Manual]

Implementation Manual for the Stage 1 Disinfectants and Disinfection Byproducts Rule. EPA 816-R-01-012, June 2001. [DDBP Rule Implementation Manual]

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Introduction

This manual is intended to serve as a quick reference to the requirements of the *Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DDBP Rule)*. With the exception of the State policies in Section 5, reference is made to EPA Guidance for substantial details. Full citations to the EPA manuals are given in the preface, along with shortened names by which these publications will be identified whenever they are mentioned in this Guidance. DEQ drinking water personnel, public water system officials, and other interested parties can use this guidance as a starting point when examining the requirements of this rule.

An Acronyms and Definitions List is provided as an aid to using this document. This list is limited to terms used in this Guidance.

Section 1 is an overview of the *Stage 1 DDBP Rule* and a timetable for compliance. Each requirement listed in the timetable is cross-referenced to the state and federal rules, the applicable sections of this document, and to EPA Guidance Manuals.

Section 2 describes the requirements associated with new ceilings on disinfectant residual concentrations (MRDL's). This section applies to all CWS's and NTNCWS's that practice disinfection. It also applies to transient systems that practice disinfection with chlorine dioxide.

Section 3 outlines the MCL's for DBP's, describes monitoring requirements (as well as opportunities for reduced monitoring), and explains compliance calculations and reporting requirements.

Section 4 spells out DBP precursor removal requirements for surface water and GWUDI systems that practice conventional filtration (coagulation which may be followed by a sedimentation step, filtration, and disinfection).

Section 5 describes DEQ's policies and procedures that will be used in meeting the reporting and recordkeeping and special primacy requirements established by the DDBPR.

Appendix A contains selected excerpts from the *Idaho Rules for Public Drinking Water* pertaining to the DDBP Rule.

Appendix B lists approved methods for measuring disinfectant residuals at the water system.

Acronyms and Definitions

CWS: Community water system.

DEQ: Division of Environmental Quality, Idaho’s primacy agency for administration of the Safe Drinking Water Act. When the term, “the State” is used in this Guidance, it refers to this agency.

DEQ is also used as an umbrella term, to include the district health departments and other partners in drinking water program administration in Idaho. This is not meant to diminish the importance of these cooperators, but is simply a way to prevent cumbersome and repetitive phrasing in this document.

EPA: The United States Environmental Protection Agency. Has oversight responsibility with respect to the Safe Drinking Water Act. Prepares Guidances and other documents to aid in achieving consistent implementation nationally.

GWUDI: Ground water under the direct influence of surface water. Systems with sources that are determined to be GWUDI are required to treat the water from these sources as required under the *Surface Water Treatment Rule*.

IESWTR: The *Interim Enhanced Surface Water Treatment Rule*, promulgated by EPA on December 16, 1998. A companion to the *Stage 1 DDBP Rule*. These two rules have interrelated provisions and actions taken under one rule have the potential to affect compliance under the companion rule.

MCL: Maximum contaminant level. An upper limit on the concentration of a drinking water contaminant established in the national primary drinking water regulations, including the *DDBPR*.

M/DBP Rules: Stands for Microbial/Disinfection Byproducts Rules. This term refers to the *IESWTR* and the *Stage 1 DDBP Rule* collectively.

MRDL: Maximum residual disinfectant level. The *DDBPR* establishes an upper limit on the concentration of disinfectant allowed in the distribution system.

NTNCWS: A non-transient non-community water system.

Stage 1 DDBP Rule: The *Stage 1 Disinfectants and Disinfection Byproducts Rule*, promulgated by EPA on December 16, 1998.

SWTR: The *Surface Water Treatment Rule*, promulgated by EPA in 1989.

TNCWS: Transient non-community water system.

Section 1. Rule Overview and Implementation Timetable

1.A. Water Systems Affected by this Rule

This rule applies to all community and non-transient non-community public water systems that use a disinfectant for either primary or residual water treatment. Transient water systems that apply chlorine dioxide as a disinfectant must also comply.

1.B. General Requirements

The *Stage 1 DDBP Rule* contains the following major provisions.

- * Establishes maximum disinfectant residual levels (MRDL's) for disinfectants in the distribution system. This is an upper limit on the concentration of disinfectants allowable during normal operating conditions. Water systems may exceed the MRDL for free chlorine and chloramines for the period necessary to address specific microbiological contamination problems. The MRDL for chlorine dioxide may not be exceeded at any time.
- * Chlorine or choramine residual disinfectant concentrations must be measured in the distribution system at the same points in the distribution system and at the same time as total coliforms are sampled. There are no provisions for reduced monitoring. Compliance is based on a running annual arithmetic average. Violations require public notification. Sampling for chlorine dioxide is discussed in the body of this Guidance.
- * Maximum contaminant level goals (MCLG's) and maximum contaminant levels (MCL's) are established for disinfection byproducts. MCL's are:
 - * For systems using chlorine or chloramines in disinfection--
 - A group of five haloacetic acids (HAA5)-- 0.060 mg/l
 - Total trihalomethanes (TTHM)-- 0.080 mg/l
 - * Chlorite (systems using chlorine dioxide) -- 1.0 mg/l
 - * Bromate (systems using ozone) -- 0.010 mg/l
- * Each system is required to monitor for the DBP's of concern for their particular disinfectant. A monitoring plan must be prepared and systems serving more than 3300 customers must submit their monitoring plan to the State. The State may require changes in the plan. Monitoring

requirements vary with system size and type; reduced monitoring is available.

