

Implementation Guidance for the Long-Term 2 Enhanced Surface Water Treatment Rule

Draft for Public Comment

This document will be edited before it is finalized to ensure that it conforms to agency guidelines for style and format. However, during the public comment process DEQ is seeking input on the information this guidance contains and the manner in which it is presented. Suggestions are welcome on how DEQ can modify the document in ways that will enhance the user's understanding of rule requirements

**Idaho Department of Environmental Quality
July 2007**

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Preface

This guidance provides a concise summary of the requirements of the Long-Term 2 Enhanced Surface Water Treatment Rule. The primary audience is water system owners and operators who need to learn about their obligations under this rule, but it may be helpful to DEQ regulatory personnel, professional consultants, and interested customers of public drinking water systems. It may be particularly useful to those who prefer to read rule requirements in a narrative format. However, whenever a question of interpretation arises, it is the rule language itself that must be consulted. Use of this guidance is not mandatory. Interested persons may learn about these rules by reading the appropriate sections of the Code of Federal Regulations, or by referring to a variety of guidance documents that have been prepared by the U.S. EPA. Information on obtaining the EPA publications is provided on page 37 of this document.

The Long-Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) was promulgated by the U.S. Environmental Protection Agency on January 5, 2006. The Idaho Department of Environmental Quality is in the process of adopting this rule in the *Idaho Rules for Public Drinking Water Systems*. A copy of these rules may be downloaded from the Internet at: <http://adm.idaho.gov/adminrules/rules/idapa58/58index.htm>. Pertinent language from these rules is included in this guidance as Appendix A.

This rule addresses cryptosporidium, an important waterborne pathogen. All surface water systems are required to conduct a course of source water monitoring. Based on the results of this monitoring, system owners may be required to provide additional treatment for removal and/or inactivation of cryptosporidium. EPA has estimated that only a small percentage of surface water systems will be required to increase treatment in response to source water monitoring results.

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Definitions and Abbreviations

Bank Filtration. A water treatment process that uses a well to recover surface water that has naturally infiltrated into ground water through a river bed or bank(s). Infiltration is typically enhanced by the hydraulic gradient imposed by a nearby pumping water supply or other well(s).

Flowing Stream. As used in the Long Term 2 Enhanced Surface Water Treatment Rule (40 CFR Part 141, Subpart W), this term means a course of running water flowing in a definite channel.

Lake/Reservoir. As used in the Long Term 2 Enhanced Surface Water Treatment Rule (40 CFR Part 141, Subpart W), this term means a natural or man-made basin or hollow on the Earth's surface in which water collects or is stored that may or may not have a current or single direction of flow.

LT2 Rule. A shortened form of the Long Term 2 Enhanced Surface Water Treatment Rule.

Subpart W. The part of the Code of Federal Regulations containing the LT2 Rule.

Subpart H. Surface Water Treatment rule. Also used as an identifier, i.e. a "Subpart H System" is shorthand for a public water system that obtains some or all of its water from a surface water source or a source that has been identified as ground water under the direct influence of surface water.

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Section 1—Rule Overview and Compliance Timetable

This section presents a brief outline of the rule requirements and a timetable for compliance. Each of the requirements is discussed in greater detail in subsequent Sections of this document.

1.A Water Systems Affected by this Rule

All public water systems that are supplied by a surface water source and systems supplied by a ground water source under the direct influence of surface water (GWUDI) are subject to this rule. To avoid repeating this lengthy description, these systems are often referred to as Subpart H Systems.

1.B General Requirements

Systems are required to conduct an initial and a second round of source water monitoring for each plant that treats a surface water or GWUDI source. This monitoring may include sampling for cryptosporidium, *E. coli*, or turbidity, depending on system size and type.

Systems that plan to make a significant change in their disinfection practices may be required to develop a disinfection profile and calculate disinfection benchmarks.

Systems will be assigned to a “treatment bin” based on the results of source water monitoring. The treatment bin specifies the level of cryptosporidium removal and/or inactivation that the system must achieve.

Systems that are required to provide increased treatment must install the necessary capability in accordance with the schedule shown in Table 1, below. The rule provides a “toolbox” of treatment options and specifies how these options are to be designed and operated for purposes of LT2 compliance.

1.C Implementation Schedule

During national negotiations concerning this rule, agreements were reached between U.S. EPA and various interest groups that provided for early implementation of certain LT2 requirements. As a result of these agreements, U.S. EPA will interact directly with some of Idaho’s largest systems to implement the early requirements, since Idaho is legally unable to implement this rule until it has promulgated a DEQ regulation and been awarded primacy by EPA.

Idaho DEQ has started the rule making process to adopt the Stage 2 DBP Rule and after DEQ Board adoption and legislative approval, expects to begin implementing this rule by early 2008. Once EPA has awarded primacy, all systems will work with Idaho DEQ as their regulatory agency (see Table 1, below). DEQ will be working with water systems on the milestones that are shaded in grey. EPA is implementing the early requirements of

this rule under their adopted rule authorities and those deadlines are in the unshaded portion of Table 1.

Table 1—LT2 Compliance Milestones

Population Served	LT2 MILESTONES		
	Submit source water sampling schedule	Begin source water sampling	Comply with <i>Cryptosporidium</i> treatment requirements*
≥100,000	July 1, 2006	October 1, 2006	April 1, 2012
50,000 - 99,999	January 1, 2007	April 1, 2007	October 1, 2012
10,000 - 49,999	January 1, 2008	April 1, 2008	October 1, 2013
<10,000	July 1, 2008	October 1, 2008	October 1, 2014

*-States may allow up to an additional two years to comply with a treatment requirement for water systems making capital improvements.