- * Subpart H systems with conventional filtration treatment must use enhanced coagulation or enhanced softening to achieve reductions in total organic carbon in source waters, unless certain alternative compliance criteria are met. Determination of TOC removal requirements, or demonstrating that the system meets alternative compliance criteria, depends upon monitoring of source water TOC and alkalinity.
- * Reporting and record-keeping requirements are specified for water systems and for DEQ. Specific health effects language is provided for purposes of public notification.
- * The State is required to develop specific policies and procedures for record-keeping and for dealing with decisions and interpretations required by the DDBP Rule (See Section 5 of this Guidance). These include:

How the State will determine any interim treatment requirements for systems that have elected to install granular activated carbon or membrane filtration treatment and have been granted additional time to comply.

How the State will determine operator qualifications.

Approval of DPD colorimetric test kits for measuring disinfectant residuals and description of the qualifications that will be required of persons taking onsite measurements of these residuals.

Define criteria to determine whether multiple wells are being drawn from the same aquifer and may be considered a single source for compliance with monitoring requirements.

How the State will approve certain alternative TOC removal requirements.

1.C. Timetable for the DDBP Requirements

Date	Rule Requirement	Reference
January 2000	Large (≥ 10000 customers) surface water and GWUDI (Subpart H) systems may begin monitoring to determine Step 1 TOC removals before the compliance date.	40 CFR 141.132(d)(1) IDAPA 58.01.08.320.03 Idaho DDBPR Guidance Sect. 4 <i>EPA Enhanced Coagulation Manual</i>
January 1, 2002	Large Subpart H CWS's and NTNCWS's must comply with the MCL's for TTHM, HAA5, bromate, and chlorite.	40 CFR 141.64(b)(1) IDAPA 58.01.08.050.07 Idaho DDBPR Guidance Sect. 3
January 1, 2002	Large Subpart H CWS's and NTNCWS's must comply with the MRDL's for chlorine, chloramines, and chlorine dioxide.	40 CFR 141.65(b)(1) IDAPA 58.01.08.050.08 Idaho DDBPR Guidance Sect. 2
January 1, 2002	Requirements of Subpart L (the DDBP Rule) generally apply to large Subpart H CWS's and NTNCWS's <ul style="list-style-type: none"> * Monitoring requirements * Reporting and record-keeping requirements * Compliance * Treatment technique for control of DBP precursors 	40 CFR 141.130(b)(1) IDAPA 58.01.08.320.01 Idaho DDBPR Guidance Sections 2-4
January 1, 2002	Small Subpart H systems using conventional filtration may begin monitoring to determine Step 1 TOC removals before the compliance date.	40 CFR 141.132(d)(1) IDAPA 58.01.08.320.03 Idaho DDBPR Guidance Sect. 4 <i>EPA Enhanced Coagulation Manual</i>
January 1, 2004	Small Subpart H and all ground water CWS's and NTNCWS's must comply with the MCL's for TTHM, HAA5, bromate, and chlorite.	40 CFR 141.65(b)(2) IDAPA 58.01.08.050.07 Idaho DDBPR Guidance Sect. 3
January 1, 2004	Small Subpart H and all ground water CWS's and NTNCWS's must comply with the MRDL's for chlorine, chloramines, and chlorine dioxide.	40 CFR 141.65(b)(1) IDAPA 58.01.08.050.08 Idaho DDBPR Guidance Sect. 2
January 1, 2004	Small Subpart H and ground water TNCWS's that use chlorine dioxide must comply with the MRDL for chlorine dioxide.	40 CFR 141.65(b)(2) IDAPA 58.01.08.050.08 Idaho DDBPR Guidance Sect. 2
January 1, 2004	Requirements of Subpart L generally apply to small surface water and GWUDI and ground water CWS's and NTNCWS's. <ul style="list-style-type: none"> * Monitoring requirements * Reporting and record-keeping requirements * Compliance * Treatment technique for control of DBP precursors 	40 CFR 141.130(b)(1) IDAPA 58.01.08.320.01 Idaho DDBPR Guidance Sections 2-4
January 1, 2004	Small subpart H TNCWS's that use chlorine dioxide must comply with the requirements for chlorine dioxide and chlorite.	40 CFR 141.130(b)(2) IDAPA 58.01.08.320.01 Idaho DDBPR Guidance Sect. 3
June 30, 2005	Systems that made a clear and irrevocable financial commitment before the applicable compliance date to install technologies that limit TTHM and HAA5 to 0.040 mg/l and 0.030 mg/l, respectively, must have these technologies installed and operating.	40 CFR 141.135(a)(2)(iii) IDAPA 58.01.08.320.05 Idaho DDBPR Guidance Sect. 4 <i>EPA Enhanced Coagulation Manual</i>

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Section 2. Monitoring and Compliance Requirements for Maximum Residual Disinfectant Levels (MRDL's)

2.A. Introduction

The *DDBPR* is a product of an extended regulatory negotiation process involving water industry representatives, scientists, regulators and other interested parties. The goal of the negotiation was to arrive at a regulation that would reduce exposure of the general public to DBP's, which are associated with cancer risk, while maintaining the well established public health benefits that derive from practicing disinfection to control microbial pathogens. Surface water sources contain dissolved organic matter and are much more susceptible to DBP formation than are ground water sources in general. Even ground water systems must be aware of DBP's, however, because these compounds can form in portions of the water storage and distribution network when conditions are favorable. These conditions include warm temperatures, the presence of organic sediments in pipes or reservoirs, and the concentration of disinfectant routinely maintained as a residual in the distribution system.

The *DDBPR* seeks to minimize DBP's in three ways:

- 1) optimizing existing treatment processes to remove DBP precursors
- 2) controlling disinfectant residual levels to minimize DBP formation following treatment
- 3) establishing BAT (best available technologies) for DBP removal if the first two strategies are insufficient to ensure compliance with MCL's.

2.B. Maximum Residual Disinfectant Levels (MRDL's)

The maximum residual disinfectant level goals (MRDLG's) established by this rule are the same as the enforceable residuals (MRDL's). The MRDL's apply to all community and non-transient non-community water systems that practice disinfection. In addition, transient systems using chlorine dioxide must comply with the MRDL for that disinfectant.

Disinfectant Residual	MRDLG mg/L	MRDL mg/L
Chlorine (as free Cl ₂)	4	4.0
Chloramines (as total Cl ₂)	4	4.0
Chlorine dioxide (as ClO ₂)	0.8	0.8

Exception—Operators of systems using chlorine or chloramines may increase the concentration of disinfectants to a level and for a time necessary to address specific microbiological contamination events such as distribution line breaks, storm run-off events, source water contamination, or cross-connections.

2.C. Requirements for Systems Using Chlorine and/or Chloramines

Monitoring and Analytical Requirements—Systems must monitor the disinfectant residual at the same points in the distribution system and at the same time as coliform samples are taken. There are no provisions for reduced monitoring. Residuals must be measured at each sample site using one of the analytical methods prescribed in 40 CFR 141.131(c)(1)—See Appendix B. Section 58.01.08.320.02 of the *Idaho Rules* specifically allows the use of DPD colorimetric kits for measuring disinfectant residuals. Persons who conduct these measurements must receive training in the use of the analytical method chosen by the water system. Section 5.E. of this Guidance, which deals with special primacy requirements, contains further discussion of the qualifications required of persons who measure disinfectant residuals.

Compliance with the MRDL-- disinfectant residual measurements taken during each monitoring period are added together and averaged. An average for each calendar quarter is determined. If the average of four quarterly averages exceeds the MRDL, the water system is in violation and must provide public notification. Compliance will not be determined until one full year of sampling has been completed. Thereafter, compliance will be based on the running average computed quarterly. An example of compliance calculations is given in the box below. The best available technology for achieving compliance with the MRDL requirement is to properly manage and control the disinfection process and the disinfectant residual concentration in the distribution system.

System collects five coliform samples per month. Disinfectant residual is measured and recorded during each coliform sampling event.			
<i>Results:</i>	2 mg/L	2 mg/L	4 mg/L
	5 mg/L	2 mg/L	
	Add the residuals together and divide by five to yield a average for the month of 3 mg/L		
At the end of each calendar quarter, the monthly averages are added together and divided by three to yield a quarterly average. (Systems sampling quarterly will obviously not need to calculate an average)			
At the end of the first year of monitoring, the four quarterly averages , or individual sample results for systems sampling quarterly, are added together and divided by four to yield an “annual average of quarterly averages”. Note: A mathematical comparison will show that, <u>for systems that sample monthly</u> , the average of twelve monthly averages is equivalent to the “average of quarterly averages” and either computation may be used to determine compliance.			
If the annual average is > 4 mg/L for chlorine and chloramines then the water system has exceeded the MRDL and must report to the state and provide public notification. If the average is < MRDL the system is in compliance.			

Reporting and Recordkeeping—The water system must keep a record of disinfectant residual measurements for each coliform sample taken and from these measurements calculate monthly and quarterly averages, as discussed in the previous section. These records should be retained for the same time period as the system retains coliform sample results. Within ten days of the end of each quarter, the system must report the following information to the State:

1. The number of samples taken during each month of the previous quarter
2. The monthly arithmetic average of all samples taken in each month for the past twelve months.
3. The arithmetic average of all quarterly averages for the past 12 months (or the average of the preceding twelve monthly averages for systems sampling monthly)
4. Based on the calculation in #3, state whether or not the MRDL was exceeded

Public Notification—Exceeding the MRDL for chlorine or chloramines is a violation, which requires the public to be notified in accordance with the requirements for non-acute health risks. These requirements are spelled out in the public notification rule and will not be repeated here. Systems may seek assistance from DEQ if they are unclear about notification requirements. **It is important to keep in mind that the purpose of routine residual measurements is to assist the water system operator in optimizing the disinfection process. The MRDL is based on a running annual average, so there is plenty of time to correct an upward drift in residual concentration. An MRDL violation should be easy to avoid.**

2.D. Requirements for Systems Using Chlorine Dioxide

Monitoring and Analytical Requirements—The system must sample chlorine dioxide residual daily at the entrance to the distribution system using a DPD or amperometric method (See Appendix B). If any daily sample exceeds the MRDL, the system must conduct three additional samplings the following day:

1. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a distribution system residual and there are no disinfection addition points after the entrance to the distribution system (no “booster” chlorination)—

The system must take three chlorine dioxide samples as close to the first customer as possible and at intervals of at least six hours.

2. If chlorine is used for distribution system residual and there are one or more disinfection addition points after the entrance to the distribution system—

The system must take one sample as close to the first customer as possible, one sample at a location representative of average distribution system residence time, and one sample as close to the end of the distribution system as possible (reflecting maximum residence time).

Compliance with the MRDL—Compliance is based on the sampling described above. There are both acute and non-acute violations:

1. If any daily sample exceeds the MRDL and on the following day one or more of the three samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and must take immediate corrective action to lower the level of chlorine dioxide below the MRDL. Failure to take samples in the distribution system the day following an exceedance of the MRDL at the entrance to the distribution system will also be considered an MRDL violation. An MRDL violation of either type requires that the public be notified in accordance with the requirements for acute health risks (see below).
2. If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling. Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation. An MRDL violation of either type requires that the public be notified in accordance with the requirements for non-acute health risks (see below).