Section 2—Source Water Monitoring

2.A. Regulatory Authority

The requirements discussed in this section were promulgated as 40 CFR 141, Subpart W, of the Code of Federal Regulations and incorporated by reference in the *Idaho Rules for Public Drinking Water Systems* at IDAPA 58.01.08.311.

2.B. Initial Round of Source Water Monitoring

Owners of public water systems must conduct the following monitoring on the schedule shown in Table 2 unless they meet the monitoring exemption criteria described in 2.D, below. Idaho does not have any Subpart H systems that have met the criteria to avoid filtration. The requirements below apply to a Subpart H system that is required to filter even if it has not yet achieved compliance with the filtration requirements.

Filtered systems serving at least 10,000 persons must sample their source water for cryptosporidium, *E. coli*, and turbidity at least monthly for twenty-four months.

Filtered systems serving less than 10,000 persons must sample their source water for *E. coli* at least once every two weeks for twelve months. Systems in this category may choose to monitor for cryptosporidium instead of *E. coli*.

A system serving less than 10,000 and sampling for *E. coli* must switch to cryptosporidium sampling if the following trigger levels are exceeded:

- For systems using a lake/reservoir source, the annual mean *E. coli* concentration is greater than 10 *E. coli* per 100 ml.
- For systems using a flowing stream sources, the annual mean *E. coli* concentration is greater than 50 *E. coli* per 100 ml.

Filtered systems serving less than 10,000 that exceed the trigger levels for *E. coli*, or that choose to monitor for cryptosporidium instead of *E. coli*, must sample their source water for cryptosporidium at least twice per month for 12 months or once per month for 24 months.

Systems using ground water under the direct influence of surface water must comply with the monitoring requirements based on the *E. coli* requirements that apply to the nearest surface water body. If there is no surface water body nearby, these systems must comply with the requirements pertaining to a lake/reservoir source.

System owners may sample more frequently than required above if the sampling frequency is evenly spaced throughout the monitoring period.

2.C. Second Round of Source Water Monitoring

This rule requires that owners of public water systems conduct a second round of monitoring in order to verify and/or reassess source water contamination levels. The second round of monitoring must begin no later than the dates in the following table.

Table 2—LT2 Source Water Monitoring Starting Dates

System Population	Must begin first round of source water monitoring...	Must begin second round of source water monitoring...
At least 100,000	October 1, 2006	April 1, 2015
50-000-99,999	April 1, 2007	October 1, 2015
10,000-49,999	April 1, 2008	October 1, 2016
<10,000 and monitor for <i>E. coli</i>	October 1, 2008	October 1, 2017
<10,000 and monitor for crypto	April 1, 2010	April 1, 2019

2.D. Monitoring Avoidance

Filtered systems are not required to conduct source water monitoring if they will provide at least 5.5 log of treatment for cryptosporidium (equivalent to Bin 4 treatment requirements—see Table 4) . If a system owner elects to provide this level of treatment, the owner must notify the State in writing no later than the date the system is otherwise required to submit a sampling schedule (see Table 1). Alternatively, the system owner may choose to stop sampling at any point after monitoring has been initiated, if the owner notifies the state in writing that this level of treatment will be provided. System owners must install and operate the equipment necessary to provide this level of treatment by the applicable compliance date in the right-hand column of Table 1.

2.E. New Systems or Systems that add a New Surface Water or GWUDI Source

DEQ will establish monitoring schedules and cryptosporidium compliance dates for the following categories of systems:

- A system that begins using a new source of surface water or GWUDI after the date the system is required to begin source water monitoring (Table 2.1).
- A new system that uses a surface water or GWUDI source and begins operations after the date that a system of its size and type would have been required to begin source water monitoring.

Systems described in this paragraph must conduct a second round of source water monitoring no later than six years following determination of bin classification resulting from the first round of monitoring.

2.F. Grandfathering of Previously Collected Data

DEQ believes that few, if any, Subpart H systems will have previously collected sufficient data to meet the source water monitoring requirements. This guidance will not

discuss the rather complex requirements that apply to grandfathered data. EPA has published a guidance manual that describes this option in detail (*Source Water Monitoring Guidance for Public Water Systems*—see Reference section on page 37 for information on how to obtain this publication). Qualifying grandfathered data may substitute for an equivalent number of months at the end of the scheduled source water monitoring period. If a system owner intends to submit previously collected data the owner must notify EPA or the DEQ at the time that a source water monitoring schedule is due (see Table 1).

2.G. Sampling Schedules

Owners of systems that are required to conduct source water monitoring must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample. A description of each sampling location is required as part of the submission. This description must address the sampling location in relation to water sources and treatment processes. If a system fails to meet any of the following criteria for any required source water sample, the system must add dates to their sampling schedule for collecting the missing or invalid samples. The revised sampling schedule must be submitted to DEQ for approval prior to beginning collection of the missing samples.

- Owners of systems must submit sampling schedules in accordance with the dates listed in Table 1.
- Owners of systems serving at least 10,000 persons must submit their monitoring schedule electronically to EPA or in another manner approved by EPA.
- Owners of systems serving less than 10,000 persons must submit their monitoring schedule to Idaho DEQ.
- All system owners must submit the monitoring schedule for the second round of source water monitoring to Idaho DEQ at least three months before the starting date shown in Table 2.
- If EPA or DEQ do not respond to a system regarding their monitoring schedule, the system must sample according to the submitted schedule.
- **System owners must collect samples within two days before or two days after the dates indicated in their sampling schedule (within a five-day period around the sampling date) unless the following conditions apply:**
 - 1) If an extreme condition or situation exists that may pose danger to the sample collector, or that cannot be avoided and causes the system to be unable to sample in the scheduled five day period, the system owner must sample as close to the scheduled date as is feasible unless DEQ approves an alternative sampling date. The system owner must submit an explanation for the delayed sampling date to the state concurrent with shipment of the sample to the laboratory.
 - 2) If a system owner is unable to report an analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical requirements or the failure of an

approved laboratory to analyze the sample, then the system owner must collect a replacement sample. The replacement must be taken within 21 days after receiving notice that an analytical result cannot be reported, or on an alternative date approved by the state. An explanation must be provided to the state concurrent with shipment of the replacement sample to the laboratory.

2.H. Sampling Locations

Source water samples must be taken for each plant that treats water from a surface or GWUDI source, unless multiple plants treat water from the same intake.

Samples are to be taken prior to any chemical treatment (such as coagulants, oxidants, and disinfectants) unless DEQ approves collection following chemical treatment based on a determination that it is not feasible for the system to collect samples prior to treatment and that treatment is unlikely to have a significant adverse effect on analysis of the sample.

Systems that recycle filter backwash water are required to take source samples prior to the point of filter backwash water addition.

There are special requirements for source sampling in systems that use bank filtration. DEQ is not aware of any Idaho systems that practice bank filtration, so these requirements will not be discussed in this guidance. If your water system uses or begins to use bank filtration, contact DEQ to discuss prior to initiation of source water sampling.

Systems that use multiple sources, including multiple surface water sources and blended ground and surface water sources must collect samples as follows. The use of multiple sources during monitoring must be consistent with routine practice.

- If a sample tap is available where the sources are combined prior to treatment, samples must be taken from the tap.
- If a sample tap is not available where the sources are combined prior to treatment, the system must collect samples at each source on the same day and either 1) composite the sample with the amount from each source proportional to the rate of blending in place at the time the samples were taken, or 2) analyze each sample separately and calculate a weighted average of sample results based on the fractional contribution of each source to total plant flows.

2.I. Analytical Methods

Samples for cryptosporidium and *E. coli* must be analyzed by a laboratory certified for these analyses by EPA or the Idaho Department of Health and Welfare- Bureau of Laboratories. The laboratory will use approved analytical methods.

Analysis of source samples for turbidity must be conducted by the licensed system operator or by a person operating under the direct supervision of the system operator.

2.J. Reporting of Sample Results

Note: Data management issues regarding this rule and the Stage 2 DBP rule have not been fully resolved as of the date of this writing. This document will be modified as needed when these issues are settled.

System owners are required to report the results of source water monitoring not later than 10 days after the end of the first month following the month when the sample is collected. Unless other arrangements are made, systems serving at least 10,000 will report results to EPA electronically or as otherwise approved by EPA. Systems serving fewer than 10,000 will report results to Idaho DEQ. All second round monitoring will be reported to DEQ.

The following information must be reported for cryptosporidium samples:

- PWS identification number
- Facility (treatment plant) number
- Collection date
- Sample type (field or matrix spike)
- Filtered sample volume to nearest 1.4 L
- Was 100% of sample volume examined?
- Number of oocysts counted

For matrix spike samples, systems must also report the sample volume spiked and estimated number of oocysts spiked (not required for field samples).

For samples in which less than 10 L is filtered or less than 100% of the sample volume is examined, systems must also report the number of filters used and the packed pellet volume.

For samples in which less than 100% of the sample volume is examined, systems must also report the volume of re-suspended concentrate and volume of this re-suspension processed through immunomagnetic separation.

The following information must be reported for *E. coli* samples:

- PWS identification number
- Facility (treatment plant) number
- Sample collection date
- Analytical method number
- Method type
- Source type (lake/reservoir, flowing stream, or GWUDI)
- *E. coli* per 100 ml
- Turbidity (for systems serving at least 10,000)

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Section 3—Disinfection Profiling and Benchmarking

3.A. Regulatory Authority

The requirements discussed in this section are part of 40 CFR 141, Subpart W (specifically 141.708 and 709), which has been incorporated by reference in the *Idaho Rules for Public Drinking Water Systems*, IDAPA 58.01.08.311.

3.A. Profiling Required when a Change in Disinfection Practice is Planned

Following completion of source water monitoring, as discussed in Section 2 of this document, a system planning to make a significant change in its disinfection practice is required to complete a disinfection profile and calculate benchmarks for Giardia and viruses. Significant changes to disinfection practice include:

- Changes to the point of disinfection
- Changes to the disinfectants used in the treatment plant
- Changes to the disinfection process
- Any other modification identified by DEQ as a significant change to disinfection practice

The system is required to notify DEQ of the intended change in disinfection practice and include the following information:

- A completed disinfection profile and disinfection benchmark for Giardia and viruses
- A description of the proposed change in disinfection practice
- An analysis of how the change in disinfection practice will affect the current level of disinfection.

3.B. Developing the Disinfection Profile

A disinfection profile is a graphical presentation of Giardia and virus inactivation attained by a treatment plant over a year-long period. Systems may use disinfection profiles developed under the LT1 Rule or the Interim Enhanced Surface Water Treatment Rule, provided that disinfection practices have not changed since the profiles were developed and the system has not changed sources.

Most surface water systems in Idaho must collect daily CT data under the provisions of IDAPA 58.01.08.300.05.a. unless such monitoring has been suspended on approval by DEQ. Systems that have this data will be asked to develop a disinfection profile without additional monitoring. Systems lacking this data will need to collect temperature, pH, and chlorine concentration/contact time at least weekly for a one-year period.

The disinfection benchmark is the lowest monthly mean value (for systems with one year of profiling data) or the mean of the lowest monthly mean values (for systems with more than one year of profiling data) of Giardia and virus inactivation.