Reporting and Record-Keeping—Within ten days following the end of each quarter, the system must report the following information to the State:

1. The dates, results, and locations of samples taken during the last quarter.
2. Whether the MRDL was exceeded.
3. Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or non-acute.

Public Notification—The public notification requirements for acute and non-acute violations are described in the public notification rule and will not be repeated here. These requirements vary with system size and type. If water systems have not experienced violations requiring public notification in the past, they may seek assistance from DEQ. The mandatory health effects language for disinfection by-products and disinfectant residuals is reproduced in Appendix C of this Guidance.

Section 3. Monitoring and Compliance Requirements for Disinfection By-Products

3.A. Introduction

The DDBPR requires water systems to monitor for DBP's at a frequency that is based on system size and type. All systems must monitor for **total trihalomethanes (TTHM's)** and a group of **five haloacetic acids (HAA5)**. In addition, systems using chlorine dioxide must monitor for chlorite, and systems using ozone must monitor for bromate. This section describes MCL's for disinfection by-products and outlines the various monitoring schemes.

3.B. MCL's for Disinfection By-Products

Total trihalomethanes is the sum of the concentrations of chloroform, bromodichloromethane, dibromochloromethane, and bromoform. HAA5 is the sum of the concentrations of mono-, di-, and trichloroacetic acids and mono- and dibromoacetic acids.

Disinfection By-Products	MCLG (mg/L)	MCL (mg/L)
Total Trihalomethanes	----	0.080
Chloroform	Zero	
Dibromodichloromethane	Zero	
Dibromochloromethane	0.06	
Bromoform	Zero	
Haloacetic Acids 5	-----	0.060
Dichloroacetic Acid	Zero	
Trichloroacetic Acid	0.3	
Chlorite	0.8	1.0
Bromate	Zero	0.010

There are no MCLG's for the sum of TTHM's and HAA5's. The rationale used in establishing these values is discussed in detail in the preamble to the DDBPR. From a regulatory perspective, the numbers that are important are the MCL's.

3.C. Monitoring Requirements for TTHM's and HAA5

General Requirements—Systems must take all samples during normal operating conditions. Multiple wells drawing from a single aquifer may be considered one “treatment plant” when determining the minimum number of TTHM and HAA5 samples required. State approval of this approach is required, in accordance with criteria described in Section 5.G of this Guidance.

Monitoring Plans—Each system subject to the DDBPR must develop a monitoring plan. The system is required to maintain the plan and make it available for inspection by the State and the general public no later than 30 days following the applicable compliance dates (see table on page 11 of this Guidance for compliance dates). Subpart H systems that serve more than 3300 people must submit a copy of the monitoring plan to the State at the time it submits its first report of monitoring results (see reporting requirements on page 22). The State may require any water system to submit a copy of its monitoring plan. After review, the State may require changes in any plan elements. The plan must include the following elements:

1. Specific locations and schedules for collecting samples for any parameters required by the DDBP Rule. The system’s coliform monitoring plan will suffice to demonstrate the sampling scheme for disinfectant residuals.
2. A description of how the system will calculate compliance with MCL’s, MRDL’s, and treatment techniques.
3. The plan must be representative of the entire distribution system, including any consecutive water systems.

Developing a monitoring plan for systems having multiple treatment plants (a treatment plant is any point in the system where treatment is applied) and multiple sources may be a complex undertaking. It will require the system to have or acquire detailed knowledge of its distribution network, to understand the proportional contributions made by different sources and treatment zones, and any seasonal variations that may occur in these conditions.

Routine Monitoring Requirements—The table that begins on the next page summarizes routine monitoring requirements by system size and type. Subpart H Systems serving 10,000 or more persons are to begin monitoring for TTHM’s and HAA5’s in the first quarter of 2002. All other systems will initiate this monitoring in the first quarter of 2004.

Routine TTHM and HAA5 Monitoring Requirements

Size and Type of System	Minimum Monitoring Frequency	Sample Location in the Distribution System
Subpart H system serving at least 10,000 persons.	Four water samples per quarter per treatment plant.	At least 25 percent of all samples collected each quarter at locations representing maximum residence time. Remaining samples taken at locations representative of at least average residence time in the distribution system and representing the entire distribution system, taking into account number of persons served, different sources of water, and different treatment methods.
Subpart H system serving from 500 to 9999 persons	One water sample per quarter per treatment plant	Locations representing maximum distribution system residence time.
Subpart H system serving fewer than 500 persons	One water sample per year per treatment plant during month of warmest water temperature	Locations representing maximum residence time. If the sample (or average of annual samples if more than one is taken) exceeds the MCL, system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until system is able to meet the requirements for reduced monitoring
System using only ground water , using chemical disinfectant, and serving at least 10,000 persons	One water sample per quarter per treatment plant.	Locations representing maximum distribution system residence time.
System using only ground water , using chemical disinfectant, and serving fewer than 10,000 persons	One sample per year per treatment plant during month of warmest water temperature..	Locations representing maximum residence time. If the sample (or average of annual samples if more than one is taken) exceeds the MCL, system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until system is able to meet the requirements for reduced monitoring..

Reduced Monitoring— The following table describes the conditions that must be met in order to qualify for reduced monitoring. With the exception of large systems that monitored under the Information Collection Rule, no system may qualify for reduced monitoring until it has monitored at routine levels (preceding table) for at least one year. There are no provisions for reduced monitoring for Subpart H systems serving fewer than 500 persons, because routine monitoring for these systems is at the minimum frequency allowed for surface water systems under this rule. Water systems must return to routine monitoring if the annual average exceeds 0.060 mg/L for TTHM's and 0.045 mg/L for HAA5's, or at the State's request.