More information on profiling and benchmarking is available in EPA's *LT1ESWTR Disinfection Profiling and Benchmarking Technical Guidance Manual*. See the References section on page 37 of this document for information on obtaining this publication.

Section 4—Treatment Technique Requirements

4.A. Regulatory Authority

The treatment technique requirements discussed in this Section are part of 40 CFR 141, Subpart W (specifically 141.710 through 714), which have been incorporated by reference in the *Idaho Rules for Public Drinking Water Systems*, IDAPA 58.01.08.311.

4.B. Bin Classification for Filtered Systems

Following completion of the initial round of source water monitoring, owners of filtered systems must calculate an initial cryptosporidium bin concentration for each plant for which monitoring was required. This calculation is based on the cryptosporidium results reported for source samples and the following procedures:

- For system owners that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.
- For system owners that collect at least 24 samples but not more than 47 samples, the bin concentration is equal to the highest arithmetic mean of all sample concentrations in any 12 consecutive months during which cryptosporidium samples were collected.
- For systems that serve fewer than 10,000 and monitor for cryptosporidium for only one year (i.e. 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.
- If the monthly cryptosporidium sampling frequency varies, system owners must first calculate a monthly average for each month of monitoring and then use these monthly average concentrations instead of individual sample concentrations in the applicable bin calculations above.

System owners will use the bin concentration to determine their initial bin classification, as described in Table 3.

Table 3—Bin Classification Table

For systems that are...	With a crypto bin concentration of...	The bin classification is...
Required to monitor for cryptosporidium	Crypto <0.075 oocyst/L..... 0.075 oocysts/L ≤ Crypto < 1.0 oocyst/L... 1.0 oocyst/L ≤ Crypto < 3.0 oocysts/L..... Crypto ≥ 3.0 oocysts/L.....	Bin 1 Bin 2 Bin 3 Bin 4
Serving fewer than 10,000 and NOT required to monitor for cryptosporidium	NA.....	Bin 1

Following completion of the second round of source water monitoring, system owners must recalculate their bin concentrations using the cryptosporidium results obtained at that time. System owners must then determine their bin classification using the same procedures discussed above.

System owners must report their initial bin classification to DEQ for approval no later than six months after the system is required to complete initial source water monitoring. System owners must also report their bin classification within six months of completing the second round of source water monitoring.

The report of bin classification must include to a summary of source water monitoring data and the calculation procedure used to determine bin classification.

Failure to report bin classification is a violation of the treatment technique requirements of the LT2 Rule.

4.C. Additional Cryptosporidium Treatment Requirements

Systems that are classified in Bins 2, 3, or 4 are required to provide additional cryptosporidium treatment in accordance with Table 4.

Table 4—Additional Crypto Treatment Requirements

If the System Bin Classification is...	And the system uses the following filtration treatment in full compliance with Subparts H, P, and T (as applicable) then the additional cryptosporidium treatment requirements are...			
	Conventional Filtration (including softening)	Direct Filtration	Slow sand or diatomaceous earth	Alternative Filtration Technologies
Bin 1 Bin 2 Bin 3 Bin 4	No additional treatment 1-log treatment 2-log treatment 2.5-log treatment	No additional... 1.5 log treatment 2.5 log treatment 3.0-log treatment	No additional... 1-log treatment 2-log treatment 2.5-log treatment	No additional... (1) (2) (3)

- (1) As determined by DEQ such that total crypto removal and inactivation is at least 4.0-log
- (2) As determined by DEQ such that total crypto removal and inactivation is at least 5.0-log
- (3) As determined by DEQ such that total crypto removal and inactivation is at least 5.5-log

Systems must use one or more of the treatment and management options listed in the Microbial Toolbox (see page 23) to comply with the additional cryptosporidium treatment requirements.

Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional cryptosporidium treatment using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in the next Section of this document.

Failure by a system to achieve in any one month the required treatment credit is a violation of the treatment technique requirements of the LT2 Rule.

If DEQ determines during a sanitary survey or equivalent source water assessment that after a system completed source water monitoring significant changes occurred in the system’s watershed that could lead to increased contamination of the source water by cryptosporidium, the system owner must take actions specified by DEQ to address the contamination. These actions may include additional source water monitoring or additional treatment.

4.D. Schedule for Compliance with Additional Treatment Requirements

Following initial bin classification, the system must comply with additional treatment requirements in accordance with Table 5.

Table 5—Crypto Treatment Compliance Dates

Systems that serve...	Must comply with treatment requirements no later than....*
1) At least 100,000 2) From 50,000 to 99,999 3) From 10,000 to 49,999 4) Fewer than 10,000	1) April 1, 2012 2) October 1, 2012 3) October 1, 2013 4) October 1, 2014

*DEQ may allow up to an additional two years for complying with the treatment requirements for systems that are making capital improvements.

If a system’s bin classification changes as a result of the second round of source water monitoring, the system must apply the level of treatment required under their new bin classification on a schedule approved by DEQ.

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Section 5—The LT2 Toolbox of Treatment Options

The LT2 Rule provides a “toolbox” of treatment options that systems can select from if they are required by their bin classification to provide additional cryptosporidium treatment. Although some of the design and operational prescriptions set forth in the toolbox options have wider merit, it is important to remember that the presumptive treatment credits and other restrictions on the use of toolbox treatment options apply only to those systems that are required to install additional treatment under the provisions of the LT2 rule.