Reduced Monitoring for TTHM and HAA5

Size and Type of System	System may reduce monitoring if it has monitored at least one year and has. . .	Reduced Monitoring Frequency
Subpart H system serving at least 10,000 persons which has a source water annual average TOC level before any treatment ≤ 4.0 mg/L.	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L	One sample per treatment plant per quarter at distribution system location reflecting maximum residence time.
Subpart H system serving from 500 to 9999 persons which has a source water annual average TOC level before any treatment ≤ 4.0 mg/L.	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L.	One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature.
System using only ground water , using chemical disinfectant, and serving at least 10,000 persons	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L.	One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature.
System using only ground water , using chemical disinfectant, and serving fewer than 10,000 persons	TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L for two consecutive years OR TTHM annual average ≤ 0.020 mg/L and HAA5 annual average ≤ 0.015 mg/L for one year.	One sample per treatment plant per three year monitoring cycle at distribution system location reflecting maximum residence time during month of warmest water temperature, with the three year cycle beginning on January 1 following quarter in which system qualifies for reduced monitoring.

3.D. Monitoring for Chlorite

Systems that use chlorine dioxide as a disinfectant must monitor for chlorite. This includes transient water systems. Routine monitoring at the entrance to the distribution is required daily. Monitoring at the entrance to the distribution system may not be reduced. In addition, a three-sample set of chlorite samples must be taken each month at various locations in the distribution system. Distribution system monitoring may be reduced to once per quarter after one full year of monthly monitoring if there are no individual samples above the MCL and there has been no sample at the entrance to the system that exceeded the MCL. If daily monitoring at the entrance to the distribution system results in an exceedance of the chlorite MCL, the system is required to take a three-sample set on the day following the MCL exceedance. These requirements are summarized in the following table.

Chlorite Monitoring Requirements

Type of Sampling	# Required	Location
Routine	One Sample Daily	Entrance to the Distribution System
Monthly	Three-sample set once per month.	In the distribution system: 1. Near the first customer; 2. At a location representing average residence time; and 3. At a location reflecting maximum residence time in the distribution system.
Additional	Three-sample set on the day following an MCL exceedance during routine monitoring.	In the distribution system at locations specified above for monthly monitoring. If a system is required to collect a three-sample set as a result of an MCL exceedance at the entrance to the distribution system, these samples may be used to meet the monthly monitoring requirements.
Reduced	Distribution system monitoring only —one three sample set per quarter.	Allowed only if, during the past year of monitoring, there have been no individual samples in excess of the MCL and no samples at the entrance to the distribution have exceeded the MCL. Sampling reverts to monthly if any individual distribution system sample or any sample at the entrance to the distribution system exceeds the MCL.

3.E. Monitoring for Bromate

Community and nontransient noncommunity systems that use ozone disinfection must monitor for bromate once per month for each treatment plant that uses ozone disinfection. The monthly sample is to be taken at the entrance to the distribution system while the ozonation system is operating under normal conditions.

The system may qualify for a reduction to quarterly bromate monitoring if it collects representative measurements of bromide in the source water each month and the average of these samples is less than 0.05 mg/L. Anytime the running annual average of source water bromide equals or exceeds 0.05 mg/L, the system must return to monthly bromate monitoring.

3.F. Compliance Requirements

For TTHM's and HAA5—Compliance is based on a running annual arithmetic average this is computed quarterly. If the running average of any consecutive four-quarter period exceeds the MCL, the system is in violation and must notify the public and report to the state. If a system fails to complete four quarters of monitoring, compliance will be based on an average of the available data. Systems monitoring less often than quarterly will base compliance on an average of samples taken during the year. If this average exceeds the MCL, monitoring must be increased to once per quarter per plant. Systems on reduced monitoring must revert to routine monitoring if the TTHM annual average exceeds 0.060 mg/L or the HAA5 annual average exceeds 0.045 mg/L. Water systems

will not be considered in violation of the MCL until they have completed one year of quarterly monitoring.

For chlorite—Compliance is based on the arithmetic average of each three-sample set. If this average exceeds 1.0 mg/L, the system must notify the public and report the violation to the State.

For Bromate—Compliance is based on a running annual arithmetic average this is computed quarterly. If the average bromate concentration of samples collected in any consecutive four-quarter period exceeds the MCL, the system is in violation and must notify the public and report to the State. If the system fails to complete 12 consecutive months of monitoring, MCL compliance is based on the average of available data.

3.G. Reporting Requirements

Systems monitoring quarterly or more frequently must report within ten days of the end of each calendar quarter. Systems sampling less frequently than quarterly must report within ten days of the end of each monitoring period. The following table, adapted from 40 CFR 141.134, summarizes reporting requirements.