Due to the fact that few systems are expected to be assigned to bin classifications that will require additional treatment, this guidance will not address the toolbox options in detail. A brief overview will be provided here, but systems that are required to select treatment options from the toolbox will need to refer to EPA’s *Microbial Toolbox Guidance Manual* [Note: as of the time this draft guidance was being written, the referenced EPA manual had not yet been finalized. It is expected that this national guidance will be available in final form by early fall, 2007. This is about the same time that this DEQ guidance is expected to be finalized as well]. EPA’s guidance provides in-depth discussion of the toolbox options and the design/operational/management criteria that apply. See page 37 for information on how to obtain this EPA publication.

5.A. Regulatory Authority

The requirements discussed in this Section were promulgated as 40 CFR 141. Subpart W (specifically 141.715 through 720), which is incorporated by reference in the *Idaho Rules for Public Drinking Water Systems*, IDAPA 58.01.08.311.

5.B. Source Protection and Management Toolbox Options

Watershed control program: 0.5-log credit is available for systems that implement an approved watershed control program that meets the following conditions. Based on past experience, DEQ believes that few water systems will be able to exercise sufficient control of their watershed to achieve an approvable watershed control program. This program should not be confused with source water protection programs, which are less rigorous and do not attain the required level of administrative control over watershed activities.

- Systems must notify DEQ that they intend to apply for the watershed control program treatment credit no later than two years prior to the treatment compliance date for the system (Table 5, page 21).
- Systems must submit a watershed control plan to DEQ no later than one year prior to the treatment compliance date. The plan must include the following elements.
 - 1) Identification of an “area of influence” outside of which the likelihood of cryptosporidium or fecal contamination affecting the treatment plant intake is not significant.

- 2) Identification of both potential and actual sources of cryptosporidium contamination and an assessment of the relative impact of these source of contamination on the system's source water.
 - 3) An analysis of the effectiveness and feasibility of control measures that could reduce cryptosporidium loading from sources of contamination.
 - 4) A statement of goals and specific actions the system will undertake to reduce source water cryptosporidium levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and the roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions.
- System owners must complete the following actions to maintain the 0.5-log treatment credit. If DEQ determines that a system owner is not carrying out the approved watershed control plan, DEQ may withdraw the watershed control program treatment credit.
 - 1) Submit an annual watershed control program status report to the state. This report must describe the implementation of the plan and assess the adequacy of the plan in meeting its goals. It must explain how the system is addressing any shortcomings, including those previously identified by DEQ or as the result of a watershed survey (described below). It must describe any changes that have occurred in the watershed since the last watershed sanitary survey. If a system owner determines that a significant change to its watershed control program is necessary, the owner must notify DEQ prior to making any such changes.
 - 2) Undergo a watershed sanitary survey every three years for community water systems and every five years for noncommunity water systems and submit the survey report to DEQ. The survey must be conducted under DEQ guidelines and by persons DEQ approves.
 - 3) The system owner must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. DEQ may authorize the water system to withhold portions of these documents based on water supply security considerations.

Alternative source: A system owner may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source. If DEQ approves, a system owner may determine its bin classification based on the alternative source monitoring results. If a system owner chooses to conduct alternative source monitoring, the owner must also monitor the current plant intake simultaneously. If a system owner determines its bin classification based on alternative source monitoring that reflects a different intake location or procedure for managing rate and level of withdrawal from the source, the owner must relocate the intake or permanently adopt the withdrawal procedure no later than the compliance date for the system (Table 5).

5.C. Pre-filtration Toolbox Components

Pre-sedimentation: Systems receive .5-log cryptosporidium treatment credit for a pre-sedimentation basin during any month the process meets the following criteria.

- The basin must be in continuous operation and must treat the entire flow from the surface water or GWUDI source.
- The system must continuously add coagulant to the basin.
- The basin must achieve the following performance criteria.
 - 1) Demonstration of at least .5-log reduction in mean influent turbidity.
 - 2) Meets DEQ criteria for removal of micron-sized particulate material.

Two-stage lime softening: Systems receive an additional .5-log cryptosporidium treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stage prior to filtration. Both softening stages must treat the entire plant flow taken from the surface water or GWUDI source.

Bank filtration: Systems receive cryptosporidium treatment credit that serves as pretreatment to a filtration plant by meeting the following criteria. *Systems that are using bank filtration at the time they begin source water monitoring under the LT2 Rule are not eligible for this credit, since the bin classification that results from source monitoring will reflect the treatment being provided by bank filtration.*

- Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a flow path of at least 50 feet receive a 1.0-log credit. For vertical wells, the ground water flow path is the measured distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary) to the well screen.
- Systems must monitor each wellhead for turbidity at least once every four hours while the bank filtration process is in operation. If monthly average turbidity, based on daily maximum values in the well exceed 1.0 NTU, the system must report this result to the state and conduct an assessment within thirty days to determine the cause of high turbidity levels in the well. If DEQ determines that microbial removal has been compromised, DEQ may revoke the treatment credit until appropriate mitigation has been conducted.
- There are provisions for receiving additional treatment credit upon completion of a bank filtration demonstration study. Refer to the EPA *Toolbox Guidance Manual*.

5.D. Treatment Performance Toolbox Components

Combined filter performance: Systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log cryptosporidium treatment credit during any month the combined effluent turbidity is less than or equal to 0.15 NTU in at least

95% of the measurements. Turbidity must be measured as described in the Surface Water Treatment Rule at 40 CFR 141.74(a) and (c).

Individual filter performance: Systems using conventional or direct filtration receive 0.5-log cryptosporidium treatment credit, which can be in addition to the credit awarded under combined filter performance above, during any month the system meets the following criteria:

- The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95% of the measurements recorded each month.
- No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken fifteen minutes apart.
- Any system that has received treatment credit for individual filter performance and fails to meet the preceding criteria during any month does not receive a treatment technique violation if DEQ determines that the failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance and the system has experienced no more than two such failures in any calendar year.

5.E. Additional Filtration Toolbox Components

Treatment credits may be awarded for additional filtration performed with the following technologies. The detailed eligibility criteria for treatment credits for bag and cartridge and membrane filters are complex and will not be repeated in this guidance. EPA's *Toolbox Guidance Manual* provides in-depth discussion of these options.

- Bag and cartridge filters (based on results of challenge testing).
- Membrane filtration (based on challenge testing or direct integrity testing).
- Second-stage filtration consisting of sand, dual media, granular activated carbon, or other fine grain media following filtration with granular media, if DEQ approves. 0.5-log treatment credit may be given if the first stage of filtration is preceded by a coagulation step and both filtration stages treat the entire plant flow. A cap, such as GAC, on a single stage of filtration is not eligible for this credit.
- Slow sand filtration as a secondary filter. A cryptosporidium treatment credit of 2.5-log may be given for a slow sand filtration process that follows a separate stage of filtration if both stages treat the entire plant flow and no disinfectant residual is present in the influent water to the slow sand filtration stage of the process. This paragraph does not apply to treatment credit given to slow sand filtration as the primary filtration process.

5.F. Inactivation Toolbox Components

Calculation of CT values: Systems with treatment credit for chlorine dioxide or ozone must calculate CT at least once each day, with both concentration (C) and time (T) measured during peak hourly flow. Systems with several distinct disinfection segments

in sequence may calculate CT for each segment, where a disinfection segment is defined as a treatment unit process with a measurable disinfectant residual level and a liquid volume. Under this approach, systems must add the cryptosporidium CT values in each segment to determine the total CT for the treatment plant.

CT values for chlorine dioxide and ozone: Cryptosporidium treatment credits for these disinfectants are presented in tables that may be accessed in the *Toolbox Guidance Manual* or in the LT2 rule at 40 CFR 141.720. These tables are not reproduced in this guidance because Idaho DEQ is not aware of any systems currently using these disinfectants for treatment of surface water.

UV disinfection: UV inactivates cryptosporidium very efficiently. Unfortunately, it is not particularly efficient at inactivation of viruses, which means that it is most practical to use UV disinfection along with a chemical disinfectant such as chlorine. DEQ recommends that systems or engineering consultants considering the use of UV disinfection refer to EPA’s *Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule* (See References on page 37).

The following table lists inactivation credits achievable by UV light at a wavelength of 254 nm as delivered by a low pressure mercury vapor lamp. Credit for other lamp types must be based on reactor validation testing. The values in the table are applicable only to post-filter applications of UV.

Table 6—UV Dose (mj/cm²) for Cryptosporidium, Giardia, and Virus Inactivation Credit

Log Credit	Crypto UV dose	Giardia UV dose	Virus UV Dose
0.5	1.6	1.5	39
1.0	2.5	2.1	58
1.5	3.9	3.0	79
2.0	5.8	5.2	100
2.5	8.5	7.7	121
3.0	12	11	143
3.5	15	15	163
4.0	22	22	186

Systems must validate and monitor UV reactors as described below to demonstrate that they are achieving a particular UV dose value for treatment credit, as listed in Table 6.

Systems must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose the system needs to meet its overall treatment requirement.

- These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status. When determining validated operating

conditions, system owners must account for UV absorbance of the water, lamp fouling and aging, measurement uncertainty of on-line sensors, UV dose distributions arising from the velocity profiles through the reactor, failure of UV lamps, or other critical system components.

- Validation testing must include full scale testing of a reactor that conforms to the UV reactor used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury lamp.

Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions. Monitoring must include:

- UV intensity as measured by a UV sensor.
- Flow rate
- Lamp status

To receive treatment credit for UV, systems must treat at least 95% of the water delivered to the public during each month with UV reactors operating within validated conditions for the required UV dose. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with an approved protocol.

Section 6—Reporting and Recordkeeping Requirements for Water Systems

6.A. Regulatory Authority

The requirements discussed in this Section were promulgated as 40 CFR 141. Subpart W (specifically 141.721 and 722), which is incorporated by reference in the *Idaho Rules for Public Drinking Water Systems*, IDAPA 58.01.08.311.

6.B. Reporting Requirements

Many of the LT2 Rule reporting requirements have been previously mentioned in the context of specific rule provisions. These requirements are summarized below.

- System owners must report their source water monitoring schedule and sample results unless they have notified DEQ that they will provide 5.5-logs cryptosporidium treatment.
- System owners must report their bin classification, as calculated based on source water sampling results.
- System owners must report disinfection profiles and benchmarks to DEQ prior to making a significant change in disinfection practices.
- System owners must report to DEQ in accordance with the following table for any microbial toolbox options used to comply with LT2 treatment technique requirements. **Alternatively, the state may approve a system owner to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.**

Table 7—Microbial Toolbox Reporting Requirements

Toolbox Option	Submit the following information	On the following schedule
(1) Watershed Control Program	(i) notice of intention to develop a new or continue an existing watershed control program. (ii) Watershed control plan..... (iii) Annual watershed control program status report..... (iv) Watershed sanitary survey report.....	No later than two years before the applicable treatment compliance date in Table 5 No later than one year before compliance date in Table 5 Every 12 months, beginning one year after compliance date in Table 5 Every three years for community systems, beginning three years after treatment compliance date in Table 5, Every five years for non-community systems

Table 7—Microbial Toolbox Reporting Requirements (continued)