DBP Reporting Requirements

System Monitoring for . . .	Must Report . . .
TTHM and HAA5 on quarterly or more frequent basis.	<ol style="list-style-type: none"> 1. # of samples taken during the last quarter. 2. Location, date, and result of each sample. 3. The arithmetic average of all samples during the last quarter. 4. Arithmetic average of the quarterly arithmetic averages for the last four quarters. 5. Whether the MCL was exceeded.
TTHM and HAA5 less than quarterly but at least annually.	<ol style="list-style-type: none"> 1. # of samples taken during the last year. 2. Location, date, and result of each sample taken during the last quarter. 3. The arithmetic average of all samples taken over the last year. 4. Whether the MCL was exceeded.
TTHM and HAA5 less frequently than annually.	<ol style="list-style-type: none"> 1. The location, date, and result of the last sample taken. 2. Whether the MCL was exceeded.
Chlorite	<ol style="list-style-type: none"> 1. # of samples taken each month for the last 3 months. 2. Location, date, and result of each sample taken during the last quarter. 3. For each month in the reporting period, the arithmetic average of all samples taken in the month. 4. Whether the MCL was exceeded, and in which month it was exceeded.
Bromate	<ol style="list-style-type: none"> 1. # of samples taken in the last quarter. 2. The location, date, and result of each sample taken during the last quarter. 3. The arithmetic average of the monthly arithmetic averages of all samples taken in the last year. 4. Whether the MCL was exceeded.

Section 4. Monitoring and Treatment Technique Requirements for Disinfection Byproduct Precursors

4.A. Introduction

The DDBPR imposes special requirements on surface water systems that practice conventional filtration. These requirements are based on the knowledge that surface water contains dissolved substances that contribute to the formation of DBP's, and that optimized conventional treatment is capable of significantly reducing the amount of precursors in the treated water. A conventional filtration process, for the purposes of this Section, is one that includes the addition of coagulant to the raw water followed by a sedimentation step during which the coagulant floc can be removed prior to passing the water through filters.

4.B. Monitoring Requirements

Total Organic Carbon (TOC) Monitoring—Subpart H systems that practice conventional filtration must monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and at a location that is representative of the treated water. The system must also monitor for TOC in the source water prior to any treatment, at the same time as monitoring for TOC in the treated water. These source water and treated water samples are referred to as paired samples. At the same time as the source water TOC sample is taken, the system must monitor for alkalinity in the source water prior to any treatment. Systems must take one set of paired samples and one source water alkalinity sample per month per treatment plant at a time representative of normal operating conditions and influent water quality.

Monitoring Plan Required—Systems monitoring for TOC and alkalinity must prepare a monitoring plan and make it available for inspection by the State and the general public. Systems serving more than 3300 customers must submit their plan to the State. The State may require changes to the monitoring plan. The plan must contain specific locations and schedules for collecting samples for TOC and alkalinity. The TOC monitoring plan may be integrated with the system's monitoring plan for DBPs and disinfectant residuals.

Reduced Monitoring—Systems with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC \geq 2.0 mg/L.

4.C. Treatment Technique Requirements

Alternative Compliance Criteria—Systems using conventional filtration must practice enhanced coagulation or enhanced softening to remove a certain percentage of raw water

TOC unless the system can meet at least one of the following alternative compliance criteria:

1. System source water TOC level is less than 2.0 mg/L, calculated quarterly as a running annual average.
2. The system's treated water TOC level is less than 2.0 mg/L, calculated quarterly as a running annual average.
3. The system's source water TOC level is less than 4.0 mg/L, calculated quarterly as an annual running average; the source water alkalinity is greater than 60 mg/L (as CaCO₃), calculated quarterly as an annual running average, and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or, prior to the compliance date for this rule the system has made a clear and irrevocable financial commitment to use technologies to limit TTHM and HAA5 to no more than these levels. This technology must be installed not later than June 16, 2005.
4. The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a disinfection residual in the distribution system.
5. The system's source water SUVA (defined in IDAPA 58.01.08.003.) prior to any treatment and measured monthly, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.
6. The system's finished water SUVA, measured monthly, is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

Systems that practice enhanced softening and are unable to meet at least one of the criteria above, may use one of the alternative criteria listed below:

1. Softening that results in lowering the treated water alkalinity to less than 60 mg/L (expressed as calcium carbonate), measured monthly and calculated quarterly as an annual running average.
2. Softening that results in removing at least 10 mg/L of magnesium hardness (expressed as calcium carbonate), measured monthly and calculated quarterly as a running annual average.
3. ***Step 1 TOC Removal Requirements***—Systems which cannot meet any of the preceding criteria must practice enhanced coagulation or softening to achieve the percent TOC removals shown in the following table. Systems practicing softening are required to meet the TOC reductions shown in the far right column of the table (Source water alkalinity > 120 mg/L). All alkalinities are expressed as CaCO₃.

Percent TOC Removal Required

Source Water TOC in mg/L	Source Water Alkalinity 0-60 mg/L	Source Water Alkalinity > 60-120 mg/L	Source Water Alkalinity >120 mg/L
> 2.0 to 4.0	35	25	15
> 4.0 to 8.0	45	35	25
> 8.0	50	40	30

As an example, a system that has a raw water TOC level of 5.5 mg/L and source water alkalinity of 72 mg/L must remove 35% of the TOC if it practices enhanced coagulation.

A system with the same TOC and alkalinity that practices softening must remove 25% of the TOC.

Step 2 TOC Removal Requirements—Systems that are unable to meet the removal requirements in the preceding table (or the alternative compliance criteria listed previously) must apply to the State, within three months of failing to meet the removal requirements, for approval of alternative minimum TOC removal standards. This process is complex and will not be described in this Guidance. The water system and DEQ will work together to establish alternative TOC requirements in accordance with the procedures specified in 40 CFR 141.131(b)(3) and/or (4) and described in EPA’s *Enhanced Coagulation Manual*. See also the discussion under Section 5.H. of this Guidance.

4.D. Compliance Calculations

Compliance is determined by dividing actual TOC removal by required TOC removal for each month. The results for twelve months are averaged. If the result is < 1.00, the system is not in compliance with the TOC removal requirements. A water system may assign a value of 1.0 in any month that:

- * The system’s treated or source water TOC concentration is 2.0 mg/L
- * The system’s softening process removes at least 10 mg/L of magnesium hardness
- * The system’s source water SUVA before treatment is 2.0 L/mg-m or;
- * The system’s finished water SUVA is 2.0 L/mg-m or:
- * A system practicing enhanced softening lowers alkalinity below 60 mg/L.

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Section 5. State Recordkeeping and Special Primacy Requirements

5.A. Introduction

This Section describes the policies and procedures that DEQ will follow in order to meet the recordkeeping and special primacy requirements of the *DDBPR*.

5.B. Recordkeeping by the State

DEQ will keep the following records in connection with *DDBPR* activities. Most of these records will be maintained in the water system master file located at each jurisdictional field office.

1. Any determinations made by the State, including supporting information and an explanation of the technical basis for each decision. These records must also include any interim measures allowed by the State.
 - a. Records of any systems that elect to install granular activated carbon or membrane filtration processes as a means of complying with the rule. These records must include the date by which the system is required to have these processes installed.
 - b. Records of systems that are required to meet alternative minimum TOC removal requirements or for whom the State has determined that the source water is not amenable to enhanced coagulation. These records must include alternative limits and rationale for establishing the alternative limits.
 - c. Records of subpart H systems using conventional treatment meeting any of the alternative compliance criteria in 40 CFR 141.135(a)(2) and (3), as described in Section 4 of this Guidance.
 - d. A register of qualified operators that have met State requirements.
2. Records of systems with multiple wells considered to be one treatment plant, including the technical basis and rationale for this conclusion.
3. Monitoring plans for Subpart H systems serving more than 3300 customers.
4. A list of laboratories approved to perform analyses required under the *DDBPR*. This list is published and periodically updated by the Idaho State Bureau of Laboratories, which is the certifying authority for drinking water labs in the state.
5. The State will maintain a list of all systems that practice disinfection and must monitor for disinfectants and disinfection byproducts under this rule. This list will

include all disinfectants and DBP's, other than chlorine, TTHM, and HAA5, if any, that are measured.

5.C. Interim Treatment Requirements

The DDBPR allows large systems that elect to install granular activated carbon or membrane filtration treatment as a means of complying with the rule to apply for a two-year extension of the compliance deadline. In these situations, the State must determine any interim treatment requirements that the system will be required to meet in order to minimize customer risk until treatment is in place. As a practical matter, this provision only applies to systems serving 10,000 or more customers. In Idaho, there are only two such systems at the time this Guidance is being written and both of these have conventional treatment plants that could, if required, use enhanced coagulation or softening to achieve compliance. The only Subpart H system in the State that presently serves fewer than 10,000 customers, but could conceivably exceed that number sometime in the next five years, also has these treatment capabilities. Therefore, DEQ will not grant an extension of the compliance deadline to any system.

5.D. Qualification of Operators

The State of Idaho has a mandatory operator certification program. All community and non-transient non-community water systems are required to have a certified operator. Rules to that effect have been written and are in force. These rules are designed around the criteria established by EPA Guidance, and will ensure that all operators are certified at a level appropriate for the size and type of system they are operating. DEQ will contract with the independent Idaho Operator Certification Board to administer testing and certification activities and to maintain a registry of certified operators for the State.

For transient systems, provisions exist in the *Idaho Rules for Public Water Systems* to ensure that systems of this type that use surface water or GWUDI sources are operated by persons who possess qualifications commensurate with the size and complexity of the water system. In addition to these requirements, Section 5.E. of this Guidance describes qualifications needed by operators who will be conducting on site measurements of disinfectant residuals.

5.E. Qualifications of Persons Performing Measurements

The DDBPR requires on site measurements of disinfectant residuals and, in some cases, pH, bromide, and alkalinity. It will be DEQ's policy that these measurements must be taken by the system operator or another person acting under his or her direct supervision. The qualifications required of system operators, as discussed in Section 5.D., will ensure that sufficient knowledge exists to conduct these measurements in an accurate and repeatable fashion. Persons performing the on site measurements must have training in the use of each piece of equipment used in the testing process. All testing equipment must be properly calibrated in accordance with the manufacturer's instructions.

5.F. Use of DPD Colorimetric Kits

IDAPA 58.01.08.320.02 specifically allows the use of DPD colorimetric kits for performing measurements of chlorine, chloramine, and chlorine dioxide residuals.

5.G. Demonstrating that Multiple Wells are Drawn from a Single Aquifer

As noted in Section 3.C. of this Guidance, systems which have multiple wells that draw water from a common aquifer may use this fact in determining the number of samples that must be taken when monitoring for disinfection byproducts. A scientifically credible demonstration that the finished water quality characteristics of all the wells drawing from the identified aquifer are very similar, such that the water from these wells would be expected to react alike in terms of formation of DBP's, must be submitted to the State. It should be prepared by a qualified hydrogeologist, geologist, or engineer, and may include a consideration of the following lines of evidence:

1. Well construction and geology.

- Well locations, marked on a topographical map
- Well depths
- Well logs which show geological strata, identify water production zones, screened or slotted areas, and grouting of the annular space
- Static water levels
- Aquifer studies and maps
- Treatment applied

2. Water characteristics and chemistry of each well.

- Field pH
- Field temperatures
- Specific conductivity
- Total organic carbon
- Analyses of common ions with a calculated cation/ion balance (calcium, magnesium, iron, manganese, sodium sulfate, alkalinity, chloride)

The key factor in this demonstration is the similarity of waters with respect to DBP formation potential. A variety of statistical treatments may be used to group waters together according to chemical characteristics. Source waters that are not necessarily drawn from the same water bearing formation may nonetheless be similar enough in their chemistry to be treated together in DBP sampling. A water system may choose to sample source waters for total organic carbon, which is a relatively inexpensive test that can be combined with other lines of evidence to demonstrate similar DBP formation potential in different wells.