Toolbox Option	Submit the following information	On the following schedule
(2) Alternative source or intake management	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results	No later than the applicable compliance date in Table 5
(3) Pre-sedimentation	Monthly verification of the following: (i) Continuous basin operation, (ii) Treatment of 100% of the flow, (iii) Continuous addition of a coagulant, (iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative state approved performance criteria.	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(4) Two-Stage Lime Softening	Monthly verification of the following: (i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration. (ii) Both stages treated 100% of the flow.	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(5) Bank filtration	(i) Initial demonstration of the following: (A) Unconsolidated, predominantly sandy aquifer (B) Setback distance of at least 25 ft. (0.5-log credit or 50 ft. (1.0-log credit) (ii) If monthly average of daily max turbidity is greater than 1 NTU then system must report result and submit an assessment of the cause.	No later than the applicable treatment compliance date in Table 5 Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(6) Combined filter performance	Monthly verification of combined filter effluent turbidity levels less than or equal to 0.15 NTU in at least 95% of the measurements taken each month.	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(7) Individual filter performance	Monthly verification of the following: (i) Individual filter effluent turbidity levels less than or equal to 0.15 NTU in at least 95% of samples each month in each filter (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5

Table 7—Microbial Toolbox Reporting Requirements (continued)

Toolbox Option	Submit the following information	On the following schedule
(8) Bag and cartridge filters	(i) Demonstration that the following criteria are met: (A) Process meets the definition of bag or cartridge filtration; (B) Removal efficiency established through challenge testing that meets criteria in this subpart. (ii) Monthly verification that 100% of plant flow was filtered.	No later than the applicable treatment compliance date in Table 5 Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(9) Second stage filtration	Monthly verification that 100% of flow was filtered through both stages and that first stage was preceded by coagulation step.	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(10) Slow sand filtration (as secondary filter)	Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100% of flow from subpart H sources	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(11) Chlorine dioxide	Summary of CT values for each day	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(12) Ozone	Summary of CT values for each day	Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5
(13) UV	(i) Validation test results demonstrating operating conditions that achieve required UV dose. (ii) Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose	No later than the applicable treatment compliance date in Table 5 Within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in Table 5

6.C. Recordkeeping Requirements

System owners must keep results from the initial round of source water monitoring and the second round of source water monitoring until 3 years after bin classification for the particular round of monitoring.

System owners must keep any notification to DEQ that they will not conduct source water monitoring for 3 years (See paragraph 2.D. on page 12).

System owners must keep the results of treatment monitoring associated with microbial toolbox options for 3 years.

Section 7—Recordkeeping and Reporting by DEQ and Special Primacy Requirements

This section discusses requirements for states that have primacy for administering the Safe Drinking Water Act. These provisions are in 40 CFR 142. This portion of the Code of Federal Regulations is not incorporated in Idaho rule because it does not affect public drinking water systems.

7.A DEQ Recordkeeping

DEQ must keep the following records for the period of time specified in 40 CFR 142.14.

- A copy of any decisions made pursuant to the requirements of the LT2 Rule.
- Results of source water *E. coli* and cryptosporidium monitoring.
- The bin classification after the initial and after the second round of source water monitoring for each filtered system.
- Any change in treatment requirements for filtered systems due to watershed assessment during a sanitary survey.
- The treatment processes or control measures that systems use to meet their cryptosporidium treatment requirements.

7.B. DEQ Reporting

As part of its annual report to the EPA Administrator, DEQ will provide the following information. This information will be made available to the public on request.

- The bin classification after the initial and after the second round of source water monitoring for each filtered system.
- Any change in treatment requirements for filtered systems due to watershed assessment during a sanitary survey.

7.C. Discussion of Special Primacy Requirements

Special primacy conditions are provisions that offer DEQ the flexibility to depart from certain requirements of the LT2 rule if appropriate justification is provided and protocols for decision making are developed. DEQ considered the flexibility offered in the special primacy section of 40 CFR 142.16 and prepared an issue paper discussing the agency's initial position on each of the special primacy provisions. This issue paper was the basis for a public negotiation meeting in April, 2007. No members of the public attended this meeting and no comments were received by DEQ. The special primacy conditions are listed below, each followed by the position taken by DEQ.

- 1) DEQ is allowed to approve an alternative to *E. coli* levels that trigger Cryptosporidium monitoring by filtered systems serving fewer than 10,000 people.

DEQ's Position: DEQ has no reason at this time to question the science behind the *E. coli* trigger levels specified in the rule. DEQ does not have scientific evidence or a practical reason to select an indicator other than *E. coli*. DEQ may consider an alternative trigger level in the future, if EPA publishes guidance recommending that states adopt a new trigger level based on the cumulative source water monitoring results from large water systems around the country.

2) DEQ may assess significant changes in the watershed and source water as part of its sanitary survey process and determine appropriate follow-up actions for water systems.

DEQ's Position: DEQ will include such an assessment as part of its sanitary surveys of surface water systems. See the rule language in Appendix A.

3) DEQ may approve watershed control programs for the 0.5-log treatment credit in the microbial toolbox.

DEQ's Position: DEQ will allow water systems to apply for credit for a .5 log reduction of source water cryptosporidium concentration through a watershed control program (see rule language in Appendix A and discussion in paragraph 5.B. on pages 23-24). An effective watershed control program requires the water system to control activities in the watershed to a degree that makes possible a meaningful reduction in potential cryptosporidium contamination. This is rarely achievable in practice, and for this reason DEQ believes that this option will have limited application in Idaho.

4) DEQ may approve protocols for demonstration of performance treatment credits in the microbial toolbox, for alternative ozone and chlorine dioxide CT values in the microbial toolbox, and an alternative approach to UV reactor validation testing.