DEQ may require modification of a monitoring plan that is based on a "common aquifer" demonstration if results of early sampling reveal levels of DBP occurrence that are

independent of source water characteristics. This may be particularly likely in ground water systems, where factors such as ground water intrusion, corrosion of buried pipes, sediment accumulation, and biofilm growth can alter water chemistry in the distribution system and lead to DBP formation that is not entirely dependent on source water chemistry.

5.H. Alternative TOC Removal Requirements

Based upon DEQ's knowledge of the treatment practices of the small number of conventional treatment facilities in Idaho, it is considered unlikely that any of these facilities will have difficulty achieving the alternative compliance criteria or the TOC removal requirements. However, if it proves impossible for a system to meet these requirements, DEQ intends to closely follow the suggestions offered in Section 2.3.2 of EPA's *Enhanced Coagulation Manual*. All determinations will be made on a case-by-case basis and will require bench or pilot scale testing by the water system that is designed to demonstrate the best level of TOC removal feasibly attainable, given the unique characteristics of the raw water which must be treated.

Appendix A— Selected Excerpts from Idaho Rules for Public Water Systems

Definitions -- Section 003

Enhanced Coagulation. The addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

Enhanced Softening. The improved removal of disinfection byproduct precursors by precipitative softening.

GAC 10. Granular activated carbon filter beds with an empty bed contact time of ten (10) minutes based on average day demand and a carbon reactivation frequency of every one hundred eighty (180) days, except that the reactivation frequency for GAC 10 used as a best available technology for compliance with MCLs established in the Stage 2 Disinfection Byproducts Requirements (40 CFR Part 141, Subpart V) shall be one hundred twenty (120) days.

Haloacetic Acids (Five) (HAA5). The sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid) rounded to two (2) significant figures after addition.

Maximum Residual Disinfectant Level (MRDL). A level of disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a public water system is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a public water system is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two (2) consecutive daily samples exceed the MRDL. MRDL's are enforceable in the same manner as maximum contaminant levels under Section 1412 of the Safe Drinking Water Act. There is convincing evidence that addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDL's listed in 40 CFR 141.65, operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

Maximum Residual Disinfectant Level Goal (MRDLG). The maximum level of a disinfectant added for water treatment at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. MRDLG's are non-enforceable health goals and do not reflect the benefit of the addition of the chemical for control of waterborne microbial contaminants.

Specific Ultraviolet Absorption (SUVA). SUVA means specific ultraviolet absorption at two hundred fifty-four (254) nanometers (nm), an indicator of the humic content of water. It is a calculated parameter obtained by dividing a sample's ultraviolet absorption at a wave length of two hundred fifty-four (254) nm (UV_{254})(in m^{-1}) by its concentration of dissolved organic carbon (DOC)(in mg/L).

Total Organic Carbon (TOC). Total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two (2) significant figures.

320. DISINFECTANT RESIDUALS, DISINFECTION BYPRODUCTS, AND DISINFECTION BYPRODUCT PRECURSORS. This Section incorporates 40 CFR Part 141, Subpart L, of the National Primary Drinking Water Regulations, known as the Disinfectants and Disinfection Byproducts Rule.

01. General Requirements. 40 CFR 141.130, revised as of July 1, 2002, is herein incorporated by reference.

02. Analytical Requirements. 40 CFR 141.131, revised as of July 1, 2002, is herein incorporated by reference. DPD colorimetric kits may be used to measure residual disinfectant concentrations for chlorine, chloramines, and chlorine dioxide.

03. Monitoring Requirements. 40 CFR 141.132, revised as of July 1, 2002, is herein incorporated by reference.

04. Compliance Requirements. 40 CFR 141.133, revised as of July 1, 2002, is herein incorporated by reference.

05. Treatment Techniques for Control of Disinfection Byproduct (DBP) Precursors. 40 CFR 141.135, revised as of July 1, 2002, is herein incorporated by reference.

Note: As a State with primacy for administering the Safe Drinking Water Act, Idaho is required to adopt rules that are no less stringent than the federal rules. By legislative intent, Idaho has chosen not to adopt rules that are more stringent than the federal rules. Therefore, unless the federal rule contains explicit language that provides the State with interpretive latitude, the adoption of these rules by reference is a more economical method when compared to drafting State rules that essentially mirror the federal code.

The excerpts shown in this Appendix do not include all of the Sections of IDAPA that were modified in order to incorporate the *DDBPR* by reference.

Appendix B—Methods for Disinfectant Residual Monitoring

The following table lists the methods that are approved for use in monitoring for disinfectant residuals. This table is reproduced from 40 CFR 141.131(c)(1).

Methodology	Standard Method	ASTM Method	Free Chlorine	Combined Chlorine	Total Chlorine	Chlorine Dioxide
Amperometric Titration	4500-CI D	D 1253-86	X	X	X	
Low Level Amperometric Titration	4500-CI E				X	
DPD Ferrous Titrimetric	4500-CI F		X	X	X	
DPD Colorimetric	4500-CI G		X	X	X	
Syringaldazine (FACTS)	4500-CI H		X			
Iodometric Electrode	4500 CI I				X	
DPD	4500-CIO ₂ D					X
Amperometric Method II	4500-CIO ₂ E					X