DEQ's Position: DEQ has chosen not to pursue the alternatives provided in these three very technical areas. DEQ will adhere to the provisions of the rule, as discussed in Section 5 of this document.

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

Definitions:

Bag Filters. Pressure-driven separation devices that remove particulate matter larger than one (1) micrometer using an engineered porous filtration media. They are typically constructed of a non-rigid, fabric filtration media housed in a pressure vessel in which the direction of flow is from the inside of the bag to outside.

Bank Filtration. A water treatment process that uses a well to recover surface water that has naturally infiltrated into ground water through a river bed or bank(s). Infiltration is typically enhanced by the hydraulic gradient imposed by a nearby pumping water supply or other well(s).

Cartridge Filters. Pressure-driven separation devices that remove particulate matter larger than one (1) micrometer using an engineered porous filtration media. They are typically constructed as rigid or semi-rigid, self-supporting filter elements housed in pressure vessels in which flow is from the outside of the cartridge to the inside.

Flowing Stream. As used in the Long Term 2 Enhanced Surface Water Treatment Rule (40 CFR Part 141, Subpart W), this term means a course of running water flowing in a definite channel.

Lake/Reservoir. As used in the Long Term 2 Enhanced Surface Water Treatment Rule (40 CFR Part 141, Subpart W), this term means a natural or man-made basin or hollow on the Earth's surface in which water collects or is stored that may or may not have a current or single direction of flow.

Membrane Filtration. A pressure or vacuum driven separation process in which particulate matter larger than one (1) micrometer is rejected by an engineered barrier, primarily through a size-exclusion mechanism, and which has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test. This definition includes the common membrane technologies of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis.

Plant Intake. The works or structures at the head of a conduit through which water is diverted from a source (e.g., river or lake) into the treatment plant.

Presedimentation. A preliminary treatment process used to remove gravel, sand, and other particulate material from the source water through settling before the water enters the primary clarification and filtration processes in a treatment plant.

Two-Stage Lime Softening. A process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes in series prior to filtration.

Uncovered Finished Water Storage Facility. A tank, reservoir, or other facility that is directly open to the atmosphere and is used to store water that will undergo no further treatment to reduce microbial pathogens except residual disinfection.

Incorporation of LT2 Rule by reference and language concerning watershed control programs and assessment of watersheds as part of a sanitary survey conducted by the state.

311. ENHANCED FILTRATION AND DISINFECTION FOR CRYPTOSPORIDIUM—LONG TERM 2 ENHANCED SURFACE WATER TREATMENT RULE. 40 CFR 141, Subpart W, revised as of July 1, 2006, is herein incorporated by reference.

01. Cryptosporidium Treatment Credit for Approved Watershed Control Program.

The Department shall award 0.5 (zero point five) logs cryptosporidium removal credit to systems that have an approved Watershed Control Program. Requirements for a watershed control program are set forth in 40 CFR 141, Subpart W. Guidance on how to develop a watershed control program and obtain Department approval is provided in “Implementation Guidance for the Long Term 2 Enhanced Surface Water Treatment Rule, as referenced in Section 002.

02. Assessment of Significant Changes in the Watershed.

As part of the sanitary survey process set forth in Section 302, the Department, or an agent approved by the Department, shall assess significant changes in the watershed of a surface water system that have occurred since the system conducted source water monitoring. If changes in the watershed have the potential to significantly increase contamination of the source water with cryptosporidium, the Department shall consult with the water system owner on follow-up actions that may be required under Subpart W, including, but not limited to, source water monitoring and/or additional treatment requirements. “Implementation Guidance for the Long Term 2 Enhanced Surface Water Treatment Rule”, as referenced in Section 002, provides a description of factors that will be considered by the Department when making an assessment of changes in the watershed. These factors include, but are not limited to the following: (

- a. New NPDES permits or changes in existing NPDES permits that involve increased loading of contaminants.
- b. Changes in land use patterns.
- c. Changes in agricultural cropping, chemical application, or irrigation practices.
- d. Changes in other non-point discharge source activities (such as grazing, manure application, commercial or residential development).
- e. Stream or riverbed modifications.
- f. NPDES permit violations at wastewater treatment plants and confined animal feedlot operations.
- g. Dramatic natural events such as floods, forest fires, earthquakes, and landslides that may transport or expose contaminants.
- h. Prolonged drought conditions that may warrant special preparatory measures to minimize impacts from waste accumulations that are washed into source waters when precipitation returns.
- i. Status of the water system’s emergency response plan.
- j. Accidental or illegal waste discharges and spills.

References and Additional Resources

LT1ESWTR Disinfection Profiling and Benchmarking Technical Guidance Manual, US EPA 816-R-03-004, 2003.

Available at <http://www.epa.gov/safewater/mdbp/lt1eswtr.html>

Source Water Monitoring Guidance for Public Water Systems, US EPA 2006

Microbial Toolbox Guidance Manual, US EPA 2007

Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule, US EPA 815-R-06-007, 2006.

The last three guidances are (or will be) available at the following web address:

<http://www.epa.gov/safewater/disinfection/lt2/compliance.html>

Fact sheets, quick reference guides, the full text of the Federal rule, and a number of other guidance manuals are available at this website. The EPA guidance presents the material contained in this guidance document in different formats and often in much greater detail.

Persons who do not have Internet access may order the EPA publications mentioned above through the National Safe Drinking Water Hotline at (800) 426-4791.

This guidance and other DEQ publications may be found on DEQ's website at:

http://www.deq.idaho.gov/water/prog_issues/drinking_water/information_pws.cfm

Assistance with this and other drinking water rules may always be obtained by calling the DEQ Regional Office that your system normally works with on drinking water matters.